National Institutes of Health

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

NIH Almanac 2008–2009

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NIH Publication No. 08-05
September 2008

Prepared by the
Office of the Director
Office of Communications & Public Liaison
Bethesda, Maryland 20892-2090

Use of funds for printing this recurring publication has been approved by the Office of Management and Budget.

NIH Almanac 2008-2009

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The NIH Almanac

Begun as a one-room Laboratory of Hygiene in 1887, the National Institutes of Health (NIH) today is one of the world's foremost medical research centers. An agency of the Department of Health and Human Services, the NIH is the Federal focal point for health research.

NIH is the steward of medical and behavioral research for the Nation. Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability. The goals of the agency are as follows:

1. foster fundamental creative discoveries, innovative research strategies, and their applications as a basis to advance significantly the Nation's capacity to protect and improve health;
2. develop, maintain, and renew scientific human and physical resources that will assure the Nation's capability to prevent disease;
3. expand the knowledge base in medical and associated sciences in order to enhance the Nation's economic well-being and ensure a continued high return on the public investment in research; and
4. exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

In realizing these goals, the NIH provides leadership and direction to programs designed to improve the health of the Nation by conducting and supporting research: in the causes, diagnosis, prevention, and cure of human diseases; in the processes of human growth and development; in the biological effects of environmental contaminants; in the understanding of mental, addictive and physical disorders; in directing programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical librarians and other health information specialists.

The 2008-2009 NIH Almanac is now available on CD-ROM. Please contact the OD Online Information Branch (OLIB) to request your copy.

The NIH Almanac: About the NIH Almanac

Published annually, the NIH Almanac contains pertinent facts about the National Institutes of Health—the Federal government's principal medical research agency. As of December 1, 2001, NIH was composed of 27 Institutes and Centers. Of these, 24 receive direct appropriations from the U.S. Congress to award research grants and support scientific programs. The remaining three include the Warren Grant Magnuson Clinical Center (clinicalcenter.nih.gov/)—a combined research hospital and laboratory complex on the NIH campus—the Center for Scientific Review (www.csr.nih.gov), which supports the scientific review of grant applications, and the Center for Information Technology (www.cit.nih.gov), which provides, coordinates, and manages information technology for the NIH.

Prepared by Office of Communications and Public Liaison, Online Information Branch.

NIH Almanac: Historical Data

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NIH Almanac: Historical Data

Photo Gallery

President Franklin D. Roosevelt dedicated the new NIH campus in Bethesda on October 31, 1940. This event was held to celebrate NIH's historic move from one building in Washington, D.C. to its new campus setting in Maryland on 45 acres of land donated by Luke and Helen Wilson.

On June 22, 1951, President Harry S. Truman applied the first trowel of mortar to the NIH Clinical Center cornerstone. To symbolize advances in clinical medicine at the time, the cornerstone included samples of therapeutic aids, drugs, and techniques and devices to represent diagnosis, treatment and prevention of disease.

President Lyndon B. Johnson stepping off a helicopter onto the lawn of the NIH Clinical Center, August 9, 1965. He is being greeted by PHS Surgeon General William H. Stewart, NIH Director Dr. James Shannon, and Dr. Jack Masur, Clinical Center Director.

President Johnson with PHS Surgeon General William H. Stewart and NIH Director Dr. James Shannon arrived at the NIH on August 9, 1965, to sign into law an extension of the Research Facilities Construction Program. In his remarks, President Johnson noted that "Here on this quiet battleground our Nation today leads a worldwide war on disease."

Dr. Theodore Cooper, President Gerald Ford, and Dr. Donald S. Fredrickson listening to HEW Secretary Casper Weinberger speak at the July 1, 1975, swearing in ceremonies of Dr. Cooper as the HEW Assistant Secretary for Health, and Dr. Fredrickson as Director of the NIH.

President Gerald Ford speaking at the July 1, 1975, ceremony swearing in Dr. Donald S. Fredrickson as NIH Director. In his speech, President Ford says of the NIH "Through your accomplishments, NIH has become a symbol of hope, not just for the patients who are here in this or the other buildings, but all people, everywhere."

President Gerald Ford observes Dr. Donald S. Fredrickson taking his oath of office as Director of the National Institutes of Health on July 1, 1975. HEW Secretary Casper Weinberger administers the oath as Mrs. Fredrickson holds the family Bible.

President Gerald Ford shakes hands with NIH staff, patients, and guests at the Clinical Center. He was on hand to observe the swearing in of Dr. Donald S. Fredrickson as the Director of the NIH, July 1, 1975.

First Lady Rosalyn Carter, and Mrs. James Callaghan, wife of the British Prime Minister, are shown speaking with a patient in the Clinical Center's Laminar Flow Room facilities. Mrs. Carter and Mrs. Callaghan visited the Clinical Center on March 11, 1977.

On March 11, 1977, First Lady Rosalyn Carter, and Mrs. James Callaghan, wife of the British Prime Minister, visited the NIH campus and met with NIH Director Dr. Donald S. Fredrickson for a tour of the Clinical Center.

On July 23, 1987, President Ronald Reagan visited the NIH Clinical Center to announce his 13-member Commission on the Human Immunodeficiency Virus Epidemic. HHS Secretary Otis R. Bowen and President Ronald Reagan listen as NIH Director James B. Wyngaarden briefed the president on the NIH's efforts in fighting AIDS.

HHS Secretary Otis R. Bowen and NIH Director James B. Wyngaarden greet President Ronald Reagan during his July 23, 1987 visit to the NIH Clinical Center. President Reagan visited the NIH to announce his 13-member Commission on the Human Immunodeficiency Virus Epidemic.

President Ronald Reagan, HHS Secretary Otis R. Bowen, Dr. James B. Wyngaarden and members of the Commission on the Human Immunodeficiency Virus Epidemic. In his remarks, the president said, "I hope the Commission will help us all put aside our suspicions and work together with common sense against this threat."

President Bill Clinton speaking with HHS Secretary Donna Shalala and NIH Director Dr. Harold Varmus after the cornerstone dedication ceremony for the Dale and Betty Bumpers Vaccine Research Center on June 9, 1999.

Mrs. Betty Bumpers, President Bill Clinton, and Sen. Dale Bumpers during the cornerstone dedication ceremony for the Dale and Betty Bumpers Vaccine Research Center on June 9, 1999. In his speech, President Clinton praised the Bumpers by saying "It is entirely fitting that today we dedicate this state-of-the-art facility to them. They are two great Americans."

On June 9, 1999, HHS Secretary Donna Shalala, President Bill Clinton, Arkansas Sen. Dale Bumpers, and Mrs. Betty Bumpers unveil the cornerstone to the Dale and Betty Bumpers Vaccine Research Center. President Clinton called the NIH "one of America's great citadels of hope, not only for our people, but also for the world."

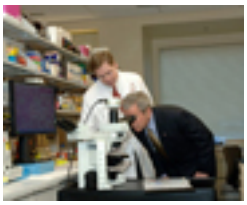
President George W. Bush tours the Vaccine Research Center on February 2, 2003. He is accompanied by (from left) NIAID Director Anthony Fauci, NIH Director Elias A. Zerhouni, HHS Secretary Tommy Thompson, and Secretary of the Department of Homeland Security, Tom Ridge.

President George W. Bush delivers an address on Project BioShield to a full audience at Natcher Auditorium during his visit to NIH on February 3, 2003.

President George W. Bush visits NIH on May 12, 2004 and participates in a panel discussion about reading education and development. Touting his No Child Left Behind legislation and its Reading First initiative, President Bush talks with other panel members, including G. Reid Lyon (l) of NICHD and Alabama kindergarten teacher Cynthia Henderson (r).

President George W. Bush visited NIH on November 1, 2005 to announce the government's pandemic influenza preparations and response. At a Natcher Bldg. address of just under half an hour, he outlined a $7.1 billion plan to meet the threat of avian flu. Bush credited NIH for more than a century of work "at the forefront of this country's efforts to prevent, detect and treat disease, and I appreciate the good work you're doing here. This is an important facility, an important complex, and the people who work here are really important to the security of this nation."

President George W. Bush visits NIH on January 26, 2005 to hold a 40-minute town hall meeting in Masur Auditorium called "Strengthening Health Care". Greeting him in the lobby of the Clinical Research Center are: NIH director Dr. Elias Zerhouni joined by NCI director Dr. Andrew von Eschenbach (l) and Maryland Gov. Robert L. Ehrlich, Jr.



On January 17, 2007, President George W. Bush makes his fifth visit to the NIH campus during his presidency. In his tour of a cancer research laboratory and a roundtable discussion, the president learned about the Cancer Genome Atlas project and other NIH-funded research efforts.

Campus Photos

Building 1, the "Shannon Building," serves as NIH headquarters in the heart of the campus in Bethesda, Maryland.

Building 10, the "Warren Grant Magnuson Clinical Center," has served as the nation's clinical research hospital since 1953.

The Mark O. Hatfield Clinical Research Center opened in 2005. The facility houses inpatient units, day hospitals, and research labs and connects to the original Warren Grant Magnuson Clinical Center. Together, the Magnuson and Hatfield buildings form the NIH Clinical Center. The Clinical Center provides patient care and the environment clinical researchers need to advance clinical science. It was named in honor of Senator Mark O. Hatfield of Oregon, who supported medical research throughout his congressional career.

The Children's Inn at NIH provides pediatric patients and their families a place to stay during treatment at the Clinical Center.

The Edmond J. Safra Family Lodge at NIH is the temporary residence for families and loved ones of adult patients receiving care at the Clinical Center.

Building 16, the "Lawton Chiles International House," is a locus for international activities supported by NIH and the Department of Health and Human Services (HHS).

The C.W. Bill Young Center (Building 33) is a new laboratory complex constructed for the National Institute of Allergy and Infectious Diseases (NIAID) to expand its research programs for developing new and improved diagnostics, vaccines, and treatments for emerging diseases caused by infectious agents that may occur naturally or be deliberately released into civilian populations.

Buildings 38 (and 38A—shown in the background) house the National Library of Medicine, the world's largest collection of medical literature, and the Lister Hill National Center for Biomedical Communications, the research component of the NLM.

Building 40, the "Dale and Betty Bumpers Vaccine Research Center," was established to facilitate research in vaccine development.

Building 45, the "William H. Natcher Building," is the gateway to the NIH campus. It houses a 1,000-seat auditorium, nine conference rooms, a spacious cafeteria, and underground parking for visitors.

Building 50, "The Louis Stokes Laboratories," provides 250,000 GSF of state-of-the-art laboratory, office and conference facilities for scientists from nine NIH Institutes.

This view of the NIH campus looks north past the Natcher Building (right) to the Stokes Labs (center) and beyond to the Clinical Center (upper left). Building 31, the "Claude D. Pepper Building," (upper right) provides office space for most Institute directors and their immediate staff.

This view of the NIH campus looks south beyond the Stokes Labs and Natcher Building (center) to the reflective façade of the National Library of Medicine (upper right).

Historical Photos of Scientists

The NIH began in 1887 as a one-room Hygienic Laboratory in this Marine Hospital on Staten Island, New York. The Hygienic Laboratory was located here until 1891, when it was moved to Washington, D.C.

This is a photograph of a PHS research laboratory, circa 1899. The staff is shown at workstations with microscopes and laboratory glassware.

In 1910, U.S. Public Health Service workers prepared poisons to be used for the extermination of plague-carrying rats.

In 1910, researchers worked at a U.S. Public Health Service laboratory equipped with a bunsen burner, microscope, and petri dishes.

In 1916, Dr. Ida A. Bengston became the first woman on the professional staff at the U.S. Public Health Service Hygienic Laboratory. Dr. Bengston worked on ways of developing vaccines for spotted fever.

In 1929, field laboratory technicians for the Rocky Mountain Laboratory collected research specimens from the north side of Blodgett Canyon, Montana.

A 1937 NIH laboratory technician surrounded by tools of the trade; a rack of cotton-stoppered test tubes, a microscope and various glass jars.

In 1939, laboratory technicians performed tick research at a field laboratory in Boulder, Colorado. The laboratory was equipped with a refrigerator, an autoclave, and a wood-burning stove.

In 1946, researchers work at a field laboratory set up in the basement of the Kew Gardens apartments in New York City.

In 1953, NIH scientists were seeking the cause of the hypersensitivity that develops during a 10-21 day lapse after infection before the onset of rheumatic fever or nephritis.

In 1954, NIH researchers were studying weight and blood changes in rats with folic acid deficiency.

In 1975, NIH's central computer facility housed computers to aid in the collection, analysis and display of data from laboratory instruments, such as this mass spectrometer.

Dr. Martin Rodbell, former scientific director of NIEHS, won the 1994 Nobel Prize in Physiology or Medicine. Photo courtesy of Andrew M. Rodbell.

Former NIEHS Director Kenneth Olden (l) with senior members of the NIEHS component of the team that identified the first breast cancer susceptibility gene, BRCA1. Also pictured (left to right) are Dr. J. Carl Barrett, Dr. Roger W. Wiseman, and Dr. Andrew Futreal. Photo by Steven R. McCaw.

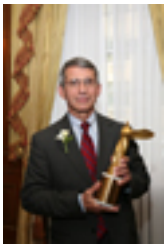
2007 Photos

NIH Director Dr. Elias A. Zerhouni (seated left) and Dr. Maharaj K. Bhan, secretary of the Department of Biotechnology, India (seated right) sign the Statement of Intent for the Indo-U.S. Collaboration on Expansion of Vision Research, August 24, 2005. The signing took place at the Lawton Chiles International House on the NIH campus in Bethesda, Maryland. Looking on are Tina Chung of NIH's John E. Fogarty International Center (left) and Dr. Kamal K. Dwivedi, counsellor for science and technology, Embassy of India (right).

NHLBI Director Dr. Elizabeth G. Nabel speaks at the January 2007 launch of the NHLBI's Learn More Breathe Better campaign to raise awareness of chronic obstructive pulmonary disease. Photo courtesy of NHLBI.

At a November 2007 news conference, Ivonne Borrero, mother of 2, describes how the We Can! parents' program has helped her family learn to eat healthier and be more physically active. We Can! (Ways to Enhance Children's Activity and Nutrition) is a science-based national education program developed by NHLBI to help children ages 8 to 13 stay at a healthy weight by improving food choices, increasing physical activity, and reducing recreational screen time. The news conference announced the expansion of We Can! through a partnership with the Association of Children's Museums. Additional speakers (pictured, left to right) included Dr. Elias Zerhouni, NIH Director; Dr. Steven K. Galson, Acting U.S. Surgeon General; Lou Casagrande, president and CEO of Boston Children's Museum, which hosted the event. Photo by Les Veilleux Photography.

Dr. Boris Tabakoff (right), professor and chairman in the Department of Pharmacology, University of Colorado School of Medicine, accepts the 2007 Mark Keller Honorary Award from NIAAA Director Dr. T.-K. Li. Photo by Bill Branson, NIH Medical Arts and Photography Branch.



NIAID Director Dr. Anthony S. Fauci receives the 2007 Mary Woodard Lasker Award for Public Service. The award recognized Dr. Fauci's role in developing two major U.S. public health programs, in AIDS and biodefense.

Harvard Medical School's Dr. Paul Farmer focused on community-based care for chronic infectious disease when he delivered the 2007 James C. Hill Memorial Lecture, presented in April 2007 on the NIH campus. The Hill lecture honors the memory of the former NIAID deputy director, who helped build the Institute's HIV/AIDS research program during the early years of the epidemic.

In September 2007, NIH Director Dr. Elias Zerhouni and NASA Administrator Dr. Michael D. Griffin signed an agreement making U.S. resources on the International Space Station available for NIH-funded research. Sen. Kay Bailey Hutchison (l), Sen. Barbara Mikulski, and NIAMS Director Dr. Steve Katz witnessed the occasion.

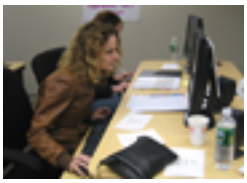
At NIBIB's 5th Anniversary Symposium, held in June 2007, NIBIB Director Dr. Roderic Pettigrew (l) chatted with special guest speaker Dr. Charles Townes, recipient of the 1964 Nobel Prize in Physics for his discovery of the laser.

In June 2007, NIBIB Director Dr. Roderic Pettigrew (l) presented the first NIBIB Landmark Achievement Award to M. Joan Dawson, wife of the late Dr. Paul Lauterbur. As a 2003 Nobel Laureate in Physiology or Medicine, Dr. Lauterbur was recognized for his pioneering contributions to the development of magnetic resonance imaging.

At a meeting in New Delhi, Dr. Maharaj Bhan (l), Secretary of the Republic of India's Department of Biotechnology, Ministry of Science, shakes hands with NIBIB Director Dr. Roderic Pettigrew following the signing of a bilateral agreement in 2007. Witnessing the occasion (left to right) were Steven White, Deputy Chief of Mission, U.S. Embassy, New Delhi; Elias Zerhouni, NIH Director; Kapil Sibal, Science Minister; T.S. Rao, Medical Biotechnology Group Leader; and Roger Glass, Director of NIH's Fogarty International Center.

The cover of NIDA's first plain language booklet explaining the science behind addiction—*Drugs, Brains & Behavior - The Science of Addiction.*

During NIDA's first national "Drug Facts Chat Day," more than 40 scientists and science writers who specialize in addiction issues answered over 36,000 questions submitted online by high school students across the country. The students asked wide-ranging questions on drug abuse-related topics, and experts tried to answer them as soon as possible.

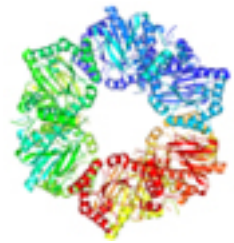


NIDA Director Dr. Nora Volkow was among the experts who assisted during the chat day's 10-hour question-and-answer session. The scientists and writers sometimes fielded as many as 6,000 questions per hour.

NIDA staffers David Anderson, Dr. Ruben Baler, and Dr. Barry Hoffer answered students' questions about how drugs affect the brain during NIDA's Drug Facts Chat Day.

Panoramic photograph of the main NIEHS building in Research Triangle Park, NC. Photo by Steven R. McCaw.

NIEHS Acting Director Samuel Wilson strategizes with Acting Deputy Director William Suk at "Superfund Basic Research Program: 20 Years of Success and a Vision for the Future," held December 3-5, 2007, in Durham, NC. Photo credit Steven R. McCaw.



This model of the enzyme nicotinic acid phosphoribosyltransferase is one of more than 2,000 protein structures solved as part of NIGMS's Protein Structure Initiative. Although the enzyme is from a bacterium, its amino acid sequence suggests that it is structurally similar to a clinically important human protein called B-cell colony enhancing factor. Image courtesy of Berkeley Structural Genomics Center.

NINR Director Dr. Patricia A. Grady, speaking at the Institute's 20th Anniversary Symposium.

NINR Director Dr. Patricia A. Grady (seated, third from right) with the 2007 National Advisory Council for Nursing Research.

On October 22, 2007, NIH's Fogarty International Center and National Library of Medicine co-sponsored the launch of the Council of Science Editor's global theme issue on poverty and human development. The event coincided with the publication of related research by more than 230 journals worldwide. Researchers gathered from around the world to present scientific discoveries published as part of the theme issue.

Fogarty Director Dr. Roger I. Glass (center) accompanied U.S. Health and Human Services Secretary Michael Leavitt (left) on a visit to Africa in August 2007. They met with local officials and observed U.S. government programs that are delivering health care to underserved communities.

Participants discuss issues related to NCCAM and complementary and alternative medicine at an "NCCAM Stakeholder Dialogue" meeting, held at NIH in June 2007.

Dr. Nasser Altorki, director of the Division of Thoracic Surgery at New York-Presbyterian Hospital/Weill Cornell Medical Center, confers with a colleague about a CT scan of a patient's chest. Weill Cornell Medical College became a member of the Clinical and Translational Science Awards (CTSA) consortium in October 2007. The CTSA Program-led by NCRR-is designed to speed discoveries from the laboratory to clinical practice. (Photo courtesy of Weill Cornell Medical College)

The sequencing of the rhesus macaque genome-funded by NIH's National Human Genome Research Institute-was performed at the Baylor College of Medicine Human Genome Sequencing Center in Houston, Texas; the Genome Sequencing Center at Washington University in St. Louis, Missouri; and the J. Craig Venter Institute in Rockville, Maryland. This effort was supported by several NCRR-funded National Primate Research Centers. (Photo by Randall C. Kyes / University of Washington)

Nashville's Vanderbilt University Institute of Imaging Science received a $2 million High-End Instrumentation (HEI) grant from NCRR to support the purchase of a 7-tesla human magnetic resonance imaging and spectroscopy system. It provides the highest magnetic imaging available for humans and is one of only several such instruments in the country. (Photo by Dana Johnson, courtesy of Vanderbilt University Medical Center)

Physicians, scientists, and engineers at Rhode Island Hospital and The Warren Albert Medical School of Brown University are establishing a multidisciplinary Center of Biomedical Research Excellence in Skeletal Health and Repair to develop treatment strategies for bone and joint diseases such as osteoarthritis. The Center is funded by NCRR's Institutional Development (IDeA) Program, which builds capacity in underserved states. Pictured is Dr. Qian Chen, director of the Center at Rhode Island Hospital. (Photo courtesy of Lifespan/Robin Dunn Blossom)

NIH Almanac: Historical Data

Chronology of Events

1700 | 1800 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000

1700

1798 The Marine Hospital Service was established with the July 16 signing by President John Adams of an act for the relief of sick and disabled seamen.

1799 An amending act of March 2 extended benefits of the Marine Hospital Service to officers and men of the U. S. Navy.

1800

1802 The admission of foreign seamen to Marine hospitals on a reimbursable basis was authorized on May 3.

1803 The first permanent Marine hospital was authorized on May 3 to be built in Boston, Mass.

1807 Dr. Benjamin Waterhouse was appointed physician in charge of the Boston Marine Hospital on November 27. He was the first to introduce interns and residents into hospitals in the United States.

1836 The Library of the Office of the Surgeon General of the Army was established (the present National Library of Medicine).

1865 John Shaw Billings, M.D., was assigned to supervise the Surgeon General's Library, which he built into a national resource of biomedical literature.

1870 A bill dated June 29 provided for administration of Marine hospitals within a Bureau of the Treasury Department with a medical officer in charge.

1871 Dr. John Maynard Woodworth was appointed supervising surgeon of the Marine Hospital Service in April, marking the beginning of central control of Marine hospitals.

1873 Regulations were approved on December 1 for appointment and promotion of physicians in the Marine Hospital Service, establishing the first career service for civilian employees in the Federal Government.

1875 A bill passed on March 3 authorized admission of Navy seamen and seamen of other government services to Marine hospitals on a reimbursable basis.

In recognition of Dr. Woodworth's progress in reorganizing the Marine Hospital Service, his title was changed by law to supervising Surgeon General on March 3.

1878 The first Federal Quarantine Act was passed April 29.

On December 21, Congress appropriated funds "for investigating the origin and causes of epidemic diseases, especially yellow fever and cholera."

1879 The National Board of Health was created by law on March 3. It represented the first organized, comprehensive, national medical research effort of the Federal Government.

Dr. John B. Hamilton was appointed Surgeon General of the Marine Hospital Service, April 3.

1884 The seamen's hospital tax was abolished on July 1. The cost of maintaining Marine hospitals was paid out of a tonnage tax, which continued until 1906.

1887 A bacteriological laboratory, known as the Laboratory of Hygiene, was established under Dr. Joseph J. Kinyoun at the Marine Hospital, Staten Island, N.Y., in August, for research on cholera and other infectious diseases (renamed Hygienic Laboratory in 1891.)

1889 The commissioned corps was authorized on January 4 establishing by law the policy of a mobile corps subject to duty anywhere upon assignment.

1890 Congress gave the Marine Hospital Service interstate quarantine authority on March 27.

1891 The Hygienic Laboratory moved from Staten Island, N.Y., to the Butler Building, Service Headquarters, Washington, D.C., in June.

Dr. Walter Wyman was appointed Surgeon General of the Marine Hospital Service on June 1.

1893 A new Quarantine Act, passed February 15, strengthened the Quarantine Act of 1878 and repealed the act establishing the National Board of Health.

1899 The Marine Hospital Service was directed by Congress on March 2 to investigate leprosy in the United States.

Dr. Milton J. Rosenau succeeded Dr. Kinyoun as director of the Hygienic Laboratory on May 1.

1900

1902 The earliest studies of Rocky Mountain spotted fever took place in Montana.

A bill approved July 1 changed the name of the Marine Hospital Service to the Public Health and Marine Hospital Service and established an advisory board for the Hygienic Laboratory. It later became the National Advisory Health Council.

The 57th Congress enacted Public Law 244 to regulate the shipment of biologics. The technical responsibilities of the program were assigned to the Hygienic Laboratory.

The Advisory Board for the Biologics Control Division was established July 1.

The Pan American Sanitary Bureau was established December 2. The Public Health and Marine Hospital Service began international health cooperation.

1904 The Hygienic Laboratory moved to a new building on a 5-acre tract at 25th and E Streets NW, Washington, D.C., on March 16.

1906 Medical care for merchant seamen and other beneficiaries of the Public Health and Marine Hospital Service began to be supported by direct congressional appropriations, with the repeal of the tonnage tax on June 30.

1909 Dr. John F. Anderson was appointed Hygienic Laboratory director on October 1.

1910

1912 Dr. Rupert Blue was appointed Surgeon General of the Public Health and Marine Hospital Service on January 13.

The name Public Health and Marine Hospital Service was changed to Public Health Service (PHS) on August 14, and the research program was expanded to include other-than-communicable diseases field investigations, navigable stream pollution, and information dissemination.

1914 Dr. Joseph Goldberger announced his views of pellagra as a dietary deficiency, emphasizing the importance of dietary deficiency diseases.

1915 Dr. George W. McCoy was appointed Hygienic Laboratory director on November 20.

1918 The Chamberlain-Kahn Act, passed July 9, provided for the study of venereal diseases. The PHS made grants to 25 institutions, establishing a precedent for the Federal Government to seek assistance of scientists through grants.

The PHS reserve corps was established by law on October 27, during the influenza pandemic, as a means of coping with the emergencies.

1920

1920 Dr. Hugh Smith Cumming was appointed PHS Surgeon General on March 3.

1921 The Rocky Mountain Spotted Fever Laboratory was established in a former school building in Hamilton, Mont., on September 20 as a recognized PHS field station.

1922 The Library of the Office of the Surgeon General (Army) was renamed the Army Medical Library in January.

A Special Cancer Investigations Laboratory was established by PHS investigators at Harvard Medical School on August 1.

1929 On January 19, the Narcotics Control Act was passed, authorizing construction of two hospitals for drug addicts, and creation of a PHS Narcotics Division.

1930

1930 On April 9, the Advisory Board for the Hygienic Laboratory became the National Advisory Health Council.

On May 26 the Ransdell Act redesignated the Hygienic Laboratory as the National Institute of Health, authorizing $750,000 for construction of two buildings for NIH, and creating a system of fellowships.

On June 14, Public Law 357 authorized creation of a separate Bureau of Narcotics in the Treasury Department and changed the PHS Narcotics Division to the Division of Mental Hygiene. The law gave the Surgeon General authority to investigate the causes, treatment, and prevention of mental and nervous diseases.

1935 A narcotic "farm" at Lexington, Ky., was completed and opened on May 29.

On August 10, Mr. and Mrs. Luke I. Wilson made a gift of 45 acres of their estate "Tree Tops" for use of the National Institute of Health in Bethesda, MD.

Title VI of the Social Security Act was passed August 14 authorizing the expenditure of up to $2 million on health grants to the states for "investigation of disease and problems of sanitation."

1936 Dr. Thomas Parran was appointed PHS Surgeon General on April 6.

1937 The Rocky Mountain Laboratory became part of the National Institute of Health in February, and was administratively made part of the Division of Infectious Diseases.

Dr. Lewis R. Thompson was appointed director of the National Institute of Health on February 1.

With the reorganization of the National Institute of Health into eight divisions, the biologics control program, previously the responsibility of the Division of Pathology and Bacteriology, NIH, was assigned to a newly established Division of Biologics Control (redesignated Biologics Control Laboratory, 1944).

The National Cancer Institute Act was signed on July 23.

1938 The National Advisory Cancer Council recommended approval of the first awards for fellowships in cancer research on January 3.

Mrs. Luke I. Wilson made a second gift of 10.7 acres, to NIH on May 28.

The cornerstone for Building 1 was laid June 30.

Congress approved construction of new, larger laboratory facilities, and NIH moved to Bethesda, MD., in July.

Mrs. Luke I. Wilson made a third gift, 14.4 acres of land, to NIH on September 30.

The narcotics hospital at Fort Worth, Tex., was dedicated on October 28.

1939 Under a Reorganization Act dated April 3, the PHS was transferred from the Treasury Department to the Federal Security Agency.

1940

1940 Mrs. Luke I. Wilson made a fourth gift, 11.6 acres of land, to NIH on September 27.

President Franklin D. Roosevelt dedicated the buildings and the grounds of the National Institute of Health on October 31.

1942 Dr. Rolla Eugene Dyer was appointed director of the National Institute of Health on February 1.

A final gift of land was made by Mrs. Luke I. Wilson on March 17 bringing the total to 92 acres. This was the nucleus of the present 306.4-acre reservation. Additional land was acquired through a series of purchases.

1943 NIH was given bureau status in the PHS on November 11.

1944 The PHS act was approved on July 1, consolidating and revising existing public health legislation, and giving NIH the legislative basis for its postwar program, with general authority to conduct research. Under this act NCI became a division of NIH.

1946 The Research Grants Office was created at NIH in January to administer the Office of Scientific Research and Development projects transferred to the PHS at the end of World War II and to operate a program of extramural research grants and fellowship awards.

The National Mental Health Act was passed July 3.

On August 12, the Research Grants Office became the Research Grants Division (later renamed Division of Research Grants). The division was instructed by the National Advisory Health Council to establish study sections for scientific and technical review of research grant applications, and to explore neglected areas of research in the health sciences.

The Hospital Survey and Construction Act, introduced by Senators Lister Hill and Harold H. Burton, was passed on August 13, authorizing the Hill- Burton program.

1948 Dr. Leonard A. Scheele was appointed PHS Surgeon General on April 6.

On June 16 the National Heart Act was signed. It authorized the National Heart Institute and changed the name of the National Institute of Health to National Institutes of Health.

The National Dental Research Act, passed June 24, authorized the National Institute of Dental Research.

The National Heart Institute was established August 1.

The National Institute of Dental Research was established September 16.

Construction of the Clinical Center was started in November.

The National Microbiological Institute and the Experimental Biology and Medicine Institute were established on November 1.

The Rocky Mountain Laboratory and Biologics Control Laboratory became two of the four components of the National Microbiological Institute on November 1.

1949 The purchase of 115.8 acres from the Town & Country Golf Club, Inc., for $600,000 was concluded February 11.

The purchase of 47.9 acres of land from Mr. and Mrs. G. Freeland Peter for $505,000 was concluded on February 14.

The National Institute of Mental Health was established on April 15, with the abolishment of the Division of Mental Hygiene.

The first issue of The NIH Record was published May 20.

The purchase of 50.2 acres of land from the Sisters of the Visitation for $173,058 was concluded on June 28.

Dr. Frank B. Rogers became director of the Army Medical Library in October.

1950

1950 The Omnibus Medical Research Act, signed August 15, authorized the National Institute of Neurological Diseases and Blindness and the National Institute of Arthritis and Metabolic Diseases, the latter absorbing the Experimental Biology and Medicine Institute. The act also gave the Surgeon General authority to establish new institutes.

Dr. William H. Sebrell, Jr. was appointed NIH director on October 1.

The National Institute of Neurological Diseases and Blindness and the National Institute of Arthritis and Metabolic Diseases were established November 22.

1951 The first R. E. Dyer Lecture was given by Dr. George W. Beadle, California Institute of Technology, June 21.

President Harry S. Truman laid the Clinical Center cornerstone on June 22.

1952 The Army Medical Library was renamed Armed Forces Medical Library in April.

1953 The first NIH Lecture was given on January 21 by Dr. Severo Ochoa of New York University College of Medicine.

PHS became part of the newly created Department of Health, Education, and Welfare on April 11.

The Clinical Center was dedicated on July 2, extending the clinical dimension of PHS research programs.

The first patient was admitted to the Clinical Center on July 6.

1954 A central data processing facility was established in the Office of the Director, NIH.

The NIH Graduate School Program began on September 27.

1955 The biologics control function was placed in the newly formed Division of Biologics Standards in June. The Division of Research Services and Division of Business Operations were also formed.

The Cancer Chemotherapy National Service Center was established April 1 to coordinate the first national cancer chemotherapy program.

The Mental Health Study Act was passed July 28.

Dr. James A. Shannon was appointed NIH director on August 1.

The National Microbiological Institute became the National Institute of Allergy and Infectious Diseases (NIAID) by order of the Surgeon General on December 29. The Biologics Control Laboratory was detached from the institute and expanded to division status within NIH.

1956 In January the biometric facility became the Biometrics Branch in the new Division of Research Services.

Dr. Leroy E. Burney was appointed PHS Surgeon General August 8.

The Armed Forces Medical Library was designated the National Library of Medicine (NLM) and placed under PHS October 1.

1957 The Center for Aging Research was established November 27 as the focal center for NIH extramural activities in gerontology.

1958 On July 16 the Division of General Medical Sciences was established by order of the Surgeon General, extending research into noncategorical areas covered until that time by the Division of Research Grants.

The Center for Aging Research was transferred from the National Heart Institute to the Division of General Medical Sciences on November 4.

1959 The Office of Administrative Management was formed July 15, consolidating the Division of Business Operations and other managerial responsibilities.

Congress appropriated $2 million for the establishment of one or two private research centers on August 19.

1960

1960 On March 8 the Surgeon General approved establishment of a Computation and Data Processing Branch in the Division of Research Services.

NIH acquired 513 acres of farmland near Poolesville, MD., on May 6. This land became the site of the NIH Animal Center.

The International Health Research Act was passed July 12, extending NIH international programs.

1961 The Surgeon General established the Center for Research in Child Health in the Division of General Medical Sciences on February 17.

Dr. Luther L. Terry was appointed PHS Surgeon General March 24.

On May 26, DHEW Secretary Abraham A. Ribicoff dedicated the new NIDR building.

The first Jules Freund Lecture was given by Dr. Merrill W. Chase of the Rockefeller Institute on November 15.

The NIH European Office was established in Paris, France, on December 18.

1962 The NIH Latin American Office was established in Rio de Janeiro, Brazil, July 1.

The Division of Research Facilities and Resources was established July 15.

Public Law 87-838, passed October 17, authorized the National Institute of Child Health and Human Development and the National Institute of General Medical Sciences.

Five acres of land for a Gerontology Research Center were donated by the City of Baltimore in December.

1963 The NIH Pacific Office was established in Tokyo, Japan, on January 1.

The National Institute of Child Health and Human Development and the National Institute of General Medical Sciences were established on January 30.

The Center for Research in Child Health and the Center for Research in Aging (established in 1956) were transferred from NIGMS to NICHD.

The surgical wing for the Clinical Center was dedicated September 5.

The first NIH International Lecture was given October 31 by Dr. Walsh McDermott of Cornell University Medical College.

1964 The Medical Literature Analysis and Retrieval System (MEDLARS) became operational at the NLM in January.

The Division of Computer Research and Technology was established on April 16.

On September 19 Congress authorized planning funds for a central environmental health research facility.

A special virus-leukemia program was initiated under a special appropriation, included in the FY 1965 appropriation signed into law on September 19.

1965

On January 7, the Surgeon General announced that the National Environmental Health Sciences Center would be located in Research Triangle Park, N.C.

The NIH Animal Center, Poolesville, MD., officially opened May 27 with 2 days of orientation for NIH employees, area residents and the press after completion of the first of three phases of an $18 million construction program.

NIH received a $20,250,000 supplemental appropriation on August 31 to intensify and expand support of research in heart disease, cancer, stroke and related diseases.

Dr. William H. Stewart, appointed PHS Surgeon General September 24, took office on October 2.

A reorganization of the DHEW provided for an expansion of the secretary's office with the creation of three new assistant secretaries, including an assistant secretary for health and scientific affairs.

Dr. Philip R. Lee was appointed to the new position of assistant secretary for health and scientific affairs on November 2.

1966

The Division of Regional Medical Programs was created on February 1 to administer grants under the Heart Disease, Cancer and Stroke Amendments of 1965. Dr. Robert Q. Marston was appointed NIH associate director for regional medical programs and chief of the division.

At a White House meeting June 27, the NIH director and institute directors discussed with the President how the benefits of research findings in health could be brought more rapidly to all the people. Later in the year, a report to the President described current NIH research efforts on the major U.S. disease problems and set forth the status of those problems, the nature of present and planned investigative efforts and the problems of and opportunities for further research.

A Division of Environmental Health Sciences was established in NIH November 1 to conduct, foster and coordinate research on the biological, chemical, and physical effects of environmental agents. Dr. Paul Kotin, scientific director for etiology, NCI, was named director of the new division.

An advisory committee to the NIH director was appointed on November 9 to provide advice on the further development of NIH research and related programs.

1967

The National Institute of Mental Health was separated from NIH and raised to bureau status in PHS by a reorganization that became effective January 1. NIMH's Division of Clinical, Behavioral and Biological Research, within the mental health Intramural Research Program, comprising activities con- ducted in the Clinical Center and other NIH facilities, continued here under an agreement for joint administration between the two companion bureaus. The Toxicology Information Program was established at NLM, January 1, in response to recommendations of the President's Science Advisory Committee. The program includes the entire range of chemical effects on living organisms.

The PHS Audiovisual Facility, renamed the National Medical Audiovisual Center, became an NLM component July 1.

On September 26, the deed for 509.25 acres of Research Triangle Park, N.C., to serve as a permanent site for the Division of Environmental Health Sciences, was presented to the Surgeon General.

1968 Establishment of the John E. Fogarty International Center for Advanced Study in the Health Sciences (FIC) was given departmental approval February 26. The center became operational on July 1, at which time the NIH Office of International Research was abolished and certain of its functions were transferred to FIC and NIAID.

Under a reorganization of health activities announced on April 1, NIH assumed status as a new operating agency within the department, with the NIH director reporting directly to the assistant secretary for health and scientific Affairs. Under the reorganization, the Bureau of Health Manpower and the National Library of Medicine became components of NIH.

On June 15 the four-story $7.5 million Gerontology Research Center building, located at and operated in cooperation with Baltimore City Hospitals, was officially opened.

A proposed facility to house the biomedical communications network was designated the Lister Hill National Center for Biomedical Communications by passage of P.L. 90-456 on August 3.

Established by the DHEW secretary on August 9, the Center for Population Research conducts a contract and grant program in population and reproduction research. The center was designated by the President as the primary Federal agency responsible for population research and training.

On August 16 the National Eye Institute was created to build an enlarged program based on blindness research formerly conducted in the National Institute of Neurological Diseases and Blindness. The legislation also changed the NINDB name to the National Institute of Neurological Diseases.

Dr. Robert Q. Marston was sworn in as NIH director on August 29.

A Nobel Prize in Physiology or Medicine was awarded on October 16 to Dr. Marshall W. Nirenberg, chief of NIH's Laboratory of Biochemical Genetics, for discovering the key to deciphering the genetic code. He was the first NIH Nobel laureate, and the first Federal employee to receive a Nobel Prize.

On October 24 the President signed into law (P.L. 90-639) legislation changing the name of the NIND to the National Institute of Neurological Diseases and Stroke.

The National Eye Institute was established on December 26.

1969 A further reorganization of the NIH internal structure announced January 4 renamed the Bureau of Health Manpower as the Bureau of Health Professions Education and Manpower Training and expanded it to include seven divisions, one of which was the Division of Research Resources (DRR).

The Division of Environmental Health Sciences was elevated to institute status on January 12, thus becoming the 10th NIH institute.

Dr. Roger O. Egeberg was named DHEW assistant secretary for health and scientific affairs on July 14, succeeding Dr. Lee.

On November 10, the DHEW secretary redesignated the National Heart Institute as the National Heart and Lung Institute (NHLI).

1970

1970 A reorganization of the Bureau of Health Professions Education and Manpower Training renamed it the Bureau of Health Manpower Education on September 18. DRR was separated from the bureau and became a division within NIH.

1971 Dr. Merlin K. DuVal was appointed DHEW assistant secretary for health and scientific affairs on July 1, succeeding Dr. Egeberg.

The White House Conference on Aging recommended creating a separate National Institute on Aging on December 2.

On December 23 the President signed the National Cancer Act of 1971 initiating a National Cancer Program, establishing the President's Cancer Panel, a National Cancer Advisory Board and 15 new research, training and demonstration cancer centers.

1972 The National Institute of Arthritis and Metabolic Diseases was renamed the National Institute of Arthritis, Metabolism, and Digestive Diseases on May 19. On July 1, DBS transferred from NIH and officially became a sixth bureau, the Bureau of Biologics in the Food and Drug Administration. The bureau continues to use NIH facilities and buildings.

The DHEW secretary approved a reorganization of NHLI on July 14, elevating the institute to bureau status within NIH. A bureau-level organization was established for the National Cancer Institute on July 27.

On October 25 Public Law 92-564 established a temporary National Commission on Multiple Sclerosis (supported by NINDS).

Dr. Christian B. Anfinsen, NIAMDD, won the Nobel Prize in Chemistry for his work on ribonuclease.

1973 Dr. Charles C. Edwards was appointed DHEW assistant secretary for health on April 18, succeeding Dr. DuVal.

Dr. Robert S. Stone was sworn in as the 10th NIH director on May 29.

The Bureau of Health Manpower Education was transferred from NIH to the new Health Resources Administration on July 1 and renamed the Bureau of Health Resources Development.

The National Institute of Mental Health rejoined the National Institutes of Health on July 1. On September 25, NIMH became part of the new Alcoholism, Drug Abuse and Mental Health Administration.

1974 The Research on Aging Act of 1974, creating the National Institute on Aging, was signed into law on May 31.

On July 23, the National Cancer Act Amendments of 1974 were signed by the President to improve the National Cancer Program. It also established a President's Biomedical Research Panel.

The National Institute on Aging was established on October 7.

The Interagency Primate Steering Committee was established by the DHEW assistant secretary for health with NIH as the lead agency.

Institutional Relations Branch was transferred on October 27 from DRG to the immediate Office of the Director, NIH, and renamed the Office for Protection From Research Risks.

1975 On March 13 the National Institute of Neurological Diseases and Stroke was renamed the National Institute of Neurological and Communicative Disorders and Stroke.

Dr. Theodore Cooper was appointed DHEW assistant secretary for health on July 1, succeeding Dr. Edwards.

Dr. Donald S. Fredrickson was sworn in as the 11th NIH director on July 1.

The Adult Development and Aging Branch and the Gerontology Research Center were separated from NICHD to become the core of the National Institute on Aging, also on July 1.

1976 On June 25, the National Heart and Lung Institute was renamed the National Heart, Lung, and Blood Institute.

Dr. D. Carleton Gajdusek, NINCDS, shared the Nobel Prize in Physiology or Medicine with Dr. Baruch Blumberg, Institute for Cancer Research. Dr. Gajdusek was honored for his research on kuru and Dr. Blumberg for his work on the Australia antigen at the National Institute of Arthritis and Metabolic Diseases (1957-1964).

1977 Construction of the Ambulatory Care Research Facility was started in April.

On July 13, Dr. Julius B. Richmond took the oath of office as DHEW assistant secretary for health and Surgeon General, becoming the first person to hold both offices simultaneously.

1978 On November 15 the DHEW secretary announced the establishment of the National Toxicology Program under the direction of NIEHS.

1979 Dr. Hans J. Muller Eberhard, Scripps Clinic and Research Foundation, delivered the first Kinyoun Lecture on April 24.

A protocol of cooperation in the exchange of information on medicine and public health between the United States and China was signed on June 22 in Beijing's historic Great Hall. The DHEW secretary signed on behalf of the United States.

On July 18 NCI and the National Naval Medical Center, Bethesda, MD., agreed to cooperate in a cancer treatment research program.

1980

1980 DHEW became the Department of Health and Human Services (DHHS) on May 14.

A separate Department of Education was established.

On May 22, the Lister Hill Center for Biomedical Communications was dedicated as part of NLM.

1981 On May 14 Dr. Edward N. Brandt, Jr., was sworn in as assistant secretary for health.

The National Institute of Arthritis, Metabolic, and Digestive Diseases was renamed the National Institute of Arthritis, Diabetes, and Digestive and Kidney diseases on June 23.

On June 30 Dr. Fredrickson stepped down as NIH director. Dr. Thomas E. Malone was appointed acting director.

The Ambulatory Care Research Facility was officially dedicated on October 22. The research hospital was renamed the Warren Grant Magnuson Clinical Center in honor of the former chairman of the Senate Committee on Appropriations. Sen. Magnuson was involved in support of biomedical research at NIH since 1937.

Dr. C. Everett Koop became PHS Surgeon General on November 16.

1982 On April 22 NIADDK was converted to bureau status, joining NCI, NHLBI, and NLM. Dr. James B. Wyngaarden, chairman of the Duke University department of medicine, was appointed NIH director on April 29.

The National Institute of Child Health and Human Development marked its 20th anniversary on September 20.

NIGMS celebrated its 20th anniversary by establishing the DeWitt Stetten, Jr., Lectureship. Dr. David S. Hogness, Stanford University, gave the first lecture, October 13.

The National Institute on Aging opened its first on-campus research unit in the NIH Clinical Center.

The NIEHS facility in Research Triangle Park, N.C., was dedicated on November 15.

Lasker Foundation Awards were presented on November 17 to three NIH scientists: Dr. Elizabeth Neufeld, NIADDK; Dr. Roscoe O. Brady, NINDS; and Dr. Robert C. Gallo, NCI.

1983 On January 18, Building 1 was officially named the James A. Shannon Building in honor of the former NIH director (1955-1968).

The first multidisciplinary pain clinic in the United States devoted exclusively to research was opened in the Clinical Center March 21 by NIDR.

NCI dedicated its R.A. Bloch International Cancer Information Center on October 2. The building houses the institute's information programs that serve health professionals and scientists.

In December, the Clinical Center celebrated its 30th anniversary of operation.

1984 NIH purchased the Convent of the Sisters of the Visitation of Washington along with about 11 acres of land for $4.5 million.

In May NCI scientists headed by Dr. Robert C. Gallo, Jr., uncovered strong evidence that variants of a human cancer virus called HTLV-III are the primary cause of acquired immunodeficiency syndrome (AIDS).

DCRT celebrated its 20th anniversary in May.

NIH and Howard Hughes Medical Institute launched a multimillion dollar cooperative program in August to help increase the vigor of American biomedical research and continue the flow of new doctors into research areas.

The former Convent was dedicated September 19 as the Mary Woodard Lasker Center for Health Research and Education.

1985 NIH and the Howard Hughes Medical Institute chose the first 25 HHMI-NIH research scholars in June.

In July the NIA celebrated its 10th anniversary.

1986 In May the National Institute of Arthritis and Musculoskeletal and Skin Diseases became a separate institute separated from its parent NIADDK - now called the National Institute of Diabetes and Digestive and Kidney Diseases. Also created was the National Center for Nursing Research.

NIH held the First Intramural Research Day on September 25 featuring symposia and poster sessions.

In June NIAID funded 14 centers to evaluate experimental drugs in the treatment of AIDS.

NIH opened its year-long centennial celebration—A Century of Science for Health—on October 16.

1987

NIH scheduled monthly events, hosted by individual components throughout the year, to commemorate its 100th anniversary.

NIAID awarded contracts to five medical centers to establish AIDS treatment evaluation units.

NIEHS celebrated its 20th anniversary, while NIGMS and DRR marked their 25th.

Fifty-six promising science students—one from each state and U.S. possession—were honored by NIH as centennial scholars.

On July 23 President Reagan named a 13-member Commission on the Human Immunodeficiency Virus Epidemic, which held its first meeting following the announcement.

NIH became a smoke-free agency on September 1, banning smoking in all buildings.

Hundreds of NIH alumni from the United States and abroad returned to the campus on October 15-16 to help close out the year-long celebration of the NIH centennial.

1988

NIH was honored by Spain with the presentation of the Grand Cross of the Civil Order of Health.

The NICHD celebrated its 25th anniversary and NIAID and NIDR marked their 40th.

The Children's Inn at NIH, a temporary home away from home for NIH pediatric patients, was dedicated. A gift of $2.5 million from Merck and Co., Inc. was donated toward the construction of the building.

"Sky Horizon," a sculpture created by Louise Nevelson, was provided to the NIH on loan by Edwin C. Whitehead, founder of the Whitehead Institute of Biomedical Research.

Officials from NICHD, NINDS, and NIMH broke ground for a facility they will share—Building 49, the Child Health and Neurosciences Building.

November marked the establishment of the National Institute on Deafness and Other Communication Disorders. The parent institute was renamed the National Institute of Neurological Disorders and Stroke.

1989

On May 10, Building 31 was named the Claude Denson Pepper Bldg. to honor NIH's "legislative father."

The NIH Record marked its 40th year of publication in May.

On May 22, NIH conducted its first gene transfer in humans. A cancer patient was infused with tumor-infiltrating lymphocytes (TIL) that had been altered by insertion of a gene. This allowed scientists to track the special cancer-fighting cells in the body to increase the understanding of TIL therapy.

1990 The National Center for Human Genome Research was established in January.

DRR and DRS merged in March and named the National Center for Research Resources.

On June 21 the Children's Inn at NIH opened its doors to pediatric patients and their families. The President and Mrs. Bush attended the ceremonies.

The Recombinant DNA Advisory Committee approved the first experiments involving transfer of human genes for therapeutic purposes on July 31. The treatment was initiated on September 14 in a 4-year-old girl with adenosine deaminase deficiency.

The National Institute of Neurological Disorders and Stroke and the National Institute of Diabetes and Digestive and Kidney Diseases marked their 40th anniversaries.

It was announced in September that the gene that caused osteoarthritis was isolated by scientists supported by the National Institute of Arthritis and Musculoskeletal Diseases.

The Office of Research on Women's Health was established to strengthen NIH's efforts to improve the prevention, diagnosis and treatment of illness in women and to enhance research related to diseases and conditions that affect women.

1991 On January 29, NIH scientists treated the first cancer patients with human gene therapy. Two patients received transfusions of special cancer-killing cells removed from their own tumors and armed in the laboratory with a gene capable of producing a potent antitumor toxin, tumor necrosis factor.

Dr. Bernadine Healy was confirmed as NIH's 13th director on March 21. She was the first woman appointed to this post.

In August the National Center for Human Genome Research announced the start of a new, unified effort to develop a "framework" map of the human genome—expected to take 2 to 3 years to complete.

1992 The National Institute on Drug Abuse, National Institute on Alcohol Abuse and Alcoholism, and National Institute of Mental Health were transferred from the Alcohol, Drug Abuse, and Mental Health Administration to become part of the NIH.

Two components—NICHD and NIGMS—celebrated their 30th anniversaries on September 21 and October 17, respectively.

1993 NIH Director Bernadine Healy stepped down to return to the Cleveland Clinic Foundation.

The Clinical Center celebrated its 40th anniversary.

Sixteen university medical programs were launch sites for the 15-year, $625 million Women's Health Initiative. About 3,000 women will be enrolled at each center to investigate women's most common causes of death and disability.

Dr. Harold Varmus was appointed NIH's 14th Director.

FIC noted its 25th anniversary.

The National Center for Nursing Research became the 16th institute.

1994 Former director, Dr. James Shannon, died.

NHLBI scientists for the first time successfully transferred a normal cystic fibrosis gene into the cells lining a CF patient's lungs.

Researchers at NIEHS isolated the BRCA1 gene—responsible for about 5 percent of all breast cancers and 25 percent in women under age 30.

Dr. Martin Rodbell, NIEHS, shared the Nobel Prize in physiology or medicine for research on G proteins, key components of the communication system that regulates cellular activity.

1995 NLM unveiled the "Visible Man," a detailed atlas of human anatomy created from thousands of images of a human body collected by radiographic and photographic techniques.

NIAAA celebrated its 25th anniversary.

1996 The first multicenter trial of bone marrow transplantation in children with sickle cell disease demonstrated that the procedure can provide a cure for young patients that have a matched sibling, according to NHLBI-supported scientists.

DRG celebrated its 50th anniversary and NIEHS noted its 30th.

1997 Researchers with NHGRI completed a map of chromosome 7, an important milestone within the Human Genome Project.

DRG was renamed the Center for Scientific Review and DCRT became the Center for Information Technology.

Vice President Al Gore performed an "inaugural search," opening up free access on the world wide web to NLM's MEDLINE.

Results from the NIH-supported Dietary and Systolic Hypertension trial indicated that blood pressure can be swiftly and significantly lowered through a diet low in fat and high in vegetables, fruits, and low-fat dairy foods.

A team led by NHGRI scientists identified a defective gene that causes some inherited cases of Parkinson's disease.

Results from an NIH trial showed that a low-dose diuretic cuts by half the chance that an older person with high systolic blood pressure will develop heart failure. In those who had already had a heart attack, their chance of developing heart failure dropped by 80 percent.

A team led by NIH-funded scientists determined the complete genome sequence of the E. coli bacterium, a laboratory workhorse. This accomplishment gives researchers a powerful new tool for understanding fundamental questions of biological evolution and function.

On November 4, Vice President Al Gore and Senator Mark O. Hatfield attended the groundbreaking ceremonies for the new Clinical Center, which will be called the Mark O. Hatfield Clinical Research Center.

1998 Building 20, NIH's apartment building, was carefully demolished to make way for the new Mark O. Hatfield Clinical Research Center.

NICHD's new zebrafish facility opened. Zebrafish have become the mainstay of developmental biologists for studying the development of the vascular system and central nervous system, as well as the functional genomics of the zebrafish.

A large prevention trial conducted by NCI showed that long-term use of a moderate-dose vitamin E supplement substantially reduced prostate cancer incidence and deaths in male smokers.

In a cooperative endeavor (Neurolab) between NASA, NIH and others, astronauts on Space Shuttle Columbia conducted research on how the neurological system responds to the challenges of space flight.

Results from a NCI-sponsored clinical trial showed that women at high risk of developing breast cancer who took the drug tamoxifen had 49 percent fewer cases of breast cancer than those who didn't. Tamoxifen was hailed as the first drug to prevent breast cancer in women at high risk for the disease.

The new NIH Intramural Sequencing Center opened in Gaithersburg. NISC is a 14-institute consortium that is dedicated to large-scale sequencing of human and animal DNA.

NIDR celebrated its 50th anniversary, with a name change to the National Institute of Dental and Craniofacial Research.

Building 16, known as the Stone House, was renamed the "Lawton Chiles International House"; it will be the locus for international activities supported by FIC and other NIH and DHHS components.

Between 1992 and 1996, the rate of Sudden Infant Death Syndrome (SIDS) dropped by 38 percent, much of that likely being due to a 66 percent decrease during the same period in the number of U.S. infants being placed to sleep on their stomachs. A national Back to Sleep Campaign—encouraging parents to put their infants to sleep on their backs - was launched in 1994 by NICHD, in partnership with HHS and other organizations.

The complete sequence of two bacteria that are among the major causes of sexually transmitted diseases worldwide—Treponema pallidum, responsible for syphilis, and Chlamydia trachomatis, responsible for chlamydial infections—were obtained by two separate teams of scientists supported by NIAID and others.

NIDCD celebrated its 10th anniversary.

Senator John Glenn and six other astronauts spent nine days in space aboard NASA's Space Shuttle Discovery conducting about 83 scientific projects, the most research-intensive space journey yet. Glenn, NASA and others worked with NIA to develop the projects.

NIAID celebrated its 50th anniversary.

NHLBI's Framingham Heart Study celebrated its 50th anniversary.

An international team funded by NHGRI and others obtained the complete sequence of the 97-million-base genome of the roundworm, Caenorhabditis elegans. This marks the first time that scientists have spelled out the instructions for a complete animal which, like humans, has a nervous system, digests food, reproduces, and gets old, making it a very important organism in which to carry out studies that parallel human biology.

1999

The new South Entry to the Clinical Center opened, thus facilitating construction on the Mark O. Hatfield Clinical Research Center on the north face of Building 10.

A team of investigators led by an NIAID grantee discovered that a subspecies of chimpanzees native to west Africa are the origin of HIV-1, the virus responsible for the global AIDS pandemic.

Underlying vitamin D deficiency in postmenopausal women is associated with increased risk of hip fracture, according to a study supported by NIA and NCRR.

NIDA, NIMH, and NINDS moved into the new Neuroscience Center office building on Executive Boulevard, which some have dubbed "NIH North".

A meta-analysis study, led by an NICHD researcher, found that pregnant women infected with HIV could reduce the risk of transmitting the virus to their infants by about 50 percent if they deliver by cesarean section before they go into labor and before their membranes rupture.

NIH Director Dr. Harold Varmus convened the first meeting of the Director's Council of Public Representatives (COPR). The Council will provide advice and recommendations to, and consult with, the NIH Director regarding matters related to medical research, NIH's policies and programs, and public participation in NIH's activities. COPR was chartered in November 1998.

On June 9, President Bill Clinton unveiled the cornerstone for the new Dale and Betty Bumpers Vaccine Research Center, which initially will focus on accelerating the search for a vaccine against AIDS. Earlier, Dr. Varmus named Dr. Gary Nabel as the director of the new VRC, which currently exists as a "center without walls". The VRC is funded by NIAID and NCI and spear- headed by them and NIH's Office of AIDS Research.

NLM's MEDLINE added the 10 millionth journal citation to its database.

A joint Uganda—U.S. study, funded by NIAID, demonstrated a highly effective, affordable and practical strategy for preventing transmission of HIV from an infected mother to her newborn. A single-oral dose of the antiretroviral drug nevirapine given to the HIV-infected mother while in labor and another to her baby within three days of birth reduced the transmission rate by half compared with a similar short course of AZT.

Women with preeclampsia, a potentially fatal complication of pregnancy, were found to have an imbalance of two key chemical compounds that control blood pressure, prostacyclin and thromboxane, months before their symptoms appeared, according to NICHD scientists.

NIDA celebrated its 25th anniversary.

NIH announced its plan to establish a repository called PubMed Central for free electronic distribution of primary research reports in the life sciences. The new site would be integrated with NLM's widely used bibliographic site PubMed and is intended to be one of several repositories in an international system first proposed by NIH director Dr. Harold Varmus. PubMed Central would begin receiving, storing and distributing content—including peer—reviewed articles, preprints, and other screened reports from existing journals, new journals, and reputable scientific organizations—in January 2000.

Children born to mothers with untreated hypothyroidism during pregnancy were found to score lower on IQ tests than children of healthy mothers suggesting that early detection and treatment of hypothyroidism in pregnant women may be a critical part of prenatal care, according to a study funded by NICHD and others.

In October 1999, NIH announced a major research program involving 10 laboratories, called the Mouse Genome Sequencing Network, to map and sequence the DNA in the mouse genome.

A research effort led by NIAID scientists produced the first high-resolution genetic map of Plasmodium falciparum, the deadliest malaria parasite, which is responsible for the death of more than two million people annually.

Scientists supported by NHGRI along with groups in England and Japan completed the first sequence of a human chromosome, chromosome 22. Genes on chromosome 22 have been implicated in immune system

function, congenital heart disease, and several cancers including leukemia.

The National Toxicology Program, headquartered at NIEHS, announced that Federal regulatory agencies—FDA, OSHA, EPA and CPSC—would accept, for the first time, an alternative way to test chemicals for allergic contact dermatitis that could reduce by thousands the number of guinea pigs needed for such tests.

After leading NIH for 6 years, Dr. Harold Varmus left to become the President and CEO of Memorial Sloan-Kettering Cancer Center in New York City.

2000

2000 On January 1, Dr. Ruth Kirschstein, deputy director of NIH, became the acting director.

Scientists funded by NIDCR and NIAMS, along with an NCI scientist discovered that leptin, the product of the obesity gene, acts as a bone inhibitor by telling the brain to slow down the rate of bone formation, showing for the first time that the brain has a central role in controlling bone formation and density.

A team including NCI scientists and grantees used microarray technology to show that the most common form of non-Hodgkin's lymphoma (NHL), diffuse large B-cell lymphoma, is actually two distinct diseases, thus explaining why 40 percent of patients with this NHL can be cured through chemotherapy while others succumb to the disease. This is the first demonstration of a technology that promises to revolutionize cancer diagnosis as well as many other areas of research.

The NIEHS headquarters and laboratory Building 101 in Research Triangle Park, N.C., was renamed the Rall Building in honor of former NIEHS director, Dr. David Platt Rall.

NLM received Vice President Al Gore's Hammer Award for a series of improvements in its information services, including making its popular MEDLINE database of journal article references and abstracts free and easier for the public to use.

NIH launched the first phase of a consumer-friendly database, ClinicalTrials. gov, with information on more than 4,000 Federal and private medical studies involving patients and others at more than 47,000 locations nationwide. The new database may be reached at http://clinicaltrials.gov/.

CC and NIAID scientists demonstrated that the widely used herbal product St. John's wort could significantly compromise the effectiveness of a protease inhibitor often used to treat those infected with HIV.

An NIAID study showed that a nasal spray flu vaccine not only protected young children against the three strains of influenza for which the vaccine was designed to provide protection but also a flu strain not covered by the vaccine. It also protected the children against flu-related middle-ear infections.

Scientists supported by NHGRI and DOE along with the private company Celera completely sequenced the genome of the fruitfly Drosophila melanogaster, which is used to study a host of biological questions related to aging, development, learning, memory and more.

NIH's Office of Research on Minority Health and the Office of Research on Women's Health celebrated their tenth anniversaries.

An NHLBI-supported clinical trial showed that lowering the amount of salt for those who ate a "usual" American diet as well as those following the DASH diet—rich in vegetables, fruits and low-fat dairy foods and low in saturated fat, total fat and cholesterol—lowered blood pressure correspondingly for both those with and without hypertension, including African Americans.

NIGMS and the Indian Health Service announced plans to collaborate on a new program, Native American Research Centers for Health (NARCH), designed to promote, develop and support centers that will link the Native American community with organizations that conduct health research.

The international Human Genome Project public consortium—funded by NIH, DOE, and others—assembled a working draft of the sequence of the human genome. The information from this project has been completely, immediately, and freely released to the world with no restrictions on its use.

Researchers supported by NIGMS demonstrated that a simple and inexpensive change in basic surgical procedures—giving patients more oxygen during and immediately after surgery—can cut the rate of wound infections in half, thus saving millions of dollars in hospital costs by helping to prevent post-surgical wound infection, nausea and vomiting.

A team of scientists funded by NIAID determined the complete sequence of the genome of the bacterium—Vibrio cholerae—that causes cholera.

2001

Grantees of NIAID and NHGRI and others sequenced the entire genome of a deadly strain of E. coli, a bacterium that is emerging as a major public health threat through contaminated ground beef, milk, fruits and vegetables. By comparing the sequence of this strain with that of harmless strains of E. coli, scientists may learn why only some forms cause disease and then find ways to prevent harmful strains from causing disease.

A team of NHGRI and NCI scientists and others developed a new genetic test that can distinguish between two types of hereditary breast cancer—caused by BRCA1 and BRCA2 mutations—and sporadic breast cancer. The new approach uses microarray (gene chip) technology to analyze the activity of more than 5300 genes at once. This advance should ultimately help physicians diagnose the cause of a woman's breast cancer and guide decisions about the most effective treatments.

A team composed of scientists from NHGRI and NINDS, grantees of NHLBI and NIA, and others demonstrated that adult stem cells isolated from mouse bone marrow could become functioning heart muscle cells when injected into a damaged mouse heart. The new cells at least partially restored the heart's ability to pump blood.

NIAID grantees completed sequencing the genome of Streptococcus pyogenes, a bacterium that causes a wide variety of human diseases including strep throat, scarlet fever, pneumonia, toxic shock syndrome, blood "poisoning," acute rheumatic fever, rheumatic heart disease, and the flesh-eating disease known as necrotizing fasciitis. This information should aid scientists in developing new ways to prevent and treat these diseases.

Scientists from NICHD developed and, along with an NIDDK scientist and others, tested the first vaccine capable of protecting children ages 2 to 5 against typhoid fever. Seemingly the most effective typhoid vaccine ever developed, it is also virtually free of side effects. About 16 million people worldwide develop typhoid each year, and 600,000 die from it, mainly in developing countries without adequate sewage and sanitation.

Under a CRADA with the drug company Novartis, NCI scientists found that a new drug known as Gleevec was effective against chronic myelogenous leukemia (CML) in patients for whom standard treatments had failed. (CML is a disease in which too many white blood cells are made in the bone marrow, the spongy tissue inside the large bones in the body.) NCI funded the lion's share of the basic research that led to the discovery and development by Novartis of Gleevec, the first anti-cancer drug specifically developed to target the molecular problem that causes a particular type of cancer.

NHGRI scientists and others developed a method that combined microarray (gene chip) technology with a form of artificial intelligence. This enabled them to tell the difference between four childhood cancers that often look alike—neuroblastoma, Ewing's sarcoma, non-Hodgkin lymphoma (Burkitt's lymphoma) and rhabdomyosarcoma. Because the treatments for these tumors are quite different, an accurate diagnosis can be critical for a child's survival. This study should help lead to the discovery of genes that are altered in these tumors and ultimately to the development of effective new treatments.

Grantees of NHLBI and NIA found that human heart muscle cells can regenerate after a heart attack. This finding opens up the possibility of repairing heart muscle damage after a heart attack.

Animal studies by NIDA researchers found that craving for cocaine seems to increase, rather than decrease, in the days and months after drug use has stopped. This phenomenon helps explain why addiction is a chronic, relapsing disease.

People at high risk for type 2 diabetes can sharply lower their chances of getting the disease by losing

weight (5 percent to 7 percent of their body weight) and by getting 30 minutes of walking or other moderate exercise every day, according to the findings of a clinical trial sponsored by NIDDK.

On August 9, President Bush announced that Federal funds could be used to support research using existing lines of human embryonic stem cells that meet certain criteria. NIH then developed a registry of the known human embryonic stem cell lines so researchers could identify in their applications for funding which sources of stem cells they plan to use.

An NEI-sponsored clinical trial showed that people at high risk of developing advanced stages of age-related macular degeneration (AMD) significantly lowered that risk by taking a high-dose combination of zinc and the antioxidants vitamin C, vitamin E and beta-carotene. These nutrients are the first effective treatment to slow the progression of AMD, a leading cause of visual impairment and blindness in Americans 65 years of age and older.

2002 NCRR-supported scientists were part of a team that cloned the world's first "knockout" pigs—ones with a particular gene removed. The gene they removed was for a molecule on the surface of the pig cells that the human immune system recognizes and attacks, leading to the failure of transplanted tissues or organs.

A team of NICHD and other scientists developed the first vaccine against Staphylococcus aureus, a major cause of infection and death among hospital patients.

People with elevated levels of homocysteine in the blood had nearly double the risk of Alzheimer's disease (AD), according to a team of scientists supported by NIA and NINDS. The findings, in a group of participants in NHLBI's long-running Framingham Study, are the first to tie homocysteine levels measured several years before with a later diagnosis of AD and the other dementias, providing some of the most powerful evidence yet of an association between high plasma homocysteine and later significant memory loss.

NIAID released its Counter-Bioterrorism Research Agenda, a document describing an accelerated research plan for the most threatening agents of bioterrorism. The agenda outlines the research NIAID will undertake to help protect civilian populations from diseases such as smallpox, anthrax and plague should those who wish to do harm unleash them intentionally.

Results of an NIAID study indicate that the existing U.S. supply of smallpox vaccine—15.4 million doses—could successfully be diluted up to five times and retain its potency, effectively expanding the number of individuals it could protect from the contagious disease. The success of this study puts us one step closer to the goal of having enough vaccine for every American if needed to respond to a potential outbreak.

Dr. Elias Zerhouni became the 15th director of the National Institutes of Health.

The international Mouse Genome Sequencing Consortium, jointly funded by NHGRI and several NIH institutes along with the Wellcome Trust in the United Kingdom, announced that it had assembled and deposited into public databases an advanced draft sequence of the mouse genome, the genetic blueprint for the most important animal model in biomedical research. The sequence is freely available on the Internet.

Dr. Roderic I. Pettigrew was named the first director of NIH's new National Institute of Biomedical Imaging and Bioengineering.

Researchers used whole-genome sequencing technology and computational methods to genetically compare two important isolates of the anthrax bacterium: the well-known Ames strain and an isolate from the 2001 Florida anthrax attacks. These techniques will enable researchers to more accurately trace the origin of individual bacterial strains, determine if those strains have been genetically modified, and assess differences in their ability to cause disease or resist antibiotics. NIAID teamed with the Office of Naval Research, the National Science Foundation, and other agencies to fund the research.

NHLBI stopped early a major clinical trial of the risks and benefits of combined estrogen and progestin in healthy menopausal women due to an increased risk of invasive breast cancer. The large trial, a component of the Women's Health Initiative (WHI), also found increases in coronary heart disease, stroke, and pulmonary embolism in study participants on estrogen plus progestin compared to women taking

placebo pills. There were some benefits of estrogen plus progestin, including fewer cases of hip fractures and colon cancer, but on balance the harm was greater than the benefit.

NIH licensed a new technology that allows physicians and researchers to make detailed, three-dimensional maps of nerve pathways in the brain, heart muscle fibers, and other soft tissues. The new imaging technology, called Diffusion Tensor Magnetic Resonance Imaging (DT-MRI), was invented by researchers now at NICHD.

A new approach to cancer treatment that replaces a patient's immune system with cancer-fighting cells can lead to tumor shrinkage. NCI researchers demonstrated that immune cells, activated in the laboratory against patients' tumors and then administered to those patients, could attack cancer cells in the body. The experimental technique, known as adoptive transfer, has shown promising results in patients with metastatic melanoma who have not responded to standard treatment.

NIAID-supported researchers proved conclusively that the malaria-causing parasite Plasmodium falciparum became resistant to the anti-malarial drug chloroquine through mutations in a single parasite gene. This finding has potentially important implications for malaria treatment and control.

An international research consortium of NHGRI, other NIH components, and other countries launched a public-private effort to create the next generation map of the human genome. Called the International HapMap Project, this new venture is aimed at speeding the discovery of genes related to common illnesses such as asthma, cancer, diabetes and heart disease.

2003

The International Human Genome Sequencing Consortium, led in the United States by NHGRI and the Department of Energy, completed the Human Genome Project more than two years ahead of schedule and for a cost substantially less than the original estimates. The international effort to sequence the three billion DNA letters is considered by many to be one of the most ambitious scientific undertakings of all time. The first draft of the human sequence was completed in June 2000. Researchers have now produced a "finished" sequence, which covers about 99 percent of the human genome's gene-containing regions, and has been sequenced to an accuracy of 99.99 percent. All of the sequence data have been deposited into public databases and made freely available to scientists around the world, with no restrictions on their use or redistribution.

The complete genetic blueprint of Bacillus anthracis—the microbe that gained notoriety during the 2001 anthrax mail attacks—has been completed by NIAID-funded researchers. This bacterium, which can cause potentially fatal inhalational anthrax, differs very little from a common soil bacterium related to it. Scientists hope that the genetic differences between these two may reveal valuable clues to its vulnerabilities.

NHLBI published new clinical practice guidelines for the prevention, detection, and treatment of high blood pressure—a major risk factor for heart disease and the chief risk factor for stroke and heart failure. The guidelines define a new blood pressure category called "prehypertension" that includes about 22 percent of American adults, or about 45 million people. Americans' lifetime risk of developing hypertension is greater than previously thought, according to the new guidelines. Medications and lifestyle changes are both crucial parts of treatment.

Researchers supported by NIMH found a gene called 5-HTT that influences whether people become depressed when faced with major life stresses such as relationship problems, financial difficulties and illness. The gene by itself does not cause depression, but it does affect how likely people are to get depressed when faced with major life stresses. Another study led by NIAAA researchers found that this same gene affects drinking habits in college students. These studies are major contributions toward understanding how a person's response to their environment is influenced by their genetic makeup.

A team led by NIDCR and NICHD researchers discovered that "baby" teeth, the temporary teeth that children begin losing around their sixth birthday, contain a rich supply of stem cells in their dental pulp. The cells, named SHED, remain alive inside the tooth for a short time after it falls out of a child's mouth. This easily accessible source of stem cells could be readily harvested for research. Scientists hope they can learn to manipulate them to repair damaged teeth, induce the regeneration of bone, and treat neural injury or disease.

Researchers supported by NICHD, NIGMS, NHLBI and NIDCR discovered how an embryo attaches to the

wall of the uterus in what may be one of the earliest steps needed to establish a successful pregnancy. After an egg is fertilized, a specialized protein called L-selectin on the embryo surface binds to carbohydrates on the uterine wall. Scientists think that this interaction slows the embryo down to a complete stop so it can then attach to the wall of the uterus. The finding may lead to insights into infertility and early pregnancy loss.

An international research team funded by NINR found that filters made from old cotton saris cut the number of cholera cases in rural Bangladesh villages almost in half. Other inexpensive cloth should work just as well in other parts of the world where cholera is endemic. Cholera is a waterborne disease that causes severe diarrhea and vomiting, killing thousands of people around the world every year. This simple preventive measure has the potential to make a significant impact on a global health problem.

NIH director Dr. Elias Zerhouni names five new institute directors: Dr. Ting-Kai Li at the National Institute on Alcohol Abuse and Alcoholism; Dr. Thomas Insel at the National Institute of Mental Health; Dr. Nora Volkow at the National Institute on Drug Abuse, Dr. Jeremy Berg at the National Institute of General Medical Sciences; Dr. Story Landis at the National Institute of Neurological Disorders and Stroke.

President George W. Bush visits NIH on Feb. 3 to unveil Project BioShield, a $6 billion, 10-year effort to protect the public from various weapons of bioterrorism.

The FY 2003 appropriation for NIH completes a 5-year doubling of the NIH budget that began in 1998.

Construction begins on a new Perimeter Security System including a fence around the Bethesda campus.

Construction begins on the Bldg. 33 Complex, to include a parking garage and 150,000 gross square foot laboratory for work on infectious agents that might be used in bioterrorism.

Dr. Zerhouni announces the NIH Roadmap for Medical Research, a comprehensive plan whose purpose is to identify the major scientific opportunities and gaps in medical research that no single institute or center at NIH could tackle alone.

2004 NIH opens the Mark O. Hatfield Clinical Research Center, a 240-bed successor to the NIH Clinical Center, which opened in 1953. It is the world's largest facility dedicated to clinical research. The 870,000-square-foot addition welcomed occupants of its research wings in fall 2004, and was to admit its first patients in early January 2005.

The NIH Roadmap for Medical Research, a coordinated effort to speed the results of bench research to the patient bedside, marks its first anniversary, which includes the award of 9 grants to the inaugural class of winners of the NIH Director's Pioneer Awards.

NIH director Dr. Elias Zerhouni announces an NIH proposal to enhance public access to taxpayer-supported research by creating an online, searchable archive of all NIH-funded publications within 6 months of their appearance in journals.

NIH proposes enhancements to its rules governing potential conflicts of interest on the part of employees, thereby resolving public and congressional concerns about the outside activities of NIH staff.

NIH launches the Neuroscience Blueprint, a framework to enhance cooperative activities among 14 NIH Institutes and Centers that support research on the nervous system. The ultimate goal of the Blueprint is to accelerate neuroscience research to reduce the burden of nervous system disorders and maintain a healthy nervous system throughout life.

The Council of Public Representatives to the NIH director (COPR) holds a Public Trust Workshop aimed at increasing public participation in clinical research. COPR advocates building trust through community partnerships, building relationships with patients, building partnerships with community providers and building trust in both scientists and NIH scientific research.

An international clinical trial concluded that women should consider taking letrozole after 5 years of tamoxifen treatment to continue to reduce the risk of recurrence of breast cancer. This advance in breast cancer treatment will improve the outlook for many thousands of women. NCI supported the U.S. portion of

the study, which offered one more example of the ability to interrupt the progression of a cancer using a drug that blocks a crucial metabolic pathway in the tumor cell.

As of July 2003, about 10 million American women were taking some form of hormone therapy, including approximately 6.7 million taking estrogen alone and 3.3 million taking estrogen plus progestin. A large, multi-center prevention study of estrogen-alone hormone therapy in healthy, postmenopausal women without a uterus, was stopped in February 2004 after researchers found that estrogen-alone had no effect on coronary heart disease risk, but increased the risk of stroke. The study, part of the NHLBI-sponsored Women's Health Initiative (WHI), also found that estrogen-alone therapy significantly increased the risk of deep vein thrombosis, had no significant effect on the risk of breast or colorectal cancer, and reduced the risk of hip and other fractures. In addition, among older women in the study, estrogen-alone therapy did not prevent cognitive decline.

The International Human Genome Sequencing Consortium, led in the United States by the National Human Genome Research Institute and the Department of Energy, published its scientific description of the finished human genome sequence, reducing the estimated number of human protein-coding genes from 35,000 to only 20,000-25,000, a surprisingly low number for our species.

Adding to a developing body of research examining a possible link between diabetes and cognitive decline, a long-term study supported by NIA found that diabetes mellitus was linked to a 65 percent increased risk of developing Alzheimer's disease (AD). These results are among the first to examine how certain cognitive systems, including memory for words and events, the speed of processing information, and the ability to recognize spatial patterns, decline in people with diabetes, while others do not. Further research, some currently under way, will tell researchers whether therapies for diabetes may in fact play a role in lowering risk of AD or cognitive decline.

From language to literature, from music to mathematics, a single protein, known as mBDNF, appears central to the formation of the long-term memories needed to learn these and all other disciplines. Most of what we accomplish as human beings depends on what we learn. This discovery, led by scientists at NICHD, brings the possibility of studying this protein system in people with learning and memory disorders and perhaps designing new medications that might help to compensate for these problems.

2005

People with type 1 diabetes can lower their risk of heart disease and stroke by about 50% by tightly controlling their blood glucose levels, according to a study supported by NIDDK and NCRR. The findings were based on a follow-up study of patients who took part more than a decade ago in the Diabetes Control and Complications Trial, a major clinical study funded by NIDDK and other NIH components along with Genentech, Inc. Continuing studies will reveal whether the same applies to those with type 2 diabetes, the more prevalent form of the disease.

NCI and NHGRI launched a comprehensive effort called The Cancer Genome Atlas (TCGA) to accelerate an understanding of the molecular basis of cancer using genome analysis technologies. A pilot project involves a few types of cancer chosen for their value in helping to determine the feasibility of a possible larger-scale project. The project will develop and test the complex science and technology framework needed to systematically identify and characterize genomic changes associated with cancer.

An international team supported by NHGRI published the genome sequence of the dog. Because of selective breeding over the past few centuries, modern dog breeds are a model of genetic diversity, from 6-pound Chihuahuas to 120-pound Great Danes, from high-energy Jack Russell Terriers to mild-mannered basset hounds, and from the herding instincts of Shetland sheepdogs to pointers pointing. However, selective breeding has also caused many dog breeds to be predisposed to genetic disorders including heart disease, cancer and blindness. In combination with the human genome, the dog genome sequence will help researchers identify genetic contributors to several diseases.

Prince Charles and his wife, the Duchess of Cornwall, visited NIH on November 3 for a briefing on osteoporosis. The Duchess of Cornwall's interest in osteoporosis—her mother and grandmother died as a result of the disease—spurred the visit. Sponsored by NIAMS, the meeting explored opportunities to spread the messages of the Bone Health and Osteoporosis: A Surgeon General's Report.

President George W. Bush made his fourth visit to NIH in less than 3 years on November 1 to announce the government's pandemic influenza preparations and response. His previous visit, on January 26, was for

a 40-minute town hall-style meeting to emcee a discussion with five citizens on the topic "Strengthening Health Care."

NIH launched a new state-of-the-art way for applicants to submit their grant applications electronically. Beginning with the receipt date of Dec. 1, 2005, NIH is requiring all its SBIR/STTR grant applicants to electronically submit their competing grants. NIH plans to transition all of its competing grant programs from paper to electronic by May 2007.

The International HapMap Consortium, a public-private effort to chart patterns of genetic variation in the world's population, published the human haplotype map, or HapMap. With more than 1 million markers of genetic variation, the HapMap is a comprehensive catalog of human genetic variation showing "neighborhoods" of correlated genetic variation, or haplotypes, across the entire human genome. Researchers will be able to identify genetic contributions to common diseases far more efficiently using HapMap data than with traditional approaches.

NIH launched a major new program, the Institutional Clinical and Translational Science Awards (CTSAs) program, to encourage the development of clinical and translational science, so that new treatments can be developed more efficiently and delivered more quickly to patients.

An HIV/AIDS vaccine developed by scientists at NIAID's Dale and Betty Bumpers Vaccine Research Center moved into its second phase of clinical testing in October. This vaccine contains synthetic genes representing HIV subtypes found in Europe, North America, Africa and Asia that account about 85% of HIV infections worldwide.

Rates for new cases of kidney failure stabilized after 20 years of annual increases from 5 to 10%, according to research from NIDDK. Credit likely goes to clinical strategies proven in the 1990s to significantly delay or prevent kidney failure: angiotensin-converting enzyme inhibitors (ACE-inhibitors) and angiotensin receptor blockers (ARBs), which lower protein in the urine and are thought to directly prevent injury to the kidneys' blood vessels; and careful control of diabetes and blood pressure. The launch of private and government programs to improve care and increase awareness, including NIDDK's National Kidney Disease Education Program (NKDEP), likely also had an impact.

The nation's leading cancer organizations reported in October that Americans' risk of dying from cancer continues to decline and that the rate of new cancers is holding steady. Observed cancer death rates from all cancers combined dropped 1.1% per year from 1993 to 2002. NCI announced the results in the "Annual Report to the Nation on the Status of Cancer, 1975-2002" in collaboration with the Centers for Disease Control and Prevention, the American Cancer Society, and the North American Association of Central Cancer Registries.

NIH celebrated the second anniversary of progress guided by the NIH Roadmap for Medical Research in September. In fiscal year 2005, NIH funded $235 million in new and continuing NIH Roadmap projects. Key NIH Roadmap accomplishments include:

- The establishment of advanced centers in nanomedicine.
- The Molecular Libraries Screening Center Network began work in June 2005.
- Research Teams of the Future awards were granted through fiscal year 2006 to fund 21 Exploratory Centers for Interdisciplinary Research throughout the country.
- The launch of the Re-engineering the Clinical Research Enterprise.

Within a day of Katrina's passage, NIH director Dr. Elias Zerhouni convened the first in a series of emergency meetings at which clinical directors, nursing and administrative leaders rapidly hammered out ways NIH could help. In partnership with the American Association of Medical Colleges, NIH created and activated a telemedicine brain trust for specialty medical consultations over a telephone hotline. An advance team and medical team numbering about 50 people deployed temporarily to a field hospital in Mississippi. In addition, the Clinical Center made 100 beds of "surge capacity" available for patients who might need to be transferred from the affected areas, such as young cancer patients who would need specialized services.

The Chimpanzee Sequencing and Analysis Consortium, which is supported in part by NHGRI, described its landmark analysis comparing the genome of the chimp (Pan troglodytes) with that of humans (Homo sapiens). The chimp sequence draft represents the first non-human primate genome. Our closest living relatives share 96% of our DNA sequence.

Dr. Zerhouni announced the latest and final regulations to prevent conflicts of interest at NIH on August 25. In the works since interim final regulations were published in February of 2004, the new revised standards became effective on August 31, when they appeared in the Federal Register.

Computer models developed by the NIGMS-funded Models of Infectious Disease Agent Study (MIDAS) research network found that a carefully chosen combination of public health measures, if implemented early, could stop the spread of an avian flu outbreak at its source. The researchers found that antiviral treatment is a critical component of a multi-pronged approach.

An international group of researchers working in more than 20 laboratories around the globe and funded in part by NIAID sequenced the genomes of three parasites that cause deadly insect-borne diseases: African sleeping sickness, leishmaniasis and Chagas disease. Knowing the full genetic make-up of the three parasites might lead to better ways to treat or prevent the diseases they cause.

The Women's Health Study, a long-term clinical trial funded by NHLBI and NCI, found that vitamin E supplements don't protect healthy women against heart attacks and stroke. They also had no effect on the most common cancers in women or on total cancers.

The Protein Structure Initiative (PSI) completed its first 5-year phase and moved into its second. The PSI aims to figure out the three-dimensional shapes of proteins, with the long-term goal of being able to predict most protein structures from their DNA sequences. More than 1,100 protein structures were solved in the PSI's first phase, which was dedicated to figuring out how to process proteins and determine their three-dimensional structures more efficiently. Phase 2 is the production phase, in which thousands more protein structures will be solved and put into the Protein Data Bank (http://www.rcsb.org/pdb/), a public repository with powerful tools for processing protein structure information.

NHGRI announced 13 more organisms that the Large-Scale Sequencing Research Network will target, including 9 mammals, as part of its ongoing effort to produce genomic data that will expand biological knowledge and improve human health.

The Edmond J. Safra Family Lodge opened its doors to guests on Wednesday, June 1. This new addition to the NIH campus offers a temporary residence for families and loved ones of adult patients who are receiving care at the NIH Clinical Center.

Using New Bioshield Authorities, NIAID awarded 10 grants and 2 contracts totaling approximately $27 million to fund development of new therapeutics and vaccines against some of the most deadly agents of bioterrorism including anthrax, botulinum toxin, Ebola virus, pneumonic plague, smallpox and tularemia. Project Bioshield, which was signed into law on July 21, gives federal agencies new tools to accelerate research on medical countermeasures to safeguard Americans against chemical, biological, radiological or nuclear attack.

Researchers funded by NIH were asked to begin voluntarily submitting their manuscripts on May 2, 2005 to the National Library of Medicine's PubMed Central upon acceptance for publication. "Public access" to peer-reviewed, NIH-funded research publications will enable health care providers, educators and scientists to more easily exchange and search for research results. The public will also have greater access to published material about the medical research their tax dollars support.

The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT), a long-term, multi-center trial of antihypertensive therapies funded by NHLBI, found that diuretics work better than newer therapies in treating high blood pressure and reducing the risk of heart disease in both black and non-black patients. The large study, with 33,357 participants, concluded that diuretics should be the first therapy for most patients with high blood pressure.

Three independent research teams supported by NEI found a gene, called complement factor H (CFH), that

affects a person's risk of developing age-related macular degeneration (AMD), the leading cause of blindness in people over age 60. One team, which included NIH's own researchers, found that people with this variant of the CFH gene are more than seven times more likely to develop the disease.

The Heart Truth, a national awareness campaign about women's heart disease sponsored by NHLBI, hosted the Red Dress Collection 2005 Fashion Show at Olympus Fashion Week in New York City on February 4, National Wear Red Day. First Lady Laura Bush, the national ambassador for NHLBI's campaign, joined Sarah Ferguson, the Duchess of York, and NHLBI director Dr. Elizabeth Nabel at a press event at the Time Life building in New York to kick off the fashion show. Made possible by Johnson & Johnson, Celestial Seasonings and Swarovski, the show was hosted by actress Vanessa Williams and included 26 of America's most influential designers along with a star-studded cast of celebrity models. The fashion show brought to life the Red Dress, the national symbol for women and heart disease awareness. In a survey was conducted by Harris Interactive in January, 60% of all the women surveyed agree that the Red Dress makes them want to learn more about heart disease, 25% recalled the Red Dress as the national symbol for women and heart disease and 45% agreed that it would prompt them to talk to their doctor and/or get a check-up.

2006 NCI-funded research spanning nearly 2 decades helped lead to FDA approval for a vaccine to prevent cervical cancer, a disease that claims the lives of nearly 4,000 women each year in the United States. It is the first cancer vaccine approved by the FDA.

NHLBI's nearly half-century commitment to exploring innovative mechanical approaches for treating damaged hearts led to the development of the first totally implanted artificial heart, approved by FDA in September 2006.

The NIH Office of Technology Transfer announced that products and processes invented by NIH scientists generated close to $100 million in royalties in 2005, nearly double $56 million-plus earned by NIH inventions the previous year. The top royalty earner is the invention of a Taxol-coated stent, which helps more than half a million Americans each year avoid bypass surgery.

On May 2, NIH dedicated a new research facility for studying globally important infectious diseases. NIAID's new C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases will house studies of naturally occurring infectious diseases, infectious agents that might be used for bioterrorism and potential vaccines.

A multicenter research team, funded in part by NHGRI, completed the draft genome sequence of the rhesus macaque monkey and deposited the information into free public databases. The macaque is the second non-human primate, after the chimpanzee, to have its genome sequenced. Overall, the macaque shares about 92-95% of its genome sequence with humans. The genome sequence will facilitate research in neuroscience, behavioral biology, reproductive physiology, endocrinology, and cardiovascular studies.

NIH announced the launch of the first clinical studies under the Rare Diseases Clinical Research Network. The network unites more than 300 investigators at dozens of research centers nationwide to study more than 40 rare diseases, most of which are difficult to diagnose and treat because they are so poorly understood. The new initiative will help move discoveries more quickly to patients.

As part of the largest hypertension clinical trial conducted to date, researchers began a comprehensive outreach program to improve high blood pressure control nationwide. About 150 physicians in 34 states and Washington, DC, have completed training to educate other physicians in their communities. Their goal is to help doctors and patients prevent and better treat high blood pressure.

The drug misoprostol was shown to provide a safe, convenient, and inexpensive way to prevent postpartum hemorrhage, a major killer of women in developing countries. In a clinical study conducted in rural villages in India, women who received the drug after birth were less likely to have serious postpartum bleeding, and had significantly lower average blood loss, than women who received placebo. The study was funded by the Global Network for Women's and Children's Health Research, a public-private partnership between NICHD and the Bill and Melinda Gates Foundation.

Leading scientists and experts on women's health joined study participants for a 2-day conference at NIH. Attendees discussed the findings, public health impact, and future directions of the Women's Health

Initiative—the largest and most comprehensive study of postmenopausal women's health ever conducted in the United States.

The NIH Pathway to Independence Award program introduced a new opportunity for promising postdoctoral scientists to receive both mentored and independent research support from the same award. Announced in January, the program answers a National Academy of Sciences call for new ways to help early-career scientific investigators progress from postdoctoral studies to running their own research programs.

NIH created a plan for continuity of operations should a pandemic flu outbreak occur. The goal is to maintain critical operations and protect patients, visitors, and employees—as well as animals and ongoing research—in the event of widespread infectious disease or other emergencies.

The first comprehensive analysis of an animal's reaction to the 1918 influenza virus provided new insights into this deadly flu, which disproportionately killed young people at the prime of life. NIAID-funded scientists found that the 1918 virus triggers a hyperactive immune response that may be the key to its lethal effects. A deeper understanding of the 1918 virus will aid efforts to develop improved therapies against future influenza threats, including the H5N1 avian influenza virus.

The U.S. House of Representatives passed the National Institutes of Health Reform Act of 2006 by a vote of 414 to 2 on September 26; the U.S. Senate passed an amended version by unanimous consent on December 8. The House approved the Senate version by voice vote on December 9. The legislation—NIH's third omnibus reauthorization in history and first since 1993—affirmed the importance of NIH and its vital role in advancing biomedical research to improve the health of the Nation.

NIH Director Dr. Elias Zerhouni endorsed the conclusions of a National Academies report on women in science, which proposed that immediate, decisive action must be taken to maximize the potential of women scientists. The report found that women currently face barriers to hiring and promotion in research universities in many fields of science and engineering, which deprives the nation of an important source of talent and may reduce U.S. competitiveness in the global marketplace.

An imaging molecule known as FDDNP binds to abnormal proteins in the brain and shows promise for enabling early and reliable diagnosis of Alzheimer's disease. The molecule was developed and tested by researchers supported in part by NIA, NCRR, and NIMH. When administered to patients before a brain scan, the molecule helps to distinguish among people who are healthy, those with Alzheimer's disease, and those with mild cognitive impairment, which sometimes progresses to Alzheimer's disease.

Thirteen recipients of the 2006 NIH Director's Pioneer Award—5-Year, $2.5 million grants that support highly innovative research—were announced at the second annual Pioneer Award Symposium. Now in its third year, the award is a key component of the NIH Roadmap for Medical Research.

NIEHS-supported researchers announced that they had successfully sequenced the DNA of 15 mouse strains most commonly used in biomedical research. More than 8.3 million tiny genetic variations called single nucleotide polymorphisms (SNPs) were discovered among the 15 genomes. The new data will help researchers better understand complex genetic traits, such as why some individuals are more susceptible to certain diseases, and how environmental agents influence the development of disease.

2007

President George W. Bush visited NIH on January 17, touring a cancer research laboratory and participating in a discussion on cancer prevention. It was his fifth visit to the NIH campus in the past 4 years. The president praised the agency's work, touting the new vaccine against cervical cancer. He was briefed on the Cancer Genome Atlas Project, a 3-year, $100 million collaboration between NCI and NHGRI to create a trove of molecular data describing the genomic changes that occur in all types of cancer.

An experimental vaccine—originally created and tested over the past 2 decades by NIAID scientists—appears safe and effective in preventing hepatitis E, a sometimes-deadly viral disease prevalent in developing countries. A clinical trial involving nearly 2,000 healthy adults in Nepal, where the virus is widespread, found that the vaccine was nearly 96% effective in preventing hepatitis E during a follow-up period of about 2 years.

NINDS launched the new Neurological Emergencies Treatment Trials (NETT) network, a nationwide clinical study that will look at emergency interventions for stroke, massive seizure, brain or spinal cord injury, and other major emergencies that affect the brain and nervous system. The long-term goal of the study, conducted in ambulances and hospitals across the country, is to improve medical care in the first minutes and hours after neurological emergencies occur.

By modifying only 4 genes in human skin cells, researchers supported by NCRR and NIGMS found that they could "reprogram" the cells to give them the characteristics of embryonic stem cells. This major advance could open doors to innovative therapies in the future, where people's own cells might be reprogrammed and used to repair their damaged tissues and organs.

EUREKA, a new funding initiative to help researchers with original ideas, was launched by 5 institutes. EUREKA—exceptional, unconventional research enabling knowledge acceleration—awards seek to raise the profile of paradigm-shifting concepts that might otherwise get overlooked.

A collaborative effort by 3 international research teams uncovered new clues about why some people develop type 2 diabetes and others don't. The NIH-funded research relied on a relatively new method, called a genome-wide association study (GWAS), which rapidly and cost effectively analyzes and compares genetic differences between people with and without specific illnesses. The scientists identified 4 new genetic risk factors for type 2 diabetes.

NIH Director Dr. Elias Zerhouni established an NIH-wide working group to address the issues that surround GWAS research, which holds tremendous promise for uncovering new and more effective methods for preventing, diagnosing, and treating disease. Because GWAS science is so new, policies for collecting, storing and using GWAS data have not yet been set. The new working group will gather feedback from the public, examine important issues, and draft an NIH policy.

The International HapMap Consortium, funded in part by NHGRI, published analyses of its second-generation map of human genetic variation. The revised map contains more than 3.1 million genetic variants —3 times the number reported in the initial HapMap of 2005. The improved HapMap will help researchers find DNA variants that influence the risk of disease and other traits.

NIH Director Dr. Elias Zerhouni met with nearly 200 members of the scientific community to hear comments on NIH peer review, the process of evaluating research grant applications. Over the last 60 years, peer review has been examined several times. The current effort to revitalize the process came as federal funding had receded, the number of experienced reviewers had dwindled, and grant application volume had increased in number and complexity.

The Human Microbiome Project, part the NIH's Roadmap for Medical Research, will explore the role of the trillions of microbes that live within or on the human body. The "human microbiome" is the collective genomes of all these organisms. By analyzing these genomes, the scientists hope to discover what microbial communities exist in different parts of the human body and explore how they change in health and disease.

With this year's NIH Director's Pioneer Awards and the inaugural class of NIH Director's New Innovator Awards, the agency made a major investment in the future of science, distributing 5-year grants totaling more than $105 million to 41 investigators. This is the first group of New Innovator Awards and the fourth

group of Pioneer Awards. Both programs are part of an NIH Roadmap initiative that tests new approaches to supporting research.

Scientists identified a tiny, unchanging region on an AIDS virus protein that may be the key to neutralizing the virus. A multi-site research team, including scientists from NIAID and NCI, used X-ray crystallography to take detailed 3-D snapshots of an antibody grabbing onto this stable viral region, which HIV uses to latch onto and infect T cells. Discovery of this potential viral weak spot could have a profound impact on development of an AIDS vaccine.

The Clinical and Translational Science Award (CTSA) consortium, funded by NCRR, added 12 more academic health centers to the 12 announced in 2006. When fully implemented in 2012, 60 institutions will be linked together to energize the discipline of clinical and translational science.

In a September 12 ceremony in the U.S. Capitol, NIH and NASA signed a memorandum of understanding that will help American scientists use the International Space Station to answer questions about human health and disease. NIH Director Dr. Elias Zerhouni and NASA Administrator Dr. Michael D. Griffin signed a pact to collaborate on space-related health research.

NIH research was featured in a new TV series, "Tomorrow's Medicine Today." NIH Director Dr. Elias Zerhouni served as guest-co-host of the discussion shows, taped at Montclair State University studios in New Jersey. Each episode featured interviews with NIH Institute or Center directors, who invited extramural scientists to present their research in lay terms for a general audience.

The NIH Council of Councils, a new advisory body to the NIH Director, convened for the first time on November 8. Created by the NIH Reform Act of 2006, the Council oversees Common Fund expenditures, which pay for broad, trans-NIH initiatives that need support no single institute or center could offer. Council members represent the advisory councils of all 27 Institutes and Centers plus 3 ad hoc representatives. Their mission is to advise the NIH Director about which cross-cutting initiatives to support.

NIH's Public Trust Initiative launched its Partners in Research Program, a unique opportunity for scientists to team up with community organizations. Announced in fall 2007 and set to award grants in 2008, the 2-year pilot was fast-tracked. The goals of the partnerships are to better communicate research results and to make sure the health care needs and interests of the community are included in development of research programs.

A draft environmental impact statement for expansion of the National Naval Medical Center (NNMC) to accommodate Walter Reed Army Medical Center's move to Bethesda was released in mid-December 2007, launching a 45-day period for public comments. Between 2,500 and 4,000 workers are expected to be added to the existing NNMC and tenant staff of 7,500, and NNMC outpatient visits are expected to double to about 4,000 per weekday, which is expected to have a major impact on traffic congestion in the area.

NIH Almanac: Historical Data

Legislative Chronology

1700 | 1800 | 1900 | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000

This legislative chronology is limited to enactments that had a major influence upon the Marine Hospital Service as it evolved into the PHS, to legislation leading to the establishment of the National Institutes of Health, and to specific NIH legislation with the exception of appropriations bills, unless such bills provided significant new authorities for or restrictions on NIH components. To view the actual public law, see the Office of NIH History website http://www.history.nih.gov/01Docs/historical/LegislativeChronologyLaws.htm.

1700

July 16, 1798—"An Act for the relief of sick and disabled Seamen" established the Marine Hospital Service for merchant seamen. The Marine Hospital Service—forerunner of the present-day PHS—became a component of the Treasury Department. A monthly hospital tax of 20 cents was deducted from the pay of merchant seamen in the first prepaid medical care plan in the United States. (1 Stat. L. 605.)

March 2, 1799—An amending act to the legislation of 1798 extended Marine Hospital Service benefits to officers and men of the U.S. Navy. This arrangement continued until 1818 after which the Navy built its own hospitals. However, the deduction of 20 cents per month from the pay of Navy and Marine Corps personnel continued until June 15, 1943. (1 Stat. L. 729.)

1800

June 29, 1870—A bill to reorganize the Marine Hospital Service and establish a central controlling office in Washington, D.C., was enacted. This act also increased the amount of hospital tax paid by seamen from 20 cents to 40 cents per month, a tax which continued until 1884. (16 Stat. L. 169.) (After the seamen's hospital tax was abolished July 1, 1884, the cost of maintaining Marine hospitals was paid out of a tonnage tax until 1906. Since then medical care for merchant seamen and other beneficiaries of the service has been supported by direct congressional appropriations.)

March 3, 1875—An act was passed authorizing the admission of seamen from the Navy and other government services to Marine hospitals on a reimbursable basis.

The Surgeon General of the Marine Hospital Service was to be appointed by the President, by and with the advice and consent of the Senate. (18 Stat. L. 377.)

April 29, 1878—The first Federal Quarantine Act "to prevent the introduction of contagious or infectious diseases into the United States" was passed. (20 Stat. L. 37.)

March 3, 1879—The National Board of Health was created by law and given quarantine powers; first organized, comprehensive Federal medical research effort. (20 Stat. L. 484.)

January 4, 1889—A bill to establish a commissioned officer corps in the Marine Hospital Service was passed. This law

established a mobile corps subject to duty anywhere upon assignment, a policy that had been in effect since Dr. Woodworth assumed leadership of the Marine Hospital Service in 1871. (25 Stat. L. 639.)

March 27, 1890—Congress gave the Marine Hospital Service interstate quarantine authority. (26 Stat. L. 31.)

February 15, 1893—A new Quarantine Act was passed following outbreaks of cholera in Europe, strengthening the inadequate Quarantine Act of 1878 by giving the Federal Government the right of quarantine inspection. The act of March 3, 1879, was repealed. (27 Stat. L. 449.)

March 2, 1899—The Marine Hospital Service was directed by Congress to investigate leprosy in the United States. (30 Stat. L. 976.)

1900

March 3, 1901—An appropriation of $35,000 was made for the Hygienic Laboratory building (first legislative mention of Hygienic Laboratory). Thus "investigations of contagious and infectious diseases and matters pertaining to public health" were given definite status in law. (31 Stat. L. 1086.)

July 1, 1902—A bill to increase the efficiency and change the name of the Marine Hospital Service to Public Health and Marine Hospital Service was enacted. The law authorized the establishment of specified administrative divisions and, for the first time, designated a bureau of the Federal Government as an agency in which public health matters could be coordinated. (32 Stat. L. 712.)

Another law, usually referred to as the Biologics Control Act, authorized the Public Health and Marine Hospital Service to regulate the transportation or sale for human use of viruses, serums, vaccines, antitoxins, and analogous products in interstate traffic or from any foreign country into the United States. (P.L. 57-244, 32 Stat. L. 728.)

1910

August 14, 1912—Under an act, the name Public Health and Marine Hospital Service was changed to Public Health Service. The legislation broadened the PHS research program to include "diseases of man" and contributing factors such as pollution of navigable streams, and information dissemination. (37 Stat. L. 309.)

July 9, 1918—The Chamberlain-Kahn Act provided for the study of venereal diseases by the PHS. (40 Stat. L. 886.)

October 27, 1918—A PHS reserve corps was established. The 1918 influenza pandemic emphasized the need for a reserve corps to meet such emergency situations. (40 Stat. L. 1017.)

1920

January 19, 1929—The Narcotics Control Act provided for construction of two hospitals for the care and treatment of drug addicts, and authorized creation of a Narcotics Division in the PHS Office of the Surgeon General. (P.L. 70-672, 45 Stat. L. 1085.)

1930

April 9, 1930—A law changed the name of the Advisory Board for the Hygienic Laboratory to the National Advisory Health Council. (P.L. 71-106, 46 Stat. L. 152.)

May 26, 1930—The Ransdell Act reorganized, expanded, and redesignated the Hygienic Laboratory as the National Institute of Health. The act authorized $750,000 for the construction of two buildings for NIH and authorized a system of fellowships. (P.L. 71-251, 46 Stat. L. 379.)

June 14, 1930—A law authorized creation of a separate Bureau of Narcotics in the Treasury Department to control trading in narcotic drugs and their use for therapeutic purposes. Also, the legislation redesignated the PHS Narcotics Division to the Division of Mental Hygiene, giving the Surgeon General authority to investigate abuse of narcotics and the causes, treatment, and prevention of mental and nervous diseases. (P.L. 71-357, 46 Stat. L. 585.)

August 14, 1935—The Social Security Act was an event of major importance in the progress of public health in the United States. This act authorized health grants to the states on the principle that the most effective way to prevent the interstate spread of disease is to improve state and local public health programs. With this legislation, the PHS became adviser and practical assistant to state and local health services. (P.L. 74-271, 49 Stat. L. 634.)

August 5, 1937—A law established the National Cancer Institute to conduct and support research relating to the cause, diagnosis, and treatment of cancer. The law authorized the Surgeon General to make grants-in-aid for research in the field of cancer, provide fellowships, train personnel, and assist the states in their efforts toward cancer prevention and control. (P. L. 75-244, 50 Stat. L. 559.)

April 3, 1939—The Reorganization Act of 1939 transferred the PHS from the Treasury Department to the Federal Security Agency. (P.L. 76-19, 53 Stat. L. 561.)

1940

July 1, 1944—The PHS act consolidated and revised laws pertaining to the PHS and divided the service into the Office of the Surgeon General, Bureau of Medical Services, Bureau of State Services, and the National Institute of Health. The act gave the Surgeon General broad powers to conduct and support research into the diseases and disabilities of man, authorized projects and fellowships, and made the National Cancer Institute a division of NIH. The act also empowered the Surgeon General to treat at PHS medical facilities, for purposes of study, persons not otherwise eligible for such treatment. (P.L. 78-410, 58 Stat. L. 682.) Under this provision, the Clinical Center was later established. (Under this act, the Research Grants Office, January 1, 1946; the Experimental Biology and Medicine Institute and the National Microbiological Institute, November 1, 1948; and the Division of Research Services, January 1, 1956, were established.)

July 3, 1946—The National Mental Health Act was designed to improve the mental health of U.S. citizens through research into the causes, diagnosis, and treatment of psychiatric disorders. It authorized the Surgeon General to support research, training, and assistance to state mental health programs. (P.L. 79-487, 60 Stat. L. 421.) (The National Institute of Mental Health was established under the authority of this law on April 15, 1949.)

August 13, 1946—The Hospital Survey and Construction Act (Hill-Burton Act) authorized grants to the states for construction of hospitals and public health centers, for planning construction of additional facilities, and for surveying existing hospitals and other facilities. (P.L. 79-725, 60 Stat. L. 1040.)

July 8, 1947—Under P.L. 80-165, research construction provisions of the Appropriations Act for FY 1948 provided funds "for the acquisition of a site, and the preparation of plans, specifications, and drawings, for additional research buildings and

a 600-bed clinical research hospital and necessary accessory buildings related thereto to be used in general medical research...."

June 16, 1948—The National Heart Act authorized the National Heart Institute to conduct, assist, and foster research; provide training; and assist the states in the prevention, diagnosis, and treatment of heart diseases. In addition, the act changed the name of National *Institute* of Health to National *Institutes* of Health. (P.L. 80-655, 62 Stat. L. 464.)

June 24, 1948—The National Dental Research Act authorized the National Institute of Dental Research to conduct, assist, and foster dental research; provide training; and cooperate with the states in the prevention and control of dental diseases. (P.L. 80-755, 62 Stat. L. 598.)

1950

August 15, 1950—The Omnibus Medical Research Act authorized the Surgeon General to establish the National Institute of Neurological Diseases and Blindness, as well as additional institutes, to conduct and support research and research training relating to other diseases and groups of diseases. (P.L. 81-692, 64 Stat. L. 443.) (The National Institute of Arthritis and Metabolic Diseases and the National Institute of Neurological Diseases and Blindness were established under the authority of this act on November 22, 1950. Under this same act, the National Institute of Allergy and Infectious Diseases was established on December 29, 1955, replacing the National Microbiological Institute which was originally established November 1, 1948, under authority of section 202 of the PHS act.)

April 1, 1953—Reorganization plan #1 assigned the PHS to the new Department of Health, Education, and Welfare.

July 28, 1955—The Mental Health Study Act authorized the Surgeon General to award grants to non-governmental organizations for partial support of a nationwide study and reevaluation of the problems of mental illness. Under this act, the Joint Committee on Mental Illness and Health was awarded grant support for 3 years. (P.L. 84-182, 69 Stat. L. 381.)

July 3, 1956—The National Health Survey Act authorized the Surgeon General to survey sickness and disabilities in the United States on a sampling basis. (P.L. 84-652, 70 Stat. L. 489.)

July 28, 1956—The Alaska Mental Health Enabling Act provided for territorial treatment facilities to eliminate the need to transport the mentally ill outside Alaska. It also authorized PHS grants to Alaska for its mental health program. (P.L. 84-830, 70 Stat. L. 709.)

July 30, 1956—The Health Research Facilities Act of 1956 (Title VII of the PHS act) authorized a PHS program of Federal matching grants to public and nonprofit institutions for the construction of health research facilities. (P.L. 84-835, 70 Stat. L. 717.)

August 2, 1956—The Health Amendments Act of 1956 authorized the Surgeon General to assist in increasing the number of adequately trained nurses and professional public health personnel. It also authorized PHS grants to support the development of improved methods of care and treatment of the mentally ill. (P.L. 84-911, 70 Stat. L. 923.)

August 3, 1956—An amendment to Title III of the PHS act, the National Library of Medicine Act, placed the Armed Forces Medical Library under the PHS, and renamed it the National Library of Medicine. (P.L. 84-941.)

June 30, 1958—The Mutual Security Act of 1958 amended P.L. 83-480, authorizing the President to enter into agreements with friendly nations to use foreign currencies accruing under title I for collection, translation, and dissemination of scientific information and to conduct research and support scientific activities overseas. (P.L. 85-477.)

1960

July 12, 1960—Congress passed the International Health Research Act. The law authorized the Surgeon General to establish and make grants for fellowships in the United States and participating foreign countries; make grants or loans of equipment and other materials to participating foreign countries for use by public or nonprofit institutions and agencies; participate in international health meetings, conferences, and other activities; and facilitate the interchange of research scientists and experts between the United States and participating foreign countries. (P.L. 86-610, 74 Stat. L. 364.)

September 15, 1960—A law amended the PHS act to authorize grants-in-aid to universities, hospitals, laboratories, and other public and nonprofit institutions to strengthen their programs of research and research training in the sciences related to health. The act also authorized the use of funds appropriated for research or research training to be set aside by the Surgeon General in a special account for general research support grants. (P.L. 86-798, 74 Stat. L. 1053.)

October 17, 1962—An act authorized the Surgeon General to establish the National Institute of General Medical Sciences and the National Institute of Child Health and Human Development. The latter was authorized to conduct and support research and training relating to maternal health; child health; human development, in particular the special health problems of mothers and children; and the basic sciences relating to the processes of human growth and development. The former was authorized to conduct and support research in the basic medical sciences and related behavioral sciences that have significance for two or more institutes, or which are outside the general area of responsibility of any other institute. (P.L. 87-838, 76 Stat. L. 1072.) (On January 30, 1963, the NICHD and the NIGMS were established under this act.)

September 24, 1963—A law amended the Health Research Facilities Act of 1956 (Title VII to the PHS act) to allow grants for multipurpose facilities that would provide teaching space as well as essential research space. (P.L. 88-129, 77 Stat. L. 164.)

October 24, 1963—The Maternal and Child Health and Mental Retardation Planning Amendments of 1963 amended the Social Security Act of 1935 by authorizing a five-point grant program of $265 million, over a 5-year period. Major provisions designed to prevent mental retardation included increased Federal grants for maternal and child health services and crippled children's service administered by the Children's Bureau; a new 5-year program of grants to the states for health care of expectant mothers who have, or are likely to have, conditions associated with childbearing which may lead to mental retardation; funds for research to improve maternal and child health and crippled children's services; and grants to the states to assist in developing plans for comprehensive state and community programs to combat mental retardation. (P.L. 88-156, 77 Stat. L. 273.)

October 31, 1963—A companion measure to P.L. 88-156 was the Mental Retardation Facilities and Community Mental Health Centers Construction Act of 1963. This act authorized a total of $329 million over 5 years for grants to assist in the construction of mental retardation research centers and community mental health centers, and to train teachers of mentally retarded and other handicapped children. (P.L. 88-164, 77 Stat. L. 282.)

August 18, 1964—The Hospital and Medical Facilities Amendments of 1964 extended the Hospital Survey and Construction Act of 1946 (Hill-Burton Act) for 5 years with a total authorization of $1.4 billion. (P.L. 88-443, 78 Stat. L. 447.)

August 27, 1964—Graduate Public Health Training Amendments of 1964 extended the authorization for public health traineeships and training grants to schools of public health, nursing, and engineering for 5 years, through June 30, 1969. (P. L. 88-497, 78 Stat. L. 613.)

September 19, 1964—The Appropriations Act for 1965 included $10 million for establishment of a virus-leukemia program. (P.L. 88-605.)

August 4, 1965—The Mental Retardation Facilities and Community Mental Health Centers Construction Act Amendments of 1965 provided monies through FY 1972 to help finance initial staffing of community mental health centers

which were authorized in the original act; extended and increased appropriations authority for mental retardation education research and demonstration projects; and authorized increased annual funds through FY 1969 for training teachers of the handicapped young. (P.L. 89-105.)

August 9, 1965—The Health Research Facilities Amendments of 1965 extended the program for construction of health research facilities for 3 years with $280 million authorized for that period in lieu of the previous $50 million annual appropriations authorizations. (P.L. 89-115.)

August 31, 1965—A supplemental appropriations act resulting from recommendations of the President's Commission on Heart Disease, Cancer and Stroke provided an additional $20,250,000 (shared by NCI, NHI, NIGMS and NINDB) to intensify and expand support of research in the three major "killer" diseases. (P.L. 89-156.)

October 6, 1965—The Heart Disease, Cancer and Stroke Amendments of 1965 provided for establishment of regional cooperative programs in research, training, continuing education and demonstration activities in patient care among medical schools, clinical research institutions and hospitals so that the latest treatment methods for the three diseases may be more widely available to patients. Under this act, the Division of Regional Medical Programs was created February 1, 1966. (P.L. 89-239.)

October 22, 1965—The Medical Library Assistance Act was passed, authorizing NLM's extramural programs. (P.L. 89-291.)

August 3, 1968—A law authorized the designation of a national center for biomedical communications as the Lister Hill National Center for Biomedical Communications. (P.L. 90-456.)

August 16, 1968—An amendment to the PHS act authorized the secretary to establish a National Eye Institute and to rename NINDB the National Institute of Neurological Diseases. The new institute was formed from NINDB programs to conduct and support research for new treatment and cures, and training relating to blinding eye diseases and visual disorders. (P.L. 90-489.)

The Health Manpower Act of 1968 extended and expanded the following five health laws then in effect: Health Professions Educational Assistance Act of 1963, as amended; Nurse Training Act of 1964, as amended; Allied Health Professions Personnel Training Act of 1966; Health Research Facilities Act of 1956, as amended; and Public Health Service Act of 1944, as amended. The measure provided a 2-year extension, through FY 1971, of the above legislation except for the Allied Health Professions Act, extended only through FY 1970. (P.L. 90-490.)

October 24, 1968—The President signed legislation further amending the name of NIND to National Institute of Neurological Diseases and Stroke. (P.L. 90-639.)

1970

March 12, 1970—An amendment to the PHS act extended and made coterminous through June 30, 1973, the authority to make formula grants to schools of public health, project grants for graduate training in public health, and traineeships for professional public health personnel. (P.L. 91-208, 84 Stat. 52.)

March 13, 1970—The Medical Library Assistance Extension Act of 1970 amended the PHS act to improve and extend the provisions relating to assistance to medical libraries and related instrumentalities for 3 years through June 30, 1973. (P. L. 91-212, 84 Stat. 63.)

October 30, 1970—The PHS act was amended to provide: 1) extension of research contract authority in areas of public health through June 30, 1974; 2) authorization of mission-related clinical training (as well as research training) by the

NIGMS; 3) clarification of terms in the regulation of biological products; 4) clarifying and technical directives relating to appointment, compensation and functions of advisory councils and committees, and 5) extension of statutory authority for regional medical programs, comprehensive medical planning, and health services research and development. (P.L. 91-515.)

November 2, 1970—The Health Training Improvement Act of 1970 extended and amended allied health professions training authority (which expired June 30, 1970) and established eligibility of new health professions educational assistance schools for "start-up" grants. (P.L. 91-519.)

December 24, 1970—The Congress enacted the Family Planning Services and Population Research Act of 1970 to expand, improve and better coordinate family planning services and population research activities of the Federal Government. (P.L. 91-572.)

May 22, 1971—Congress passed into law the Supplemental Appropriations Bill, which included $100 million for cancer research. This appropriation was made in response to the President's State of the Union address, in which he called for "an intensive campaign to find a cure for cancer." The appropriation includes authority under grants and contracts, as well as direct construction authority for NCI. (P.L. 92-18.)

July 9, 1971—A law amended the Public Health Service Act to provide for extension of student loan scholarship programs for up to four fiscal years. (P.L. 92-52.)

November 18, 1971—The President signed the Comprehensive Health Manpower Training Act of 1971 to provide increased manpower in the health professions, and the Nurse Training Act of 1971 to provide training for increased numbers of nurses. (P.L. 92-157, P.L. 92-158.)

December 23, 1971—The National Cancer Act of 1971 enlarged the authorities of NCI and NIH in order to advance the national effort against cancer. The authority of the director, NCI, was expanded, a National Cancer Advisory Board was established, and appropriations in excess of $400 million were authorized for 1972, with further increases in subsequent years. (P.L. 92-218.)

May 16, 1972—The National Sickle Cell Anemia Control Act of 1972 became law and established a national program for diagnosis and treatment of, and counseling and research in, sickle cell disease. (P.L. 92-294.)

May 19, 1972—The need for further support of research and training in the field of digestive diseases was emphasized by adding a new section 434 to the PHS act and renaming NIAMD the National Institute of Arthritis, Metabolism, and Digestive Diseases. (P.L. 92-305.)

August 29, 1972—The National Cooley's Anemia Control Act authorized over $9 million for 3 years for research in the diagnosis and treatment of Cooley's anemia, and for counseling and public information programs. (P.L. 92-414.)

September 19, 1972—The National Heart, Blood Vessel, Lung, and Blood Act expanded the authorities of the National Heart and Lung Institute to augment the national effort against heart, lung, and blood diseases. Appropriations of $375 million for 1973 were authorized with further increases in subsequent years. (P.L. 92-423.)

October 25, 1972—The National Advisory Commission on Multiple Sclerosis Act established a commission charged to determine the most productive avenue of researching possible causes and cures of MS, and make specific recommendations for the maximum utilization of national resources directed toward MS. (P.L. 92-563.)

June 18, 1973—The Health Programs Extension Act of 1973 extended the medical library assistance programs of NLM (with the exception of the construction program) for 1 year. Population research and family planning activities were also extended through FY 1974, along with other Federal health programs. (P.L. 93-45.)

November 16, 1973—The Emergency Medical Services System Act of 1973 amended the PHS act to provide assistance and encouragement for the development of comprehensive area emergency medical services systems, including grants and contracts for the support of research in emergency medical techniques, methods, devices, and delivery. (P.L. 93-154.)

April 22, 1974—The Sudden Infant Death Syndrome Act of 1974 amended the PHS act to authorize specific and general research on the sudden infant death syndrome through the NICHD. The collection, analysis, and public dissemination of information and data and the support of counseling programs were also authorized. The act did not authorize specific funds for research, but did authorize appropriations of $9 million over a 3-year period for the other programs. (P.L. 93-270.)

May 31, 1974—The Research on Aging Act of 1974 established a National Institute on Aging. The act authorized the NIA to conduct and support biomedical, social, and behavioral research and training related to the aging process and the diseases and other special problems and needs of the aged. (P.L. 93-296.)

June 22, 1974—The Energy Supply and Coordination Act directed the secretary through NIEHS to study the effects of chronic exposure to sulfur oxides, and authorized $3.5 million for that purpose. (P.L. 93-319.)

July 12, 1974—The National Research Act of 1974 amended the PHS act by repealing existing research training and fellowship authorities and consolidating such authorities in the national research service awards authority. The NRSAs (both individual and institutional grants) are restricted on the basis of subject area shortages and would involve service obligations and payback provisions. The act established a temporary National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research within the department to make a comprehensive investigation of the ethical principles involved in biomedical and behavioral research (including psychosurgery and living fetus research), and to develop ethical guidelines for conducting such research. Also, a permanent National Advisory Council for the Protection of Subjects of Biomedical and Behavioral Research was to be established. (P.L. 93-348.)

July 23, 1974—The National Cancer Act Amendments of 1974 authorized $2.565 billion over a 3-year period to extend and improve the National Cancer Program as well as $210.5 million over 3 years for cancer control programs. The act also: 1) established the President's Biomedical Research Panel to make a comprehensive investigation of Federal biomedical and behavioral research; 2) extended indefinitely the research contract authority of section 301(h) of the PHS act; 3) provided that the director, NIH, shall be appointed by the President by and with the advice of the Senate; and 4) required peer review of NIH and ADAMHA grant applications and contract projects. (P.L. 93-352.)

The Health Services Research, Health Statistics, and Medical Libraries Act of 1974 extended and amended NLM program authorities ($37.5 million over a 2-year period). The act also extended the FIC's authority to engage in international cooperative efforts in health. (P.L. 93-353.)

The National Diabetes Mellitus Research and Education Act provided for regional research and training centers ($40 million authorized over a 3-year period), a long-range plan prepared by a National Commission on Diabetes, expanded research and training programs, a Diabetes Mellitus Coordinating Committee, and an associate director for diabetes in the National Institute of Arthritis, Metabolism, and Digestive Diseases. (P.L. 93-354.)

October 29, 1974—The Federal Fire Prevention and Control Act authorized $5 million and $8 million for fiscal years 1975-76 for establishment of 25 research and treatment centers, 25 burn units, and 90 burn programs by NIH. (P.L. 93-498.)

January 4, 1975—The National Arthritis Act established a National Commission on Arthritis and Related Musculoskeletal Diseases, authorized $2 million to develop a long-range plan involving research, training, services and data systems; established an associate director for arthritis in NIAMDD; and provided 3-year authorizations for arthritis screening, detection, prevention, and referral projects and for arthritis research and demonstration centers. (P.L. 93-640.)

July 29, 1975—A law extended and amended authorities of Title X relating to family planning and population research

and made Title X sole authority for all departmental extramural, collaborative, and intramural research in "biomedical, contraceptive development, behavioral, and program implementation fields related to family planning and population;" and created two temporary national commissions for the control of epilepsy and Huntington's disease. (P.L. 94-63.)

April 22, 1976—The Health Research and Health Services Amendments 1) extended authorization through FY 1977 and amended provisions governing the programs of the National Heart and Lung Institute, placed increased emphasis on blood-related research, and changed the institute's name to the National Heart, Lung, and Blood Institute; 2) mandated studies by the President's Biomedical Research Panel and the National Commission for the Protection of Human Subjects of the implications of public disclosure of information contained in grant applications and contract proposals; 3) authorized broad-based genetic diseases research under section 301 of the PHS act, and provided for programs of counseling, testing, and information dissemination about genetically transmitted diseases; and 4) extended authorization through FY 1977 for national research service awards for NIH and ADAMHA. The act prohibited consideration of political affiliation in making appointments to health advisory committees. (P.L. 94-278.)

October 19, 1976—The 1976 Arthritis, Diabetes, and Digestive Diseases Amendments 1) provided for an arthritis data system; 2) emphasized public information and encouragement of proper treatment for arthritis; 3) established a National Arthritis Advisory Board; 4) provided for a National Diabetes Board; and 5) established a National Commission on Digestive Diseases to develop a long-range plan for research. (P.L. 94-562.)

October 21, 1976—The Emergency Medical Services Amendments of 1976 extended the National Commission on Arthritis; extended the Commission for the Protection of Human Subjects of Biomedical and Behavioral Research; and authorized research and demonstration programs on burn injuries under Title XII of the PHS act. (P.L. 94-573.)

August 1, 1977—Health Planning and Health Services Research and Statistics Extension, Biomedical Research Extension, and Health Services Extension Acts of 1977 continued the following programs through September 30, 1978: the Medical Library Assistance Program; cancer research and control programs; heart, blood vessel, lung and blood disease research, prevention and control programs; national research service awards; population research and voluntary family planning programs; and sudden infant death syndrome information and counseling programs. It also extended various health service programs. (P.L. 95-83.)

August 7, 1977—The Clean Air Act Amendments established a coordinating committee to review and comment on plans, execution, and results of research relating to the stratosphere. NCI and NIEHS are members. It also established a Task Force on Environmental Cancer and Heart and Lung Disease, with NCI, NHLBI, and NIEHS among the members. (P.L. 95-95.)

September 29, 1977—The Food and Agriculture Act of 1977 designated the Department of Agriculture as the lead agency of the Federal Government for agricultural research (except with respect to the biomedical aspects of human nutrition concerned with diagnosis or treatment of disease). The act also required establishment of procedures for coordinating nutrition research in areas of mutual interest between DHEW and Department of Agriculture. (P.L. 95-113.)

November 9, 1977—The Federal Mine Safety and Health Amendments of 1977 gave the HEW secretary authority to appoint an advisory committee on coal or other mine health research. One member of this committee is to be the director of the NIH or delegate. (P.L. 95-164.)

November 23, 1977—The Saccharin Study and Labeling Act extended the Commission for the Protection of Human Subjects until November 1, 1978. (P.L. 95-203.)

November 9, 1978—The Family Planning, Population Research and SIDS Amendments authorized a 3-year extension for the aforementioned programs through FY 1981. This was the only authority for population research programs in NICHD, the Center for Population Research. (P.L. 95-613.)

Amendments to the Community Mental Health Centers Act authorized a 3-year extension for NLM programs, and NRSA's

expiring September 30, 1981, and a 2-year extension for each of the following: Community Mental Health Centers, NHLBI, and NCI. This legislation also authorized the secretary, HEW, to: 1) conduct studies and tests of substances for carcinogenicity, teratogenicity, mutagenicity and other harmful biological effects; 2) establish and conduct a comprehensive research program on the biological effects of low-level radiation; 3) conduct and support research and studies on human nutrition; and 4) publish an annual report which lists all substances known to be carcinogenic and to which a significant number of Americans are exposed. (P.L. 95-622.)

Other important provisions of this act included the authority given to the director of NIH to appoint 200 experts and consultants for the use of NIH components other than NCI and NHLBI and the establishment of the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research.

The Health Services Research, Health Statistics, and Health Care Technology Act of 1978 (P.L. 95-623) established in the Office of the Assistant Secretary for Health, the National Center for Health Care Technology, and reauthorized for 3 years the National Center for Health Statistics and the National Center for Health Services Research.

The legislation also established the National Council on Health Care Technology on which the director, NIH, serves as an ex officio member. The director, NIH, is required annually to submit to the center a listing of all technologies under development which appear likely to be used in the practice of medicine.

NLM is required to disseminate, publish, and make available all standards, norms, and criteria developed by the council concerning the use of particular health care technologies. (P.L. 95-623.)

October 17, 1979—The Department of Education Organization Act established a Department of Education and renamed the DHEW the Department of Health and Human Services. (P.L. 96-88.)

December 12, 1979—The Emergency Medical Services Systems Amendments and Sudden Infant Death Syndrome Amendments of 1979 required the NICHD to assure that "adequate amounts" of its appropriated dollars are used for research into identification of infants at risk of SIDS and for prevention of SIDS. In addition, the NICHD is required to provide information on expenditure of funds for these purposes, the number of SIDS grant applications received and approved, the latest research findings on SIDS, and estimate of needs for funds in succeeding years. (P.L. 96-142.)

December 29, 1979—P.L. 96-167 extended the tax exemption for NRSA's for 1 year.

P.L. 96-171 required that the NIH Director, in consultation with the secretary of transportation, conduct a study to determine the effect of aging on the ability of individuals to perform the duties of pilots. The report on the study was to be submitted to Congress within 1 year after enactment.

1980

September 26, 1980—P.L. 96-359 requires the HHS secretary to conduct a study to determine the long-term effects of hypochloremic metabolic ankylosis resulting from chloride-deficient formulas. The responsibility for the study was assigned to NICHD.

December 12, 1980—P.L. 96-517 revised the patent and trademark laws and in particular awarded title to the patent rights for inventions made with Federal assistance to nonprofit organizations and small businesses.

The Clinical Center was redesignated as the Warren Grant Magnuson Clinical Center of NIH. (P.L. 96-518.)

December 17, 1980—P.L. 96-538 reauthorized for 2 years programs for NHLBI and NCI; changed the name of the

NIAMDD to the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases, extensively revised its authorities, and reauthorized its programs for 3 years; and required the NINCDS to conduct a study and submit a report on spinal cord regeneration and other neurological research.

P.L. 96-541 extended for 1 year the tax exemption on NRSAs.

August 13, 1981—P.L. 97-35, the Omnibus Budget Reconciliation Act of 1981, reauthorized NRSAs for 2 years through FY 1983, reauthorized the Medical Libraries Assistance program for 1 year, and repealed the prohibition in Title X against using other PHS authority to fund population research, thus eliminating the need for reauthorizations for this program located in the NICHD.

July 22, 1982—The Small Business Innovation Development Act of 1982 requires that each Federal agency with an annual research and development budget exceeding $100 million set aside a certain portion of its extramural R&D budget for a Small Business Innovation Research (SBIR) program as follows: 0.2 percent in FY 1983; 0.6 percent in FY 1984; 1.0 percent in FY 1985; and 1.25 percent in FY 1986 and all subsequent years. (P.L. 97-219.)

September 3, 1982—The Tax Equity and Fiscal Responsibility Act of 1982 included among its provisions an extension of the partial exclusion of NRSAs from taxable gross income. This extension will expire at the end of calendar year 1983; during this time, the Treasury Department will complete a study of the taxability of NRSA's and other government educational grants which, like NRSA's, have payback or service requirements. (P.L. 97-248.)

January 4, 1983—The Orphan Drug Act made changes in the law to encourage development and marketing of orphan drugs (drugs for rare diseases or conditions which are not economically feasible for private industry to develop and market). The act included a requirement to prepare radioepidemiological tables relating radiation-related cancer to specific radiation doses, and a report on the risks of thyroid cancer associated with doses of I_{131}. These responsibilities were assigned to NIH and NCI respectively. The act further provided that NHLBI help develop and support not less than 10 comprehensive sickle cell centers. (P.L. 97-414.)

July 30, 1983—The supplemental appropriations for FY 1983 provided funds for PHS AIDS activities, $9.375 million of which was earmarked for NIH. This marked the first time the Congress directly appropriated money for AIDS research for NIH. The supplemental also provided $5.9 million for NLM and development of a Biomedical Information Communication Center in Portland, Oreg. (P.L. 98-63.).

October 1 and November 17, 1983—Continuing resolutions supported unauthorized NIH programs including NRSA and Medical Library Assistance. (P.L. 98-107 and P.L. 98-151.)

May 24, 1984—P.L. 98-297 designated the convent and surrounding land as the Mary Woodard Lasker Center for Health Research and Education.

October 12 and **November 8, 1984**—Appropriations legislation reauthorized NRSAs, provided construction funds for NIH, and medical library funding. (P.L. 98-473, P.L. 98-619.)

October 19, 1984—The National Organ Transplant Act authorized the secretary to establish a Task Force on Organ Procurement and Transplantation to examine relevant issues and report to the Congress within 12 months. Its membership included the director, NIH, ex officio. OMAR will sponsor the required conference on bone marrow transplantation. (P.L. 98-507.)

October 24, 1984—The Veterans' Dioxin and Radiation Exposure Compensation Standards Act required the director, NIH, to conduct a study of devices and techniques for determining previous radiation exposure and submit a report; to enter into an interagency agreement with the VA administrator to identify agencies capable of furnishing such services; and to provide an independent expert who could prepare radiation dose estimates for use by VA administrator in adjudicating

claims. (P.L. 98-542.)

October 30, 1984—The Health Promotion and Disease Prevention Amendments of 1984 amended the PHS act to extend provisions relating to health promotion and disease prevention and to establish centers for research and demonstration in those areas. It required that the director, NIH, be consulted as to procedures for peer review of applications; that NCHSR cooperate with NIH in its responsibilities pertaining to health care technologies; and that the director, NIH, serve on the newly established National Advisory Council on Health Care Technology Assessment. (P.L. 98-551.)

The Human Services Reauthorization Act, Title V, ordered the secretary, through NCI, to establish or support at least one facility for cancer screening and research in St. George, Utah, to be affiliated with a health science center and accessible to most residents of the areas that received greatest fallout from Nevada nuclear tests. (P.L. 98-558.)

August 15, 1985—The Orphan Drug Act was amended, establishing a 20-member National Commission on Orphan Diseases, to be appointed by the secretary (including NIH representative), to assess the activities of NIH and other entities in connection with research and dissemination of knowledge related to rare diseases. NIH was required to allocate to the commission $1 million from its FY 1986 appropriation. (P.L. 99-91.)

November 20, 1985—The Health Research Extension Act of 1985 reauthorized NIH programs for 3 years; established the National Institute of Arthritis and Musculoskeletal and Skin Diseases, renaming the remaining component the National Institute of Diabetes and Digestive and Kidney Diseases; created a new National Center for Nursing Research; established positions of associate director for prevention in OD, NCI, NHLBI, and NICHD; and required the development of guidelines for the care and use of laboratory animals. Additional provisions included establishment of committees to develop a plan for research into methods that reduce animal use or animal pain, to study research on lupus erythematosus, to study the NRSA program, to plan and develop Federal initiatives in spinal cord injury research, to study personnel for health needs of the elderly through the year 2020, to review research activities in learning disabilities, and to review the research programs of NIDDK. The act also established NIH and all of its ICD's in law and consolidated and made uniform many authorities and responsibilities of institute directors and advisory councils. (P.L. 99-158.)

December 12, 1985—Under the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm-Rudman-Hollings), aimed at reducing the Federal deficit to zero within 5 years, starting in FY 1986, budget authority was reduced in accordance with the deficit targets. For NIH this reduction amounted to $236 million. The revised total NIH appropriation after "sequestration" became $5.3 billion, 4.3 percent below the original FY 1986 appropriation. The mandated across-the-board reduction was applied again to the total amount appropriated to each NIH institute, to each research mechanism, and to each identified program, project, or activity. (P.L. 99-177.)

In the FY 1986 Labor-HHS-Education Appropriation bill, the number of new and competing renewal research project grants to be supported by NIH (6,100) was specified in law for the first time. The act, which included $5.498 billion for NIH, provided that $4.5 million of this amount be transferred to the departmental management account for construction of the Mary Babb Randolph Cancer Center in West Virginia and that $70 million for AIDS research be added to the account of the Office of the Director. (P.L . 99-178.)

December 23, 1985—The Food Security Act, title XVII, subtitle F, amended the Animal Welfare Act, requiring the secretary of agriculture to promulgate standards including exercise of dogs and consideration of the psychological well-being of primates, minimization of pain and distress, use of anesthetics, and consideration of alternatives; formation of an institutional animal committee at each research facility; and provision of annual training for those involved in animal care and treatment. An information service was established at the National Agricultural Library, in cooperation with NLM. Title XIV, subtitle B, required an assessment of existing scientific literature relating to dietary cholesterol and calcium to be conducted by the secretaries of agriculture and HHS. (P.L. 99-198.)

December 28, 1985—P.L. 99-231 designated 1986 as the "Sesquicentennial Year of the National Library of Medicine."

July 2, 1986—The Urgent Supplemental Appropriations Act provided an additional $6 million for NCI cancer research

and demonstration centers and specified that funds for the Clinical Center should be available for payment of nurses at rates of pay authorized for VA nurses. (P.L. 99-349.)

October 6, 1986—P.L. 99-443 amended the Small Business Act to extend by 5 years the Small Business Innovation Research Program.

October 16, 1986—P.L. 99-489 designated the period from October 1, 1986, through September 30, 1987, as "National Institutes of Health Centennial Year" and requested the President to issue a proclamation calling upon the people of the United States to observe the year with appropriate ceremonies and activities.

October 18, 1986—P.L. 99-500 and P.L. 99-591 (October 31, corrected version), making continuing appropriations for FY 1987, included $6.18 billion for NIH, a requirement to support 6,200 research project grants, funding for 10,700 research trainees and 559 centers; and $247.7 million in AIDS money for components.

October 20, 1986—The Federal Technology Transfer Act amended the Stevenson-Wydler Technology Innovation Act of 1980, authorizing directors of government-operated Federal laboratories to enter into collaborative R&D agreements with other government agencies, universities, and private organizations; established a Federal Laboratory Consortium in the National Bureau of Standards; and mandated that royalties received by a Federal agency be shared with the inventor. (P.L. 99-502.)

November 14, 1986—Title IX, the Alzheimer's Disease and Related Dementias Services Research Act, of P.L. 99-660 established an interagency council and an advisory panel on Alzheimer's disease (AD). It authorized the director, NIA, to make awards for distinguished research on AD, to plan for and conduct research, to establish an AD clearinghouse, to make a grant to or enter into a contract with a national organization representing Alzheimer's patients, to establish an information system and national toll-free telephone line, and to provide information to caregivers of Alzheimer's patients and to safety and transportation personnel. Title III—Vaccine Compensation—named the director, NIH, as an ex officio member of the newly established Advisory Commission on Childhood Vaccines.

July 11, 1987—The FY 1987 Supplemental Appropriations bill, P.L. 100-71, allocated funds to NIA for clinical trials, to NCNR and HRSA for studies related to the nurse shortage and nurse retention, and to OD/NIH for costs associated with pay raises and the new Federal Employees Retirement System.

September 29, 1987—The Balanced Budget and Emergency Deficit Control Reaffirmation Act of 1987 ("Gramm-Rudman-Hollings II") adjusted the original deficit target reduction in FY 1988 appropriations, including Labor-HHS-Education. (P.L. 100-119.)

October 8, 1987—P.L. 100-126 designated October 1, 1987, as "National Medical Research Day," acknowledging 100 years of contributions by NIH and other federally supported research institutions to improving the health and well-being of Americans and all humankind.

November 29, 1987—The Older Americans Act Amendments, Title III—Alzheimer's Disease Research, authorized the director, NIA, to provide for conduct of clinical trials on therapeutic agents for Alzheimer's disease recommended for further analysis by NIA and FDA. It also authorized the President to call a White House Conference on Aging in 1991. (P.L. 100-175.)

December 22, 1987—P.L. 100-202, making further continuing appropriations for the fiscal year ending September 30, 1988, provided $6.667 billion to NIH, including $448 million to be allocated among the institutes for AIDS. It also restricted forward or multiyear funding, required expeditious testing of experimental drugs for AIDS, and included $3.8 million for a National Center on Biotechnology Information within NLM.

September 20, 1988—The Labor-HHS-Education Appropriations Act, 1989, provided $7,152,207,000 for NIH (which

included a 1.2 percent across-the-board reduction and a $6.8 million reduction for procurement reform). Of the amount appropriated for NINCDS, up to $96,100,000 was to go to the new National Institute on Deafness and Other Communication Disorders, following enactment of authorizing legislation. The pay rate for NIH nurses and allied health specialists having direct patient care responsibilities was equated to that of nurses at the Veterans Administration. Fifteen million dollars was appropriated to develop specifications and design for a consolidated office building at NIH, $14 million for the new Building 49, and $5 million for renovation of AIDS facilities. In addition, a biotechnology training program was established, as well as human genome and biotechnology panels.

Funds were authorized to support no less than 13,252 FTEs, including an additional 200 for AIDS and 150 for non-AIDS. Funding was also authorized for new magnetic resonance imaging equipment at the cardiac energetic laboratory and for a National Bone Marrow Registry at NHLBI; $8.7 million was earmarked for AIDS clinical trials.

Building 31 was renamed the Claude Denson Pepper Building. (P.L. 100-436.)

September 22, 1988—The Treasury, Postal Service and General Government Appropriations Act, 1989, provided that no Federal agency could receive funds appropriated for FY 1989 unless it had in place a written policy ensuring that its workplaces were free from illegal use, possession, or distribution of controlled substances. This restriction also applied to grant recipients, contractors, and parties to other agreements. (Subsequent legislation required implementation of this law in January 1989.) (P.L . 100-440.)

September 29, 1988—The National Defense Authorization Act, FY 1989, provided a special pay retention bonus for medical officers below grade O-7 who met certain criteria. Although officers of the commissioned corps were not specifically mentioned, 42 U.S.C. 210(a) states that they shall receive special pay received by commissioned medical and dental officers of the Armed Forces. (P.L. 100-456.)

October 4, 1988—P.L. 100-471 amended the PHS act to authorize the secretary, HHS, to make grants to the states to provide drugs determined to prolong the life of individuals suffering from AIDS; $15 million was authorized to be appropriated through March 31, 1989. (Funds appropriated for FY 1989 were transferred from NIH and other PHS agencies to pay for this program, according to transfer authority contained in P.L. 100-436.)

October 28, 1988—The National Deafness and Other Communication Disorders Act of 1988 established that institute at NIH and renamed NINCDS the National Institute of Neurological Disorders and Stroke. The legislation included a program, a data system and information clearinghouse, centers, and an advisory board, as well as a Deafness and Other Communication Disorders Interagency Coordinating Committee, to be chaired by the director of NIH or designee. (P.L. 100-553.)

November 4, 1988—Title I of the Health Omnibus Programs Extension of 1988 (HOPE), the National Institute on Deafness and Other Communication Disorders and Health Research Extension Act of 1988, established the NIDCD and reauthorized expiring programs of NIH for 2 years. Since the new institute had already been established by P.L. 100-553, the provision in this bill is not valid. (P.L. 100-607)

A National Center for Biotechnology Information was established in the National Library of Medicine; the provision for VA pay for nurses and allied health professionals was reiterated; NCI, NHLBI, and NRSA programs were reauthorized; responsibility for the primary care training program was shifted to HRSA; the Interagency Technical Committee was abolished; the Alzheimer's disease provisions of P.L. 99-660 were shifted to the NIA section of the PHS act; the moratorium on fetal research was extended through November 4, 1990; funds were appropriated for the Biomedical Ethics Advisory Board and a report specified; the secretary was directed to consult with the director, NIH, on establishment of a National Commission on Sleep Disorders, which would include among the ex officio members the directors of NINCDS, NHLBI, NIMH, NIA, and NICHD, with a report and a plan required. Finally, the bill extended confidentiality provisions to subjects of all biomedical, behavioral, clinical, or other research, including research on mental health.

Title II, "Programs with Respect to Acquired Immune Deficiency Syndrome," laid the foundation for a Federal policy on AIDS. In addition to provisions for AIDS research, the bill included provisions for information dissemination, education, prevention,

anonymous testing, and establishment of a National Commission on AIDS. The review process for AIDS-related grants was expedited, provision was made for priority requests for personnel and administrative support, a clinical research review committee was established within NIAID, the AIDS outpatient capacity at the Clinical Center was doubled, community-based clinical trials were mandated, awards for international clinical research were authorized, research centers were supported, and information services were expanded. An Office of AIDS Research was established within OD. Title VI, the Health Professions Reauthorization Act of 1988, established a loan repayment program for scientists who agree to conduct AIDS research while employed at NIH. (P.L. 100-607.)

November 21, 1989—Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 1990, provided for the purchase of an advanced design supercomputer and named four NIH buildings for members of Congress. (P. L. 101-166)

November 29, 1989—An act to provide for the construction of biomedical facilities in order to ensure a continued supply of specialized strains of mice essential to biomedical research in the United States, and for other purposes, provided authority to make construction grants for this purpose. (P.L. 100-190)

1990

August 18, 1990—Ryan White Comprehensive AIDS Resources Emergency Act of 1990, authorized NIH to make demonstration grants to community health centers and other entities providing primary health care and servicing a significant number of pediatric patients and pregnant women with HIV disease. Awardees were to provide clinical data to NIH for evaluation. (P.L. 101-381)

November 5, 1990—Omnibus Budget Reconciliation Act of Response, Compensation, and Liability Act of 1980 (under which NIEHS operates some programs) and called on the secretary, with NCI, to review periodically the appropriate frequency for performing screening mammography.

Treasury, Postal Service and General Government Appropriations Act, 1991, established the PHS senior biomedical research service. (P.L. 101-509)

Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 1991, provided for the first time, a 1 percent NIH director's transfer authority for high-priority activities and capped the NIH contribution for salaries for individuals receiving extramural funding. (P.L. 101-517)

November 15, 1990—Clean Air Act Amendments of 1990, required NIEHS to conduct a study of mercury exposure; to be available, with NCI, for membership on a panel for the Mickey Leland Urban Air Toxics Research Center and an inter-agency task force on air pollution; and authorized an NIEHS program of basic research on human health risks from air pollutants. (P.L. 101-549)

Home Health Care and Alzheimer's Disease Amendments of 1990, broadened the authority for Alzheimer's disease research centers and authorized Claude D. Pepper Older Americans Independence Centers grants. (P.L. 101-557)

November 16, 1990—The NIH Amendments of 1990, had two purposes: it authorized a nonprofit organization the National Foundation for Biomedical Research (membership amended by P.L. 102-170) and created NICHD's National Center for Medical Rehabilitation Research. (P.L. 101-613)

Hazardous Materials Transportation Uniform Safety Act of 1990, authorized NIEHS to provide grants for the training and education of workers who are or may be engaged in activities related to hazardous waste removal, containment or emergency response. (P.L. 101-615)

Transplant Amendments of 1990, reauthorized and amended the PHS act as it concerns the National Bone Marrow Donor Registry in the NHLBI and called for the establishment of national standards and procedures. (P.L. 101-616)

August 14, 1991—Terry Beirn Community Based AIDS Research Initiative Act of 1991, authorized this initiative in the PHS act and NIAID. (P.L. 102-96)

November 26, 1991—Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 1992, established NCI's Matsunaga-Conte Prostate Cancer Research Center, a women's health study, and provided authority to transfer funds to emergency activities. (P.L. 102-170)

December 9, 1991—The High Performance Computing Act of 1991, authorized Federal agencies such as NIH to allow recipients of research grant funds to pay for computer networking expenses. (P.L. 102-194)

February 4, 1992—The American Technology Preeminence Act of 1991 gave authority to the directors of Federal laboratories (NIH) to give research equipment that is excess to the needs of the laboratory to an educational institution or nonprofit organization for the conduct of technical and scientific education and research activities (P.L. 102-245)

July 10, 1992—The Alcohol, Drug Abuse, and Mental Health (ADAMHA) Reorganization Act, amended by the PHS act to provide for the incorporation of the three ADAMHA research institutes —NIMH, NIAAA, and NIDA—into the NIH as of October 1, 1992. A new PHS act section 409 was added and defined "health services research" as research endeavors that study the impact of organization, financing, and management of health services of the quality, cost, access to and outcomes of care. This is an entirely new programmatic undertaking for NIH and these three new institutes. Of particular interest are provisions that authorize a bypass budget for these three institutes for FY 1994 and 1995. (P.L. 102-321)

October 13, 1992—The DES Education and Research Amendments of 1992, require the director, NIH, to establish a program for the conduct and support of research and training, dissemination of health information, and other programs with respect to the diagnosis and treatment of conditions associated with exposure to DES. (P.L. 102-409)

The Agency for Health Care Policy and Research Reauthorization Act of 1992, requires that the NLM establish an information center on health service research, and on selected technology assessments and clinical practice guidelines produced by AHCPR and other public and private sources. The AHCPR administrator, in consultation with the NLM director, is required to develop and publish criteria for the inclusion of practice guidelines and technology assessments in the information center database. (P.L. 102-410)

October 24, 1992—The Cancer Registries Act requires the establishment of a national program of cancer registries, with the overall goal being the assurance of minimal standards for quality and completeness of (cancer) case information. Provisions also require the DHHS secretary, acting through the NCI director, to conduct a study for the purpose of determining the factors contributing to the fact that breast cancer mortality rates in 9 states and the District of Columbia are elevated compared to rates in the other 43 states. (P.L. 102-515)

The Energy Policy Act of 1992 authorizes electric and magnetic fields research and public information activities by the NIEHS director. (P.L. 102-486)

October 26, 1992—The Preventive Health Amendments of 1992 provide authorities regarding the coordination of Federal programs related to preventable cases of infertility arising as a result of sexually transmitted diseases; also delineates coordination between the director, CDC, and director, NIH. (P.L. 102-531)

October 28, 1992—The Small Business Innovation Research and Development and Enhancement Act of 1992 reauthorizes the SBIR program through September 30, 2000, and increases set aside percentages for each Federal agency with an extramural budget for research and development in excess of $100 million in FY 1992 (1.25 percent) upward to 2.5 percent by 1997 and onward. Legislation also requires enhancement of agency outreach efforts to increase participation of

women-owned and socially and economically disadvantaged small business concerns, and tracking of awards to document their participation in the program. (P.L. 102-564)

The Housing and Community Development Act of 1992 requires the secretary, HHS, acting through the director, CDC, and director, NIEHS, to jointly conduct a study of the sources of lead exposure in children who have elevated blood lead levels (or other indicators of elevated lead body burden) as defined by the director, CDC. (P.L. 102-550)

November 4, 1992—The National Aeronautics and Space Administration (NASA) Authorization Act includes provisions offered as an amendment requiring NIH and NASA to jointly establish a working group, with equal representation from NASA and NIH, to coordinate biomedical research activities in areas where microgravity environment may contribute to significant progress in the understanding and treatment of diseases and other medical conditions; establishment of a joint program of biomedical research grants in the above described areas, where such research requires access to a microgravity environment, and annual issuance of joint research opportunity announcements; creation of a joint program of graduate research fellowships in biomedical research; and establishment and submission of a plan for the "conduct of joint biomedical research activities by the republics of the former Soviet Union and the United States." (P.L. 102-588)

June 10, 1993—The NIH Revitalization Act of 1993 reauthorized certain expiring authorities of the NIH; mandated establishment of the Office of Research Integrity in DHHS; lifted the moratorium on human fetal tissue transplantation research; mandated inclusion of women and minorities in clinical research protocols; created in statute the Office of Alternative Medicine, the Office of Research on Women's Health, the Office of Research on Minority Health, the Office of Biobehavioral and Social Sciences Research, and the National Center for Human Genome Research; mandated establishment of an intramural laboratory and clinical research program on obstetrics and gynecology within NICHD and the National Center on Sleep Disorders Research in NHLBI; codified in statute the establishment of the Office of AIDS Research, and strengthened and expanded its authorities, including authorizing OAR receipt of all appropriated AIDS funds for distribution to the ICs; authorized the establishment of an NIH director's discretionary fund; provided the director, NIH, with extramural construction authority; required from extramural construction funds a $5 million set aside for Centers of Excellence; mandated establishment of the IDeA program; required the NCI to conduct the Long Island breast cancer study; authorized establishment of scholarship and loan repayment programs for individuals from disadvantaged backgrounds; changed the designation from center to institute for NINR and from division to center for the Division of Blood Resources, NHLBI; and provided other new NIH authorities and directives. (P.L. 103-43)

August 3, 1993—The Government Performance and Results Act of 1993 seeks to curb fraud waste and mismanagement in the operation of the Federal Government by establishing performance standards. (P.L. 103-62)

December 14, 1993—The Preventive Health Amendments of 1993 required the director, NIAID, to conduct or support research and research training regarding the cause, early detection, prevention and treatment of tuberculosis, and authorized to be appropriated $50 million for FY 1994 and such sums as necessary for FYs 1995-98. (P.L. 103-183)

September 30, 1994—The Department of Labor, HHS, and Education Appropriations Act, 1995, provided for the first time a consolidated appropriation for NIH AIDS research to the Office of AIDS Research. (P.L. 103-333)

October 25, 1994—The Dietary Supplement Health and Education Act of 1993 mandated establishment of an Office of Dietary Supplements within NIH to conduct and coordinate NIH research relating to dietary supplements and the extent to which their use reduces the risk of certain diseases. (P.L. 103-417)

May 22, 1995—The Paperwork Reduction Act of 1995 amends the U.S. Code to reduce by 5 percent the Federal paperwork burdens imposed on individuals, small businesses, state and local governments, education and nonprofit institutions and Federal contractors; also had the effect of establishing in statute the NIH Office of Information Resources Management. (P.L. 104-13)

December 21, 1995—The Federal Reports Elimination and Sunset Act of 1995 provides for improvement of the efficiency of agency operations by reducing staff time and resources spent on producing "unnecessary" reports to Congress. (P.L. 104-66)

November 1, 1995—The Biotechnology Process Patents Protection Act of 1995 strengthens patent protection and clarifies the circumstances under which a patent using biotechnological processes can be issued; allows U.S. researchers to enforce their patents claiming a certain starting material against the unfair importation of products made overseas using such material; and stops international theft of intellectual property; and makes U.S. patent law consistent with that of the Europeans and the Japanese. (P.L. 104-41)

January 26, 1996—The Balanced Budget Downpayment Act I, a continuing resolution, contained an amendment prohibiting the use of NIH funds for human embryo research; and cited NIH's FY 1996 funding in P.L. 104-91, such that the prohibition would continue for the duration of the FY 1996 funding year. (P.L. 104-99)

March 7, 1996—The National Technology Transfer and Advancement act of 1995 amended the Stevenson-Wydler Technology Innovation Act of 1980 with respect to reinvention made under Cooperative Research and Development Agreements; addressed the assignment of intellectual property rights and the use and deregulation of royalty income. (P.L. 104-113)

April 24, 1996—The Antiterrorism and Effective Death Penalty Act of 1996 required that the Secretary, HHS, establish safety procedures for use of biological agents, training in handling and proper laboratory containment, safeguards to prevent their use for criminal purposes, and procedures to protect the public safety. The act provided, however, that the Secretary must ensure availability of biological agents for research purposes. (P.L. 104-132)

May 20, 1996—The Ryan White CARE Reauthorization Act revised and extended authorization of the 1990 act, which provided for care and services for persons living with HIV/AIDS. Title IV provisions require the administrator, HRSA, to consult with the director, NIH, in carrying out a grants program to provide health care and opportunities for women, infants, children, and youth to participate as voluntary subjects of clinical research on HIV disease that is of potential benefit to them. (P.L. 104-146)

July 29, 1996—The Traumatic Brain Injury Act amended the PHS Act to provide for the conduct of expanded studies and establishment of innovative programs with respect to traumatic brain injury. The act authorizes the Secretary, acting through the director, NIH, to award grants or contracts for the conduct of basic and applied research regarding traumatic brain injury. (P.L. 104-166)

August 6, 1996—The Safe Drinking Water Act amendments reauthorized the Safe Drinking Water Act, toughened standards and required the Environmental Protection Agency to consult with NIH and the CDC in announcing an interim national primary drinking water regulation for a contaminant in the case of an urgent threat to public health. (P.L. 104-182)

October 2, 1996—The Electronic Freedom of Information Act established the right of the public to obtain access to Agency records, including electronically stored documents, and requires Federal agencies to make available certain Agency information to the public for inspection and copying. (P.L. 104-231)

October 18, 1996—The General Accounting Office Management Reform Act amended the PHS Act to limit the amount NIH may obligate for administrative expenses each fiscal year and repealed a requirement that the U.S. Comptroller General conduct, audit, and report to the Congress regarding the National Foundation for Biomedical Research. (P.L. 104-316)

September 30, 1996—The FY 1997 Labor, HHS, and Education Appropriations Act continued the prohibition on use of NIH funds for human embryo research. The act provided for construction of the new Mark O. Hatfield Clinical Research Center. (P.L. 104-208)

July 3, 1997—Section 2118 of the Energy Policy Act of 1992 was amended to extend the Electric and Magnetic Fields Research and Public Information Dissemination Program, a joint U.S. Department of Energy and NIEHS venture, for 1 year. (P.L. 105-23)

August 5, 1997—The Balanced Budget Act authorized a $150 million increase for research on the prevention and care of type-1 diabetes. (P.L.105-33)

November 21, 1997—The Food and Drug Administration Regulatory Modernization Act of 1997 directed NIH, in coordination with the CDC, to develop and maintain a database and information service that provides centralized information on research, treatment, detection, and prevention activities related to serious or life-threatening diseases. The act also directed NIH, the FDA, and medical and scientific societies to identify published and unpublished studies by clinicians and researchers that may support a supplemental application for a licensed product and to encourage manufacturers to submit a supplemental application or to conduct further research to support a supplemental application. (P.L. 105-115)

December 2, 1997—The Small Business Reauthorization Act, reauthorized the Small Business Technology Transfer (STTR) program for 4 years and required that the STTR program information be submitted as a part of Federal agency performance plans and be made available to the Congress. (P.L. 105-135)

December 17, 1997—The Federal Advisory Committee Act Amendment included provisions that permit the public to attend taxpayer-funded advisory committee meetings and receive minutes and other documents prepared for or by such committees. (P.L. 105-153)

June 23, 1998—The Agricultural Research, Extension, and Education Reform Act of 1998 required the Secretary, U.S. Department of Agriculture, to establish a Food Safety Research Information Office whose activities are carried out in cooperation with the NIH, the FDA, CDC, and public and private institutions. (P.L. 105-185)

July 16, 1998—The National Marrow Donor Program was reauthorized. (P.L. 105-196)

August 7, 1998—The Workforce Investment Partnership Act of 1997 is omnibus legislation that created in statute an Interagency Committee on Disability Research whose membership includes the directors of NIH and NIMH. (P.L. 105-220)

October 9, 1998—The Mammography Quality Standards Reauthorization Act reauthorized through FY 2002 such sums as may be necessary for the award of grants for breast cancer screening surveillance research. (P.L. 105-248)

October 19, 1998—The Federal Employees Health Care Protection Act of 1998 contained a provision to raise the cap from $20,000 to $30,000 for the Physician's Comparability Allowance (PCA). The PCA is subject to "applicable limitations," including aggregate compensation limitation. (P.L. 105-266)

October 21, 1998—The Appropriations for the Department of Veterans Affairs and Housing and Urban Development for FY 1999 provided appropriations for the NIEHS Superfund Worker Training Program and for the NIEHS Superfund Research Program. (P.L. 105-276)

October 21, 1998—FY 1999 Treasury and General Government Appropriations prohibited interagency financing of commissions, councils, committees, or similar groups. Section 622 prohibited Federal agencies from purchasing information technology that is not Year 2000 compliant unless the agency's chief information officer determines that noncompliance would be necessary to the function and operation of the agency.

October 21, 1998—The Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, created in statute at NIH the National Center for Complementary and Alternative Medicine; renamed the NIDR as the National Institute of Dental and Craniofacial Research; and named two new NIH buildings after retiring members of Congress: 1) the Louis Stokes Laboratories and 2) the Dale and Betty Bumpers Vaccine Research Facility.

The act continued human embryo research prohibition, the NIH director's transfer authorities, and third-party payment authority for the NIH Clinical Center. In addition, permanent authority was provided to NIH for transit subsidies for non-full-

time equivalent bearing positions, including visiting fellows, trainees, and volunteers. General provisions were provided for prohibition on the use of funds for programs for sterile needle distribution; and a prohibition on the use of funds for promoting legalization of controlled substances, except where there is evidence of therapeutic advantage or that federally sponsored clinical trials are being conducted to determine advantage.

This act authorized NICHD to be represented on a peer review panel established by the Secretary of Education to review applications from the states for scientifically based reading research activities.

Provisions included amendment of OMB Circular A-110, requiring Federal funding agencies to ensure that all data produced under an award will be made available to the public through the procedures established under the Freedom of Information Act.

The director of the Office of National Drug Control Policy was directed to consult with the directors of appropriate NIH institutes to establish criteria for evaluation of substance abuse treatment and prevention programs.

The conference report included the following:

- Directive language for the NCI on prostate cancer research.
- The NIDDK and other ICs were urged to expand funding for juvenile diabetes.
- The NIEHS and ORMH would enhance support for environmental health effects/minority health centers; NIEHS is to work with NIOSH on the national occupational research agenda (NORA).
- NIA is to launch a full-scale prevention initiative for Alzheimer's disease and is to work with NIOSH on NORA.
- The NIAMS is to expand research on Osteogenesis Imperfecta.
- The Office of Rare Diseases is to develop an information program on biological samples and human cell and tissue banks available for research purposes.
- The Office of Behavioral and Social Sciences Research is urged to establish two to five mind/body centers.
- NIH is to focus resources on the cause and treatment for Parkinson's disease.
- NIH is to enhance research on Multiple Sclerosis and other autoimmune disorders. (P.L. 105-78)

October 28, 1998—The Next Generation Internet Research Act of 1998 amended the High-Performance Computing Act of 1991 to authorize Government-funded research into high-capacity, high-speed computer networks. (P.L. 105-305)

October 31, 1998—The Women's Health Research and Prevention Amendments of 1998 extended and/or amended various NIH authorities related to women's health research, including: the drug DES (diethylstilbestrol); osteoporosis, Paget's disease and related disorders; breast, ovarian and related cancers; heart attack, stroke, and other cardiovascular diseases; aging processes; and the Office of Research on Women's Health. (P.L. 105-340)

November 10, 1998—The Federal Reports Elimination Act of 1998 provided for the elimination of the following reports of particular interest to NIH: Report of the Council on Alzheimer's Disease; Report on the U.S.-Japan Cooperative Medical Science Program; Report of the Interagency Coordinating Committee on Arthritis and Musculoskeletal and Skin Diseases; Report on Family Planning and Population Research; Report of the NICHD Associate Director for Prevention; Report on Health Services Research; Annual Reports of the National Diabetes Advisory Board, National Digestive Diseases Advisory Board, and National Kidney and Urologic Diseases Advisory Board; Public Health Service Report; Annual Report on Disease Prevention; and Annual Report on Administrative Expenses. (P.L. 105-362)

November 13, 1998—The Health Professions Education Partnership Act reauthorized and consolidated health professions, nursing, and minority and disadvantaged health education programs within the Department of Health and Human Services. The act provided additional research training and Title 38 appointment authorities for the NIH director; reauthorized the NIH AIDS loan repayment program (LRP); and increased the maximum annual loan repayment from $20,000 to $35,000 for this and other NIH LRPs; authorized tax relief benefits for participants in the NIH Clinical Researchers from Disadvantaged Backgrounds LRP; and made discretionary the National Center for Research Resources director's authority for construction awards to the regional primate research centers and reduced the amount that may be reserved from $5.0 million to $2.5 million. (P.L. 105-392)

November 20, 1999—Federal Financial Assistance Management Improvement Act of 1999 required agencies to develop plans to streamline grant administration activities. OMB was directed to 1) develop a common application, or set of common applications, for applying for Federal assistance; 2) develop a common system, including electronic processes, for grant administration activities; and 3) develop uniform administrative rules for Federal financial assistance programs across different agencies. (P.L. 106-107)

November 29, 1999—Omnibus Appropriations for NIH, Fiscal Year 2000, provided NIH with an increase of $2.3 billion over FY 1999. This legislation also included the Newborn and Infant Screening and Intervention Act which directed the National Institute on Deafness and Other Communication Disorders (NIDCD) to carry out a program of research on the efficacy of new screening techniques and technology, including clinical trials of screening methods, studies on the efficacy of intervention, and related basic and applied research on hearing loss in newborns. (P.L. 106-113)

December 6, 1999—Healthcare Research and Quality Act reauthorized and renamed the Agency for Health Care Policy and Research as the Agency for Healthcare Research and Quality (AHRQ). Provisions required the AHRQ Director, to promote innovation in evidence-based clinical practice and healthcare technologies to consult with the NIH Director and work with the National Library of Medicine to develop an electronic clearinghouse of currently available assessments and those in progress. The NIH Director will serve on the AHRQ Advisory Council as an ex oficio member. (P.L. 106-129)

2000

June 30, 2000—The Electronic Signatures in Global and National Commerce Act mandated that electronic contracts with electronic signatures have the same legal force as paper contracts. (P.L. 106-229).

July 10, 2000—The Radiation Exposure Compensation Act (RECA) Amendments of 2000 amended the Public Health Service Act to establish a grant program to States for education, prevention, and early detection of radiogenic cancers and diseases. Entities eligible to receive such grants include National Cancer Institute-designated cancer centers. The competitive grants would be made by the Secretary of Health and Human Services, acting through the Administrator of the Health Resources and Services Administration, in consultation with the Directors of the National Institutes of Health and Indian Health Service. (P.L. 106-245)

July 13, 2000—The Emergency Supplemental Act, Fiscal Year 2000, repealed Section 216 of P.L. 106-113, the Omnibus Consolidated Appropriations Act, which funded the NIH for fiscal year (FY) 2000. Section 216 of that Act specified that $3 billion of the funds appropriated for NIH were not available for obligation until September 29, 2000, and would not be available for obligation until October 15, 2000. This provision was repealed, thus releasing the funds for use prior to September 29, 2000. (P.L. 106-246)

July 28, 2000—The Semipostal Authorization Act amended the Postal Service Reorganization Act to extend the authority to issue semipostal stamps for breast cancer research until July 29, 2002. Seventy percent of the profits of this stamp go to the NIH to fund breast cancer research and thirty percent go to the U.S. Department of Defense for its breast cancer research program. Appropriations to NIH was not affected by any proceeds received from the sale of semipostal stamps. (P. L. 106-253)

October 17, 2000—The Children's Health Act of 2000 authorized Federal programs for research and other activities related to autism, Fragile X, juvenile arthritis, juvenile diabetes, asthma, hearing loss, epilepsy, traumatic brain injuries, childhood skeletal malignancies, muscular dystrophy, autoimmune diseases, birth defects and genetic mental impairment, among other conditions. The bill also required an NIH pediatric research initiative within the Office of the Director, NIH, with provisions addressing loan repayment for pediatric researchers and pediatric research human subject protections. (P.L. 106-310)

October 17, 2000—The American Competitiveness in the 21st Century Act of 2000 increased the cap on the number of

H1-B visas from 115,000 to 195,000 each year for the next 3 years. The legislation eliminated the cap on H1-B visas for government, academic, non-profit and affiliated workers. (P.L. 106-313)

October 20, 2000—The Ryan White CARE Act Amendments of 2000 provisions required an NIH review of the distribution and availability of ongoing and appropriate HIV/AIDS research projects to existing Ryan White sites for the purpose of enhancing and expanding voluntary access to HIV-related research, particularly in communities underserved by such projects. In addition, the NIH is required to conduct research on development of rapid diagnostic test kits. (P.L. 106-345)

November 1, 2000—The Technology Transfer Commercialization Act of 1999 is intended to "improve the ability of Federal agencies to license Federally-owned inventions." (P.L. 106-404)

November 6, 2000—The Needlestick Safety and Prevention Act required changes in the blood-borne pathogens standards in effect under the Occupational Safety and Health Act of 1970 to protect workers whose occupations expose them to pathogens such as HIV. Employers are required to use needles and other medical devices that have built-in safety mechanisms to reduce accidental punctures and to keep a log of needlestick injuries that would protect confidentiality of injured employees. (P.L. 106-430)

November 13, 2000—The Older Americans Act of 2000 required a White House Conference on Aging to be convened no later than December 31, 2005, to make fundamental policy recommendations regarding programs that are important to older individuals, and to the families and communities of such individuals. The Conference is to be planned and conducted under the direction of the Secretary, in cooperation with other federal agencies, including the Director of the National Institute on Aging. H.R. 782 will now proceed to the Senate for consideration. The legislation reauthorizes and amends the Older American's Act of 1965 and the Older Americans Act Amendments of 1987. (P.L. 106-501)

November 13, 2000—The Public Health Improvement Act of 2000 is a compilation of bills which amended the Public Health Service Act and provided new authorities to NIH and other Public Health Service agencies, or placed in statute ongoing activities or programs. This law provided the following: 1) established in statute the National Center for Research Resources (NCRR's) general clinical research centers, the NIH Career Awards in Patient-Oriented Research, which include the Mentored Patient-Oriented Research Career Development Award (K23), the Mid-Career Investigator Award in Patient-Oriented Research (K24), and the Clinical Research Curriculum Award (K30); 2) required the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) to expand and intensify research and related activities regarding lupus; 3) substantially increased the authorization for NIH extramural facilities construction and authorized $100 million to allow the continued operation of NCRR's Shared Instrumentation Grant Program; 4) established in statute an extramural clinical loan repayment program for qualified health professionals who agree to conduct clinical research; 5) created in statute the Alzheimer's Disease Clinical Research and Training program within the National Institute on Aging (NIA); 6) extended the current authority to conduct basic and clinical research in combating prostate cancer research at the National Cancer Institute; 7) directed NIH to evaluate the effectiveness of screening strategies; and 8) included a technical amendment to the Children's Health Act of 2000 (Public Law 106-310) which corrects an inaccurate citation to a provision in the Code of Federal Regulations. (P.L. 106-505)

November 22, 2000—The Minority Health and Health Disparities Research and Education Act of 2000 created in statute a National Center on Minority Health and Health Disparities at the NIH to coordinate: 1) health disparities research performed or supported by NIH, 2) a grant program through the new Center to further biomedical and behavioral research education and training, 3) an endowment program to facilitate minority and other health disparities research at centers of excellence, and 4) a loan repayment program to train members of minority or other health disparities populations as biomedical research professionals. (P.L. 106-525)

December 19, 2000—The Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) Authorization Act of 2000 codifies the existing ICCVAM as a permanent standing committee to be administered by the National Institute on Environmental Health Sciences. The statute requires the ICCVAM to establish, wherever feasible, guidelines, recommendations, and regulations that promote the regulatory acceptance of new or revised scientifically valid toxicological tests that protect human and animal health and the environment while reducing animal tests and ensuring human safety and product effectiveness. (P.L. 106-545)

December 20, 2000—The Chimpanzee Health Improvement, Maintenance, and Protection Act requires NIH to enter into a contract with a nonprofit private entity for the purpose of operating a sanctuary system for the long-term care of chimpanzees that are no longer needed in research conducted or supported by the NIH, the Food and Drug Administration, and other Federal agencies. The law provides for standards for permanent retirement of chimpanzees into the system, including prohibiting using sanctuary chimpanzees for research except in specified circumstances. (P.L. 106-551)

December 21, 2000—The Consolidated Appropriations Act, 2001, provides funding for the U.S. Departments of Labor, Health and Human Services (HHS) and Education; the legislative branch; and the Treasury and Postal Service, and H.R. 5667, the Small Business Reauthorization Act. For the NIH this law provides an appropriation of a $2.523 billion, or 14 percent increase over fiscal year 2000. Specific provisions of the law: 1) provides $47.3 million within Buildings and Facilities for the National Neuroscience Research Center, to be named the John Edward Porter Neurosciences Research Center; 2) permits the Director of NIH to enter into and administer a longterm lease for facilities for the purpose of providing laboratory, office and other space for biomedical and behavioral research at the Bayview Campus in Baltimore, Maryland; 3) expands the intramural loan repayment program for clinical researchers from disadvantaged backgrounds to the extramural community; and 4) raises the salary cap for extramural investigators to Executive Level I from Level II. (P.L. 106-554)

December 28, 2000—The Federal Physicians Comparability Allowance Amendments of 2000 makes physician comparability allowances a permanent authority and requires the allowances to be treated as part of basic pay for retirement purposes. (P.L. 106-571)

December 29, 2000—The National Institute of Biomedical Imaging and Bioengineering Establishment Act amends the Public Health Service Act to create at NIH the National Institute of Biomedical Imaging and Bioengineering. The statute authorizes an amount equal to (plus inflation) the amount currently spent by NIH Institutes for imaging and engineering programs. In establishing the Institute, the Director of NIH is authorized to transfer personnel, use appropriate facilities to house the new Institute, and obtain administrative support from other agencies of NIH. The Institute is required to have a 12-member advisory council, and prepare a plan to address the consolidation and coordination of NIH biomedical imaging and engineering programs, as well as related activities of other Federal agencies. (P.L. 106-580)

May 24, 2001—The Animal Disease Risk Assessment, Prevention and Control Act of 2001 mandates that the Secretary of Agriculture submit a final report to Congress on plans by Federal agencies (including the National Institutes of Health and the Agriculture Research Service and Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture) to carry out in partnership with the private sector 1) research programs into the causes and mechanisms of transmission of foot and mouth disease and bovine spongiform encephalopathy (BSE), variant Creutzfeldt-Jacob disease, and related disease, and 2) diagnostic tools and preventive and therapeutic agents needed for foot and mouth disease, BSE, variant Creutzfeldt-Jacob disease, and related diseases. In addition, this legislation mandates that the final report to Congress contain plans by Federal agencies (including the Centers for Disease Control and Prevention) 1) to monitor the incidence and prevalence of the transmission of foot and mouth disease, BSE, variant Creutzfeldt-Jacob disease, and related diseases in the United States; and 2) to assess the effectiveness of efforts to prevent and control the spread of foot and mouth disease, BSE, variant Creutzfeldt-Jacob disease, and related diseases in the United States. (P.L. 107-9)

July 24, 2001—The 2001 Supplemental Appropriations Act included 1) provisions to permit the transfer of funds from the National Library of Medicine (NLM) to the National Institutes of Health (NIH) Buildings and Facilities account to complete the design phase of a new NLM facility, 2) report language to permit the new National Institute of Biomedical Imaging and Bioengineering (NIBIB) to use funds appropriated to the NIH Office of the Director (OD) for start up of the new Institute, and 3) language directing that information requested from the Committee on Appropriations was to be transmitted "uncensored and without delay." (P.L. 107-20)

October 26, 2001—The Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (PATRIOT) Act of 2001 amends a number of titles of the United States Code in an effort to expand the Nation's ability to intercept and thwart terrorist threats. Of particular interest are amendments to Title 18 regarding possession, use, and transport of biological agents. These amendments seek to ensure that only those persons who have a lawful purpose for possessing, using, and/or transporting such agents are permitted to work with these agents, and that

penalties are established for certain "restricted" individuals who are in possession of such agents. The Act also enhances the powers of the Attorney General, law enforcement officials, and the courts regarding wire, oral, and electronic communications. (P.L. 107-56)

December 18, 2001—The Muscular Dystrophy Community Assistance Research and Education Amendments of 2001 (MD-CARE Act) amends the Public Health Service Act. Of particular interest to NIH this legislation mandates that the Director of the National Institutes of Health, in coordination with the Directors of the National Institute of Neurological Disorders and Stroke, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institute of Child Health and Human Development, and other national research institutes, as appropriate, expand and intensify programs with respect to research and related activities concerning Duchenne, myotonic, facioscapulohumeral, and other forms of muscular dystrophy (MD). In addition, the legislation 1) requires the establishment of Muscular Dystrophy Centers of Excellence, 2) requires the Secretary of Health and Human Services (HHS) to contract with the Institute of Medicine to study centers at NIH and make recommendations when their establishment is appropriate, 3) creates a Muscular Dystrophy Interagency Coordinating Committee that is required to develop a plan for conducting and supporting research and education on MD through the national research institutes and submits a biennial report to Congress describing research activities; 4) establishes a program in which samples of tissues and genetic materials that are of use in research on MD are donated, collected, preserved, and made available for such research; 5) requires the Secretary of HHS to provide a means of public input on existing and planned MD research activities; 6) requires the Centers for Disease Control and Prevention to carry out activities with respect to Duchenne MD epidemiology. (P.L. 107-84)

January 4, 2002—The Best Pharmaceuticals for Children Act reauthorizes the pediatric studies provision of the Food and Drug Administration Modernization and Accountability Act of 1997 to improve the safety and efficacy of pharmaceuticals for children. It continues to encourage pharmaceutical companies to conduct pediatric studies of on-patent drugs that are used in pediatric populations, but are not labeled for such use, by extending their market exclusivity. In addition, this legislation authorizes studies for "off-patent" drugs by the Federal Government or other entities with the expertise to conduct pediatric clinical trials. (P.L. 107-109)

January 10, 2002—The Department of Defense Appropriations Act, 2002 provides funding for NIH for bioterrorism under the Emergency Supplemental Act, 2002 (which is part of this legislation). The "conferees encourage the National Institute of Allergy and Infectious Diseases (NIAID) to conduct research on safer alternatives to the existing smallpox vaccine, such as an inactivated smallpox virus." In addition, funds are provided for the construction of a level-4 biosafety laboratory and related infrastructure costs at NIAID and for improving laboratory security at CDC and NIH. The bill also includes funds for the National Institute of Environmental Health Sciences (NIEHS) "for carrying out under current authorities, worker training, research, and education activities" in response to the September 11 terrorist attacks. (P.L. 107-117)

May 14, 2002—The Hematological Cancer Research Investment and Education Act, amends the Public Health Service Act to require 1) the Director of the National Institutes of Health, through the National Cancer Institute, to expand and coordinate blood cancer research programs, particularly with respect to leukemia, lymphoma, and multiple myeloma (the Joe Moakley Research Excellence Program); and 2) the Secretary of Health and Human Services to establish a related education program for patients and the general public (the Geraldine Ferraro Cancer Education Program). (P.L. 107-172)

June 12, 2002—The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 amends Section 319 of the Public Health Service Act to strengthen protections related to public health. The Act requires the Secretary of Health and Human Services (HHS), in coordination with appropriate Federal department and agency officials, to establish a joint interdepartmental working group on preparedness for acts of bioterrorism. Among its activities, this group is charged with providing consultations on, assistance in, and recommendations regarding provision of appropriate safety and health training; coordination and prioritization of countermeasures to treat, prevent, or identify exposures to biological agents; and research on pathogens likely to be used in a biological threat or attack on the civilian population. (P.L. 107-188)

August 2, 2002—The Supplemental Appropriations for FY 2002 bill names in statute the National Research Service Awards (NRSA) the Ruth L. Kirschstein National Research Service Awards. (P.L. 107-206)

October 26, 2002—The Medical Device User Fee and Modernization Act of 2002 amends Section 215 of the Public

Health Service Act to authorize the Director of NIH to conduct or support research to examine the long-term health implications of gel and saline-filled breast implants. This authorization includes studies to 1) develop and examine techniques to measure concentrations of silicone in body fluids and tissues, and 2) track silicone breast implant recipients. Within 6 months of enactment, the Director of NIH is required to submit a report to Congress describing the status of research on breast implants being conducted or supported by the Agency. (P.L. 107-250)

October 26, 2002—The Health Care Safety Net Amendments, repeals the requirement for the Health Resources and Services Administration loan repayment program (LRP) reporting requirements, which also repeals the National Institutes of Health LRP reporting requirements, which were mandated under the National Health Service (NHS) authorities. Specifically, this repeals Section 338B(i) of the Public Health Service Act, which required an annual report to Congress on the NHS Corps Loan Repayment Program. (P.L. 107-251)

November 2, 2002—The 21st Century Department of Justice Appropriations Authorization Act contains a provision that amends Section 464N of the Public Health Service Act addressing drug abuse and addiction research. The law provides that the Director of NIDA may make grants or enter into cooperative agreements to expand the current and ongoing interdisciplinary research and clinical trials with treatment centers of the National Drug Abuse Treatment Clinical Trials Network that relate to drug abuse and addiction, including related biomedical, behavioral, and social issues. The law mandates that the Director of NIDA shall promptly disseminate research results to Federal, State, and local entities involved in combating drug abuse and addiction. The law also requires NIDA to conduct a study of methamphetamine treatment. (P. L. 107-273)

November 6, 2002—The Rare Diseases Act provides statutory authorization for the existing NIH Office of Rare Diseases (ORD). The measure requires the Director of the Office of Rare Diseases to recommend an agenda for research on rare diseases, promote coordination and cooperation among NIH Institutes and Centers, promote sufficient allocation of NIH resources related to rare diseases, promote the establishment of a centralized rare diseases information clearinghouse, prepare a biennial report of rare disease research activities and opportunities, prepare the annual report of the Director of NIH to Congress on rare disease research, and serve as the principal advisor on orphan diseases to the Director of NIH. In addition, the legislation establishes regional Centers of Excellence on Rare Diseases. (P.L. 107-280)

November 25, 2002—The Homeland Security Act of 2002 establishes a new Executive Branch agency known as the U. S. Department of Homeland Security (DHS). Among its research provisions, the Act: 1) establishes within DHS a Directorate of Science and Technology, to conduct basic and applied research, development, demonstration, testing, and evaluation activities that are relevant to any or all elements of DHS with the exception of human health-related research and development activities; 2) requires the Secretary of HHS to set priorities, goals, objectives, and policies and to develop a coordinated strategy for these activities in collaboration with the Secretary of Homeland Security; and 3) authorizes the Secretary of Homeland Security to draw upon the expertise of any Federally-supported laboratory, and to establish a headquarters laboratory and additional laboratory units for the Department at any laboratory or site. The Act also includes provisions regarding Federal agency information security protections; acquisitions and procurement improvements; permanent extension, revision, and expansion of authorities for use of voluntary separation incentive pay and voluntary early retirement; and other authorities relevant to human resources management. (P.L. 107-296)

December 18, 2002—The Public Health Service Amendment on Diabetes amends Section 319 of the Public Health Service Act to renew funding for the special diabetes programs for Type 1 diabetes research, and also the parallel services program for diabetes in Native Americans, at $150 million for each of the FYs 2004 through 2008. This measure provides additional funding separate from the regular appropriations process for the special diabetes programs for Type 1 diabetes research at NIH. (P.L. 107-360)

May 27, 2003—The United States Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act of 2003 has the following provisions: 1) requires the President to establish a comprehensive, integrated 5-year strategy to combat global HIV/AIDS, including specific objectives, approaches and strategies; 2) assigns priorities for relevant executive branch agencies; 3) improves coordination among such agencies; and 4) projects general levels of resources needed to achieve the stated goals. This legislation also requires the President to establish a position of HIV/AIDS Response Coordinator at the U.S. Department of State, who would have primary responsibility for oversight and coordination of all U.S. international activities to combat the HIV/AIDS pandemic. (P.L. 108-25)

August 15, 2003—The Mosquito Abatement for Safety and Health Act authorizes grants through the Centers for Disease Control and Prevention for mosquito control programs to prevent mosquito-borne diseases. This legislation requires the Director of the National Institute of Environmental Health Sciences to conduct or support research on methods of controlling the population of insects and vermin that transmit dangerous, diseases to humans. (P.L. 108-75)

December 8, 2003 —The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 requires NIDDK to conduct a clinical investigation of pancreatic islet cell transplantation. (P.L. 108-173)

January 23, 2004 —The Omnibus Appropriations for FY 2004, contains the following two provisions: 1) provides flexible research authority for the NIH Director to enter into transactions (other than contracts, cooperative agreements, or grants) to carry out research in support of the NIH Roadmap Initiative of the Director on a pilot basis; and 2) designates the NIH Muscular Dystrophy Centers as the Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Centers. (P.L. 108-199)

July 21, 2004 —The Project Bioshield Act of 2004 authorizes NIAID to award grants or contracts to public and nonprofit private entities to expand, remodel, renovate, or alter existing research facilities or construct new research facilities. (P.L. 108-276)

August 2, 2004 —The Minor Use and Minor Species Animal Health Act of 2004 requires NIH to convene an ad hoc panel of nationally known experts in the fields of allergy and immunology to review current basic and clinical research activities related to food allergies. The panel is to make recommendations to the Secretary regarding the enhancement and coordination of food allergies research not later than 1 year after the date of enactment of the Act. (P.L. 108-282)

October 25, 2004 —The Pancreatic Islet Cell Transplantation Act of 2004 requires the Diabetes Mellitus Interagency Coordinating Committee to include in its annual report an assessment of the Federal activities and programs related to pancreatic islet cell transplantation, which shall address: 1) the adequacy of funding; 2) policies and regulations affecting the supply of pancreata; 3) the effect of xenotransplantation; 4) the effect of the United Network for Organ Sharing policies; 5) the existing mechanisms to collect and coordinate outcome data from trials; 6) implementation of multi-agency clinical investigations; and 7) recommendations for legislation and administrative actions to increase the supply of pancreata. (P.L. 108-362)

November 30, 2004—The Research Review Act of 2004 requires the NIH to submit an NIH Roadmap for Medical Research progress report to Congress no later than February 1, 2005. The bill also incorporated a component of an earlier bill, the Christopher Reeve Paralysis Act, requiring NIH to prepare a report describing NIH Roadmap efforts with respect to spinal cord injury and paralysis research. (P.L. 108-427)

December 8, 2004—The Consolidated Appropriations Act, 2005, provided that "The Center for Biodefense and Emerging Infectious Diseases (Building 33) at the National Institutes of Health is hereby named the C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases." (P.L. 108-447)

November 11, 2005—The Breast Cancer Research Stamp Reauthorization Act reauthorized the issuance of semipostal stamps for breast cancer research, from which NIH receives seventy percent of the profits and the Department of Defense receives 30 percent for their respective breast cancer research activities. These funds are in addition to annual appropriations received. (P.L. 109-100)

December 5, 2005—The Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2006, provided new language permitting the Office of AIDS Research to use its funding in this Act to make grants for the construction or renovation of facilities in order to expand a breeding colony that will serve as a new national resource to breed nonhuman primates for AIDS research; and a general provision stating that "None of the funds made available in this Act may be used to request that a candidate for appointment to a Federal scientific advisory committee disclose the political affiliation or voting history of the candidate or the position that the candidate holds with respect to political issues not directly related to and necessary for the work of the committee involved." These provisions

carry a time limitation relevant to FY 2006 activities only. (P.L. 109-149)

December 19, 2006—The Combating Autism Act of 2006 requires the Director of the National Institutes of Health (NIH) to expand, intensify, and coordinate autism spectrum disorders (ASD)-related research. Specifically, the Act sets forth a nonexhaustive list of research areas to be included in NIH's ASD initiatives, including research into possible environmental causes of autism. It expands the scope of autism research under NIH and the Centers of Excellence in such research to address the entire scope of ASD, rather than only autism. The new law also authorizes the Director to consolidate program activities to improve efficiencies and outcomes. (P.L. 109-416)

December 20, 2006—The Sober Truth on Preventing Underage Drinking Act requires the Secretary of Health and Human Services to formally establish and enhance the efforts of the interagency coordinating committee that began operating in 2004, focusing on underage drinking. The Director of the National Institute on Alcohol Abuse and Alcoholism, and such other Federal officials as the Secretary of Health and Human Services determines to be appropriate will serve as members of this interagency coordinating committee. (P.L. 109-422)

January 15, 2007—The NIH Reform Act revises Title IV of the PHS Act and creates the Division of Program Coordination, Planning, and Strategic Initiatives, to be supported by a Common Fund. There is no growth formula for the Fund and a review is required when the Fund reaches five percent of the total NIH budget. In addition, provisions establish a Council of Councils to advise on research proposals that would be funded by the Common Fund; establish a Scientific Management Review Board (SMRB) to conduct periodic organizational reviews of NIH every seven years, and make recommendations on the use of NIH organizational authorities; and require a public process for reorganizing NIH programs. Provisions authorize (but do not appropriate) for NIH $30,331,309,000 for FY 2007, $32,831,309,000 for FY 2008 and such sums as may be necessary for FY 2009. Provisions also authorize the NIH Director to award grants for demonstration projects for research bridging the biological sciences with the physical, chemical, mathematical, and computational sciences; and authorize the establishment of demonstration programs that award grants, contracts, or engage in other transactions, for high-impact, cutting-edge research demonstration programs. (P.L. 109-482)

For more information on legislation affecting NIH, go to http://olpa.od.nih.gov/legislation/.

NIH Almanac: Historical Data

NIH Director Elias A. Zerhouni, M.D.

NIH Director, Elias A. Zerhouni, M.D., leads the nation's medical research agency and oversees the NIH's 27 Institutes and Centers with more than 18,000 employees and a fiscal year 2008 budget of $29.5 billion.Read Dr. Zerhouni's full biosketch

Chronology of NIH Directors

Name	In Office from	To
Joseph J. Kinyoun[1]	August 1887	April 30, 1899
Milton J. Rosenau	May 1, 1899	September 30, 1909
John F. Anderson	October 1, 1909	November 19, 1915
George W. McCoy[2]	November 20, 1915 May 26, 1930	May 25, 1930 Jan. 31, 1937
Lewis R. Thompson	February 1, 1937	January 31, 1942
Rolla E. Dyer[3]	February 1, 1942 June 16, 1948	June 15, 1948 September 30, 1950
William H. Sebrell, Jr.	October 1, 1950	July 31, 1955
James A. Shannon	August 1, 1955	August 31, 1968
Robert Q. Marston	September 1, 1968	January 21, 1973
Robert S. Stone	May 29, 1973	January 31, 1975
Donald S. Fredrickson	July 1, 1975	June 30, 1981
James B. Wyngaarden	April 29, 1982	July 31, 1989
Bernadine Healy	April 9, 1991	June 30, 1993
Harold E. Varmus	November 23, 1993	December 31, 1999
Elias A. Zerhouni	May 2, 2002	Present

[1] Director, Hygienic Laboratory.
[2] Director, National Institute of Health.
[3] Director, National Institutes of Health.

Biographical Sketches

Joseph James Kinyoun, M.D.

Founder and director of the Hygienic Laboratory, Dr. Joseph J. Kinyoun introduced scientific research into the Marine Hospital Service. His interest in bacteriology and his isolation of the cholera organism laid the groundwork for the present health research program of NIH.

Dr. Kinyoun received his M.D. degree from New York University in 1882 and did postgraduate work in Europe under the German bacteriologist, Robert Koch.

Dr. Kinyoun joined the Marine Hospital Service in 1886. In a one-room laboratory on Staten Island, N.Y., he applied new techniques he had learned in Europe, enabling him to isolate the organism that causes cholera. The Hygienic Laboratory was established in August 1887 and Dr. Kinyoun served as its director until April 30, 1899.

During his government career, Dr. Kinyoun designed the Kinyoun-Francis sterilizer, a shipboard disinfecting apparatus. In 1903 he retired from public service and, after working in private industry and as a professor at the George Washington University, he became a bacteriologist in the District of Columbia Health Department.

Milton Joseph Rosenau, M.D.

As second director of the Hygienic Laboratory, Dr. Milton J. Rosenau was responsible for expanding its scope of investigations.

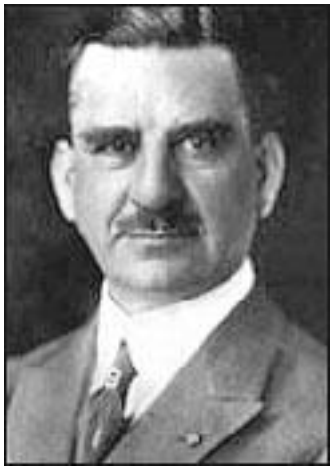
After receiving his M.D. from the University of Pennsylvania, he did postgraduate work in Europe in the field of sanitation and public health.

In 1890 he received his commission in the Marine Hospital Service. He became director of the Hygienic Laboratory on May 1, 1899.

A pioneer in the study of anaphylaxis, he also conducted research on yellow fever, malaria, typhoid fever, poliomyelitis, disinfectants, and the pasteurization of milk. His *Preventive Medicine and Hygiene* is a standard text for students of public health.

On September 30, 1909, Dr. Rosenau resigned from government service to join the staff of Harvard Medical School. In 1936 he went to the University of North Carolina where he served as director of the Public Health School.

John F. Anderson, M.D.



Dr. John F. Anderson, third director of the Hygienic Laboratory, was among the early scientists who made the Laboratory well-known in scientific circles.

After receiving his M.D. degree at the University of Virginia, he went abroad to study bacteriology. Upon returning in 1898, he joined the Marine Hospital Service and on October 1, 1909, succeeded Dr. Rosenau as director of the Hygienic Laboratory.

Throughout his career in the service, he was actively engaged in research. He studied serum and vaccine therapy, immunology, cholera, typhus, poliomyelitis, and public health and sanitation problems. He worked with Dr. Rosenau on hyper-susceptibility, anaphylaxis, and tuberculosis, and with Dr. Joseph Goldberger on the transmission of measles to monkeys, providing science with an experimental animal for that disease.

Dr. Anderson served as director of the Hygienic Laboratory until November 19, 1915, when he resigned to become director of the Research and Biological Laboratories and later vice president of E. R. Squibb & Sons.

George Walter McCoy, M.D.

Dr. George W. McCoy was, during his lifetime, the Nation's greatest authority on leprosy. For his many contributions to public health, he won the Sedgwick Memorial Medal of the American Public Health Association in 1921.

He entered the Marine Hospital Service in 1900 after graduating from the University of Pennsylvania Medical School.

During his first assignment at the Marine hospital in San Francisco, he became interested in leprosy. While heading the U.S. Plague Laboratory in San Francisco from 1908 to 1911, he discovered that the California ground squirrel was responsible for the spread of the organism causing tularemia.

On November 20, 1915, he became fourth director of the Hygienic Laboratory, renamed "National Institute of Health" in 1930. During this period he conducted important studies in influenza, poliomyelitis, smallpox, tularemia, amoebic dysentery, and pneumonia. Dr. McCoy served as director until January 31, 1937.

After conducting a nationwide survey on leprosy, Dr. McCoy retired from PHS on June 30, 1938, and joined the staff of Louisiana State University in New Orleans.

Lewis Ryers Thompson, M.D.

Dr. Lewis R. Thompson was intensely interested in research on industrial health problems and on problems of stream pollution.

He joined PHS in 1910, having graduated from Louisville Medical College. After becoming chief of the Division of Scientific Research in 1930, he administered field investigations of stream pollution, malaria, cancer, nutritional diseases, child hygiene, milk, dental problems, and industrial hygiene. When the division was merged with NIH, Dr. Thompson became director on February 1, 1937.

Dr. Thompson was largely responsible for securing the present-day site of NIH and for securing appropriations for the construction of the first six buildings. He served as director until January 31, 1942, and after retiring from PHS in 1947 became a scientific director of the international health division of the Rockefeller Foundation.

Rolla Eugene Dyer, M.D.

Dr. Rolla E. Dyer's major research contributions were in the field of infectious diseases; in particular, endemic typhus. He demonstrated how endemic typhus is spread and helped develop a vaccine to protect against the disease.

Dr. Dyer received his M.D. from the University of Texas and joined PHS in 1916.

His first assignment involved fieldwork on bubonic plague in New Orleans. Five years later he joined the staff of the Hygienic Laboratory, became chief of the Division of Infectious Diseases in 1936, and director of NIH in 1942.

As director, Dr. Dyer organized the Division of Research Grants, assisted in planning the Clinical Center, and helped establish three new institutes: the National Heart Institute, the National Institute of Dental Research, and the National Institute of Mental Health.

After retiring from active duty on September 30, 1950, Dr. Dyer served as a member of the scientific board of directors of the international health division of the Rockefeller Foundation.

William Henry Sebrell, Jr., M.D.

A leading international authority on nutrition, Dr. William H. Sebrell first recognized and described the dietary deficiency disease, ariboflavinosis, and made significant contributions to knowledge of dietary needs and deficiencies.

Dr. Sebrell received his M.D. degree from the University of Virginia and joined PHS in 1926.

He began his research career under Dr. Joseph Goldberger who demonstrated that pellagra is a deficiency disease. During the 1930's, Dr. Sebrell made many important contributions to our knowledge of the anemias and the role of diet in cirrhosis of the liver.

During World War II, Dr. Sebrell was codirector of the National Nutrition Program which coordinated activities of all state agencies working in the field of nutrition. This program aided food production and the maintenance of civilian health during the war years.

In 1948 he became director of the Experimental Biology and Medicine Institute, and on October 1, 1950, was appointed director of NIH. He held this post until his retirement on July 31, 1955.

Dr. Sebrell helped formulate the first international standards of nutrition for the League of Nations, and pioneered the growing acceptance of scientific nutrition as a regular function of modern state and local health departments.

James A. Shannon, M.D.

Dr. James A. Shannon, widely recognized in the scientific world for his original research in kidney function, chemotherapy, and malaria, has throughout his career, been devoted to medical research, teaching, and public service.

He received his M.D. in 1929 and a Ph.D. in physiology in 1935 from New York University.

Following his internship at Bellevue Hospital in New York, Dr. Shannon taught in the department of physiology at New York University College of Medicine from 1931 to 1941, and directed research at the university's Goldwater Memorial Hospital from 1940 to 1945.

During periods of leave, he served as guest investigator at the physiological laboratory, University of Cambridge, England, and as a member of the staff of the Marine Biological Laboratory at Woods Hole, Mass.

During World War II, Dr. Shannon played a prominent part in malaria research activities of the National Research Council and was consultant on tropical diseases to the secretary of war. In recognition of this work, he received the Presidential Medal for Merit, the highest award at that time for civilian service in government.

Before joining PHS in 1949, he was director of the Squibb Institute for Medical Research (1946-49), and special consultant to the PHS Surgeon General.

Dr. Shannon then served as associate director in charge of research in the National Heart Institute until 1952. After holding the post of associate director, NIH, for 3 years, he became its director on August 1, 1955.

Among his many honors were the Public Welfare Medal of the National Academy of Sciences for "eminence in the application of science to the public welfare" (1962), the Rockefeller Public Service Award for Science, Technology, or Engineering (1964), and the Presidential Distinguished Federal Civilian Service Award (1966).

On retiring as NIH director (August 31, 1968), Dr. Shannon joined the NAS as special advisor to the president. In February 1970 he became professor and special assistant to the president, Rockefeller University. He retired from those positions in 1975.

Robert Q. Marston, M.D.

Dr. Robert Quarles Marston became director of NIH on September 1, 1968, after serving for 5 months as administrator of the Health Services and Mental Health Administration.

He received his B.S. degree in 1943 from the Virginia Military Institute, and his M.D. from the Medical College of Virginia in 1947. As a Rhodes scholar, he worked for the next 2 years with Nobel prizewinner Howard Florey at Oxford University, Oxford, England, earning a B.Sc. from that institution in 1949.

After an internship at Johns Hopkins Hospital and a year's residency at Vanderbilt University Hospital in Nashville, Tenn., he was stationed at NIH from 1951 to 1953 as a member of the Armed Forces Special Weapons Project, conducting research on the role of infection after whole body irradiation. He completed his residency at the Medical College of Virginia in Richmond the following year.

While a Markle fellow, he served as assistant professor of medicine at the Medical College of Virginia from 1954 to 1957, and as assistant professor of bacteriology and immunology at the University of Minnesota in Minneapolis for 1 year. He returned to the Medical College of Virginia in 1959 as associate professor of medicine and assistant dean in charge of student affairs.

In 1961, Dr. Marston became director of the University of Mississippi Medical Center and dean of the School of Medicine in Jackson, Miss., and was appointed vice chancellor there in 1965.

He became an associate director of NIH and director of the newly created Division of Regional Medical Programs on February 1, 1966.

On April 1, 1968, Dr. Marston was named administrator of the Health Services and Mental Health Administration, under a departmental reorganization.

He became acting director of the National Institute of Neurological Diseases and Stroke on January 21, 1973. He left the Federal service in April 1973 to become a scholar-in-residence at the University of Virginia. He also was named the first distinguished fellow of the Institute of Medicine, NAS.

On January 11, 1974, Dr. Marston was named president of the University of Florida at Gainesville, a position he held until 1984, after which he sat on the governing board of Virginia Military Institute while continuing his work with graduate students at the University. He retired in the late 1980's.

Robert S. Stone, M.D.

Dr. Robert S. Stone, former vice president for health services and dean of the school of medicine at the University of New Mexico, became director of NIH on May 29, 1973.

He received his B.A. in 1942 from Brooklyn College and his M.D. from the State University of New York College of Medicine in 1950. Dr. Stone was an instructor in pathology at Columbia University College of Physicians and Surgeons from 1950 to 1952.

Following his 1950-1952 internship and assistant residency in pathology at New York's Presbyterian Hospital, Dr. Stone moved to Los Angeles and joined the faculty of UCLA's School of Medicine, department of pathology.

From 1957 to 1959 as part of his academic duties he was deputy coroner at Los Angeles County, and for several years was pathologist for the Los Angeles Shriners Hospital for Crippled Children.

While on sabbatical as a visiting scientist at the Rockefeller Institute in 1959, he was credited with demonstrating by electron microscopy that the Shope papilloma virus of rabbits could be found in mature skin cells, but was undetectable, although presumed present, in younger growing cells.

Based on his observation of autopsies of atomic bomb victims in Hiroshima, Japan, Dr. Stone was one of the first researchers to suggest that radiation exposure increases the incidence of certain known diseases rather than creating new types. He served as chief of research in pathology for the Atomic Bomb Casualty Commission from 1959 to 1960.

He contributed to the concept of developing a method control population to study the normal incidence of various diseases for comparison, as was subsequently done.

It was as a result of this work and his continuing interest that he was appointed to the NAS Advisory Committee on the Atomic Bomb Casualty Commission.

Dr. Stone joined the University of New Mexico School of Medicine as chairman of the department of pathology in 1963, and became dean of the school in 1968. Prior to his appointment as NIH director, he took a year's leave from the university and was a visiting professor at the Sloan School of Management, MIT.

He became dean of the School of Medicine of the University of Oregon Health Sciences Center and vice president of the Health Sciences Center in August 1975. In August of 1978, he was appointed dean of the College of Medicine at Texas A & M University in August of 1978.

Donald S. Fredrickson, M.D.

Dr. Donald S. Fredrickson, internationally known authority on lipid metabolism and its disorders, became NIH director on July 1, 1975. Immediately prior to this appointment, he had served for 1 year (1974-1975) as president of the Institute of Medicine, NAS.

His association with NIH, however, spanned more than two decades beginning in 1953 when he joined the scientific staff of the then National Heart Institute (renamed the National Heart, Lung, and Blood Institute in 1976) as a clinical associate.

During his research career in the Federal service, Dr. Fredrickson held numerous positions at NIH, several in the heart institute simultaneously. From 1955 to 1961 he was a member of the Laboratory of Cellular Physiology and Metabolism. He then served as clinical director (1961-1966), while continuing his research as head of the section of molecular diseases, Laboratory of Metabolism (1962-1966). He was appointed institute director in 1966, serving in that capacity until 1968. He combined this executive responsibility with research as chief of the Molecular Diseases Branch (1966-1974), and as director of intramural research (1969-1974).

His earliest research interests centered on the metabolism of sterols. Later he focused on the structure of the plasma lipoproteins, their importance in the transport of fats, and the genetic factors regulating their metabolism and concentration in blood. It was during this period that he discovered two new genetic disorders: Tangier disease (absence of high density lipoproteins) and cholesteryl ester storage disease, a lysosomal enzyme deficiency.

In 1965 he and his coworkers introduced a system for identifying and classifying blood-lipid abnormalities on the basis of plasma lipoprotein patterns. From this work came recognition of new monogenic causes of hyperlipidemia: type 3 and type 5 hyperlipoproteinemia and what is called familial hypertriglyceridemia. The system received prompt acceptance by the WHO and is now used widely by laboratories around the world.

Research findings of Dr. Fredrickson and colleagues have also included the discovery of several previously unknown apolipo-proteins, and new knowledge including descriptions concerning the structure and function of various apoproteins.

He received both his B.S. (1946) and M.D. (1949) from the University of Michigan, and was certified by the American Board of Internal Medicine in 1957. He did postgraduate work at Peter Bent Brigham and Massachusetts General Hospitals and the Harvard Medical School prior to coming to NIH in 1953.

Dr. Fredrickson was a member of numerous professional societies in addition to the NAS and the American Academy of Arts and Sciences.

He resigned as NIH director on June 30, 1981 and returned to the NAS as a visiting scholar. In 1983 he joined the Howard Hughes Medical Institute (HHMI) as vice president, and became president and CEO in 1984. In 1987 he left HHMI and became a scholar at the National Library of Medicine.

James B. Wyngaarden, M.D.

Dr. James B. Wyngaarden, an internationally recognized authority on the regulation of purine biosynthesis and the genetics of gout, and a nationally respected advisor on various aspects of the administration of biomedical research, became the 12th director on April 30, 1982. Immediately prior to his appointment, he was professor and chairman of the department of medicine at Duke University School of Medicine, a position he had held since 1967.

He has had a long association with the NIH. From 1953 to 1954, he was a research associate in the Laboratory of Chemical Pharmacology of the then National Heart Institute, and from 1954 to 1956, he was a clinical associate at the then National Institute of Arthritis and Metabolic Diseases. After leaving in 1956 to become associate professor at the Duke University School of Medicine, he continued an association with NIH. He has held grants from several NIH components.

Dr. Wyngaarden has been active on various NIH study groups, evaluation committees, and review panels over the years, including a term with the board of scientific counselors of the then NIAMD (1971-1974). He also served as a consultant to the NIH as a member of study sections (1958-1960; 1967-1969).

He has also served as advisor to the broader scientific community as a member of the National Academy of Sciences since 1974, and was active from 1975 to 1982 on an NAS committee set up to study the Nation's overall need for biomedical and behavioral researchers; consultant for the President's Office of Science and Technology (1966-1972), a member of the President's Science Advisory Committee (1972-1973), and a member of the U.S. Atomic Energy Commission's Advisory Committee on Biology and Medicine.

Dr. Wyngaarden is the coauthor of *Cecil Textbook of Medicine*. In collaboration with former NIH director, Dr. Fredrickson, and others, he edited *The Metabolic Basis of Inherited Disease*. The original work was published in 1960.

He attended Calvin College there, and Western Michigan University in 1943-1944. In 1948 he graduated first in his class from the University of Michigan Medical School.

Dr. Wyngaarden trained in internal medicine at the Massachusetts General Hospital and did postdoctoral work at the Public Health Research Institute of the City of New York, under the direction of Dr. DeWitt Stetten, Jr., former NIGMS director. After serving as research associate at NIH from 1953 to 1956, he went to Duke and in 1959 became director of the medical research training program there as well as associate professor of medicine and biochemistry. In 1961 he became professor of medicine and associate professor of biochemistry.

In 1963 and 1964, he was a visiting scientist at the Institute de Biologie-Physiocochemique in Paris. Shortly after his return to this country, he left Duke to become professor and chairman of the department of medicine and professor of biochemistry at the University of Pennsylvania. He returned to Duke in 1967.

Dr. Wyngaarden has received many honorary degrees: University of Michigan (D.Sc., 1980), Medical College of Ohio (D.Sc., 1984), University of Illinois at Chicago (D.Sc., 1985), George Washington University (D.Sc., 1986), and Tel Aviv University (Ph.D., 1987).

He is a diplomate of the American Board of Internal Medicine. He has served on editorial boards of numerous professional publications.

Dr. Wyngaarden is a member of a number of professional societies including the NAS Institute of Medicine, the American Academy of Arts and Sciences, the American Society for Clinical Investigation, and is a past president of the Association of American Physicians. He is a fellow of the Royal College of Physicians of London and was elected to the Royal Academy of Sciences of Sweden in 1987.

Bernadine Healy, M.D.

Dr. Bernadine Healy became NIH director in April 1991. Shortly after her appointment, she launched the NIH Women's Health Initiative, a $500 million effort to study the causes, prevention, and cures of diseases that affect women. She also established the Shannon Award, grants designed to foster creative, innovative approaches in biomedical research and keep talented scientists in a competitive system.

Prior to her appointment, she was chairman of the Research Institute of the Cleveland Clinic Foundation, where she directed the research programs of nine departments including efforts in cardiovascular disease, neurobiology, immunology, cancer, artificial organs, and molecular biology. From her appointment in November 1985, she also served as a staff member of the clinic's department of cardiology.

In February 1984, Dr. Healy became deputy director of the Office of Science and Technology Policy at the White House. Her appointment, made by President Reagan and confirmed by the Senate in June of 1984, involved her heavily in life science and regulatory issues at the Federal level. She served as chairman of the White House Cabinet Working Group on Biotechnology, was executive secretary of the White House Science Council's Panel on the Health of Universities, and served as member of several advisory groups, including the councils of the NHLBI, NCI, as well as the White House Working Group on Health Policy and Economics. From June 1976 until February 1984, she was professor of medicine at Johns Hopkins University School of Medicine and Hospital, where she also had clinical responsibilities, directed a program in cardiovascular research, and was director of the coronary care unit. In addition to serving on the medical school faculty, she assumed the role of assistant dean for postdoctoral programs and faculty development.

Among her other professional affiliations, Dr. Healy has served on the board of governors of the American College of Cardiology and has been president of the American Federation of Clinical Research (1983-84) and was chairman of its public policy committee for several years. She was president of the American Heart Association in 1988-1989 and has served as a member of its board of directors since 1983. As AHA president, she initiated a women's minority leadership task force and a women and heart disease program that took hold in affiliates nationwide.

She is a member of the Institute of Medicine of NAS. In 1989 she was elected as a member of the board of overseers of Harvard College and has served on the board of trustees of Vassar College. She has also been chairman of the Ohio Council on Research and Economic Development, and served on several other advisory committees and boards, including the Ohio Board of Regents.

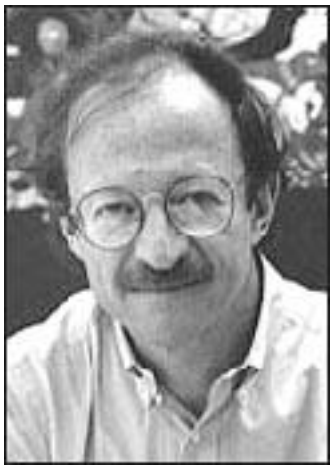
Dr. Healy has been active in several Federal advisory groups. Until her NIH appointment, she was a member of the advisory committee to the NIH director. She has been a member of the White House Science Council and chairman of the advisory panel for new developments in biotechnology of the Office of Technology Assessment of the U.S. Congress and a member of the NASA Life Sciences Strategic Planning Study Committee. In 1990 she was appointed to the President's Council of Advisers on Science and Technology (PCAST) and served as its vice chairman. She also chaired the advisory panel for basic research for the 1990s of the Office of Technology Assessment, and served on the special medical advisory committee of the Department of Veterans Affairs.

She received her bachelor's degree from Vassar College in 1965, and her M.D., cum laude, from Harvard Medical School in June 1970. She completed training in internal medicine and cardiology at Johns Hopkins School of Medicine.

Dr. Healy has written extensively in the areas of cardiovascular research and medicine, and has served on the editorial boards of numerous scientific journals.

She stepped down as director of NIH on June 30, 1993, to return to the Cleveland Clinic in Ohio. Dr. Healy was dean of the Ohio State University Medical School and President and Chief Executive Officer of the American Red Cross.

Harold E. Varmus, M.D.



Dr. Harold E. Varmus became 14th director of NIH on November 23, 1993. Winner of the Nobel Prize in 1989 for his work in cancer research, he came to NIH from the University of California, San Francisco. He is a leader in the study of cancer-causing genes called "oncogenes," and an internationally recognized authority on retroviruses, the viruses that cause AIDS and many cancers in animals.

Prior to his appointment, he was professor of microbiology, biochemistry, and biophysics, and the American Cancer Society professor of molecular virology at UCSF. He has been working at the cutting edge of modern cell and molecular biology, and has had an active relationship with NIH for about 30 years as an intramural scientist, grantee, and public advisor.

Dr. Varmus and his UCSF colleague Dr. J. Michael Bishop shared the 1989 Nobel in Physiology or Medicine for demonstrating that cancer genes (oncogenes) can arise from normal cellular genes, called proto-oncogenes. While investigating a retroviral gene, v-src, responsible for causing tumors in chickens, they discovered a nonviral src gene, very similar to v-src, present in the normal cells of birds and mammals.

In recent years his work has assumed special relevance to AIDS, through a focus on biochemical properties of HIV, and to breast cancer, through investigation of mammary tumors in mice. His research activities included grants from NCI, NIAID, NIGMS, American Cancer Society, and the Melanie Bronfman Award for Breast Cancer.

Dr. Varmus has served as chairman of the board of biology for the National Research Council, an advisor to the Congressional Caucus for Biomedical Research, a member of the joint steering committee for Public Policy of Biomedical Societies, and cochairman of the New Delegation for Biomedical Research, a coalition of leaders in the biomedical community. He directed "Winding Your Way Through DNA," a popular public symposium on recombinant DNA staged by UCSF.

Author or editor of four books and nearly 300 scientific papers, he has been elected to the Institute of Medicine, the National Academy of Sciences, and the American Academy of Arts and Sciences. His most recent book, *Genes and the Biology of Cancer*, intended for a general audience, was coauthored with Robert Weinberg for the Scientific American Library. He as edited several professional journals, and served on a variety of review and advisory boards for government, biotechnology firms, and pharmaceutical companies.

Dr. Varmus was a member of the IOM committee that advised the Department of Defense on the use of $210 million allocated by Congress in 1992 for breast cancer research. In 1986 he chaired the subcommittee of the International Committee on the Taxonomy of Viruses that gave the AIDS virus its name, HIV.

He attended public schools in Freeport, Long Island; his father practiced family medicine and his mother was a psychiatric social worker. He is a graduate of Amherst College (B.A., 1961), where he majored in English literature and edited the school newspaper; Harvard University (M.A., 1962); and Columbia University (M.D., 1966). While in medical school, he worked for 3 months at a mission hospital in northern India.

After an internship and residency in internal medicine at Columbia-Presbyterian Hospital in New York, he served as a clinical associate for 2 years (1968-70) at the National Institute of Arthritis and Metabolic Diseases, where he did his first scientific work in the area of bacterial genetics with Dr. Ira Pastan, who is now chief of NCI's Laboratory of Molecular Biology. He came to UCSF as a postdoctoral fellow in Bishop's laboratory in 1970, initiating a long-standing collaboration to study tumor viruses, and was appointed to the faculty later that year.

He became a full professor in 1979 and an ACS research professor in 1984. Dr. Varmus left NIH in December 1999 to become the President and Chief Executive Officer of the Memorial Sloan-Kettering Cancer Center.

Elias A. Zerhouni, M.D.

NIH Director, Elias A. Zerhouni, M.D., leads the nation's medical research agency and oversees the NIH's 27 Institutes and Centers with more than 18,000 employees and a fiscal year 2008 budget of $29.5 billion. Read Dr. Zerhouni's full biosketch

NIH Almanac: Historical Data

Deputy Directors of the NIH

Raynard S. Kington, Principal Deputy Director, NIH
Michael Gottesman, Deputy Director for Intramural Research
Norka Ruiz Bravo, Deputy Director for Extramural Research
Colleen Barros, Deputy Director for Management and Chief Financial Officer
Alan Krensky, Deputy Director for Portfolio Analysis and Strategic Initiatives (OPASI)

Chronology of Deputy Directors

Name	In Office from	To
C. J. Van Slyke	December 3, 1958	December 1, 1959
David E. Price	July 1, 1960	June 30, 1962
Stuart M. Sessoms	August 1, 1962	July 31, 1968
G. Burroughs Mider[1]	July 1, 1960	May 19, 1968
John. F. Sherman	November 1, 1968	March 16, 1974
Robert W. Berliner[2]	February 23, 1969	September 1, 1973
Carl M. Leventhal[1,2]	September 1973	February 1974
DeWitt Stetten, Jr.[2]	March 17, 1974	September 11, 1979
Ronald W. Lamont-Havers	August 4, 1974	September 25, 1976
Thomas E. Malone	March 24, 1977	Aug. 1, 1986
Robert Goldberger[2]	September 11, 1979	June 26, 1981
Joseph E. Rall[3]	July 2, 1981	June 6, 1982
Philip S. Chen, Jr.[3]	June 7, 1982	March 18, 1983
William F. Raub[4]	April 3, 1983	November 1991
Joseph E. Rall[5]	June 1983	May 13, 1991
Katherine Bick[4]	May 19, 1987	March 1990
John Diggs[4]	August 1990	June 14, 1993
Lance Liotta[5]	July 6, 1992	August 1993
Jay Moskowitz[6]	March 1993	October 1993
John D. Mahoney	March 21, 1993	February 19, 1995
Ruth L. Kirschstein	November 1993	February 8, 2003

Michael Gottesman[5]	November 1993	Present
Wendy Baldwin[4]	February 1994	December 2002
Anthony Itteilag	January 7, 1996	October 2001
Yvonne Maddox (Acting)	January 1, 2000	May 18, 2002
Charles E. Leasure, Jr.[7]	October 7, 2001	February 3, 2004
Raynard S. Kington	February 9, 2003	Present
Norka Ruiz Bravo[4]	October 30, 2003	Present
Colleen Barros[8]	May 30, 2004	Present
Alan Krensky[9]	July 8, 2007	Present

[1] Held title "Director of Laboratories and Clinics."
[2] For Science.
[3] For Science, Acting.
[4] For Extramural Research.
[5] For Intramural Research.
[6] Named by NIH director as NIH principal deputy director and NIH deputy director for Science Policy and Technology Transfer.
[7] For Management.
[8] For Management and Chief Financial Officer.
[9] For Portfolio Analysis and Strategic Initiatives.

Biographical Sketches

Cassius James Van Slyke, M.D.

Dr. Van Slyke, first deputy director of NIH, served in that position from December 3, 1958, until his retirement on December 1, 1959. He received his M.D. in 1928 from the University of Minnesota and entered the PHS reserve corps that same year.

In 1932 he was commissioned in the regular corps and from 1936 to 1944 pursued a distinguished research career at the PHS Venereal Disease Research Laboratory in Staten Island, N.Y. In 1944, he was made assistant chief, Venereal Disease Division, Washington, D.C.

Dr. Van Slyke joined NIH in 1946 as chief of the newly established Research Grants Office, later renamed the Division of Research Grants, serving there until he was named director of the National Heart Institute (NHI) on August 1, 1948. He left NHI on November 30, 1952, to serve as associate director of NIH, a post he held until he was named NIH deputy director.

David E. Price, M.D.

Dr. Price earned his medical degree at the University of California School of Medicine at Berkeley in 1940, and served his internship at the PHS Hospital in San Francisco. In 1946, he received his doctorate in public health at Johns Hopkins University School of Hygiene and Public Health.

Following a tour of duty in the Venereal Disease Division, PHS, he was assigned first to the DRG as assistant to the chief (1946-47) and then to the NCI as chief of the Research Grants Branch (1947-48). He returned to DRG in 1948 as chief, a post he held until he was named NIH associate director for extramural affairs (1950-52).

After a series of key appointments in the Office of the Surgeon General, the Bureau of Medical Services and the Bureau of State Services, Dr. Price was named deputy director of NIH on July 1, 1960. Two years later, he was appointed deputy surgeon general, PHS.

He retired from the service in 1965. After his retirement, he was associated with the Ford Foundation and the American Public Health Association.

Dr. Price was director of planning of the medical institutions, the Johns Hopkins Medical Institution, Baltimore, MD, until his retirement on July 1, 1980.

Stuart M. Sessoms, M.D.

Dr. Sessoms came to NIH in 1953 as a member of the NCI staff. From 1955 to 1957 he was assistant director of the Clinical Center. He was appointed assistant director, NCI, on January 1, 1958, prior to his appointment in November 1958 as chief of NCI's Cancer Chemotherapy National Service Center.

During this period, Dr. Sessoms also served as NCI associate director (1960), and associate director for collaborative research (1961) with responsibility for the institute's Virology Research Resources Branch, in addition to his duties at the Cancer Chemotherapy National Service Center.

He became the third NIH deputy director on August 1, 1962, serving in that capacity until his retirement July 31, 1968. On retirement, he held the rank of assistant surgeon general (rear admiral) in the PHS.

During his career at NIH, Dr. Sessoms was the recipient of two Meritorious Service Awards for his accomplishments as head of the Cancer Chemotherapy National Service Center, and for "outstanding ability and achievements in the development, operation and staffing" of the Regional Medical Programs.

He received his B.S. in pharmacy at the University of North Carolina in 1943 and his M.D. from the Medical College of Virginia in 1946.

On retiring after 25 years of government service, Dr. Sessoms joined Duke University.

On Jan. 1, 1976, he was named president of Blue Cross and Blue Shield of North Carolina.

G. Burroughs Mider, M.D.

Dr. Mider, whose career at NIH reaches back to 1939, is well-known on the campus. Just prior to transferring to the National Library of Medicine, an NIH component, in 1968, Dr. Mider had served for 8 years as NIH director of laboratories and clinics (1960-68), in which he functioned as deputy director as well.

He first came to NIH as a research fellow, NCI, in 1939. On completing the fellowship, he became an instructor in pathology and assistant professor of pathology (1941-44) at Cornell Medical College. Concurrently, he was an assistant pathologist at New York Hospital.

Then came assignments as associate professor of pathology, University of Virginia School of Medicine (1944-45) and research associate in surgery and professor of cancer research, University of Rochester School of Medicine and Dentistry (1945-52).

On returning to NIH in 1952, he became NCI associate director in charge of research. In 1960 he was appointed NIH director of laboratories and clinics. In May 1968, Dr. Mider transferred to the NLM as special assistant to the director for medical program development and evaluation. The following year he was named acting deputy director, and in 1970 became NLM deputy director.

In 1960, he was the recipient of a DHEW Distinguished Service Award. Dr. Mider retired from the Library on June 30, 1972, to become executive officer for the Universities Associated for Research and Education in Pathology, Inc., and the American Society of Experimental Pathology.

John F. Sherman, Ph.D.

Dr. Sherman was appointed deputy director of NIH on November 1, 1968, after a long career in research and research grants administration. He was designated by HEW Secretary Richardson as acting director of NIH on January 21, 1973, and served until a new director was appointed on May 29, 1973. He then returned to the position of deputy director.

He came to NIH in January 1953 as a research pharmacologist in the Laboratory of Tropical Diseases, National Microbiological Institute, which became the NIAID in 1955.

In July 1956, Dr. Sherman joined the staff of the NIAMD as assistant to the chief of extramural programs. He became assistant chief of the institute's extramural programs in August 1957, and deputy chief in October 1958.

On July 1, 1961, he was appointed associate director for extramural programs, NINDB. He rejoined the NIAMD in 1962 as associate director for extramural programs, serving in that capacity until January 1, 1964, when he was named NIH associate director for extramural programs.

Dr. Sherman received his B.S. in 1949 from Union University College of Pharmacy in Albany, N.Y., and his Ph.D. in pharmacology in 1953 from Yale University.

He is the author of numerous scientific papers and articles in his field of research. In 1971, he received a DHEW Distinguished Service Award.

Dr. Sherman left NIH in 1974 to become vice president of the Association of American Medical Colleges and director of the association's department of planning and policy development.

Robert W. Berliner, M.D.

Dr. Berliner, the first NIH deputy director for science, is an internationally renowned renal physiologist whose research in the field has contributed to understanding of the control of the excretion of sodium and potassium salts.

For 12 years (1950-62), he was chief of the Laboratory of Kidney and Electroyte Metabolism, NHI, and from 1954 to 1968 served as the institute's director of intramural research.

In 1968, he was appointed director of laboratories and clinics, NIH. He was named to the newly created post of deputy

director for science in 1969.

Prior to joining NIH in 1950, Dr. Berliner was assistant professor of medicine at Columbia University, and research associate with the New York City department of hospitals.

He received his B.S. from Yale University and his M.D. from Columbia University in 1939. He served his internship and residency at the Presbyterian Hospital and Goldwater Memorial Hospital, respectively, both in New York.

He was elected to the National Academy of Sciences in 1968. Other honors include the PHS Distinguished Service Award (1962), the Homer W. Smith Award (1965), the Modern Medicine Award for Distinguished Achievement (1969), and the American Heart Association's Research Achievement Award (1970).

Dr. Berliner left NIH to accept appointment as dean of the Yale University Medical School in September 1973.

DeWitt Stetten, Jr., M.D., Ph.D.

Dr. Stetten, an eminent medical educator and researcher in metabolic diseases, was named NIH deputy director for science on March 17, 1974.

He received his A.B. degree from Harvard College in 1930, and his M.D. and Ph.D. from Columbia University in 1934 and 1940, respectively. From 1934 to 1937, he took his internship and residency at Bellevue Hospital in New York. Dr. Stetten then joined the staff at Columbia University for 9 years, serving successively as assistant instructor and assistant professor of biochemistry. In 1947, he was appointed assistant professor in biological chemistry at the Harvard Medical School. From 1948 to 1954, he was chief of the division of nutrition and physiology for the Public Health Research Institute of New York City.

Dr. Stetten first came to NIH in 1954 as director of the intramural research program of the National Institute of Arthritis and Metabolic Diseases. In that capacity, he directed institute programs on basic and clinical research in diabetes, vitamin deficiencies, and disorders of the blood, bone, and liver. He left NIH in 1962 to become the first dean of the Rutgers Medical School, a position he held until his return to NIH on October 1, 1970, as director of the National Institute of General Medical Sciences.

The American Diabetes Association awarded Dr. Stetten the Banting Medal in 1957. In 1963, he delivered the 22nd annual NIH Lecture on the "History and Natural History of Gout."

Among his many honors were the DHEW Superior Service Honor Award (1973) and the DHEW Distinguished Service Award (1977). He also received honorary D.Sc. degrees from Washington University (1974), and from the College of Medicine and Dentistry of New Jersey (1976).

Author of more than 100 original papers in his field of research, and coauthor of the early editions of the textbook, *Principles of Biochemistry,* Dr. Stetten served on the editorial boards of numerous scientific and medical journals. He was president of the Foundation for Advanced Education in the Sciences (1972-74), and was a member of the National Academy of Sciences and the NAS Council. He was president of the Society for Experimental Biology and Medicine, 1977-79.

Dr. Stetten was named senior scientific advisor to the NIH director in September 1979.

Ronald W. Lamont-Havers, M.D.

Dr. Lamont-Havers, internationally known rheumatologist, was appointed deputy director of NIH on August 4, 1974, after serving in an acting capacity since May 20.

Prior to this appointment, he had been deputy director of the National Institute of Arthritis, Metabolism, and Digestive Diseases (1972-74), and NIH associate director for extramural research and training for 4 years (1968-72).

He received his B.A. in 1942 from the University of British Columbia, Canada, and M.D. in 1946 from the University of Toronto. He took staff and residency training (1946-48) at the Vancouver General Hospital, and residency in internal medicine (1949-51) at the Queen Mary Veterans Hospital in Montreal. From 1951 to 1953, he was a fellow of the Canadian Arthritis and Rheumatism Society at Columbia Presbyterian Hospital, College of Physicians and Surgeons, Columbia University. He also received a diploma in internal medicine in 1953 from McGill University.

He came to NIH in 1964 as associate director for extramural programs, NIAMD. From 1955 to 1964 he was national medical director of the Arthritis Foundation and an instructor in medicine, College of Physicians and Surgeons, Columbia University. Previously, he served as medical director of the Canadian Arthritis and Rheumatism Society, British Columbia division, Vancouver, from 1953 to 1955, and as associate medical director, Student Health Service, University of British Columbia (1948-49).

Dr. Lamont-Havers, author or coauthor of numerous papers on arthritis and rheumatism, was honored in June 1973 with a DHEW Superior Service Award.

He left NIH in September 1976 to become deputy for research policy and administration to the general director, Massachusetts General Hospital, Boston.

Thomas E. Malone, Ph.D.

Dr. Malone, whose career at the NIH began in 1962, was named the sixth deputy director of NIH in March 1977.

He earned his B.S. and M.S. degrees from North Carolina Central University in 1948 and 1949 respectively, and his Ph.D. from Harvard University in 1952. During the period 1950-52 he held a teaching fellowship at Harvard University.

Dr. Malone was professor of zoology at N.C. Central University in Durham from 1952 to 1958. He left that position to accept a postdoctoral fellowship of the NAS National Research Council, serving as a resident research associate at Argonne National Laboratory from 1958 to 1959. He subsequently served on the faculty at Loyola University in Chicago until joining the NIH staff in 1962.

He came to NIH as a member of the Grants Associates Program. After completing a year's training, he joined the staff of the National Institute of Dental Research in 1963, serving in several capacities - from 1963 to 1964 he was assistant chief of the research grants section; 1964 to 1966, deputy chief, extramural programs; and 1966 to 1967, chief, periodontal diseases and soft tissue studies, extramural programs.

In 1967 Dr. Malone accepted a position as professor and chairman of the department of biology at the American University of Beirut, Lebanon. He returned to NIDR in 1969, where he was associate director for extramural programs until 1972 when he was appointed NIH associate director for extramural research and training, a position which he held until his appointment as deputy director of NIH.

He is a member of the Institute of Medicine and of numerous other professional organizations in health research and

administration.

In June of 1971 Dr. Malone received the DHEW Superior Service Award and was honored in April 1974 with the DHEW Distinguished Service Award. In October 1975 the American College of Dentists presented him with a Certificate of Merit. He received a Senior Executive Service Presidential Merit Award in 1980 and a Senior Executive Service Presidential Distinguished Executive Rank Award in 1983.

He served as a member of the U.S. Delegation to the 31st through 35th World Health Assemblies and has participated in numerous other international health activities.

Upon the resignation of Dr. Fredrickson, Dr. Malone was named acting NIH director until the appointment of Dr. Wyngaarden.

Robert Goldberger, M.D.

A highly regarded scientist in biomedical research, Dr. Goldberger became NIH deputy director for science in September 1979.

After receiving his A.B. degree from Harvard College in 1954, he attended the New York University Medical School, where he obtained an M.D. in 1958. He interned at Mt. Sinai Hospital in New York, and then spent 2 years as a post- doctoral fellow at the University of Wisconsin's Institute for Enzyme Research. He came to the NIH as a research associate in the National Heart Institute in 1961, working with Dr. C. B. Anfinsen on the mechanism by which newly synthesized polypeptide chains attain three-dimensional structures characteristic of native proteins. In 1963 he was a visiting scientist at the Weizmann Institute of Science.

Dr. Goldberger served as a biochemist in the Laboratory of Chemical Biology, NIAMD, from 1963 to 1966, when he became chief of that laboratory's Biosynthesis and Control Section. He worked on regulation of gene expression in bacteria.

In 1973 he moved to the NCI's Division of Cancer Biology and Diagnosis, where, as chief of the cellular regulation section, he worked on hormonal regulation of gene expression in avian liver.

Dr. Goldberger has written one book on biochemistry and has edited a multivolume treatise on biological regulation. From 1970 to 1971 he served as president of NIH's Inter-Assembly Council of the Assemblies of Scientists. He received the Superior Service Award, DHEW, in 1973 and the Meritorious Service Medal, USPHS, in 1977.

At the end of June 1981, he left NIH to accept a dual position as provost of Columbia University and vice president for health sciences, and as a professor of chemistry.

William F. Raub, Ph.D.

Dr. Raub was appointed deputy director in August 1986. Since June 1983, he had served as deputy director for extramural research and training coordinating the development and implementation of policies affecting extramural programs.

Upon the resignation of Dr. Wyngaarden, July 31, 1989, Dr. Raub was named acting NIH director.

He was NIH associate director for extramural research and training previous to this appointment. He has served as associate director, National Eye Institute (1975-78), and chief, Biotechnology Resources Branch, Division of Research Resources (1969-75). He joined NIH in 1966.

Dr. Raub led the effort to develop the PROPHET system, a national computer resource for pharmacologists and others who study chemical/biological interactions. PROPHET is the most nearly comprehensive set of information-handling tools for this area of science ever to be presented in a unified system, and offered as a service to the biomedical community.

A graduate of Wilkes College in Wilkes-Barre, Pa., in 1961, he received his Ph.D. in 1965 from the University of Pennsylvania.

Joseph E. Rall, M.D., Ph.D.

Dr. Rall was appointed deputy director for intramural research in June 1983. He advised the NIH director on general scientific matters and intramural research policies and coordinated the intramural research program.

With NIH since 1955, he was director of the division of intramural research at the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases for more than 20 years.

Dr. Rall received his M.D. from Northwestern University School of Medicine (1945) and Ph.D. from the University of Minnesota (1952). He received honorary degrees from North Central College, (1966), the Free University of Brussels (1975), and the University of Naples (1985). He was elected to the NAS in 1980 and to the American Academy of Arts and Sciences in 1985. In 1988 he was invited to become a member of the scientific advisory committee for the International Human Frontier Science Program.

A member of many organizations and the coauthor of more than 160 scientific articles, his research involves thyroid hormones, iodine metabolism, and thyroid diseases.

In addition to the Van Meter Prize (1950) and the Robert Williams Distinguished Leadership Award of the Endocrine Society (1983), Dr. Rall has received the Arthur S. Flemming Award (1959), the DHHS Superior Service Award (1965), and the Distinguished Service Award (1968).

Katherine L. Bick, Ph.D.

Dr. Bick was named NIH deputy director for extramural research in April 1987. As a principal advisor to the NIH director, she coordinated the development and implementation of policies affecting NIH extramural programs.

She joined NIH in 1976 as a scientist administrator in the Neurological Disorders Program, NINCDS. In September 1983 she was appointed NINCDS deputy director, after serving in an acting capacity since February 1981. While in this position she received a PHS Special Achievement Award for sustained superior work performance.

Dr. Bick received her undergraduate degree from Acadia University, Nova Scotia, and earned her Ph.D. from Brown University. She has held academic positions at Georgetown University and California State University, Northridge, and research positions at the UCLA School of Medicine and the University of Western Ontario.

Among her many honors are the PHS Superior Service Award (1986), Senior Executive Service Bonus Award for Performance (1984-88), and the NIH Director's Award (1977). In 1989 she received a Presidential Senior Rank Award.

Dr. Bick left NIH in April 1990.

John W. Diggs, Ph.D.

Dr. Diggs was appointed NIH deputy director for extramural research on July 29, 1990. He had been director of the NIAID Division of Extramural Activities since 1982.

A biology major at Lane College in Jackson, Tenn., he earned his M.S. (1969) and Ph.D. (1972) in physiology from Howard University. His postdoctoral work included serving as a senior research physiologist at Walter Reed Army Institute of Research.

Dr. Diggs joined NINDS in 1974 as a health scientist administrator and received the institute's Special Achievement Award in 1979. He received the NIH Director's Award in 1985, the Presidential Meritorious Executive Rank Award in 1987, and the PHS Superior Service Award in 1990.

Included in his other honors are the Super Achiever in Science Award of Lane College National Alumni (1989), Merit Award of the District of Columbia General Hospital (1989), Outstanding Service Award of Montgomery Count Department of Health (1989), Outstanding Service Award of Maryland Congress of Parents and Teachers, Inc. (1989), the Distinguished Senior Professional Award from the Inter- national Professional Management Association (1986), and Howard's Distinguished Alumni Award (1979).

He served the NIH until 1993.

Lance A. Liotta, Ph.D., M.D.

Dr. Liotta was named NIH deputy director for intramural research and training on July 6, 1992. He joined the Office of the Director after simultaneously serving since 1982 in three NCI Laboratory of Pathology positions: chief, tumor invasion and metastases section; lab chief; and codirector, Anatomic Pathology Residency Program.

He earned his A.B. degree in general science and biology from Hiram College in Ohio, followed by his Ph.D. in biomedical engineering and biomathematics from Case Western Reserve University. In 1976 he earned his M.D. from Case Western and joined NIH as a PHS resident physician in the NCI Laboratory of Pathology.

Dr. Liotta has devoted his career to the study of cancer invasion and metastasis, the major cause of cancer treatment failure. He was one of the first scientists to investigate this process at the molecular level. In 1975 he proposed that tumor cell attachment and degradation of the basement membrane (a collagenous sheath that surrounds epithelial ducts, blood vessels and nerves, and separates tissue compartments) was crucial to invasion and metastasis.

He found that disruption of the basement membrane is the general hallmark of the transition from in situ to invasive cancer for all human epithelial cancers. He discovered metallo-proteinases produced by tumor cells that degrade the metastasis; TIMP-2 (Dr. William Stetler-Stevenson), a new protein that inhibits invasion and angiogenesis; laminin-binding proteins (Dr. Mark Sobel) that mediate tumor cell attachment; and autotaxin (Dr. Mary Stracke), a protein that profoundly stimulates motility.

Dr. Liotta's group also developed the first synthetic compound (CAI) (Dr. Elise Kohn) that blocks cancer metastasis growth by inhibiting selected signal transduction pathways. CAI has now entered clinical phase I trials under support from the Division of Cancer Treatment.

He is a member of the International Metastasis Research Society, American Association for Cancer Research, American Association of Pathologists, American Society of Cell Biology, American Society for Clinical Investigation, and the International Academy of Pathology.

Dr. Liotta has received numerous awards including three PHS Commissioned Corps Medals, the Arthur S. Flemming Award, the Warner Lambert/Parke Davis Award, the Josef Steiner Prize, and the Lil Gruber Research Award. He holds more than 30 patents for his work.

Jay Moskowitz, Ph.D.

Dr. Moskowitz was named by the NIH director as NIH principal deputy director and NIH deputy director for science policy and technology transfer in March 1993. He voluntarily resigned in October 1993.

In October 1993, Dr. Moskowitz became deputy director of the National Institute on Deafness and Other Communication Disorders (NIDCD) and acting director of NIDCD's Division of Intramural Research. He earlier served as founding and acting director of NIDCD, which was established in 1988.

Dr. Moskowitz joined NIH in 1969 as a postdoctoral pharmacology research associate with the National Institute of General Medical Sciences. In 1971 he became a grants associate with the Division of Research Grants.

From 1972 to 1986, Dr. Moskowitz held several administrative positions with the National Heart, Lung, and Blood Institute (NHLBI). As acting chief of the Special Programs and Resources Branch, NHLBI, he was responsible for planning and developing the Young Investigator Pulmonary Research Grant Program.

From 1986 to 1987, Dr. Moskowitz was NIH associate director for program planning and evaluation and executive director of the NIH Centennial Observance. From 1987 to 1993, Dr. Moskowitz was NIH associate director for science policy and legislation.

A graduate of Queens College, City University of New York, Dr. Moskowitz received his Ph.D. in 1969 from Brown University. He is the recipient of numerous honors and awards, including the NIH Director's Award in 1987, the PHS Superior Service Award in 1980, the Senior Executive Service Meritorious Executive Rank Award in 1989, and the DHHS Distinguished Service Award in 1991.

Dr. Moskowitz left NIH in 1995. He became senior associate dean (science and technology) and professor of public health sciences at the Wake Forest University School of Medicine in Winston-Salem, North Carolina, and in 2002 was appointed associate vice president for health sciences research and professor of health policy and administration and vice dean for research and professor of medicine at Penn State College of Medicine.

John D. Mahoney

Mr. Mahoney was named NIH deputy director for management on March 21, 1993. He became senior advisor to the NIH director on August 7, 1994.

Mr. Mahoney began his career in the U.S. Public Health Service in 1970 as a budget analyst for the National Institute of Mental Health. From 1972 to 1979, he held several positions in financial and budget management with the Alcohol, Drug Abuse and Mental Health Administration. From 1979 to 1984, he was chief of the Budget Branch in the Office of the Assistant Secretary for Health. In this position he was responsible for planning and coordinating budget estimates for programs of the agencies of the U.S. Public Health Service, including NIH.

From 1984 to 1986, Mr. Mahoney was director of the Office of Financial Management and Administrative Systems for the Health Care Financing Administration.

In 1986, Mr. Mahoney was named NIH associate director for administration, responsible for advising the NIH director on administrative matters and for developing and implementing administrative policies in support of NIH's research mission. He held that position until 1993. Mr. Mahoney was also acting deputy assistant secretary for health operations from 1990 to 1991.

Mr. Mahoney earned a B.A. and M.B.A. from the University of Maryland. He has received numerous awards including the Presidential Rank Award for Meritorious Service in 1990 and 1996; the General Services Administration, Excellence in Administration, Certificate of Merit in 1992; the Department's Distinguished Service Award and the PHS Special Achievement Award in 1990; the Secretary's Award for Exceptional Achievement in 1983; and the PHS Superior Service Award in 1982.

Mr. Mahoney became the deputy administrator, Health Resources and Services Administration, on February 19, 1995, and retired from federal service on December 31, 1996. Since that time he has been an independent consultant to various agencies of the Department of Health and Human Services and nonprofit organizations.

Ruth Kirschstein, M.D.

Dr. Ruth L. Kirschstein served as the NIH Deputy Director until February 8, 2003. She also served as NIH Deputy Director between November 1993 and December 1999. On January 1, 2002, Dr. Kirschstein was named Acting Director, NIH, and continued to serve in that role (technically called Principal Deputy Director) until May 20, 2002. She also served as Acting Director, NIH between July 1993 and November 1993.

Dr. Kirschstein received a B.A. degree magna cum laude in 1947 from Long Island University. She went on to earn her M.D. in 1951 from Tulane University School of Medicine in New Orleans, LA. She interned in medicine and surgery at Kings County Hospital, Brooklyn, and did residencies in pathology at Providence Hospital, Detroit; Tulane University School of Medicine; and the Warren G. Magnuson Clinical Center, NIH.

From 1957 to 1972, Dr. Kirschstein performed research in experimental pathology at the Division of Biologics Standards (now the Center for Biologics Evaluation and Research, FDA). During that time, she helped develop and refine tests to assure the safety of viral vaccines for such diseases as polio, measles, and rubella. Her work on polio led to selection of the Sabin vaccine for public use. For her role, she received the DHEW Superior Service Award in 1971.

In 1972, Dr. Kirschstein became Assistant Director of the Division of Biologics Standards. That same year, when the division was transferred to the FDA as a bureau, she was appointed Deputy Director. She subsequently served as Deputy Associate Commissioner for Science, FDA.

In 1974, Dr. Kirschstein was named Director of the National Institute of General Medical Services, NIH. She held that position for over nineteen years. From September 1990 to September 1991, she also served as Acting Associate Director of the NIH for research on women's health.

Dr. Kirschstein has twice taken part in World Health Organization deliberations in Geneva, Switzerland, in 1965 as a member of the WHO Expert Group on International Requirements for Biological Substances, and in 1967 as a consultant on problems related to the use of live poliovirus oral vaccine.

Dr. Kirschstein has received many honors and awards, including the PHS Superior Service Award, 1978; the Presidential Meritorious Executive Rank Award, 1980; election to the Institute of Medicine, 1982; the Public Health Service Equal Opportunity Achievement Award, 1983; a doctor of science, honoris causa, degree from Mt. Sinai School of Medicine, 1984; the PHS Special Recognition Award, 1985; the Presidential Distinguished Executive Rank Award, 1985; the Distinguished Executive Service Award of the Senior Executive Association, 1985; an honorary doctor of laws degree from Atlanta University, 1985; an honorary doctor of science degree from the Medical College of Ohio, 1986; the Harvey Wiley FDA Commissioner's Special Citation, 1987; selection by the Office of Personnel Management as 1 of 10 outstanding executives

and organizations for its first group of "Profiles in Excellence," 1989; the Dr. Nathan Davis Award from the AMA, 1990; an honorary doctor of humane letters from Long Island University in 1991; election as a fellow of the American Academy of Arts and Sciences, 1992; and the Public Service Award from the Federation of American Societies for Experimental Biology in 1993.

In 2000, Dr. Kirschstein received the Albert B. Sabin Heroes of Science Award from the Americans for Medical Progress Education Foundation. The following year, she received honorary degrees from Spelman College in Atlanta, GA, and from Georgetown University Medical School in Washington, DC. She was also recognized by the Anti-Defamation League, which bestowed her with their Women of Achievement Award.

Michael Gottesman, M.D.

A well-known and respected basic cancer researcher who has focused on multidrug resistance in human cancer cells, Dr. Gottesman was appointed NIH deputy director for intramural research (DDIR) in November 1993. He had been acting DDIR for the previous year and was acting director of the National Center for Human Genome Research from 1992 to 1993. He continues as chief of NCI's Laboratory of Cell Biology.

He received his B.A. degree from Harvard College in 1966 and earned his M.D. degree at Harvard Medical School in 1970.

In 1971 Dr. Gottesman came to NIH as a research associate in the National Institute of Arthritis, Metabolism, and Digestive Diseases (now NIDDK), where he worked for 3 years. He spent a year as an assistant professor at Harvard Medical School and, together with his wife, joined the permanent staff of NCI in 1976. He became chief of the molecular cell genetics section, Laboratory of Molecular Biology, NCI, in 1980 and chief of the Laboratory of Cell Biology, NCI, in 1990.

At NIH, his research interests have ranged from how DNA is replicated in bacteria to how cancer cells elude chemotherapy. In the past several years—collaborating with Dr. Ira Pastan, chief of NCI's Laboratory of Molecular Biology, and others—he has identified the human gene responsible for resistance of cancer cells to many of the most common anticancer drugs and has shown that this gene encodes a protein that acts to pump anticancer drugs out of drug-resistant human cancers.

This evidence supports the proposal, now widely accepted, that P-glycoprotein (P-gp), the product of the MDR1 gene, is an energy-dependent pump, ferrying toxins or drugs out of the cell. For several years, Dr. Gottesman has been examining clinical applications of his P-gp findings using gene therapy, monoclonal antibodies, and reversing agents to fight multidrug resistance. Recently, his lab has extended studies of multidrug resistance in cancer to the 47 other known ABC transporters and to mechanisms of resistance to the anti-cancer drug cisplatin.

His research has earned him many awards, including the Milken Family Foundation Award for Cancer Research, 1990; C.E. Alken Prize, 1991; the Rosenthal Foundation Award, 1992; and the American Society for Pharmacology and Experimental Therapeutics (ASPET) award in 1997. He was elected a fellow in the American Association for the Advancement of Science in 1988, elected to the Institute of Medicine of the National Academies in 2003, and elected to the Association of American Physicians in 2006. He received the Public Health Service Commendation, Outstanding Service and Distinguished Service awards, the NIH Director's award in 2002, and the HHS Secretary's Award for Distinguished Service in 2005.

Dr. Gottesman is also a member of the American Association for Cancer Research, the American Society for Biochemistry and Molecular Biology, and the American Society for Cell Biology. He has served on several editorial boards including the *Journal of Cell Biology*, *Journal of Biological Chemistry, Molecular Pharmacology, Molecular Biology of the Cell, Cancer Research*, and *Human Gene Therapy*. He has also been involved in initiating several training and mentoring initiatives at NIH for high school, undergraduate, graduate, medical, post-baccalaureate, and postdoctoral students.

As DDIR, Dr. Gottesman has created the NIH Academy (supporting post-baccalaureate students in the study of health disparities); the Graduate Partnerships Program (which permits graduate students to conduct thesis research at NIH); and

loan repayment programs for biomedical researchers supported by NIH. He has institutionalized an intramural tenure-track, new fellows' training programs, the NIH Intramural Database (providing online information about all researchers and research at NIH), and other career development programs to help prepare biomedical research leaders of tomorrow.

Wendy Baldwin, Ph.D.

Dr. Baldwin was appointed NIH deputy director for extramural research in February 1994, after serving in an acting capacity since June 1993. She was responsible for guiding the NIH institutes and centers in the development of policies for their extramural research and research training programs. She also managed—for NIH and PHS—programs aimed at protection of human subjects in research and the proper care and use of laboratory animals in scientific studies.

She has made significant scientific contributions, primarily in adolescent fertility, contraceptive practice, childbearing patterns, AIDS risk behaviors, and infant mortality. She has published widely and has served on many NIH panels and committees, including the panel on NIH research on antisocial, aggressive, and violence-related behaviors, as well as the NIH advisory committee on women's health issues.

Dr. Baldwin joined NIH in 1973 as a health scientist administrator with NICHD. In 1979 she became chief of NICHD's Demographic and Behavioral Sciences Branch in the Center for Population Research. She was named deputy director of NICHD in 1991, a post she held until her appointment as NIH deputy director for extramural research.

She earned her Ph.D. in demography in 1973 and her M.A. in 1970 from the University of Kentucky. She received her B.A. from Stetson University in 1967.

Among her professional activities, she served as a temporary advisor to the WHO task force for social science research on reproductive health, on a National Academy of Sciences panel on adolescent pregnancy, and on a scientific advisory committee for demographic and health sciences. She is a past member of several editorial boards.

Dr. Baldwin has received many professional awards from PHS, NIH, and outside organizations.

Anthony L. Itteilag

Mr. Itteilag was NIH deputy director for management and chief financial officer, NIH, from January 1996 to October 2001.

Mr. Itteilag began his Federal career as a management intern in the Navy Department in 1964. After positions at Navy and at ACTION, in 1975 he became Chief of the Budget Branch in the U.S. Public Health Service (PHS). In 1978 he became the Director of the Division of Budget Policy and Management for the Department of Health and Human Services (DHHS).

From 1980 to 1984, he was Deputy Assistant Secretary for Budget, DHHS, and from 1984 to 1990 he was Director of Budget at the Department of the Interior.

In 1991 Mr. Itteilag became the Deputy Assistant Secretary for Health (Management and Budget), PHS, DHHS. He held that position through 1995.

Mr. Itteilag has a B.A. (summa cum laude) from the University of Rhode Island. He is the recipient of numerous awards including the Clifford R. Gross Award for Federal Public Service, American Society for Public Administration, (Maryland Chapter) in 2001; the Presidential Rank Award (Distinguished Senior Executive) in 1983 and 1992 and (Meritorious Senior Executive) in 1982 and 1988; the Department of the Interior Distinguished Service Award in 1991; the HHS Distinguished Service Award in 1981, 1997 (group) and 2001 (group); and the Public Health Service Exemplary Service Award in 1976. In

1980 he was corecipient of the Secretary's Exceptional Achievement Award, HHS.

He also is a member of the American Society for Public Administration, the American Association for Budget and Program Analysis, the American Political Science Association, the Federal Executive Institute Alumni Association, and the Senior Executives Association.

Mr. Itteilag has been a Senior Advisor to the NIH Director since October 2001.

Yvonne Thompson Maddox, Ph.D. (Acting)

Dr. Yvonne Thompson Maddox was named Acting Deputy Director, NIH in January 2000 and continued to serve in that role until May 20, 2002. In this position, she guided the organizations and programs within the Office of the Director, NIH and was a chief advisor to the Acting Director, NIH. In addition, Dr. Maddox is the Deputy Director of the National Institute of Child Health and Human Development (NICHD), a position she has held since 1995.

Dr. Maddox received her B.S. in biology from Virginia Union University, Richmond and a Ph.D. in Physiology from Georgetown University. Following completion of the Ph.D., she served as a National Research Service Award (NRSA) Post Doctoral Fellow and as an Assistant Professor of Physiology in the Department of Physiology and Biophysics at Georgetown. She studied as a Visiting Scientist at the French Atomic Energy Commission, Saclay, France, and is a graduate of the Senior Managers in Government Program of the Kennedy School of Government, Harvard University.

Dr. Maddox came to NIH in November 1985 as a health scientist administrator in the National Institute of General Medical Sciences (NIGMS), where she managed the Congressionally mandated clinical and basic research grants program in trauma and burn injury. Following her initial appointment, she served NIGMS in various capacities: Acting Director, Minority Access to Research Careers (MARC) Program; Chief, Pharmacology and Physiological Sciences Section; and Deputy Director, Biophysics and Physiological Sciences Program.

In January 1995, Dr. Maddox joined NICHD as its Deputy Director. At the NICHD, Dr. Maddox manages the institute's diverse extramural program that supports research on population issues, reproductive biology, contraception, pregnancy, child development, nutrition, developmental biology, AIDS, mental retardation, and medical rehabilitation.

During her career at NIH, Dr. Maddox has received numerous honors and awards, including the Presidential Meritorious Executive Rank Award, the Public Health Service Special Recognition Award and the NIH Director's Award. She is a member of the American Physiological Society and serves on several public service and academic boards, including the Center for Development and Population Activities Advisory Board and the Robert Woods Johnson Health Policy Fellowship Advisory Board.

Dr. Maddox is author or coauthor of a number of scientific articles, book chapters and conference proceedings, including the often-cited paper on a method she developed to extract peritoneal macrophages from peritoneal dialysate, "A routine clinical source of peritoneal macrophages and their release of prostaglandins *in vitro*," which was published in 1984. She has delivered more than 100 lectures.

Charles E. Leasure, Jr.

Mr. Leasure was named NIH deputy director for management on October 7, 2001. He also served as NIH's chief financial officer and was acting executive officer for the Office of the Director, NIH, from 2000 to 2004.

Mr. Leasure began his career at NIH in 1965 as an employee management relations specialist in the Office of the Director. From 1966 to 1974 he held various administrative positions with the National Cancer Institute.

In 1974, Mr. Leasure became the associate director for administration at the National Institute of Allergy and Infectious Diseases. In 1984, he was named associate director for management at the National Institute of Environmental Health Sciences. He left that position in 1998 to become the associate director for management at the National Human Genome Research Institute.

Mr. Leasure has served as chair of the Administrative Training Committee that oversees the Presidential Management Intern Program, and as a member of the NIH-wide Leadership Development Committee. He has mentored NIH employees in several programs, including the Management Cadre Program, the Presidential Management Intern Program, and the Leadership Development Program.

Mr. Leasure has a B.A. from Georgetown University. He is also the recipient of the NIH Director's Award in 1996 and 2000 for his "outstanding efforts to improve the quality of life for NIH employees." He received the Presidential Meritorious Rank Award in 1994.

Raynard S. Kington, M.D.

Dr. Kington was appointed deputy director of NIH as of February 9, 2003. The deputy director, NIH, functions as the principal deputy director to the NIH Director and shares in the overall leadership, policy direction, and coordination of NIH biomedical research and research training programs of NIH's 27 Institutes and Centers with a budget of almost $29 billion and 18,000 employees. Prior to this appointment, Dr. Kington had been associate director of NIH for behavioral and social sciences research since September 2000. In addition to this role, from January 2002 to November 2002, he served as acting director of the National Institute on Alcohol Abuse and Alcoholism. Prior to coming to NIH, Dr. Kington was director of the Division of Health Examination Statistics at the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). As division director, he also served as director of the National Health and Nutrition Examination Survey (NHANES), one of the nation's largest studies to assess the health of the American people. Prior to coming to NCHS, Dr. Kington was a senior scientist in the health program at the RAND Corporation. While at RAND, Dr. Kington was a co-director of the Drew/RAND Center on Health and Aging, a National Institute on Aging Exploratory Minority Aging Center.

Dr. Kington attended the University of Michigan, where he received his B.S. with distinction and his M.D. He subsequently completed his residency in internal medicine at Michael Reese Medical Center in Chicago. He was then appointed a Robert Wood Johnson Clinical Scholar at the University of Pennsylvania. While at the University of Pennsylvania, he completed his M.B.A. with distinction and his Ph.D. with a concentration in Health Policy and Economics at the Wharton School and was awarded a Fontaine Fellowship. He is board-certified in Internal Medicine and Public Health and Preventive Medicine. In 2006, Dr. Kington was elected to membership in the Institute of Medicine of the National Academies.

Dr. Kington's research has focused on the role of social factors, especially socioeconomic status, as determinants of health. His current research includes studies of the health and socioeconomic status of black immigrants, differences in populations in willingness to participate in genetic research, and racial and ethnic differences in infectious disease rates. His research has included studies of the relationship between wealth and health status; the health status of U.S. Hispanic populations; the determinants of health care services utilization; the economic impact of health care expenditures among the elderly; and racial and ethnic differences in the use of long-term care.

Norka Ruiz Bravo, Ph.D.

Dr. Ruiz Bravo began her tenure as NIH deputy director for extramural research on November 16, 2003, after her appointment was announced by the Director of NIH on October 30, 2003. She oversees the NIH external grants and awards program—a portfolio totaling approximately 83% of the NIH budget—providing trans-NIH coordination and directing the development of policies, standards, guidelines, and staff training for extramural research.

A biologist by training, Dr. Ruiz Bravo earned her Ph.D. degree in 1983 from Yale University. Her postdoctoral tour included completion of an NSRA Fellowship that began at the Johns Hopkins University and ended at the University of Texas M.D. Anderson Cancer Research Center in the fields of biochemistry and molecular biology. She then held a research faculty position at the M.D. Anderson Cancer Research Center and a tenure-track faculty position at Baylor College of Medicine.

In 1990, Dr. Ruiz Bravo joined the NIH as a scientific review administrator in the National Institute of General Medical Sciences (NIGMS) Office of Review Activities. During the years that followed, she actively pursued and was appointed to numerous special assignments. Some of these included: acting deputy director, NIGMS Division of Minority Opportunities in Research; special assistant, NIGMS Office of Extramural Activities; and, scientific review administrator at the National Center for Human Genome Research. She was concurrently a program director in the Division of Genetics and Developmental Biology, where she managed an active portfolio of grants in the field of transcriptional mechanisms.

In early 1997, Dr. Ruiz Bravo transferred her scientific, managerial, and administrative expertise to the National Cancer Institute (NCI), where she served as deputy director and then acting director for the Division of Cancer Biology.

She returned to the NIGMS in late 1999 as deputy associate director for extramural activities, and in 2000 was appointed associate director for extramural activities. In this role, Dr. Ruiz Bravo oversaw the $1.7 billion (FY2003) NIGMS budget for research, and research training grant programs supporting basic biomedicine. She was a principal advisor to the NIGMS director, providing counsel for strategic planning, development, and management of Institute grant activities.

Involved in leadership activities trans-NIH, Dr. Ruiz Bravo currently chairs the Extramural Program Management Committee, co-chairs the Extramural Activities Working Group, and is a member of the Information Technology Working Group. The Working Groups are subcommittees of the NIH Director's Steering Committee, the NIH's governance body. Formerly, she participated in a variety of service committees, chaired the Office of Research Services Advisory Committee, was the chair and co-founder of the Extramural Information Systems Advisory Group at NCI and chaired the Staff Training in Extramural Programs Committee. In addition to her trans-NIH leadership activities, Dr. Ruiz Bravo co-chairs the National Science and Technology Council's (NSTC) Subcommittee on Research Business Models, a trans-agency group tasked with facilitating research by harmonizing policies and regulations across the government. She is a former member of the NSTC's Working Group on Aligning Mechanisms with Scientific Opportunity. Dr. Ruiz Bravo is a member of the American Association for the Advancement of Science, the American Society for Cell Biology, and the Society for Developmental Biology.

Colleen Barros

Ms. Barros received her M.A. in Public Administration from American University and has served in a variety of Federal administrative positions with special expertise in managing technical and scientific information systems and in R&D management. She began her career with NIH in 1979 as a Budget Analyst and served as Senior Administrative Officer in the NIH Office of the Director. In that position she was responsible for directing the efforts in establishing several new offices such as the Office of AIDS Research, the Office of Human Genome Research, the Office of Research on Minority Health and the Office of Alternative Medicine.

In 1995, Ms. Barros was selected as the Associate Director for Administration in the National Institute on Aging where she received several awards for her outstanding contributions toward improving the administrative operations of both the NIH and the NIA. In addition, she participated in several trans-NIH committees and projects including serving on the NIH Information Technology Central Committee responsible for advising the NIH Director on NIH information technology issues and as the NBRSS Project Leader responsible for the development and implementation of NIH's new business system.

In February of 2004, Ms. Barros joined the Office of the Director again as she took on the role of Acting Deputy Director for Management until May 30th when she was appointed Deputy Director for Management.

Alan Krensky, M.D.

Dr. Krensky is the first Director of the Office of Portfolio Analysis and Strategic Initiatives (OPASI) and a Deputy Director of the National Institutes of Health. For the past 23 years, he was at Stanford University where he served as the Shelagh Galligan Professor of Pediatrics, Associate Dean for Children's Health, Associate Chair for Research, Chief of the Division of Immunology and Transplantation Biology and Executive Director of the Children's Health Initiative. A medical graduate of the University of Pennsylvania in 1977, he trained in pediatrics and nephrology at Boston Children's Hospital and immunology with Steven Burakoff at the Dana-Farber Cancer Institute. After one year on the faculty at Harvard, he moved to Stanford as Assistant Professor of Pediatrics in 1984. He was appointed Shelagh Galligan Professor in 1995 and has been at NIH since July 8, 2007.

Dr. Krensky is a member of the American Society of Clinical Investigation, Association of American Physicians, Society for Pediatric Research, American Pediatric Society, American Society of Nephrology, American Society of Pediatric Nephrology, American Association of Immunologists and Transplantation Society. He has served as Councilor and President of the Society for Pediatric Research and Councilor and Secretary-Treasurer of the American Society of Nephrology. He has served on several Scientific Advisory Boards and holds nine patents. Dr. Krensky is a past recipient of the Society for Pediatric Research Young Investigator Award, American Society for Histocompatibility and Immunogenetics Young Investigator Award, American Society of Nephrology Young Investigator Award, American Academy of Pediatrics Award for Excellence in Pediatric Research, E. Mead Johnson Award for Research in Pediatrics, and Novartis Established Investigator Award of the American Society of Transplantation. He presented the David Cornfeld Lecture at Children's Hospital of Philadelphia, the David Hume Lecture at the American Society of Transplant Surgeons, the Roche Visiting Professorship at Harvard Medical School, the Robert Haslam Lecture at the Hospital for Sick Children, and the John Capp Clark lecture at the University of Pennsylvania. He has been supported by the American Heart Association Clinician-Scientist and Established Investigator Awards, the Medical Foundation Fellowship, the Joseph A. Shankman Award of the National Kidney Foundation of Massachusetts, Basil O'Connor Award of the March of Dimes, Mellon Foundation Fellowship, Burroughs Wellcome Scholar in Experimental Therapeutics and a MERIT Award from the National Institutes of Health.

As Executive Director of the Children's Health Initiative and Associate Dean for Children's Health at Stanford, Dr. Krensky planned and implemented a $500 million investment in preeminence and sustainability of the Lucile Packard Children's Hospital at Stanford. He helped develop six centers of excellence, five multidisciplinary cores, and the recruitment of more than forty faculty. In this role, he chaired the CHI Executive Committee, was involved in fund raising and served as a liaison between the Lucile Packard Foundation for Children's Health, Lucile Packard Children's Hospital and Stanford University School of Medicine. During his tenure, the endowment of the Packard Children's Hospital increased 500%.

Dr. Krensky's research program was continuously funded by the National Institutes of Health from 1984 to his assumption of the NIH post. He has made important contributions to understanding the role of human T lymphocytes in human disease and applying this information to the development of new diagnostic and therapeutic approaches to disease. He first identified the human lymphocyte function-associated antigens (1-3), the chemokine RANTES, the host defense molecule Granulysin, and the transcription factor KLF-13 (RFLAT-1). He has published more than 250 scientific articles and reviews and has served on the editorial boards of the Journal of Immunology (Associate Editor), Current Opinion in Pediatrics (Section Editor), Pediatric Nephrology (Assistant Editor), Journal of the American Society of Nephrology (Associate Editor), Pediatric Transplantation, Graft, and Annual Review of Medicine. Dr. Krensky has trained more than 46 graduate students and post-doctoral fellows in his laboratory and has a special interest in training undergraduate and high school students.

Dr. Krensky has enjoyed long service with several organizations, serving as Chairman of the Experimental Immunology Study Section at the National Institutes of Health, American Heart Association National Peer Review Group, American Cancer Society Institutional Review Group, Medical Advisory Board of the National Kidney Foundation of Northern California, the Burroughs Wellcome Fund Translational Research Advisory Committee, and the Steering Committee of the Immune Tolerance Network (NIH-JDRF).

NIH Almanac: Historical Data

Associate Directors of the NIH

Vivian Pinn, Associate Director for Research on Women's Health
Diane Frasier, Acting Associate Director for Administration
Lana Skirboll, Associate Director for Science Policy
Marc Smolonsky, Associate Director for Legislative Policy and Analysis
Barnett Kramer, Associate Director for Disease Prevention
John Burklow, Associate Director for Communications
John Bartrum, Associate Director for Budget

Chronology of Associate Directors

Name	In Office from	To
Norman H. Topping	1948	1952
David E. Price	December 1, 1950	January 30, 1952
James A. Shannon	December 1, 1952	July 31, 1955
C.J. Van Slyke	December 1, 1952	December 2, 1958
Joseph E. Smadel	May 1, 1956	June 30, 1960
Kenneth M. Endicott	January 6, 1958	June 30, 1960
Jack Masur	July 1, 1960	March 8, 1969
Charles V. Kidd	September 13, 1960	December 9, 1964
Ernest M. Allen	August 10, 1960	January 8, 1963
Martin M. Cummings	July 11, 1963	January 1, 1964
John F. Sherman	January 1, 1964	October 31, 1968
Robert Q. Marston	February 1, 1966	March 31, 1968
Thomas J. Kennedy, Jr.	August 8, 1968	August 31, 1974
R.W. Lamont-Havers	November 3, 1968	October 1, 1972
Richard L. Seggel	January 4, 1969	November 28, 1971
Leonard D. Fenninger	November 10, 1969	May 4, 1973
Thomas C. Chalmers	February 9, 1970	October 20, 1973
Storm Whaley	July 1, 1970	February 3, 1992
Leon M. Schwartz	February 6, 1972	June 30, 1979
Thomas E. Malone	November 26, 1972	March 24, 1977
Leon Jacobs	July 30, 1972	July 3, 1978
Robert S. Gordon, Jr.	November 7, 1974	September 1, 1975
Joseph G. Perpich	February 15, 1976	December 12, 1981
Mortimer Lipsett	August 29, 1976	June 30, 1982
Seymour Perry	January 3, 1978	March 1980
William F. Raub	April 4, 1978	April 2, 1983

Charles U. Lowe (Acting)	January 3, 1980	July 9, 1982
Edwin D. Becker	March 1980	April 1988
Calvin Baldwin	August 1, 1980	January 31, 1986
Mark S. Beaubien (Acting)	July 1, 1982	January 18, 1984
Jay R. Shapiro (Acting)	July 1, 1982	July 1983
J. Richard Crout	July 12, 1982	April 16, 1984
Michael I. Goldberg	November 28, 1982	September 17, 1984
Philip S. Chen, Jr.	July 3, 1982	July 29, 1983
John L. Decker	August 1, 1983	June 1, 1990
Craig K. Wallace	January 19, 1984	February 8, 1991
George Galasso	February 5, 1984	January 2, 1996
Jay Moskowitz	January 1986	April 1993
John D. Mahoney	June 1986	April 1993
William T. Friedewald	November 1986	August 31, 1991
Itzhak Jacoby (Acting)	July 10, 1987	December 1999
Anthony S. Fauci	April 5, 1988	1994
Norman D. Mansfield	October 10, 1988	February 1992
John Ferguson (Acting)	September 1989	June 19, 1991
James D. Watson	October 1, 1989	April 10, 1992
Saul Rosen (Acting)	June 1990	June 1994
Ruth Kirschstein	September 1990	September 1991
William R. Harlan	June 30, 1991	April 30, 2001
Vivian Pinn	September 1991	Present
Stephen A. Ficca	February 1992	March 2004
R. Anne Thomas	April 14, 1996	April 21, 2002
William E. Paul	March 1994	November 21, 1997
Leamon Lee	July 10, 1994	January 2004
John Ruffin	August 26, 1990	January 9, 2001
Diane Wax	May 1995	October 1998
Norman Anderson	July 1995	March 2000
Lana Skirboll	August 1995	Present
Sue Quantius	September 1999	April 2002
Marc Smolonsky	July 1999	Present
Raynard Kington	October 2000	February 2003
Jack Whitescarver	October 20, 2000	Present
Barnett Kramer	May 6, 2001	Present
Donald Poppke	April 17, 2002	September 26, 2003
John Burklow	April 22, 2002	Present
Richard Turman	October 9, 2003	July 22, 2005
Andy Baldus (Acting)	July 23, 2005	October 2006
John Bartrum	October 15, 2006	Present

NIH Almanac: Historical Data

Department of Health and Human Services*

Mike Leavitt, Secretary, HHS

Chronology of HHS Secretaries

Name	In Office from	To
Oveta Culp Hobby	April 11, 1953	July 31, 1955
Marion B. Folsom	August 1, 1955	July 31, 1958
Arthur S. Flemming	August 1, 1958	January 1, 1961
Abraham A. Ribicoff	January 20, 1961	July 13, 1962
Anthony J. Celebrezze	July 31, 1962	August 17, 1965
John W. Gardner	August 18, 1965	February 29, 1968
Wilbur J. Cohen	May 9, 1968	January 19, 1969
Robert H. Finch	January 22, 1969	June 24, 1970
Elliot L. Richardson	June 24, 1970	January 29, 1973
Caspar W. Weinberger	February 12, 1973	August 10, 1975
David Mathews	August 8, 1975	January 20, 1977
Joseph A. Califano, Jr.	January 26, 1977	July 19, 1979
Patricia Roberts Harris	July 27, 1979	January 19, 1981
Richard S. Schweiker	January 22, 1981	February 3, 1983
Margaret M. Heckler	March 9, 1983	December 12, 1985
Otis R. Bowen	December 13, 1985	January 20, 1989
Louis Sullivan	March 1, 1989	January 1993
Donna Shalala	January 22, 1993	January 19, 2001
Tommy G. Thompson	February 2, 2001	January 25, 2005
Mike Leavitt	January 26, 2005	present

*Name changed from Department of Health, Education, and Welfare on May 14, 1980; separate Department of Education formed.

NIH Almanac: Organization

Office of the Director, NIH

The Office of the Director (OD) is responsible for setting policy for NIH and for planning, managing, and coordinating the programs and activities of all 27 of NIH's Institutes and Centers. The OD program offices include the Office of AIDS Research, Office of Behavioral and Social Sciences Research, Office of Disease Prevention, and Office of Research on Women's Health, among others.

NIH Institutes

- National Cancer Institute (NCI)
- National Eye Institute (NEI)
- National Heart, Lung, and Blood Institute (NHLBI)
- National Human Genome Research Institute (NHGRI)
- National Institute on Aging (NIA)
- National Institute on Alcohol Abuse and Alcoholism (NIAAA)
- National Institute of Allergy and Infectious Diseases (NIAID)
- National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
- National Institute of Biomedical Imaging and Bioengineering (NIBIB)
- National Institute of Child Health and Human Development (NICHD)
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- National Institute of Dental and Craniofacial Research (NIDCR)
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
- National Institute on Drug Abuse (NIDA)
- National Institute of Environmental Health Sciences (NIEHS)
- National Institute of General Medical Sciences (NIGMS)
- National Institute of Mental Health (NIMH)
- National Institute of Neurological Disorders and Stroke (NINDS)
- National Institute of Nursing Research (NINR)
- National Library of Medicine (NLM)

NIH Centers

- Center for Information Technology (CIT)
- Center for Scientific Review (CSR)
- John E. Fogarty International Center (FIC)
- National Center for Complementary and Alternative Medicine (NCCAM)
- National Center on Minority Health and Health Disparities (NCMHD)
- National Center for Research Resources (NCRR)
- NIH Clinical Center (CC)

NIH Almanac: Organization

Office of the Director, NIH

The NIH comprises the Office of the Director and 27 Institutes and Centers. The Office of the Director (OD) is the central office at NIH. The OD is responsible for setting policy for NIH and for planning, managing, and coordinating the programs and activities of all the NIH components.

The NIH Director provides overall leadership to NIH activities in both scientific and administrative matters. Although each institute within the NIH has a separate mission, the NIH Director plays an active role in shaping the agency's research agenda and outlook. With a unique and critical perspective on the mission of the entire NIH, the Director is responsible for providing leadership to the institutes for identifying needs and opportunities, especially for efforts that involve several institutes. The NIH Director is assisted by the Principal Deputy Director, who shares in the overall direction of the agency's activities.

In carrying out these responsibilities, the NIH Director stays informed about program priorities and accomplishments through regular staff meetings, discussions, and briefing sessions with OD and institute staff. The Director also receives input from:

- the extramural scientific community, including both individual researchers and scientific organizations
- patient advocacy and voluntary health groups that deal directly with NIH or indirectly through Congress and the media
- the Congress, the Administration, and the Director's Council of Public Representatives, which brings public views to NIH.

Ongoing discussions with these groups and others provide the basis for an established framework within which priorities for the agency are identified, reviewed, and justified.

The following describes the major offices in within the NIH Office of the Director:

Research, Funding, and Coordination

Office of Extramural Research (OER)

The Office of Extramural Research provides the leadership, oversight, tools, and guidance needed to administer and manage NIH grants policies and operations. Extramural research grants—awarded to investigators throughout the U.S. and abroad—account for about 84% of NIH's $29 billion budget.

Office of Intramural Research (OIR)

The Office of Intramural Research is responsible for oversight and coordination of intramural research, training, and technology transfer conducted within the laboratories and clinics of the National Institutes of Health. Comprising less than 10% of the NIH budget, the program includes the NIH Clinical Center research hospital and the National Library of Medicine and supports approximately 1,200 principal investigators and 8,000 scientific staff.

Office of Portfolio Analysis and Strategic Initiatives (OPASI)

The Office of Portfolio Analysis and Strategic Initiatives provides NIH and its constituent Institutes and Centers with the methods and information necessary to manage their large and complex scientific portfolios. OPASI identifies important areas of emerging scientific opportunities or rising public health challenges and helps to accelerate investments in these areas. OPASI comprises 3 divisions:

- **Division of Resource Development and Analysis (DRDA)** coordinates with other organizations to develop new analytic tools and support systems that will comprise part of an improved executive decision support system to enhance the management of the NIH's large and complex scientific portfolio.
- **Division of Strategic Coordination (DSC)** oversees NIH-wide efforts to plan and implement programs known as the NIH Roadmap for Medical Research. These programs are funded through the Common Fund and are selected by the NIH Leadership following a process of public input.
- **Division of Evaluation and Systemic Assessments (DESA)** coordinates use of the Evaluation Set-Aside funds to evaluate programs across the NIH. This division also oversees processes related to the Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART).

Communications

Office of Communications and Public Liaison (OCPL)

The Office of Communications and Public Liaison advises the Director and communicates information about NIH policies, programs, and research results to the general public. OCPL also encourages broad national public participation in NIH activities, helps to resolve local community concerns, and coordinates how NIH implements the Freedom of Information Act.

Policy

Office of Science Policy (OSP)

The Office of Science Policy advises the NIH Director on science policy issues affecting the medical research community; participates in the development of new policy and program initiatives; monitors and coordinates agency planning and evaluation activities; plans and implements a comprehensive science education program; and develops and implements NIH policies and procedures for the safe conduct of recombinant DNA activities.

Office of Legislative Policy and Analysis (OLPA)

The Office of Legislative Policy and Analysis serves as the principal legislative policy, analysis, and development office for the Director and other senior NIH staff; develops legislative policy and proposals; and provides analysis and liaison with Congress, the U.S. Department of Health and Human Services, and other Federal agencies on issues affecting NIH programs and activities.

Administration and Services

Executive Office (ODEO)

The Executive Office serves in both a staff and an operational capacity for all administrative support activities for the Office of the Director (OD), excluding the Office of Research Services.

NIH Ethics Office

The NIH Ethics Office provides oversight and strategic direction of NIH activities relating to ethics policy, oversight, and operational activities; develops and administers the NIH policies and procedures for implementing the Government-wide conflict of interest statutes and regulations, the HHS supplemental conflict of interest regulations, and HHS policies; implements a program for trans-NIH ethics oversight that includes information technology (IT) support systems, periodic reviews, audits, delegations of authority, training, and records management; determines real or potential conflicts of interest and assesses ethical considerations in scientific reporting, clinical trials, and scientific conferences and workshops; and serves as the liaison and coordinates the NIH response to requests from Congress, the Inspector General, HHS, and the Office of Government Ethics, and performs appropriate liaison activities.

Office of Equal Opportunity and Diversity Management (OEODM)

The Office of Equal Opportunity and Diversity Management serves as the focal point for NIH-wide policy formulation,

implementation, coordination, and management of the civil rights, equal opportunity, affirmative employment, and workforce diversity programs of the NIH.

Office of Management (OM)

The Office of Management advises the NIH Director and staff on all phases of NIH-wide administration and management. The OM includes the following offices:

- **Office of Acquisition and Logistics Management (OALM)** advises the NIH Director and staff on acquisition and logistics activities and contract and grant financial advisory services; provides leadership and guidance to NIH components on acquisition and logistics administration and management; and develops/implements policies, provides oversight, and manages the operational components in the areas of acquisition and logistics management.
- **Office of Budget (OB)** has primary responsibility for NIH-wide budget policy, planning, analysis, formulation, and presentation. OB is also responsible for budget management once appropriations have been made, including reprogramming and coordination of the use of the Director's Discretionary Fund and transfer authority. OB provides budget advice to the NIH Director and to senior officials within the OD and the NIH Institutes and Centers.
- **Office of Financial Management (OFM)** advises the NIH Director and staff and provides leadership and direction for NIH financial management activities; develops policies and instructions for budget preparation and presentation; administers allocation of funds; and manages a system of fund and budgetary controls.
- **Office of Human Resources (OHR)** advises the NIH Director and staff on human resource (HR) management; directs HR management services; provides NIH leadership and planning on HR program development, salary administration, corporate recruitment, and other functions; and conducts studies and makes recommendations to senior NIH management for new or redirected HR efforts, programs, and policies, as appropriate.
- **Office of Management Assessment (OMA)** provides NIH-wide management of activities/oversight and advice to the NIH Institutes and Centers on management reviews/corrective actions involving program integrity (including fraud, waste, abuse, and mismanagement reviews), OIG/GAO/Outside review liaison, management control, quality management, risk management, best practices, continuous improvement, regulations, delegations of authority, A-76/FAIR Act, Privacy Act requirements, records and forms management, organizational and functional analysis, NIH manual chapters, and guidance and oversight on the control and safeguarding of classified national security information.
- **Office of Research Facilities Development and Operations (ORF)** supports the advancement of NIH scientific and program priorities by planning, designing, constructing, managing, and maintaining state-of-the-science facilities critical to new and expanding research initiatives and the NIH mission. ORF is the single point of accountability for all NIH facility activities and is responsible for assisting the NIH Director with the formulation and execution of the Buildings and Facilities appropriation; developing and maintaining policies and standards governing the use of real property; planning and directing facility-related services such as master planning and construction, renovation, maintenance, and management of real property; providing centralized acquisition services for architecture, engineering, and construction contracting and for real property purchasing and leasing activities; and protecting the NIH environment.
- **Office of Research Services (ORS)** provides a comprehensive portfolio of services to support the biomedical research mission of the NIH. Some examples of the diverse services ORS provides include: laboratory safety, security and emergency response, veterinary resources, the NIH Library, events management, travel and transportation, services for foreign scientists, and programs to enrich and enhance the NIH worksite.
- **Office of Strategic Management Planning (OSMP)** provides assistance to the NIH leadership with the development and accomplishment of goals and strategic and technical plans for emerging and ongoing human capital programs preparation of NIH programs and support activities to achieve the long-term goals of the NIH mission; and implementation, operation, and evaluation of key workforce programs. OSMP develops and accomplishes short- and long-range initiatives through an active and ongoing partnership with the staff of the NIH Office of Human Resources and other NIH components.

Office of the Ombudsman/Center for Cooperative Resolution

The NIH Office of the Ombudsman, Center for Cooperative Resolution provides the NIH community with confidential and informal assistance in resolving work-related conflicts, disputes and grievances; promotes fair and equitable treatment within NIH; offers effective, efficient and innovative dispute resolution services; helps people use non-adversarial approaches in

resolving disputes; and works toward improving the overall quality of worklife at NIH.

Program Coordination

Program offices within the Office of the Director are responsible for encouraging and coordinating specific areas of research throughout NIH and for planning and supporting research and related activities. The program offices fund research through the NIH institutes and centers.

Office of AIDS Research (OAR)

The Office of AIDS Research formulates scientific policy, and recommends allocation of research resources, for AIDS research at NIH.

Office of Behavioral and Social Sciences Research (OBSSR)

The Office of Behavioral and Social Sciences Research advises the NIH Director and other key officials on matters relating to research on the role of human behaviors in the development of health, prevention of disease, and therapeutic intervention. Established by the U.S. Congress as part of the NIH Office of the Director, its mission is to stimulate behavioral and social sciences research throughout NIH and to integrate it more fully into the NIH research enterprise.

Office of Disease Prevention (ODP)

The Office of Disease Prevention coordinates the activities of disease prevention, rare diseases, dietary supplements, and medical applications of research, and advises the NIH Director and senior staff on related matters.

Office of Research on Women's Health (ORWH)

The Office of Research on Women's Health promotes, stimulates, and supports efforts to improve the health of women through biomedical and behavioral research. ORWH works in partnership with the NIH Institutes and Centers to ensure that women's health research is part of the scientific framework at NIH and throughout the scientific community.

NIH Almanac: Organization

National Cancer Institute

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Cancer Institute is the world's largest organization solely dedicated to cancer research.

NCI supports researchers at universities and hospitals across the United States and at NCI-Designated Cancer Centers, a network of facilities that not only study cancer in laboratories but also conduct research on the best ways to rapidly bring the fruits of scientific discovery to cancer patients.

In NCI's own laboratories—almost 5,000 principal investigators, from basic scientists to clinical researchers—conduct earliest phase cancer clinical investigations of new agents and drugs. Recent advances in bioinformatics and the related explosion of technology for genomics and proteomics research are dramatically accelerating the rate for processing large amounts of information for cancer screening and diagnosis. The largest collaborative research activity is the Clinical Trials Program for testing interventions for preventing cancer, diagnostic tools, and cancer treatments, allowing access as early as possible to all who can benefit. NCI supports over 1,300 clinical trials a year, assisting more than 200,000 patients.

NCI's scientists also work collaboratively with extramural researchers to accelerate the development of state-of-the-art techniques and technologies. In addition to direct research funding, NCI offers the nation's cancer scientists a variety of useful research tools and services, including tissue samples, statistics on cancer incidence and mortality, bioinformatics tools for analyzing data, databases of genetic information, and resources through NCI-supported Cancer Centers, Centers of Research Excellence, and the Mouse Models of Human Cancer Consortium. NCI researchers are also seeking the causes of disparities among underserved groups and gaps in quality cancer care, helping to translate research results into better health for groups at high risk for cancer, including cancer survivors and the aging population.

As the leader of the National Cancer Program, NCI provides vision and leadership to the global cancer community, conducting and supporting international research, training, health information dissemination, and other programs. Timely communication of NCI scientific findings help people make better health choices and advise physicians about treatment options that are more targeted and less toxic.

Information about the National Cancer Institute's research and activities is available through its Web site, http://cancer.gov.

Important Events in NCI History

August 5, 1937—President Franklin D. Roosevelt signed the National Cancer Institute Act.

November 9, 1937—The National Advisory Cancer Council held its first meeting.

November 27, 1937—The Surgeon General awarded first grants-in-aid on the recommendation of the National Advisory Cancer Council.

January 3, 1938—The National Advisory Cancer Council recommended approval of first awards for fellowships in cancer research.

August 1940—The *Journal of the National Cancer Institute* published its first issue.

July 1, 1946—The cancer control program was established with appropriations to the states for support of cancer control activities. Staff was organized into 6 sections: biology, biochemistry, biophysics, chemotherapy, epidemiology, and pathology.

July 1, 1947—NCI reorganized to provide an expanded program of intramural cancer research, cancer research grants, and cancer control activities.

November 13, 1947—The Research Grants and Fellowship Branch was established. It became the administrative arm of the Advisory Council.

October 1948—A grants program to medical, dental, and osteopathic schools was initiated for improvement of training in the field of cancer research, diagnosis, and treatment.

July 2, 1953—NCI inaugurated a full-scale clinical research program in the new Clinical Center.

April 1955—The Cancer Chemotherapy National Service Center was established in the institute to coordinate the first national, voluntary, cooperative cancer chemotherapy program.

1957—The first malignancy (choriocarcinoma) was cured with chemotherapy at NCI.

November 1959—The *Journal of the National Cancer Institute* inaugurated a series of occasional publications as *Monographs* to be used for in-depth scientific communications in specific subject areas.

September 13, 1960—The NCI director appointed an associate director for grants and training, associate director for field studies, and associate director for collaborative research.

January 12, 1961—The Laboratory of Viral Oncology was established to investigate the relationship of viruses to human cancer.

April 2, 1962—An exhibit, "Man Against Cancer," opened in Washington, D.C., to commemorate the institute's 25th anniversary and inaugurate Cancer Progress Year.

May 7, 1962—The Acute Leukemia Task Force held its first meeting. It focused the combined efforts and resources of scientists on studies of therapy of the acute leukemia patient, and was the forerunner of other task forces on specific forms of cancer.

October 25, 1962—The Human Cancer Virus Task Force held its first meeting. The task force, of scientists from NCI and other institutions, stimulated the development of special programs in viral oncology.

1963—Studies were initiated at NCI in Hodgkin's disease with combination chemotherapy.

December 1964—The report of the President's Commission on Heart Disease, Cancer, and Stroke was published.

January 11, 1966—NCI reorganized to coordinate related activities. Scientific directors oversaw three newly established scientific divisions: etiology, chemotherapy, and a group of discipline-oriented laboratories and branches referred to as general laboratories and clinics. Two associate directors were named for program and for extramural activities.

February 13, 1967—A cancer research center, USPHS Hospital, was established in Baltimore by the institute to conduct an integrated program of laboratory and clinical research.

April 27, 1970—At the request of Senator Ralph W. Yarborough, chairman of the Committee on Labor and Public Welfare, the Senate approved the establishment of the National Panel of Consultants on the Conquest of Cancer.

November 25, 1970—The national panel of consultants submitted to the Senate committee a report entitled "National Program for the Conquest of Cancer."

October 18, 1971—President Nixon converted the Army's former biological warfare facilities at Fort Detrick, Maryland, to house research activities on the causes, treatment, and prevention of cancer.

December 23, 1971—President Nixon signed the National Cancer Act of 1971.

July 27, 1972—A Bureau-level organization was established for NCI, giving the institute and its components organizational status commensurate with the responsibilities bestowed on it by the National Cancer Act of 1971. Under the reorganization, NCI was composed of the Office of the Director and 4 divisions: Cancer Biology and Diagnosis, Cancer Cause and Prevention, Cancer Treatment, and Cancer Grants (renamed successively the Division of Cancer Research, Resources and Centers, and later the Division of Extramural Activities).

June 20, 1973—NCI director Dr. Frank J. Rauscher, Jr., announced that 8 institutions were recognized as Comprehensive Cancer Centers to bring results of research as rapidly as possible to a maximum number of people. Additional centers were announced on November 2, 1973; June 13, 1974; October 18, 1974; April 8, 1976; December 30, 1976; July 27, 1978; and March 2, 1979, increasing the number of Comprehensive Cancer Centers to 20. (In July 2000 there are 37.)

September 5, 1973—The President transmitted to Congress the first annual report of the director of the National Cancer Program, a 5-year strategic plan for the program, and the report of the National Cancer Advisory Board. Preparation and transmittal of the documents were mandated by the National Cancer Act of 1971.

September 10, 1974—The Division of Cancer Control and Rehabilitation was established to plan, direct, and coordinate an integrated program of cancer control and rehabilitation activities with the goal of identifying, testing, evaluating, demonstrating, communicating, and promoting the widespread use of available and new methods for reducing cancer incidence, morbidity, and mortality.

September 12, 1974—NCI made its first cancer control awards to state health departments for a 3-year program to screen low-income women for cancer of the uterine cervix. At its peak in 1978, the program had grown to a total of 32 states and territories.

December 17, 1974—NCI and the National Library of Medicine established CANCERLINE, a jointly developed computerized service to provide scientists across the country with information on cancer research projects and published findings.

December 19, 1974—The Clinical Cancer Education Program was announced to develop more innovative teaching methods in cancer prevention, diagnosis, treatment, and rehabilitation in schools of medicine, dentistry, osteopathy, and public health; affiliated teaching hospitals; and specialized cancer institutions.

1975—The Cooperative Minority Biomedical Program, as approved by the National Cancer Advisory Board, represented a cofunding effort by NCI to implement and foster cancer research through NIH's Division of Research Resources' Minority Biomedical Research Support Program and the NIGMS Minority Access to Research Careers Program.

July 1, 1975—The Cancer Information Service (CIS) was established on July 1, 1975, following the mandate of the National Cancer Act of 1971, which gave NCI new responsibilities for educating the public, patients, and health professionals.

August 5, 1977—NCI celebrated its 40th anniversary with a ceremony on the NIH campus. Senator Warren G. Magnuson of Washington who, as a member of the House of Representatives, introduced a bill to establish the NCI in 1937, sent a message stating: "Those one and a half million Americans who are alive today—cured of cancer—are ample justification for all that we've appropriated over the last 40 years."

1979—The first human RNA virus (HTLV-I) was discovered by NCI's Dr. Robert C. Gallo.

July 18, 1979—NCI and the National Naval Medical Center, Bethesda, Md., signed an agreement to cooperate in a cancer treatment research program.

July 10, 1980—The U.S. Department of Health and Human Services (HHS) Secretary Patricia Roberts Harris approved institute-wide reorganization. A newly created Division of Resources, Centers, and Community Activities incorporated functions of the former Division of Cancer Control and Rehabilitation and programs for education, training, construction, cancer centers, and organ site research of the former Division of Cancer Research, Resources, and Centers (DCRRC). Other activities of the DCRRC were incorporated into the new Division of Extramural Activities.

April 27, 1981—A new Biological Response Modifiers Program was established in the Division of Cancer Treatment to investigate, develop and bring to clinical trials potential therapeutic agents that may alter biological responses that are important in the biology of cancer growth and metastasis.

September 1982—PDQ, a computerized database on cancer treatment information, became available nationwide via the National Library of Medicine's MEDLARS system.

December 16, 1982—NCI purchased what is now the R. A. Bloch International Cancer Information Center through generous donations to the NCI Gift Fund. This building houses the *Journal of the National Cancer Institute*; the Scientific Information Branch, which publishes *Cancer Treatment Reports* and *Cancer Treatment Symposia*; the International Cancer Research Data Bank; and PDQ.

July 16, 1983—NCI launched the Community Clinical Oncology Program (CCOP) to establish a cancer control effort that combines the expertise of community oncologists with NCI clinical research programs. The CCOP initiative is designed to bring the advantages of clinical research to cancer patients in their own communities.

September 1983—The Office of International Affairs was reorganized to add a Scientific Information Branch and a Computer Communications Branch. The Scientific Information Branch is composed of a literature research section, cancer treatment reports section, *Journal of the National Cancer Institute* section, and the international cancer research data bank section.

Community Clinical Oncology Program, an NCI resource that links community-based physicians with cooperative groups and cancer centers for participation in institute-approved clinical trials, was created.

December 5, 1983—The name of the Division of Cancer Cause and Prevention was changed to the Division of Cancer Etiology.

The Division of Resources, Centers and Community Activities was renamed the Division of Cancer Prevention and Control (DCPC) to emphasize the division's roles in cancer prevention and control research.

1984—A policy statement regarding the relationship of the NCI, the pharmaceutical industry, and NCI-supported cooperative groups was developed. The statement articulates the need for collaboration between the NCI and the pharmaceutical industry in pursuing the joint development of anticancer drugs of mutual interest. It also sets forth guidelines for the handling of issues such as the joint sponsorship of trials, the sharing of information between sponsors, maintaining the confidentiality of certain classes of data, the funding of cooperative groups by drug companies, the review of protocols and the publication of results.

The Comprehensive Minority Biomedical Program, DEA, was established to widen the focus of the minority effort along lines of the programmatic thrusts of the institute, thereby giving it trans-NCI responsibilities.

The Cancer Control Science program was established in DCPC to develop programs in health promotion research and to stimulate widespread application of existing cancer control knowledge. Branches include health promotion sciences, cancer control applications and cancer training.

March 6, 1984—HHS Secretary Margaret M. Heckler launched a new cancer prevention awareness program by NCI to inform the public about cancer risks and steps individuals can take to reduce risk.

April 1984—An NCI scientist, Dr. Robert C. Gallo, reported the isolation of a new group of viruses found in the helper T-cells of patients with AIDS or pre-AIDS symptoms, as well as from healthy individuals at high risk for developing AIDS. These viruses were ultimately named human immunodeficiency virus or HIV. This discovery made the control of blood-product-transmitted AIDS feasible by enabling the development of a simple test for the detection of AIDS-infected blood by blood banks and diagnostic laboratories.

August 1985—The Cancer Prevention Fellowship Program, one of the first formal postdoctoral research training programs in cancer prevention, began.

November 10, 1986—The International Cancer Information Center was established in the Office of International Affairs, NCI Office of the Director.

May 1987—As part of NIH's centennial celebration year, NCI commemorated its 50th anniversary.

October 15, 1987—The DCPC established the Laboratory for Nutrition and Cancer Research with the basic nutrition science section and the clinical/metabolic human studies section.

October 24, 1987—The Office of Technology Development was established in the NCI Office of the Director as the institute's focal point for the implementation of pertinent legislation, rules and regulations, and the administration of activities relating to collaborative agreements, inventions, patents, royalties, and associated matters.

October 26, 1987—The DCT abolished the following branches, sections, and laboratory: the chromosome structure and function section in the Laboratory of Molecular Pharmacology; the Drug Evaluation Branch and its sections; the drug synthesis section and the acquisition section in the Drug Synthesis and Chemistry Branch; the fermentation section and the plant and animal products section in the Natural Products Branch; the chemical resources section, the analytical and product development section and the clinical products section in the Pharmaceutical Resources Branch; the Extramural Research and Resources Branch; and the Animal Genetics and Production Branch; the sections of the Information Technology Branch; the Laboratory of Experimental Therapeutics and Metabolism and its sections; the sections of the Laboratory of Pharmacology and Experimental Therapeutics.

The DCT changed the name of the Laboratory of Pharmacology and Experimental Therapeutics to the Laboratory of Biochemical Pharmacology. The division also established the Laboratory of Medicinal Chemistry, Pharmacology Branch, Biological Testing Branch, and Grants and Contracts Operations Branch.

1988—In DCT's Clinical Oncology Program, the Clinical Pharmacology Branch merged with the Medicine Branch.

The International Cancer Information Center established a separate office in the NCI Office of the Director.

January 1988—NCI journals *Cancer Treatment Reports* and *Journal of the National Cancer Institute* were consolidated into a biweekly *Journal of the National Cancer Institute*.

September 30, 1988—The first Consortium Cancer Center was established, comprised of three historically black medical schools. Component universities supported by this core grant—Charles R. Drew University of Medicine and Science in Los Angeles, Meharry Medical College in Nashville, and Morehouse School of Medicine in Atlanta—focus their efforts on cancer prevention, control, epidemiology, and clinical trials.

April 1989—The NCI-initiated mechanism of supplementing research grants to encourage recruitment of minority scientists and science students into extramural research laboratories is published as an NIH-wide extramural program announcement. This initiative will be expanded to cover science students and scientists who are women or persons with disabilities.

May 22, 1989—NCI scientist Dr. Steven A. Rosenberg conducted the first human gene transfer trial using human tumor-infiltrating lymphocytes to which a foreign gene has been added.

September 14, 1990—Scientists from NCI and NHLBI conducted the first trial in which a copy of a faulty gene was inserted into white blood cells to reverse the immune deficiency it causes. This was the first human gene therapy trial and adenosine deaminase deficiency was treated.

December 19, 1990—The institute began its year-long celebration of the 20th anniversary of the National Cancer Act by inaugurating a series of articles in the *Journal of the National Cancer Institute*. The series described the growth in knowledge that has occurred in cancer research since 1971.

January 29, 1991—The first human gene therapy to treat cancer was started. Patients with melanoma were treated with tumor-infiltrating lymphocytes to which a gene for tumor necrosis factor has been added.

September 24, 1991—Congress held a special hearing to commemorate the 20th anniversary of the National Cancer Act. Dr. Samuel A. Broder, NCI director, thanked Congress for its "consistent vision, leadership, and commitment to the goal of alleviating the death and suffering caused by cancer in this country."

October 1991—NCI began its Five-a-Day program, in partnership with the nonprofit group Produce for Better Health, to encourage Americans to eat at least five fruits and vegetables a day.

December 18, 1992—Taxol (paclitaxel), an anticancer drug extracted from the bark of the Pacific yew, received approval by the U.S. Food and Drug Administration (FDA) for the treatment of ovarian cancer that has failed other therapy. NCI spearheaded the development of the drug through collaboration with the USDA's Forest Service, the Department of the Interior's Bureau of Land Management, and Bristol-Myers Squibb Company, made possible by the Federal Technology Transfer Act of 1986.

November 1993—The Prostate, Lung, Colorectal, and Ovarian trial, designed to determine whether certain screening tests will reduce the number of deaths from these cancers, began recruiting 148,000 men and women, ages 55-74.

February 1995—The results of the Community Intervention Trial for Smoking Cessation were completed and published.

1995/1996—NCI leadership initiated a major reorganization, based on recommendations of the Ad Hoc Working Group of the National Cancer Advisory Board and NCI streamlining work groups and quality improvement teams. Two extramural divisions were created—the Division of Cancer Treatment, Diagnosis, and Centers and the Division of Cancer Biology. Two intramural divisions were also created—the Division of Basic Sciences and the Division of Clinical Sciences—and one combined intramural/extramural division—the Division of Cancer Epidemiology and Genetics. The Divisions of Cancer Prevention and Control and Extramural Activities remain a part of the NCI structure, but in the extramural program.

November 1996—Cancer mortality rates decline nearly 3% between 1991 and 1995, the first sustained decline since national record keeping was instituted in the 1930s.

1996—The NCI Office of Liaison Activities was established to ensure that advocates have input concerning NCI research and related activities. The office supports NCI's research and programs by fostering strong communications and partnerships with the cancer advocacy community, professional societies, and Federal agencies.

August 1, 1997—NCI, in partnership with government, academic, and industrial laboratories, launched the Cancer Genome Anatomy Project with 2 overall goals: to enhance discovery of the acquired and inherited molecular changes in cancer and to evaluate the clinical potential of these discoveries. The project included a website allowing scientists to rapidly access data generated through the project and apply it to their studies.

October 1997—NCI reorganization continued, with the creation of the Division of Cancer Prevention and the Division of Cancer Control and Population Sciences from the former Division of Cancer Prevention and Control and the extramural component of the Division of Cancer Epidemiology and Genetics.

1997—The NCI Director's Consumer Liaison Group was established to advise and provide recommendations to the NCI Director from the perspective and viewpoint of cancer advocates on a wide variety of issues, programs, and research priorities and to maintain strong collaborations between NCI and the advocacy community.

March 1998—Cancer incidence rates showed first sustained decline since NCI began keeping records in 1973. The rates dropped 0.7% per year from 1990 to 1995. Cancer mortality rates continued to decline.

April 6, 1998—Results of the Breast Cancer Prevention Trial, testing the effectiveness of tamoxifen to prevent the disease, were announced 14 months earlier than expected: women taking tamoxifen had 45% fewer breast cancer diagnoses than women on the placebo, proving that breast cancer can be prevented. Rare but serious side effects—endometrial cancer and blood clots—were shown to occur in some postmenopausal women on tamoxifen. A study to compare tamoxifen to another, potentially less toxic drug was planned for fall 1998.

September 25, 1998—The FDA approved the monoclonal antibody Herceptin (Trastuzumab) for the treatment of metastatic breast cancer in patients with tumors that produce excess amounts of a protein called HER-2. (Approximately 30% of breast cancer tumors produce excess amounts of HER-2.)

May 25, 1999—The Study of Tamoxifen and Raloxifene, or STAR, one of the largest breast cancer prevention studies ever, began recruiting volunteers at more than 400 centers across the United States, Puerto Rico, and Canada. The trial will include 22,000 postmenopausal women at increased risk of breast cancer to determine whether the osteoporosis prevention drug raloxifene (Evista) is as effective in reducing the chance of developing breast cancer as tamoxifen (Nolvadex) has proven to be.

October 6, 1999—NCI awarded nearly $8 million in grants toward the creation of the Early Detection Research Network, a network to discover and develop new biological tests for the early detection of cancer and of biomarkers for increased

cancer risk. The awards created 18 Biomarker Developmental Laboratories to identify, characterize, and refine techniques for finding molecular, genetic, and biologic early warning signals of cancer.

December 8, 1999—The National Cancer Institute published the new *Atlas of Cancer Mortality, 1950-94*, showing the geographic patterns of cancer death rates in over 3,000 counties across the country over more than 4 decades. This atlas updated the first atlas, published in 1975. The 254 color-coded maps in the atlas made it easy for researchers and state health departments to identify places where high or low rates occur. For the first time, maps were presented for both white and black populations. An interactive version of the data was made available on the Internet for the first time, as well.

April 6, 2000—A $60 million program was announced to address the unequal burden of cancer within certain special populations in the United States over the next 5 years. The Special Populations Networks for Cancer Awareness Research and Training were intended to build relationships between large research institutions and community-based programs. Eighteen grants at 17 institutions were expected to create or implement cancer control, prevention, research, and training programs in minority and underserved populations. The cooperative relationships established by the Networks fostered cancer awareness activities, supported minority enrollment in clinical trials, and encouraged and promoted the development of minority junior biomedical researchers.

June 7, 2000—President Clinton issued an executive memorandum directing the Medicare program to reimburse providers for the cost of routine patient care in clinical trials. The memorandum also provides for additional actions to promote the participation of Medicare beneficiaries in clinical studies.

December 3, 2000—NCI established the Center to Reduce Cancer Health Disparities. The Center absorbed the former Office of Special Populations Research. The NCI Strategic Plan to Reduce Health Disparities is part of a major national commitment to identify and address the underlying causes of disease and disability in racial and ethnic communities. Because these communities carry an unequal burden of cancer-related health disparities, NCI is working to enhance its research, education, and training programs that focus on populations in need.

January 12, 2001—NCI announced the creation of the Center for Cancer Research, merging 2 intramural divisions at NCI—the Division of Basic Sciences and the Division of Clinical Sciences—to provide greater opportunities to translate fundamental research into pioneering clinical research and molecular medicine.

May 10, 2001—The Food and Drug Administration announced its approval of the drug Gleevec, also known as STI571, as an oral treatment for chronic myelogenous leukemia (CML). This marked the approval of the first molecularly targeted drug that directly turns off the signal of a protein known to cause a cancer. Clinical trials are continuing to expand as clinical investigators test Gleevec in a variety of cancers that share common molecular abnormalities.

July 24, 2001—The largest-ever prostate cancer prevention study was launched by the NCI and a network of researchers known as the Southwest Oncology Group (SWOG). The Selenium and Vitamin E Cancer Prevention Trial, or SELECT, was designed to determine if these 2 dietary supplements can protect against prostate cancer, the most common form of cancer, after skin cancer, in men. The study was expected to include a total of 32,400 men.

September 4, 2001—NCI and the American College of Radiology Imaging Network (ACRIN) launched the first large, multicenter study to compare digital mammography to standard mammography for the detection of breast cancer.

September 10, 2001—NCI launched the Consumer Advocates in Research and Related Activities (CARRA) program—a landmark initiative convening a large network of dedicated advocates who bring the viewpoint of those affected by cancer to NCI. NCI staff, including researchers and scientists, are able to rely on the CARRA network of more than 200 advocates to give insight and feedback from the consumer's perspective to their developing programs.

February 7, 2002—Scientists from NCI and FDA reported that patterns of proteins found in patients' serum may reflect the presence of ovarian cancer, even at early stages. Currently, more than 80% of ovarian cancer patients are diagnosed at a late clinical stage and have a 20% or less chance of survival at 5 years. This new diagnostic concept is potentially

applicable to the diagnosis of other diseases.

May 19, 2002—Researchers from NCI reported that the molecularly targeted drug bevacizumab slowed tumor growth in patients with metastatic renal cell carcinoma, the most common form of kidney cancer in adults.

June 19, 2002—NCI scientists used microarray technology to determine the patterns of genes that are active in tumor cells from which they were able to predict whether patients with the most common form of non-Hodgkin's lymphoma in adults are likely to be cured by chemotherapy. Trials designed to correlate clinical results with molecular data will allow researchers to identify drugs that are effective in subgroups of cancer patients, an approach that has already proven effective in finding new agents to treat breast cancer and leukemia.

July 16, 2002—An NCI-funded trial showed that postmenopausal women who used estrogen replacement therapy for 10 or more years were at significantly higher risk of developing ovarian cancer than women who never used hormone replacement therapy. The relative risk for 10 to 19 years of use was 80% higher risk than non-users, and increased to a 220% higher risk than non-users for women who took estrogen for 20 or more years.

September 18, 2002—NCI launched the National Lung Screening Trial to compare 2 ways of testing for early lung cancer in current and former heavy smokers: spiral computed tomography and single-view chest x-ray. Both spiral CT scans and chest x-rays have been used in clinical practice to detect lung cancer in asymptomatic individuals, but scientific evidence is inconclusive as to whether screening for lung cancer with either method will reduce lung cancer mortality. The trial will examine the relative risks and benefits of both tests in 50,000 current and former smokers at 30 study sites throughout the United States.

September 19, 2002—A new approach to cancer treatment that replaces a patient's immune system with cancer-fighting cells can lead to tumor shrinkage. NCI researchers demonstrated that immune cells, activated in the laboratory against patients' tumors and then administered to those patients, could attack cancer cells in the body. The experimental technique, known as adoptive transfer, has shown promising results in patients with metastatic melanoma who have not responded to standard treatment.

October 16, 2002—Patterns of proteins found in patients' blood may help distinguish between prostate cancer and benign conditions, according to scientists from NCI and FDA. The technique, which relies on a simple test using a drop of blood, may be useful in deciding whether to perform a biopsy in men with elevated levels of prostate specific antigen (PSA).

October 31, 2002—NCI researchers have discovered that a molecule best known for its antimicrobial properties also has the ability to activate key cells in the immune response. This newly discovered function suggests the molecule, a peptide called ß-defensin 2, may be useful in the development of more effective cancer vaccines.

December 12, 2002—A new clinical trial has shown that reducing the interval between successive doses of a commonly used chemotherapy regimen improves survival in women whose breast cancer has spread to the lymph nodes. While previous research has evaluated the use of various forms of "dose dense" chemotherapy, this is the first major controlled study to show a clear survival benefit for women with node-positive breast cancer.

2003—A novel approach to treatment of solid cancers involves therapeutic agents that inhibit the generation of new blood vessels in growing tumors (angiogenesis). The evidence linking tumor growth and metastases with angiogenesis is compelling: in colorectal and breast cancers, the density of microvessels in histologic specimens has been correlated with disease recurrence, metastases, and survival. Of the identified angiogenic factors, vascular endothelial growth factor has been shown to be the most potent and specific.

February 2003—NCI scientists, using DNA microarrays, found that the length of survival following diagnosis of mantle cell lymphoma can be accurately predicted based on gene expression measurements in the diagnostic tumor biopsy. This molecular predictor can identify one quartile of these patients who have a very indolent disease, with a median survival of greater than 6 years, and another quartile that have an aggressive disease, with a median survival of less than one year.

Using this predictor, patients with the indolent form of mantle cell lymphoma can be managed conservatively, whereas new clinical trials can be designed specifically for those patients with the more aggressive tumors.

March 5, 2003—Taking daily aspirin for as little as 3 years was shown to reduce the development of colorectal polyps by 19% to 35% in people at high risk for colorectal cancer in 2 randomized, controlled NCI clinical trials published in the *New England Journal of Medicine*.

April 24, 2003—NCI, CDC, AHRQ, and SAMHSA, in collaboration with the American Cancer Society, launched the Cancer Control PLANET (Plan, Link, Act, Network with Evidence-based Tools), a web portal providing access to regularly updated cancer surveillance data and program resources including cancer control interventions. PLANET is designed to also help state- and community-based planners, program staff, and researchers develop, implement, and evaluate evidence-based cancer control programs. The portal is accompanied by in-person technical support meetings with state and regional public and private sector partnership staff who are working together to use PLANET resources for comprehensive cancer control. (Visit http://cancercontrolplanet.cancer.gov/ for more information.)

May 30, 2003—Under an agreement between FDA and NCI, the 2 agencies, overseen by an Interagency Oncology Task Force, will share knowledge and resources to facilitate the development of new cancer drugs and speed their delivery to patients.

June 24, 2003—Results of the Prostate Cancer Prevention Trial, testing the effectiveness of finasteride to prevent the disease, were announced about a year earlier than expected. Men taking finasteride had 25% fewer prostate cancer diagnoses than men on the placebo, proving that prostate cancer can be prevented. There was a note of caution, however; the men who did develop prostate cancer while taking finasteride were more likely to have high-grade tumors.

July 1, 2003—Data from the Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial gave fresh insight into the appropriate screening intervals for colorectal cancer after a negative exam. This was the largest study to date of repeat sigmoidoscopy screening after an exam. In 2003 the accepted interval for sigmoidoscopy, a technique in which the rectum and lower colon are examined with a lighted instrument called a sigmoidoscope, was 5 years after a negative exam. This recommendation was based primarily on indirect evidence. Exactly how often to repeat sigmoidoscopy is an evolving field of research. It was unclear whether data from this study, which measured the incidence of growths or polyps 3 years after an initial exam, might play a role in changing the recommended 5-year interval.

September 2, 2003—Death rates from the 4 most common cancers—lung, breast, prostate, and colorectal—continued to decline in the late 1990s according to data from the "Annual Report to the Nation on the Status of Cancer, 1975-2000."

October 9, 2003—A Canadian-led international clinical trial found that post-menopausal survivors of early-stage breast cancer who took the drug letrozole after completing an initial 5 years of tamoxifen therapy had a significantly reduced risk of cancer recurrence compared to women taking a placebo. The clinical trial had been halted early because of the positive results.

November 6, 2003—NCI scientists demonstrated that the growth factors interleukin-2 (IL-2) and IL-15 have contrasting roles in the life and death of lymphocytes, an observation that has implications for the immunotherapy of cancer and autoimmune diseases.

June 3, 2004—NCI's Annual Report to the Nation found cancer incidence and death rates on the decline as survival rates showed significant improvement. Overall, cancer death rates for all racial and ethnic populations combined declined by 1.1% per year from 1993 to 2001 and also declined for many of the top 15 cancers in both men and women. Lung cancer death rates among women leveled off for the first time between 1995 and 2001 after increasing continuously for many decades.

July 16, 2004—An NCI Phase I clinical trial is underway to test the safety and efficacy of BMS-354825 in chronic myeloid leukemia patients with imatinib resistance. The effectiveness of imatinib (Gleevec), a small-molecule drug that inhibits the aberrant activity of the BCR-ABL protein tyrosine kinase, has been limited due to the problem of drug resistance. BMS-

354825, a closely related drug, overcomes much of this resistance.

September 13, 2004—NCI announced the Alliance for Nanotechnology in Cancer, a 5-year initiative to integrate nanotechnology development into basic and applied cancer research to facilitate the rapid application of this science to the clinic. The initiative was designed to support the development of nanomaterials and nanoscale devices for molecular imaging and early detection, reporters of efficacy, and multifunctional therapeutics to combat the cancer process.

November 18, 2004—Scientists at NCI have created a model that predicts the survival of 191 follicular lymphoma patients based on the molecular characteristics of their tumors at diagnosis. The model is based on 2 sets of genes—called survival-associated signatures. Understanding the molecular causes of such differences in survival could provide a more accurate method to determine patient risk, which could be used to guide treatment and may suggest new therapeutic approaches.

December 10, 2004—An NCI study determined that a new molecular test can predict the risk of breast cancer recurrence and may identify women who will benefit most from chemotherapy. The test is based on levels of expression (increased or decreased) of a panel of cancer-related genes that is used to predict whether estrogen-dependent breast cancer will come back.

February 16, 2005—In preparation for the new generation of molecular-based oncology medical products, NCIand FDA established an NCI-FDA Research and Regulatory Review Fellowship program. The program is designed to train a cadre of researchers to bridge the processes from scientific discovery through clinical development and regulatory review of new oncology products. The new generation of targeted therapies and diagnostic products will demand new skills and processes that must be incorporated into the current research and regulatory system. The NCI-FDA fellowship program represents an innovative and collaborative approach to that objective. The NCI-FDA Research and Regulatory Fellowship program is an initiative of NCI's and FDA's Interagency Oncology Task Force (IOTF), a major collaboration between the 2 agencies. The IOTF was established in recognition of the fact that cross-fertilization between the NCI and FDA is critical for developing the knowledge base necessary to bring new, molecular-based therapies and diagnostics into the clinical practice of oncology. http://iotftraining.nci.nih.gov or http://www.cancer.gov/newscenter

April 12, 2005—NCI announced the creation of the cancer Biomedical Informatics Grid™. The program brings together open source, open access tools, applications, data and standards developed by the caBIG™ community to accelerate cancer research, prevention and care. caBIG™ providies the foundational infrastructure and specific applications to create a World Wide Web of cancer research. Over 800 individuals from NCI-designated Cancer Centers and other organizations (more than 80 organizations in all) are participating. https://cabig.nci.nih.gov

April 25, 2005—The combination of the targeted agent trastuzumab (Herceptin) and standard chemotherapy cuts the risk of HER-2-positive breast cancer recurrence by more than half compared with chemotherapy alone. The result comes from two large, NCI-sponsored, randomized trials testing, as adjuvant therapy, a trastuzumab/chemotherapy combination against chemotherapy alone in women with invasive, early stage, HER-2 positive breast cancer. For women with this type of aggressive breast cancer, the addition of trastuzumab to chemotherapy appears to virtually reverse prognosis from unfavorable to good.

May 6, 2005—NCI announced the Community Networks Program (CNP), a 5-year initiative to reduce cancer disparities in minority and underserved populations through community participation in education, research and training. Building upon the work of the previous Special Populations Networks, the CNP aims to improve access to- and utilization of- beneficial cancer interventions and treatments in communities experiencing cancer health disparities. For more information, see http://crchd.nci.nih.gov

September/October 2005—NCI implemented major components of its $144.3 million 5-year initiative for nanotechnology in cancer research. First-year awards totaling $26.3 million were expected to help establish 7 Centers of Cancer Nanotechnology Excellence (CCNEs). Each of the CCNE awardees is associated with 1 or more NCI-designated cancer centers, affiliated with schools of engineering and physical sciences, and partnered with not-for-profit organizations

and/or private sector firms, with the specific intent of advancing the technologies being developed. In addition NCI funded awards totaling $35 million over five years to establish 12 Cancer Nanotechnology Platform Partnerships. The National Cancer Institute and the National Science Foundation launched a collaboration to establish integrative training environments for U.S. science and engineering doctoral students to focus on interdisciplinary nanoscience and technology research with applications to cancer. Through this partnership, $12.8 million in grants are being awarded to four institutions over the next 5 years. These advances are part of the NCI Alliance for Nanotechnology in Cancer, launched in September 2004 as a comprehensive, integrated initiative to develop and translate cancer-related nanotechnology research into clinical practice. http://nano.cancer.gov

September 16, 2005—Preliminary results from a large, clinical trial of digital vs. film mammography showed no difference in detecting breast cancer for the general population of women in the trial. However, those women with dense breasts, who are pre- or perimenopausal (women who had a last menstrual period within 12 months of their mammograms), or who are younger than age 50 may benefit from having a digital rather than a film mammogram. These results may give clinicians better guidance and greater choice in deciding which women might benefit most from various forms of mammography.

September 28, 2005—NCI and the National Institute of Neurological Disorders and Stroke (NINDS) created Rembrandt (Repository for Molecular BRAin Neoplasia DaTa), a joint informatics initiative to molecularly characterize a large number of primary brain tumors and to correlate those data with extensive retrospective and prospective clinical data. Understanding the biology behind these tumors and overlaying this valuable data on clinical data will provide clues to discover new therapies. http://rembrandt.nci.nih.gov/

October 5, 2005—NCI' *Annual Report to the Nation on the Status of Cancer*, *1975-2002,* showed observed cancer death rates from all cancers combined dropped 1.1% per year from 1993 to 2002. According to the report's authors, declines in death rates reflect progress in prevention, early detection, and treatment.

October 11, 2005—NCI announced the Transdisciplinary Research on Energetics and Cancer (TREC) initiative to study the effects of diet, weight, and physical activity on cancer and to answer critical questions to help guide our nation's public health efforts. The TREC initiative was one of many NIH-funded programs designed to understand and reduce the increasing prevalence of overweight and obesity in the United States.

October 2005—The Patient Navigator Research Program (PNRP), an NCI initiative, was underway to assess the impact of patient navigators on providing timely and quality standard cancer care to patients following an abnormal cancer finding. The PNRP was designed to encourage research collaborations and partnerships with organizations serving diverse underserved communities within cancer care delivery systems. http://crchd.nci.nih.gov

November 7, 2005—NCI launched a cancer biorepository pilot project designed to standardize biospecimen collection and management among investigators of the NCI's prostate cancer Specialized Programs of Research Excellence. The project was expected to enhance the quality and availability of various biospecimens and associated data for the broader scientific community. This year, NCI established the Office of Biorepositories and Biospecimen Research (OBBR) in recognition of the critical role of biospecimens to an understanding of disease at the molecular level, and the OBBR has issues its First Generation Guidelines for NCI-Supported Biorepositories. http://biospecimens.cancer.gov

December 7, 2005—Results from several studies presented at the San Antonio Breast Cancer Symposium validated that a new test can predict the risk of breast cancer recurrence in a sizable group of patients. The studies also appeared to identify which of those patients might benefit most from chemotherapy. The studies were heralded by researchers as an important moment in the move toward individualized cancer care. Central to the investigations was a test, Oncotype DX, that analyzed the expression of a 21-gene panel in biopsy samples from women with estrogen-dependent, lymph-node negative breast cancer, which accounts for more than 50,000 breast cancer cases in the United States each year.

December 13, 2005—NCI and the National Human Genome Research Institute (NHGRI) launched a comprehensive effort to accelerate an understanding of the molecular basis of cancer through the application of genome analysis

technologies, especially large-scale genome sequencing. The overall effort, called The Cancer Genome Atlas (TCGA), began with a pilot project to determine the feasibility of a full-scale effort to systematically explore the universe of genomic changes involved in all types of human cancer. NCI and NHGRI each committed $50 million over 3 years to the TCGA Pilot Project. The project was expected to develop and test the complex science and technology framework needed to systematically identify and characterize the genetic mutations and other genomic changes associated with cancer. http://cancergenome.nih.gov

January 12, 2006—NCI Supports Interagency Oncology Task Force Efforts to Stimulate Faster and Safer Development of New, Life-saving Interventions for Cancer Patients—Today's announcement by the FDA of guidance for exploratory investigational new drug (IND) studies will help streamline the earliest phases of clinical research in the development of life-saving medical interventions for cancer patients.

April 17, 2006—Osteoporosis Drug Raloxifene Shown to be as Effective as Tamoxifen in Preventing Invasive Breast Cancer—Initial results of the Study of Tamoxifen and Raloxifene, or STAR, show that the drug raloxifene, currently used to prevent and treat osteoporosis in postmenopausal women, works as well as tamoxifen in reducing breast cancer risk for postmenopausal women at increased risk of the disease. Questions and Answers, STAR en Español

May 23, 2006—Personalized Treatment Trial for Breast Cancer Launched—The **T**rial **A**ssigning **I**ndividua**L**ized **O**ptions for Treatment (**Rx**), or TAILORx, was launched on May 23, 2006, to examine whether genes that are frequently associated with risk of recurrence for women with early-stage breast cancer can be used to assign patients to the most appropriate and effective treatment. Questions and Answers, TAILORx en Español

June 7, 2006—Gene Expression Profiling Can Accurately Diagnose Burkitt's Lymphoma—Gene profiling, a molecular technique that examines many genes simultaneously, can accurately distinguish between two types of immune cell tumors, Burkitt's lymphoma and diffuse large B-cell lymphoma (DLBCL). Burkitt's lymphoma and DLBCL appear similar when viewed under a microscope but correct diagnosis is critical because each requires very different treatments.

June 8, 2006—Statement from NCI on FDA Approval of the HPV Vaccine—Nearly 2 decades ago, researchers at NCI and other institutions began searching for the underlying causes of cervical cancer. That scientific quest led to today's FDA approval of the vaccine Gardasil, which protects against infection from the 2 types of human papillomavirus (HPV) that cause the majority of cervical cancers worldwide. HPV en Español

June 29, 2006—Scientists Identify an Inherited Gene That Strongly Affects Risk for the Most Common Form of Melanoma—Researchers at NCI have identified a link between inherited and acquired genetic factors that dramatically increase the chance of developing a very common type of melanoma. This finding appeared in an online version of *Science* on June 29, 2006.

August 14, 2006—Researchers Discover a Unique Pattern of Gene Activity that Can Predict Liver Cancer Spread—Researchers have found that a unique pattern of activity for genes in cells located in the tissue surrounding a liver tumor can accurately predict whether the cancer will spread to other parts of the liver or to other parts of the body.

August/September 2006—NCI researchers developed a new model for estimating the 5-year risk of melanoma. The model can be used by health professionals to identify individuals at increased risk of melanoma through routine office visits and help them plan for potential interventions. Also available is the Breast Cancer Risk Assessment Tool, a computer program developed by scientists at NCI and the National Surgical Adjuvant Breast and Bowel Project. This model allows a health professional to estimate a woman's individual breast cancer risk over a 5-year period and over her lifetime and compares her risk calculation with the average risk for a woman of the same age. http://www.cancer.gov/melanomarisktool/; http://www.cancer.gov/bcrisktool/

September 6, 2006—Annual Report to the Nation Finds Cancer Death Rates Continue to Drop; Lower Cancer Rates

Observed in U.S. Latino Populations—A new report from the nation's leading cancer organizations found that Americans' risk of dying from cancer continued to drop, maintaining a trend that began in the early 1990s. However, the rate of new cancers remains stable. Questions and Answers

September 27, 2006—NCI Creates Network of Clinical Proteomic Technology Centers for Cancer Research—NCI announced awards totaling $35.5 million over 5 years to establish a collaborative network of 5 Clinical Proteomic Technology Assessment for Cancer Teams.

October 2, 2006—NCI Scientists Identify Novel Protein That Ties Disruption of a Critical Cellular Pathway to Birt-Hogg-Dubé Syndrome—Researchers at NCI have linked specific genetic mutations to defects in cells that lead to a rare disease known as Birt-Hogg-Dubé syndrome. The researchers discovered a novel protein that binds to the normal version, but not the mutant version, of the protein implicated in Birt-Hogg-Dubé syndrome.

October 5, 2006—The Biomarkers Consortium—The Foundation for the National Institutes of Health, NIH, FDA, and the Pharmaceutical Research and Manufacturers of America, a public-private biomedical research partnership, formed The Biomarkers Consortium to search for and validate new biomarkers to accelerate the delivery of new technologies, medicines, and therapies for prevention, early detection, diagnosis, and treatment of disease. The first projects, to be undertaken by NCI, will be 2 clinical trials, one in non-Hodgkin lymphoma and one in lung cancer.

October 16, 2006—NIH Announces 2 Integral Components of The Cancer Genome Atlas Pilot Project—The Cancer Genome Atlas program, created by NCI and the National Human Genome Research Institute (NHGRI), will accelerate understanding of the molecular basis of cancer through the application of genome analysis technologies. NIH today announced another 2 of the components of The Cancer Genome Atlas (TCGA) Pilot Project, a 3-year, $100 million collaboration to test the feasibility of using large-scale genome analysis technologies to identify important genetic changes involved in cancer. Lung, brain (glioblastoma), and ovarian cancers were chosen as the tumors for study by TCGA Pilot Project.

October 18, 2006—NCI Releases Preliminary Data on Genetic Susceptibility for Prostate Cancer—NCI released new data from the Cancer Genetic Markers of Susceptibility (CGEMS) study on prostate cancer. This information could help identify genetic factors that influence the disease and will be integral to the discovery and development of new, targeted therapies. This was the first public release of a whole-genome association study of cancer—such studies examine the entire genome, with no assumptions about which genetic alterations cause cancer.

November 2006—NCI's National Community Cancer Centers Program (NCCCP) Pilot will examine the concept of providing a comprehensive approach to cancer care for all patients in local communities through a pilot initiative scheduled to launch in early 2007. The NCCCP seeks to improve cancer care in local communities by: increasing participation in early phase clinical trials, reducing cancer health disparities, and improving overall access to prevention, screening and treatment services. The pilot program will also explore the value of a computer-based knowledge exchange network that could be used to support the work of the community sites, giving them an effective way to share findings, best practices, and other information to advance the goals and improve the NCCCP model. The pilot program will be conducted at approximately 6 community sites over a period of 3 years.

March 28, 2007—MRI Detects Cancers in the Opposite Breast of Women Newly Diagnosed with Breast Cancer—Magnetic Resonance Imaging (MRI) scans of women who were diagnosed with cancer in one breast detected over 90% of cancers in the other breast that were missed by mammography and clinical breast exam at initial diagnosis, according to a new study. Given the established rates of mammography and clinical breast exams for detecting cancer in the opposite, or contralateral breast, adding an MRI scan to the diagnostic evaluation effectively doubled the number of cancers immediately found in these women.

April 1, 2007—NCI Researchers Discover a Common Variation in a Gene Segment that Increases the Risk for Prostate

Cancer—Researchers reported that a variation in a portion of DNA strongly predicts prostate cancer risk and that this common variation may be responsible for up to 20% of prostate cancer cases in white men in the United States. Researchers are scanning the entire human genome to identify common, inherited gene mutations that increase the risks for breast and prostate cancers.

April 18, 2007—Decrease in Breast Cancer Rates Related to Reduction in Use of Hormone Replacement Therapy — The sharp decline in the rate of new breast cancer cases in 2003 may be related to a national decline in the use of hormone replacement therapy (HRT). Age-adjusted breast cancer incidence rates in women in the United States fell 6.7% from 2002 to 2003. Prescriptions for HRT also declined rapidly in 2002 and 2003.

May 8, 2007—Risk of Lymphoma Increases with Hepatitis C Virus Infection—People infected with the hepatitis C virus (HCV) are at an increased risk of developing certain lymphomas (cancers of the lymphatic system). Researchers found that HCV infection increased the risk of developing non-Hodgkin's lymphoma by 20% to 30%. The risk of developing Waldenström's macroglobulinemia (a rare type of non-Hodgkin's lymphoma) went up by 300% and the risk for cryoglobulinemia, a form of blood vessel inflammation, was also elevated for those with HCV infections.

June 14, 2007—NCI Launches a Pilot of its Community Cancer Centers Program to Bring Quality Cancer Care to All—NCI today launched the 3-year pilot phase of a new program that will help bring state-of-the-art cancer care to patients in community hospitals across the United States. The NCI Community Cancer Centers Program (NCCCP) was designed to encourage the collaboration of private-practice medical, surgical, and radiation oncologist—with close links to NCI research and to the network of 63 NCI-designated Cancer Centers principally based at large research universities.

October 2, 2007—National Cancer Institute Symposium Showcases HIV/AIDS Research and Introduces a New Center of Excellence in HIV/AIDS and Cancer Virology—NCI held a symposium to showcase several important historic achievements in HIV/AIDS research made by former and current NCI scientists, introduce a new Center of Excellence for HIV/AIDS and cancer virology, and discuss new directions in the continuing effort to combat HIV infection, the devastating consequences of AIDS, and AIDS-related cancers.

October 15, 2007—Annual Report to the Nation Finds Cancer Death Rate Decline Doubling—*Special Feature Examines Cancer in American Indians and Alaska Natives*—A new report from the nation's leading cancer organizations showed cancer death rates decreased on average 2.1% per year from 2002 through 2004, nearly twice the annual decrease of 1.1% per year from 1993 through 2002.

November 27, 2007—More Accurate Method of Estimating Invasive Breast Cancer Risk in African American Women Developed—A new model for calculating invasive breast cancer risk, called the CARE model, was found to give better estimates of the number of breast cancers that would develop in African American women 50 to 79 years of age than an earlier model which was based primarily on data from white women.

NCI Legislative Chronology

February 4, 1927—Senator M. M. Neely, West Virginia, introduced S. 5589, "To authorize a reward for the discovery of a successful cure for cancer, and to create a commission to inquire into and ascertain the success of such cure." The reward was to be $5 million.

March 7, 1928—Senator M. M. Neely introduced S. 3554, "To authorize the National Academy of Sciences to investigate the means and methods for affording Federal aid in discovering a cure for cancer and for other purposes.

April 23, 1929—Senator W. J. Harris, Georgia, introduced S. 466, "To authorize the Public Health Service and the National Academy of Sciences jointly to investigate the means and methods for affording Federal aid in discovering a cure

for cancer and for other purposes."

May 29, 1929—Senator W. J. Harris introduced S. 4531, authorizing a survey in connection with the control of cancer and providing "That the Surgeon General of the Public Health Service is authorized and directed to make a general survey in connection with the control of cancer and submit a report thereon to the Congress as soon as practicable, together with his recommendations for necessary Federal legislation."

April 2, 1937—Senator Homer T. Bone of Washington introduced S. 2067, "Authorizing the Surgeon General of the Public Health Service to control and prevent the spread of the disease of cancer." It authorized an annual appropriation of $1 million. Congressman Warren G. Magnuson of Washington introduced an identical bill (H.R. 6100) in the House.

April 29, 1937—Congressman Maury Maverick of Texas introduced H.R. 6767, "To promote research in the cause, prevention, and methods of diagnosis and treatment of cancer, to provide better facilities for the diagnosis and treatment of cancer, to establish a National Cancer Center in the Public Health Service, and for other purposes." It authorized an appropriation of $2,400,000 for the first year and $1 million annually thereafter. The legal office of PHS had helped draft the bill on the basis of suggestions made by Dr. Dudley Jackson of San Antonio, Tex.

July 8, 1937—A joint hearing of the Senate and House committees was conducted before a subcommittee on cancer research and a revised bill was written.

July 23, 1937—The National Cancer Institute Act was passed by Congress.

August 5, 1937—The National Cancer Institute Act, P.L. 244, 75th Congress, was signed by President Franklin D. Roosevelt, "To provide for, foster, and aid in coordinating research relating to cancer; to establish the National Cancer Institute; and for other purposes." An appropriation of $700,000 for each fiscal year was authorized.

March 28, 1938—House Joint Resolution 468, 75th Congress, was passed, "To dedicate the month of April in each year to a voluntary national program for the control of cancer."

July 1, 1944—The Public Health Service Act, P.L. 410, 78th Congress, provided that "The National Cancer Institute shall be a division in the National Institute of Health." The act also revised and consolidated many revisions into a single law. The limit of $700,000 annual appropriation was removed.

August 15, 1950—Public Law 692, 81st Congress, increased the term of office of National Advisory Cancer Council members from 3 to 4 years and the size of the Council from 6 to 12 members, exclusive of the ex-officio members.

December 23, 1971—President Richard M. Nixon signed P.L. 92-218-the National Cancer Act of 1971—providing increased authorities and responsibilities for the NCI director; initiating a National Cancer Program; establishing a 3-member President's Cancer Panel and a 23-member National Cancer Advisory Board, the latter replacing the National Advisory Cancer Council; authorizing the establishment of 15 new research, training, and demonstration cancer centers; establishing cancer control programs as necessary for cooperation with state and other health agencies in the diagnosis, prevention, and treatment of cancer; and providing for the collection, analysis, and dissemination of all data useful in the diagnosis, prevention, and treatment of cancer, including the establishment of an international cancer data research bank.

July 23, 1974—The National Cancer Act Amendments of 1974 (P.L. 93-352) were signed by the President to improve the National Cancer Program and to authorize appropriations for the next three fiscal years. P.L. 93-352 also included provisions for disseminating information on nutrition as related to the therapy or causation of cancer, for trials of cytology test programs for the diagnosis of uterine cancer, and for peer review of grant applications and contract projects. It also established a President's Biomedical Research Panel.

August 1, 1977—The NCI mandate was extended for 1 year when the President signed the Health Planning and Health

Services Research and Statistics Extension Act (P.L. 95-83).

November 9, 1978—The President signed the Community Mental Health Centers Act (P.L. 95-622) amending the National Cancer Act to emphasize education and demonstration programs in cancer treatment and prevention, and stipulating that NCI devote more resources to prevention, focusing particularly on environmental, dietary and occupational cancer causes. December 17, 1980—The Health Programs Extension Act of 1980 (P.L. 96-538) was signed into law, extending NCI authorization for 3 years.

November 20, 1985—The Health Research Extension Act of 1985 (P.L. 99-158) was signed into law. It affirmed the special authorities of NCI and emphasized the importance of information dissemination to the public.

November 4, 1988—The Health Research Extension Act of 1988 (P.L. 100-607) was signed into law. The 2-year extension reaffirmed the special authorities of NCI and added information dissemination mandates, as well as a requirement to assess the incorporation of cancer treatments into clinical practice and the extent to which cancer patients receive such treatments. A representative from the Department of Energy was added to the National Cancer Advisory Board as an ex officio member.

June 10, 1993—The NIH Revitalization Act of 1993, P.L. 103-43, was signed. The act encouraged NCI to expand and intensify its efforts in breast cancer and other women's cancers and authorized increased appropriations. Similar language is included for prostate cancer. The institute is also directed to collaborate with NIEHS, to undertake a case control study to assess biological markers of environmental and other potential risk factors contributing to the incidence of breast cancer in specific counties in the Northeast. In FY 1994 NCI is directed to allocate 7% of its appropriation to cancer control, in FY 1995, 9%, and in FY 1996, 10%.

August 13, 1998—The Stamp Out Breast Cancer Act (PL 105-41) was signed into law. The bill established a special alternative rate of postage up to 25% higher than a regular first-class stamp. Seventy% of the profits from the sale of the stamp, also referred to as semipostal, would go to NIH to fund breast cancer research; the remaining 30% would go toward DOD breast cancer research.

July 28, 2000—President Bill Clinton signed into law the Semipostal Authorization Act (P.L. 106-253), which gave the U. S. Postal Service the authority to issue semipostals. These stamps are sold at a premium in order to help provide funding for a particular area of research. The law also extended the Breast Cancer Stamp Act until July 29, 2002.

July 10, 2000—The Radiation Exposure Compensation Amendments of 1999 (P.L. 106-245) was signed into law. The bill allowed more workers who handled radioactive material for weapons programs to be eligible to receive federal compensation for radiation-induced illness. The law expanded previously written compensation acts, making more grades of workers eligible for compensation, and to include compensation for brain, lung, bladder, colon, ovary, and salivary gland cancers.

November 12, 2001—The President signed P.L. 107-67 making appropriations for the Treasury Department, the United States Postal Service, the Executive Office of the President, and certain Independent Agencies, for the fiscal year ending September 30, 2002, and for other purposes. Within this bill was a provision to reauthorize the Breast Cancer Research Postage Stamp through July 29, 2008.

January 4, 2002—President George W. Bush signed P.L. 107-109 - S. 1789, the Best Pharmaceuticals for Children Act. This legislation was designed to improve the safety and efficacy of pharmaceuticals for children, by reauthorizing legislation that encourages pediatric drug research by giving drug companies an incentive of 6 months of additional market exclusivity to test their products for use in children.

May 14, 2002—The President signed the Hematologic Cancer Research Investment and Education Act of 2002 (P.L. 107-172) that directed the NIH Director, through the NCI Director, to conduct and support research on blood cancers. In addition, the CDC was directed to establish and carry out an information and education program.

September 10, 2002—The Public Health Security and Bioterrorism Preparedness and Response Act (P.L. 107-188) was signed and contained a provision instructing Federal agencies to stockpile and distribute potassium iodide (KI) to protect the public from thyroid cancer in the event of a radiation emergency.

June 30, 2005—The Patient Navigator Outreach and Chronic Disease Prevention Act of 2005 (P.L. 109-18) amended the Public Health Service Act to authorize a demonstration grant program to provide patient navigator services to reduce barriers and improve health care outcomes. The bill directed the Secretary to require each recipient of a grant under this section to use the grant to recruit, assign, train, and employ patient navigators who have direct knowledge of the communities they serve to facilitate the care of individuals who have cancer or other chronic diseases. The bill also directed the Secretary to coordinate with, and ensure the participation of, the Indian Health Service, NCI, the Office of Rural Health Policy, and such other offices and agencies as deemed appropriate by the Secretary, regarding the design and evaluation of the demonstration programs.

November 11, 2005—The 2-Year Extension of Postage Stamp for Breast Cancer Research (P.L. 109-100) extended, through December 31, 2007, the U.S. Postal Service's authority to issue special postage stamps to help provide funding for breast cancer research.

January 12, 2007—The Gynecologic Cancer Education and Awareness Act of 2005', or "Johanna's Law'" (P.L. 109-475) amended the Public Health Service Act to direct the HHS Secretary to carry out a national campaign to increase the awareness and knowledge of health care providers and women with respect to gynecologic cancers.

April 20, 2007—The National Breast and Cervical Cancer Early Detection Program Reauthorization Act of 2007 (P.L. 110-18) allowed the Secretary to waive requirements for awarding breast and cervical cancers grants for preventive health measures, such as expanding the level of screening and follow-up services, and established 2020 as the new target year to meet HHS objectives for reductions in the rate of mortality from breast and cervical cancer in the U.S.

NCI Directors

Name	In Office from	To
Carl Voegtlin	January 13, 1938	July 31, 1943
Roscoe Roy Spencer	August 1, 1943	July 1, 1947
Leonard Andrew Scheele	July 1, 1947	April 6, 1948
John Roderick Heller	May 15, 1948	July 1, 1960
Kenneth Millo Endicott	July 1, 1960	November 10, 1969
Carl Gwin Baker	July 13, 1970	May 5, 1972
Frank Joseph Rauscher, Jr.	May 5, 1972	November 1, 1976
Arthur Canfield Upton	July 29, 1977	December 31, 1980
Vincent T. DeVita, Jr.	July 9, 1980	September 1, 1988

Samuel Broder	December 22, 1988	April 1, 1995
Richard D. Klausner	August 1, 1995	September 30, 2001
Andrew C. von Eschenbach	January 22, 2002	June 10, 2006
John E. Niederhuber	September 15, 2006	Present

National Cancer Institute Research Programs

The National Cancer Institute leads the National Cancer Program through its operation of 11 research components that provide support for extramural and intramural cancer-related research and through its outreach and collaborations within the cancer community worldwide.

Cancer research is conducted with NCI funding in nearly every state in the United States and more than 20 foreign countries, in addition to research conducted at its own facilities. NCI supports cancer research training, education, and career development, and provides leadership for setting national priorities in cancer research.

NCI Research Components

- Division of Cancer Biology
- Division of Cancer Control and Population Sciences
- Division of Cancer Prevention
- Division of Cancer Treatment and Diagnosis
- Division of Extramural Activities
- Center for Cancer Research
- Division of Cancer Epidemiology and Genetics
- Office of Centers, Training and Resources
- Center for Strategic Science and Technology Initiatives

- Office of Technology and Industry Relations
- Office of Cancer Genomics
- Office of Biorepositories and Biospecimen Research

- Center for Biomedical Informatics and Information Technology
- Center to Reduce Cancer Health Disparities

Division of Cancer Biology

The Division of Cancer Biology (DCB) manages a multidisciplinary program of basic and applied research on cancer cell biology, including research on carcinogenesis and cancer immunology. Six Branches within DCB support a variety of broad-based investigator-initiated research grants from academic institutions, research institutes, and small businesses. Several high-profile NCI programs are also coordinated through the Division's Office of the Director.

The ***Cancer Cell Biology Branch*** encourages and supports basic research projects covering a broad spectrum of topics directed at understanding the biological basis of cancer. The portfolio includes the search for proteins and networks responsible for the cancer phenotype, investigation of aberrantly modified regulatory processes that promote cell proliferation or inhibit cell death, and the identification of connecting pathways that ensure tumor cell survival. The research utilizes non-mammalian organisms as well as mammalian models to undertake the functional analysis of oncogenes and

tumor suppressors in parallel with studies on human tumor cells and tissues. Other areas of special focus include the subcellular location and trafficking of proteins in the cell, regulation of proteolysis, and cancer cell physiology. Investigations in all tumor cell types are included. The ultimate goal of the Cancer Cell Biology program is the discovery of new information that has practical application to disease detection or treatment.

The ***Cancer Etiology Branch*** develops and manages a national extramural research program dealing with biological, chemical, and physical agents that are possible etiological factors or co-factors in cancer and with the control of these agents and their associated diseases. Specific agents of interest include infectious agents such as viruses and bacteria and chemical carcinogens such as polycyclic aromatic hydrocarbons and hormones. Investigations include studies of the agents themselves and their properties, mechanisms of oncogenesis and carcinogenesis, interactions of oncogenic microbiological agents with their hosts, and basic studies to identify possible targets for preventive or therapeutic measures.

The ***Cancer Immunology and Hematology Branch*** supports basic research in tumor immunology and the biology, biochemistry, and molecular biology of the hematologic malignancies (leukemias, lymphomas, and multiple myeloma). Areas of major interest include the immune response to tumors; receptor biology/signal transduction cascades; cytokines; antibodies and antibody genes; T-cell biology; the biology of antigen-presenting cells and nonspecific effectors of the immune system (e.g., natural killer cells); granulocytes and macrophages; hematopoietic differentiation; oncogenes; the biology of hematopoietic tumors (including AIDS lymphomas); immunologic aspects of bone-marrow transplantation; and the stem cell biology of hematologic malignancies.

The ***DNA and Chromosome Aberrations Branch*** supports a basic cancer research program that emphasizes cancer genetics and genomic studies at the DNA and chromosome level, including discovery of genes at sites of chromosome breaks, deletions, and translocations; studies of DNA structure and mechanisms involved in chromosomal aberrations; DNA damage, mutagenesis and repair, chromatin remodeling and transcriptional regulation of gene expression; RNA interference, epigenetics, radiation- and chemical-induced changes in DNA replication and supporting analytical technologies. Other areas of special focus include the genetics of cancer susceptibility and resistance, and the generation of mammalian and non-mammalian model systems to study human cancer.

The ***Structural Biology and Molecular Applications Branch*** focuses on structural and molecular approaches to understanding processes involved in carcinogenesis and tumorigenesis. The Branch also supports integrated and systems biology approaches in cancer biology, employing high throughput technologies, information science, and computational modeling. Research interests include structural biology; genomics; proteomics; molecular and cellular imaging; nanotechnology; enzymology; bio-related and combinatorial chemistry; bioinformatics; and modeling and theoretical approaches to cellular and molecular cancer biology. The Branch also supports the development and application of technologies to advance cancer biology.

The ***Tumor Biology and Metastasis Branch*** supports research that seeks to understand the interactions of cancer cells with the tumor or host microenvironment to delineate the molecular mechanisms and signaling pathways of tumor growth, angiogenesis, lymphangiogenesis, cell migration and invasion, and tumor progression and metastasis. This includes examination of cell-cell and cell-matrix interactions and matrix-degrading enzymes, and the roles played by cellular growth factors and cytokines, cell adhesion molecules, cytoskeleton, the nuclear matrix and lamins, the pathobiology of solid tumors and tumor bearing animals, and the development of technology to facilitate these studies. An area of emphasis is the microenvironment created by inflammation and the inflammatory signaling molecules in tumor initiation and progression, and elucidating the role of tumor stem cells in tumor initiation and metastasis. Emphasis is also placed on the following areas: the role of the extracellular matrix and tissue microenvironment in development and tissue morphogenesis; the role of glycoproteins and proteoglycans in tumor growth, invasion, and metastasis; the role of caveolae/lipid rafts and plasma membranes; and the role of steroid hormones, their receptors and coactivators during tumor growth, progression and the acquisition of the hormone independent phenotype. Models used in these studies may include animal models, tumor tissues/ cells, their components, or their products. Special attention is also given to delineating mechanisms of organ-specific metastasis, and the development of organotypic models that closely mimic in vivo models is encouraged.

The ***Mouse Models of Human Cancers Consortium (NCI-MMHCC)*** is a cooperative group begun in 2000 to foster the high-risk efforts needed to develop accurate, reproducible models of human cancers, consists of 25 research groups and 300-plus members that connect more than 50 institutions in the U.S. and abroad. Altering the genes of

laboratory mice results in animals with heritable malignancies that undergo the steps of cancer progression that mimic the natural histories of human cancers, and closely mirror the clinical course—response or resistance to therapy, and recurrence. The Consortium performs cross-species comparisons of the cancer process and tumors to disclose features of cancer biology that support immediate discovery in human research. The Consortium's experimental therapy efforts have exposed appropriate ways to use mouse cancer models for translational research; the mice guide selection of new therapy targets and testing of single agents and their combinations. The Consortium laboratories collaborate with many NCI SPORE groups to expose the genomic and proteomic signatures of disease subsets in mouse and human that account for variable responses to therapy. They explore the characteristics of pre-malignant lesions in the models for clues about the identity of the earliest stages of human cancer etiology and progression, information that is invaluable for understanding human pre-cancer biology, developing tools for early detection, and devising strategies for effective interventions. Consortium investigators use the models, and unmodified strains of mice, to study the genetic determinants of cancer susceptibility; these mouse gene networks allow epidemiologists to home in very rapidly on relevant susceptibility genes in human populations. And the mice are superb test-beds to explore the interactions among genes on an individual or population basis and to define the roles of environmental perturbations in susceptibility. Consortium groups incorporate state-of-the-art *in vivo* imaging to detect developing malignant lesions and determine their functional characteristics, follow their progression to invasive, metastatic tumors, explore the mechanisms of metastasis, and monitor response and resistance to therapy. The NCI-MMHCC works closely with the NCI Center for Bioinformatics to provide information resources for the entire cancer research community through the eMICE website (http://emice.nci.nih.gov), with links to caMOD, a database for mouse, rat, and zebrafish cancer models (http://cancermodels.nci.nih.gov), caIMAGE, a cancer histology images database (http://cancerimages.nci.nih.gov), caELMIR, a mouse laboratory information management system, and the NCI Mouse Repository (http://mouse.ncifcrf.gov/), which accepts donations of mouse cancer models from the research community and deploys them worldwide.

The ***Integrative Cancer Biology Program (ICBP)*** is a unique initiative designed to gain new insights into the development and progression of cancer through a systems-wide approach. An integrative and multi-disciplinary effort among all fields of cancer research is being applied, incorporating a spectrum of new technologies such as genomics, proteomics, and molecular imaging, to generate computer and mathematical models that could predict the cancer process.

There are 9 integrative biology centers consisting of approximately 120 investigators and associates that represent a broad spectrum of cancer research and provide the nucleus for the design and validation of computational and mathematical cancer models. The models will simulate complex cancer processes and are to be used to address all stages of cancer, from the basic cellular processes through tumor growth and metastasis. The key aspect that sets the ICBP effort apart from others is the focus on building predictive cancer models. The ICBP centers also serve as training and outreach programs, enabling developing technologies to be communicated to other scientists in the cancer research community. The outreach effort adds another level of integration and provides the means for other scientists to validate the usefulness of these models. The ICBP centers interact and collaborate with other NCI programs and external groups. NCI's Cancer Biomedical Information Grid (caBIG™) program coordinates all the bioinformatics software needed by the ICBP, as part of caBIG™'s ongoing effort to simplify and integrate the sharing and usage of data by providing access to NCI's cancer research communities. http://icbp.nci.nih.gov/

The ***Tumor Microenvironment Network*** initiative focuses on expanding our understanding of the role of the tumor microenvironment in cancer initiation, progression, and metastases. Through this initiative, NCI intends to generate a more comprehensive understanding of the composition of the stroma in normal tissues, with the goal of delineating the mechanisms of tumor-stromal interactions in human cancer.

The Network comprises all the investigators funded by this initiative. The major goal of the Network is to develop resources for the research community, such as novel reagents and technologies, disseminating information and resources via an NCI-managed bioinformatics center experimental models suitable for studying tumor-host interactions, identification and characterization of stromal markers as well as development of molecular profiling and immunological tools to identify stromal markers, and dynamic and real time *in vivo* imaging techniques suitable for visualizing molecules, cells and tumors. This is being accomplished by the collaborative efforts among the Network members and by leveraging their expertise. The specific areas of science addressed in the initiative include elucidation of the mechanisms of tumor-stroma interactions in cancer, characterization of component cells and matrix molecules in normal organ and tumor-associated stroma, examination of alterations in the microenvironment that are critical for tumor development, progression and metastasis, characterization of the role of inflammatory and immune cells in tumor initiation, progression and metastasis, and identification of tumor stem

cells (and stromal stem cells) and defining their role in stem cell-stroma interactions. http://tmen.nci.nih.gov/

The **GM/CA CAT Project (Beamline)** provides accurate and rapid structure determination of cancer-related macromolecules that are essential to our understanding of the disease as well the identification and development of new chemotherapeutic drugs. The most robust technique for obtaining t high-resolution structural information is X-ray crystallography. This technology provides a detailed 3-dimensional atomic image of the structure of molecules by using powerful X-rays to take pictures of diamondlike crystals of the biomolecule of interest. This information can be used to locate specific molecular interactions that are likely drug targets, identify potential drug candidates, and finetune drugs to increase both effectiveness and specificity. To fully leverage the exciting potential of this technique, NCI, in collaboration with NIGMS, has invested in the construction and operation of a state-of-the-art X-ray crystallography experimental facility at the Advanced Photon Source at Argonne National Lab. This facility couples extremely powerful X-rays to state-of-the-art optics; robotic sample handling; extremely flexible data collection hardware; and the most advanced data collection, reduction, and analysis software available to produce detailed pictures of the molecular interactions that drive cancer initiation and progression. Cancer researchers now have access to the resources necessary for rapid automated structure determination of cancer-related biomolecules, significantly reducing the time of rational drug design and greatly enhancing NCI's capacity for translating basic mechanistic research into clinical therapies. http://www.gmca.anl.gov/.

Additional information about NCI's Division of Cancer Biology can be found at http://dcb.nci.nih.gov or http://cancer.gov.

Division of Cancer Control and Population Sciences

The Division of Cancer Control and Population Sciences (DCCPS) strives to understand the causes and distribution of cancer in populations; support the development and implementation of effective interventions; and monitor and explain cancer trends. DCCPS both generates new knowledge and seeks to ensure that the products of cancer control research are effectively applied in all segments of the population.

The ***Office of Cancer Survivorship*** supports research that explores the long and short term physical and psychological effects of cancer and its treatment. The Office provides a focus within the NIH for the support of research and education aimed at professionals who deal with cancer patients and survivors. In consultation with the medical and consumer communities, the Office articulates and coordinates a research strategy that will result in improvement in the quality of life, and a reduction in morbidity and mortality in cancer survivors.

The ***Applied Research Program*** evaluates patterns and trends in cancer associated health behaviors and practices, genetic susceptibilities, outcomes, and services. The Program monitors and evaluates cancer control activities in general and specific populations in the United States and determines the influence of these factors on patterns and trends in cancer incidence, morbidity, mortality, and survival. The Program comprised 3 branches: Health Services and Economics, Outcomes Research, and Risk Factor Monitoring and Methods.

The ***Behavioral Research Program*** supports investigations ranging from basic behavioral research to research on the development and dissemination of interventions in areas such as tobacco use, dietary behavior, sun protection, decision making, and counseling about testing for cancer susceptibility and participation in cancer screening. The Program comprises the Applied Cancer Screening Research Branch, Basic Biobehavioral Research Branch, Health Communication and Informatics Research Branch, Health Promotion Research Branch, and Tobacco Control Research Branch.

The ***Epidemiology and Genetics Research Program*** supports population-based research to increase our understanding of the etiology and prevention of cancer. Staff manages and fosters a range of etiologic research on genetic, environmental, infectious, hormonal, lifestyle, and pharmacologic factors in cancer etiology. The Program includes the Methods and Technologies Branch, the Modifiable Risk Factors Branch, the Host Susceptibility Branch, and the Clinical and Translational Research Branch.

The ***Surveillance Research Program*** supports cancer surveillance and health services research to answer key questions about cancer incidence and mortality in diverse regions and populations of the U.S. The Surveillance,

Epidemiology, and End Results Program (SEER), a major component of the Program, collects cancer data on a routine basis from designated population-based cancer registries in various areas of the country. The Program includes the Cancer Statistics Branch and the Statistical Research and Applications Branch.

Additional information about NCI's Division of Cancer Control and Population Sciences can be found at http://cancercontrol.cancer.gov.

Division of Cancer Prevention

The Division of Cancer Prevention (DCP) is the primary NCI unit devoted to cancer prevention research. DCP works through 11 research groups that focus on either defined scientific subject areas or specific organ systems.

The ***Chemopreventive Agent Development Research Group*** focuses on the identification, preclinical development, and qualification of potential cancer preventive agents for phase I clinical studies. Research includes all classes of agents and a wide range of methodologies and technologies. This group also manages the Rapid Access to Preventive Intervention Development program (RAPID), which helps bridge the gap between discovery and clinical testing; supports clinical trial development, agent acquisition, Investigational New Drug (IND)—directed toxicology and related research; and provides technical support and research resources to extra- and intramural investigators and industry for chemopreventive agent development.

The ***Community Oncology and Prevention Trials Research Group*** works to improve clinical oncology in community settings via the Community Clinical Oncology Program (CCOP). Local medical facilities known as CCOPs promote interaction between community oncologists and clinical cooperative groups by allowing local physicians to participate in NCI-sponsored treatment, prevention, and symptom management clinical trials. NCI's large-scale prevention trials are coordinated through the CCOP program, including the Study of Tamoxifen and Raloxifene (STAR) for breast cancer prevention and the Selenium and Vitamin E Cancer Prevention Trial (SELECT) for prostate cancer prevention. The group also funds quality of life and palliative care research.

The ***Nutritional Science Research Group*** generates and tests hypotheses relating diet to the causation and prevention of cancer. It also works to establish a comprehensive understanding of the precise role of bioactive food components in determining cancer risk and tumor behavior. The group seeks to determine how specific genes and/or molecular targets are influenced by either essential or non-essential nutrients, allowing the identification of people who may benefit from a prevention intervention.

The ***Basic Prevention Science Research Group*** integrates fundamental research from intramural and extramural divisions to study the role of molecular markers in cancer prevention. Specific components of this approach include the molecular genetics of cancer risk and the molecular pathogenesis of precancer and cancer. Specimens under study by this group are generated from population studies as well as clinical trials, and the ultimate goal is to apply accumulated data to clinical trials in cancer prevention.

The ***Cancer Biomarkers Research Group*** is the principal resource in the NCI for biomarker information pertaining to cancer detection and risk assessment. This group of scientists supports research for the development and validation of promising early cancer biomarkers for risk prediction and early detection of cancer, including development of databases and informatics systems to track the utility of new biomarkers and new or refined technologies for studying the molecular circuitry of preneoplastic cells. The Early Detection Research Network, a program of translational research to identify early cancer and cancer risk, is managed by this group.

The ***Early Detection Research Group*** develops scientific information and concepts to aid in the dissemination of knowledge of early detection techniques, practices, and strategies to reduce mortality and morbidity from cancer. This group manages and supports clinical trials for early detection and analyzes research results on screening; fosters technology development and statistical modeling of new technologies; and encourages the publication of scientific findings and adoption of early detection practices. NCI's large-scale early detection trials are coordinated through this program, including the

Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial and the National Lung Screening Trial.

The ***Biometry Research Group*** plans and conducts independent and cooperative research studies on cancer epidemiology, prevention, screening, and diagnosis using methods of mathematical and analytic statistics. This Group provides consultation and advice on biostatistical methodology, study design, and biometry to investigators inside and outside of NCI.

The 4 organ-specific research groups in DCP are the ***Breast and Gynecologic Cancer Research Group,*** the ***Gastrointestinal and Other Cancers Research Group***, the ***Lung and Upper Aerodigestive Cancer Research Group***, and the ***Prostate and Urologic Cancer Research Group***. Each group focuses on cancer sites within their defined organ group, overseeing and supporting research in chemoprevention, nutrition, and other prevention strategies that include nutritional, pharmacologic, biologic, and genetic approaches; vaccine development or immunologic intervention; cancer screening and early detection. These groups support clinical trials that lead to new technologies for identifying and modifying premalignant lesions as well as trials that develop agents based on measures of efficacy, such as cancer incidence reduction. Surrogate endpoint biomarkers studies also measure the modulation of the biomarkers as a potential indicator of efficacy.

Additional information about NCI's Division of Cancer Prevention can be found at http://prevention.cancer.gov

Division of Cancer Treatment and Diagnosis

The Division of Cancer Treatment and Diagnosis (DCTD) takes prospective detection and treatment leads, facilitates their paths to clinical application, and expedites the initial and subsequent large-scale testing of new agents and interventions in patients.

DCTD has 7 major programs that work together to bring unique molecules from the laboratory bench to the patient bedside:

The *Cancer Diagnosis Program* stimulates, coordinates, and funds specimen resources, databases related to those specimens, and research on diagnostics and improved technologies to better characterize tumors.

The *Cancer Imaging Program* uses new technologies to expand the role of imaging in noninvasive diagnosis, identification of disease subsets in patients, disease staging, and treatment monitoring.

The *Cancer Therapy Evaluation Program* functions as NCI's primary clinical evaluator of new anticancer agents, radiation treatments, and surgical methods. The program administers the 11 cooperative research groups that unite researchers around the nation and the world in the pursuit of distinctive and effective new treatments for cancer.

The *Developmental Therapeutics Program* serves as a vital resource in discovering potential cancer therapeutics and acquiring preclinical development information. The program provides research materials and manufactures new agents in bulk quantities for use in investigational new drug (IND)-directed studies.

The *Radiation Research Program* provides expertise to investigators who perform novel radiotherapy research and assists in establishing future radiation research directions.

The *Biometrics Research Branch* provides state-of-the-art statistical and biomathematical analyses for DCTD and other NCI components.

The *Office of Cancer Complementary and Alternative Medicine* recently relocated to DCTD. The Office aims to increase the amount of high-quality cancer research and information about the use of complementary and alternative modalities.

Additional information about NCI's Division of Cancer Treatment and Diagnosis can be found at http://cancer.gov/dctd or http://cancer.gov.

Division of Extramural Activities

The Division of Extramural Activities (DEA) is responsible for providing guidance to potential cancer research grant applicants, coordinating and assisting in the development of NCI's extramural funding initiatives, referring applications to appropriate programs, providing scientific peer review and oversight of NCI's extramural research, coordinating advisory committees including the National Cancer Advisory Board and the Board of Scientific Advisors, establishing policies and procedures for extramural research, research integrity, and grant applications, and coding and tracking NCI's research portfolio.

DEA staff members serve as chief NCI liaisons to the extramural cancer research community, processing approximately 12,000 grant applications for referral and recruiting thousands of scientific experts to review about 3,000 grants per year. The DEA's Committee Management Office handles the complex preparation and logistics required for NCI's advisory groups to function productively and for the HHS Secretary's Advisory Committee on Genetics, Health, and Society to act in its prescribed role.

Additional information about NCI's Division of Extramural Activities can be found at http://deainfo.nci.nih.gov or http://cancer.gov.

Center for Cancer Research

The Center for Cancer Research (CCR), the major onsite intramural research program of NCI, is a distinctive and effective community of scientists who integrate basic research discovery with the development of novel interventions against cancer and AIDS. It is based in Maryland, on the Bethesda and Frederick campuses of NIH, and is the nation's in-house investment in cancer research. With over 3,000 employees, the CCR is one of the world's largest cancer research centers.

CCR is home to a critical mass and a unique mix of basic, translational, and clinical scientists who work in interdisciplinary teams to aggressively pursue new approaches for the prevention and treatment of cancer and AIDS. CCR teams already have produced many new drugs and technologies that are improving the lives of Americans and rapidly advancing research, providing hope for the future.

Leaders of CCR promote a collaborative research environment, which is integral to accelerating scientific progress. Focus areas give CCR the flexibility to reassess and respond rapidly to emerging scientific needs and opportunities, leveraging strengths of experts from diverse fields. This approach enables the organization to complement and interface with the activities of the extramural cancer research community. The agile infrastructure leaves CCR well poised to tackle complex scientific questions related to cancer and generate answers that will ultimately benefit patients and the public.

Scientific teams are encouraged to pursue high-risk research that will make a major impact, but may be too difficult or risky for industry or academia to undertake. That type of research clearly distinguishes CCR. The distinctive bench-to-bedside infrastructure enables CCR to be innovative and agile in the pursuit of cancer treatments. CCR invents new tools or harnesses existing ones to translate discoveries about the nature of cancer and its progression into workable solutions aimed at intervening earlier in the cancer process. Using cutting-edge technologies—functional imaging, genomics, serum proteomics, and new approaches to drug development—the research teams are able to drive their discoveries from the lab, to early phase clinical studies, all the way to a benefit for cancer patients.

The CCR has distinguishing strengths in several key areas, including immunotherapy, molecularly targeted therapies for cancers and viruses, and vaccines against cancer and HIV/AIDS. These strengths enable the development of strategies to detect cancer earlier, diagnose it more precisely, and prevent or treat it more effectively.

Technology Development and Support. Technology development and support is another important goal of the CCR intramural program. Current technology initiatives include clinical proteomics, molecular targets drug discovery, microarray technology, animal models development, and imaging technologies. The proteomics initiative involves the search for new serum markers for cancer, development of antibody chips, protein arrays and reverse phase chips, a mass spectrometry center, protein expression laboratory and bioinformatics support. The molecular targets discovery program provides a full range of drug discovery scientific support; advising scientists on molecular target discovery, development of screening assays, conducting screens of pure compound libraries, validation of hits, and assistance in preclinical and clinical development of promising lead compounds. The microarray initiative uses modern lab automation and robotic methods for the production of gene microarrays to allow simultaneous study of the differential expression of large numbers of genes in normal, diseased, or treated cells. The animal models initiative includes transgenic and knockout core services, molecular and comparative pathology support, mouse proteomics, rodent imaging, phenotyping core support, and an animal brain tumor therapeutic and diagnostic core. The imaging initiative incorporates clinical imaging, advanced imaging applications, experimental and innovative technologies, and animal imaging into an interrelated imaging resources program.

Mentoring and Training. The CCR places a particular emphasis on training the next generation of investigators in basic, interdisciplinary, and translational cancer research. Programs offered in the CCR include Accreditation Counsel on Graduate Medical Education (ACGME) accredited residency programs in anatomic pathology, radiation oncology, and dermatology. Additionally, ACGME clinical fellowship training programs in medical oncology, pediatric hematology/oncology, hematology/pathology, and cytology/pathology are available. Fellowship programs in surgical oncology, urological oncology, neuro-oncology, HIV and AIDS malignancy, gynecologic oncology, cancer epidemiology, cancer genetics and cancer prevention are also offered. Translational research opportunities include fellowships in Multidisciplinary Breast Cancer Research, Postdoctoral Fellowships in Radiation Sciences, Clinical Cancer Research Fellowship for Ph.D.s, and a Training Program in Veterinary Pathology. Interdisciplinary fellowship programs include a Biostatistics/Mathematics Training Fellowship (Informatics Training Program) and a Program for Interdisciplinary Training in Chemistry.

The Center is actively involved in the recently established NIH-Graduate Program Partnership initiative, which attracts outstanding graduate students to CCR laboratories. Areas of partnership currently under development include bioinformatics, chemistry, and comparative pathology. The Cancer Research Training Award and the Visiting Fellows program for foreign trainees are available in all the Laboratories, Branches, and Programs.

The CCR Office of Training and Education (OTE) was created in November of 2001 to support the training and mentoring experience for postdoctoral fellows. The OTE mission is to have a programmatic impact on the overall training experience of the basic scientists and clinical fellows in cancer research. This mission is achieved by facilitating and promoting training opportunities for fellows utilizing NCI, NIH, and academic courses; planning and implementing new courses and training programs to prepare fellows as successful independent biomedical researchers; providing opportunities for secondary mentors and expanded collaborative interactions; providing funding mechanisms to reward outstanding research efforts by postdoctoral fellows; implementing funding mechanisms such as the Career Development Awards (K22) to facilitate the fellows' competitiveness as candidates for academic faculty positions; assisting trainees as they transition into academic positions and offering exposure to alternative career paths; and assisting investigators in the recruiting of new postdoctoral candidates. The major responsibilities of the OTE include the CCR Fellows and Young Investigators Retreat, the Tenure Track Investigators Retreat, exceptional pay increases for Postdoctoral Fellows, the CCR Fellows Editorial Board, and the Summer Intern Program. The OTE serves as a resource for the fellows' community and as a liaison to the Office of the Director. The Office of Training and Education will represent the Center both within the NIH and at outside meetings and institutions to recruit quality scientific and professional staff for the research programs.

Center of Excellence in Immunology (CEI). CCR Investigators have been at the forefront of the paradigm shift illuminating the multifaceted relationship between the immune response and cancer. In the past 30 years, these research advances have begun opening the door to developing immune-based treatments for this disease and providing groundbreaking contributions in areas as diverse as cellular immunity, innate immunity, cytokines, and viral immunology. Translation of advances in basic research to the clinic has yielded a portfolio of immunotherapy research at the CCR that is unparalleled. Some bench-to-bedside accomplishments from the CCR include successful treatment of hairy cell leukemia using immunotoxins, radio-immunotherapy of refractory non-Hodgkin's lymphoma and targeting the IL-2 receptor with monoclonal antibodies to treat T cell leukemia, autoimmune disease and graft vs. host disease (GVHD). An exciting recent development is a cell-based therapy for the treatment of refractory melanoma that has resulted in improvement in 51% of patients involved in clinical trials. Given the bleak prognosis for those with late stage melanoma, these are remarkable and

promising results.

The CCR is also host to several strong programs aimed at developing cancer vaccines. Basic research into the assembly of HPV has been translated into a vaccine designed to prevent infection by this virus. Further, therapeutic cancer vaccines from the NCI are in clinical trials throughout the nation. The unique blending of expertise in basic, translational and clinical research, as well as the ability of the NCI IRP to fund long-term, high risk research, have been key in developing each of these approaches to the immunotherapy of cancer.

The CEI was formed to capitalize on the strength of the immunology community at the CCR. Composed of a 19-member steering committee and a faculty of approximately 250, the CEI cuts across and is inclusive of many existing Laboratory/ Program/Branch structures to promote information exchange and collaborations among immunologists in the CCR, as well as generate a multidisciplinary venue to further discovery, development, and delivery of novel immunologic approaches for the prevention and treatment of cancer. The CEI faculty includes two members of the National Academy of Sciences and five members of the Institute of Medicine of the National Academy of Sciences. Thus, the CEI is uniquely suited to catalyze advances in basic, translational and clinical immunology and use this information to facilitate the development of successful immunotherapy for cancer.

Center of Excellence in Chromosome Biology (CECB). The CECB integrates CCR's intellectual and physical resources to support outstanding research in chromosome biology. Its mission is to achieve a comprehensive understanding of the mechanisms involved in chromosome function, how aberrations in chromosomes and chromatin lead to disease, and how these defects can be corrected. The CECB brings together internationally renowned experts in the fields of gene expression and regulation, chromatin/chromosome structure and function, DNA replication and repair, epigenetics and molecular cytogenetics to achieve this mission.

CECB research programs have direct implications for translational medicine. Examples include: examining the chromatin fiber as a promising molecular target for a variety of therapeutic drugs, such as the histone deacetylase inhibitors or modifiers of DNA methylation; developing ligands for steroid/nuclear receptor superfamily members that are critically involved in the development and progression of many human neoplasias, including ovarian, breast, and prostate cancer; exploring interphase genome organization in the early diagnosis of tumor cells and cancer stem cells; utilizing high-throughput imaging approaches to provide useful methodologies for drug discovery; employing high-resolution mapping of genomic imbalance and associated gene expression changes as an entry point for the molecular cloning of novel cancer genes and novel targets for improved detection, diagnosis, and prognosis; and applying these approaches and results towards the realization of an individualized medicine in patients with cancer.

The current CECB steering committee consists of ten CCR investigators, including two members of the National Academy of Sciences. The steering committee meets monthly to plan initiatives and to catalyze advances in basic and translational research related to chromosome biology in order to develop successful therapies for cancer and move them to the clinic.

Center of Excellence in HIV/AIDS and Cancer Virology (CEHCV). The mission of the CEHCV is to facilitate and rapidly communicate advances in the discovery, development, and delivery of antiviral and immunologic approaches for prevention and treatment of HIV infection, AIDS-related malignancies, and cancer-associated viral diseases. The CEHCV coordinates existing structures and areas of expertise across the NCI-Frederick and Bethesda campuses, and is composed of members from across the NCI's different branches, laboratories, and programs.

Current research is being conducted in the areas of AIDS malignancies, HIV virology and molecular pathogenesis, immunology/immunopathology, vaccines and immunotherapy, epidemiology, drug development/resistance, and cancer virology.

The CEHCV endorses NCI's longstanding commitment to making reagents and resources available, both nationally and internationally, as a means of diversifying the strategies that can be applied to these devastating diseases and of facilitating further efforts in this area. By leading new initiatives, projects, and collaborations, the CEHCV positions the IRP to play a significant role in interdisciplinary and multi-disciplinary translational research.

Intramural Cancer Nanotechnology Program (ICNP). Nanotechnology applied to complex biological systems and biomedical sciences will accelerate the progress in our understanding of cancer and the fight against it. For the potential benefits of oncological nanotechnology to be realized, the National Cancer Institute is poised to serve as a catalyst to bridge the gap between innovators of nanotechnology in the areas of physics and engineering, and those possessing the vision for novel strategies against cancer. In many of our new organizational initiatives, we are exploring opportunities to re-direct intramural resources to more effectively support NCI's overall research portfolio and mission. One good example is the reappearance of the Laboratory of Experimental and Computational Biology as Intramural Cancer Nanobiology Program (ICNP). The research portfolio in ICNP will leverage existing resources across CCR, NCI and extramural community to focus on the analyses of biomolecular approaches using lipid based-nonodevices such as nanocapsules and nano fusion machines. These nanodevices could be used for in vivo imaging, as diagnostic tools or to deliver molecularly targeted drugs to cancer cells in support of the NCI challenge goal of eliminating death and suffering due to cancer. The reorientation of existing resources will provide a critical mass of investigators with complementary expertise united by a common goal of developing biomolecular nanodevices. This strong nanotechnology-oriented discovery effort should complement the existing cancer Nanotechnology Plan and will be a distinctive complement to the nanotechnology Standards Laboratory and the overall molecular targets/molecular oncology efforts of the CCR and NCI.

Molecular Imaging Program. The goal of the Molecular Imaging Program is to develop and test targeted imaging agents for use in cancer patients. The MIP has a preclinical program in which new compounds are tested in vivo, a translational component in which compounds are introduced into the clinic and a clinical component in which larger trials are conducted.

- *Pre-clinical and Translational:* Topics include imaging of angiogenesis, lymphangiogenesis and growth factor targeting in mouse models using optical, MRI and radionuclide/PET imaging probes. Key to the development of these agents is conjugate chemistry that links specific targeting agents to imaging beacons.

- *Clinical Program:* The Molecular Imaging Program is introducing new contrast agents into cancer clinical trials. Examples include F-L-Thymidine (FLT), a new PET proliferation marker, and radiolabeled Herceptin. New imaging techniques such as Dynamic Contrast Enhanced MRI (DCE-MRI) and MR spectroscopy are also integrated into clinical trials. Promising new pre-clinical agents may also be introduced into Phase I testing.

Facilities include an extensive chemistry and biology lab. We have microMRI, optical cameras and microPET. We are developing a new microSPECT unit. Future additions include an imaging center for human and animal imaging and animal holding/procedure facility.

Inflammation and Cancer Initiative. A new front in our campaign against cancer will integrate CCR's excellent basic, clinical, and core infrastructure with cross-cutting research activities around one of the major causes of cancer, namely, chronic inflammation caused by infections. A staggering 1.6 million or 18% of all cancer cases are linked to infection. Pro-inflammatory conditions such as obesity or gastric reflux also predispose individuals to cancer. In addition to causing cancer, chronic inflammatory state appears to play a role during the most deadly stage of cancer, cancer metastasis. We have identified CCR's existing research efforts related to basic, clinical, translational, and population aspects of chronic infection and cancer. Leveraging our significant strengths in the fields of immunology and carcinogenesis, 4 key areas of investigative opportunity have been identified for which the discovery and development of interventions (prevention and therapeutic) will have a significant impact on cancer with initiative directed at: cancer susceptibility, chronic inflammatory diseases; innate and adaptive immunity; stem cells; and inflammation-related molecular targets.

Partnerships with Academia and Industry. CCR is committed to forming partnerships that encourage technology development with industry, academia and the private sector. CCR scientists and clinicians have a history of successful research collaborations with colleagues nationally and internationally. The CCR is also active in the area of technology transfer and strives to ensure that scientific breakthroughs reach the public through formal agreements between the government and industry. During the last year there were over 140 active Collaborative Research and Development Agreements (CRADAs) between CCR investigators and outside institutions. These CRADA collaborations were with more than 85 different organizations.

In addition, CCR has further excelled through partnership by participating in many informal collaborations and formal

collaborations by way of material transfer agreements, licensing agreements, and memorandums of understanding.

Unique Aspects of the Intramural Research Program. The juxtaposition of basic and clinical researchers in this large, diverse yet highly interactive Center provides exceptional translational research and training opportunities. With the resources available at the NIH Clinical Center, which houses over 50% of the NIH-funded general clinical research center beds in the U.S., CCR scientists have a unique environment to move new drugs and diagnostics quickly from the bench to the bedside. Medical care is provided without charge to patients enrolled on NCI protocols.

CCR is a center of excellence for vaccine development and cell-based cancer immunotherapies utilizing specialized expertise, techniques and facilities that exist within the Intramural Program. An example of the uniqueness of the Intramural Program is seen in the basic and clinical proteomics initiative—a collaboration between the NCI and the FDA built on Laser Capture Microdissection technology. Laser Capture Microdissection, developed in the CCR Laboratory of Pathology, involves identification and extraction of microscopic homogenous cellular subpopulations from surrounding tissue.

This technology is now being used to isolate tumor versus normal cellular subpopulations to identify potential molecular targets for cancer therapies. The long-range commitment needed to develop the technology to accurately identify specific targets for various cancers requires support that is unique to the Intramural Research Program. Another component of the proteomics initiative is the identification of novel markers for early cancer detection.

These types of long-term, high-risk projects can accelerate the pace of medical research with public health importance and have an immeasurable impact on improving the nation's health care.

The Future. With the creation of CCR, communication, collaborations, and translational research opportunities among the intramural scientists have been increased. To go from bench to bedside and back requires an environment that is not available to most individual investigators or at most research institutions. CCR is unique in having strong basic and clinical components within the same institutional organization and an institutional infrastructure that facilitates the translation of discoveries from the laboratory to the clinic and, in turn, submits clinical observations back to the laboratory for further analysis.

The CCR and the Intramural Research Program are an invaluable resource for generating initiatives that will help guide and shape the direction of the NCI. CCR will continue to serve as a model for interdisciplinary and translational biomedical research programs, and lead the development of new technologies, provide advanced training for the next generation of cancer scientists, and pioneer new avenues for cancer prevention, diagnosis and treatment.

Additional information about NCI's Center for Cancer Research can be found at http://ccr.cancer.gov

Division of Cancer Epidemiology and Genetics

Through its broadly based programs in epidemiology, genetics, statistics, and related areas, the intramural Division of Cancer Epidemiology and Genetics (DCEG) carries out population-based and interdisciplinary research both nationally and internationally to discover the genetic and environmental determinants of cancer. DCEG is uniquely positioned to conduct value-added epidemiologic research projects that are high-risk in nature and require (a) long-term commitments of scientific staff and funding support through contracts, (b) a coordinated national programmatic approach, or (c) a rapid response to emerging public health or scientific issues. The Division develops multi-disciplinary infrastructures and resources for use throughout the scientific community, including database management software for genome-wide association studies, biospecimen inventories, and family-based studies, a variety of software packages for exposure assessment and for estimation of dietary intake, and interactive cancer atlases to generate leads into the environmental determinants of cancer. DCEG also has a firm commitment to training the next generation of scientists, and has developed specialized tracks in genetic epidemiology, radiation epidemiology, molecular epidemiology, and biostatistics. The research conducted by the Division often provides a scientific basis for public health recommendations and policies.

The ***Epidemiology and Biostatistics Program*** consists of 6 branches that conduct independent and collaborative

epidemiologic and biostatistical investigations to identify the distribution, characteristics, and causes of cancer in human populations. The Program investigates demographic variation in the occurrence of cancer by age, race, gender, geography, and over time (descriptive studies). Special emphasis is placed on the studies into carcinogenic effects of occupational and environmental exposures, ionizing and non-ionizing radiation, dietary and nutritional factors, medicinal agents such as hormones, infectious agents, and host factors including genetic susceptibility to cancer-causing exposures. The Program also develops biostatistical methods for family-based and population-based studies.

The ***Human Genetics Program*** provides an expanded focus for interdisciplinary research into the genetic determinants of human cancer. Its 2 branches explore and identify heritable factors that predispose to cancer, including studies of gene-environment interactions. Program investigators study cancer-prone families to identify and clone predisposing genes; investigate the prevalence of identified genes in the general population; conduct pharmacogenetic studies to evaluate genetic polymorphisms as determinants of cancer risk and treatment outcomes; develop new methodologies in genetic epidemiology; and translate advances in molecular genetics into evidence-based management strategies, such as genetic testing and counseling, cancer screening and prevention strategies, and assessment of social and behavioral aspects of heritable cancer. The Laboratory of Translational Genomics examines validated regions of the genome associated with cancer risk, laying the groundwork for further functional studies to determine the causal variants and biological mechanisms involved. These activities are complemented by the NCI Core Genotyping Facility, which provides the tools necessary to look across the genome at large numbers of single nucleotide polymorphisms (SNPs) to uncover the genomic causes of cancer.

The ***DCEG Fellowship Program*** allows participants to design, conduct, and analyze research related to the etiology of cancer in human populations. Fellows participate in protocol development and data collection; feasibility studies; case-control and prospective cohort studies; family-based studies; genetic and biochemical assays; and manuscript preparation and publication. Opportunities exist to initiate new investigations, compete for funding, and present at scientific meetings. Professional skills development and preparation for a future career in epidemiology are an integral part of the program. Postdoctoral training lasts for up to 5 years under the mentorship of NCI senior scientists, with opportunities to work with multiple researchers on a variety of projects. The fellowships may be tailored to one or more specialty tracks including molecular, genetic, occupational, environmental, radiation, viral, and nutritional epidemiology, as well as biostatistics and cancer health disparities.

Additional information about NCI's Division of Cancer Epidemiology and Genetics can be found at http://dceg.cancer.gov.

Office of Centers, Training and Resources

The Office of Centers, Training, and Resources (OCTR) is located within the Office of the Director, NCI. OCTR is responsible for planning, directing, coordinating, and evaluating an extramural grants portfolio that is critical to the NCI's mission to eliminate death and suffering due to cancer. This portfolio provides support for the development of key research infrastructure needed to advance scientific understanding of the causes and mechanisms of cancer, and to transform that knowledge into clinical tools to diagnose, prevent and treat cancer more effectively. OCTR also promotes cancer research through its training and career development grants. Furthermore, OCTR advances national cancer research priorities by stimulating collaborations within and across the NCI/NIH, and between the NCI and other institutions, such as federal, state, and international agencies; patient advocacy groups; and research and professional organizations.

The Office has 4 branches:

- The ***Cancer Centers Branch*** administers complex multidisciplinary grants designed to synergize scientific interactions by providing essential support for cancer research programs and shared resources. Core grants to NCI-designated cancer centers support most of the nation's cancer-related research in basic, clinical, and population science.

- The ***Organ Systems Branch*** administers Specialized Program of Research Excellence (SPORE) grants in order to promote translational research, which links laboratories to clinics and populations (and vice versa) in order to develop devices and agents that prevent and treat cancer. Translational research also seeks to improve

scientific understanding of the complexities of cancer initiation and development. In addition, the SPORE program also provides training opportunities for investigators in translational science and the development of tissue resources.

- The ***Cancer Training Branch (CTB)*** focuses on training, education, and career development in basic, translational, clinical, and prevention/control science. Training is provided through National Research Service Awards and other extramural institutional grants designed to increase the number of cancer researchers working in multidisciplinary and translational research settings. Additionally, CTB grants support fellowship training and individual career development, thereby fostering the next generation of cancer investigators. To this end, CTB also manages the NCI Loan Repayment Program, which covers a portion of the educational debt incurred by health professionals preparing for careers in clinical research.

- The ***Comprehensive Minority Biomedical Branch (CMBB)*** stimulates the training, education and career development of individuals from minority and under-represented populations who wish to pursue a career in cancer research. These programs span the entire spectrum of candidates, from high school, undergraduate, pre- and post-doctoral students/trainees to new investigators capable of competing successfully for peer-reviewed grant support. In addition to these training programs, CMBB provides institutional support for minority serving institutions through partnership grants with NCI-funded cancer centers. Finally, CMBB also serves as an information resource for minority scientists aspiring to a career in cancer research.

Center for Strategic Science and Technology Initiatives

In recent years, the NCI has challenged itself to revolutionize the way we detect, treat and prevent cancer. By placing a heavy emphasis on advanced technology development, NCI is accelerating the creation and use of tools that are already starting to hasten the translation of basic knowledge into clinical advances. These technologies are by definition cross-cutting and multi-disciplinary, and therefore require a systematic management approach. In 2005, NCI established the Center for Strategic Science and Technology Initiatives to centralize its new technology-driven initiatives in nanotechnology, proteomics, cancer genomics and biospecimen resources, ensuring collaboration and alignment among research groups; among academic laboratories and NCI comprehensive cancer centers and affiliated Specialized Programs of Research Excellence (SPOREs); and between the public and private sectors.

The Center comprises 3 offices:

- Office of Technology and Industry Relations
- Office of Cancer Genomics
- Office of Biorepositories and Biospecimen Research

Center for Biomedical Informatics and Information Technology

NCI's Center for Biomedical Informatics and Information Technology (CBIIT) provides informatics leadership and support for the diverse basic and clinical research initiatives of NCI. It advises the NCI Director on all aspects of the Institute's biomedical informatics and information technology program. CBIIT combines the NCI Center for Bioinformatics and the Information Systems and Computer Support (ISCS) office. ISCS plans, buys, maintains, and manages all the internal scientific and business IT for the Institute.

Since 2001, the ***NCI Center for Bioinformatics (NCICB)*** has worked to speed scientific discovery and facilitate translational research by building many types of tools and resources that enable information to be shared along the continuum from the scientific bench to the clinical bedside and back. Molecular medicine which holds great promise for delivering new, more effective and targeted patient therapies is generating massive of amounts of data that overwhelm the IT resources of most biomedical institutions. NCICB aims to provide the broad cancer research community with the software tools and resources to more efficiently manage and analyze this data so that scientists can more readily draw insight from this information and improve patient outcomes.

NCICB's distinctive open access, standards-based technical approach is coupled with a firm commitment to collaboration across disciplines, institutions, and sectors. The Center spearheads critical public-private partnerships to develop and disseminate informatics for managing, analyzing, and sharing the wealth of information generated in the fight against cancer.

As part of this larger endeavor, NCICB leads the cancer Biomedical Informatics Grid™ (caBIG™) initiative. As of June 2007, there were over 190 organizations participating in the caBIG™ community, including 51 Cancer Centers, and 30 other Federal, academic, not-for-profit, and industry entities, represented by close to 1,000 individuals. More than 300 software products have been delivered, including over 40 end-user applications, and a wide range of infrastructure components such as data standards and software development toolkits. Many of these tools are in use at cancer research sites, and activities are under way to provide installation and support services to facilitate more widespread use throughout the research community. Research organizations can now use software applications that connect to caGrid, the underlying network that enables seamless, secure exchange of the large and complex datasets that are common in modern biomedical research.

Central to caBIG™ is the concept of interoperability; that is, compatibility among information technology tools used to collect, analyze and share data. This compatibility provides a means to link together all the scientists, clinicians, patients and other participants so that they can conduct more dynamic, collaborative and ultimately more successful research. Additional information about caBIG™ can be found at https://caBIG.nci.nih.gov.

NCICB's core infrastructure forms a platform for more specific biomedical informatics tools, applications and activities we undertake in support of research initiatives—as well as for demonstration projects conducted by NCI groups and the broader biomedical research community. Our Applications Support function provides support and training for NCI staff and members of the cancer research community utilizing NCICB infrastructure, tools, applications, and activities.

NCICB serves as a focal point for cancer research informatics planning worldwide. Additionally, NCICB serves as the bioinformatics basis of many key NCI initiatives including NCI Alliance for Nanotechnology in Cancer, Clinical Proteomics Technologies for Cancer, Office of Biorepositories and Biospecimen Research (OBBR), Office of Cancer Genomics and the Clinical Trials Working Group.

Additional information about the NCI Center for Bioinformatics can be found at http://ncicb.nci.nih.gov.

Center to Reduce Cancer Health Disparities

The Center to Reduce Cancer Health Disparities (CRCHD) supports the NCI mission to lessen the burden of cancer, and is committed to enhancing the understanding of the causes of disparities and addressing inequities in the cancer burden among populations experiencing cancer disparities.

CRCHD seeks to spawn new studies across NCI research divisions that identify scientific and training opportunities for reducing and ultimately eliminating cancer health disparities. In addition, the Center supports research, including investigator initiated research to define, reduce and monitor disparities; develops and implements new community and clinical interventions, and evaluates their impact; sustains ongoing research and training efforts in cancer health disparities through partnerships and collaborations; expands minority participation, both as investigators and as patients, in health disparities research and clinical trials; supports evidence-based prevention, screening, treatment and survivorship interventions to aid understanding and reduction of cancer health disparities, and promotes its dissemination; and coordinates comprehensive reporting of NCI research in minority health and health disparities.

Two current CRCHD initiatives are the Community Networks Program (CNP) and the Patient Navigation Research Program (PNRP). The CNP is a 5-year initiative designed to reduce cancer-related health disparities in minority and underserved populations through community-based participatory research education, research, and training. Expanding upon previous NCI-funded community research, the CNP aims to improve access to and utilization of beneficial cancer interventions and treatments in communities experiencing cancer -related health disparities. The PNRP initiative represents a new approach to providing individualized assistance to patients, survivors and their families to improve access to quality standard cancer care. This 5-year program is developing innovative patient navigator interventions designed to decrease the time between a

cancer-related abnormal finding, definitive diagnosis, and delivery of quality standard care services and to test their efficacy and cost-effectiveness.

CRCHD's future plans include a merger with the Comprehensive Minority Biomedical Branch, and an emphasis on the training of new minority investigators to better address cancer health disparities.

For more information about CRCHD and its programs and about cancer health disparities, visit http://crchd.cancer.gov.

For information about CMBB and its training programs, visit http://minorityopportunities.nci.nih.gov/

NIH Almanac: Organization

National Eye Institute

Mission | Important Events | Director | Programs

Mission

The National Eye Institute (NEI) conducts and supports research, training, health information dissemination, and other programs with respect to blinding eye diseases, visual disorders, mechanisms of visual function, preservation of sight, and the special health problems of individuals who are visually impaired or blind.

Vision research is supported by the NEI through research grants and training awards made to scientists at more than 250 medical centers, hospitals, universities, and other institutions across the country and around the world. The NEI also conducts laboratory and patient-oriented research at its own facilities located on the NIH campus in Bethesda, Maryland.

Another part of the NEI mission is to conduct public and professional education programs that help prevent blindness and reduce visual impairment. To meet these objectives, the NEI has established the National Eye Health Education Program, a partnership of more than 60 professional, civic, and voluntary organizations and government agencies concerned with eye health. The program represents an extension of the NEI's support of vision research, where results are disseminated to health professionals, patients, and the public.

Important Events in NEI History

August 16, 1968—Public Law 90-489 authorized formation of the National Eye Institute.

December 26, 1968—The NEI was established.

April 3-4, 1969—The National Advisory Eye Council held its first meeting.

January 11, 1970—Dr. Carl Kupfer was appointed NEI Director.

December 15, 1970—Reorganization of the NEI resulted in the formation of an Office of Biometry and Epidemiology; an Office of the Director of Intramural Research; and a Laboratory of Vision Research and a Clinical Branch as the foci of intramural research.

April 1975—Publication of the National Advisory Eye Council's report, *Vision Research Program Planning*, was the first comprehensive assessment of major needs and opportunities in vision research in the United States.

April 1978—Publication of the National Advisory Eye Council's 5-year plan, *Vision Research: 1978-1982,* included review and analysis of vision research and research training in the United States and discussion of future priorities.

September 1978—A Laboratory of Sensorimotor Research was established within the intramural research program.

June 1981—A Laboratory of Molecular and Developmental Biology was established within the intramural research program.

May 1983—The National Advisory Eye Council's second 5-year plan (1983-87) recommended future NEI programs.

July 19, 1984—The Office of Biometry and Epidemiology was transferred out of the Office of the Director and established as the Biometry and Epidemiology Program (now Division of Epidemiology and Clinical Research).

August 1985—An Intramural Research Program reorganization abolished the Laboratory of Vision Research and created the Laboratories of Mechanisms of Ocular Diseases; Retinal Cell and Molecular Biology; and Immunology.

1987—The National Advisory Eye Council's *Vision Research—A National Plan: 1983-1987, 1987 Evaluation and Update*, discussed accomplishments since the 1983-87 plan was published, evaluated the status of NEI-supported research activities, and revised priorities for the next 2 years.

December 1987—The Collaborative Clinical Vision Research Branch was established to provide overall scientific management and administration for NEI grants, contracts, and cooperative agreements supporting clinical trials and epidemiologic studies.

February 1989—The Office of International Program Activities was created to enhance coordination of NEI's international activities, particularly those relating to cooperation with nongovernmental organizations, international agencies, and the international components of other Federal agencies.

February 10, 1990—The Ophthalmic Genetics and Clinical Services Branch (now Ophthalmic Genetics and Visual Function Branch) was established in the intramural program.

December 1991—The NEI established the National Eye Health Education Program, following Congressional encouragement that NEI increase its commitment to the prevention of blindness through public and professional education programs that encourage early detection and timely treatment of glaucoma and diabetic eye disease and the appropriate treatment for low vision. The National Eye Health Education Program is coordinated in partnership with national organizations in the public and private sector that conduct eye health education programs.

Spring 1993–Spring 1995—A "Celebration of Vision Research" commemorated the NEI's 25th anniversary.

June 1993—The NEI and its advisory body, the National Advisory Eye Council, produced and distributed its fifth long-range plan, *Vision Research—A National Plan: 1994-1998*, that contained policy recommendations and scientific program priorities.

June 1998—The NEI and National Eye Advisory Council produced and distributed *Vision Research—A National Plan: 1999-2003*, that contained policy recommendations and scientific program priorities. In developing this 5-year plan, the NEI and and its advisory council assembled panels of over 100 experts representing each of NEI's formal programs and special interest areas. In drafting this plan, special consideration was give to the purpose, intent, and requirements of the Government Performance and Review Act.

October 19, 1999—The NEI launched the Low Vision Education Program, part of the National Eye Health Education Program.

2000—The NEI was designated the lead agency for a new focus area on vision in the U.S. Department of Health and Human Services Healthy People 2010 initiative.

July 15, 2000—Dr. Carl Kupfer stepped aside after 30 years as Director of the NEI. Dr. Jack A. McLaughlin was named Acting Director, NEI.

June 17, 2001—Dr. Paul A. Sieving assumed duties as Director, NEI.

October 2003—The NEI published and released its *National Plan for Eye and Vision Research*. The first strategic plan produced through the new, 2-phase planning process. This ongoing planning process involves the assessment of important areas progress in eye and vision research and the development of new goals and objectives that address outstanding needs and opportunities for additional progress. Workshops, conferences, or symposia in critical or emerging areas of science are conducted during the second phase of the planning process to explore how they might be applied to diseases of the eye and disorders of vision.

August 2005—NIH Director Dr. Elias A. Zerhouni, and Dr. Maharaj K. Bhan signed a United States-India Statement of Intent for collaboration on expansion of vision research. View Image. Information on the Indo-U.S. agreement is published on the NEI website at www.nei.nih.gov.

Biographical Sketch of NEI Director Paul A. Sieving, M.D., Ph.D.

Dr. Sieving became director of the National Eye Institute, NIH, in 2001. He came from the University of Michigan Medical School, where he was the Paul R. Lichter Professor of Ophthalmic Genetics and was the founding Director of the Center for Retinal and Macular Degeneration in the Department of Ophthalmology and Visual Sciences.

After undergraduate work in history and physics, he studied nuclear physics at Yale Graduate School in 1970-73 under D. Allan Bromley. He attended Yale Law School from 1973-74. He received his M.D. in 1978 and a Ph.D. in bioengineering in 1981 from the University of Illinois. Dr. Sieving completed an ophthalmology residency at the University of Illinois Eye and Ear Infirmary in Chicago. After a post-doctoral study of retinal physiology in 1982-84 at the University of California, San Francisco, he completed a clinical fellowship in genetic retinal degenerations with Eliot Berson in 1985 at Harvard Medical School, Massachusetts Eye and Ear Infirmary.

Dr. Sieving is known internationally for studies of human progressive blinding genetic retinal neurodegenerations, termed retinitis pigmentosa, and rodent models of these conditions. His laboratory study of pharmacological approaches to slowing degeneration in transgenic animal models led to the first human clinical therapy trial of ciliary neurotrophic factor for retinitis pigmentosa, which he reported in *PNAS* in 2006. He also successfully treated a genetic mouse model of X-linked retinoschisis using gene transfer, which restored retinal function in adult mice. He maintains a clinical practice for patients with these and other genetic forms of retinal diseases, including Stargardt juvenile macular degeneration.

Dr. Sieving served as Vice Chair for Clinical Research for the Foundation Fighting Blindness from 1996-2001. He serves on the Bressler Vision Award Committee and on the jury for the annual 1 million euro Award for Vision Research of the Champalimaud Foundation, Portugal. He was elected to membership in the American Ophthalmological Society in 1993 and the Academia Ophthalmologica Internationalis in 2005. He received an honorary Doctor of Science from Valparaiso University in 2003. He was named as one of The Best Doctors in America in 1998, 2001, and 2005. Dr. Sieving has received numerous awards, including the RPB Senior Scientific Investigator Award, 1998; the Alcon Award, Alcon Research Institute, 2000; and the 2005 Pisart Vision Award from the New York Lighthouse International for the Blind. He was elected a member of the Institute of Medicine in 2006.

Major Programs

The NEI's extramural research activities are organized into 6 scientific areas: retinal diseases; corneal diseases; lens and

cataract; glaucoma and optic neuropathies; strabismus, amblyopia, and visual processing; and low vision and blindness rehabilitation.

Retinal Diseases

NEI-supported investigations include studies of the development, molecular and cell biology, human genetics, and metabolism of the photoreceptor cells and their dependence on the underlying retinal pigment epithelium; the mechanism of the retina's response to light and the initial processing of information that is transmitted to the visual centers of the brain; and the pathogenesis, etiology, molecular biology and genetics, and treatment of retinal diseases such as diabetic retinopathy; uveitis; and retinitis pigmentosa, age-related macular degeneration, and retinal detachment.

Corneal Diseases

NEI-supported projects include studies of the regulation of genes that express proteins unique to corneal tissue; details of the assembly of corneal extracellular matrices; mechanisms that maintain corneal hydration and transparency; physiologic basis for immune privilege in the cornea; cell biology of corneal wound healing; corneal biomechanics; corneal infections; and the pathogenesis of corneal transplant rejection.

Lens and Cataract

The NEI-supported research includes studies of normal lens development and aging; the molecular and cellular characterization of lens transparency; control of lens cell division; structure and regulation of the expression of lens-specific genes; the impact of environmental insults on the lens; and the pathogenesis of human cataract.

Glaucoma and Optic Neuropathies

NEI supports a range of research designed to better understand the pathophysiology underlying glaucoma, the discovery of drugs and surgical techniques for its treatment, the basis of racial and ethnic disparities in the incidence and severity of the disease, and the development of procedures for earlier diagnosis. Studies include the molecular genetics of glaucoma syndromes; physiologic mechanisms regulating fluid flow in the disease; the cell and molecular biology of optic nerve damage; ganglion cell death; and mechanisms of neuroprotection as a possible treatment strategy.

Strabismus, Amblyopia, and Visual Processing

The NEI supports studies concerned with the function of the neural pathways from the eye to the brain, the central processing of visual information, visual perception, the optical properties of the eye, the function of the pupil, and molecular cell biology of the extraocular muscles. Support is provided for research on the pathogenesis and treatment of eye movement disorders, and the development of myopia. Particular emphasis is placed on studies of strabismus and amblyopia, as these are frequent causes of lifelong visual impairment.

Low Vision and Blindness Rehabilitation

The NEI supports research in low vision and rehabilitation of people with visual impairments and blindness. Examples include projects aimed at improving the methods of specifying, measuring, and categorizing loss of visual function; devising strategies to help visually impaired people maximize the use of their residual vision; systematically evaluating new and existing visual aids; and studying the optical, electronic, and other rehabilitative needs of people with visual impairments.

NIH Almanac: Organization

National Heart, Lung, and Blood Institute

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Heart, Lung, and Blood Institute (NHLBI):

- Provides leadership for a national program in diseases of the heart, blood vessels, lungs, and blood; sleep disorders; and blood resources.
- Plans, conducts, fosters, and supports an integrated and coordinated program of basic research, clinical investigations and trials, observational studies, and demonstration and education projects related to the causes, prevention, diagnosis, and treatment of heart, blood vessel, lung, and blood diseases, and sleep disorders conducted in its own laboratories and by scientific institutions and individuals supported by research grants and contracts.
- Plans and directs research in development, trial, and evaluation of interventions and devices related to the prevention of diseases and disorders in the above areas and the treatment and rehabilitation of patients suffering from such conditions.
- Conducts research on clinical use of blood and all aspects of the management of blood resources.
- Supports research training and career development of new and established researchers in fundamental sciences and clinical disciplines to enable them to conduct basic and clinical research related to heart, blood vessel, lung, and blood diseases; sleep disorders; and blood resources through individual and institutional research training awards and career development awards.
- Coordinates relevant activities with other research institutes and all Federal health programs in the above areas, including the causes of stroke.
- Conducts educational activities, including development and dissemination of materials for health professionals and the public in the above areas, with emphasis on prevention.
- Maintains continuing relationships with institutions and professional associations, and with international, national, state, and local officials as well as voluntary agencies and organizations working in the above areas.
- Oversees management of the Women's Health Initiative.

Important Events in NHLBI History

June 16, 1948—President Harry S. Truman signed the National Heart Act, creating and establishing the National Heart Institute (NHI) in the Public Health Service (PHS) and the National Advisory Heart Council.

August 1, 1948—Surgeon General Leonard A. Scheele, by General Circular No. 36, Organization Order No. 14, established the NHI as one of the National Institutes of Health to assume responsibility for heart research, training, and administration as set forth in the National Heart Act. Intramural research projects in cardiovascular diseases and gerontology, conducted elsewhere in NIH, were transferred to the NHI. The director of the NHI was designated to lead and coordinate the total PHS heart program.

September 8, 1948—The National Advisory Heart Council held its first meeting. Dr. Paul Dudley White served as the Council's Executive Director.

January 1949—Cooperative research units were established at the University of California, University of Minnesota,

Tulane University, and Massachusetts General Hospital. Pending completion of the NHI's own research organization and availability of further research facilities, the units were jointly financed by the NIH and the institutions.

July 1, 1949—The NHI intramural research program was established.

The Heart Disease Epidemiology Study at Framingham, Massachusetts, was transferred from the Bureau of State Services, PHS, to the NHI.

July 6, 1953—The Clinical Center admitted its first patient for heart disease research.

July 1, 1957—The first members of the NHI Board of Scientific Counselors began their terms. The Board was established in 1956 "to provide advice on matters of general policy, particularly from a long-range viewpoint, as they relate to the intramural research program."

February 19, 1959—The American Heart Association and the NHI presented a report to the Nation on "A Decade of Progress Against Cardiovascular Disease."

October 16, 1968—A Nobel Prize in Physiology or Medicine was awarded to Dr. Marshall W. Nirenberg, chief of the NHI Laboratory of Biochemical Genetics, for discovering the key to deciphering the genetic code. Dr. Nirenberg was the first NIH Nobel laureate and the first Federal employee to receive a Nobel Prize.

October 26, 1968—The NHI received the National Hemophilia Foundation's Research and Scientific Achievement Award for its "medical leadership ... tremendous stimulation and support of research activities directly related to the study and treatment of hemophilia."

November 10, 1969—The NHI was renamed the National Heart and Lung Institute (NHLI), reflecting expansion of functions.

February 18, 1971—In his Health Message to the Congress, President Richard M. Nixon identified sickle cell anemia as a high-priority disease target and called for increased Federal expenditures. Subsequently, the Health, Education, and Welfare (HEW) Assistant Secretary for Health and Scientific Affairs assigned the NIH and NHLI as the lead agencies responsible for coordinating a National Sickle Cell Disease Program.

June 12, 1972—HEW Secretary Elliot Richardson approved a nationwide program of hypertension information and education. The secretary appointed the Hypertension Information and Education Advisory Committee, chaired by the Director of NIH, and the Interagency Working Group, chaired by the Director of the NHLI, to implement the national effort.

July 1972—The NHLI initiated the National High Blood Pressure Education Program (NHBPEP).

July 14, 1972—Secretary Richardson approved a reorganization of NHLI, elevating the Institute to Bureau status within the NIH.

June 25, 1976—The NHLI was renamed the National Heart, Lung, and Blood Institute (NHLBI), reflecting an expansion in blood-related activities within the Institute.

November 1979—The results of the Hypertension Detection and Follow-up Program, a clinical trial initiated by the NHLBI in 1971, provided evidence that systematic, aggressive treatment of hypertension saves lives.

October 1981—The NHLBI Beta-Blocker Heart Attack Trial demonstrated benefits to those in the trial who received

propranolol compared with the control group.

October 1983—The NHLBI Coronary Artery Surgery Study results demonstrated that mildly symptomatic patients with coronary artery disease can safely defer coronary artery bypass surgery until symptoms worsen.

January 1984—The NHLBI Lipid Research Clinics Coronary Primary Prevention Trial established conclusively that reducing total blood cholesterol reduces the risk of coronary heart disease in men at increased risk because of elevated cholesterol levels. Each 1% decrease in cholesterol was shown to reduce heart attack risk by 2%.

April 1985—Phase I of the NHLBI Thrombolysis in Myocardial Infarction Trial found that the new thrombolytic agent recombinant tissue plasminogen activator (rt-PA) is approximately twice as effective as streptokinase in opening thrombosed coronary arteries.

October 1985—NHLBI-supported researchers Michael S. Brown and Joseph L. Goldstein received the Nobel Prize in Physiology or Medicine for their discoveries concerning the regulation of cholesterol metabolism.

November 1985—The NHLBI initiated the National Cholesterol Education Program (NCEP).

June 1986—Results of the NHLBI Prophylactic Penicillin Trial demonstrated the efficacy of prophylactic penicillin in reducing morbidity and mortality associated with pneumococcal infections in children with sickle cell disease.

March 1989—The NHLBI initiated the National Asthma Education Program. The program was later renamed the National Asthma Education and Prevention Program (NAEPP).

September 1990—Scientists from the NHLBI and the National Cancer Institute began the first gene therapy trial in a human patient, a 4-year-old girl with an inherited immune dysfunction.

January 1991—The NHLBI developed an Obesity Education Initiative to educate the public and health professionals about obesity as an independent risk factor for cardiovascular disease and its relationship to other risk factors such as high blood pressure and high blood cholesterol.

June 1991—The NHLBI initiated the National Heart Attack Alert Program.

July 1991—The NHLBI Systolic Hypertension in the Elderly Program demonstrated that low-dose pharmacologic therapy of isolated systolic hypertension in those over age 60 significantly reduces stroke and myocardial infarction.

August 1991—The NHLBI Studies of Left Ventricular Dysfunction demonstrated that use of enalapril—an angiotensin converting enzyme inhibitor—causes significant reduction in mortality and hospitalization for congestive heart failure in patients with symptomatic heart failure.

January 1995—Results of the NHLBI Multicenter Study of Hydroxyurea demonstrated that hydroxyurea reduced the number of painful episodes by 50% in severely affected adults with sickle cell disease. This is the first effective treatment for adult sickle cell patients.

September 1995—Results of the NHLBI Bypass Angioplasty Revascularization Investigation demonstrated that patients on drug treatment for diabetes who had blockages in 2 or more coronary arteries and were treated with coronary artery bypass surgery had, at 5 years, a markedly lower death rate than similar patients treated with angioplasty.

May 1996—Framingham Heart Study investigators concluded that earlier and more aggressive treatment of hypertension

is vital to preventing congestive heart failure.

The Treatment of Mild Hypertension Study demonstrated that lifestyle approaches, such as weight loss, a healthy eating plan, and physical activity, are crucial for reducing blood lipids in those treated for Stage I hypertension.

September 1996—Findings from the NHLBI Asthma Clinical Research Network indicated that inhalation of a beta-agonist at regularly scheduled times is safe for people with asthma but provides no greater benefit than use of the medication only when asthma symptoms occur.

November 1996—Two studies, the Dietary Approaches to Stop Hypertension (DASH) trial and the Trial of Nonpharmacologic Intervention in the Elderly, showed that lifestyle changes, such as modifying one's diet and losing weight, substantially reduce blood pressure in adults and eliminate the need for antihypertensive medication in some older patients.

January 1997—Results from the Pathobiological Determinants of Atherosclerosis in Youth program showed that atherosclerosis develops before age 20 and that high-density lipoprotein cholesterol, low-density lipoprotein (LDL) cholesterol, and cigarette smoking affect progression of atherosclerosis equally in women and men regardless of race.

May 1997—Results from the Antiarrhythmic versus Implantable Defibrillator clinical trial demonstrated that implantable cardiac defibrillators are superior to antiarrhythmic drug therapy for improving overall survival for patients with life-threatening heart arrhythmias.

October 1, 1997—The NHLBI is given responsibility for the Women's Health Initiative (WHI), a study begun in 1991 to address chronic diseases in women.

March 1999—A large clinical trial of mechanical ventilator use for intensive care patients with acute respiratory distress syndrome demonstrated that approximately 25% fewer deaths occurred among patients receiving small, rather than large, breaths of air from a mechanical ventilator.

September 2000—NHLBI-supported investigators identified a gene for primary pulmonary hypertension.

January 2001—Results of the Dietary Approaches to Stop Hypertension (DASH) Sodium Trial showed that dietary sodium reduction substantially lowers blood pressure in persons with high blood pressure; the greatest effect was seen when sodium reduction was combined with a diet rich in fruits and vegetables and low in saturated fat previously shown to lower blood pressure (i.e., the DASH diet).

April 2001—The NHLBI released international guidelines for diagnosis, management, and prevention of chronic obstructive pulmonary disease (COPD).

July 2001—A self-contained artificial heart was implanted in a patient for the first time.

September 2001—The NHLBI, along with the American Heart Association and other partners, launched a national Act in Time to Heart Attack Signs campaign to increase awareness of the symptoms of heart attack and the need for a fast response.

July 2002—The NHLBI stopped early the trial of estrogen plus progestin component of the WHI due to increased breast cancer risk and lack of overall benefits. The multicenter trial also found increases in coronary heart disease, stroke, and pulmonary embolism in participants on estrogen plus progestin compared to women taking placebo pills. In 2004, the WHI component evaluating estrogen-alone hormone therapy also was stopped early because the long-term risks of the medications outweighed the long-term benefits.

December 2002—Results of the NHLBI Atrial Fibrillation Follow-up Investigation of Rhythm Management Trial indicated that a strategy involving rate control rather than rhythm control may be the preferred treatment for patients with atrial fibrillation. The rate control strategy involves the use of less expensive drugs and fewer hospitalizations.

December 2002—Results from the NHLBI Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT), the largest hypertension clinical trial ever conducted, showed that traditional diuretics are at least as good as newer medicines (calcium channel blockers and ACE inhibitors) to treat high blood pressure and to prevent some forms of heart disease. These findings were in addition to ALLHAT results from 2000, when researchers reported that an alpha-adrenergic blocker was less effective than the diuretic in reducing risk of some forms of CVD.

January 2003 —A study demonstrated that magnetic resonance imaging can detect heart attacks faster and more accurately than traditional methods in patients who arrive at an emergency room with chest pain.

February 2003—The NHLBI Prevention of Recurrent Venous Thromboembolism (PREVENT) trial was stopped because treatment with low-dose warfarin to prevent recurrence of the blood clotting disorders deep vein thrombosis and pulmonary embolism was found to benefit the patients.

May 2003—The NHLBI National Emphysema Treatment Trial found that lung volume reduction surgery benefits emphysema patients who have certain clinical characteristics. The findings will help determine the Medicare coverage policy for the surgery.

July 2003—The NHLBI and Gen-Probe Corporation developed a test to screen donated blood for the West Nile virus.

March 2004—Preliminary results of the NHLBI Sudden Cardiac Death in Heart Failure study demonstrated that an implantable cardiac defibrillator can reduce the risk of death from arrhythmia for heart failure patients.

August 2004—The NHBPEP Working Group on High Blood Pressure in Children and Adolescents released *The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents.*

An NHLBI-funded study showed that nucleic acid-amplification testing for HIV-1 and hepatitis C virus further safeguards the nation's blood supply.

October 2004—Researchers participating in the NHLBI Asthma Clinical Research Network demonstrated that genetic differences affect how adult patients with mild asthma respond, over time, to daily doses of inhaled albuterol (a drug used for relief of acute asthma symptoms).

November 2004—Results of the NHLBI Prevention of Events with Angiotensin Converting Enzyme Inhibition study demonstrated that many coronary heart disease patients who were receiving state-of-the art therapy do not gain extra cardiovascular protection from ACE inhibitors.

December 2004—The NHLBI Stroke Prevention Trial II showed that children with sickle cell disease who receive transfusions to prevent stroke revert to high risk for stroke when transfusions are stopped. STOP II was initiated after an earlier trial demonstrated that periodic red blood cell transfusions reduce the stroke rate by 90% among high-risk children with sickle cell disease.

January 2005—The NHLBI issued new guidelines for managing asthma during pregnancy.

February 2005—NHLBI-supported scientists identified 2 genetic mutations common in individuals of African descent that are associated with a 40% reduction in LDL cholesterol.

February 2006—Results from the WHI Calcium and Vitamin D trial showed that calcium and vitamin D supplements in healthy postmenopausal women provide a modest improvement in bone mass preservation and prevent hip fractures in certain groups including older women but do not prevent other types of fractures or colorectal cancer.

May 2006—Results from the Childhood Asthma Research and Education Network showed that daily treatment with inhaled corticosteroids can reduce breathing problems in pre-school-aged children at high risk for asthma, but does not prevent them from developing persistent asthma.

The Prospective Investigation of Pulmonary Embolism Diagnosis II found that the ability to diagnose pulmonary embolism is improved when a commonly used imaging test of the chest to detect potentially deadly blood clots in the lung is complemented by an extension of the scan to the legs—where the clots typically originate—or by a standard clinical assessment.

June 2006—The Should We Emergently Revascularize Occluded Coronaries for Cardiogenic Shock (SHOCK) trial showed that treating heart attack patients who have a life-threatening complication called cardiogenic shock with emergency angioplasty or bypass surgery greatly improves their long-term survival. Improved short-term survival was reported in 1999.

July 2006—NHLBI scientists found that a hormone called brain natriuretic peptide—or BNP, which can be detected in a simple blood test—can identify patients with sickle cell disease who have developed a life-threatening complication called pulmonary hypertension. The hormone is also a predictor of death in adult sickle cell patients.

July 2006 Results from 2 randomized clinical trials demonstrated that inhaled nitric oxide administered within the first few weeks of life helps prevent chronic lung disease in some low birthweight premature infants. Moreover, when administered within 48 hours after birth, it appears to protect some premature newborns from brain injury.

September 2006—The NHLBI launched a peripheral arterial disease (PAD) awareness and education campaign entitled *Stay in Circulation...Take Steps to Learn about P.A.D.*

January 2007—The NHLBI launched the Learn More Breathe Better campaign to increase COPD awareness among primary care physicians and the public. View Image.

August 2007—The NAEPP issued the *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma—Full Report 2007*, an update of the latest scientific evidence and recommendations for clinical practice on asthma care.

October 2007—NHLBI-supported researchers Mario Capecchi and Oliver Smithies were awarded the Nobel Prize in Physiology or Medicine for their creation of a gene-targeting technique that allows scientists to create mice that are genetically modified to develop human diseases.

NHLBI Legislative Chronology

June 16, 1948—The National Heart Act (Public Law 80-655) authorized NHI. The act's purpose was "To improve the health of the people of the United States through the conduct of researches, investigations, experiments, and demonstrations relating to the cause, prevention, and method of diagnosis and treatment of diseases of the heart and circulation; assist and foster such researches and other activities by public and private agencies, and promote the coordination of all such researches and activities and the useful application of their results; provide training in matters relating to heart diseases, including refresher courses for physicians; and develop, and assist States and other agencies in use of the most effective methods of prevention, diagnosis, and treatment of heart diseases."

December 30, 1963—House Joint Resolution 848 (P.L. 88-254) authorized and requested the President to issue an annual proclamation designating February as American Heart Month, inviting governors of states and territories to issue similar proclamations.

May 16, 1972—The National Sickle Cell Anemia Control Act (P.L. 92-294) established a national program for diagnosis, control, and treatment of and research in sickle cell anemia. The act did not mention NHLI but had special pertinence because NHLI was designated to coordinate the National Sickle Cell Disease Program.

September 19, 1972—The National Heart, Blood Vessel, Lung, and Blood Act of 1972 (P.L. 92-423) enlarged institute authority to advance the national attack on heart, blood vessel, lung, and blood diseases. The act provided for expanded, intensified, and coordinated institute activities in accordance with a comprehensive, specified National Heart, Blood Vessel, Lung, and Blood Disease Program to be planned by the director and the Advisory Council.

It also called for establishment of prevention and control programs; development of 15 new centers for basic and clinical research, training, demonstration, and prevention programs for heart, blood vessel, and blood diseases; and development of 15 such centers for chronic lung diseases.

June 25, 1976—Title I of the Health Research and Health Services Amendments of 1976 (P.L. 94-278) redesignated NHLI as NHLBI to advance the national attack on heart, blood vessel, lung, and blood diseases, and to conduct research in use of blood and blood products and in management of blood resources. The NHLBI director and the National Heart, Lung, and Blood Advisory Council continue to plan the national program under the basic P.L. 92-423 provisions with some refinements.

August 1, 1977—The Biomedical Research Extension Act of 1977 (P.L. 95-83) reauthorized NHLBI, with continued emphasis on both the national program and related prevention and dissemination activities.

December 17, 1980—The Health Programs Extension Act of 1980 (P.L. 96-538) reauthorized NHLBI, with continued emphasis on both the national program and related prevention programs.

January 4, 1983—The Orphan Drug Act (P.L. 97-414) amended the Public Health Service Act to mandate development and support of not less than 10 comprehensive centers for sickle cell disease.

November 20, 1985—The Health Research Extension Act (P.L. 99-158) reauthorized the NHLBI, provided for the establishment of information dissemination and education programs, and provided for an Associate Director for Prevention.

September 20, and **November 4, 1988**—The National Bone Marrow Donor Registry (P.L. 100-436, P.L. 100-607) was established. With enactment of these authorization and appropriation measures, NHLBI was given the task of developing an implementation plan for the voluntary bone marrow registry. Responsibility for the Registry later was transferred to the Health Resources and Services Administration.

June 10, 1993—The NIH Revitalization Act of 1993 (P.L. 103-43) established a National Center on Sleep Disorders Research within NHLBI.

October 31, 1998—Section 104 of the Women's Health Research and Prevention Amendments (P.L.105-340) instructed the NHLBI director to expand and intensify research and related activities of the institute with respect to heart attack, stroke, and other CVDs in women and to collaborate with other NIH institutes.

October 17, 2002—The Children's Health Act (P.L. 106-310) mandated that the Director of NHLBI, through the Coordinating Committee of the National Asthma Education and Prevention Program, develop a Federal plan for responding to asthma and recommended ways to strengthen coordination of Federal asthma-related activities.

Biographical Sketch of NHLBI Director Elizabeth G. Nabel, M.D.

Elizabeth G. Nabel, M.D., a native of St. Paul, Minnesota, received her M.D. from Cornell University Medical College in 1981. She completed an internship and residency in internal medicine followed by a clinical and research fellowship in cardiovascular medicine at Brigham and Women's Hospital, Harvard University. In 1987, she joined the faculty at the University of Michigan as an Assistant Professor of Medicine and rose through the ranks, becoming Director of the Cardiovascular Research Center in 1992, Professor of Medicine and Physiology in 1994, and Chief of the Division of Cardiology in 1997. A cardiologist with extensive clinical experience, Dr. Nabel has had a distinguished career as a researcher. While at the University of Michigan, she became known for her research on the molecular genetics of cardiovascular diseases.

Dr. Nabel joined the National Heart, Lung, and Blood Institute (NHLBI) in 1999 as the Institute's Scientific Director of Clinical Research. In 2005, Dr. Nabel became Director of the NHLBI, where she oversees an extensive national research portfolio of basic and clinical research to prevent, diagnose, and treat heart, lung, and blood diseases. The Institute also conducts educational activities for health professionals, patients, and the general public. The NHLBI budget is approximately $3.0 billion.

Dr. Nabel has made many contributions to basic and clinical research on the pathogenesis and treatment of cardiovascular diseases. She has devoted several decades to exploring genes that contribute to vascular disease and strategies for gene transfer to benefit patients with those diseases. She has delineated the mechanisms that regulate the vascular proliferation and remodeling which lead to blood vessel blockages. Her research now focuses on the role of genetic factors in blood vessel diseases, including atherosclerosis and Hutchinson Gilford Progeria Syndrome, a rare, premature aging syndrome.

Dr. Nabel has served as a Visiting Professor at major medical centers throughout the country and delivered major lectureships in Europe and Australia. She has received numerous awards for her scientific accomplishments, including the Willem Einthoven Award from Leiden University in the Netherlands, the Amgen-Scientific Achievement Award from the American Society for Biochemistry and Molecular Biology, and Distinguished Achievement Awards from the Basic Cardiovascular Sciences Council and the Atherosclerosis, Thrombosis, and Vascular Biology Council of the American Heart Association. In 2001, she received an honorary doctorate from the University of Leuven, Belgium and in 2006 from Mt. Sinai School of Medicine, New York.

Dr. Nabel is an elected member of the Institute of Medicine of the National Academies, the American Society of Clinical Investigation, and the Association of American Physicians, as well as a Fellow of the American Heart Association and the American College of Cardiology. She serves on the editorial board of many scientific journals, including being an editorial board member of the *New England Journal of Medicine,* past Board of Reviewing Editors for *Science,* and associate editor for the *Journal of Clinical Investigation.*

A partner on 13 patents, Dr. Nabel is the author of more than 200 scientific publications, and she has mentored more than 45 students and fellows.

NHLBI Directors

Name	In Office from	To
Cassius James Van Slyke	August 1, 1948	November 30, 1952
James Watt	December 1, 1952	September 10, 1961
Ralph E. Knutti	September 11, 1961	July 31, 1965

William H. Stewart	August 1, 1965	September 24, 1965
Robert P. Grant	March 8, 1966	August 15, 1966
Donald S. Frederickson	November 6, 1966	March 1968
Theodore Cooper	March 15, 1968	April 19, 1974
Robert I. Levy	September 16, 1975	June 1981
Claude Lenfant	July 1, 1982	September 2, 2003
Elizabeth G. Nabel	February 1, 2005	Present

NHLBI Programs

The NHLBI is organized into the Extramural Research Program, the Division of Intramural Research (DIR), the Division for the Application of Research Discoveries (DARD), the Center for Biomedical Informatics (CBI), and the Center for Population Studies (CPS).

Extramural Research Program

NHLBI extramural research programs are implemented through 4 scientific units—the Division of Cardiovascular Diseases, the Division of Prevention and Population Sciences, the Division of Lung Diseases, and the Division of Blood Diseases and Resources—and a service unit, the Division of Extramural Research Activities. Research grants, program project grants, specialized center grants, cooperative agreements, research contracts, research career development awards, and institutional and individual national research service awards are used to support research, research training, and career development.

Division of Cardiovascular Diseases (DCVD)

The DCVD provides leadership for a national and international extramural program in cardiovascular diseases that integrates basic science and clinical research. It promotes opportunities to translate promising scientific and technological advances from discovery through preclinical studies to networks and multisite clinical trials. It designs, conducts, supports, and oversees research on the causes and prevention and treatment of diseases and disorders such as atherothrombosis, coronary artery disease, myocardial infarction and ischemia, heart failure, arrhythmia, sudden cardiac death, adult and pediatric congenital heart disease, cardiovascular complications of diabetes and obesity, and hypertension. It also supports and oversees research in vascular medicine and biology and valvular, cerebral, renal, peripheral, and other cardiovascular disorders. The DCVD fosters biotechnological research in genomics, proteomics, nanotechnology, imaging, device development, cell- and tissue-based therapeutics, and gene therapy, and in their uses as they relate to cardiovascular diseases.

The Division is organized into 5 branches and 1 office:

- Advanced Technologies and Surgery Branch
- Atherothrombosis and Coronary Artery Disease Branch
- Heart Development and Structural Disease Branch
- Heart Failure and Arrhythmias Branch
- Vascular Biology and Hypertension Branch
- Office of Research Training and Career Development

The *Advanced Technologies and Surgery Branch* conducts and manages an integrated basic and clinical research

program to study innovative and developing technologies for the diagnosis, prevention, and treatment of cardiovascular diseases.

The *Atherothrombosis and Coronary Artery Disease Branch* conducts and manages an integrated basic and clinical research program to study the etiology, pathogenesis, prevention, diagnosis, and treatment of coronary artery disease and atherothrombosis.

The *Heart Development and Structural Disease Branch* conducts and manages an integrated basic and clinical research program to study normal and abnormal cardiovascular development. It is also responsible for overseeing research related to the etiology, pathogenesis, prevention, diagnosis, and treatment of pediatric and adult structural heart disease. The Branch is a focal point for coordination of activities and development of educational materials related to clinical research on pediatric cardiovascular disease within the NHLBI and the NIH.

The *Heart Failure and Arrhythmias Branch* conducts and manages an integrated basic and clinical research program to study normal cardiac function and pathogenesis to improve diagnosis, treatment, and prevention of heart failure and arrhythmias.

The *Vascular Biology and Hypertension Branch* conducts and manages an integrated basic and clinical research program to investigate vascular biology and the etiology, pathogenesis, prevention, diagnosis, and treatment of hypertension and vascular diseases.

The *Office of Research Training and Career Development* supports training and career development programs in cardiovascular research, offering opportunities to individuals at all educational levels, from high school students to academic faculty, including programs for individuals from diverse populations.

Division of Prevention and Population Sciences (DPPS)

The DPPS supports and provides leadership for population- and clinic-based research on the causes, prevention, and clinical care of cardiovascular, lung, and blood diseases and sleep disorders. Research includes a broad array of epidemiological studies to describe disease and risk factor patterns in populations and to identify risk factors for disease; clinical trials of interventions to prevent disease; studies of genetic, behavioral, sociocultural, and environmental influences on disease risk and outcomes; and studies of the application of prevention and treatment strategies to determine how to improve clinical care and public health. The Division also supports training and career development for these areas of research.

The Division is organized into 3 branches:

- Clinical Applications and Prevention Branch
- Epidemiology Branch
- Women's Health Initiative Branch

The *Clinical Applications and Prevention Branch* supports, designs, and conducts research, and supports training, on behavioral, environmental, clinical, and health care approaches to reduce occurrence and consequences of cardiovascular disease. Prevention research examines effects of interventions to slow or halt risk factor or disease development or progression. Studies examine lifestyle, nutrition and exercise, psychological and sociocultural factors, and environmental and genetic influences relevant to prevention. Clinical applications research examines approaches to improve health care delivery and patient outcomes. Studies include clinical and community trials and selected observational studies. Studies include clinical and community trials and selected observational studies.

The *Epidemiology Branch* supports, designs, and conducts research, and supports training, in the epidemiology of cardiovascular, lung, blood, and sleep diseases and disorders. Studies are conducted to identify temporal trends and population patterns in the prevalence, incidence, morbidity, and mortality from the diseases and include single- and

multicenter observational epidemiology studies of development, progression, and treatment of cardiovascular, lung, blood, and sleep diseases and disorders. Studies identify environmental, lifestyle, physiological, and genetic risk factors for disease and risk factor development including characterization of gene/gene and gene/environment interactions. The Branch also distributes data from all eligible NHLBI studies to researchers as a national data resource and adheres to guidelines that protect participant privacy and confidentiality.

The *Women's Health Initiative Branch* supports clinical trials and observational studies to improve the understanding of the causes and prevention of major diseases affecting the health of women. Current studies focus on cardiovascular disease, cancer, and fractures, in collaboration with NIH's National Cancer Institute, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institute on Aging, National Institute of Neurological Disorders and Stroke, and Office of Research on Women's Health. Large multicenter observational epidemiology studies seek to identify risk markers for disease or better quantify known markers using questionnaire, clinical examination, and laboratory data. The large and long-term multicenter clinical trials test promising but unproven interventions such as hormone therapy, diet, and supplements to prevent major diseases and evaluate overall effects on health. The Branch has established an infrastructure to support the use of data and blood samples from the studies by the scientific community.

Division of Lung Diseases (DLD)

The DLD plans and directs a coordinated research program on the causes and progression of lung diseases and sleep disorders including their prevention, diagnosis, and treatment. It supports basic research, clinical trials, national pulmonary centers, technological development, and application of research findings. Activities focus on understanding the structure and function of the respiratory system, increasing fundamental knowledge of mechanisms associated with pulmonary disorders, and applying new findings to evolving treatment strategies for patients. The DLD, through the National Center on Sleep Disorders Research, also coordinates sleep research activities across the NIH, other Federal agencies, and outside organizations.

The Division is organized into 2 branches and 1 center:

- Airway Biology and Disease Branch
- Lung Biology and Disease Branch
- National Center on Sleep Disorders Research

The *Airway Biology and Disease Branch* supports research and research training in asthma, COPD, cystic fibrosis, and airway function in health and disease. Basic research focuses on elucidating the etiology and pathophysiology of the diseases. Clinical studies focus on improving asthma management and reducing health disparities in asthma, improving COPD treatment and management, and developing genetic, pharmacologic, and nonpharmacologic (e.g., gene transfer) treatments for cystic fibrosis.

The *Lung Biology and Disease Branch* supports research, education, and training programs in lung cell and vascular biology; developmental biology and pediatric lung diseases; acute lung injury and critical care medicine; and interstitial lung diseases and lung immunology including pulmonary fibrosis, sarcoidosis, and pulmonary manifestations of HIV/AIDS and associated infections with emphasis on active and latent tuberculosis (TB) and drug-resistant TB. Basic research focuses on lung development and cell biology, including stem cell biology and cell-based therapies, and mechanisms of disease etiology and pathogenesis. Clinical studies focus on evaluating innovative therapies for acute lung injury and acute respiratory distress syndrome, pulmonary fibrosis, neonatal lung disease, pulmonary embolism, and pulmonary hypertension.

The *National Center on Sleep Disorders Research* plans, directs, and supports basic, clinical, and applied research, health education, training, and prevention research in sleep, chronobiology, and sleep disorders. It oversees developments in its program areas; assesses the national needs for research on causes, diagnosis, treatment, and prevention of sleep disorders and sleepiness; and coordinates sleep research activities across the Federal government and with professional, voluntary, and private organizations.

The NHLBI sleep research program seeks to understand the molecular, genetic, and physiological regulation of sleep and

the relationship of sleep disorders to cardiovascular diseases. It also supports efforts to understand the relationships of sleep restriction and sleep-disordered breathing to the metabolic syndrome, including obesity, high blood pressure and stroke, dyslipidemia, insulin resistance, and vascular inflammation.

Division of Blood Diseases and Resources (DBDR)

The DBDR plans and directs research and research training on the causes and prevention of blood diseases and disorders. Areas of interest encompass a broad spectrum of research from stem cell biology to medical management of blood diseases, with a focus on nonmalignant and premalignant processes. The DBDR has recently taken a leading role in developing cell-based therapies, combining the expertise of transfusion medicine and stem cell technology with the exploration of repair and regeneration of human tissues and biological systems. The Division also has a major responsibility to improve the adequacy and safety of the Nation's blood supply.

The Division is organized into 3 branches:

- Blood Diseases Branch
- Thrombosis and Hemostasis Branch
- Transfusion Medicine and Cellular Therapeutics Branch

The *Blood Diseases Branch* supports research and research training in nonmalignant disorders of the hematopoietic system including sickle cell disease and thalassemia. Attention is focused on reducing morbidity and mortality caused by the disorders and preventing their occurrence. The Branch oversees a program of Comprehensive Sickle Cell Centers, which collectively form a sickle cell disease clinical research network—and which individually conduct basic and clinical research—and provide state-of-the-art patient care, educational activities for patients and health professionals, community outreach, and genetic counseling services. A thalassemia clinical network is evaluating new treatment strategies and ensuring that research findings on optimal management of the disease are rapidly disseminated to practitioners and health care professionals.

The *Thrombosis and Hemostasis Branch* supports research and research training in hemostasis, thrombosis, and endothelial cell biology. It oversees a comprehensive program of basic research, clinical studies, and technology development focusing on understanding the pathogenesis of both arterial and venous thrombosis in order to improve the diagnosis, prevention, and treatment of thrombosis in heart attack, stroke, and peripheral vascular diseases. The Branch also supports research on bleeding disorders (e.g., hemophilia and von Willebrand Disease) and immune disorders (e.g., idiopathic thrombocytopenic purpura, thrombotic thrombocytopenic purpura, and systemic lupus erythematosus).

The *Transfusion Medicine and Cellular Therapeutics Branch* plans and directs research and research training in transfusion medicine, stem cell biology and disease, and clinical cellular medicine. It supports research on the use, safety, and availability of blood and blood components for transfusion and cellular therapies. The Branch also develops programs for basic and clinical research related to normal and abnormal cellular biology and pathology. In addition, it collaborates with governmental, private sector, and international organizations to improve the safety and availability of the global supply of blood and blood components.

Division of Extramural Research Activities (DERA)

The DERA provides a number of services to the Institute. For example, it represents the Institute on overall NIH committees on extramural program policies and oversees compliance with such policies within the NHLBI. It also provides grant and contract management services to the Institute's program divisions, and provides initial scientific merit review of some research grant applications (e.g., applications submitted in response to an Institute Request for Applications, RFA). In addition, the DERA coordinates the Institute's Committee Management Activities and the meetings of the National Heart, Lung, and Blood Advisory Council.

Examples of FY 2007 Research Initiatives

In FY 2007, the NHLBI initiated programs to:

- Establish a network to develop, conduct, and evaluate multiple cell-based therapies for the management of cardiovascular diseases.
- Establish a cardiovascular research network to increase scientific knowledge of cardiovascular disease in the context of community-based health care delivery.
- Create multidisciplinary career development programs in genetics and genomics of lung diseases that will equip new investigators with the knowledge and skills to become independent investigators.
- Foster collaborative research between basic scientists and clinical investigators that will lead to cell-based therapies for lung diseases.
- Conduct longitudinal studies to characterize HIV-associated lung infections and their complications and consequences.
- Determine the efficacy of long-term oxygen treatment for improving survival in patients with COPD and less-than-severe hypoxemia at rest.
- Establish centers that will conduct multidisciplinary research on COPD and promote rapid translation of basic scientific findings into clinical application for its diagnosis, treatment, and prevention.
- Conduct multidisciplinary research to answer clinically relevant questions related to the diagnosis, prevention, and treatment of pulmonary vascular disease.
- Establish a training program for curriculum development and implementation in pediatric transfusion medicine and attract young investigators into the field.
- Support refinement and manufacture of HIV-SELECTEST enzyme-linked immunoabsorbent assay kits and a Rapid HIV-1 Antibody Test for distribution to national and international laboratories conducting Phase II/III HIV-1 vaccine trials.
- Develop, implement, and evaluate short courses in computational modeling for biomedical researchers and clinical scientists.
- Support genome-wide association studies to identify genetic components related to heart, lung, and blood disorders and their risk factors.
- Establish a clinical coordinating center for the NHLBI Gene Therapy Resource Program.
- Determine the epidemiology, pathophysiology, and clinical aspects of anemia in the elderly.
- Encourage innovative, high-risk strategies based on nanotechnology to diagnose and treat heart, lung, and blood diseases and sleep disorders.
- Study the interaction between hypertension and inflammation.
- Understand the factors present in elderly persons that contribute to age-related increases in thrombosis and thromboembolism.
- Establish a cooperative network of academic centers with cardiothoracic surgeons and their colleagues in allied specialties that will foster rigorous scientific evaluation of newer surgical techniques, technologies, and devices or innovative pharmaceutical and bioengineered products for treatment of cardiovascular disease.

Division of Intramural Research

The DIR conducts laboratory and clinical research in heart, vascular, lung, blood, and kidney diseases and develops technology related to cardiovascular and pulmonary diseases.

The DIR is organized into 4 centers and 4 branches:

- Biochemistry and Biophysics Center
- Cell Biology and Physiology Center
- Genetics and Development Biology Center
- Immunology Center
- Cardiology Branch
- Hematology Branch
- Pulmonary Critical Care Medicine Branch
- Vascular Medicine Branch

The *Biochemistry and Biophysics Center* studies the molecular basis of structure–function relationships of proteins and biologically relevant molecules. It performs state-of-the-art studies of protein structure and functional interactions, develops mathematical tools for generating models of protein structure–function relationships, elucidates mechanisms of enzyme function, and investigates relationships between protein structure–function and cell signaling pathways.

The *Cell Biology and Physiology Center* studies mechanisms that regulate cellular function and physiology. It evaluates mechanisms that control different molecular machines within the cytosol, including those involved in muscle contraction, and cytosolic and membrane transport processes. The Center studies cellular signaling events associated with hormone action, cytosolic trafficking, and energy metabolism; investigates the role of cellular processes on function and adaptation in whole animal model systems; and develops unique measuring devices for studying biochemical and physiological processes in intact cells, whole animals, and clinical situations.

The *Genetics and Development Biology Center* studies mechanisms that regulate cardiovascular development and the etiology of congenital heart anomalies and cardiovascular disease. It evaluates the function of specific genes and transcription factors in the development of the heart and other tissues, develops techniques and approaches for gene delivery and gene therapy, and investigates processes that regulate and interpret the genetic code in development and disease.

The *Immunology Center* studies intracellular and signaling processes involved in the activation of lymphocytes and mast cells, investigates mechanisms by which drugs and other agents result in allergic–autoimmune reactions, and applies the results to the development of diagnostic and therapeutic approaches.

The *Cardiology Branch* develops new diagnostic and therapeutic modalities for treatment of cardiovascular disease. It focuses on mechanistic studies and clinical protocols.

The *Hematology Branch* investigates normal and abnormal hematopoiesis. It focuses on bone marrow failure, viral infections of hematopoietic cells, gene therapy of hematologic and malignant diseases, bone marrow transplantation, and mechanisms of immunologically mediated syndromes like graft-versus-host disease and autoimmune diseases.

The *Pulmonary Critical Care Medicine Branch* studies the lung and cardiovascular system to define, at a molecular level, normal function and disease. It focuses on understanding biochemical and immunologic events involved in intra- and intercellular communication and organ function.

The *Vascular Medicine Branch* conducts research on the lung and vasculature directed at defining, on a molecular, biochemical, and functional level, normal physiological function and novel mechanisms of disease. It focuses on translational study and therapeutic modulation of physiological functions to mitigate vasculopathy in lung and heart disease.

Division for the Application of Research Discoveries

The DARD leads national and international programs of research translation, dissemination, and utilization to accelerate the application of science advances in the prevention, detection, and treatment of cardiovascular, lung, and blood diseases. Through knowledge networks, education programs, community outreach, conferences, and symposia, the DARD fosters communication and collaboration among researchers, clinical care providers, public health practitioners, patients, and the public in an effort to connect research and practice in a continuous learning loop. Reaching out to people in high-risk, low-income, and minority communities to eliminate health disparities is a high priority.

The DARD is organized into 3 branches:

- Research Translation Branch
- Enhanced Dissemination and Utilization Branch
- Health Communications and Social Marketing Branch

The *Research Translation Branch* fosters the rapid translation of emergent knowledge into practice by synthesizing and organizing evidence around priority diseases and conditions. It identifies gaps in knowledge that need to be addressed by future research, promotes evidence-based reviews and facilitates the development of clinical guidelines, and develops innovative tools for use in clinical and public health settings to facilitate clinical decision-making and other implementation activities. To inform future research needs and opportunities, the branch uses knowledge networks and other strategies to facilitate communication between researchers, health care professionals, and the public about the applicability, relevance, and usefulness of research efforts.

The *Enhanced Dissemination and Utilization Branch* collects, synthesizes, and communicates new knowledge and recommendations to foster the dissemination of research-based findings and their utilization by diverse groups, including minorities and underserved populations. The Branch provides technical assistance and information resources to enhance the dissemination efforts of NHLBI-supported researchers, and uses best-practices strategies to accelerate the introduction of evidence-based tools and education programs into community practice settings. In addition, the branch establishes community-based Enhanced Dissemination and Utilization Centers committed to applying and evaluating the impact of cutting-edge research advances in multiple settings in an effort to achieve the goals of the U.S. Department of Health and Human Services Healthy People Program and to eliminate health disparities.

The *Health Communications and Social Marketing Branch* supports the communication of health information to health care professionals and the public. Using results of the latest communications and social marketing research, the branch plans health communications strategies and develops consumer messages and public education campaigns. It develops and maintains media relations and communicates research results and educational messages through the media. In addition, the branch operates the NHLBI Health Information Center to respond to professional and public inquiries and to develop and distribute publications and deliver on-line information to health care providers and the public.

Center for Biomedical Informatics

The CBI provides an integrated informatics and knowledge environment for the NHLBI. It is organized into 3 branches:

- Information Technology (IT) Resources Branch
- Applications Development and Support Branch
- Planning, Architecture, Communication, and Evaluation Branch

The *IT Resources Branch* is responsible for ensuring that NHLBI personnel have continuous access to appropriate network resources needed to carry out the Institute's mission. It oversees the installation and maintenance of personal computers, peripherals, and other computing hardware; assists individuals in their use of a defined collection of productivity tools; and ensures that all computer and user practices are compliant with NIH standards for information security.

The *Applications Development and Support Branch* provides or develops software engineering methods to address the high-priority needs of the Institute. The branch keeps abreast of the evolving IT field to ensure that the Institute is current in the state-of-the-art of IT applications. It designs methods to allow the outside community to be able to access existing IT resources and educates users to take maximum advantage of these applications.

The *Planning, Architecture, Communication, and Evaluation Branch* relies on a network of constituency groups to collect information relevant to the planning of all IT activities for the Institute. Activities of the branch include developing an information architecture; evaluating deployed IT systems; designing methods to communicate with the NHLBI community, both internal and external; and developing methods to manage information relevant to the Institute's mission such as procedural knowledge (e.g., administrative practices) and scientific knowledge created by the Institute's programs.

Center for Population Studies

The CPS conducts research using data from the NHLBI Framingham Heart Study to advance understanding of the etiology, natural history, and time-period trends in heart, lung, and blood diseases and sleep disorders from various disciplines. It

develops and oversees training in population research in heart, lung, and blood disorders; conducts collaborative scientific research with the Jackson Heart Study and other NHLBI population studies; and performs state-of-the-art research on heart, lung, blood, and sleep conditions with attention to early-onset diseases, their biochemical milieu, and genetic susceptibility.

NIH Almanac: Organization

National Human Genome Research Institute

Mission | Important Events | Research Advances and Collaborations | Director

Mission

In January 2007, the National Human Genome Research Institute (NHGRI) celebrated its 10th anniversary as an Institute of the National Institutes of Health (NIH), marking a decade that saw genomics emerge as a powerful research tool and looking ahead to an era in which genomics will transform medical care.

NHGRI, established originally as the National Center for Human Genome Research in 1989, led NIH's contribution to the International Human Genome Project. The project, which had as its primary goal the sequencing of the 3 billion DNA letters that make up the human genetic instruction book, was successfully completed in April 2003.

NHGRI's mission has evolved over the years to encompass a broad range of studies aimed at understanding the structure and function of the human genome and its role in health and disease. To that end, the Institute supports the development of resources and technologies that will accelerate genome research and its application to human health. A critical part of NHGRI's mission continues to be the study of the ethical, legal, and social implications of genome research. NHGRI also supports the training of investigators, as well as the dissemination of genome information to the public and to health professionals.

NHGRI is organized into 3 main divisions: the Office of the Director, which provides guidance to scientific programs and oversees the general operation of the Institute; the Division of Extramural Research, which supports and administers the expansion of genomic research at academic and other research centers; and the Division of Intramural Research, which is home to the Institute's in-house genetics research laboratories.

Guidance related to NHGRI research programs and grants comes from the National Advisory Council for Human Genome Research, which meets 3 times a year, usually in Bethesda, Maryland. Members include representatives from health and science disciplines, public health, social sciences, and the general public. Portions of the council meetings are open to the public.

Important Events in the History of NHGRI and the Human Genome Project

While the Human Genome Project had its conceptual origins in the mid-1980s, the effort to determine the order of all the letters in the human genetic instruction book, or genome, owes much of its success to a series of pioneering genetics discoveries dating back to the early 20th Century. For example, Alfred Sturtevant, Ph.D., created the first gene map for the fruit fly *Drosophila* in 1911. In 1953, Francis Crick, Ph.D., and James D. Watson, Ph.D., provided the crucial first step for molecular genome analysis with their description of the double helical structure of the DNA molecule. The two researchers, along with Maurice Wilkins, Ph.D., won the 1962 Nobel Prize for physiology or medicine.

In the mid-1970s, Frederick Sanger, Ph.D., developed biochemical techniques to sequence DNA, for which he received a Nobel Prize for chemistry in 1980. With the automation of DNA sequencing in the 1980s, the idea of analyzing the entire human genome was first proposed by a few academic biologists.

The U.S. Department of Energy (DOE), seeking data on protecting the genome from the mutagenic (gene-mutating) effects

of radiation, established an early version of the genome project in 1987. The following year, Congress funded both NIH and DOE to embark on further exploration of the concept, and the 2 agencies formalized an agreement by signing a Memorandum of Understanding to "coordinate research and technical activities related to the human genome." James D. Watson, Ph.D., was appointed to lead the NIH component, which was initially dubbed the Office of Human Genome Research. The following year the Office of Human Genome Research evolved into the National Center for Human Genome Research (NCHGR).

Before the Human Genome Project could officially launch in October 1990, Congress asked NIH to develop a strategic plan for the monumental project. NCHGR collaborated with DOE and, in April 1990, published a joint research plan, "Understanding Our Genetic Inheritance: The Human Genome Project, The First Five Years, FY 1991-1995." This plan set out specific goals for the first 5 years of what was then projected to be a 15-year research effort. If the ultimate goal of sequencing the human genome was to be completed by 2005, it was imperative to construct detailed human genetic maps, to improve physical maps of the human genome and of the genomes of certain model organisms, and to develop better technologies for DNA sequencing and information handling.

The initial plan also set aside 3% of the project's budget for the study of the ethical, legal, and social implications (ELSI) of genome research so that policy options could be developed to address concerns such as genetic discrimination. Since 1990, the insights gained through ELSI research have informed the development of federal guidelines, regulations, and legislation to safeguard against misuse of genetic information, such as the introduction of the "Genetic Information Nondiscrimination Act of 2007" in both houses of the U.S. Congress. Through the ELSI research program, NHGRI also supports a variety of ethics- and policy-related research studies, workshops, and conferences to further explore and address such issues. Between 1990 and 2007, ELSI-funded activities included more than 400 research and education projects which have produced hundreds of peer-reviewed journal articles, books, newsletters, Web sites, and broadcast media programs as well as dozens of workshops, conferences, and related activities focused on translating ELSI research into clinical and public health practices.

During its first 5 years, a large part of the work of the Human Genome Project was devoted to developing improved technologies and techniques for accelerating the elucidation of the genome. Advances that helped to speed scientific research and analysis during this time period included: restriction fragment-length polymorphisms, polymerase chain reaction, bacterial and yeast artificial chromosomes, and pulsed-field gel electrophoresis.

NCHGR also went through a number of leadership changes during this time. In 1992, Dr. Watson resigned as director, and Michael Gottesman, M.D., was appointed acting director of the center. The following year, Francis S. Collins, M.D., Ph.D., was recruited from the University of Michigan to be the new director.

By 1993, a majority of the goals laid out in the 1990 plan were already on or ahead of schedule. Efforts to construct human genetic maps and physical maps of genomes had been accelerated by technological improvements that could not have been anticipated even a few years earlier. Also, in the period since the original plan was published, leaders of the Human Genome Project had gained a better understanding of what needed to be done to reach the goal of obtaining the human genome sequence.

Consequently, the leaders revised and extended the project's goals to cover the first 8 years (through September 1998) with the publication of "A New Five-Year Plan for the United States Human Genome Program" in the journal *Science*. Among the goals of the new plan were improving technologies for rapid genotyping, developing higher resolution physical maps, moving towards a systematic large-scale sequencing strategy, and expanding ELSI goals to contemplate the potential widespread use of genetic testing.

Also in 1993, the NCHGR established a Division of Intramural Research (DIR), in which genome technology is developed and used to study specific diseases. DIR was charged with concentrating its efforts on future applications of genomics. Over the division's 13-year history, NHGRI investigators have developed a variety of research approaches that accelerate the understanding of the molecular basis of disease. These advances include: DNA microarray technologies for large-scale molecular analyses, innovative computer software to study fundamental biological problems, animal models critical to the study of human inherited disorders and the clinical testing of new therapeutic approaches for genetic disease.

In 1994, the Human Genome Project's genetic mapping goal was achieved a year ahead of schedule and, in 1995, a physical map of chromosome 22 was published providing researchers with an important tool for finding genes on this chromosome. In 1996, pilot studies were launched that began the process of dramatically improving the technology needed for sequencing human DNA. That same year, the sequence of the first eukaryotic genome, *Saccharomyces cerevisiae* (brewer's yeast), was completed; a map pinpointing the locations of more than 16,000 human genes was published; and the International Human Genome Sequencing Consortium (IHGSC) made a historic decision to place all sequence data of 1 to 2 million bases into public databases within 24 hours for anyone to freely access.

The NCHGR received full Institute status at NIH in 1997, being renamed the National Human Genome Research Institute (NHGRI) with Dr. Collins as its director. Having accomplished all major goals in the 1993-98 plan, NHGRI published a third 5-year plan in 1998, again in the journal *Science*. All 3 plans had a set of interconnected goals that proved pivotal to achieving a completed sequence and maintaining progress to meet ambitious milestones.

Human DNA sequencing would become the major emphasis of the new plan and an audacious timetable was set forth for completing the sequence by April 2003—more than 2 years ahead of previous projections. In addition, researchers would work to finish one-third of the human sequence during 2001 and publish a "working draft" by the end of the same year. A "working draft," while not as accurate as a finished sequence, would contain 90% of the sequence and would provide researchers around the world with a useful tool for bringing important scientific projects to fruition much sooner than having to wait for the finished sequence to be completed. Other important goals included studying human genome sequence variation, developing technology for functional genomics, completing the genomic sequences of the roundworm *Caenorhabditis elegans* and the fruit fly *Drosophila melanogaster*, and starting the sequencing of the mouse genome.

The task of building the "working draft" of the human sequence was delegated to the IHGSC. The 3 largest NIH-funded sequencing centers (the Whitehead Institute in Cambridge, Massachusetts, Washington University at St. Louis, and Baylor College of Medicine in Houston), along with the Sanger Centre in Hinxton, England, and DOE's Joint Genome Institute, in Walnut Creek, California, were responsible for sequencing 80% of the genome. International partners from France, Germany, Japan, and China obtained the remainder of the sequence.

In 1999, the goal of producing a "working draft" seemed very far away, with less than 15% of the genome sequenced. If the accelerated goals had not already generated a sense of urgency in the consortium, a decision by the sequencing center leaders at a February meeting in Houston would. At the meeting, the leaders accepted Dr. Collins' challenge to ramp up their efforts to produce a "working draft" by spring of 2000.

By January 2000, the centers were collectively producing 1,000 base pairs a second, 24 hours a day, 7 days a week, and 2 billion of the human genome's 3 billion base pairs were sequenced by March. At a White House ceremony hosted by President Bill Clinton in June 2000, Dr. Collins and J. Craig Venter of Celera Genomics, which had carried out its own sequencing strategy, announced that the majority of the human genome had been sequenced.

In February 2001, IHGSC researchers published the sequence and analysis of 90% of the human DNA sequence in the journal *Nature*. A simultaneous publication by Celera Genomics appeared in the journal *Science*. Surprises accompanying the sequence publication included: the relatively small number of human genes, perhaps as few as 30,000; the complex architecture of human proteins compared to their homologs—similar genes with the same functions—in worms and flies; and the lessons to be learned from repeated sequences of DNA.

On April 14, 2003, at a news conference at NIH, the IHGSC announced completion of a finished, reference version of the human genome sequence that has an accuracy of 99.99 percent and covers about 99 percent of the genome's gene-containing regions. In October 2004, IHGSC researchers published a scientific description in the journal *Nature* assessing the quality of the reference version of the finished human genome sequence produced by the Human Genome Project, confirming it has both the high coverage and accuracy needed to perform the most sensitive analyses. For instance, the improved accuracy of the finished human genome sequence, compared with earlier drafts, allowed researchers to lower the estimated number of human genes to 20,000-25,000.

When the Human Genome Project was launched in 1990, many in the scientific community were deeply skeptical about whether the project's audacious goals could be achieved, particularly given its hard-charging timeline and relatively tight spending levels. At the outset, the U.S. Congress was told the project would cost about $3 billion in FY 1991 dollars and would be completed by the end of 2005. In actuality, the Human Genome Project was finished two and a half years ahead of schedule and, at $2.7 billion in FY 1991 dollars, significantly under original spending projections.

Research Advances and Collaborations

A Vision for the Future of Genomics Research

In late 2001 through 2002, knowing that completion of a finished version of the human genome sequence was imminent, NHGRI gathered the world's leading genome researchers to chart the course of future research at two meetings called *Beyond the Beginning: The Future of Genomics I and II*. These meetings were supplemented with workshops throughout 2002 to discuss specific areas of genomic research, policy, education and ethics. The ideas and recommendations that arose from these sessions have informed plans for the next stage of genomic research, resulting in a vision document authored by the leadership at NHGRI: *A Vision for the Future of Genomics Research,* published in April 2003 in the journal *Nature*.

The overarching mission of NHGRI, however, remains the same: to understand the human genome and the role it plays in both health and disease. To that end, NHGRI has embarked on a new set of projects aimed at providing the scientific community with the next generation of tools needed to understand the underlying function and structure of the human genome sequence.

In 2003, NHGRI launched a pilot project, called the ENCyclopedia Of DNA Elements (ENCODE), that involves an international consortium of scientists in government, industry, and academia. Initially, research groups worked cooperatively to test a diverse set of existing and novel high-throughput technologies, techniques and strategies for identifying, locating, and fully analyzing all of the functional elements contained in a set of DNA target regions that cover approximately 30 megabases, or about 1%, of the human genome.

In 2007, the ENCODE research consortium published a set of landmark papers in the journals *Nature* and *Genome Research* that found the organization, function, and evolution of the human genome to be far more complicated than scientists previously expected. The ENCODE data indicate that beyond genes and their associated proteins, the human genome is an interwoven network in which genes are just 1 of many types of DNA sequences with a functional role to play.

Based on the pilot project's findings and success, NHGRI recently expanded the ENCODE project to begin building a parts list of biologically functional elements across the entire human genome over the next 4 years. NHGRI also began a parallel effort called modENCODE to identify similar functional elements in the fruit fly and roundworm genomes. These model organisms can easily be experimented with to validate the biological relevance of functional elements they share with humans.

The International HapMap Project, launched in October 2002, is a partnership of scientists and funding agencies from Canada, China, Japan, Nigeria, the United Kingdom, and the United States. The purpose of the project is to develop a public resource that will help researchers find genes associated with human disease and response to pharmaceuticals. The DNA sequence of any 2 people is 99.9% identical. However, the 0.1% variation among individuals may greatly affect disease risk. Sites in the DNA sequence where individuals differ by a single DNA base are called single nucleotide polymorphisms (SNPs, pronounced "snips"). Sets of nearby SNPs on the same chromosome are inherited in blocks. This pattern of SNPs on a block is called a haplotype.

At the project's outset, the consortium set an ambitious goal of creating a human haplotype map, or HapMap, within 3 years. A *Nature* paper published in October 2005 marked the attainment of that goal with its detailed description of the Phase I HapMap, consisting of more than 1 million markers of genetic variation or SNPs. In 2007, the consortium published a Phase II HapMap in *Nature* that contains nearly 3 times more markers than the initial version and enables researchers to focus

their gene searches even more precisely on specific regions of the genome. The HapMap offers the scientific community an enormous savings, reducing the expense of searching the genome for hereditary factors in common disease by a factor of 10 to 20.

Researchers trying to uncover the genetic risk factors for a wide range of diseases are now using genome-wide association studies (GWAS), a powerful new approach made possible by the HapMap. Since 2005, GWAS research has identified more than 60 common DNA variants associated with risk of disease or related traits—with the pace of discovery rapidly accelerating during 2007

In a related development, the U.S. Department of Health and Human Services launched 2 groundbreaking initiatives: The Genes and Environment Initiative (GEI), a trans-NIH collaboration led administratively by NHGRI; and the Genetic Association Information Network (GAIN), a public-private partnership between NIH, the Foundation for the National Institutes of Health, and major pharmaceutical and biotech companies.

Each study will identify the genetic contributions to health conditions that affect the public health, such as depression and diabetes. Using biological samples already collected in earlier clinical studies, each initiative will comprehensively evaluate the subtle differences between the genomes of approximately 1,000-2,000 normal, healthy volunteers and the genomes of 1,000-2,000 patients with the condition being studied. GAIN launched 6 studies in 2006 focusing on attention deficit hyperactivity disorder (ADHD), psoriasis, schizophrenia, bipolar disorder, depression, and type 1 diabetes. In 2007, GEI selected 8 initial health conditions to target. They include addiction, oral clefts, coronary heart disease, lung cancer, type 2 diabetes, tooth decay, and premature birth. GEI also provided funding as part of its technology development program to more than 30 investigators to devise new ways of monitoring personal environmental exposures that interact with genetic variations and result in human diseases.

In addition to sequencing the 3 billion letters in the human genetic instruction book, researchers involved in the Human Genome Project sequenced the genomes of a number of important model organisms that are commonly used as surrogates in studying human biology. They include: the mouse, the rat, 2 species of puffer fish, 2 species of fruit flies, 2 species of sea squirts, 2 species of roundworms, baker's yeast, and the bacterium *Escherichia coli*. By comparing genome sequences from carefully chosen organisms, scientists are able to identify specific DNA sequences that have been conserved throughout the evolution of different species, which is a strong indicator that these sequences reflect functionally important regions of the genome.

Comparative genomics will continue to play a pivotal role in the next stage of genomic research. To aid in interpretation of the human genome, NHGRI has approved plans to sequence a wide variety of other organisms, including the northern white-cheeked gibbon, an elephant shark, freshwater snail, a wasp, as well as several fungi, yeast, and roundworm species. The journal *Nature* published an analysis of the South American opossum genome sequence in May 2007 and an analysis of 12 fruit fly genomes in November 2007. An analysis of the rhesus macaque monkey genome sequence was published in April 2007 in the journal *Science*.

NHGRI has recently devoted a portion of its large-scale sequencing capacity to "medical sequencing" projects aimed at identifying the genetic roots of human diseases that have long eluded gene hunters. Three projects announced in 2005 include efforts to identify the genes responsible for dozens of relatively rare, single-gene (autosomal Mendelian) diseases; to sequence all of the genes on the X chromosome from affected individuals to identify those involved in sex-linked diseases; and to survey the range of variants in genes known to contribute to some common diseases.

Also in 2005, NHGRI partnered with the National Cancer Institute to launch a comprehensive effort to accelerate our understanding of the molecular basis of cancer through the application of genome analysis technologies, especially large-scale genome sequencing. The overall effort, called The Cancer Genome Atlas (TCGA), is a pilot project which will initially target lung, brain (glioblastoma), and ovarian cancer to determine the feasibility of a full-scale effort to systematically explore the universe of genomic changes involved in all types of human cancer.

An international team of scientists, supported in part by NHGRI, recently demonstrated the value of efforts like TCGA, targeting cancer with a systematic approach relying on large-scale sequencing. The team, part of the Tumor Sequencing

Project, identified more than 50 genomic changes in lung adenocarcinoma and uncovered a critical gene alteration not previously linked to any form of cancer. Their work was published in *Nature* in November 2007.

The sequencing centers in NHGRI's Large-Scale Sequencing Research Network will dedicate a significant portion of their pipelines to TCGA. Cancer is now understood to include more than 200 different diseases. In all forms of cancer, genomic changes—often specific to a particular type or stage of cancer—cause disruptions within cellular pathways that result in uncontrolled cell growth. TCGA will delve more deeply into the genetic origins leading to this complex set of diseases and, in doing so, will create new discoveries and tools that will provide the basis for a new generation of cancer therapies, diagnostics, and preventive strategies.

Another of NHGRI's near-term goals is to lower the cost of sequencing a mammalian-sized genome to $100,000, which would enable researchers to sequence the genomes of hundreds or even thousands of people as part of studies to identify genes that contribute to cancer, diabetes, and other common diseases. Ultimately, NHGRI's vision is to cut the cost of whole-genome sequencing to $1,000 or less, which would enable the sequencing of individual genomes as part of medical care. The ability to sequence each person's genome cost-effectively could give rise to more individualized strategies for diagnosing, treating and preventing disease. Such information could enable doctors to tailor therapies to each person's unique genetic profile.

The availability of such gene-sequencing technologies will revolutionize healthcare in the future. In the meantime, NHGRI continues to develop the partnerships and tools necessary to make a difference in today's healthcare setting. For example, in November 2004, NHGRI partnered with the U.S. Surgeon General and other divisions of the Department of Health and Human Services to launch the Family History Initiative.

The Family History Initiative encourages all Americans to learn about their families' health histories as a way of promoting personal health and preventing disease. The centerpiece of this effort is a free, and recently improved, Web-based tool called "My Family Health Portrait" (http://familyhistory.hhs.gov/), which can be used to record common diseases that run in a person's family. The family history can then be printed and taken to a healthcare professional to help determine whether a patient is at higher risk for disease.

Ethical, legal, and social issues continue to occupy a central role in NHGRI's mission. In 2004, NHGRI's ELSI research program announced grants establishing the first Centers of Excellence in ELSI Research, which will bring together investigators from multiple disciplines to address some of the most pressing ethical, legal, and social questions raised by the rapidly expanding fields of genetics and genomics. Two more centers were established in 2007.

The completion of the sequence of the human genome in April 2003 represents a major milestone in the history of science. However, the challenges set forth in *A Vision for the Future of Genomics Research* will likely prove even more significant by advancing the effort to utilize the human genome sequence to benefit humankind. As medical research ventures further into the genome era, NHGRI will remain at the forefront of such research by providing the tools and information needed to understand human health and disease.

Intramural Research Advances

NHGRI's Division of Intramural Research investigators have made numerous discoveries during the last 14 years, including identifying genes involved in type 2 diabetes, Parkinson's disease, hereditary prostate cancer, breast cancer, Pendred syndrome (deafness), tumor suppression, neurological disorders, and developmental disorders. In 2007, NHGRI researchers, working as part of a U.S.-Finnish team searching for genetic variants involved in type 2 diabetes, combined their findings with 2 other international groups of scientists. The groups published simultaneous studies in the journal *Science* and identified 4 new genetic variants and confirmed the existence of 6 others associated with an increased risk for adult-onset diabetes. NHGRI researchers have also recently identified genetic variants associated with the development of late-onset Alzheimer's disease and the genetic factors involved in how effective a particular antidepressant medication works in patients.

Two efforts involving NHGRI researchers were launched in 2007 with the aim of generating information that will help to

integrate genomic tools into clinical settings. The Multiplex Initiative will examine how people who decide to take genetic tests for common conditions, such as coronary heart disease and osteoporosis, interpret and use the results in making their own health care decisions. Ultimately, the insights gained will be used to improve how genetic risk is communicated to patient populations, a key to advancing the concept of personalized medicine. Another NHGRI-led project, known as ClinSeq, will sequence targeted regions of patient's genomes to uncover rare and common genetic variants associated with the cardiovascular disease, coronary artery calcification. Researchers are particularly interested in exploring the technical, medical and genetic counseling issues associated with using genome sequencing in a clinical setting.

Also in 2007, a research team that included NHGRI investigators used a transgenic mouse model to uncover clues that identified a potential treatment of hereditary inclusion body myopathy (HIBM), a rare, degenerative muscle disease. A clinical trial has been launched to test the feasibility of using the treatment for HIBM patients, and preliminary research suggests the treatment may also help patients with certain kidney disorders.

NHGRI Collaborations Across NIH

An additional project featured in NHGRI's vision paper and also appearing prominently in NIH's Roadmap for Medical Research is an initiative called Molecular Libraries. The initiative offers public-sector biomedical researchers access to small organic molecules that can be used as chemical probes to study cellular pathways in greater depth. It will provide new ways to explore the functions of major components of the cell in health and disease. In 2004, as part of the Molecular Libraries initiative, NHGRI's Division of Intramural Research launched the NIH Chemical Genomics Center. In June 2005, an additional 9 centers were funded as part of a nationwide network that will produce innovative chemical "tools" for use in biological research and drug development.

The availability of molecular libraries has the potential to accelerate the development of new agents to detect and treat diseases by providing early-stage compounds that encompass a broad range of novel targets and activities. These compounds will help validate new targets for drug therapy more rapidly, as well as enable other researchers in the public and private sectors to take these targets and compounds and move them through the drug-development pipeline. For instance, NIH researchers used the NIH Chemical Genomics Center's high-throughput screening process to identify 3 new classes of small molecules that may prove useful for treating Gaucher disease, an inherited disorder that disrupts a cell's ability to break down and dispose of certain cellular waste.

NHGRI is also involved with 2 other NIH Roadmap for Medical Research projects initiated in 2007: the Human Microbiome Project and the Epigenomics initiative. Researchers use the term microbiome to refer to the collective genomes of all microorganisms present in or on another organism, such as human. The Human Microbiome Project will begin deciphering the genomes of approximately 1,000 types of bacteria. Researchers will then go on to use new, comprehensive laboratory technologies to characterize the microbial communities present in samples taken from healthy human volunteers. Finally, the project will include a set of demonstration projects designed to examine whether changes in the human microbiome correlate with health and disease.

Epigenetics is an emerging frontier of science that involves the study of changes in the regulation and activation of genes not directly dependent on changes in the gene sequence. The initiative will examine epigenetic changes across the entire genome that contribute to health and disease by regulating the activity of the genetic blueprint. Funding will be provided to establish epigenome mapping centers to develop epigenome maps of a variety of human cells that can be used by the research community and to develop new technologies to aid in epigenome analysis.

NHGRI is also helping to lead the NIH Knockout Mouse Project, launched in 2006. The goal of this program is to build a comprehensive and publicly available resource of knockout mutations in the mouse genome. In knockout mice, specific genes have been intentionally disrupted, or "knocked out." Systematic disruption of each of the 20,000 genes in the mouse genome will allow researchers to determine the role of each gene in normal physiology and development. Even more important, researchers will use knockout mice to develop better models of inherited human diseases such as cancer, heart disease, neurological disorders, diabetes, and obesity.

NHGRI Acting Director Alan Edward Guttmacher, M.D.

Alan Edward Guttmacher, M.D., is the Acting Director of the National Human Genome Research Institute (NHGRI), helping oversee the institute's efforts in advancing genome research, integrating the benefits of genome research into health care, and exploring the ethical, legal, and social implications of human genomics.

Born in Baltimore, Maryland, Dr. Guttmacher, 58, received an A.B. degree in 1972 from Harvard College and his M.D. from Harvard Medical School in 1981. From 1982 to 1985, Dr. Guttmacher completed an internship and residency in pediatrics at Children's Hospital Boston. In 1985, he earned a two-year National Research Service Award from the U.S. Public Health Service as a fellow in medical genetics at Children's Hospital Boston and Harvard Medical School.

In 1987, Dr. Guttmacher became director of the Vermont Regional Genetics Center at the University of Vermont College of Medicine. While there, he launched a series of public health genetics programs. In addition, Dr. Guttmacher directed the Vermont Cancer Center's Familial Cancer Program, the Vermont Newborn Screening Program, Vermont's only pediatric intensive care unit, and an NIH-supported initiative that was the nation's first statewide effort to involve the general public in discussion of the Human Genome Project's ethical, legal, and social implications.

While in Vermont, Dr. Guttmacher developed a busy practice in clinical genetics, conducted research, and was a tenured associate professor of pediatrics and medicine at the University of Vermont. He is currently a Fellow of the American Academy of Pediatrics, a Fellow of the American College of Medical Genetics and a member of the Institute of Medicine.

In 1999, Dr. Guttmacher joined the NHGRI as Senior Clinical Advisor to the Director. In that role, he established a dialogue with health professionals and the public about the health and societal implications of the HGP. He has given hundreds of talks to physicians, consumer groups, students and the lay public about genetics and its impact on health, health care and society.

Dr. Guttmacher also has played a critical role in guiding the National Coalition for Health Professional Education in Genetics [nchpeg.org] (NCHPEG), a non-profit coalition that promotes health-professional education and access to information about advances in human genetics. The NHGRI partnered with the American Medical Association and the American Nurses Association to establish NCHPEG in 1996. For its first three years, NCHPEG operated from within the genome institute. Dr. Guttmacher oversaw the maturation of NCHPEG into a freestanding entity with 120 member organizations and its own executive director.

In 2003, Dr. Guttmacher and the NHGRI's director, Dr. Francis S. Collins, co-edited a series about the application of advances in genomics to medical care titled: Genomic Medicine [content.nejm.org] for *The New England Journal of Medicine*.

Dr. Guttmacher also oversees the NIH's involvement in the U.S. Surgeon General's Family History Initiative, an effort to encourage all Americans to learn about and use their families' health histories to promote personal health and prevent disease.

On August 2, 2008, Dr. Guttmacher assumed the role of Acting Director of NHGRI. He will continue to serve as NHGRI's Deputy Director, a position he has held since 2002.

NHGRI Directors

Name	In Office from	To
James D. Watson	1989	April 10, 1992
Michael Gottesman (Acting)	April 10, 1992	April 1993
Francis S. Collins	April 1993	August 1, 2008
Alan E. Guttmacher, M.D. (Acting)	August 1, 2008	Present

NIH Almanac: Organization

National Institute on Aging

Mission | Important Events | Director | Programs

Mission

Since 1974, the mission of the National Institute on Aging (NIA) has been to improve the health and well-being of older Americans through biomedical, social, and behavioral research.

NIA research focuses on aging processes, age-related diseases, and special problems and needs of the aged. Towards this mission, NIA conducts and supports research on aging through extramural and intramural programs. The extramural program funds research and training at universities, hospitals, medical centers, and other public and private organizations nationwide. The intramural program conducts basic and clinical research in Baltimore and on the NIH campus in Bethesda, Maryland.

The Institute also supports research training across its programs to maintain and build a strong cadre of highly skilled research scientists from all population groups.

Further, NIA communicates with a variety of audiences about research on aging and about healthy aging and age-related diseases and conditions. A major focus of these efforts is to provide evidence-based information to a broad range of older people, families, health professionals, and policymakers.

Important Events in NIA History

December 2, 1971—The White House Conference on Aging recommends the creation of a separate National Institute on Aging.

May 31, 1974—Public Law 93-296 authorizes the establishment of a National Institute on Aging and mandates the Institute develop a national comprehensive plan to coordinate the U.S. Department of Health, Education, and Welfare (succeeded by the Department of Health and Human Services) involvement in aging research.

October 7, 1974—The National Institute on Aging is established.

April 23, 1975—First meeting of the National Advisory Council on Aging is held.

July 1, 1975—The Adult Development and Aging Branch and Gerontology Research Center become the core of NIA.

December 8, 1976—Research plan required by P.L. 93-296 is transmitted to the Congress.

September 20, 1982—NIA Laboratory of Neurosciences Clinical Program admits first inpatient to a new unit at the NIH Clinical Center.

September 9-11, 1983—The Institute marks the 25th anniversary of the Baltimore Longitudinal Study of Aging. The first volunteers joined this unique study in 1958.

1984—NIA funds Alzheimer's Disease Centers, where researchers at medical institutions nationwide focus on prevention and treatment while improving care and diagnosis.

1986—Per congressional direction, NIA funds the Federal Forum on Aging-Related Statistics, a coordinating organization made up of more than 35 Federal agencies, charged with providing an integrating focus identifying national data needs and developing and disseminating these data.

November 14, 1986—P.L. 99-660, section 501-503, authorizes NIA's Alzheimer's Disease Education and Referral (ADEAR) Center as part of a broad program to conduct research and distribute information about Alzheimer's disease to health professionals, patients and their families, and the general public. Under sections 301-302, Congress authorizes NIA to make Leadership and Excellence awards in Alzheimer's Disease (LEAD) to researchers making significant contributions to Alzheimer's disease and related dementias research.

November 4, 1988—P.L. 100-607 establishes the Geriatric Research and Training Centers, renamed the Claude D. Pepper Older American Independence Centers in 1990 and charged with conducting research on diseases that threaten independent living.

1991—NIA sets up the Alzheimer's Disease Cooperative Study, an ongoing consortium of academic medical centers and others to facilitate clinical trials research.

1992—NIA and the University of Michigan begin the Health and Retirement Study, which follows more than 20,000 people at 2-year intervals, providing data from pre-retirement to advanced age to allow multidisciplinary study of the causes and course of retirement.

1993—The first Edward Roybal Centers for Research on Applied Gerontology are authorized focusing on translational research to convert basic and clinical findings into programs that improve the lives of older people and their families.

NIA launches the Longevity Assurance Genes initiative, an interactive network of funded researchers looking for genetic clues to longevity, using a variety of lower organisms such as *C. elegans, Drosophila,* and yeast.

1994—The first Demography of Aging Centers are funded to provide research on health, economics, and aging and to make more effective use of data from several national surveys of health, retirement, and long-term care.

The Study of Women's Health Across the Nation (SWAN) is launched to characterize in diverse populations the biological and psychosocial influences related to the transition to menopause.

1995—Nathan Shock Centers of Excellence in Basic Biology of Aging are established to further the study of the basic processes of aging.

1996—NIA introduces its *Exercise: A Guide from the National Institute on Aging*, providing encouragement and evidence-based guidance for older adults to engage in exercise.

1997—The Resource Centers for Minority Aging Research (RCMAR) is funded to investigate the variability of health differences experienced across racial and ethnic groups, as well as the mentoring of new scholars in health disparities research.

1999—As part of NIA's 25th anniversary celebration, a strategic plan is formulated and made available for public comment. The plan addressees scientific topics holding the greatest promise for advancing knowledge in areas such as the basic biology of aging, geriatrics, and social and behavioral functioning.

2000—The Institute distributes established mouse cDNA microarray/clone set containing more than 15,000 unique genes to 10 designated academic centers worldwide. Link to Story.

2001—In a unique private-public partnership, NIA joins the Osteoarthritis Initiative to bring together resources and commitment to the search for biological markers of osteoarthritis. Link to Story.

NIA and the Icelandic Heart Association announce collaboration on a vast study on the interactions of age, genes, and the environment. The collaboration extends 34 years of data on the health of 23,000 Icelandic residents into the new millennium. Link to Story.

NIA funds the ProgeNIA project, an international research initiative to study the underlying genetic processes involved in age-related traits and diseases. Link to Story.

2003—NIA and the National Library of Medicine (NLM) launch NIHSeniorhealth.gov, a web site designed to encourage older people to use the Internet. Link to Story.

The NIA, joined by the Alzheimer's Association, expands the Alzheimer's Disease Genetics Initiative to create a large bank of genetic materials and cell lines for study to speed up the discovery of risk-factor genes for late-onset Alzheimer's disease.

NIA and the American Federation for Aging Research—in collaboration with the John A. Hartford Foundation, the Atlantic Philanthropies, and the Staff Foundation—establish a public-private partnership to support clinically trained junior faculty to pursue careers in aging research.

2004—NIA launches the Longevity Consortium, a network of investigators from several large-scale human cohort studies working in collaboration with individual basic biological aging researchers to facilitate the discovery, confirmation, and understanding of genetic determinants of healthy human longevity.

NIA begins the Long Life Family Study, an international multicenter research project to examine families with high numbers of long-lived individuals to better understand the genetic and environmental contributions to exceptional long life in families.

NIA, in conjunction with other Federal agencies and private companies and organizations through the Foundation for the National Institutes of Health, leads the Alzheimer's Disease Neuroimaging Initiative. Link to Story.

NIA launches Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS), a multidisciplinary community-based, longitudinal, epidemiologic study examining the influences and interaction of race and socioeconomic status on the development of age-associated health disparities among socioeconomically diverse African Americans and whites in Baltimore.

2006—NIA leads the NIH conference “AD: Setting the Research Agenda a Century after Auguste D,” a conclave assessing the state of current Alzheimer's disease research and the most promising routes to progress.

2007—U.S. Secretary of State Condoleezza Rice sponsors the Summit on Global Aging in collaboration with NIA to call attention to challenges and opportunities worldwide from population aging.

Biographical Sketch of NIA Director Richard J. Hodes, M.D.

Richard J. Hodes, M.D., directs the research program of the National Institute on Aging (NIA) at the National Institutes of Health. A leading immunologist, Dr. Hodes was named Director of the NIA in 1993 to oversee studies of the basic, clinical, epidemiological, and social aspects of aging.

Under Dr. Hodes's stewardship, the NIA budget has surpassed $1 billion, reflecting increased public interest in aging as America and the world grow older. Dr. Hodes has devoted his tenure to the development of a strong, diverse, and balanced research program, focusing on the genetics and biology of aging; basic and clinical studies aimed at reducing disease and disability, including Alzheimer's disease and age-related cognitive change; and investigation of the behavioral and social aspects of aging. Ultimately, these efforts have one goal—improving the health and quality of life for older people and their families.

In the past decade, the NIA has worked in new and innovative ways to conduct research and to translate research findings into practical interventions and public information. In Alzheimer's disease, new initiatives to find associated genes and to identify biomarkers are expected to considerably reduce the length and cost of clinical trials, thereby speeding up the testing of new therapies for Alzheimer's disease. In biology, research conducted and supported by NIA examines the genetic and other factors influencing lifespan and age-related diseases and conditions. Research in geriatrics is uncovering new ways to combat frailty with age, and social and demographic research is deepening understanding of the individual behaviors and societal decisions that affect wellbeing.

Dr. Hodes is a Diplomate of the American Board of Internal Medicine. In 1995, he was elected a member of The Dana Alliance for Brain Initiatives; in 1997, he was elected a Fellow of the American Association for the Advancement of Science; and in 1999, he was elected to membership in the Institute of Medicine of the National Academy of Sciences.

Dr. Hodes is actively involved in research on the NIH campus through his direction of the Immune Regulation Section, a laboratory at the National Cancer Institute focused on cellular and molecular events that activate the immune response. This involvement in campus research also serves to strengthen ties with other NIH scientists studying age-related diseases. As author of more than 200 research papers, Dr. Hodes is an influential scientist in the field of immunology.

Dr. Hodes received his undergraduate degree from Yale University (summa cum laude) in 1965 and was a research fellow at the Karolinska Institute in Stockholm, Sweden, prior to attending Harvard Medical School, from which he graduated (magna cum laude) in 1971. Dr. Hodes completed training in Internal Medicine at Massachusetts General Hospital and in Oncology at the National Cancer Institute.

NIA Directors

Name	In Office from	To
Norman Kretchmer (Acting)	October 1974	July 1975
Richard C. Greulich (Acting)	July 1975	April 1976
Robert N. Butler	May 1, 1976	July 1982
Robert L. Ringler (Acting)	July 16, 1982	June 30, 1983
T. Franklin Williams	July 1, 1983	July 31, 1991
Gene D. Cohen (Acting)	July 1, 1991	May 31, 1993
Richard J. Hodes	June 1, 1993	Present

Research Programs

Intramural Research

The goals of NIA's Intramural Research Program (IRP) are to support a broad-based research program centered on critical issues regarding the general biology of aging and age-associated diseases and disabilities.

The specific areas of study on the general biology of aging have focused on 1) characterization of normal aging, 2) cell cycle regulation and programmed cell death, 3) stress response, 4) DNA damage and repair, 5) genetics, and 6) immunology. Age-associated disease and disabilities research has included the study of 1) Alzheimer's disease, 2) cancer, 3) osteoporosis, osteoarthritis, and frailty, 4) cardiovascular disease and hypertension, and 5) diabetes. In addition, researchers at the IRP continue to develop and/or test different intervention strategies— e.g., pharmacotherapy, gene therapy, and behavioral or lifestyle changes—to treat many age-associated diseases.

The NIA IRP comprises 11 scientific laboratories, a clinical branch, a research resources support branch, and 2 sections. The research program includes the scientific disciplines of biochemistry, cell and molecular biology, structural biology, genetics, immunology, neurogenetics, behavioral sciences (psychology, cognition, and psychophysiology), epidemiology, statistics, and clinical research and the medical disciplines of neurobiology, immunology, endocrinology, cardiology, rheumatology, hematology, oncology, and gerontology.

Most IRP research is conducted at the Gerontology Research Center in Baltimore. Some laboratory space is also located at the TRIAD Building and the Holabird Research Facility in Baltimore. Clinical research resources are located at Harbor Hospital in Southeast Baltimore. Two laboratories and one scientific research section are located in Bethesda. IRP laboratories provide a stimulating environment for age-related research. IRP also offers many excellent training opportunities in both laboratory research and clinical medicine for investigators at all stages of their careers.

IRP Laboratories

Laboratory of Cardiovascular Science (LCS)

LCS is organized into 4 sections and 5 units, each headed by a senior scientist:

- *Cardiac Function Section*
- *Cardiovascular Biology Unit*
- *Human Cardiovascular Studies Unit*
- *Hypertension Unit*
- *Molecular Cardiology Unit*
- *Cardioprotection Unit*
- *Cellular Biophysics Section*
- *Receptor Signaling Section*
- *Translational Cardiovascular Studies Section*

The overall goals of LCS are: 1) to identify age-associated changes within the cardiovascular system and to determine the mechanisms for these changes; 2) to determine how aging of the heart and vasculature interacts with chronic disease states to enhance the risk for cardiovascular diseases in older persons; 3) to study basic mechanisms in excitation-contraction coupling in cardiac cells and how these are modulated by surface receptor signaling pathways; 4) to elucidate factors that maintain stem cell pluripotentiality, that promote the commitment of stem cells to the cardiac lineage, and that regulate their development as cardiac cells; 5) to elucidate mechanisms that govern cardiac and vascular cell survival; 6) to determine mechanisms that govern neuro-hormonal behavioral aspects of hypertension; and 7) to establish the potentials and limitations of new therapeutic approaches such as changes in lifestyle, novel pharmacologic agents, and gene or stem cell

transfer techniques in aging or cardiovascular disease states. In meeting these objectives, studies are performed in human volunteers, intact animals, isolated heart and vascular tissues, isolated cardiac and vascular cells, and subcellular organelles.

Laboratory of Cellular and Molecular Biology (LCMB)

The LCMB comprises 6 independent research programs headed by either a tenure-track scientist or a senior investigator. These programs include:

- *Gene Regulation Section*
- *RNA Regulation Section*
- *Cancer Genomics Signaling Section*
- *DNA Repair Unit*
- *Chromatin Structure and Function Unit*
- *Molecular Immunology Unit*

The individual research programs share several areas of emphasis, including: 1) the elucidation of signal transduction processes and gene regulatory mechanisms involved in mediating cellular responses to environmental signals such as growth factors, cytokines, immune activators, and stress stimuli; 2) the determination of molecular mechanisms contributing to the maintenance of cellular homeostasis and cell cycle control; 3) the contribution of dysregulated gene expression, or loss of critical gene functions to the development of cancer; and 4) the examination of oxidative DNA damage and repair mechanisms in cancer. A wide variety of *in vitro* and *in vivo* models are being employed to approach these issues. These processes have direct relevance to our understanding of critical events associated with various age-related deficits as well as age-related diseases including cancer. The ultimate goal of these programs is to uncover knowledge that can be applied to prevent or delay the onset of age-related disabilities and diseases, and provide new strategies for their diagnosis or treatment.

Combined, the programs within the LCMB provide extensive and broad expertise in the areas of biochemistry, cellular and molecular biology, immunology, and genetics. The LCMB programs also offer specialized expertise in a variety of approaches used to analyze or manipulate gene expression. Important ongoing projects are examining the genetics of ovarian cancer, the regulation of gene expression through transcriptional and post-transcriptional mechanisms, the control of stress- and mitogen-induced signaling cascades, the regulation of T-cell activation, the role of chromatin re-modeling complex in cytokine gene expression, and the mechanism of somatic hypermutation of immunoglobulin genes.

Laboratory of Clinical Investigation (LCI)

The LCI is organized into 4 sections:

- *Bioanalytical and Drug Discovery Section*
- *Diabetes Section*
- *In Vivo Nuclear Magnetic Resonance Section*
- *Molecular and Clinical Pharmacology Section*

The overall goals of the LCI are: 1) to gain fundamental understanding of age- and disease-related changes in calcium ion channel function, islet cell differentiation and insulin secretion, insulin receptor function, molecular and cellular changes in osteoarthritis, and genetic features of tumorigenesis; 2) to carry out translational research in each of these areas in order to take hypotheses generated from fundamental studies and apply them to humans in health and disease; 3) to identify therapeutic targets in each of these areas and in other laboratories across the NIA IRP; and 4) to develop therapeutic agents for the identified targets and carry out preclinical and clinical studies for proof of principle for the targets. To meet these objectives, studies are performed at the molecular, cellular, animal model, and human levels.

To support the objectives as well as the more usual biological sciences, the physical sciences (in vivo nuclear magnetic resonance (NMR), bioanalytical separation, and analytic techniques) are brought to bear. This permits asking questions “at

the cutting edge" to achieve the above goals. For example, NMR is one of the better (but rarely used) methods of characterizing genetically altered (transgenic) mice. NMR is used by all the LCI sections, and is a resource to the whole NIA IRP, to understand the role of specific genetic changes in whole-animal physiology. In the same manner, to understand post-genetic alterations in cellular constituents, the emerging science of proteomics is assuming greater importance.

The Bioanalytical/Drug Discovery Section uses the best tools for protein analysis, such as matrix-assisted laser desorption/ionization mass spectrometry (MALDI-MS) and capillary electrophoresis/laser induced fluorescence (CE-LIF). Access to these tools helps all LCI sections and the NIA IRP to be at the leading edge of research to understand the contribution of post-genetic protein alterations as well as genomic variability, which will lead to better understanding of diversity in cellular function in health and disease.

Current ongoing projects include studies of: the genetic polymorphisms associated with variability in vascular response; the use of neural networks and wavelet analysis in pharmacokinetic/pharmacodynamic studies; insulinotropic agents in the differentiation of the pancreatic islet beta cell and their use in the treatment of type 2 diabetes mellitus; the mechanism of insulin receptor signal transduction; human calcium channel function in aging, atherosclerosis, and neurodegenerative disease; the role of skeletal muscle atrophy and inflammation in osteoarthritis; the use of in vivo NMR to characterize the evolution of arthritis and potential therapies; and applications of receptor and enzyme immobilized column technology for identification of candidate molecules as new drugs.

Laboratory of Epidemiology, Demography, and Biometry (LEDB)

The LEDB conducts research on aging and age-associated diseases and conditions using population-based epidemiologic and biometric methods. Laboratory staff works collaboratively both within and among 4 groups:

- *Epidemiology and Demography Section,* which plans and conducts studies on chronic diseases, functional status, and disability in the older population.
- *Neuroepidemiology Section,* which conducts interdisciplinary research on the association of genetic, molecular, and behavioral factors in relation to dementia and neurological disease in old age.
- *Geriatric Epidemiology Section,* which carries out interdisciplinary studies of the association of behavioral, molecular, and genetic risk factors with health outcomes in old age, including discrete diseases, disability, and mortality.
- *Biometry Section,* which conducts research on statistical issues and epidemiologic and demographic methodologies related to research on aging. This Section also provides statistical consulting, computing, graphics, and data management services to the other units within LEDB.

Collaborators also include other NIA and outside investigators. The mission of LEDB is to elucidate the etiology of diseases and conditions of old age by analyzing epidemiologic data collected in prospective, population-based studies developed by LEDB, combining epidemiologic data with information from other disciplines, evaluating the consistency of epidemiologic data with etiologic hypotheses developed either clinically or experimentally, and providing the basis for developing and evaluating preventive procedures and public health practices. These general principles have guided a research agenda that emphasizes 3 important and interrelated areas: Physical Function and Disability; Cognitive Function and Dementia; and Age-associated Diseases and Conditions, including successful or effective aging. In each area, studies are influenced by results of analytic efforts of current LEDB-sponsored studies and by opportunities created by advances in biology and medicine. Cross-cutting research themes being addressed by more than one LEDB investigator are: functional status, comorbidity, genetic epidemiology, inflammation, socioeconomic status and health, diabetes/metabolism, and energy balance–physical activity/obesity.

Senior LEDB staff consults with other components within the IRP, NIA, other NIH Institutes, other government agencies, and the academic and private sectors. LEDB research interests use data from the Established Populations for Epidemiologic Studies of the Elderly (EPESE); the Women's Health and Aging Study (WHAS); the Honolulu-Asia Aging Study (HAAS); the Health, Aging, and Body Composition (Health ABC) Study; Age, Gene/Environment Susceptibility (AGES) Study Reykjavik, Iceland; and the In Chianti Study. Senior investigators are leading efforts in 2 large clinical trials: ACCORD-MIND (Action to Control Cardiovascular Risk in Diabetes), a study to evaluate whether aggressive control of risk factors for atherosclerosis in diabetics reduces cognitive decline and LIFE (Lifestyle Interventions and Independence for Elders), a trial to evaluate if physical activity prevents the onset of disability.

Laboratory of Experimental Gerontology (LEG)

The LEG conducts basic research in experimental models focused on interventions that retard aging processes. One of the major projects is a longitudinal study of the potential beneficial effects of diet restriction on aging in nonhuman primates. A second major focus for investigation isin vivo rodent, fly, and nematode models andin vitro cellular models to identify protective mechanisms invoked by calorie restriction. A third major project involves a standardized research program to evaluate various aging interventions (pharmaceuticals, hormones, dietary supplements, genes) in mouse models to assess effects on lifespan, pathology, and functional capacity at older ages. Another important activity of LEG is the development of behavioral assays for assessing aging in rodents and nonhuman primates with a focus on motor and memory performance. Related research seeks to identify mechanisms of age-related decline in motor and memory performance. A primary objective of the research is preclinical development of pharmacological, genetic, and nutritional interventions that improve function.

Laboratory of Genetics (LG)

LG efforts are based on the view that aging is an integrated extension of human development, with important genes influencing the course of aging even in embryonic and fetal life. Our long-term goal is to borrow from development to prolong or ameliorate problems of aging tissues. This is done by understanding the coordinated action of genes in normal pathways and genetic disorders that affect development, and in stem cells that can grow indefinitely and may help to regenerate tissues. The LG includes the following components:

- *Developmental Genomics and Aging Section,* which performs molecular analysis of stem cells and early embryos
- *Human Genetics Section,* which conducts genetic analysis of age-related tissue-developmental pathways and risk factors
- *Genome Instability and Chromatin Remodeling Section,* which focuses on chromatin remodeling and DNA repair
- *Gene Recovery and Analysis Unit,* which studies long-range gene regulation and recombineering
- *Image Informatics and Computational Biology Unit,* which focuses on quantitative visual assays

Laboratory of Immunology (LI)

The LI research program aims to uncover the fundamental cellular, genetic, and molecular mechanisms that contribute to changes in the immune system during the aging process and also contribute to age-associated diseases (e.g., increasing incidence with advancing age). The LI has 7 major areas of concentration and long-term development, including: 1) the molecular examination of telomere length and telomerase activity in lymphocyte populations; 2) the molecular analysis of differentially regulated genes involved in lymphoid cell and organ development, differentiation, trafficking, and activation; 3) molecular mechanisms of memory lymphocyte formation, maintenance, and activation; 4) the study and use of biological response modifiers to optimize and control leukocyte trafficking, activation, organ engraftment, and vaccine efficacy in normal and aging hosts; 5) induction of antigen-specific tolerance and use in transplantation and autoimmunity; 6) the cellular and molecular dynamics involved in thymic involution and regeneration; and 7) understanding the molecular and biological aspects of tumor cell development and metastasis.

- The *Clinical Immunology Section* focuses on several important project areas, including the role of inflammation and cytokines in neurodegeneration and Alzheimer's disease, the role of lipid rafts and cholesterol in the maintenance of chemokine signaling and cellular activation in the aged host and the immunoregulatory effects of pituitary and metabolic hormones in inflammation and immunity. In addition, ongoing studies use high-throughput gene expression profiling techniques to unravel pathways involved in cellular migration and metastasis of cancers such as melanoma, a highly immune-modulated cancer. Especially important are pathways associated with chemokine, cytokine, and T-cell receptor signaling and pathways reflective of melanocyte development that go awry in metastasis, involving molecules such as Wnt5a.
- The *Lymphocyte Cell Biology Unit's* recent work has focused on understanding the cell biology of

lymphomas; tumor-induced immunosuppression; the roles of PTEN and mTOR in lymphocyte activation and function; and defining the role of CD28-mediated costimulatory signal in immune responses, particularly in cancer and autoimmune disease.

- The *Immunotherapeutics Unit* works to develop simpler and more potent vaccines for cancer and other clinically relevant diseases utilizing strategies that target antigen presenting cells. Current research seeks to assess a carrier potency and mechanism of antigen presentation of chemokine- and defensin-based vaccines, to search for alternative delivery methods for DNA vaccines (such as chemokine bearing empty protein particles), and to establish models to study therapeutic efficacy of newly found tumor-associated antigens.
- The *Lymphocyte Development Unit* focuses on understanding the role of Wnt-beta catenin-TCF signaling pathway in the development and function of T lymphocytes. Interaction of this signaling pathway with Notch 1 mediated signals, as well as pre-TCR and TCR mediated signals will provide insight into the programs utilized by the bone marrow derived precursors as they commit to the T cell lineage, mature and age in mammals.
- The *Lymphocyte Differentiation Section* is investigating the influence of age on telomere length and telomerase expression in peripheral blood T lymphocytes in vivo, regulation and function of telomerase in lymphocytes, and the molecular mechanisms involved in the generation and maintenance of memory T lymphocytes and their effector function.

Laboratory of Molecular Gerontology (LMG)

The LMG investigates processes and mechanisms such as genomic instability, DNA repair, DNA replication, and transcription. This laboratory comprises 4 sections and 3 units:

- The *DNA Repair Section* examines the role of DNA damage accumulation in senescence as the major molecular change with aging. The goal of LMG and the DNA Repair Section is to understand the underlying mechanisms involved in DNA damage formation and its processing, as well as the changes that take place with aging that make aging cells susceptible to cancer. The investigative focus is on the molecular mechanisms involved in DNA repair and determinants of genomic instability in normal, senescent, and cancer cells.

  Also in this section, Premature Aging Disease studies examine the molecular functions and protein interactions of the proteins defective in the premature aging disorders Werner and Cockayne syndromes. The cell biological, biochemical, and functional properties of premature aging proteins are investigated with a special focus on the protein partners, thus searching for the pathways in which they participate.
- The *Unit on Oxidative DNA Damage Processing and Mitochondrial Functions* investigates the basis for the mitochondrial hypothesis of aging, which states that accumulation of DNA damage with aging leads to the phenotypical changes that are observed in senescence and age-associated disease. Mechanistic studies dissecting base excision repair at the level of mitochondria are the central work of this unit.
- The *Unit on Structure and Function in Base Excision Repair* investigates the mechanism involved in base excision repair, the DNA repair pathway responsible for the removal of oxidative DNA lesions. The Unit studies the functions of individual proteins and the nature of their interactions. The approach is a combination of protein structure and function, with a view of how mutations and alterations in these proteins in the population change their function and cause disease.
- The *Unit on Telomeric Maintenance and DNA Repair* studies the proteins and functions involved in maintenance of the chromosome ends—known as telomeres—which help to stabilize the genome. Loss of telomere protection is frequently observed in elder populations, cellular senescence, and premature aging syndromes. In addition, mutations in genes that are critical in telomere maintenance have been found in human disorders, such as diseases with bone marrow failure and idiopathic pulmonary fibrosis. Furthermore, telomere dysfunction contributes to genomic instability that leads to cell death, cell proliferation defects, and malignant transformation, which may in turn contribute to age related-disorders and a higher incidence of cancer during aging. This research will elucidate the genes or pathways that are important in telomere length regulation and maintenance and genomic stability. Studies also involve analysis of the repair of damage to telomere DNA.
- The *Section on Gene Targeting* is developing oligonucleotides that can form a 3-stranded DNA structure

called a triple helix. The third strand lies in the major groove of an intact double helix and is stabilized by hydrogen bonds between the bases in the third strand and the purine bases in the duplex. These oligonucleotides can be linked to DNA reactive compounds, and several research groups have demonstrated site-specific modification of DNA with these oligo-reagent conjugates. This approach can now be used to deliver additional DNA reactive compounds to specific genomic locations. Eventually this approach will be used to modulate genomic sequences with targeted gene knockout as a specific application.

- The *Section on Antibody Diversity* investigates the mechanism of somatic hypermutation of immunoglobin genes. Somatic hypermutation occurs at a frequency that is a million times greater than mutation in other genes. Evidence points to a process that involves DNA repair events at sites of lesions in the genes. This Section is studying the roles of DNA polymerases and mismatch DNA repair proteins in the mechanism.
- The *Section on DNA Helicases* focuses on the roles of DNA helicases in genomic stability. The growing number of DNA helicases implicated in human disease suggests that these enzymes have vital specialized roles during replication, DNA repair, recombination, and transcription. RecQ DNA helicases are of particular interest because the human hereditary disorders Werner syndrome, Bloom syndrome, and Rothmund-Thomson syndrome all arise from mutations in genes of the RecQ helicase family. This Section focuses on understanding the cellular and molecular defects of these disorders and of RecQ and related proteins.

Laboratory of Neurogenetics (LNG)

The LNG aims to understand neurodegenerative diseases based on a resolution of their genetic etiology, and to use this understanding to develop cellular and animal models of disease. These genetic-based models can then be used to test theories of disease pathogenesis.

To achieve this goal, LNG is divided into 3 main research groups:

- *Molecular Genetics Section*, which seeks to find genes for neurodegenerative disease. At present, the focus of the Section's work is movement disorders. Identifying rare mutations that cause Parkinson's disease, dystonia, ataxia, and other conditions will enhance understanding of the pathoetiology of these and related disorders. Of note has been our observation that triplication of the alpha-synuclein gene can result in a rare form of Parkinson's disease. LNG has also recently found the gene LRRK2/Dardarin as a common cause for Parkinson's disease. In addition, NIA is leading a study to find the basis of the predisposition of late-onset dementias including Alzheimer's disease.
- *Cell Biology and Gene Expression Unit,* which studies the effects of mutant genes on cell physiology. The goal of the Unit is to develop an understanding of the cell biology and protein chemistry of proteins involved in disease pathogenesis, and in particular, to try to elucidate which biochemical pathways are affected by pathogenic mutations. Currently, the major focus is on the molecular interactions between the proteins encoded by the multiple genes involved in Parkinson's disease. This involves making use of the mutant forms of proteins to clarify the central events in neurodegeneration and tease out the primary pathways leading to neuronal cell loss from secondary occurrences. Part of this work also involves understanding the normal function of proteins, which is especially important for genes with recessive, loss of function mutations. Some smaller projects focus on other movement disorders such as dystonia and amyotrophic lateral sclerosis (ALS), which largely follow the same logic.
- *Transgenic Unit,* which studies pathogenesis in whole animals and tests potential treatments for the diseases. The goal of the Transgenic Unit is to employ the genetically engineered mouse model to study the pathogenic mechanisms and therapeutics of neurodegenerative diseases. Currently, 3 major neurodegenerative diseases: Alzheimer's disease, Parkinson's disease, and ALS are being actively studied. For Alzheimer's disease, the BACE1-null and APP/PS1 transgenic mice have been developed to directly examine the “Amyloid Hypothesis,” in which the aggregation of Aβ is critical for the pathogenesis of the disease. For ALS, the ALS2 knockout mouse has been generated and is ready for characterization on both the cellular and the behavioral levels. Meanwhile, a missense mutation of dynactin/P150 has been introduced into the mouse to model this newly defined genetic mutation that also causes motor neuron disease. For Parkinson's disease, the DJ-1 knockout mouse will be made and analyzed to examine the physiological functions of this protein and the underlying pathogenic

mechanisms of this disorder.

Underpinning these Sections are 3 Cores:

- *Clinical Core,* which aims to identify patients with neurological disorders and facilitate collaborations with clinical investigators from around the world. The Clinical Core has protocols approved to collect clinical data and samples from families with movement disorders and dementia, diseases of the autonomic nervous system, and stroke. The aim of this Core is twofold: to collect information on families with familial disease and, as a longer term goal, to characterize fully the phenotype of these familial diseases, especially features that occur in the preclinical period of the disease process. This plan is designed to enable the identification of very early markers of disease so that treatments can be targeted to disease pathogenesis early in the process. A subsidiary aim of the Core is to examine diseases in minority populations, as it is becoming increasingly apparent that clinical features of diseases have different appearances in different racial groups. The current focus of the Clinical Core is to characterize families with Parkinsonism, dystonia, and restless legs syndrome.
- *Computational Biology Core,* which facilitates the analysis of laboratory data in the broad context of the wealth of information available through the Human Genome Project and related endeavors. The roles of the Core are twofold: first, to enable the interpretation of data from genetic, genomic, and proteomic studies in the context of the wealth of data and computational tools available from Web-based sources, and second, to improve our high-throughput data pipeline and database management system to allow the integration and easy access of both clinical and laboratory data while maintaining appropriate data security and patient confidentiality.
- *Linkage Analysis Core,* which performs genome screens and linkage and association analyses. The primary function of the Linkage Analysis Core is to carry out linkage analysis on families and populations with neurodegenerative disease. Currently, the main projects of the Core focus on doing genome screens on siblings affected with childhood-onset schizophrenia and families affected with holoprosencephaly. Genetic analyses of families affected with Alzheimer's disease are also ongoing to identify new genes involved in the development of the disease.

Laboratory of Neurosciences (LNS)

The major goals of research at the LNS are to understand the cellular and molecular mechanisms of neural plasticity during aging and to develop novel interventions for the prevention and treatment of neurodegenerative conditions such as Alzheimer's, Parkinson's and Huntington's diseases, as well as stroke. To address this area of research, LNS comprises 2 sections and 2 units:

- *Cellular and Molecular Neurosciences Section*
- *Drug Design and Development Section*
- *Invertebrate Molecular Genetics Unit*
- *Receptor Pharmacology Unit*

The ongoing work in this laboratory pursues a variety of projects, including oxidative stress and calcium regulation in neuronal cell models, signal transduction scaffolds and their modification by aging and disease, the role of dietary and behavioral factors in aging and age-related neurodegeneration, genetic abnormalities and the pathogenesis of neurodegenerative diseases, stem cell biology and therapy, mechanisms of neuronal cell apoptosis, and drug discovery.

For example, LNS investigators are examining the biochemical and cellular consequences of genetic mutations that cause inherited forms of Alzheimer's and Parkinson's diseases and amyotrophic lateral sclerosis. They are using cell culture and animal models of these diseases to screen drugs and dietary supplements to determine their effectiveness in preventing or slowing the progression of disease. Ongoing work has shown that when rats and mice are maintained on a dietary energy restriction regimen, neurons are more resistant to dysfunction and degeneration in experimental models of neurodegenerative disorders. Other studies by LNS investigators have documented beneficial effects of exercise, and adverse effects of diabetes, on neurogenesis (the production of new neurons from stem cells) and synaptic plasticity.

Recent findings by LNS investigators include: preclinical evidence of a clinical benefit of treatment with the glucagon-like peptide 1 analog exendin-4 in models of neurodegenerative disorders; the establishment of a role for telomerase in regulating neural stem cell fate during brain cell development; genetic data suggesting that the nervous system controls lifespan in the nematode *C. elegans;* evidence that brain-derived neurotrophic factor mediates beneficial effects of dietary restriction on glucose regulation and longevity in mice; evidence that Notch signaling plays an important role in synaptic plasticity related to learning and memory, and in brain injury responses; the involvement of innate immune responses and toll-like receptors in stroke pathogenesis; evidence that abnormalities in the metabolism of membrane lipids called ceramides are involved in neuronal dysfunction and degeneration in Alzheimer's disease; advances in understanding the molecular profiles of embryonic human stem cells and the mechanisms that control their self-renewal and differentiation.

Laboratory of Personality and Cognition (LPC)

The LPC conducts basic and clinical research on individuals in cognitive and personality processes and traits; investigates the influence of age on these variables and their reciprocal influence on health, well-being, and adaptation; and employs longitudinal, experimental, and epidemiological methods in the analysis of psychological and psychosocial issues of aging, including health and illness, predictors of intellectual competence and decline, models of adult personality, and correlates of disease risk factors.

- The *Personality, Stress, and Coping Section* conducts basic and applied research on personality as it relates to aging individuals. Recent work has focused on personality development in adulthood and adolescence, cross-cultural studies of the Five-Factor Model (FFM), and determining the relationship of normal personality traits to psychopathology. This innovative work has contributed to the delineation of the development curve of personality traits backward from adulthood and helped to provide information that bridges the gap with childhood temperament studies. The group's transcultural research has provided important insights into the structure and development of personality traits and the unique expression of traits in specific cultures. In addition, work from this section has underscored the usefulness of lower order personality assessments in the evaluation of anxiety and major depressive disorders.
- The *Cognition Section* conducts studies that attempt to distinguish pathological from healthy, age-related cognitive changes in a broad range of cognitive tasks, including short- and long-term memory, visuo-spatial rotation, and attention and decision tasks. Ongoing research centers on modulators of age-associated cognitive changes, age-associated changes in cognition and risks for Alzheimer's disease, age-associated changes in neuroanatomy and neurophysiology, and the effects of hormone replacement therapy on memory and cognition.

IRP Branches

Clinical Research Branch (CRB)

The CRB is organized into the following components:

- *Office of the Clinical Director*
- *Longitudinal Studies Section*
- *Health Disparities Research Section*
- *Translational Research and Medical Services Section*
- *Clinical Support Section*
- *Clinical Information and Data Management Section*
- *Cytapheresis Unit*

The overall goals of the CRB are: 1) the conduct of major longitudinal studies of aging including the Baltimore Longitudinal Study on Aging (BLSA) and the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) studies; 2) to support and carry out translational research in the major areas of clinical research focus of NIA IRP laboratories, including longitudinal studies and interventional trials with a focus on cardiology, neurology, endocrinology, rheumatology, genetics, and oncology disease areas. In the latter, the Branch: 1) provides the infrastructure needed to promote high-quality clinical research and to ensure patient safety including: protocol review, clinic infrastructure, nursing and physician support, clinical

informatics, data and safety management; 2) monitors and maintains quality assurance of the intramural clinical research program; 3) develops and implements clinical program priorities and allocates clinical resources; 4) integrates the established research themes and projects with clinical relevance from various IRP laboratories and branches; 5) evaluates program effectiveness and represents the IRP in management and scientific decision-making meetings within the Institute; 6) coordinates the credentialing of health care providers within the Institute; 7) coordinates and provides clinical research training for NIA staff and fellows; and 8) develops novel approaches for carrying out translational research in an efficient and cost-effective manner.

Ongoing research projects within the Branch include: 2 large longitudinal studies (BLSA and HANDLS); studies of factors predisposing patients to osteoarthritis and evaluation of muscular changes contributing to disability from this disease; and studies of neuromuscular/strength changes with aging.

The NIA IRP *Cytapheresis Unit* is a part of CRB that conducts cytapheresis on BLSA participants and other normal volunteers, providing important clinical research materials (T cells, B cells, monocytes) to program investigators examining immunosenescence, the role of telomeres in human aging and other age-related research. In addition, the CRB supports all other clinical studies in the areas of cardiology, neurology, endocrinology, genetics, rheumatology and oncology conducted within the NIA IRP through provision of protocol support, pharmacy support, and laboratory support under the Office of the Clinical Director and nursing support under the Clinical Support Section of the Branch.

Research Resources Branch (RRB)

The RRB provides centralized research resources and research support services essential to the productive conduct of biomedical research by the Intramural Research Program. Personnel in the Research Resources Branch represent a wide variety of talents, skills, and expertise for supporting intramural investigators.

The Branch is divided into 6 Sections that focus on particular specialties or types of service:

- *Central Laboratory Services,* which is subdivided into the Bioinformatics Unit, Confocal Microscopy, Gene Expression and Genomics Unit, Flow Cytometry, and Proteomics and Mass Spectrometry.
- *Comparative Medicine,* which includes animal husbandry for a variety of species, producing transgenic and knockout rodents, and the breeding, weaning, and mating of rodents consistent with the genetic model from which they derived.
- *Instrumentation, Design and Fabrication*
- *Network, Computing, and Telephony*
- *Photography and Arts*
- *Statistical and Experimental Design.*

Although the RRB primarily provides research services, Branch scientists also conduct several investigator-initiated projects. These projects include studies on the role of reactive oxygen species in ischemic preconditioning, bioinformatics, developing novel statistical models for survival analyses and predicting disease conditions, array-based technology development, gene expression studies in rodents, humans, and other species, and the identification of novel markers in quiescent murine and nonhuman hematopoietic stem cells.

IRP Independent Sections

Brain Physiology and Metabolism Section (BPMS)

The BPMS seeks to understand brain function and metabolism in aging and disease by studying animal models and human subjects. "Interface" research is conducted with potential clinical applications to provide fundamental information about how the brain works and what happens when it becomes dysfunctional.

Brain Lipid Metabolism and Function In Vivo. Mathematical models and novel methods are developed to examine

the dynamics of brain lipid metabolism, to quantify and image in vivo brain signal transduction and other active processes involving fatty acids and phospholipids in unanesthetized experimental animals and human subjects. We have shown that a brain cascade involving the release of arachidonic acid (a second messenger) from phospholipids, and its conversion to prostaglandins by cyclooxygenase-2, is downregulated by different agents that are used to treat clinical bipolar disorder (e. g., lithium, valproic acid, and carbamazepine) and that this downregulation is due to reduced transcription of an arachidonic acid-specific cytosolic phospholipase A2.

We also have shown that the arachidonic acid cascade is upregulated in animal models of neuroinflammation and excitotoxicity, and that it can be modified by dietary regulation of nutritionally essential polyunsaturated fatty acids, including arachidonic and docosahexaenoic acids. Quantitative autoradiography with pharmacological challenge is employed to characterize signal transduction involving these fatty acids in awake rodent models, in response to pharmacological agents acting at receptors coupled to phospholipase A2, or modulating the release of neurotransmitters. Methods include in vivo pharmacokinetics, radiotracer and chemical analytical techniques applied to brain and plasma lipids, and enzyme chemistry and molecular biology. Basic studies lead to collaborative clinical protocols when using [1-11C] arachidonic or docosahexaenoic acid and positron emission tomography (PET) to quantify human brain polyunsaturated fatty acid metabolism in relation to disease and signal transduction. An independent molecular biology program uses drug-treated and genetic rodent models, as well as cell culture systems, to dissect out the molecular regulation by cyclooxygenase and related enzymes of brain metabolism of arachidonic acid and its eicosanoid metabolites, in models of excitotoxicity and neurodegeneration.

Molecular Dynamics Section (MDS)

The MDS research program has been studying free-radical reactions involving red cells. This includes the oxidative reactions involving free radicals as well as interactions with nitric oxide and nitrite, which may play a role in the transport of nitric oxide to the vasculature.

There are 3 major areas of investigation within MDS. These include:

- Delineating red cell oxidative stress in vitro and in vivo. This is accomplished by using electron paramagnetic resonance and fluorescence to quantitate heme degradation products including rhombic heme and low molecular weight fluorescent products formed in the cell. These products are being used as markers for oxidative stress experienced in vivo.
- Investigating the role of the red cell in the transport of amyloids and their oxidative processes, as well as the interaction of amyloids with endothelial cells and how red cells participate in this interaction. These studies suggest that the red cell may play a role in the pathological responses of amyloids.
- Examining the role of red cell nitric oxide on blood flow through the microcirculation under hypoxic conditions.

Extramural Research

Office of Extramural Activities

The OEA manages NIA's grants and training policies and procedures. The Office has responsibility for oversight of grants and contract administration, scientific review, and committee management functions. The Office serves as primary liaison for NIA with the NIH Office of Extramural Research and with other Institutes that share research interests. It also has primary responsibility for NIA's extramural training programs, career development programs, small business initiatives, and other special programs. The Office handles appeals, as well as scientific integrity and other ethical issues involved in the conduct of research. The OEA organizes meetings of the National Advisory Council on Aging and meetings of related groups. OEA has central responsibility for research training and career development activities at the Institute, including policies related to different mechanisms, eligibility, and initiatives to increase the number of underrepresented students and researchers trained in aging research.

- The *Scientific Review Office* (SRO) of the OEA is responsible for initial peer review of specific research applications assigned to the NIA. These include applications for grants to Centers, for program project initiatives, for scientific meetings, and for training and career development. Members of NIA's 4 review panels that correspond to the Institute's program areas and members of the Institute's special emphasis panels include non-government scientists who are themselves grantees and who are expert in the scientific areas of the applications they review.
- While the SRO interacts with applicants prior to the award of grants, the *Grants and Contracts Management Office* (GCMO) works with scientists and institutional research administrators to issue, manage, and close awards when the research is completed. GCMO staff members provide guidance on administrative and fiscal policies and practices for the investigator and for the institutional research administrators. For example, they address questions about allowable costs and about major changes in staff or content of the research project. The GCMO has legal responsibility for the fiscal management of the Institute's extramural grants and contracts.

External Scientific Review

In support of research, research training, and career development related to aging, the NIA awards grants to universities, hospitals, and research organizations throughout the U.S. and abroad. Approximately 80% of the funds appropriated to the NIA are disbursed through these extramural awards. Competition for this funding is very high. For example, over the past 10 years, NIA was able to fund fewer than 1 in 3 of the research project grant applications it received. To ensure that funded research is of the highest quality and serves the health needs of the nation, peer review committees comprising external scientific experts are brought together to review proposed and ongoing research.

Extramural Grant Review

Extramural research investigators trigger the grant review process by submitting grant applications to the NIH Center for Scientific Review (CSR). Initial review of applications may be assigned to an NIH Center review group or to NIA's initial review committee which handles program project, center, research career, scientific meeting, and institutional training grant applications, as well as applications submitted in response to Requests for Applications (RFAs) issued by NIA.

Applications within NIA's mandate are forwarded to NIA for funding consideration. Whether the applications are reviewed at the Center for Scientific Review or at the NIA, committees of experts, including NIH grantees, assess the significance, approach, and innovation of the proposed research, as well as the qualifications of the investigators and the quality of the institutional resources. Reviewers also assess applications for treatment of animal models, if relevant. For research involving humans, reviewers assess proposed plans for recruiting women and minorities to the studies. The judgment of the group on these parameters is summarized in a report (summary statement) and overall rating (priority score) of the application. These reports are provided to the applicants and to NIA officials. Among the applications assigned to the NIA, approximately the top half, as judged by initial review, are given a second level of review by the National Advisory Council on Aging.

National Advisory Council on Aging (NACA)

Congress created the National Advisory Council on Aging (NACA) to provide advice on programmatic and policy matters; specifically: "to advise, consult with, and make recommendations to the Secretary, HHS, the Assistant Secretary for Health; the Director, NIH; and the Director, NIA; on matters relating to the conduct and support of biomedical, social, and behavioral research, training, health information dissemination, and other programs with respect to the aging process and the diseases and other special problems and needs of the aged."

Grant applications (other than fellowship applications) must receive Council approval to be eligible for funding. In its deliberations, the NACA reviews summary statements to evaluate the fairness and appropriateness of the initial review of grant applications, and considers the scientific and public importance of the proposed work. In cases in which the applicant or NIA staff has concerns about the initial review of the application, NACA members can evaluate these concerns.

Council members also serve as a conduit for insights into the concerns and opinions of the research community, and assist in keeping the scientific community, Congress, and the public knowledgeable about the activities of the NIA. The NACA meets 3 times each year, typically for a period of 2 days, to review applications for grants and cooperative agreements for research and training. The group recommends funding of research applications that show significant promise of improving the quality of life and health care for the aged or making valuable contributions to our scientific knowledge of the aging process.

The NACA consists of 18 members appointed by the HHS Secretary and 5 non-voting *ex officio* members. Of the 18 appointed members, 12 are leading representatives of the health and scientific disciplines and are leaders in the fields of public health and the behavioral or social sciences relevant to the activities of the NIA, particularly with respect to biological and medical sciences relating to aging and public health. Six of the members are leaders from the general public in the fields of public policy, law, health policy, economics, and management. Members are invited to serve for overlapping 4-year terms.

Once the Council provides its recommendations, the NIA Director may approve payment of applications that have been favorably reviewed and for which sufficient funds are available. Primary weight is given to the scientific quality of the application as judged by initial peer review. Consideration is also given to the proposed research's relevance to NIA priorities and to the timeliness of the research.

Biology of Aging Program (BAP)

The BAP supports biomedical studies through various NIH grant mechanisms and contracts. The program plans, implements, and supports fundamental molecular, cellular, and genetic research on the mechanisms of aging. It also supports resource facilities that provide aged animals and cell cultures for use in aging research. The BAP includes the following Programs:

- *Animal Models*. The objective of the Animal Models Program is to identify and develop new animal models, both mammalian and lower organism, for use in aging research. This includes research on rats, mice, birds, fish, rabbits, nonhuman primates, insects, nematodes, and yeast. Mutant and genetically engineered rodent models of both normal aging and specific age-related pathologies are of particular interest.
- *Cardiovascular Biology.* Aging, by itself, contributes to declines in heart and vascular function, and heart failure is the major cause of death in the elderly. Specific scientific investigations supported by this program cover the identification and regulation of underlying molecular and cellular changes that lead to age-related declines in cardiac and vascular function. In addition, the program supports basic research that may open the door to pharmacological interventions and cell-based therapies to relieve symptoms or treat underlying causes of cardiovascular diseases.
- *Cell Structure and Function.*The objectives of this program are to support research on the molecular basis of age-related changes in signal transduction mechanisms; microenvironment—extracellular matrix; replicative senescence/apoptosis/cancer; membranes and membrane receptors; and protein structure and function.
- *Endocrinology.* Hormones secreted by the endocrine system play major roles in informing various organs of the status of other organ systems and in coordinating the functioning of several organ systems. As humans and various animal models age, average serum levels of some of these hormones decline while others rise, changing the overall hormonal milieu of the organism. Also, the sensitivity of some intracellular signaling pathways responsive to endocrine factors change with age, altering tissue response to hormonal signals. The purpose of the Endocrinology Program is to support basic molecular and cellular research into the causes and effects of age-related changes in the endocrine system of humans and various animal models. Areas of investigation in this program include age-related changes in hormone production, metabolism, and action; type 2 diabetes; reproductive aging: biology of menopause and animal models of menopause; age-related changes in control of prostate growth; and endocrine aspects of age-dependent tumors.
- *Genetics.* The objectives of the Genetics Program are to support research on identification and characterization of longevity assurance genes (LAGs) and senescence assurance genes (SAGs); genome stability; telomere biology; genomics; mouse mutagenesis; single nucleotide polymorphisms/genetic epidemiology; and Werner syndrome.

- *Immunology.* Changes in the immune system of older people may contribute to the increased incidence of infection and cancer. Research directed towards understanding the age-related regulation of immune function in health and disease includes regulation of lymphocyte proliferation; regulation of immune specificity; response of immune system to biochemical stimuli; autoimmune disease and other immunopathology; endocrine control of immune function; molecular basis of the age-related decline in immune function; and interventions to retard and/or correct age-related decline in immune function.

- *Metabolic Regulation.* Areas of investigation in the Metabolic Regulation Program include nutrition and metabolism; age-related changes in mitochondrial function/mitochondrial dysfunction; mechanism of lifespan extension by caloric restriction; and generation of free radicals and oxidative stress.

- *Musculoskeletal Biology*. Age-related changes to the function of various physiologic systems often have a negative effect on the health of the elderly. This program supports high-quality basic molecular and cellular research to understand the causes and effects of these changes, thereby encouraging the development of preventative and interventional strategies to extend the health span of the elderly. Areas of investigation in this program include age-related changes in osteoblast and osteoclast function and bone matrix; age-related changes in muscle structure and function; age-related changes in cartilage, connective tissue, and skin; age-related changes in wound healing; molecular mechanisms of the above age-related changes; and molecular basis of osteoporosis and osteoarthritis.

- *Interventions Testing*. NIA supports a multi-institutional study investigating diets and dietary supplements purported to extend lifespan and delay disease and dysfunction. The Intervention Testing Program allows investigators to submit proposals for interventions to be tested for their ability to decelerate aging and extend lifespan in mice. For more information, see: Interventions Testing Program (ITP).

The Biology of Aging Program also includes the ***Biological Resources and Resource Development Branch*.** Because most investigators have neither the facilities nor the resources needed to develop and maintain colonies of aged animals in a barrier facility, the NIA provides support for both rat and mouse colonies for use by the scientific community. NIA partially subsidizes the cost of these animals through contracts. Other NIA resources managed by this Branch include colonies of rhesus macaque monkeys, an aged cell bank, an aged rodent tissue bank, a nonhuman primate tissue bank, and a genetic stock center for nematode mutant strains. For information on these and other resources supported by NIA, see: Scientific Resources.

Behavioral and Social Research Program (BSR)

This program supports basic social and behavioral research and research training on the processes of aging at both the individual and societal level. It focuses on how people change over the adult life course, on the interrelationships between older people and social institutions, and on the societal impact of the changing age-composition of the population. Emphasis is placed upon the dynamic interplay between the aging of individuals and their changing biomedical, social, and physical environments and on multi-level interactions among psychological, physiological, genetic, social, and cultural levels.

BSR supports research, training, and the development of research resources and methodologies to produce a scientific knowledge base for maximizing active life and health expectancy. This knowledge base is required for informed and effective public policy, professional practice, and everyday life. BSR also encourages the translation of behavioral and social research into practical applications.

BSR is administratively organized into 2 branches—the Individual Behavioral Processes Branch and the Population and Social Processes Branch—with substantial interactions between them. A section devoted to Research Resources and Development is housed within the Office of the Director of the BSR Program.

Individual Behavioral Processes Branch supports research and training on biopsychological processes linking health and behavior, emotional and cognitive functioning, and human factors, as well as integrative approaches to the study of social, psychological, genetic, and physiological influences on health and wellbeing over the life course. Vertically integrated studies that run from basic to applied are encouraged, as well as translation in some specific areas. Personality,

affect, and social/interpersonal relationships are investigated as causal variables, and as mediators or moderators of the relation between social/structural and health outcomes. Studies exploring factors that influence aging at a single level are welcomed. The Cognitive Aging Section and the Psychological Development and Integrative Science Section will have some areas of overlap.

- *Behavioral Medicine and Interventions Section* focuses on examining the dynamic interrelationships among aging, health and behavior processes. It expands traditional studies in behavioral medicine by adding an aging perspective as well an emphasis on the influence of the socio-cultural environment on the development and maintenance of a wide range of health and illness behaviors (*e.g.*, healthy lifestyle practices, medical self management, and coping with chronic illnesses and disabilities). Major research topics include: disease recognition, coping, and management, including physiological consequences of life stresses and burdens; social, behavioral, and environmental interventions for health promotion, disease prevention, and disability postponement; and understanding the role that genetic differences play in behavioral responses to treatment and intervention.

- *Cognitive Aging Section* supports research on changes in cognitive functioning over the life course. Studies are encouraged that: 1) examine the influence of contexts (behavioral, social, cultural, and technological) on the cognitive functioning of aging persons; 2) investigate the effects of age-related changes in cognition on activities of daily living, social relationships, and health status, and 3) develop strategies for improving everyday functioning through cognitive interventions. Major research topics include: higher-order cognitive processes (e.g., problem-solving, decision-making), social cognition, memory strategies, perceptual skills and reading and speech comprehension. Research is also welcomed that explores the role of individual differences in cognitive functioning (e.g., motivation, self-efficacy, beliefs about aging, emotions, sensory limitations, experience and expertise, genetic factors). This unit collaborates with the NIA Neuroscience and Neuropsychology of Aging Program to encourage research at the intersection of behavior and neurocognition.

- *Psychological Development and Integrative Science Section* promotes research that applies an integrative approach to the study of health, motivation, social behavior, stress and coping, affect, resilience, and well-being over the life course. Studies are encouraged that combine diverse levels of analysis and examine reciprocal interactions among these levels, as in the areas of social neuroscience, neuroeconomics, behavior genetics, and sociogenomics. Examples include the effects of sociocultural, psychological (socioemotional, motivational), biological and genetic processes on behavioral, social, and functional aging.

- *Population and Social Processes Branch* supports research and training on the causes and consequences of changes in social, demographic, economic, and health characteristics of the older population. Research on the effects of public policies, social institutions and health care settings on the health, wellbeing, and functioning of people is supported—over the life course in their later years and across different levels of analysis from cultural to genetic. International and comparative research is encouraged, as are interconnections with individual behavioral processes. Interdisciplinary and multi-level research is especially promoted.

- *Demography and Epidemiology Section* embraces formal, social, family, medical, and bio-demography. Topics encouraged include studies on: trends in and forecasts of functioning, disability, morbidity, and mortality; age trajectories of health; life expectancy and active life expectancy; causes and consequences of changes in age-structure of population, including implications for caregiving needs; interactions between health and socioeconomic status over time and across generations; the effect on health of social networks and social context; interrelationships between work, family, and health; the intersection between demographic processes and social outcome, including intergenerational relationships; macroeconomic and demographic perspectives on population aging; and cohort analyses of aging. Biodemographic research focusing on demographic aspects of genetic variants, population prevalence, and patterns of alleles and related research is also supported, along with research on genetic epidemiology, population genetics, and the intersection between biology, demography, and epidemiology.

- *Economics of Aging Section* concentrates on the economic analysis of factors that relate to the health and well-being of aging populations. Topics encouraged include: implications of population aging for public and private retirement and health insurance programs and for income security of future retirees; allocation of family resources across generations; determinants of retirement, family labor supply, and saving; consequences of retirement for health and functioning; the relationship among psychological, cognitive and genetic factors affecting economic behaviors; evaluations of the impact of changes in Medicaid, Medicare, and Social Security

policies; health insurance and health care expenditures; interrelationships between health and economic status, including issues related to wealth, poverty, productivity, human capital development, and economic development; the economic costs of disability; and cost-effectiveness of interventions to improve the health and well being of the elderly.

- *Health Services and Systems Section* encourages research on the impact of formal health care and long-term care systems and settings on the health and well-being of older persons. The emphasis is on how older people and their families deal with multiple services, often for multiple conditions, not on the efficacy or effectiveness of treatments for particular conditions. This Section supports research on the long-term care system; health services and health care financing for older people with multiple chronic conditions; hospital-level and regional differences in health expenditures, services, and outcomes for older persons; and U.S. and comparative cross-national studies of the efficiency and effectiveness of health-care systems.
- *Office of Research Resources and Development (ORRD)* coordinates and implements initiatives related to research data and resources. It manages the Health and Retirement Study (HRS), the National Archive of Computerized Data on Aging (NACDA), and all Interagency Agreements. ORRD also serves as the administrative site for the Federal Interagency Forum on Aging-Related Statistics that was established in 1986 to encourage cooperation among federal agencies responsible for the collection, analysis, development, and dissemination of data on the aging population.

Geriatrics and Clinical Gerontology Program (GCG)

The GCG supports research on health and disease in the aged and research on aging over the human lifespan, including its relationships to health outcomes. GCG comprises three major research areas: Geriatrics, Clinical Gerontology, and Clinical Trials. Program-wide emphases include research training and career development to attract new investigators to the field of aging and to further the development of active investigators in clinical medicine and biomedical research, and the application of new technologies to expand opportunities for clinical aging research.

The ***Geriatrics Branch*** focuses on health issues regarding the aged. Research emphases include multifactorial geriatric syndromes such as falls, frailty, and various types of disability; effects of comorbidity and polypharmacy; effects of age-related changes on clinical or functional disease outcomes or treatment responses; effects of physical activity on disease and disability in older persons; and the elucidation, diagnosis, and treatment of previously unappreciated pathologic changes in old age (e.g., sarcopenia, vascular stiffening, diastolic dysfunction). The Geriatrics Branch supports the Claude D. Pepper Older Americans Independence Centers (OAICs). The OAICs conduct basic and clinical research to enhance the ability of older persons to maintain their independence. These centers support research to develop and test interventions to prevent or delay disorders and diseases associated with aging. They also train individuals in research in these areas.

The ***Clinical Gerontology Branch*** focuses on clinically related research on aging changes over the lifespan. Research emphases include healthy aging across the lifespan (including exceptional longevity); protective factors against multiple age-related conditions; determinants of rates of progression of age-related changes that affect disease risk, particularly those for multiple age-related conditions; menopause and mid-life aging changes; translational human research to follow up findings from basic research on aging; long-term effects of current or new interventions that may be administered over a large part of the lifespan; and long-term effects of physical activity throughout the lifespan.

The ***Clinical Trials Branch*** plans and administers clinical trials on age-related issues. Research emphases include interventions to prevent or treat “geriatric syndromes,” disability, and complications of comorbidity or polypharmacy; trials to detect age- or comorbidity-related differences in responses to interventions against conditions found in middle age and old age; interventions for problems associated with menopause and other mid- and late-life changes; interventions that may affect rates of progression of age-related declines in function in early and mid-life; and interventions with protective effects against multiple age-related conditions.

Neuroscience and Neuropsychology of Aging Program (NNA)

This program fosters and supports extramural and collaborative research and training to further the understanding of neural

and behavioral processes associated with the aging brain. Research on dementias of old age—in particular Alzheimer's disease—is one of the program's highest priorities. The Program supports a number of resources and initiatives: The Alzheimer's Disease Centers (http://www.alzheimers.org/adcdir.htm) and the National Alzheimer's Coordinating Center (www.alz.washington.edu/); the National Cell Repository for Alzheimer's Disease, and the associated Alzheimer's Disease Genetics Initiative (http://ncrad.iu.edu/); the Alzheimer's Disease Neuroimaging Initiative (http://www.loni.ucla.edu/ADNI/); the Translational Initiative (PAR-05-021, PAS-05-022); and, along with NINDS and NIMH, the Cognitive and Emotional Health Project (http://trans.nih.gov/CEHP/).

Neurobiology of Aging Branch fosters research on age-related cellular, molecular, and behavioral changes in the structure or function of the nervous system. Studies of neuroimmunology, neurovirology, neuroendocrinology, neuropharmacology, sensory and motor processes, sleep, biorhythmicity, cell death, and neural plasticity are of particular interest.

- *Fundamental Neuroscience Section* supports research at cellular, molecular, and behavioral levels that explore age-related structural and functional changes in brain, including cell death, energy and metabolic changes, synaptic plasticity, neural stem cells, and neurogenesis.
- *Integrative Neurobiology Section* supports research on neural mechanisms underlying age-related changes in endocrine functions; neurodegenerative diseases of aging associated with infectious agents; and central nervous system, neuroendocrine system, and immune system interactions in aging.
- *Sleep and Biological Rhythms Section* focuses on studies of epidemiology, etiology, pathogenesis, diagnosis, treatment, and prevention of sleep disorders of older people; age-related mechanisms underlying sleep-wakefulness cycles and behavioral sequelae in the aged; and biorhythmicity in the aging nervous system.
- *Sensory Processes Section* focuses on mechanisms of normal aging and disease-related alterations in visual, auditory, somatosensory, vestibular, and chemosensory functions, and pain from the level of the gene to the whole organism as well as epidemiological studies of populations.
- *Motor Function Section* supports research on proprioception, postural control, sensory motor integration, vestibular, and movement disorders in aging, including Parkinson's disease.

Dementias of Aging Branch supports studies of etiology, pathophysiology, epidemiology, clinical course/natural history, diagnosis and functional assessment, drug design, drug development and trials, and behavioral management and intervention in the dementias of later life, especially Alzheimer's disease.

- *Population Studies Section* supports research in the epidemiology of cognitive decline, mild cognitive impairment, and Alzheimer's disease including prevalence, incidence, and risk and protective factors and on models for large-area registries for Alzheimer's disease.
- *Clinical Studies Section* supports research on the diagnosis, treatment, and management of patients with cognitive decline or Alzheimer's disease. Research on diagnosis is aimed at the development and evaluation of reliable and valid multidimensional procedures and instruments for diagnosis, progression, and response to treatment. Research in the treatment and management of Alzheimer's disease seeks to develop the knowledge required to interrupt the course of the disorder, to manage its behavioral manifestations, and to ultimately prevent it. Treatment approaches include clinical trials of pharmacologic and other agents and studies of behavioral and environmental interventions. Preclinical drug discovery, development, and animal testing studies are important aspects.
- *Research Centers Section* supports Alzheimer's Disease Research Centers and Alzheimer's Disease Center Core programs, which provide a multifaceted approach to research on Alzheimer's disease, including clinical and other core services, neuropathological evaluation, basic and clinical research, professional and public information, and educational activities. It also supports the National Alzheimer's Coordinating Center and several multi-center collaborative research projects.

Neuropsychology of Aging Branch emphasizes research, including the use of animal models, on the neural and psychological mechanisms underlying age-related changes in basic cognitive processes, including learning, memory, attention, and language. Studies of age-related changes in emotion also are supported. The use of neural modeling and computational neuroscience approaches—and the integration of these approaches—to understanding these structural and dynamic brain changes and adaptations are encouraged.

NIH Almanac: Organization

National Institute on Alcohol Abuse and Alcoholism

Mission | Important Events | Director | Programs

Mission

The mission of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) is to provide leadership in the national effort to reduce alcohol-related problems by:

- Conducting and supporting research in a wide range of scientific areas including genetics, neuroscience, epidemiology, health risks and benefits of alcohol consumption, prevention, and treatment;
- Coordinating and collaborating with other research institutes and Federal Programs on alcohol-related issues;
- Collaborating with international, national, state, and local institutions, organizations, agencies, and programs engaged in alcohol-related work; and
- Translating and disseminating research findings to health care providers, researchers, policymakers, and the public.

The Institute's efforts to fulfill its mission are guided by the NIAAA vision to support and promote, through research and education, the best science on alcohol and health for the benefit of all by:

- Increasing the understanding of normal and abnormal biological functions and behavior relating to alcohol use;
- Improving the diagnosis, prevention, and treatment of alcohol use disorders; and
- Enhancing quality health care.

Research opportunities to increase our understanding of why, how, and when people drink, and why and how some people develop alcohol use disorders, are set forth in the *NIAAA Strategic Plan for Research*. The *Strategic Plan* can be found on the NIAAA Web site: www.niaaa.nih.gov.

Important Events in NIAAA History

December 31, 1970—NIAAA was established under authority of the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment, and Rehabilitation Act of 1970 (Public Law 91-616) with authority to develop and conduct comprehensive health, education, training, research, and planning programs for the prevention and treatment of alcohol abuse and alcoholism.

May 14, 1974—P.L. 93-282 was passed, establishing NIAAA, the National Institute of Mental Health, and National Institute on Drug Abuse (NIDA) as coequal institutes within the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA).

July 26, 1976—NIAAA's research authority was expanded to include behavioral and biomedical etiology of the social and economic consequences of alcohol abuse and alcoholism under authority of the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment, and Rehabilitation Act amendments of 1976 (P.L. 94-371).

August 1981—The Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35) was passed, transferring responsibility and funding for alcoholism treatment services to the states through the creation of an Alcohol, Drug Abuse, and Mental Health Services block grant administered by ADAMHA and strengthening NIAAA's research mission.

October 27, 1986—A new Office for Substance Abuse Prevention in ADAMHA was created through the Anti-Drug Abuse Act of 1986 (P.L. 99-570), which consolidated the remainder of NIAAA's nonresearch prevention activities with those of NIDA and permitted NIAAA's total commitment to provide national stewardship to alcohol research.

1989—NIAAA launched the Collaborative Studies on Genetics of Alcoholism (COGA) with the goal of identifying the specific genes underlying vulnerability to alcoholism as well as collecting clinical, neuropsychological, electrophysiological, and biochemical data, and establishing a repository of immortalized cell lines.

1991—NIAAA began the National Longitudinal Alcohol Epidemiologic Survey, designed to study drinking practices, behaviors, and related problems in the general public.

July 10, 1992—NIAAA became a new NIH research institute under the authority of ADAMHA Reorganization Act (P.L. 102-321).

May 3, 1995—NIAAA celebrated its 25th anniversary.

1996—NIAAA established the Mark Keller Honorary Lecture Series. The series pays tribute to Mark Keller, a pioneer in the field of alcohol research, and features a lecture each year by an outstanding alcohol researcher who has made significant and long-term contributions to our understanding of alcohol's effects on the body and mind. View image.

April 8, 1999—NIAAA organized the first National Alcohol Screening Day, created to provide public education, screening, and referral for treatment when indicated. The program was held at 1,717 sites across the United States, including 499 college sites.

1999—NIAAA co-sponsored the launch of the *Leadership to Keep Children Alcohol Free,* a unique coalition of State Governors' spouses, Federal agencies, and public and private organizations that targets prevention of drinking in young people ages 9- to 15-years old.

April 9, 2002—NIAAA published *A Call to Action: Changing the Culture of Drinking at U.S. Colleges, the Final Report of the Task Force on College Drinking,* which was developed by the Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism as a comprehensive review of research on college drinking and the effectiveness of prevention programs.

June 2004—First publication of the results from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a longitudinal survey that is a representative sample of the United States population with data on alcohol and drug use; alcohol and drug abuse and dependence; and associated psychiatric and other co-occurring disorders.

Biographical Sketch of NIAAA Director Ting-Kai (T.K.) Li, M.D

Dr. Li was appointed NIAAA Director in November 2002. Prior to his appointment, Dr. Li was Distinguished Professor of Medicine, Indiana University School of Medicine, and the Director of the Indiana University School of Medicine Alcohol Research Center.

Born in Nanjing, China, Dr. Li earned his M.D. from Harvard University in 1959 and completed his residency at the Peter Bent Brigham Hospital in Boston, Massachusetts. He went on to conduct research at the Nobel Research Institute and

Karolinska Institute in Stockholm, Sweden.

After serving as Deputy Director of the Department of Biochemistry within the Walter Reed Army Institute of Research, Dr. Li joined the faculty at Indiana University as professor of medicine and biochemistry in 1971. He subsequently was named the school's John B. Hickam Professor of Medicine and Professor of Biochemistry and later Distinguished Professor of Medicine. In 1985 he became director of the Indiana Alcohol Research Center at the Indiana University School of Medicine, where he also was the Associate Dean for Research. In 2003, Dr. Li was awarded an Honorary Doctor of Science Degree by Indiana University.

Dr. Li is the author of more than 400 journal articles and book chapters. His distinguished research career includes advances that have transformed the way alcoholism is understood and the means of investigating alcohol's effects on the body and brain, including the characterization of the structure and dynamics of the multiple genetic variants of alcohol dehydrogenase (ADH), the enzyme that catalyzes the first step in the metabolism of ethanol, and the differences among individuals in ADH-related physiology. Dr. Li also pioneered the development of animal models of alcohol consumption. These animal lines helped cement the once radical notion that alcohol consumption behavior was genetically influenced.

Dr. Li has delivered numerous major scientific addresses and lectureships both nationally and internationally, and is the recipient of many prestigious awards for his scientific accomplishments. These include the Jellinek Award; the James B. Isaacson Award for Research in Chemical Dependency Diseases; the R. Brinkley Smithers Distinguished Science Award; Tharp Award for Research Distinction in Alcoholism; and Presidential Citation, American Psychological Association. In 2006, Dr. Li received the Mark Brothers Lecture award from the Indiana University School of Medicine, which also announced the establishment of an endowed chair in Dr. Li’s name, in honor of his long and distinguished career and his dedication to research and leadership in the advancement of medicine.

Dr. Li is a member of the Institute of Medicine of the National Academies, American Association for the Advancement of Science, American College of Neuropsychopharmacology (Fellow), American Society for Clinical Investigation (Emeritus), and the Association of American Physicians (Emeritus). He is a past member of the National Advisory Council on Alcohol Abuse and Alcoholism and of the Advisory Committee to the Director, National Institutes of Health, and the International Society for Biomedical Research in Alcoholism. In addition, Dr. Li is a past President of the Research Society on Alcoholism and an honorary fellow of the United Kingdom's Society for the Study of Addiction.

NIAAA Directors

Name	In Office from	To
Morris E. Chafitz	1972	September 1, 1975
Ernest P. Noble	February 1976	April 1978
Loran Archer (Acting)	April 1978 November 1981 January 1986	April 1979 July 1982 October 1986
John R. DeLuca	May 1979	October 1981
William E. Mayer (Acting)	August 1982	July 1983
Robert G. Niven	August 1983	December 1985
Enoch Gordis	November 1986	January 2002
Raynard Kington (Acting)	January 2002	November 2002
Ting-Kai Li	November 2002	Present

Organizational Structure—The Office of the Director of NIAAA comprises the following positions and offices: the NIAAA Deputy Director; the Associate Director for Administration; Associate Director for Basic Research; Associate Director for Clinical and Translational Research; the Office of Extramural Activities; the Office of Resource Management; and the Office of Science Policy and Communications.

Programs and Activities

NIAAA conducts and supports research through its Division of Intramural Clinical and Biological Research and through its 4 extramural divisions that provide grants to scientists at leading research institutions across the country. In addition, findings from these research endeavors are made available through a variety of research translation and dissemination programs and activities. More information on NIAAA programs can be found at NIAAA's Web site at http://www.niaaa.nih.gov.

Intramural Research

The overall goal of NIAAA's Division of Intramural Clinical and Biological Research is to understand the mechanisms by which alcohol produces intoxication, dependence, and damage to vital body organs, and to develop tools to prevent and treat those biochemical and behavioral processes. Areas of study include identification and assessment of genetic and environmental risk factors for the development of alcoholism; the effects of alcohol on the central nervous system, including how alcohol modifies brain activity and behavior; metabolic and biochemical effects of alcohol on various organs and systems of the body; noninvasive imaging of the brain structure and activity related to alcohol use; development of animal models of alcoholism; conducting epidemiologic research on alcohol use, abuse, and dependence; and the diagnosis, prevention, and treatment of alcoholism and associated disorders.

NIAAA utilizes a combination of clinical and basic research facilities, which enables a coordinated interaction between basic research findings and clinical applications in pursuit of these goals. A 12-bed inpatient unit and a large outpatient program are located in the NIH Clinical Research Center in Bethesda, Maryland.

NIAAA intramural researchers investigate a number of areas, including:

- genetic studies investigating, identifying, and characterizing genes that contribute to individual susceptibility to alcoholism and alcohol-related behaviors;
- studies seeking a better understanding of the underlying factors of alcoholic liver disease;
- national surveillance activities to collect, analyze, and report epidemiological data on alcohol use, abuse, and dependence, and their associated disabilities;
- behavioral and neurophysiological studies to understand the mechanisms of the motivation to drink; and
- studies to determine how alcohol interacts with nerve cells and the brain's signaling system to improve our understanding of the molecular basis of alcohol dependence and lead to development of treatments and prevention strategies.

Extramural Research

Division of Epidemiology and Prevention Research

NIAAA's Division of Epidemiology and Prevention Research (DEPR) seeks to reduce alcohol-related mortality and morbidity and other alcohol-related problems and consequences through the integration and application of epidemiology and prevention science by setting research priorities; stimulating and supporting research, training, and career development; conducting research and publishing in the scientific literature; promoting dialogue and collaboration between DEPR and other organizations; contributing to alcohol-related surveillance; and disseminating scientific information.

Two major areas of focus for the Division are:
1) the epidemiology of alcohol use and alcohol-related problems, a broad area that includes the study of the following:

- the etiology (investigating the origins and causes, including risk factors and protective factors) and the course of alcohol-related problems, including alcohol use disorders (AUDs);
- relationship of alcohol consumption and AUDs to other diseases and disorders (such as psychiatric comorbidity and alcohol's relationship to diabetes, cardiovascular disease, and other chronic diseases), the potential health benefits of alcohol consumption, and alcohol's relationship to HIV/AIDS and other sexually transmitted diseases;
- alcohol-related consequences (including mortality and morbidity, violence, risky and unprotected sex, compromised academic/vocational achievement, and the economic costs of alcohol);
- the distribution, mediation, and moderation of the above by demographic characteristics;
- alcohol-related health and preventive services; and
- methodology.

2) the prevention of alcohol-related problems, a broad area that includes the study of the following:

- the efficacy and effectiveness of screening and brief interventions, prevention interventions (such as comprehensive/community prevention interventions and drinking-driving countermeasures); and
- the impact of public policy, the media, and alcohol marketing and promotion.

Division of Metabolism and Health Effects

Chronic alcohol use affects every organ and system of the body. It also can lead to medical disorders (e.g., fetal alcohol syndrome, liver disease, cardiomyopathy, and pancreatitis) throughout the lifespan—from early development to adolescence and adulthood—and contribute to the depression of immune and endocrine functions. Heavy alcohol use is also an important factor for co-morbid conditions, such as hepatitis C, osteoporosis, obesity, type 2 diabetes, and certain cancers. NIAAA's Division of Metabolism and Health Effects (DMHE) supports a wide range of research to elucidate the genetic, metabolic, and immunologic mechanisms of alcohol-induced tissue injury that contribute to the initiation and progression of these disorders.

Basic and clinical research studies are identifying the molecular pathways through which alcohol causes organ damage, with the goal of identifying targets for drug discovery to prevent or treat alcohol-related disorders. The potential for tissue repair and regeneration following tissue damage due to chronic heavy drinking is being explored through stem cell therapy, gene targeting, pharmacogenomics, and metabolic manipulations. The role of epigenetic effects of chronic alcohol consumption in tissue damage is another area of study.

Metabolic research in the field of alcohol abuse and alcoholism is accordingly broad in nature, encompassing enzymes, proteins, substrates, substrate adducts, co-factors, vitamins, nucleic acids, sugars, and other metabolites that may be affected by alcohol or alcohol by-products.

Other basic investigations seek to identify biomarkers for the early stages of disease using genomic, proteomic, and metabolomic approaches that will facilitate early identification and treatment before diseases become irreversible. The use of systems biology to study mechanisms of alcohol-induced tissue damage is one of the new endeavors supported by DMHE.

DMHE also supports research to elucidate the mechanism of alcohol's potential beneficial effects, including studies related to cardiovascular disease, diabetes, and certain inflammatory diseases.

Division of Neuroscience and Behavior

The Division of Neuroscience and Behavior promotes research on ways in which neuronal and behavioral systems are influenced by genetic, developmental, and environmental factors in conjunction with alcohol exposure and how these factors

may lead to alcohol abuse and alcoholism. The primary goal is to support investigations into neurobiological processes promoting the initiation and maintenance of drinking, and the subsequent neuroadaptative changes leading to excessive alcohol use. This includes studies to elucidate the basic mechanisms of alcohol action on intracellular signaling pathways, neuronal membrane structure and function, ion channels and receptors, synaptic vesicle release and cycling, transporter systems, and the physiology of neurotransmission. Another goal is to identify and characterize the neurobiological and cognitive consequences of acute, binge, and chronic alcohol exposure. Results from such studies will inform the development of effective preventive and therapeutic interventions.

Areas of particular interest include:

- the consequences of alcohol use during pregnancy that produce fetal alcohol spectrum disorders; and
- the effects of alcohol drinking on the adolescent brain and throughout the lifespan.

The acute and chronic effects of alcohol exposure encompass molecular, genetic, and cellular factors, as well as neural pathways and circuits that mediate behavioral responses such as tolerance, dependence, sensitization, withdrawal, and relapse. Repeated exposure to alcohol results in adaptive changes that underlie behavioral tolerance, dependence, and withdrawal. Research projects focusing on these issues use sustained or episodic alcohol exposure to induce dependence in animal models. Progressive changes in the physiology and pharmacology of membrane proteins result in the development of tolerance and dependence, which sets the stage for withdrawal hyperexcitability and more subtle behavioral changes underlying addiction.

A spectrum of neurotransmitters, receptors, neuromodulators, signal transduction pathways, and gene transcription factors have been implicated in alcohol dependence and craving. The division supports preclinical research incorporating biochemical, physiological, and genetic approaches to identify candidate compounds that can minimize or reverse the actions of alcohol towards its targets. The goals of this program are to test the potential therapeutic efficacy of new and existing compounds and to understand their mechanism of action.

Through its Integrative Neuroscience Initiative on Alcoholism, NIAAA supports a multidisciplinary consortium of institutions conducting research to elucidate the mechanisms underlying the neuroadaptation to alcohol. The initiative integrates neurobiological, behavioral, and molecular genetic research and provides opportunities for collaboration between scientists in the alcohol field and prominent investigators from other research areas.

Division of Treatment and Recovery Research

NIAAA's Division of Treatment and Recovery Research supports research to better understand the natural history of heavy drinking and alcohol use disorders and factors associated with positive change. One priority is to better understand mechanisms of change, both for change occurring naturally as well as within the context of mutual help groups and professional treatment. There is also a need to develop and test models of disease management for chronic alcohol use disorders, especially for people who also have serious medical or mental disorders.

Another priority for NIAAA is to develop medications that diminish the craving for alcohol and reduce risk of relapse. Alcohol dependence is a complex disorder involving many neurotransmitters and neuromodulators. Thus, NIAAA is exploring a range of medications to improve treatment outcomes. Several medications are at various stages of development, ranging from preclinical research to clinical application, for the treatment of alcohol dependence. Health services research is also an important focus for the division. Current priorities include health economics research, research on stigma and help-seeking behavior, and research on implementation of evidence-based practices and quality improvement in treatment settings.

Cross-Institute Program Activity

NIAAA staff across all divisions engage in a number of cross-Institute initiatives that are require inherently broad, transdisciplinary, collaborative approaches. Examples of cross-institute activity include the following:

Research Related to Fetal Alcohol Spectrum Disorders

NIAAA is the lead Federal agency for support of research to determine how alcohol consumption during pregnancy results in adverse consequences for the fetus, the most serious of which is fetal alcohol syndrome. This developmental disorder is characterized by reduced growth; facial abnormalities; and neurological, cognitive, and behavioral impairment. NIAAA chairs the Interagency Coordinating Committee on Fetal Alcohol Syndrome (ICCFAS), created in 1996 in response to an Institute of Medicine report. To learn more about the ICCFAS, see http://www.niaaa.nih.gov/AboutNIAAA/Interagency.

In 2003, NIAAA launched the Collaborative Initiative on Fetal Alcohol Spectrum Disorders (CIFASD), a cooperative agreement program to improve diagnosis and develop effective treatment approaches for the full spectrum of neurological disorders caused by fetal alcohol exposure. CIFASD comprises highly integrated, multidisciplinary research projects at both domestic and international sites.

In 2003, NIAAA and the National Institute on Child Health and Human Development established the Prenatal Alcohol, SIDS, and Stillbirth (PASS) Research Network to determine the underlying causes of sudden infant death syndrome (SIDS) and stillbirth and the role played by prenatal alcohol exposure. The study will prospectively follow 12,000 pregnant women from the Northern Plains and South Africa and their infants to one year of age. The interaction of alcohol with a variety of maternal and fetal factors will be examined.

International Programs

NIAAA has an ongoing program of international collaborative research. Alcohol abuse and alcoholism are global health problems, and collaborative research projects can facilitate improved knowledge and care in this area. Much of the international research cooperation is carried out under formal "letters of intent" that are signed by the NIH and/or NIAAA Director and the heads of public and university medical research centers in foreign countries. For example, NIAAA has an active program of scientific exchange with the French Institut National de la Santè et de la Recherche Mèdicale (INSERM), and in the past 3 years has signed letters of intent to foster research cooperation and scientific exchange with the National Institute on Alcoholism in Japan; the Peking University Institute of Mental Health and the Institute of Nutritional Sciences in Bejing,China; the National Health Research Institute, Taiwan; and most recently, the South Korean Centers for Disease Control and Prevention.

Transdisciplinary Teams

Intramural and Extramural staff participate in several cross-disciplinary Trans-divisional Research Emphasis and Resource Development Teams that focus on the following:

- *Etiology of Risk—Genes and Environment:* An important NIAAA research emphasis is the need to identify genetic and environmental factors that contribute to or protect against alcohol misuse, and how these factors also interact with genetic/biological influences to increase or protect against the risk.
- *Mechanisms of Alcohol Action and Injury:* Alcohol is a leading contributor to morbidity and mortality rates in the United States, a result of the many medical consequences of alcohol misuse, such as liver disease. NIAAA research seeks to clarify alcohol's effects on the body's tissues and organs and to identify how individual variations in alcohol metabolism may promote alcoholism or protect people from it. Such research will help in the development of new therapeutic strategies to prevent or slow the progression of diseases caused by excessive drinking.
- *Mechanisms of Behavior Change*: In treating people with alcohol use disorders, structured interventions can encourage positive change. However, many individuals with alcohol problems also relapse in the absence of a formal intervention. A research priority for NIAAA is to stimulate studies that extend the basic understanding of how and why behavior change occurs in the context of the development and course of drinking and alcohol use disorders.
- *Medications Development:* Efforts to develop medications for alcohol use disorders have expanded rapidly in recent years. However, some patients do not respond to current medications. Developing new medications, learning which patients respond to them, and discovering how to use them in combination with other medications

and in conjunction with behavioral therapies are important steps toward improving treatment outcomes for individuals with alcohol use disorders.

- *Underage Drinking:* Research on the causes, consequences, and prevention of underage drinking is a priority for NIAAA. Such research is done in the context of adolescent development. This transdisciplinary research initiative incorporates collaboration on many levels, including support for The Leadership to Keep Children Alcohol Free, a unique coalition of State Governors' spouses, Federal agencies, and public and private organizations that targets prevention of drinking in young people ages 9- to 15-years old. For more details on NIAAA's research initiative on underage drinking, visit http://www.niaaa.nih.gov/AboutNIAAA/NIAAASponsoredPrograms/underage.htm.

Additional teams focus on developing technology and analysis resources as well as programs for training the next generation of investigators to carry out alcohol-related studies. For example, NIAAA's Alcohol Research Centers Program provides long-term support for interdisciplinary research that focuses on particular aspects of alcohol use disorders and alcohol-related problems. The program encourages outstanding scientists from many disciplines to provide a full range of expertise, approaches, and advanced technologies on aspects of alcohol abuse, alcoholism, or other alcohol-related problems. A complete description of the program with a list of the 15 National Alcohol Research Centers is found on the NIAAA Web site at http://www.niaaa.nih.gov/ResearchInformation/ExtramuralResearch/ResCtrs1198.htm.

Research Dissemination

NIAAA maintains a communications program aimed at informing health care practitioners, researchers, policy makers, and the general public about findings from supported research programs. Examples of communications products include:

- *Helping Patients Who Drink Too Much—A Clinician's Guide*, and other resources for health professionals
- *Alcohol Research & Health*, a quarterly peer-reviewed journal
- the *Alcohol Alert* series, quarterly bulletins on research findings for health professionals
- the *NIAAA Newsletter*, featuring news, events, and new resources
- Public service announcements, videos, posters, brochures, pamphlets, fact sheets, Web pages, and other materials for the general public.
- Online resources—Research findings and resources available on the NIAAA Web site, including special sections such as:
    - www.collegedrinkingprevention.gov, a resource for college students, administrators, and parents featuring information on the health consequences of alcohol misuse, campus alcohol policies, and other resources;
    - www.TheCoolSpot.gov, an interactive site for middle-school students that uses quizzes, games, and graphics to deliver important messages about the risks of underage drinking and ways to resist peer pressure, and now offers lesson plans in a "Teacher and Volunteer Corner";
    - the Alcohol Policy Information System (APIS), an online resource that provides detailed information on a wide variety of alcohol-related policies in the United States at both State and Federal levels; and
    - NIAAA Clinical Trials, Web links where patients and clinicians can find alcohol-related research trials conducted both at the NIH Clinical Center in Bethesda, Maryland, and at NIAAA-supported research centers across the country. These studies are registered with www.clinicaltrials.gov, the NIH public database.

These sites and other resources can be found via NIAAA's main Web site, www.niaaa.nih.gov.

NIH Almanac: Organization

National Institute of Allergy and Infectious Diseases

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Institute of Allergy and Infectious Diseases (NIAID) conducts and supports research to study the causes of allergic, immunologic, and infectious diseases, and to develop better means of preventing, diagnosing, and treating these illnesses.

Following is a brief description of the major areas of investigation.

- *Acquired Immunodeficiency Syndrome (AIDS).* NIAID conducts and supports research on HIV/AIDS from basic research through clinical evaluation of treatment and prevention modalities, including vaccines and topical microbicides. Since the beginning of the epidemic, NIAID's comprehensive research program has been at the forefront in the fight against HIV/AIDS. NIAID supports a broad array of domestic and international HIV/AIDS research programs and collaborates with more than 40 countries through investigator-initiated research grants and multicenter vaccine, therapeutics, microbicide, and prevention clinical research networks. With a number of research programs and initiatives, NIAID is poised to tackle new global research challenges as well as the changing demographics of the HIV/AIDS epidemic.
- *Asthma and Allergic Diseases.* NIAID supports programs to examine the causes, pathogenesis, diagnosis, treatment, and prevention of asthma and allergic diseases. Examples of such programs include the Inner-City Asthma Consortium, the Consortium of Food Allergy Research, and the Asthma and Allergic Diseases Cooperative Research Centers. NIAID runs operates a pediatric allergy clinic at the NIH Clinical Center that serves as a focal point for translational research conducted in collaboration with NIAID intramural laboratories and clinical trials of novel therapies.
- *Biodefense*. To meet the challenges posed by biodefense, NIAID conducts and supports research on basic microbiology of and host response to pathogens as well as development of medical countermeasures for potential agents of bioterrorism and naturally emerging infectious diseases. These countermeasures include (1) rapid, accurate diagnostics for natural and bioengineered microbes; (2) effective antimicrobials, antitoxins, and immunotherapeutics to treat those individuals affected; and (3) prophylactic and post-exposure vaccines. NIAID also supports biodefense and emerging infectious disease research through training programs and enhancement of research infrastructure and capacity, and by providing needed research resources and reagents to the scientific community. Basic research provides the essential underpinnings for the other research areas. The program embraces the concept that bioterrorism and emerging infectious diseases are related public health issues.
- *Radiation Exposure.* In 2004, the HHS Office of Public Health Emergency Preparedness charged NIH with designing and implementing a national research program for the development of medical countermeasures appropriate for civilian use that can be used against radiological and nuclear attack. As the lead institute for research on immune homeostasis and immune reconstitution, NIAID is tasked with developing a robust research program in this area. With the input of government and non-government experts, NIAID has developed the NIH Strategic Plan and Research Agenda for Medical Countermeasures against Radiological and Nuclear Threats (see: http://www.niaid.nih.gov/research/topics/radnuc).
- *Emerging and Re-emerging Infectious Diseases.* New diseases are arising worldwide, and old diseases are re-emerging as infectious agents evolve or spread and as changes occur in ecology, socioeconomic

conditions, and population patterns. NIAID conducts and supports basic research on influenza, severe acute respiratory syndrome (SARS), West Nile virus, malaria, hepatitis C, tuberculosis, and other emerging and re-emerging diseases, as well as translational research to develop new and improved diagnostics, treatments, and vaccines.

- *Enteric Diseases.* Worldwide, diarrheal diseases such as cholera and rotavirus infection are major causes of illness and death in infants and children. In contrast, viral hepatitis in its various forms can cause severe disease in older children and adults, although it produces few symptoms among younger age groups. NIAID conducts and supports basic research on how enteric agents cause illness as well as studies aimed at developing and testing new rapid diagnostics, vaccines, and therapeutics for enteric infections.

- *Genetics and Transplantation.* NIAID's basic immunology and genetics research seeks to define the effects of gene expression on immune function and to determine the manner in which the products of gene expression control the immune response to foreign substances, such as transplanted organs and cells. NIAID supports studies to further develop methods and reagents needed for precise tissue typing to ensure that transplant recipients receive the best-matched donor organs available. Research programs in genetics and transplantation include HLA Region Genetics in Immune-Mediated Diseases, the Genomics of Transplantation, and Clinical Trials in Organ Transplantation.

- *Immune-Mediated Diseases.* NIAID conducts and supports basic, pre-clinical, and clinical research on immune-mediated diseases, including asthma and allergic diseases, autoimmune disorders, primary immunodeficiency diseases, and the rejection of transplanted organs, tissues, and cells. Efforts are underway to evaluate the safety and efficacy of tolerance induction strategies for treating immune-mediated diseases, as well as clinical trials to assess the efficacy of hematopoietic stem cell transplantation for treating severe autoimmune disorders. Programs include the Autoimmunity Centers of Excellence, the Immune Tolerance Network (http://immunetolerance.org), Autoimmune Diseases Prevention Centers, Clinical Trials in Organ Transplantation, the Primary Immunodeficiency Diseases Consortium (http://www.usidnet.org/), and the Clinical Islet Transplantation Consortium. NIAID chairs the NIH Autoimmune Diseases Coordinating Committee (ADCC). In FY 1998, ADCC was established at the request of Congress to increase collaboration among the many NIH Institutes, private groups, and other federal agencies interested in these diseases and to facilitate the development of coordinated research plans. The *ADCC Autoimmune Diseases Research Plan*, which was mandated by the Children's Health Act of 2000 (Public Law 106-310), was presented to Congress in late 2002. In March 2005, the ADCC submitted *Progress in Autoimmune Disease Research*, its third report to Congress.

- *Malaria and Other Tropical Diseases.* Each year, millions of people worldwide are disabled or killed by tropical diseases such as malaria, filariasis, schistosomiasis, leishmaniasis, trypanosomiasis (e.g., Chagas disease and African sleeping sickness), leprosy, and dengue. NIAID supports basic research on the microbes and parasites that cause tropical diseases, as well as the interactions of these organisms with their human hosts and with animal/invertebrate vectors involved in disease transmission. NIAID also supports translational and clinical research to develop new and improved diagnostics, drugs, vaccines, and vector management strategies for tropical diseases. These efforts are conducted by U.S. and foreign investigators receiving Institute support and by NIAID intramural scientists and their collaborators around the world. In addition, the International Centers for Excellence in Research (ICER) program promotes and sustains research programs in developing countries through partnerships with local scientists. The current ICER sites are located in Mali, India, and Uganda. While the ICER program is focused on clinical research in infectious diseases such as malaria and filariasis, each center has the capability to address the research and training needs of greatest relevance to the local population. Clinical research on tropical diseases is largely dependent upon access to populations of patients, vectors, and pathogens/parasites in countries where these diseases are endemic; thus, an important complementary objective of NIAID's program is to strengthen international research capacity through research resources and support, scientific collaborations, and research training.

- *Pathogen Genomics*. NIH is working to sequence the entire genomes of microbial pathogens and invertebrate vectors of infectious diseases. Efforts to sequence pathogen genomes are enabling scientists to identify genes that may lead to potential new vaccine candidates and drug targets so that infectious diseases can be prevented or be accurately diagnosed and treated. Furthermore, knowing a pathogen's genetic sequence will help researchers better understand how mechanisms of pathogenesis and pathogen mutations contribute to drug resistance. In addition to supporting sequencing projects, NIAID provides genomics, bioinformatics, and proteomics resources and tools to the scientific community.

- *Sexually Transmitted Infections (STIs).* More than 15 million Americans each year acquire infectious diseases other than AIDS through sexual contact. STIs such as gonorrhea, syphilis, chlamydia, genital herpes, and human papillomavirus can have devastating consequences, particularly for young adults, pregnant women, and newborn babies. NIAID-supported scientists in STI Cooperative Research Centers, NIAID laboratories, and other research institutions are developing better diagnostic tests, improved treatments, and effective vaccines for STIs.

- *Vaccine Development.* Effective vaccines have contributed enormously to improvements in public health in the United States during the last century. Research conducted and supported by NIAID has led to new or improved vaccines for a variety of serious diseases, including rabies, meningitis, whooping cough, hepatitis A and B, chickenpox, and pneumococcal pneumonia, to name a few. NIAID supports vaccine evaluation units for the clinical testing of new vaccines and vaccine technologies at a number of U.S. medical centers. Many vaccines are currently under development in NIAID labs, including vaccines to prevent AIDS, pandemic influenza, childhood respiratory diseases, dengue, and malaria.

- *Drug Research and Development.* The development of therapies to treat infectious and immunologic diseases is a key component of NIAID's mission. In collaboration with industry, academia, non-profits, and other government agencies, NIAID has established research programs to facilitate drug development, including screening programs to identify compounds with potential for use as therapeutic agents, facilities to conduct preclinical testing of promising drugs, and clinical trials networks to evaluate the safety and efficacy of drugs and therapeutic strategies in humans.

- *Antimicrobial Resistance.* NIAID funds a diverse portfolio of grants and contracts to study antimicrobial resistance in major viral, bacterial, fungal, and parasitic pathogens. Projects include basic research on the disease-causing mechanisms of pathogens, host-pathogen interactions, and the molecular mechanisms responsible for drug resistance, as well as translational research to develop and evaluate new or improved products for disease diagnosis, intervention, and prevention. NIAID supports clinical trials that assess new and existing antimicrobials and new vaccines relevant to drug-resistant infections through NIAID-targeted initiatives and clinical trial networks, which include the Collaborative Antiviral Study Group, the Adult AIDS Clinical Trials Groups, and the Vaccine and Treatment Evaluation Units.

- *Minority and Women's Health.* Some of the diseases studied by NIAID disproportionately affect women and minority populations. The Institute remains committed to the inclusion of minorities and women in every aspect of its scientific agenda, from recruitment of special populations into clinical studies to the conduct of biomedical research by minority researchers. NIAID's Office of Special Populations and Research Training sponsors activities aimed at eliminating the continuing health disparities among these populations. The Office also develops innovative training initiatives to increase the number of minority scientists by supporting undergraduate, graduate, and postgraduate research training in immunologic and infectious diseases. NIAID research results are disseminated to underserved minority communities through the Institute's outreach activities, which have focused to date on AIDS, asthma, and autoimmune diseases.

Important Events in NIAID History

1948—The National Microbiological Institute was established November 1. The Rocky Mountain Laboratory and the Biologics Control Laboratory, both dating to 1902, were incorporated into the new institute, together with the Division of Infectious Diseases and the Division of Tropical Diseases of NIH.

1951—An institute-supported grants program was initiated, and a branch was established to administer research, training, and fellowship grants. Grant applications were reviewed by the National Advisory Health Council until 1956.

1953—The Clinical Research Branch was renamed the Laboratory of Clinical Investigation.

1955—The National Microbiological Institute became the National Institute of Allergy and Infectious Diseases on December 29. The Biologics Control Laboratory was detached from the institute and expanded to division status within NIH.

1956—The first meeting of the National Advisory Allergy and Infectious Diseases Council was held March 7-8.

1957—The Laboratory of Immunology was established in January to meet the growing need for research on the mechanisms of allergy and immunology.

The Middle America Research Unit was established in the Canal Zone jointly by NIAID and the Walter Reed Army Institute of Research as a temporary field station, made permanent in 1961. Important tropical diseases studies were done there for 15 years. NIAID transferred its part of the program to the Gorgas Memorial Institute in 1972.

1959—The Laboratory of Parasitic Diseases was established, formerly a part of the Division of Tropical Diseases.

1962—A collaborative research program funded mainly by contracts was established within the institute to plan, coordinate, and direct nationwide projects on infectious diseases, vaccine development, transplantation immunology, research reagents, and antiviral substances.

1967—The Laboratory of Viral Diseases was established.

1968—With the dissolution of NIH's Office of International Research (OIR) and creation of the Fogarty International Center on July 1, 1968, programs formerly managed by OIR were transferred to NIAID to be administered by the Geographic Medicine Branch. These included the U.S.-Japan Cooperative Medical Science Program—initiated in 1965 by the President and the Japanese Prime Minister to explore the health problems of Asia—and the International Centers for Medical Research and Training, a 1960 congressional initiative to advance the status of U.S. health sciences through international research.

1971—The first 7 Allergic Disease Centers were established to translate basic concepts of the biomedical sciences into clinical investigations.

1974—The first centers for the study of sexually transmitted diseases and of influenza were established.

1977—The NIAID Extramural Research Program was reorganized into 3 areas: Microbiology and Infectious Diseases; Immunology, Allergic and Immunologic Diseases; and Extramural Activities. An intramural Laboratory of Immunogenetics was formed.

1978—The first maximum containment facility (P4) for recombinant DNA research was opened in Frederick, Md. International program project grants and international exploratory/development research grants programs were established. Centers were created for interdisciplinary research on immunologic diseases.

1979—The Office of Recombinant DNA Activities was transferred from the National Institute of General Medical Sciences to NIAID. The International Collaboration in Infectious Diseases Research Program superseded the International Centers for Medical Research and Training established in 1960.

The Rocky Mountain Laboratory was reorganized into the Laboratory of Persistent Viral Diseases, to deal with both host and viral mechanisms leading to slow or persistent viral infections; the Laboratory of Microbial Structure and Function, directed at bacterial diseases, particularly sexually transmitted diseases; and an Epidemiology Branch.

1980—The Laboratory of Immunoregulation was established to provide a means for applying new knowledge in immunology to the clinical diagnosis and treatment of patients with immunological disorders.

1981—The Laboratory of Molecular Microbiology was created to exploit new techniques in recombinant DNA methodology and other molecular studies to expand the institute's interests in both bacterial and viral pathogenesis and virulence.

1984—The Office of Tropical Medicine and International Research (OTMIR) was established to coordinate NIAID's intramural and extramural research activities in tropical medicine and other international research. OTMIR works with other Federal agencies and international organizations active in these areas.

1985—The Laboratory of Immunopathology was established. At Rocky Mountain Laboratories, the Epidemiology Branch was renamed the Laboratory of Pathology.

1986—An Acquired Immunodeficiency Syndrome (AIDS) Program was established in January to coordinate the institute's extramural research efforts in HIV/AIDS.

1987—The Laboratory of Cellular and Molecular Immunology was established.

1988—The Immunology, Allergic and Immunologic Diseases Program was reorganized and renamed the Allergy, Immunology, and Transplantation Program.

The Office of Recombinant DNA Activities transferred from NIAID to the NIH Office of the Director.

1989—NIAID's programs became divisions: Intramural Research; Microbiology and Infectious Diseases; Allergy, Immunology, and Transplantation; Acquired Immunodeficiency Syndrome; and Extramural Activities.

1990—At Rocky Mountain Laboratories, a section of the Laboratory of Microbial Structure and Function became the Laboratory of Intracellular Parasites. The name of the Laboratory of Pathobiology was changed to the Laboratory of Vectors and Pathogens.

1991—The Laboratory of Host Defenses was established.

1994—The Laboratory of Allergic Diseases was established.

The Office of Research on Minority and Women's Health was created.

At Rocky Mountain Laboratories, the Laboratory of Vectors and Pathogens was renamed the Microscopy Branch.

1999—The Dale and Betty Bumpers Vaccine Research Center was launched—a research program jointly funded by NIAID, NCI, and the NIH Office of AIDS Research.

2000—The Children's Health Act of 2000 (P.L. 106-310) codified the NIH Autoimmune Diseases Coordinating Committee in law. ADCC is chaired by NIAID.

2001—Malaria Vaccine Development Unit was dedicated.

2002—Laboratory of Parasitic Diseases was reorganized; Laboratory of Malaria and Vector Research was established.

The Office of Biodefense Research Affairs was established within the Division of Microbiology and Infectious Diseases (DMID) to coordinate the planning, implementation, and evaluation of DMID-wide biodefense research.

NIAID awarded its first Partnership grants to support collaboration between private industry, academia, and government to accomplish critical infectious disease and biodefense research goals.

2003—NIAID established an intellectual and physical infrastructure for biodefense research through awards to support National and Regional Biocontainment Laboratories (NBLs and RBLs) and Regional Centers of Excellence (RCEs) for Biodefense and Emerging Infectious Diseases.

2004—The Laboratory of Molecular Immunology was established.

2005—The Laboratory of Zoonotic Pathogens was established.

The Laboratory of Bacterial Diseases was established.

NIAID made its first awards using authorities granted under Project Bioshield legislation to support development of new therapeutics and vaccines against some of the most deadly agents of bioterrorism including anthrax, botulinum toxin, Ebola virus, pneumonic plague, smallpox, and tularemia.

2006—The Division of Clinical Research was established.

The Laboratory of Virology was established.

The C.W. Bill Young Center for Biodefense and Emerging Infectious Diseases (Building 33) was launched to carry out NIAID's mission in emerging infectious disease research, including the development of medical countermeasures for biodefense.

NIAID Legislative Chronology

November 1, 1948—The National Microbiological Institute was established under authority of section 202 of the Public Health Service (PHS) Act, as implemented by General Circular No. 55, Organization Order No. 20, dated October 8, 1948.

December 29, 1955—NIAID was established (replacing the National Microbiological Institute) under authority of the Omnibus Medical Research Act (P.L. 81-692, 64 Stat. L. 443) as implemented by PHS Briefing Memorandum of November 4, 1955, from the Surgeon General to the Secretary of Health, Education, and Welfare.

November 4, 1988—NIAID was provided with additional authorities under title II of the Health Omnibus Programs Extension Act of 1988 (P.L. 100-607), the first major law to address AIDS research, information, education, and prevention.

August 14, 1991—The PHS act (P.L. 102-96), the "Terry Beirn Community Based AIDS Research Initiative Act of 1991" reauthorized NIAID's Community Programs for Clinical Research on AIDS (CPCRA) for another 5 years.

June 10, 1993—The PHS act was amended by P.L. 103-43, the National Institutes of Health Revitalization Act of 1993. This comprehensive legislation required NIAID to include research on tropical diseases in its mission statement and directed the U.S. Secretary of Health and Human Services (HHS) to ensure that individuals with expertise in chronic fatigue syndrome or neuromuscular diseases are appointed to appropriate NIH advisory committees.

December 14, 1993—The Preventive Health Amendments of 1993 were passed, which included provisions requiring the Director of NIAID to conduct or support research and research training regarding the cause, early detection, prevention,

and treatment of tuberculosis. (The institute already had authority to conduct such research under its authorities in Title IV, PHS act.)

October 7, 1998—Rep. Anne Northup (Ky.), on behalf of herself and Rep. Bill Young (Fla.), introduced H.C.R. 335, a resolution recognizing NIAID's 50th anniversary. On October 9, Sen. Richard Durbin (Ill.), on behalf of himself and Sen. Connie Mack (Fla.), introduced a companion measure, S.C.R. 127. Both pieces of legislation were submitted to "demonstrate the support of the U.S. Congress for the NIAID, the NIH and all of the dedicated professionals who have devoted their lives to improving the quality of the Nation's health."

October 17, 2000—The Children's Health Act (P.L. 106-310) required the Directors of NIAID and the National Institute of Arthritis and Musculoskeletal and Skin Diseases to expand and intensify the activities of their Institutes with respect to research and related activities concerning juvenile arthritis and related conditions.

November 13, 2000—The Public Health Improvement Act (P.L. 106-505) authorized the NIAID Director to establish a program of clinical research and training awards for sexually transmitted diseases.

July 21, 2004—The Project BioShield Act (P.L. 108-276) authorized the NIAID Director to provide grants for the modernization and construction of biomedical and behavioral research facilities and increased the Federal share of such NIAID-funded projects. The law also authorized the HHS Secretary to employ other procedures to respond to pressing needs in the research and development of countermeasures against biological, chemical, radiological, and nuclear threats, including expediting peer review procedures in certain instances, contracting with experts or consultants, and appointing professional and technical employees to positions at NIH.

Biographical Sketch of NIAID Director Anthony S. Fauci, M.D.

Anthony S. Fauci, M.D., became the Director of NIAID in 1984. He received his undergraduate degree from Holy Cross College in 1962 and his medical degree from Cornell University Medical College in 1966. He completed his internship and residency at The New York Hospital Cornell Medical Center and joined NIAID in 1968 as a clinical associate in the Laboratory of Clinical Investigation. In 1980, Dr. Fauci became Chief of the Laboratory of Immunoregulation, a post he continues to hold. Dr. Fauci serves as one of the key advisors to the White House and Department of Health and Human Services on global AIDS issues, and on initiatives to bolster medical and public health preparedness against emerging infectious disease threats such as pandemic influenza.

Dr. Fauci has made many contributions to basic and clinical research on the pathogenesis and treatment of immune-mediated and infectious diseases, including human immunodeficiency virus (HIV) disease. In 2003, an Institute for Scientific Information study indicated that in the 20-year period from 1983 to 2002, Dr. Fauci was the 13th most-cited scientist among the 2.5 to 3 million authors in all disciplines throughout the world who published articles in scientific journals during that time frame. Dr. Fauci was the world's 10th most-cited HIV/AIDS researcher in the period 1996 to 2006.

Dr. Fauci has received 31 honorary doctorate degrees from universities in the United States and abroad, as well as the National Medal of Science, the Mary Woodard Lasker Award for Public Service, and other major awards. A member of the National Academy of Sciences and many other professional organizations, Dr. Fauci is the author, coauthor, or editor of more than 1,100 scientific publications, including several textbooks.

Directors of NIAID

Name	In Office from	To
Victor H. Haas	November 1, 1948	April 1957

Justin M. Andrews	April 1957	October 1, 1964
Dorland J. Davis	October 1, 1964	August 1975
Richard M. Krause	August 1975	July 1984
Anthony S. Fauci	November 1984	Present

Research Programs

NIAID is composed of 7 research divisions: the Division of Acquired Immunodeficiency Syndrome; the Division of Allergy, Immunology, and Transplantation; the Division of Clinical Research; the Division of Extramural Activities; the Division of Intramural Research; the Division of Microbiology and Infectious Diseases; and the Dale and Betty Bumpers Vaccine Research Center. NIAID scientists conduct intramural research in laboratories located in Bethesda, Rockville, and Frederick, Maryland, and in Hamilton, Montana. More information on NIAID programs, committees, and initiatives can be found on NIAID's web site at www.niaid.nih.gov.

Division of Acquired Immunodeficiency Syndrome

The Division of Acquired Immunodeficiency Syndrome (DAIDS) was formed in 1986 to develop and implement the national research agenda to address the HIV/AIDS epidemic. Today, with the ever-changing demographics of the epidemic, DAIDS is expanding its focus to a more global research agenda with an emphasis on an integrated prevention and therapeutics agenda. The mission of DAIDS is to help ensure an end to the HIV/AIDS epidemic. DAIDS accomplishes its mission through planning, implementing, managing, and evaluating programs in (1) fundamental basic research; (2) discovery, development, and optimization of therapies and treatment strategies for HIV infection and its complications and co-infections; and (3) discovery and development of preventive vaccines, topical microbicides, and other biomedical prevention strategies. *Carl W. Diffenbach, Ph.D. Director*.

Division of Allergy, Immunology, and Transplantation

The Division of Allergy, Immunology, and Transplantation (DAIT) promotes and supports a broad range of research that seeks to further our understanding of the immune mechanisms underlying immune-mediated diseases and translating this basic knowledge to clinical applications that will benefit individuals affected by these diseases. DAIT supports preclinical and clinical development of new tolerogenic and immunomodulatory approaches for the treatment and prevention of many immune-mediated diseases, and is the lead NIH component for research on transplantation. The ultimate goal of DAIT's research program is the development of effective approaches for the treatment and prevention of immune-mediated diseases. *Daniel Rotrosen, M.D., Director*.

Division of Clinical Research

The Division of Clinical Research (DCR) plays an integral role in facilitating the efficient and effective performance of NIAID research programs on both the domestic and the international level. This is accomplished through a multi-faceted approach to the provision and support of services vital to the research infrastructure that include oversight and management of intramural clinical research, program planning and management, regulatory monitoring and compliance, statistical consultation and research methodology, and clinical research capacity building. *H. Clifford Lane, M.D., Director.*

Division of Extramural Activities

The Division of Extramural Activities (DEA) serves NIAID's extramural research community and the Institute in several key areas: overseeing policy and management for grants and contracts; managing NIAID's research training, small business,

and international programs; and conducting initial peer review for funding mechanisms with Institute-specific needs. In addition to providing broad policy guidance to Institute management, DEA also oversees all of NIAID's chartered committees, including the National Advisory Allergy and Infectious Diseases Council; disseminates information to its extramural community through its large Internet site; and develops extramural staff training and communications through the NIAID intranet. *Marvin Kalt, Ph.D.*, *Director*.

Division of Intramural Research

The Division of Intramural Research (DIR) is composed of 20 laboratories and 4 branches that conduct biomedical research programs covering a wide range of disciplines relating to immunology, allergy, and infectious diseases. This includes the subdisciplines of virology, microbiology, biochemistry, parasitology, epidemiology, mycology, molecular biology, immunology, immunopathology, and immunogenetics. In addition, DIR supports a large clinical effort to conduct patient-centered research in allergy, immunology, and infectious diseases. *Kathryn C. Zoon, Ph.D., Director*.

Division of Microbiology and Infectious Diseases

The Division of Microbiology and Infectious Diseases (DMID) supports extramural research to control and prevent diseases caused by virtually all human infectious agents, including bacterial, viral, parasitic, and prion diseases, but not HIV. DMID supports a wide variety of projects spanning the spectrum from basic biology of human pathogens and their interaction with human hosts, through translational and clinical research toward the development of new and improved diagnostics, drugs, and vaccines for infectious diseases. DMID's Biodefense Research Program supports basic research on organisms on the NIAID Category A to C list of priority pathogens for biodefense and emerging infectious diseases, as well as translational and clinical research to develop medical countermeasures for diseases caused by these agents. *Carole A. Heilman, Ph.D., Director*.

Dale and Betty Bumpers Vaccine Research Center

The Vaccine Research Center (VRC) conducts research that facilitates the development of effective vaccines for human disease. The primary focus of activities at the VRC is the development of an effective HIV/AIDS vaccine. In addition to its work on HIV, the VRC has expanded the scope of its activities to include research on developing improved smallpox vaccines; effective vaccines for Ebola and other viral hemorrhagic fevers; vaccines for West Nile virus and for SARS (severe acute respiratory syndrome)-associated coronavirus; and improved influenza vaccines protective against both seasonal influenza and avian influenza strains with the potential for pandemic outbreaks. Goals of the VRC include (1) determining whether a T-cell based vaccine can protect against acquisition of HIV-1 infection or delay disease progression; (2) developing an HIV-1 vaccine candidate that elicits neutralizing antibodies to circulating viral isolates and advancing such a vaccine into clinical trials; (3) identifying improved T-cell vaccines that optimize HIV-1-specific immunity and are independent of anti-vector immunity; and (4) advancing vaccine candidates into efficacy trials for Ebola, Marburg, and influenza viruses. *Gary Nabel, M.D., Ph.D., Director*.

NIH Almanac: Organization

National Institute of Arthritis and Musculoskeletal and Skin Diseases

Mission | Important Events | Legislative Chronology | Director | Programs

Until May 19, 1972, the National Institute of Arthritis and Metabolic Diseases; until June 23, 1981, the National Institute of Arthritis, Metabolism, and Digestive Diseases; until April 8, 1986, the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases.

Mission

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) was established in 1986. The mission of NIAMS is to support research into the causes, treatment, and prevention of arthritis and musculoskeletal and skin diseases; the training of basic and clinical scientists to carry out this research; and the dissemination of information on research progress in these diseases.

The Institute also conducts and supports basic research on the normal structure and function of joints, muscles, bones, and skin. Basic research involves a wide variety of scientific disciplines, including immunology, genetics, molecular biology, structural biology, biochemistry, physiology, virology, and pharmacology. Clinical research includes rheumatology, orthopaedics, dermatology, metabolic bone diseases, heritable disorders of bone and cartilage, inherited and inflammatory muscle diseases, and sports and rehabilitation medicine.

Important Events in NIAMS History

November 20, 1985—The Health Research Extension Act of 1985 (P.L. 99-158) authorized the establishment of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS).

April 8, 1986—NIAMS was established.

February 18, 1987—The first meeting of the National Arthritis and Musculoskeletal and Skin Diseases Advisory Council was held.

April 15, 1996—NIAMS held a 10th anniversary symposium: "Progress and Promise in Chronic Disease."

April 2006—NIAMS celebrated its 20th anniversary.

NIAMS Legislative Chronology

August 1950—An arthritis program was established within the National Institute of Arthritis and Metabolic Diseases under Public Law 81-692.

May 1972—P.L. 92-305 renamed the Institute the National Institute of Arthritis, Metabolism, and Digestive Diseases.

1973—Senator Alan Cranston introduced legislation that would eventually lead to the National Arthritis Act. Companion legislation was introduced in the House by Congressman Paul Rogers.

January 1975—The National Arthritis Act (P.L. 93-640) established the National Commission on Arthritis and Related Musculoskeletal Diseases to study the problem of arthritis in depth and to develop an arthritis plan. The act also established the position of associate director for arthritis and related musculoskeletal diseases and authorized an interagency arthritis coordinating committee; community demonstration project grants; an arthritis data bank; an information clearinghouse; and comprehensive centers for research, diagnosis, treatment, rehabilitation, and education.

April 1976—After a year of study and public hearings, the commission issued a comprehensive plan aimed at diminishing the physical, economic, and psychosocial effects of arthritis and musculoskeletal diseases. It laid the groundwork for a national program encompassing research, research training, education, and patient care.

October 1976—The Arthritis, Diabetes, and Digestive Diseases Amendments of 1976 (P.L. 94-562) established the National Arthritis Advisory Board to review and evaluate the implementation of the Arthritis Plan, prepared in response to the National Arthritis Act (P.L. 93-640).

December 1980—P.L. 96-538 changed the name of the Institute to the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases. 1982—The U.S. Department of Health and Human Services (HHS) conferred bureau status on the Institute, resulting in creation of the Division of Arthritis, Musculoskeletal, and Skin Diseases and the appointment of a division director.

November 1985—The Health Research Extension Act of 1985, P.L. 99-158, established the National Institute of Arthritis and Musculoskeletal and Skin Diseases to bring increased emphasis to research on these disorders. The legislation provided for the development of a plan for a national arthritis and musculoskeletal diseases program, and establishment of 2 interagency coordinating committees, one on arthritis and musculoskeletal diseases and one on skin diseases. It also expanded the activities of the National Arthritis Advisory Board to include musculoskeletal and skin diseases.

September 1993—The NIH Revitalization Act of 1993 (P.L. 103-43) called on NIAMS to establish "an information clearinghouse on osteoporosis and related bone disorders to facilitate and enhance knowledge and understanding on the part of health professionals, patients, and the public through the effective dissemination of information."

October 2000—The Children's Health Act of 2000 (P.L. 106-310) called on NIAMS to expand and intensify research programs on juvenile arthritis and related conditions, in coordination with other NIH Institutes and the Arthritis and Musculoskeletal Diseases Interagency Coordinating Committee. Further language stipulated that the Institute's current information clearinghouse include resources on juvenile arthritis and associated conditions.

November 2000—The Lupus Research and Care Amendments of 2000, which passed as part of the Public Health Improvement Act (P.L. 106-505), required NIAMS to expand and intensify research and related activities regarding lupus, and to coordinate such efforts with other NIH Institutes, as appropriate. Among other provisions, the bill called for information and education programs for health professionals and the public.

December 2001—The Muscular Dystrophy Community Assistance, Research, and Education Amendments of 2001, or the MD-CARE Act (P.L. 107-84), called on several components of NIH, including NIAMS, to enhance research on muscular dystrophy, including establishing Centers of Excellence.

February 2003—The Office of the Secretary, HHS, was called on to establish a Federal working group on lupus for the purpose of exchanging information and coordinating Federal efforts regarding lupus research and education initiatives (P.L. 108-7, Omnibus Appropriations Act for FY 2003). NIAMS, as the lead institute at the NIH for lupus research, was asked to lead this Federal working group. The group is comprised of representatives from all relevant HHS agencies and other Federal departments having an interest in lupus.

Biographical Sketch of NIAMS Director Stephen I. Katz, M.D., Ph.D.

Dr. Katz earned a B.A. degree cum laude in history from the University of Maryland, College Park; an M.D. degree cum laude from Tulane University Medical School, New Orleans, LA; and a Ph.D. degree in immunology from the University of London, England. He completed a medical internship at Los Angeles County Hospital, CA; a residency in dermatology at the University of Miami School of Medicine, FL; military service at Walter Reed General Hospital in Washington, DC; and postdoctoral work at the Royal College of Surgeons of England.

In 1974 he joined the National Institutes of Health (NIH) as a senior investigator in the Dermatology Branch of the National Cancer Institute (NCI), becoming acting chief in 1977 and chief from 1980 to 2001. He is still an active senior investigator. From 1989 to 1995, he also served as Marion B. Sulzberger professor of dermatology at the Uniformed Services University of the Health Sciences in Bethesda, MD. On August 1, 1995, he was appointed Director of NIAMS.

Dr. Katz's studies of Langerhans cells and epidermally derived cytokines have demonstrated that skin is a critical component of the immune system both in its normal function and as a target in immunologically mediated diseases. He has also made seminal discoveries in the field of inherited and acquired blistering skin diseases.

At NCI, he led a program of investigations in fundamental biological and clinical problems in neoplastic and inflammatory diseases of the skin. He has trained a large number of immunodermatologists from the United States and abroad. These individuals are now leading their own independent research programs.

Dr. Katz has received many Government- and private-sector honors and awards, including the Lifetime Achievement Award from the American Skin Association, the Presidential Distinguished Rank Award, Presidential Executive Meritorious Rank Award, Public Health Service Superior Service Award, NIH Director's Award, Sulzberger Lecture Award from the American Academy of Dermatology, Martin Carter Mentor Award from the American Skin Association, Alfred Marchionini Gold Medal, Outstanding Alumnus Award of Tulane University School of Medicine, Stephen Rothman Memorial Award of the Society for Investigative Dermatology (SID), Inflammatory Skin Disorders Research Award, Scleroderma Foundation's Messenger of Hope Award, honorary membership in many international dermatologic societies, and election into the Institute of Medicine of the National Academy of Sciences.

He has served many scientific organizations in leadership positions such as president of SID, membership on the board of directors of SID and of the Association of Professors of Dermatology, secretary-general of the World Congress of Dermatology, and secretary-treasurer of the Clinical Immunology Society. In addition, he was named president of the International League of Dermatological Societies in 1997, for a 5-year term.

Dr. Katz has also served on the editorial boards of most clinical and investigative dermatology journals and many immunology journals. He has authored or coauthored more than 200 scientific articles and 60 book chapters and edited several conference proceedings and books.

NIAMS Directors

Name	In Office from	To
Lawrence E. Shulman	April 1986	October 1994
Michael D. Lockshin (Acting)	November 1994	July 1995
Stephen I. Katz	August 1995	Present

Research Programs

NIAMS supports a multidisciplinary program of basic, clinical, and translational investigations; epidemiologic research; research centers; and research training for scientists within its own facilities as well as grantees at universities and medical schools nationwide. It also supports the dissemination of research results and information through the National Institute of Arthritis and Musculoskeletal and Skin Diseases Information Clearinghouse and through the NIH Osteoporosis and Related Bone Diseases~National Resource Center.

The *NIAMS Extramural Program* supports research via grants and contracts in 2 Divisions: the Division of Skin and Rheumatic Diseases and the Division of Musculoskeletal Diseases. A wide array of basic, translational, and clinical research and research training in the fields of rheumatology, muscle biology, orthopaedics, bone and mineral metabolism, and dermatology is being pursued through these programs.

The *Intramural Research Program* of NIAMS conducts innovative basic, translational, and clinical research relevant to the health concerns of the Institute and provides training for investigators interested in careers in these areas. The ultimate goals are: 1) to provide new insights into the normal function of bones, joints, skin, and muscles and diseases that affect them; and 2) to generate a cadre of well-trained investigators to continue toward a complete understanding of these structures and the disease conditions that affect them adversely.

Extramural Research Program

Known as "extramural" research, most funding for NIAMS supports investigators involved in a wide spectrum of basic, clinical, epidemiologic, training, and other programs in universities, medical schools, and academic health centers. Research in the NIAMS Extramural Program's 2 Divisions—the Division of Skin and Rheumatic Diseases and the Division of Musculoskeletal Diseases—is conducted as follows:

Division of Skin and Rheumatic Diseases

The mission of this Division is to promote and support basic, translational, and clinical studies of the skin in normal and disease states; and research leading to prevention, diagnosis, and cure of rheumatic and related diseases. Research is managed under 2 main areas:

Arthritis and Rheumatic Diseases. The overall goals of the programs in this area are to advance high-quality basic, translational, and clinical biomedical and biopsychosocial research to treat, cure, and prevent arthritis and rheumatic diseases. This includes work that advances the understanding of the natural history of these disorders, as well as mechanisms of disease susceptibility and development. The programs support research in rheumatoid arthritis; adjuvant and chemically induced inflammatory arthritis; systemic lupus erythematosus; systemic scleroderma; spondyloarthropathies; dermatomyositis and myositis; vasculitis; fibromyalgia; juvenile arthritis and general autoimmunity; the basic biology of cartilage and related diseases (such as osteoarthritis) and heritable disorders of connective tissue (such as Marfan's syndrome); gout; Lyme disease; and infection-related arthritis. An important dimension of these programs involves taking advantage of new insights in the fields of genetics, genomics, proteomics, and imaging related to arthritis and rheumatic diseases. NIAMS is committed to pursuing new opportunities that identify risk factors for these disorders, enhance disease prediction, and advance prevention strategies.

Skin Biology and Diseases. The programs in these areas support a broad portfolio of basic and translational research in skin. These efforts include work on the developmental and molecular biology of skin, the study of skin as an immune organ, and the genetics of skin diseases. Areas of particular emphasis include: investigations of stem cells found in skin; metabolic studies of skin, such as the effects of hormones and interactions with enzymes; and immunologically mediated cutaneous disorders, such as atopic dermatitis, contact dermatitis, and vasculitis. Research is underway to better understand keratinizing disorders such as psoriasis and ichthyosis; disorders of pigmentation such as vitiligo; and bullous diseases such as pemphigus, pemphigoid, and epidermolysis bullosa. Other studies encompass acne and the physiologic

activity of the sebaceous glands, as well as disorders of the hair, such as alopecia areata. Tremendous opportunities exist in the field of skin diseases research, from work toward a deeper understanding of the basic biology of skin, to new approaches for developing artificial skin, to advances in imaging technologies for diagnosis and tracking of skin disease progression. NIAMS is committed to pursuing these and other avenues of research to improve health outcomes for patients with skin diseases.

Division of Musculoskeletal Diseases

The musculoskeletal system is comprised of the skeleton, which provides mechanical support and determines shape; the muscles, which power movement; and connective tissues such as tendon and ligament, which hold the other components together. The cartilage surfaces of joints and the intervertebral discs of the spine allow for movement and flexibility.

The Division of Musculoskeletal Diseases supports research aimed at improving the diagnosis, treatment, and prevention of diseases and injuries of the musculoskeletal system and its component tissues. Key public health problems addressed by this research include osteoporosis, osteoarthritis, and muscular dystrophy. Research is conducted at every level, from fundamental biology to clinical intervention. Research is managed under 3 main areas:

Bone Biology and Diseases. The programs in these areas cover a broad spectrum of research to better understand genetic and cellular mechanisms involved in the buildup and breakdown of bone. Research areas include: regulation of bone remodeling; mechanisms of bone formation, bone resorption, and mineralization; and effects of hormones, growth factors, and cytokines on bone cells. The programs emphasize the application of fundamental knowledge of bone cell biology to the development of drug and gene therapies for bone diseases, especially osteoporosis. This program area supports several large epidemiologic cohorts for the characterization of the natural history of osteoporosis and for the identification of genetic and environmental risk factors that contribute to bone disease. Like other cohort studies supported by NIAMS, the ultimate goals are to contribute to the development of better diagnostic tools, treatments, and prevention strategies.

Muscle Biology and Diseases. The programs in these areas support a wide range of basic, translational, and clinical research projects in skeletal muscle biology and diseases. They focus on the fundamental biology of muscle development, physiology, and muscle imaging. Particular interests include the basic biology of satellite and muscle stem cells, excitation-contraction coupling, muscle metabolism, and adaptation of muscle to exercise. The programs address a need for translational research to develop discoveries that enhance treatment and improve management of muscle and musculoskeletal diseases and disorders. The overarching objective is to advance the understanding of—and ultimately prevent and treat—muscular dystrophies, inflammatory myopathies, muscle ion channel diseases, and muscle disorders such as disuse atrophy and age-related loss of muscle mass.

Musculoskeletal Biology and Diseases. The programs in these areas focus on understanding the fundamental biology of tissues that constitute the musculoskeletal system, and on translating and applying this knowledge to a variety of diseases and conditions. Research includes the study of the causes and treatment of acute and chronic injuries—including carpal tunnel syndrome, repetitive stress injury, and low back pain—and clinical and epidemiological studies of osteoarthritis. The programs support the development of new technologies such as methods for imaging bone and cartilage to improve the diagnosis and treatment of skeletal disorders, or to facilitate the repair of damage caused by trauma to otherwise healthy musculoskeletal tissue. Therapeutic approaches of interest in the programs include drugs, nutritional interventions, joint replacement (including biomaterials and implant science), bone and cartilage transplantation, and gene therapy. Tissue engineering, regenerative medicine, sports medicine, and musculoskeletal fitness are areas of special emphasis.

Intramural Research Program

The NIAMS Intramural Research Program (IRP) consists of 11 main components: Office of the Clinical Director, Office of Science and Technology, Arthritis and Rheumatism Branch, Autoimmunity Branch, Cartilage Biology and Orthopaedics Branch, Genetics and Genomics Branch, Molecular Immunology and Inflammation Branch, Laboratory of Muscle Biology, Laboratory of Skin Biology, Laboratory of Structural Biology Research, and Protein Expression Laboratory.

The **Office of the Clinical Director** implements innovative clinical research programs that relate to the broad field of rheumatologic, musculoskeletal, and skin disorders. Through specific programs in translational research, rheumatology fellowship training, and health partnerships, the Office of the Clinical Director plays an important role in establishing innovative therapeutic paradigms, in providing medical education in the field of rheumatology, and in reaching out to the community to reduce health care disparities and to improve the understanding of rheumatic and related diseases.

- *Translational Research Program.* The Bridge Between Basic Research and Clinical Disease. A goal of clinical investigation is to bridge information gained from laboratory research with that afforded by clinical experience. Carefully designed observational and interventional studies provide opportunities to verify basic biological understanding of disease. These studies then bring back to the laboratory new insight into the biology of the human body.
- *Rheumatology Fellowship Program.* The NIAMS/NIH Rheumatology Fellowship Training Program is dedicated to the clinical and research training of physicians wishing to pursue careers in biomedical or translational research related to the rheumatic diseases. The fellowship program is 2 years in duration, with extensions available for individuals interested in advanced research training. The program is accredited by the Accreditation Council for Graduate Medical Education (ACGME), and graduates are eligible to sit for the certifying examination in the subspecialty of rheumatology.
- *NIAMS Community Health Center.* The NIAMS Community Health Center is a health information and medical center, carrying out research and providing health care services to people affected by arthritis, lupus, and other rheumatic diseases. The health center offers patient care with access to a specialist, health information and education programs, and referral to clinical investigations for the prevention and treatment of rheumatic diseases. The health center is located in upper northwest Washington, DC.

The **Office of Science and Technology** encompasses an infrastructure of research and support facilities designed to enhance the research capabilities of all scientists of the IRP. In addition, members advise the Scientific Director, Laboratory and Branch Chiefs, and other key officials on collaborative and cooperative activities, training programs, and proper use of laboratory animals. Members also negotiate and facilitate scientific collaborations that involve trans-institute and trans-NIH initiatives and agreements. The Office includes the following:

- The *Career Development* Section serves as a resource to all NIAMS students, fellows, and their sponsors to ensure that NIAMS continues to attract the best fellows and provide them with a genuine growth experience.
- The *Flow Cytometry* Section provides state-of-the-art multiparameter analytic and sorting capabilities for IRP investigators.
- The *Laboratory Animal Care and Use* Section provides support to all IRP branches and laboratories using animals.
- The *Light Imaging* Section functions as a core facility, offering IRP scientists access to state-of-the-art light imaging equipment and expertise in light imaging techniques.
- The *Biodata Mining and Discovery* Section assesses the scientific computing needs of IRP scientists and develops strategies and designs computational support for researchers.
- The *X-Ray Crystallography Facility* is an NIAMS core facility that provides equipment, training, assistance, and technological innovations to determine 3-dimensional structures of protein and other macromolecules (large biological molecules).

The **Arthritis and Rheumatism Branch** conducts a variety of basic and clinical investigations. The historical focus of the branch has been the study of the autoimmune rheumatic diseases, particularly rheumatoid arthritis, systemic lupus erythematosus, and myositis. Current studies focus on inflammatory and genetic diseases affecting the musculoskeletal system.

The **Autoimmunity Branch** conducts basic and clinical research to develop new insights into the molecular basis of autoantibody formation. Autoimmune diseases such as lupus are characterized by the formation of tissue-affecting autoantibodies. The basis of this formation is not known. Branch scientists are using molecular and cell-biologic techniques as well as multiparameter flow cytometry (a technique that allows large numbers of individual cells to be characterized in detail) to analyze autoantibody formation in patients with lupus and other autoimmune diseases.

The **Cartilage Biology and Orthopaedics Branch**, which consists of the *Cartilage Molecular Genetics*, *Developmental Biology*, *Orthopaedics*, and *Tissue Engineering* Sections, conducts basic and clinical research directed towards understanding the mechanisms regulating cartilage function, the basis of cartilage and orthopaedic diseases (such as osteoarthritis), and the development of functional cartilage tissue substitutes. Researchers are using cellular, molecular, bionomic, and bioengineering approaches to analyze cartilage development, growth, diseases, and aging, as well as applying the emerging technology of tissue engineering for functional cartilage replacement.

The **Genetics and Genomics Branch** identifies and characterizes susceptibility genes for rheumatic and inflammatory diseases. This includes the study of Mendelian autoinflammatory diseases such as Familial Mediterranean Fever (FMF), tumor necrosis factor-associated periodic syndrome (TRAPS), neonatal onset multisystem inflammatory disease (NOMID), and the syndrome of pyogenic arthritis with pyoderma gangrenosum and acne (PAPA). The branch also studies genetically complex conditions such as rheumatoid arthritis. Included in the branch are the *Inflammatory Biology* Section and the *Genomics* Section.

The **Molecular Immunology and Inflammation Branch** conducts basic and clinical investigations on the molecular mechanisms underlying immune and inflammatory responses in rheumatic and autoimmune diseases. A major focus is the study of receptor-mediated signal transduction and how these processes link to the regulation of genes involved in inflammatory responses. Included in the branch are the *Lymphocyte Cell Biology*, *Genomic Integrity*, and *Molecular Inflammation* Sections.

The **Laboratory of Muscle Biology** conducts a broad range of research in muscle and structural biology. This includes the molecular mechanisms of contraction, muscle elasticity and plasticity, differentiation and assembly of muscle cells, pathobiology of muscle diseases, and the development and application of emerging technologies in proteomics and nanotechnology in muscle research.

The **Laboratory of Skin Biology** conducts basic research on the skin and its diseases, emphasizing the epidermis.

The **Laboratory of Structural Biology Research** conducts research into the structural basis of the assembly and functioning of macromolecules and their complexes (such as viruses and cytoskeletal proteins), and the mechanisms and proteins that control their assembly. These studies make extensive use of cryoelectron microscopy and 3-dimensional image processing in studies of virus infection and replication; renewal of the epidermis, with maintenance of barrier function; prionogenesis (structural transitions of infectious proteins called prions); and intracellular protein quality control by energy-dependent proteases.

The **Protein Expression Laboratory** plans and conducts research on the expression, purification, and structural characterization of human immunodeficiency virus (HIV) and HIV-related proteins. Laboratory scientists also collaborate with NIH intramural researchers studying the structure and function of HIV and HIV-related proteins. The lab serves as a support and resource group for the expression and purification of these proteins.

Communications

The *Office of Communications and Public Liaison* (OCPL) leads the NIAMS efforts in information dissemination, public input, and health education. OCPL disseminates health and research news and updates, creates print and Web publications, manages the NIAMS Web site, coordinates outreach and promotion, and serves as a point of contact for the media, the public, and public organizations. OCPL oversees the NIAMS Information Clearinghouse, which operates a toll-free service to provide information and information sources on arthritis and rheumatic diseases, musculoskeletal and connective tissue disorders, and skin diseases. OCPL also oversees the NIH Osteoporosis and Related Bone Diseases~National Resource Center, which disseminates information on bone diseases.

NIH Almanac: Organization

National Institute of Biomedical Imaging and Bioengineering

Mission | History | Director

Mission

The mission of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) is to improve health by leading the development and accelerating the application of biomedical technologies. The Institute is committed to integrating the physical and engineering sciences with the life sciences to advance basic research and medical care. This is achieved through: research and development of new biomedical imaging and bioengineering techniques and devices to fundamentally improve the detection, treatment, and prevention of disease; enhancing existing imaging and bioengineering modalities; supporting related research in the physical and mathematical sciences; encouraging research and development in multidisciplinary areas; supporting studies to assess the effectiveness and outcomes of new biologics, materials, processes, devices, and procedures; developing technologies for early disease detection and assessment of health status; and developing advanced imaging and engineering techniques for conducting biomedical research at multiple scales.

NIBIB Extramural Research Program

The NIBIB extramural research program brings together the research communities of biomedical imaging, bioengineering, the physical sciences, and the life sciences to advance human health by improving quality of life and reducing the burden of disease. The extramural research program is organized into 3 divisions: Discovery Science and Technology, Applied Science and Technology, and Inter-Disciplinary Training.

The Institute supports basic research and research training through investigator-initiated grants, contracts, program project and center grants, and career development and training awards.

NIBIB Intramural Research Program

The NIBIB intramural research program plays a key role in advancing the Institute's mission. Specifically, the program advances knowledge in imaging and bioengineering research using a combination of basic, translational, and clinical science. The intramural research program has also developed several unique training opportunities in these and related fields.

The intramural research program comprises of the Laboratory of Bioengineering and Physical Science and the Positron Emission Tomography (PET) Radiochemistry Research Laboratory. The Laboratory of Bioengineering and Physical Science specializes in the development and application of new technologies, based on engineering, mathematics, and the physical sciences, for the solution of problems in biology and medicine. The PET Radiochemistry Research Laboratory conducts research and training in the development and application of novel radiochemical probes for biomedical imaging.

NIBIB supports several training initiatives in the intramural research program for undergraduate biomedical engineering students and postdoctoral scientists and engineers through the Fogarty Visiting Fellows (www.training.nih.gov/postdoctoral/vf.asp), the Biomedical Engineering Summer Internship Program (www.nibib.nih.gov/Training/UndergradGrad/besip/home), and the National Research Council NIH/NIST Research Associateship Program (www.training.nih.gov/postdoctoral/nist.asp).

Important Events in NIBIB History

December 29, 2000—The National Institute of Biomedical Imaging and Bioengineering Establishment Act (H.R. 1795) is signed into law by President William Jefferson Clinton.

2001

The NIBIB Establishment Plan is approved by the U.S. Secretary of Health and Human Services, Mr. Tommy G. Thompson.

Dr. Donna J. Dean is named as Acting Director of NIBIB.

The National Advisory Council for Biomedical Imaging and Bioengineering is established.

NIBIB assumes administration of the NIH's Bioengineering Consortium (BECON).

The NIBIB website is launched.

2002

A working group is established to review and recommend the transfer of grants to NIBIB.

NIBIB receives its first budget appropriation (FY 2002) in the amount of $112 million.

NIBIB announces its first 2 Requests for Applications.

The NIBIB announces the award of its first research grants.

Dr. Roderic Pettigrew, professor of radiology, medicine (cardiology), and bioengineering, and director of the Emory Center for MR Research, Emory University School of Medicine, assumes the position of Director of NIBIB.

Dr. Donna Dean becomes the first Deputy Director of NIBIB.

2003

The National Advisory Council for Biomedical Imaging and Bioengineering meets for the first time in Bethesda, Maryland.

A new NIBIB organization is announced by Dr. Roderic Pettigrew.

The NIBIB Special Emphasis Panel is established.

Dr. Belinda Seto is named the Deputy Director of NIBIB.

2004

NIBIB initiates its Strategic Planning process.

NIBIB and the Center for Devices and Radiological Health, FDA, sign an interagency agreement establishing the joint Laboratory for the Assessment of Medical Imaging Systems.

NIBIB hosts a Blue Ribbon Panel on Intramural Research to provide recommendations on the planning and development of an intramural research program.

NIBIB and Howard Hughes Medical Institute (HHMI) announce a partnership to support the HHMI/NIBIB Interfaces Initiative for Interdisciplinary Graduate Research Training.

The Positron Emission Tomography (PET) Radiochemistry Group joins the Institute as the NIBIB Intramural Research Program.

NIBIB and the National Science Foundation sponsor a conference on "Research at the Interface of the Life and Physical Sciences: Bridging the Sciences."

2005

NIBIB issues a draft Strategic Plan and invites public comment.

NIBIB holds its first Regional Grantsmanship Seminar in Troy, New York. The seminars are intended to provide an overview of NIBIB funding opportunities and NIH application, review, and grant-making processes and policies.

NIBIB launches re-designed website.

2006

NIBIB awards its first Quantum Grant to Baylor College of Medicine.

NIBIB names Dr. Richard Leapman as Scientific Director of the Intramural Sciences Program.

NIBIB publishes its first strategic plan, *Strategic Plan I*, following a year-long process of input from the public, staff, and groups of outside experts. This plan is designed to (1) define key goals, (2) optimize the use of resources, and (3) install tools and processes for smart management in order to help NIBIB achieve its mission and realize its vision.

NIBIB website wins Award of Distinction from *The Communicator Awards*.

2007

NIBIB celebrates its 5-year anniversary with a commemorative scientific symposium on technological innovation in medicine entitled, "Changing the World's Healthcare through Biomedical Technologies." View Image.

NIBIB presents the first NIBIB Landmark Achievement Award to Dr. Paul Lauterbur (posthumously), 2003 Nobel Laureate, Physiology or Medicine, for his vision and fundamental discoveries in the development of magnetic resonance imaging. View

Image.

The Division of Bioengineering and Physical Science is transferred from the NIH Office of Research Services to the NIBIB intramural research program.

NIBIB awards Quantum Grants to Wake Forest University Health Sciences, the University of Michigan at Ann Arbor, the Cleveland Clinic Lerner College of Medicine-CWRU, and Massachusetts General Hospital.

NIBIB and the Department of Biotechnology of the Ministry of Science and Technology, Republic of India, sign a bilateral agreement to develop low-cost healthcare technologies aimed at the medically underserved. View Image.

Biographical Sketch of NIBIB Director Roderic I. Pettigrew, Ph.D., M.D.

Roderic I. Pettigrew, Ph.D., M.D., is the first Director of the National Institute of Biomedical Imaging and Bioengineering at the NIH. Prior to his appointment at the NIH, he was professor of radiology, medicine (cardiology) at Emory University and Bioengineering at the Georgia Institute of Technology and director of the Emory Center for MR Research, Emory University School of Medicine, Atlanta.

Dr. Pettigrew is known for his pioneering work at Emory University involving 4-dimensional imaging of the heart using magnetic resonance imaging (MRI). Dr. Pettigrew graduated cum laude with a B.S. in physics from Morehouse College, where he was a Merrill Scholar; has an M.S. in nuclear science and engineering from Rensselaer Polytechnic Institute; and a Ph.D. in applied radiation physics from the Massachusetts Institute of Technology, where he was a Whitaker Harvard-MIT Health Sciences Scholar. Subsequently, he received an M.D. from the University of Miami School of Medicine in an accelerated 2-year program, did an internship and residency in internal medicine at Emory University and completed a residency in nuclear medicine at the University of California, San Diego. Dr. Pettigrew then spent a year as a clinical research scientist with Picker International, the first manufacturer of MRI equipment. In 1985, he joined Emory as a Robert Wood Johnson Foundation Fellow with an interest in noninvasive cardiac imaging.

Dr. Pettigrew's awards include membership in Phi Beta Kappa, the Bennie Award (Benjamin E. Mays) for Achievement, and being named the Most Distinguished Alumnus of the University of Miami. In 1989, when the Radiological Society of North America celebrated its 75th diamond anniversary scientific meeting, it selected Dr. Pettigrew to give the keynote Eugene P. Pendergrass New Horizons Lecture. He has also served as chairman of the Diagnostic Radiology Study Section, Center for Scientific Review, NIH. He has been elected to membership in the Institute of Medicine and fellowship in the American Heart Association, American College of Cardiology, American Institute for Medical and Biological Engineering, International Society for Magnetic Resonance in Medicine, and the Biomedical Engineering Society.

NIBIB Directors

Name	In Office from	To
Donna J. Dean (Acting)	April 26, 2001	September 22, 2002
Roderic I. Pettigrew	September 23, 2002	Present

NIH Almanac: Organization

Eunice Kennedy Shriver National Institute of Child Health and Human Development

Mission | Important Events | Legislative Chronology | Director | Organization

Mission

The mission of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) is to ensure that every person is born healthy and wanted, that women suffer no harmful effects from the reproductive process, that all children have the chance to fulfill their potential to live healthy and productive lives free from disease or disability, and to ensure the health, productivity, independence, and well-being of all people through optimal rehabilitation.

In pursuit of this mission, the NICHD conducts and supports laboratory research, clinical trials, and epidemiological studies that explore health processes; examines the impact of disabilities, diseases, and defects on the lives of individuals; and sponsors training programs for scientists, doctors, and researchers to ensure that NICHD research can continue.

NICHD research programs incorporate the following concepts:

- **Events that happen prior to and throughout pregnancy, as well as during childhood, have a great impact on the health and well-being of adults.** The Institute supports and conducts research to: advance knowledge of pregnancy, fetal development, and birth for developing strategies that prevent maternal, infant, and childhood mortality and morbidity; identify and promote the prerequisites of optimal physical, mental, and behavioral growth and development through infancy, childhood, and adolescence; and contribute to the prevention and amelioration of mental retardation and developmental disabilities.
- **Human growth and development is a life-long process that has many phases and functions.** Much of the research in this area focuses on cellular, molecular, and developmental biology to build understanding of the mechanisms and interactions that guide a single fertilized egg through its development into a multi-cellular, highly organized adult organism.
- **Learning about the reproductive health of women and men and educating people about reproductive practices is important to both individuals and societies.** Institute-supported basic, clinical, and epidemiological research in the reproductive sciences seeks to develop knowledge that enables women and men to overcome problems of infertility, and to regulate their fertility in ways that are safe, effective, and acceptable for various population groups. Institute-sponsored behavioral and social science research in the population field strives to understand the causes and consequences of reproductive behavior and population change.
- **Developing medical rehabilitation interventions can improve the health and well-being of people with disabilities.** Research in medical rehabilitation seeks to develop improved techniques and technologies, with respect to the rehabilitation of individuals with physical disabilities resulting from diseases, disorders, injuries, or birth defects.

The Institute also supports research training across all its programs, with the intent of adding to the cadre of trained professionals who are available to conduct research in areas of critical public health concern. In addition, an overarching responsibility of the NICHD is to disseminate information that emanates from Institute research programs to researchers, practitioners, other health care professionals, and the public.

Important Events in NICHD History

January 12, 1961—The report of the Task Force on Health and Social Security calls for the establishment, by administrative action of the U.S. Surgeon General, of a National Institute of Child Health within the National Institutes of Health (NIH).

January 30, 1961—The U.S. Department of Health, Education, and Welfare (DHEW) general counsel declares that existing legislation (enacted in 1950) limited the creation of new Institutes to those focusing on a disease or group of diseases, and that new legislation would be required to establish the Institute called for in the Task Force report.

February 17, 1961—The Surgeon General establishes a Center for Research in Child Health in the Division of General Medical Sciences.

October 17, 1962—Public Law 87-838 authorizes the establishment of the NICHD.

January 30, 1963—Secretary of DHEW Anthony J. Celebrezze approves the establishment of the NICHD, with a provision that the Center for Research in Child Health and the Center for Research in Aging (established in 1956) be transferred from the Division of General Medical Sciences to the new Institute.

May 14, 1963—The Surgeon General appoints members of the National Advisory Child Health and Human Development (NACHHD) Council.

November 14, 1963—The NICHD holds the first meeting of the NACHHD Council.

December 2, 1965—A major NICHD reorganization, approved by the Surgeon General, emphasizes 4 program areas: reproduction, growth and development, aging, and mental retardation.

April 18, 1967—A second reorganization of the NICHD, approved by the Surgeon General, acknowledges the Institute's intramural research programs by separating responsibility for intramural and extramural research and creating 7 intramural laboratories. The reorganization brings the NICHD administrative structure into line with that of other NIH Institutes.

August 9, 1968—The DHEW Secretary establishes the Center for Population Research within the NICHD. The Center is responsible for contract and grant programs in population and reproduction research and is designated by the president as the federal agency primarily responsible for population research and training.

1970—The NICHD's Epidemiology and Biometry Branch, created during the Institute's second reorganization in 1967, becomes the Epidemiology and Biometry Research Program. The change allows the Program to conduct epidemiologic, behavioral, and biometric studies relating to reproductive, maternal, and child health.

May 27, 1975—The federal government establishes the Center for Research for Mothers and Children within the NICHD as the focal point for research and research training on the special health problems of mothers and children. The Center also has responsibility for increasing knowledge about pregnancy, infancy, childhood, adolescence, and adulthood, and for administering grant and contract programs related to these areas.

June 30, 1975—The Adult Development and Aging Branch and the Gerontology Research Center, with their programs for support and conduct of research in the field of aging, are transferred from the NICHD to the newly established National Institute on Aging (NIA).

1978—NICHD intramural researchers become the first to successfully clone a mammalian gene, a critical first step in

obtaining large amounts of medically important proteins.

December 1983—NICHD grantees Ralph Brinster and Richard Palmiter become the first to transplant human genes into animals. Their accomplishment, transplanting the gene for human growth hormone into mice, provides an important new means to study the function of human genes, as well as the foundation of the new biotechnology industry.

1985—The NICHD forms research networks of Neonatal Intensive Care Units and Maternal-Fetal Medicine Units. The sites, which perform large clinical trials, provide the Institute with a faster, more effective system of evaluating neonatal intensive care and maternal-fetal treatments.

December 1989—The NICHD announces the establishment of the country's first research centers that combine the biomedical and behavioral sciences to focus specifically on learning disabilities.

September 1990—The Institute begins a congressionally initiated national program of Child Health Research Centers. The goal is to expedite the application of findings from basic research to the care of sick children.

November 16, 1990—Congress establishes the National Center for Medical Rehabilitation Research within the NICHD to conduct and support programs for the rehabilitation, health, and well being of individuals with physical disabilities.

1991—The NICHD expands its Epidemiology and Biometry Research Program to create the Division of Epidemiology, Statistics, and Prevention Research, part of its intramural research component. The Division's portfolio includes research in the fields of reproduction and maternal and child health.

1994—The NICHD launches the *Back to Sleep* campaign, a program designed to teach parents and caregivers the importance of putting babies on their backs to sleep, to help reduce the risk of sudden infant death syndrome (SIDS).

January 1, 1994—In response to the need for appropriate drug therapy for pediatric patients, the NICHD establishes the Pediatric Pharmacology Research Unit Network. The Network's mission is to facilitate and promote pediatric labeling of new drugs or drugs already on the market, to ensure the safe and effective use of drugs in children.

September 1996—Two NICHD scientists, Drs. John Robbins and Rachel Schneerson, receive the 1996 Albert Lasker Clinical Medical Research Award for the landmark development of a polysaccharide-protein conjugate vaccine for *Hemophilus influenzae* type b (Hib). Also in 1996, Robbins and Schneerson receive the World Health Organization Children's Vaccine Initiative Pasteur Award for Recent Contributions in Vaccine Development for their Hib vaccine breakthrough.

1997—The NICHD launches the *Milk Matters* calcium education campaign, designed to educate people about the importance of getting enough calcium during the childhood and teenage years to help prevent osteoporosis and fragile bones in adulthood.

June 1997 –The NICHD and the National Institute on Deafness and Other Communication Disorders (NIDCD) establish the Network on the Neurobiology and Genetics of Autism, composed of 10 Collaborative Programs of Excellence in Autism (CPEAs). The CPEA Network is a multi-million dollar, international effort that seeks to solve the puzzle of autism through research.

September 1997—The NICHD initiates the first phase of its National Longitudinal Study of Adolescent Health (called the Add Health Study). The study's main premise is that social context—such as relationships with families, friends, and peers—influences the health-related behaviors of young people, and that understanding this context is essential to guide efforts to modify health behaviors.

March 1998—Using sophisticated brain imaging technology, NICHD-funded researchers reveal a brain map of the physical basis of dyslexia. This finding may provide the basis for screening techniques that will help identify dyslexia, allowing treatment to start earlier in a person's development.

June 1998—In the largest, most comprehensive analysis of its kind, NICHD-funded research finds that pregnant women who are infected with HIV can reduce the risk of transmitting the virus to their infants by about 50% if they deliver by elective Cesarean section before they have gone into labor and before their membranes have ruptured.

July 1998—The Food and Drug Administration approves an NICHD-developed DTaP (diphtheria-tetanus-acellular pertussis) vaccine for use in immunization against these diseases.

September 30, 1999—NICHD-funded researchers announce the discovery of the gene for Rett syndrome, a disorder in which healthy infant girls gradually lose their language capabilities, mental functioning, and ability to interact with others.

2000—NICHD researchers demonstrate that inhaled nitric oxide is an effective therapy for respiratory failure in critically ill term infants in whom aggressive conventional therapy had failed. The findings, which resulted from the first definitive, randomized clinical trial of nitric oxide use in human neonates, may further reduce the long-term costs of caring for such children and improve their quality of life by reducing their risk for chronic respiratory insufficiency and central nervous system ischemia.

2000—NICHD researchers evaluating data from the Fels Longitudinal Study, the oldest and largest growth study in the world, find that obesity in childhood tracks from age 3 onward, into adulthood, and that obesity in adolescence is more likely to lead to adult obesity than obesity earlier in childhood. Data from the study, supported by NICHD since 1974, may allow researchers to ascertain the segregation of growth patterns over 3 generations, to detect linkage of candidate genes to various phenotypes of growth, and to permit the discovery of new descriptors of normal growth and underlying genetic mechanisms.

January 2000—The Bill and Melinda Gates Foundation joins the NICHD in developing and supporting an international research network to improve the health of women and children throughout the world. The NICHD will match the Foundation's $15 million to help the network establish self-sustaining, international, and medical research institutions, which are urgently needed to address many of the world's health concerns.

April 13, 2000—The National Reading Panel, established by the NICHD, releases findings of the largest, most comprehensive, evidence-based review ever conducted of research related to how children learn to read. The independent panel concludes that the most effective way to teach children to read is through instruction that includes a combination of methods and addresses alphabetics (phonemic awareness and phonemic instruction), reading fluency, reading comprehension, teacher education, and computer technology.

October 5, 2000—An NICHD-funded study, conducted by researchers from Thailand, France, and the United States, shows that transmission of HIV from a mother to her child can be reduced nearly as effectively with shorter treatments of the drug AZT, as with longer AZT treatments. The findings may allow women in developing countries to better afford the treatment that can reduce their babies' chances of contracting AIDS.

October 11, 2000—An NICHD grantee, Dr. James J. Heckman of the University of Chicago, is 1 of 2 NIH researchers to receive the Bank of Sweden Prize in Economic Sciences in memory of Alfred Nobel. Dr. Heckman is awarded the Nobel Prize in Economics for his pioneering work in accounting for unknown factors affecting statistical samples. Much of his work has been applied to understanding how early life events contribute to individuals' later earning potential and economic standing.

February 2001—The NICHD establishes 3 fragile X research centers to conduct and support research related to improving the diagnosis and treatment of, and finding a cure for, fragile X and fragile X syndrome. This initiative was mandated under Public Law 106-310, the Children's Health Act, passed in October 2000.

April 2001—A typhoid vaccine developed by NICHD scientists showed a 91.5% effectiveness rate, the highest reported for any typhoid vaccine, in clinical trials done in Vietnam. More than 16 million people worldwide are affected by typhoid every year. This highly effective vaccine could prevent the more than 600,000 deaths that result annually from typhoid fever around the world.

February 2002—NICHD scientists, in conjunction with the biologics firm Nabi, develop the first vaccine against *Staphylococcus aureus*, a major cause of infection and death in hospital patients. *S. aureus*—which can cause illness ranging from minor skin infections to life-threatening pneumonia, meningitis, and infections of the heart—attacks people whose immune systems are compromised. This new vaccine provides a powerful new way to prevent these infections, a finding which could save thousands of lives every year.

June 2002—Findings from the NICHD's Women's Contraceptive and Reproductive Experiences Study (Women's CARE) reveal no association between oral contraception use and an increased risk of breast cancer. The study, which focuses on women age 35 to 64 because they are more likely to develop breast cancer than younger women, provides scientific evidence that past or present oral contraception use does not significantly increase breast cancer risk.

2003—In a first-of-its-kind collaboration, the NICHD, National Coalition of 100 Black Women, the Women in the NAACP, and Alpha Kappa Alpha Sorority, Inc., embark on a year-long program to spread the safe sleep message in African American communities. At regional summits held in Tuskegee, Los Angeles, and Detroit, the partners conduct SIDS risk-reduction training and activities to equip members and community leaders with educational techniques, strategies, and promotional materials so they can conduct outreach activities to reduce the risk of SIDS among African American infants.

June 2003—The NICHD establishes the Center for Developmental Biology and Perinatal Medicine. The Center strives to advance fundamental and clinical knowledge about maternal health and problems of child development, such as preterm birth, mental retardation and developmental disabilities, congenital defects and genetic disorders, fetal growth restriction, and other conditions.

April 2004—NICHD-supported researchers demonstrate that effective reading instruction not only improves reading ability, but also changes the functioning of the brain so that it reads more efficiently. The scientists used functional magnetic resonance imaging (fMRI) to observe brain functions in children during reading. With fMRI, the researchers could see that the brains of once-poor readers, as they overcame their reading disabilities, began to function like the brains of good readers. The findings show that the brain systems involved in reading respond to effective reading instruction and show increased activity in a part of the brain that recognizes words.

June 2004—Reorganization within the NICHD's Center for Research for Mothers and Children establishes the Obstetric and Pediatric Pharmacology Branch to meet the increased demand for research leadership and support of legislation passed to ensure the safety of drugs used to treat children. The new Branch includes the NICHD Pediatric Pharmacology Research Units Network, the Obstetric-Fetal Pharmacology Research Network, and NICHD Best Pharmaceuticals for Children Act activities. The Branch provides a focus for managing efforts across the U.S. Department of Health and Human Services (HHS) to address this important topic.

November 2004—The NICHD and its partner agencies announce the 96 recruitment locations for the National Children's Study, a national, longitudinal study of environmental influences on child health mandated in the Children's Health Act of 2000. The study, led by a consortium of federal agencies—including HHS (the NICHD and the National Institute of Environmental Health Sciences (NIEHS) within NIH, as well as the Centers for Disease Control and Prevention) and the U. S. Environmental Protection Agency—will be the largest and most comprehensive study of its kind.

December 2004—Researchers in the NICHD Maternal-Fetal Medicine Units (MFMU) Network find that the risks from vaginal delivery after a prior Cesarean delivery are low, and are only slightly higher than for a repeat Cesarean delivery, thus clarifying the safety of vaginal birth after Cesarean. The largest, most comprehensive study of its kind indicated that, although complications (such as rupture of the uterus and infection of the uterine lining) were possible, the risk of these complications was very low. Further, the researchers note that repeat Cesarean carries its own risks, including infection and

surgical complications, and that the procedure may complicate future births. The MFMU Network allows researchers to conduct large clinical trials quickly, by recruiting from multiple sites and using one protocol, providing a faster, more effective system of evaluating maternal-fetal treatments.

January 2005—NICHD-supported researchers identify a substance—placental growth factor (PlGF)—in the urine of pregnant women that can be measured to predict the later development of preeclampsia, the leading cause of maternal and fetal death in the United States. This finding sets the stage for the development of a test to screen women for risk of preeclampsia. Such foreknowledge will help physicians to better care for the women, possibly taking steps to prolong the pregnancy to allow the fetus to develop more, while closely monitoring them for signs that the fetus should be delivered, even prematurely, if necessary.

April 7, 2005—World Health Day—the Global Network for Women's and Children's Health Research, funded by the NICHD and the Bill and Melinda Gates Foundation, initiates the First Breath Project to treat newborn asphyxia, a major cause of infant death, in resource-poor settings. The new project seeks to determine if training midwives and other traditional birth attendants in standard infant resuscitation practices commonly used in the United States can reduce the death and disability from newborn asphyxia in 7 Global Network sites located in South Asia, Africa, and Latin America. The project will include nearly 80 communities and 40,000 births per year during the course of the study.

October 2006—As part of a decades-long research effort on SIDS, NICHD-funded researchers announce findings that infants who died of SIDS had abnormalities in the brainstem, a part of the brain that helps control heart rate, breathing, blood pressure, temperature, and arousal. The finding supports the concept that SIDS risk may greatly increase when an underlying predisposition combines with an environmental risk at a developmentally sensitive time in early life. Modifiable factors, such as sleep position, may provide the greatest protection against SIDS for infants with the brain abnormality.

December 2006/February 2007—NICHD researchers discover two genetic defects that lead to forms of Osteogenesis Imperfecta (OI), a disorder that weakens bones and may cause frequent fractures. The first gene discovery—a recessive form that requires 2 copies of the affected gene to show the trait—was implicated in a previously unexplained but fatal form of OI; the second was related to other previously unexplained forms of the disorder. Although there is no treatment for the disorder, the finding allows clinicians to test families who have lost a child to OI for the presence of the defective gene. Couples with a child affected by these forms of OI could be apprised of their risk for conceiving another child with the disorder.

June 2007—At the recommendation of the Blue Ribbon Panel Review and the Board of Scientific Counselors, the NICHD Division of Intramural Research was reorganized from 22 laboratories and branches to 10 programs, along with 3 branches, 2 sections, and 3 core facilities. (Please see the *Division of Intramural Research (DIR)* section of this document for more information.)

August 2007—The NIH initiates the Autism Centers of Excellence (ACE) Program, a consolidation of 2 existing programs, the Studies to Advance Autism Research and Treatment (STAART) and Collaborative Programs of Excellence in Autism (CPEA), into a single research effort. The ACE Program seeks to expand on earlier discoveries made by research previously supported by the NIH. Funding and resources for the Program are provided by the NICHD, along with NIDCD, NIEHS, the National Institute of Mental Health, and the National Institute of Neurological Disorders and Stroke.

September 2007—The National Children's Study, led by the NICHD and a consortium of federal agencies, awards contracts to 22 new study centers, which will manage participant recruitment and data collection in 26 additional communities across the United States. Funding for the new Study centers and the Study's initial phase resulted from a $69 million appropriation from Congress in fiscal year 2007. The National Children's Study is the largest study to be conducted on the effects of environmental and genetic factors on child and human health in the United States.

NICHD Legislative Chronology

October 17, 1962—Public Law 87-838 authorizes the U.S. Surgeon general, with approval of the Secretary of the DHEW, to "establish in the Public Health Service (PHS) an institute for the conduct and support of research and training relating to maternal health, child health and human development, including research and training in the special health problems and requirements of mothers and children and in the basic sciences relating to the processes of human growth and development, including prenatal development."

October 31, 1963—Public Law 88-164 provides grants to support the construction of research centers for mental retardation and related disabilities. The NICHD remains closely associated with some 12 centers installed prior to June 30, 1967, when the authority expires.

December 24, 1970—Public Law 91-572 adds Title X to the PHS Act to authorize grants and contracts for research and research training in family planning and population problems. The DHEW Secretary delegates the authority to the NICHD, where the program is administered by the Center for Population Research.

April 22, 1974—Public Law 93-270 assigns the task of conducting research on SIDS and reporting on it to the Congress to the DHEW Secretary and, ultimately, to the NICHD.

July 29, 1975—Title II of Public Law 94-63, the Family Planning and Population Research Act of 1975, amends Title X of the PHS Act. Thereafter the PHS can conduct and support population research. Title X becomes the sole authority for population research appropriations.

August 13, 1981—The Budget Reconciliation Act of 1981, Public Law 97-35, repeals sections 1004(b)(1) and 1004(b)(2) of the PHS Act. Once enacted, authority for supporting research in human reproduction and the population sciences derives from the broad provisions of sections 301 and 441 of the PHS Act.

November 20, 1985—The Health Extension Act of 1985 directs the NICHD to appoint an Associate Director for Prevention, "to coordinate and promote the programs in the Institute concerning the prevention of health problems of mothers and children."

November 16, 1990—Section 3 of the NIH Amendments of 1990, Public Law 101-613, establishes the National Center for Medical Rehabilitation Research. The Center will conduct and support programs with respect to the rehabilitation of individuals with physical disabilities that result from congenital defects, diseases, or disorders of the neurological, musculoskeletal, cardiovascular, pulmonary, or any other physiological system.

June 10, 1993—The NIH Revitalization Act of 1993, Public Law 103-43, mandates the NICHD to do the following: 1) establish contraception research centers to improve methods of contraception; establish infertility research centers to improve methods of diagnosis and treatment of infertility; and establish an educational loan repayment program for extramural and intramural health professionals who agree to conduct contraception or infertility research; 2) establish and maintain an intramural laboratory and clinical research program in obstetrics and gynecology within the Institute; 3) establish and support a program of Child Health Research Centers; and 4) undertake a national prospective, longitudinal study of adolescent health and well-being.

October 17, 2000—President Clinton signs Public Law 106-310, the Children's Health Act, which designates the NICHD as the lead organization on a number of research initiatives, including establishment of a pediatric research initiative, expansion of autism-related and fragile X syndrome research activities, and authorization for the NICHD to lead other federal agencies in conducting a national longitudinal study of environmental influences on child health.

December 18, 2001—President George W. Bush signs Public Law 107-84, the Muscular Dystrophy Community Assistance, Research and Education Amendments of 2001, which directs the NIH Director, in coordination with the National

Institute of Neurological Disorders and Stroke, the National Institute of Arthritis and Musculoskeletal and Skin Diseases, and the NICHD, to expand research activities at NIH pertaining to various types of muscular dystrophy. This expansion is to include the formation of an inter-agency coordinating committee and the establishment of centers of excellence to conduct research. The law also mandates a contract with the Institute of Medicine to study and report on the impact of and need for centers of excellence at the NIH.

January 4, 2002—The Best Pharmaceuticals for Children Act (Public Law 107-109) seeks to improve the safety and efficacy of pharmaceuticals for children. The law authorizes funding for the NIH to conduct testing of drugs already on the market, including at federally funded facilities, such as the NICHD's Pediatric Pharmacology Research Units.

January 8, 2002—President Bush signs the No Child Left Behind Act (Public Law 107-110). Among the education legislation's many provisions is authorization for programs that build upon the reading readiness research funded by the NICHD, as well as on findings from the National Reading Panel, established and supported by the NICHD.

December 3, 2003—The President authorizes the Pediatric Research Equity Act (Public Law 108-155), which codifies a policy of requiring pharmaceutical companies to test new drugs in pediatric populations, if the drugs are likely to be used to treat children, and to provide the data to the federal government. This law complements the Best Pharmaceuticals for Children Act, in which the NICHD plays a central role.

December 3, 2004—The President signs the Individuals with Disabilities Education Improvement Act (IDEA) of 2004 (Public Law 108-446). Among the many provisions in this reauthorization of IDEA activities, the Act also amends the section of the Children's Health Act of 2000 specific to the National Children's Study. This amendment requires the U.S. Department of Education to be formally included as a partner in planning and implementing the Study; the Department is already a member of the federal consortium that leads the Study, but was not named in the original legislation. The Act also requires that the National Children's Study comply with federal education law concerning the use of school records for research purposes.

December 9, 2006—The Prematurity Research Expansion and Education for Mothers who deliver Infants Early Act ("PREEMIE") passes, with provisions authorizing an Interagency Coordinating Council on Prematurity and Low Birthweight, and directing the U.S. Surgeon General to convene a meeting on preterm birth. The NICHD will assist the Surgeon General's Office in planning and holding the meeting in June 2008.

December 19, 2006—The Combating Autism Act becomes law, requiring the NIH and other federal agencies to expand their activities related to research on possible causes, diagnostics, and treatments for autism spectrum disorders. The Act also requires the NIH to develop and update an annual strategic plan for autism-related research, expand the Autism Centers of Excellence, and reauthorize the Interagency Autism Coordinating Committee.

September 27, 2007—Best Pharmaceuticals for Children/Pediatric Devices Act becomes law as part of the Food and Drug Administration Amendments Act of 2007. The Act reauthorizes the Best Pharmaceuticals for Children Act, extending additional patent exclusivity for drugs that are being tested for pediatric use, and makes improvements to the research program being supported by NICHD. The Act establishes a new program, for Pediatric Medical Device Safety and Improvement, requiring NIH to collaborate with the FDA and the Agency for Healthcare Research and Quality to develop a research plan for expanding medical device research and development focused on devices for children. NICHD is leading the trans-NIH effort to develop the research plan for studies of pediatric medical devices.

December 21, 2007—The President signs the bill renaming the NICHD as the "Eunice Kennedy Shriver National Institute of Child Health and Human Development." The bill and renaming honors Mrs. Shriver's work in both establishing the Institute and her ongoing efforts on behalf of the intellectually disabled and lauds the NICHD's research efforts in reducing SIDS, maternal HIV transmission, and development of vaccines, among others.

Biographical Sketch of NICHD Director Duane Alexander, M.D.

Duane Alexander, M.D., was named NICHD Director on February 5, 1986, after serving as Acting Director. Dr. Alexander also served a 4-year term as the Institute's Deputy Director and was the Assistant to the Director, beginning in 1978.

Much of his career has been with the NICHD. After receiving his undergraduate degree from Pennsylvania State University, Dr. Alexander earned his medical degree from Johns Hopkins University School of Medicine. Following his internship and residency at the Department of Pediatrics at Johns Hopkins Hospital, Dr. Alexander joined the NICHD in 1968, as a clinical associate in the Children's Diagnostic and Study Branch. Following his tenure with the Branch, Dr. Alexander returned to Johns Hopkins as a fellow in pediatrics (developmental disabilities) at the John F. Kennedy Institute for Habilitation of the Mentally and Physically Handicapped Child.

His interests brought him back to the NICHD in 1971, when Dr. Alexander became Assistant to the Scientific Director and directed the NICHD National Amniocentesis Study. The study established the safety and accuracy of prenatal diagnosis using amniocentesis, now widely used to detect numerous genetic defects and inborn errors of metabolism.

From 1974 to 1978, Dr. Alexander served as medical officer in the Office of the Assistant Secretary for Health, in what is now the U.S. Department of Health and Human Services (HHS). During that time, he was also the physician on the staff of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, whose recommendations form the basis of current HHS regulations that protect human subjects in research.

Dr. Alexander is a diplomate of the American Board of Pediatrics and a member of the American Academy of Pediatrics (AAP), the American Pediatric Society, and the Society for Developmental Pediatrics. For more than a decade, he also served as the United States' observer on the Steering Committee on Bioethics for the Council of Europe. As an officer in the U.S. Public Health Service (PHS), Dr. Alexander received numerous PHS awards, including a Commendation Medal in 1970, a Meritorious Service Medal, and a Special Recognition Award in 1985. He also received the Surgeon General's Exemplary Service Medal in 1990.

In 2002, Dr. Alexander received the Arnold J. Capute award from the AAP, to commend him on his contributions to the health and well-being of children with disabilities through service and/or advocacy on local, state, and national levels. In 2004, the American Medical Association (AMA) commended Dr. Alexander for his leadership in research on Sudden Infant Death Syndrome by awarding him the Dr. Nathan Davis Award for Outstanding Government Service. The award, named for the AMA's founder, recognizes federal, state, and municipal officials whose contributions promote the art and science of medicine and the betterment of the public health. Dr. Alexander received the 2007 Distinguished Service Award from the American Society for Reproductive Medicine for his significant contributions to the field of women’s health.

In addition, Dr. Alexander is the author of numerous articles and book chapters, most of which relate to his research in developmental disabilities.

Directors of NICHD

Name	In Office from	To
Robert A. Aldrich	March 1, 1963	October 1964
Donald Harting	July 8, 1965	1966
Gerald D. LaVeck	October 9, 1966	September 1, 1973
Gilbert L. Woodside (Acting)	September 1, 1973	September 1, 1974

Norman Kretchmer	September 1, 1974	September 30, 1981
Betty H. Pickett (Acting)	September 30, 1981	June 30, 1982
Mortimer B. Lipsett	July 1, 1982	January 7, 1985
Duane Alexander	February 5, 1986	Present

Organization

The NICHD's major components include both extramural programs, which support research via grants and contracts, and intramural programs, which conduct research at various laboratories, branches, units, and sections. The Division of Scientific Review provides additional support for NICHD activities. Descriptions of the major components and their functions are outlined below.

For more information on the NICHD, its mission, its components, and its research, please visit *www.nichd.nih.gov*.

Center for Population Research (CPR)

The CPR is the federal government's focal point for population research. Through grants and contracts, the Center supports: fundamental biomedical research on reproductive processes that influence human fertility and infertility; development of better methods for regulating fertility and for preventing the spread of sexually transmitted diseases, including HIV; evaluation of the safety and effectiveness of contraceptive methods now in use; and behavioral and social science research on the reproductive behavior of individuals, sexual transmission of HIV, and the causes and consequences of population change.

The Center also supports an extensive training program for individuals interested in all aspects of reproduction and population research through its 3 branches:

- Contraception and Reproductive Health Branch
- Demographic and Behavioral Sciences Branch
- Reproductive Sciences Branch

Center for Developmental Biology and Perinatal Medicine (CDBPM)

The CDBPM provides support for basic, clinical, and applied research and research training in maternal, fetal, and infant health, and disorders of human development. The Center seeks to advance fundamental and clinical knowledge about maternal health and problems of child development, such as preterm birth, mental retardation and developmental disabilities, congenital and genetic disorders, fetal and infant morbidity and mortality (including fetal growth restriction, stillbirth, SIDS, fetal therapy, and disorders of the high risk neonate), and other conditions. Areas of emphasis include, but are not limited to: biology of high-risk pregnancies and premature birth; low birth weight; mental retardation and developmental disabilities, including autism and fragile X syndrome; heritable diseases; birth defects; prenatal and neonatal screening; immunodeficiencies; and mechanisms and factors in teratogenesis and developmental biology, including basic studies of processes in embryonic development and the development and use of animal models to study developmental processes and genetic diseases.

The Center achieves its mission through the efforts of 3 branches:

- Developmental Biology, Genetics, and Teratology Branch
- Mental Retardation and Developmental Disabilities Branch
- Pregnancy and Perinatology Branch

Center for Research for Mothers and Children (CRMC)

The CRMC is a major source of research and research training in child health and in the health of mothers. The Center and its programs focus on maximizing growth and development, preventing transmission of HIV/AIDS in various populations, and improving knowledge about children's behavior and behavioral outcomes. Areas of emphasis include, but are not limited to: behavioral, social, and emotional adaptation from infancy through adolescence and early adulthood; learning disabilities; nutrition; endocrine disorders and growth retardation; and preconceptional, prenatal, and postnatal infectious diseases and HIV/AIDS. In addition, the CRMC plays a lead role in the following initiatives: the Global Network for Women's and Children's Health, the activities of the Best Pharmaceuticals Act for Child and Pediatric Pharmacology Research Unit Network, examinations of reading and math outcomes and how to improve them, and accident and injury prevention.

The Center achieves its mission through the efforts of its branches:

- Endocrinology, Nutrition, and Growth Branch
- Child Development and Behavior Branch
- Pediatric, Adolescent, and Maternal AIDS Branch
- Obstetric and Pediatric Pharmacology Branch

National Center for Medical Rehabilitation Research (NCMRR)

The NCMRR funds research training and projects to develop the scientific knowledge needed to promote the health, productivity, independence, and quality of life for people with disabilities. A primary goal of the Center is to bring the health-related problems of people with disabilities to the attention of the nation's best scientists, to capitalize upon the myriad advances occurring in the biological, behavioral, and engineering sciences.
The NCMRR supports a number of research programs:

- Behavioral Sciences and Rehabilitation Engineering Technology Program
- Biological Sciences and Career Development Program
- Pediatric Critical Care and Rehabilitation Program
- Traumatic Brain Injury and Stroke Rehabilitation Program
- Spinal Cord and Musculoskeletal Disorders and Assistive Technology Program

Division of Epidemiology, Statistics, and Prevention Research (DESPR)

DESPR, an intramural research program, provides the Institute with skills in 4 disciplines: biostatistics, epidemiology, computer sciences, and prevention research. DESPR relies solely on contracts—not grants—to fund its research. Within DESPR are 3 branches:

- Biometry and Mathematical Statistics Branch
- Epidemiology Branch
- Prevention Research Branch

In 2001, in response to the Children's Health Act of 2000, DESPR initiated the planning phase of the National Children's Study, a national, longitudinal study of environmental influences on child health. The study, led by a consortium of federal agencies, including HHS (the NICHD and NIEHS within NIH, as well as the Centers for Disease Control and Prevention) and the U.S. Environmental Protection Agency, will span more than 2 decades and will follow approximately 100,000 children. DESPR staff continue to be integral in Study planning and progress. In November 2004, DESPR staff and the Study's partner agencies announce the 96 locations for the study, release the Study Plan, and publish the request for proposals for

the study sites. Recruitment for the study is anticipated to begin in 2008.

Division of Intramural Research (DIR)

The DIR is broadly concerned with the biological and neurobiological, medical, and behavioral aspects of normal and abnormal human development. The Division's clinical research projects admit a limited number of research patients under guidelines established by the Director of the NIH Clinical Center. In addition to clinical research and training programs in the areas of genetics, endocrinology, and maternal-fetal medicine, a diverse range of developmental models are under study in research laboratories and branches. For more information about the DIR, visit http://dir2.nichd.nih.gov/.

At the recommendation of the Blue Ribbon Panel Review and the Board of Scientific Counselors, the DIR reorganized itself from 22 laboratories and branches to 10 Programs along with 3 Branches, 2 Sections, and 3 Core Facilities. The Programs, Branches, Sections, and Core Facilities include the following:

- Cell Biology and Metabolism Program (CBMP)
- Program in Cellular Regulation and Metabolism (PCRM)
- Program in Developmental and Molecular Immunity (PDMI)
- Program in Developmental Endocrinology and Genetics (PDEGEN)
- Program in Developmental Neuroscience (PDN)
- Program in Genomics of Differentiation (PGD)
- Program in Molecular Medicine (PMM)
- Program in Perinatal Research and Obstetrics (PPRO)
- Program in Physical Biology (PPB)
- Program in Reproductive and Adult Endocrinology (PRAE)
- Administrative Management Branch (AMB)
- Bone and Extracellular Matrix Branch (BEMB)
- Research Animal Management Branch (RAMB)
- Section on Nervous System Development and Plasticity (SNSDP)
- Section on Physical Biochemistry (SPB)
- Imaging Core
- Mass Spectrometry Core
- Unit on Biologic Computation (UBC) Core

Division of Scientific Review (DSR)

The DSR is responsible for a broad range of functions related to the review of grant applications for research and training, and of contract proposals for research. The Division also provides policy direction and coordination for planning and conducting initial scientific and technical merit reviews of applications for numerous types of grant applications, including small research grants, program projects, centers, institutional training grants, career development, and conference grants. In addition, the DSR coordinates and conducts the review of grant applications that are received by the NICHD in response to requests for applications, which are published with the aim of fostering work in a research area of particular relevance to the mission of the Institute. The Division also manages the technical evaluation of contract proposals that arrive in response to requests for proposals issued by the Institute.

To review grant applications, the DSR relies on subcommittees of the Child Health and Human Development (CHHD) Initial Review Group (IRG) or, where appropriate, a Special Emphasis Panel that is convened for its expertise in a specific area of science. The CHHD IRG includes subcommittees on the following scientific areas: pediatrics; developmental biology; biobehavioral and behavioral sciences; population sciences; obstetrics and maternal-fetal biology; reproduction, andrology, and gynecology; and function, integration, and rehabilitation sciences. In addition to managing the subcommittees, scientific review administrators also recruit extramural scientists to serve as peer-reviewers while maintaining oversight of all aspects of the peer-review process. Further, Special Emphasis Panels, which are convened as technical evaluation groups, also evaluate contract proposals.

National Institute of Child Health and Human Development—
Appropriations: Grants and Direct Operations

[*Amounts in thousands of dollars*]

Fiscal Year	Total Grants $	Direct Operations[1] $	Total $
1964	32,800	1,200	34,000
1965	38,906	3,790	42,695
1966	49,725	5,299	55,024
1967	55,710	9,212	64,922
1968	56,795	11,826	68,621
1969	57,363	15,763	73,126
1970	59,135	18,057	77,192
1971	64,151	30,609	94,760
1972	78,356	38,477	116,833
1973	89,114	41,315	130,429
1974	87,955	42,309	130,254
1975	97,848	44,587	142,435
1976	95,518	40,886	136,404
1977	100,717	44,826	145,543
1978	115,471	50,919	166,390
1979	143,951	54,039	197,630
1980	149,052	59,901	208,953
1981	164,233	56,395	220,628
1982	167,221	59,088	226,309
1983	188,948	65,376	254,324
1984	208,511	67,535	276,046
1985	236,547	76,211	312,758
1986	237,299	70,912	308,211
1987	281,413	85,238	366,651
1988	295,537	101,047	396,584
1989	318,567	106,701	425,628
1990	323,156	118,799	441,995
1991	351,031	127,916	478,947
1992	375,522	144,055	518,577
1993	380,059	147,708	527,767
1994	385,700	172,136	554,836
1995	397,494	172,815	570,309
1996	422,865	170,286	592,791

1997	454,374	176,991	631,365[2]
1998	486,527	185,565	672,092[3]
1999	551,845[4]	196,793	748,638[4]
2000	642,873	214,519	857,392
2001	738,441	237,140	975,581
2002	839,365	271,049	1,110,459
2003	892,243	313,684	1,205,927
2004	906,889	341,088	1,247,977
2005	903,027	359,263	1,262,290
2006	890,228	364,541	1,254,769
2007	898,923	355,221	1,254,144[5]

[1] Includes R&D contracts, intramural research, and research management support.
[2] Excludes enacted administrative reduction of $338.
[3] Reflects 1% transfers by HHS and NIH noncomparable to fiscal year 2000.
[4] Updated since the 1999 NIH Almanac.
[5] Includes comparable adjustments for program transfers as reflected in the FY 2009 Congressional Justification.

NIH Almanac: Organization

National Institute on Deafness and Other Communication Disorders

Mission | Important Events | Director | Programs

Mission

The National Institute on Deafness and Other Communication Disorders (NIDCD) conducts and supports research and research training on disorders of hearing and other communication processes, including diseases affecting hearing, balance, smell, taste, voice, speech, and language through:

- Research performed in its own laboratories and clinics
- A program of research grants, individual and institutional research training awards, career development awards, center grants, conference grants, and contracts to public and private research institutions and organizations
- Cooperation and collaboration with professional, academic, commercial, voluntary, and philanthropic organizations concerned with research and training that is related to deafness and other communication disorders, disease prevention and health promotion, and the special biomedical and behavioral problems associated with people having communication impairments or disorders
- The support of efforts to create devices that substitute for lost and impaired sensory and communication functions
- Ongoing collection and dissemination of information to health professionals, patients, industry, and the public on research findings in these areas.

Important Events in NIDCD History

October 28, 1988—Public Law 100-553 authorized the formation of the National Institute on Deafness and Other Communication Disorders.

June 26, 1989—The NIDCD Advisory Board held its first meeting.

September 18, 1989—The Advisory Council of NIDCD convened for the first time.

February 11, 1990—James B. Snow, Jr., M.D., was appointed as the first Director of NIDCD.

September 21, 1990—The NIDCD established the Office of Administrative Branch, Financial Management Branch, Personnel Management Branch, and Program and Health Reports Branch.

December 5, 1990—The Division of Intramural Research established labs and branches within the division.

December 6, 1990—The Information Systems Branch was created.

March 1, 1991—The NIDCD Information Clearinghouse was established.

April 4, 1991—The Board of Scientific Counselors of NIDCD held its first meeting.

November 19, 1991—The Deafness and Other Communication Disorders Interagency Coordinating Committee met for the first time.

December 29, 1991—David J. Lim, M.D., was appointed as Scientific Director.

May 8, 1992—NIDCD/American Academy of Otolaryngology—Head and Neck Surgery sponsored a live interactive satellite conference, "Warning! The Impact of Pollution on the Upper Alimentary and Respiratory Tracts," to inform scientists, physicians, and the public about health problems associated with pollution and identify areas of needed research.

August 21, 1992—NIDCD/Department of Veterans Affairs directors signed a Memorandum of Understanding that established a collaboration to expand and intensify hearing aid research and development.

October 23, 1992—NIDCD/National Aeronautics and Space Administration (NASA) established a formal scientific collaboration to enhance basic knowledge and understanding of vestibular function in both clinical and normal states and provide investigators access to NASA's unique ground-based research facilities and to space flight.

March 1-3, 1993—Consensus Development Conference, "Early Identification of Hearing Impairment in Infants and Young Children," evaluated current research and provided recommendations regarding hearing assessment from birth through 5 years of age.

October 25, 1993—NIDCD commemorated its fifth anniversary, "A Celebration of Research in Human Communication."

January 18, 1994—The Division of Communication Sciences and Disorders established the Hearing and Balance/ Vestibular Sciences Branch and the Voice, Speech, Language, Smell, and Taste Branch.

May 1994—The NIDCD Advisory Board held its final meeting.

August 5, 1994—The Division of Communication Sciences and Disorders was changed to the Division of Human Communication.

February 14, 1995—"The Partnership Program" began, designed to maximize opportunities for underrepresented students to participate in fundamental and clinical research in the NIDCD research areas, with 4 academic centers: Morehouse School of Medicine; University of Puerto Rico School of Medicine; University of Alaska System, Fairbanks; and Gallaudet University.

March 1, 1995—James F. Battey, Jr., M.D., Ph.D., was appointed as Director of the Division of Intramural Research.

May 15-17, 1995—Consensus Development Conference, "Cochlear Implants in Adults and Children," summarized current knowledge about the range of benefits and limitations of cochlear implantation.

September 11-13, 1995—First biennial conference, "Advancing Human Communication: An Interdisciplinary Forum on Hearing Aid Research and Development," was held.

September 4-5, 1997—Collaboration between NIDCD and the Maternal and Child Health Bureau and the Centers for Disease Control and Prevention resulted in the first NIDCD Working Group on Early Identification of Hearing Impairment. The panel agreed that early identification of and appropriate intervention for children with hearing impairment leads to improvements in speech and language development in affected children, thereby improving the likelihood of positive social,

emotional, cognitive, and academic development. The Working Group recommends a system of universal hearing screening within newborn nurseries be instituted.

September 13, 1997—James B. Snow, Jr., M.D., retired as the first Director of NIDCD. James F. Battey, Jr., M.D., Ph. D., became Acting Director of NIDCD.

September 22-24, 1997—The second biennial hearing aid research and development conference took place.

February 10, 1998—James F. Battey, Jr., M.D., Ph.D., was appointed as the new Director of NIDCD.

March 13, 1998—The NIDCD Working Group on Early Identification of Hearing Impairment's second workshop identified research opportunities offered by neonatal hearing screening programs, specifically in diagnostic strategies for characterizing hearing impairment and in the intervention strategies for remediating hearing impairment.

August 13-14, 1998—The Working Group on Single and Multiple Project Grants held its first meeting.

December 20, 1998—Robert J. Wenthold, Ph.D., was appointed as Scientific Director.

January - February 1999—The NIDCD convened a group of distinguished scientists and members of the public to provide recommendations for a Strategic Plan.

May 25, 1999—The NIDCD Working Group on Communicating Informed Consent to Individuals Who Are Deaf or Hard-of-Hearing met to clarify issues of informed consent, develop guidelines for use by scientists, and propose new, needed materials for improving communication about informed consent.

September 19, 2000—The third workshop of the NIDCD Working Group on Early Identification of Hearing Impairment identified critical research needs in the area of early identification of hearing impairment. The workshop was designed to provide advice to the NIDCD for identifying research to be supported through the Federal government grant and contract processes.

December 11, 2000—NIDCD signed a Memorandum of Understanding with the Center for Comparative and Evolutionary Biology of Hearing, University of Maryland, College Park, to establish a program for training graduate students in the hearing sciences.

March 22-23, 2001—The Division of Intramural Research, NIDCD, held its first retreat at St. Michael's, Md.

May 24, 2001—Dr. Battey unveiled the Institute's new logo at the Advisory Council meeting.

September 2002—Dr. Battey was appointed as Chair of the NIH Stem Cell Task Force by NIH Director Dr. Elias Zerhouni. In March 2007, Dr. Battey began serving as Vice Chair.

October 21, 2002—NIDCD hosted the first NIH lecture on health literacy, "Babel Babble: What Is the Doctor Saying? What Is the Patient Understanding?" for health communication professionals who develop health materials and communication strategies for a range of diverse audiences.

June 12, 2003—Dr. Battey opened the First NIH Symposium on Human Embryonic Stem Cells, Bethesda, Md.

December 2003—NIDCD's WISE EARS!® national campaign to prevent noise-induced hearing loss turned 5 years old.

The campaign is a coordinated effort among NIDCD, the National Institute on Occupational Safety and Health (NIOSH), and a coalition of organizations who care about hearing.

October 2004—NIDCD-funded investigator Dr. Linda Buck won the 2004 Nobel Prize in Physiology or Medicine.

October 19-20, 2006—NIDCD co-sponsored a workshop, titled "Noise-Induced Hearing Loss in Children at Work and Play," in Covington, Ky. The workshop convened researchers, hearing health professionals, teachers, and advocacy groups and focused on the prevention of noise-induced hearing loss.

Biographical Sketch of NIDCD Director James F. Battey, Jr., M.D., Ph.D.

Dr. Battey became the new NIDCD director on February 10, 1998. He served as acting director since the retirement of the Institute's first director in September 1997. He is responsible for the planning, implementation, and evaluation of Institute programs to conduct and support biomedical and behavioral research, research training, and public health information in human communication.

He received his education at the California Institute of Technology, where he earned his B.S. with honors in physics. He earned his M.D. and Ph.D. in biophysics at Stanford University, where he had residency training in pediatrics. His postdoctoral fellowship at Harvard Medical School was under the direction of the eminent scientist Dr. Philip Leder. While working with Dr. Leder, Dr. Battey was part of a team that cloned the genes encoding the IgE immunoglobulin constant region domains. In addition, he isolated and characterized the human c-myc gene, a key growth regulatory nuclear proto-oncogene that contributes to cancer formation when inappropriately expressed.

Dr. Battey has been with NIH since 1983, first on the staff of the National Cancer Institute (NCI), where he rose from senior staff fellow to senior investigator. In his work at the NCI-Navy Medical Oncology Branch, he collaborated in the isolation and characterization of human N-myc and L-myc, two additional members of the human myc gene family, important in human neoplasms. He became interested in neuropeptides and their receptors at this time because of their dual function as growth factors and regulatory peptides. His group isolated cDNA and genomic clones for mammalian bombesin-like peptides, key regulators of secretion, growth and neuronal firing.

In 1988 he moved to the National Institute of Neurological Disorders and Stroke as chief of the molecular neuroscience section in the Laboratory of Neurochemistry. In 1992 he returned to the NCI to head the molecular structure section of the Laboratory of Biological Chemistry, where his laboratory cloned and characterized the genes for 3 subtypes of mammalian receptors for bombesin-like peptides. His team at NCI's Laboratory of Biological Chemistry was among the first to clone the gene encoding cdk5, a member of the cyclin-dependent kinase family, where important proteins are involved in cell cycle control. Dr. Battey was appointed as director of the Intramural Research Program for NIDCD in 1995 by Dr. Snow, the first NIDCD director. The PHS has honored him with its PHS Commendation Medal in 1990 and the Outstanding Service Medal in 1994. He is author or co-author of over 130 research articles and is co-author with Leonard Davis and Michael Kuehl of *Basic Methods in Molecular Biology*.

NIDCD Directors

Name	In Office from	To
Jay Moskowitz (Acting)	October 31, 1988	February 1990
James B. Snow, Jr.	February 1990	September 13, 1997
James F. Battey, Jr.	September 14, 1997	Present

Research Programs

NIDCD supports and conducts research and research training in the normal and disordered processes of hearing, balance, smell, taste, voice, speech, and language through a program of grants and contracts in basic, clinical, and translational research. They are conducted in public and private institutions across the country and around the world and within the laboratories and clinics at the National Institutes of Health in Bethesda, Md.

The *Division of Intramural Research* conducts basic and clinical research in human communication disorders, which is within the mission of the Institute. Research objectives include: studies of electromechanical processes responsible for fine tuning in the cochlea; identification, characterization, and cloning of genes responsible for hereditary hearing impairment; electromotility of the outer hair cell; molecular bases of mechanosensory transduction mechanisms in the organ of Corti; molecular bases for G-protein signaling with emphasis on sensory signaling processes in the chemical senses; development of vaccines for otitis media; molecular mechanisms underlying the development and function of the mammalian taste system; mechanisms responsible for the development of the inner ear; molecular mechanisms underlying auditory system function with emphasis on neurotransmission and neuromodulation; identification of genes associated with neoplasms affecting human communication; identification of the genetic component of stuttering; neuroimaging of brain function in physiologic and pathophysiologic states; pathophysiology and etiology of voice and speech disorders; and epidemiological and biometric research studies of communication disorders.

The *Division of Extramural Activities* provides leadership and advice in developing, implementing, and coordinating extramural programs and policies. It represents the Institute on NIH committees on extramural program policies and oversees compliance with such policies within the NIDCD. The Division provides grant management and processing services for all of the Institute's grants and conducts initial scientific merit review of a large array of grant mechanisms and R&D contract proposals. In addition, the Division coordinates the Institute's committee management activities, research integrity activities, and Certificates of Confidentiality, and manages the meetings of the National Deafness and Other Communication Disorders Advisory Council. The Division has 2 components: Grants Management Branch and Scientific Review Branch.

- *Grants Management Branch (GMB*)—focal point for all business-related activities associated with the negotiation, award, and administration of grants and cooperative agreements within the NIDCD. GMB plays a critical role of bridging among the various NIH offices (review, program, financial management, and policy), institutional offices of sponsored programs, and principal investigators.
- *Scientific Review Branch (SRB)*—coordinates the initial scientific peer review of applications for the following mechanisms of support: research project grants, clinical center and core center grants, research training and career development grants, multi-site clinical trials, conference grants, and cooperative agreements, as well as all proposals for research and development contracts. SRB also coordinates receipt and referral issues with the Center for Scientific Review, represents NIDCD on NIH's overall committee for review policies, and manages all aspects of NIDCD's peer review process.

The *Division of Scientific Programs* of NIDCD is responsible for coordinating a broad range of activities and functions to assure sound and efficient management of NIDCD's extramural activities that include a program of research grants, career development awards, individual and institutional research training awards, center grants, and contracts to public and private research institutions and organizations. The Division also plans and directs a program of grant and contract support for research and research training in the normal processes and diseases and disorders of hearing, balance, smell, taste, voice, speech, and language to insure maximum utilization of available resources in attainment of the Institute's objectives; assesses needs for research and research training in program areas; establishes program priorities and recommends funding levels for programs to be supported by grants; and sets priorities and funding levels for research to be supported by contracts.

Hearing

The fields of cellular and molecular biology have furthered hearing research. A multitude of genes for syndromic and nonsyndromic forms of hearing impairment including autosomal dominant and recessive, X-linked and mitochondrial modes

of transmission have been located in specific regions of the human genome. In addition, clinically relevant genes essential for normal auditory development and/or function are being identified and cloned at a rapid pace.

Other cochlear-specific genes have been isolated from enriched membranous labyrinth cDNA libraries. New technology, including the development of detailed maps of expressed sequence tags (EST) coupled with the use of inner ear specific cDNA libraries, exon trapping, and cDNA library enrichment procedures, have facilitated gene cloning. Once relevant genes have been cloned, the molecular biology of hearing and the role of particular proteins in the development and/or maintenance of the inner ear can be determined. Mouse models of hereditary hearing impairment have been instrumental in mapping and cloning many deafness genes. Because of the utility of the mouse for such studies, additional mouse models of deafness are being created through mutagenesis and screening programs as well as targeted mutation of deafness genes found in man. In addition, mouse models are being used to study the function of the proteins encoded by deafness genes and to test therapeutic approaches. These advances offer researchers many opportunities to study the characteristics of deafness, hereditary factors involved in hearing loss, and genes that are critical for the development and maintenance of the human ear. Great strides are being made in the study of properties of auditory sensory cells and of characteristics of the inner ear's response to sound.

Hearing conversation in the midst of a crowded, noisy room is very difficult with current hearing aids. NIDCD-supported researchers are working to revolutionize the technology of directional microphones. The technology is based on the ears of a parasitic fly, *Ormia ochracea*. Despite the small size of the insect's ears and the short distance between them, *Ormia's* ears are able to rapidly pinpoint the location from which the sound of a potential host—a cricket—is coming, even in a noisy environment. The intriguing mechanism that enables *Ormia* to accomplish this feat has provided a model for scientists and engineers to use in developing miniature directional microphones for hearing aids that can better focus on speech in a single conversation, even when surrounded by other voices.

Scientific advances have also been translated into cochlear implants. Research has verified that despite the variability in the performance of children who have received cochlear implants, most demonstrate marked improvements in speech perception and production. Cochlear implants also positively influence children's receptive and expressive language skills. The longer children use their implants, the greater their language ability. To achieve the most benefit from their implants, however, children generally need extensive oral-auditory training following implantation and also benefit from periodic audiological assessments. Cochlear implants have benefited children who are congenitally deaf as well as those who are postlingually deaf. Scientists supported by the NIDCD have demonstrated that cochlear implants can restore the structure of synapses—the connecting space between neurons—along the auditory nerve in deaf cats. Because untreated congenital (at birth) deafness is believed to cause permanent changes in the auditory system, this finding may explain why cochlear implants work best in young children before irreversible abnormalities occur. The vast majority of adult implant recipients derive substantial benefit in conjunction with speechreading, and most can communicate effectively by telephone.

Neural prosthesis development efforts are continuing to seek improved device design elements and novel algorithms for operation. These activities are primarily based on animal studies that allow new concepts for selective stimulation of neural tissue to be tested quantitatively and any risks for safe operation identified through both neurophysiologic and histologic studies. Microstimulation delivered through electrodes that penetrate the neural tissue and infrared optical stimulation are 2 examples of novel device elements currently under development. Other research projects are assessing novel signal processing and stimulation algorithms which could be provided to the current generation cochlear implant recipients, if they are proven to extend user performance limits.

It is estimated that more than 50 million Americans experience tinnitus to some degree. Of these, about 12 million have tinnitus severe enough to seek medical attention. Many learn to ignore the sounds and experience no major effects. However, about 2 million patients are so seriously debilitated that they cannot function normally, finding it difficult to hear, work, or sleep. For many years, it was believed that structures in the inner ear produced tinnitus, but more recent evidence suggests that for many people, tinnitus is generated in the central nervous system. Though research is providing more evidence for the causes and treatments of tinnitus, there is no real understanding of the biological bases of tinnitus, nor are there any treatments that help most sufferers. New research directions promise to produce new treatments.

Valuable progress has been made in understanding the structure and function of efferent feedback pathways to the inner and middle ear. There is now evidence that this system may aid in the detection of signals in noisy environments and serve to protect the ear from acoustic injury.

Our knowledge of the mechanisms of neural plasticity (the ability of the brain to change or adapt) has increased tremendously over the past decade. In contrast, our knowledge of the mechanisms that regulate and instruct plasticity remains primitive. The calibration of the auditory system's map of space by the visual system is a well-characterized example of supervised learning. In an animal model, the site in the auditory pathway where visual signals exert their effects, and the structural and functional changes they cause, have been determined. However, the properties of the instructive signals themselves, and the mechanisms by which they exert their effects, remain unknown. Research is ongoing to understand these mysteries, which will allow us to better understand learning and learning problems.

In the aging auditory system, discoveries have been made demonstrating changes in the regulation of fluid composition and autoregulation of cochlear blood flow which may underlie some of the biologic effects of aging on auditory function. The role of the stria vascularis in maintaining cochlear homoestasis has now been shown to be a component in the loss in hearing accompanying aging. Improved behavioral and electrophysiological techniques for measuring auditory function are providing more accurate assessments of the peripheral and central components of age-related hearing impairment.

Recent development of animal models for bacterial and viral infections hold promise for new diagnostic and therapeutic approaches to sensorineural hearing loss caused by infections. Antiviral drugs may find rapid application in the treatment for these conditions with the advent of suitable animal models in which to test efficacy. In addition, models will allow a greater understanding of why and to what degree infants and children are susceptible to ototoxic drugs used in the treatment of infections.

Otitis media continues to be a significant focus of research because of its prevalence and cost to society. Important risk factors have been identified. Studies of the eustachian tubes have provided new information on tubal mechanics, surfactant-like (fluid) substances and middle ear pressure regulation. The role of bacterial biofilms in chronic otitis media is a new and promising area of investigation. State-of-the-art molecular, genetic and genomic techniques are being used to identify genes that may predispose an individual to chronic otitis media. These techniques are also being used to define the specific molecular changes that allow viral and bacterial infection of the middle ear as well as the host/pathogen interactions that facilitate the disease process. The EarPopper (developed with support from the Small-Business Innovation Research Program) is a safe, simple, non-surgical, non-drug related prescription device for treating such common conditions as otitis media with effusion, aerotitis/barotitis (caused by rapid elevation changes), and eustachian tube dysfunction in children and adults.

Balance

NIDCD supports research on balance and the vestibular system. Balance disorders affect a large proportion of the population, particularly the elderly. The vestibular system, with its receptor organs located in the inner ear, plays an important role in the control of balance while the body is immobile and in motion, the maintenance of one's orientation in space, and visual fixation of objects during head movement. Vestibular disorders can therefore yield symptoms of imbalance, vertigo (the illusion of motion), disorientation, instability, falling, and visual blurring (particularly during motion). Deficits in vestibular function result from diverse disease processes, including infection, trauma, toxicity, impaired blood supply, autoimmune disease, impaired metabolic function, and tumors.

The cellular motion detectors of the vestibular system are mechanosensory hair cells, activated by movements of fluids and masses in the inner ear. New technologies are being used with NIDCD support to visualize and understand the micromechanical motions and the biophysical mechanisms that lead to the neural signals carried from the inner ear to the brain.

Investigators supported by the NIDCD also use molecular biology and biochemistry to characterize the cellular biochemical pathways and genes essential to normal development and function in the vestibular system. The genetic bases of several human-inherited cerebellar syndromes of imbalance and incoordination are currently being investigated.

NIDCD-supported studies suggest that, in addition to its role in the stabilization of gaze and balance, the vestibular system plays an important role in regulating respiratory muscles as well as autonomic functions, including blood pressure. These

studies hold potential clinical relevance for the understanding of certain kinds of breathing problems, and management of orthostatic hypotension (lowered blood pressure related to a change in body posture).

The Institute supports research to develop and refine tests of balance and vestibular function. Computer-controlled systems have been developed and validated for clinical use to measure eye movement and body postural responses activated by stimulating specific parts of the vestibular sense organ and nerve. Also, tests of functional disability and physical rehabilitative strategies currently being applied in clinical and research settings will have important implications for refining the rehabilitation of patients with balance and vestibular disorders.

A vestibular neural prosthesis similar to the cochlear implant is under development by a team of NIDCD-funded investigators. Animal studies with this device will allow preliminary assessment of the restoration of function possible through electrical stimulation of the vestibular nerve. Research is progressing to refine the vestibular prosthesis and to determine its viability for application to vestibular-deficient humans.

Smell and Taste

NIDCD investigators study the chemical senses of olfaction (smell) and gustation (taste) to enhance our understanding of how individuals sense their environment and make discriminating food choices. Smell and taste perception play important roles in preferences and aversions for aromas, specific foods, and flavors. Sweet-tasting substances are generally consumed and contribute to caloric intake and proper nutrition; bitter-tasting substances are typically avoided because bitterness is often associated with toxic compounds that cause illness. The NIDCD is supporting research on the development of bitter-taste blockers and artificial sweeteners in an effort to identify compounds that can mask the bitter taste of essential medications and reduce the caloric impact of sugars, especially in children.

Both the olfactory and gustatory systems offer special approaches for the understanding of the fundamental mechanisms of neural plasticity. NIDCD scientists have found that smell and taste receptor cells are continually replaced and have the further capacity to replace themselves rapidly in response to injury. With every hard sneeze and with every burnt tongue from a hot cup of coffee, olfactory and taste receptor cells are destroyed and then replaced. In addition, chronic rhinosinusitis and nasal polyps can affect olfactory function, and a variety of prescription medications can harm taste receptors. Smell and taste receptor cells are the only known mammalian sensory cells with this native regenerative capability, and the olfactory system is now used as a model system in the study of the biology of multipotent stem cells. Unfortunately, the plasticity of the olfactory system declines with age, with important consequences to the health of the increasingly aged population. The perceived quality of foods moves toward blandness in the elderly and this affects food intake, diet and overall nutrition, and health status. Prevention of this age-related decline in olfactory sensitivity is being studied by NIDCD investigators.

Advances in molecular and cellular biology, biophysics and biochemistry of the olfactory and gustatory systems are paving the way for improved diagnosis, prevention and treatment of chemosensory disorders. The vertebrate olfactory receptor neuron has become an important model system in molecular and cellular biology. The olfactory receptor gene family has been described in several mammalian species, including humans, and may contain as many as 1,000 members. NIDCD scientists are presently characterizing genetic mechanisms of olfaction, which will provide the opportunity to study the molecular pharmacology of the process of smell. More recently, a family of about 80 taste receptor genes has been identified by NIDCD investigators. Interestingly, both olfactory and sweet and bitter taste receptors are structurally related and activate similar second messenger signal transduction cascades, which ultimately generate neural activity in the central nervous system. The characterization of these receptor genes was greatly facilitated by the genetic database provided by the NIH's human and mouse genome projects.

The molecular biological studies of olfactory and taste receptor cells have provided essential information about the sensitivities of the chemical senses at the first level of neural integration. The coding of odorants and tastants by the central nervous system begins at the level of the receptor cell. In addition, in both the olfactory and gustatory systems, odor and taste quality coding is further refined by a synthetic computational process of the central nervous system. NIDCD-funded projects are examining the nature of the central coding. In the olfactory system, odor coding appears very complex because of the numerous types of structurally diverse odors that must be detected and because of the complicated neuroanatomical organization of the olfactory system. We are just beginning to understand the nature of the olfactory code. On the other

hand, in the taste system, significant progress has been made in our understanding of how the four taste qualities of sweet, salty, sour, and bitter are coded centrally. Recent work suggests a fifth taste quality, umami, which is familiar to many as the taste of monosodium glutamate (MSG). The nature of the gustatory code and the high degree of central processing makes the gustatory system very resistant to damage. Consequently, the taste system is less often affected by injury and aging in comparison to the olfactory system.

NIDCD-supported research has shown that an individual's preference and sensitivity to certain odors and taste compounds has a genetic basis. Simply stated: different people like different foods. Since genetic factors play a role in one's food choices and overall diet, any level of smell and taste dysfunction will have an adverse impact on nutrition. Altered nutritional status can lead to emotional, cardiovascular and gastrointestinal complications. The NIDCD supports research to study the health risks associated with compromised smell and taste function.

Voice, Speech, and Language

Studies in the voice and speech program focus on determining the nature, causes, treatment, and prevention of a variety of disorders of motor speech production throughout the lifespan. Research is being conducted on disorders such as stuttering, speech-sound acquisition disorders, childhood apraxia of speech, voice disorders, and swallowing disorders. When oral speech communication may not be a realistic option for individuals with severe dysarthria, alternative and augmentative communication (AAC) devices and strategies are used. Substantial progress has been made in the development of augmentative communication devices to facilitate the expressive communication of persons with severe communication disabilities. An investigation of performance by young users of augmentative communicative devices is in progress. Other funded research evaluates whether a low-cost, laser-activated keyboard for accessing personal computers is feasible. By providing access to computers, including a brain-computer interface (BCI) communication prothesis, individuals with disabilities can immediately use personal computer software programs and speech synthesizers for augmentative communication.

NIDCD-funded investigators are studying the use and development of aerosol hydration to prevent voice injury and optimize vocal performance. Others are comparing behavioral treatments for voice disorders in school teachers. Basic research is laying the groundwork for translational research towards creating a more successful treatment of laryngeal paralysis and other peripheral nerve injuries. Others are studying the limbic and motor system interaction in laryngeal function using an animal model to better understand mechanisms of voice disorders and speech disorders and their recovery.

Spasmodic dysphonia is a unique voice disorder with significant physical and emotional burden. A phase 1 randomized prospective clinical trial comparing Botox injection, a combination treatment of behavioral intervention and Botox injections, and sham therapy and Botox is being conducted.

Investigators are actively working to provide locked-in individuals with a direct means of producing speech to allow rapid communication between the individual and caregivers. The individual's control of computers will be enabled through development of a direct brain-to-speech generator that uses a person's neural signals.

Language research continues to expand our knowledge of the role played by each brain hemisphere in communication and language, early specialization of the brain, and the recovery process following brain damage. This research will further our understanding of the neural bases of language and language disorders. Research on acquisition, characterization, and utilization of American Sign Language is expanding knowledge of the language used by many people who are deaf.

Language researchers supported by NIDCD are also exploring the genetic bases of child speech and language disorders, as well as characterizing the linguistic and cognitive deficits in children and adults with language disorders. Researchers are developing effective diagnostic and intervention strategies for children who are autistic, or have specific language impairment, as well as adults with aphasia.

NIH Almanac: Organization

National Institute of Dental and Craniofacial Research

Mission | Important Events | Legislative Chronology | Director | Programs

Until October 21, 1998, the National Institute of Dental Research

Mission

The mission of the National Institute of Dental and Craniofacial Research (NIDCR) is to improve oral, dental, and craniofacial health through research, research training, and the dissemination of health information. We accomplish our mission by:

- Performing and supporting basic and clinical research;
- Conducting and funding research training and career development programs to ensure an adequate number of talented, well-prepared, and diverse investigators;
- Coordinating and assisting relevant research and research-related activities among all sectors of the research community;
- Promoting the timely transfer of knowledge gained from research and its implications for health to the public, health professionals, researchers, and policy-makers.

Important Events in NIDCR History

1931—The U.S. Public Health Service created a Dental Hygiene Unit at NIH and designated Dr. H. Trendley Dean as the first dental research worker. His primary function was to apply principles of epidemiology to a series of community studies on the oral disease known as mottled enamel. His research on fluoride showed not only its relation to mottled enamel, but also its influence on tooth decay.

1945—Following fluoridation of the water supply in Grand Rapids, Michigan, annual examinations of children were begun to study the effects of fluoride on the development of dental caries.

1948—On June 24, Public Law 80-755, the National Dental Research Act created the National Institute of Dental Research (NIDR) and the National Advisory Dental Research Council. On September 16, the Institute was established.

1949—The first meeting of the National Advisory Dental Research Council was held on January 10. The institute-supported grants program was initiated, and the first grants and fellowships were awarded.

1954—Results of the first 10 years of the Grand Rapids study firmly established water fluoridation as a safe, effective, and economical procedure for the control of dental caries.

On October 30, the first meeting of the Board of Scientific Counselors was held. This board was established to provide advice to NIDR on matters of general policy, particularly from a long-range viewpoint, as they relate to the intramural program.

1958—The Laboratory of Biochemistry was established to conduct research studies on the chemistry and structure of collagen, elastin, and other proteins. President Dwight D. Eisenhower signed the appropriations bill, which included provisions to finance the construction of a building for the dental institute.

1960—On September 21, the cornerstone was laid for the dental institute building (Building 30) at NIH.

1961—On May 26, U.S. Department of Health, Education, and Welfare (HEW) Secretary Abraham A. Ribicoff dedicated the new NIDR building.

1962—The first grant for a multidisciplinary study of cleft palate was awarded to the University of Pittsburgh Health Center.

1963—Fifteen years of scientific accomplishment by NIDR were cited by scientists, administrators, and health educators on June 14 in a special anniversary observance.

1966—A reorganization of the institute's extramural programs was implemented to more adequately plan and support research and training programs designed to attack the major dental diseases and disorders—dental caries, periodontal disease, oral-facial anomalies, and biomaterials.

1967—An NIDR program of grant support was initiated for the development of several dental research institutes/centers in university environments. This program was designed to utilize all of the appropriate resources of the parent universities to create ideal research and training environments, fostering interdisciplinary approaches to the complex problems of oral diseases and disorders.

1969—The Laboratory of Histology and Pathology was reorganized and named the Laboratory of Biological Structure. This laboratory conducts basic research on the structural and chemical organization of the hard and soft tissues of the oral cavity.

1971—The National Caries Program was launched utilizing funds specifically earmarked to accelerate development of preventive methods to reduce tooth decay.

1973—The Laboratory of Oral Medicine was established to conduct both clinical and laboratory research on the cause, prevention, and treatment of diseases of the soft tissue of the oral cavity.

On June 28-29, a scientific conference commemorating the silver anniversary of NIDR was convened in Washington, D.C.

1974—To encompass the expanded research studies conducted by the Laboratory of Microbiology, the Laboratory of Microbiology and Immunology was established. Laboratory programs involve the role of host factors in periodontal diseases, autoimmune diseases, and allergic disorders.

To emphasize anesthesia-analgesia dental problems, the NIDR reorganized its intramural program to form a Neurobiology and Anesthesiology Branch composed of the neural mechanism section and the anesthesiology section. The branch collaborates closely with the extramural programs concerned with pain control and behavioral studies.

1975—Having already established the safety and efficacy of several caries preventive measures, the NIDR initiated selected school demonstration projects through its National Caries Program.

1977—The institute established its first 2 specialized clinical research centers in periodontal diseases.

In June, Dr. Marie U. Nylen was named director of intramural research, the first woman to hold such a position at NIH.

1978—NIDR sponsored its first consensus development conference, *Dental Implants—Benefit and Risk*, to examine available data, suggest future research, and draft guidelines for implant therapy.

1980—The Diagnostic Systems Branch was created to pursue research and development of noninvasive diagnostic techniques, and analysis of the functional development of the oral and pharyngeal region.

A Clinical Investigations and Patient Care Branch was established to emphasize the intimate association between the Institute's patient treatment and clinical dental research programs.

1982—The Laboratory of Biological Structure and the Laboratory of Biochemistry were replaced by the Laboratory of Oral Biology and Physiology and a Mineralized Tissue Research Branch. The Laboratory of Oral Biology and Physiology conducts research on the cell biology of secretory tissues and the chemical modification of proteins. Skeletal development, regulation, and disorders are under investigation in the Mineralized Tissue Research Branch.

1983—On March 21, the NIDR opened the first multidisciplinary pain clinic in the U.S. devoted exclusively to research. The clinic provides an opportunity for all NIH researchers and clinicians to pool their knowledge and exchange ideas about the pathophysiology and treatment of pain.

The Institute initiated an annual honorary lecture to recognize outstanding scientific accomplishment in basic and clinical research and to honor distinguished scientists who have made important contributions in areas of research directly related to the interests of the dental institute.

1984—NIDR inaugurated the Dentist Scientist Award Program designed to provide opportunities for dentists to develop into independent biomedical investigators in the oral health research field.

The Institute completed its Long-Range Research Plan FY 1985-89 entitled *Challenges for the Eighties*. Under the direction of NIDR Director Dr. Harald Löe, a coordinating committee prepared this 5-year plan and summary of progress in the oral sciences and in disease prevention, diagnosis, and treatment. The document pinpoints 14 emphasis areas for NIDR's oral health research.

NIDR established 3 new specialized caries research centers in university environments to continue research investigations into the cause, treatment, and prevention of dental decay.

An NIDR reorganization disbanded the National Caries Program and created the Epidemiology and Oral Disease Prevention Program (EODPP). The EODPP is devoted to research on the etiology, incidence, and prevalence of dental caries, periodontal diseases, and other oral diseases and disorders.

Also, a realignment of the administrative offices within the Office of the Director was completed. This realignment established the Office of Planning, Evaluation and Communications (OPEC).

An NIDR annual lecture series was named for a former Institute director. Given each September at NIH, it is known as the Seymour J. Kreshover Lecture Award.

1985—NIDR convened a meeting at NIH of over 160 deans and senior officials from almost every U.S. and Canadian dental school to explore key issues in dental research and education. The conference, first of its kind in NIDR history, was designed to strengthen the relationship between the institute and universities.

1986—NIDR completed its first nationwide survey on the dental health of American adults—the most comprehensive survey of its kind ever done, and the first to look at the prevalence of root caries and periodontal disease in detail.

1988—NIDR celebrated its 40th anniversary with a year-long agenda of commemorative activities.

NIDR funded 4 new oral biology research centers.

The Institute released findings of its second National Caries Prevalence Study. Data show half of all American schoolchildren now have no tooth decay.

NIDR held its second consensus development conference on dental implants. According to the summary statement, the use of dental implants has increased fourfold from 1983 to 1987.

NIDR and the Fogarty International Center launched an international oral health research study to identify oral health issues that would benefit most from international collaborative research.

The Institute launched the "Research and Action Program to Improve the Oral Health of Older Americans and Other Adults at High Risk." The goal is to eliminate toothlessness and prevent further deterioration of oral health in individuals who have compromised dentition.

1990—The Institute completed the *NIDR Long-Range Research Plan for the Nineties: Broadening the Scope*, the blueprint for research in this decade. The plan establishes major initiatives geared to "special care patients" whose oral health is affected by systemic diseases or treatments and to older Americans, with the ultimate goal of eliminating toothlessness among future generations and preventing further deterioration of the oral health of individuals with compromised dentition.

1991—NIDR hosted a symposium for dental practitioners, "Scientific Frontiers in Clinical Dentistry: An Update at the National Institutes of Health."

The Institute sponsored a technology assessment conference on the effects and side effects of dental restorative materials.

The Laboratory of Developmental Biology and Anomalies was renamed the Laboratory of Developmental Biology (LDB). LDB research aims to gain a better understanding of normal human development.

1992—The Epidemiology and Oral Disease Prevention Program reorganized to expand the scope of EODPP activities. The program now consists of 4 branches: Molecular Epidemiology and Disease Indicators; Disease Prevention and Health Promotion; Analytical Studies and Decision Systems; and Health Assessment. EODPP is the Federal focus for research in orofacial epidemiology and disease prevention.

A reorganization of the Extramural Program (EP) established the Program Development Branch, consisting of 7 categorical programs and an Office of Policy and Coordination. This office contains manpower development and training activities and the Program Operations Unit, which includes the Scientific Review Office, the Grants Management Office, and the Contracts Management Office. EP provides grant and contract funds for research and research training.

NIDR hosted a second meeting of the leadership from the nation's dental schools, dental professional organizations and industry to explore ways to enhance the research capacity of dental schools.

1993—The National Oral Health Information Clearinghouse was established as a centralized resource for patients, health professionals, and the public seeking information on the oral health of special care patients.

1994—The intramural, extramural, and epidemiology organizational components of NIDR were redefined from programs to divisions, establishing the Division of Intramural Research, the Division of Extramural Research, and the Division of

Epidemiology and Oral Disease Prevention (DEODP).

The DEODP was streamlined from 4 to 3 branches: Analytical Studies and Health Assessment; Disease Prevention and Health Promotion; and Molecular Epidemiology and Disease Indicators.

1995—NIDR sponsored "Partnerships in Communication: A Meeting of Dental Editors," which brought together for the first time at NIH more than 30 editors and executive directors of dental organizations to enhance communication among the group.

The Institute met with a diverse group of representatives from pharmaceutical, biotechnology, manufacturing, and other industries to develop ways to accelerate the transfer of research findings into application.

NIDR conducted more than 30 focus groups with professional organizations, NIDR staff, specialty groups, and the public toward the development of a new Institute strategic plan.

1996—The first community conference in the Institute's history was held in May for employees to review the NIDR strategic planning process to date and to discuss the NIDR mission, vision, situation audit, strategic initiatives, management principles, and plans for the future.

The NIDR sponsored a technology assessment conference on the management of temporomandibular disorders.

The Institute's intramural, extramural, and epidemiology organizational components were reorganized into the Division of Intramural Research and the Division of Extramural Research.

NIDR launched its World Wide Web page on the Internet, making all pertinent information available to the public and the research community.

1997—The NIDR's first strategic plan, Shaping the Future, was released in July. Focusing on areas of research opportunities, research capacity, and health promotion, the document serves as a critical structure within which multiple institute initiatives are undertaken.

The Institute celebrated its 50th anniversary.

A reorganization within the Office of the Director created the Office of International Health, the Office of Science Policy and Analysis, and the Office of Communications and Health Education. The Office of Planning, Evaluation, and Communications was eliminated.

1998—The Institute changed its name to National Institute of Dental and Craniofacial Research to accurately reflect its research base. NIDCR became official on October 21, 1998, with the Omnibus Consolidated and Emergency Supplemental Appropriations Act, H.R. 4328.

1999—NIDCR introduced its *Strategic Plan to Reduce Racial and Ethnic Health Disparities*. The plan is designed to support research leading to the reduction and prevention of health disparities, including those in the oral cavity, and to provide research opportunities to increase the diversity of the scientific workforce.

The Office of Information Technology was established within the NIDCR Office of the Director.

2000—The Institute hosted the first "NIDCR Patient Advocates Forum." The conference, attended by patient advocates from 15 organizations, was designed to enhance communication between patient liaison groups and NIDCR and to bring the

patient perspective to Institute planning and research.

NIDCR served as lead agency for the preparation and publication of *Oral Health In America: A Report of the Surgeon General*, released on May 25th. The report—commissioned by U.S. Department of Health and Human Services Secretary Donna Shalala and released by Surgeon General David Satcher—is the first of its kind to be dedicated solely to oral health.

The Institute supported the first-ever national, multidisciplinary meeting on children and oral health, "Face of a Child," held June 12-13 in Washington, D.C.

2001—The Division of Extramural Research was reorganized into 3 components: Division of Basic and Translational Sciences, Division of Population and Health Promotion Sciences, and Division of Extramural Activities.

NIDCR sponsored a consensus development conference on the Diagnosis and Management of Dental Caries Throughout Life.

The Institute released its strategic plan to eliminate craniofacial, oral, and dental health disparities.

NIDCR funded 5 new Centers for Research to Reduce Oral Health Disparities.

2003—NIDCR released its Strategic Plan for FY 2003-2008, which addresses the myriad diseases and conditions that affect the oral cavity and craniofacial structures by outlining a course for the Institute to follow in the areas of research, research training, and communication of research results.

The Institute was a lead agency in preparing *A National Call to Action to Promote Oral Health,* released April 29, 2003, by U.S. Surgeon General Richard Carmona.

2005—NIDCR awarded three major grants that establish regional "practice-based" research networks to investigate with greater scientific rigor everyday issues in the delivery of oral health care.

Two extramural research programs were reorganized into 4 centers focusing on craniofacial research, infectious diseases and immunology, clinical research, and health promotion and behavioral research.

2006—NIDCR integrated its extramural programs into 2 centers—the Center for Integrative Biology and Infectious Diseases and the Center for Clinical Research—and a Biotechnology and Innovation Program.

2007—NIDCR reorganized its extramural program to better reflect the current NIH extramural model. The Center for Integrative Biology and Infectious Diseases was renamed the Division of Extramural Research (DER); the Center for Clinical Research is now part of the DER.

NIDCR Legislative Chronology

June 24, 1948—Public Law 80-755 established NIDR to conduct, support, and foster research investigations on the causes, treatment, and prevention of dental diseases and conditions.

August 1, 1958—President Eisenhower signed an HEW appropriation bill that included provisions to finance construction of laboratory facilities to house NIDR.

October 21, 1998—The Institute's name change to the NIDCR became official when President Bill Clinton signed the Omnibus Consolidated and Emergency Supplemental Appropriations Act, H.R. 4328.

Biographical Sketch of NIDCR Director Lawrence A. Tabak, D.D.S., Ph.D.

Dr. Lawrence A. Tabak was appointed as the seventh director of the NIDCR in September 2000. As Director, he provides leadership for a team of 450 scientists, administrators, and support staff with an approximate annual budget of $389 million.

Prior to joining NIH, Dr. Tabak was the senior associate dean for research and professor of dentistry and biochemistry & biophysics in the School of Medicine and Dentistry at the University of Rochester in New York. He served as director of several multi- and interdisciplinary institutional programs, including the Medical Scientist Training Program, the Dentist Scientist Training Program, the Summer Program for Underrepresented Dental Students, and the Howard Hughes Medical Institute's Infrastructure Program for Schools of Medicine.

A former NIH MERIT recipient, Dr. Tabak's major research focus has been on the structure, biosynthesis, and function of mucin-glycoproteins. He continues work in this area, maintaining an active research laboratory in addition to his administrative duties.

Dr. Tabak has served actively as co-chair of the Research Teams of the Future component of the NIH Roadmap that emphasizes new ways of doing team science to catalyze additional multi- and interdisciplinary research. He also co-chairs 2 working groups, one reporting to the Advisory Committee to the NIH Director and the other to the NIH Steering Committee, that are examining approaches to enhance the system used by NIH to support biomedical and behavioral research. In addition, Dr. Tabak serves as the co-chair of the NIH-wide pain consortium.

The NIDCR director has received numerous honors and awards for his work, including being elected a fellow of the American Association for the Advancement of Science and a member of the Institute of Medicine of the National Academies. A native of Brooklyn, New York, Dr. Tabak received his undergraduate degree from City College of the City University of New York, his D.D.S. from Columbia University, and both a Ph.D. and certificate of proficiency in endodontics from the State University of New York at Buffalo.

NIDCR Directors

Name	In Office from	To
H. Trendley Dean	September 17, 1948	March 31, 1953
Francis A. Arnold, Jr.	April 1,1953	February 1966
Seymour J. Kreshover	February 1966	June 30, 1975
Clair L. Gardner (Acting)	July 1,1975	December 31, 1975
David B. Scott	January 1, 1976	December 31, 1981
John F. Goggins (Acting)	January 1, 1982	December 31, 1982
Harald Löe	January 1983	June 1, 1994
Dushanka V. Kleinman (Acting)	June 1994	June 1995
Harold C. Slavkin	July 1995	July 14, 2000
Lawrence A. Tabak	September 2000	Present

Research Programs

Division of Extramural Research

NIDCR is the primary sponsor of dental, oral, and craniofacial research and research training. Through its Division of Extramural Research, the Institute provides funds outside its intramural laboratories and clinics in Bethesda, Maryland. Funds are made available in the form of grants, cooperative agreements, and contracts, which support scientists working in institutions throughout the U.S. and in foreign countries. These scientists conduct basic, translational, patient-oriented and demonstration research to increase understanding of fundamental processes in health and disease, and to promote timely transfer and community adoption of research findings. The Institute also supports research training and career development to ensure an adequate pool of research personnel.

NIDCR supports 2 Specialized Centers for Oral, Dental, and Craniofacial Research. These centers include individuals with diverse scientific backgrounds who are applying state-of-the-art technologies to highly integrated projects designed to provide new insights into oral and craniofacial diseases and disorders. NIDCR also funds 5 Centers for Research to Reduce Oral Health Disparities. The centers are focused on identifying factors contributing to oral health disparities and developing and testing strategies for their elimination. Each center also provides training and career development opportunities for scientists in underrepresented groups and others interested in careers in oral health disparities research.

The Division of Extramural Research comprises 3 branches and 1 center:

The *Behavioral and Social Sciences Research Branch* coordinates the research activities in this field that span the Institute's extramural research program. With a focus on disease prevention and health promotion, the branch supports biobehavioral, social science, health literacy, communication, and informatics research.

The *Integrative Biology and Infectious Diseases Branch* supports basic and translational research on the microbial and immunological aspects of oral diseases such as dental caries, periodontal diseases, oral candidiasis, and head and neck cancer. Programs also focus on research into the underlying mechanisms of the oral complications of HIV/AIDS, as well as salivary gland biology and processes involved in orofacial pain. In addition, the branch supports research on developmental biology and genetics, tissue engineering, and technology development.

The *Translational Genomics Research Branch* supports research to understand the genetic factors that contribute to oral, dental, and craniofacial diseases and to apply genetic information and technologies to the development of new diagnostic and treatment strategies. The program also funds studies that explore the mechanisms by which human genes and proteins interact with environmental and behavioral factors to cause conditions more commonly seen in dental practice, such as clefting, dental caries, periodontal disease, and oral cancer.

The *Center for Clinical Research* supports patient-oriented and population-based research, including clinical trials, practice-based networks, epidemiology, and health disparity research in all areas of program interest to NIDCR. Providing statistical support Institute-wide, the center develops and supports programs to foster diversity in the scientific workforce, as well as clinical research activities aimed at the health of vulnerable and special needs populations.

Division of Extramural Activities

The Division of Extramural Activities provides leadership and advice in developing, implementing, and coordinating extramural programs and policies. The division has 3 components:

The *Grants Management Branch* is the focal point for all business-related activities associated with the negotiation,

award, and administration of grants and cooperative agreements within the NIDCR.

The *Scientific Review Branch* coordinates the initial scientific peer review of applications for the following mechanisms of support: center research grants, program project grants, small research grants, research conference grants, institutional training grants, short-term training and fellowship grants, Physician Scientist Awards for Dentists, Dentist Scientist Awards, requests for applications issued by NIDCR, certain investigator-initiated clinical trials, cooperative agreements, and all proposals for research and development contracts. The branch also coordinates, conducts, and monitors project site visits, applicant interviews, and all other aspects of NIDCR's peer review process.

The *Research Training and Career Development Branch* oversees and coordinates the Institute's programs for extramural fellowships, training grants, career development awards, dental school curriculum development grants, NIH loan repayment awards, and diversity supplements. The aim of these programs is to ensure an adequate number of talented, well-prepared, and diverse investigators to conduct dental, oral, and craniofacial research in the Institute's scientific priority areas.

Division of Intramural Research

Scientists in the Division of Intramural Research conduct basic laboratory, translational, and clinical research. Using the latest techniques in biomedical science, researchers investigate the biochemistry, structure, function and development of bone, teeth, salivary glands, and connective tissues. Studies also focus on the role of bacteria and viruses in oral disease, genetic and acquired disorders of the craniofacial region and tumors of the oral cavity, the causes and treatment of acute and chronic pain, and the development of new and improved methods to diagnose oral disease. The division has approximately 300 employees and guest researchers in 31 laboratories and a set of laboratory and clinical support facilities.

The *Craniofacial and Skeletal Diseases Branch* studies development and structure of mineralized tissues (bones, teeth, and cartilage). Emphasis is placed on genetic and acquired disorders of the skeleton through clinical, basic, and translational research in bone, cartilage, and dental cell biology; adult stem cells; and composition, synthesis, and destruction of extracellular matrix—a major component of most tissues and critical in oral tissue development, function, and health.

The *Laboratory of Cell and Developmental Biology explores* the roles and gene regulation of the extracellular matrix, a key component of connective tissue, and other cell interaction systems in embryonic development and function. Research focuses on such areas as normal and abnormal embryonic development of craniofacial and other tissues, processes involved in tissue repair and cancer, and replacement or regeneration of defective or damaged tissues.

The *Laboratory of Sensory Biology* investigates fundamental mechanisms of various types of sensation including taste, somatosensation (touch, pressure, temperature), and pain. Using a range of laboratory techniques, scientists are exploring how sensory stimuli are detected and processed, with the aim of developing and testing novel therapeutic strategies to combat pain.

The *Molecular Physiology and Therapeutics Branch* conducts research related to the diagnosis, prevention, and management of salivary gland dysfunction caused by head and neck irradiation and diseases such as Sjögren's syndrome. Primary efforts are aimed at understanding the molecular basis of salivary gland function and disease, and developing gene transfer technology and other molecular tools to restore salivary secretion.

The *Oral and Pharyngeal Cancer Branch* is exploring several aspects of cancer cell biology to identify the faulty molecular mechanisms underlying the development of oral malignancies. Investigators are using this knowledge to identify early diagnostic markers and develop novel therapeutic approaches for oral cancer.

The *Oral Infection and Immunity Branch* conducts research on the causes, diagnosis, treatment, and prevention of infectious and inflammatory diseases. Scientists study bacterial and viral infections at the biochemical, organism, and community levels and analyze the basic mechanisms of immune and inflammatory host responses. Research is also under way to enhance the understanding of signaling mechanisms inside the cell, which prompt host responses to pathogens, and

to devise strategies for therapy.

The *Developmental Mechanisms Section* investigates mechanisms of cell differentiation in early embryos, with current emphasis on the gene regulatory network underlying development of primitive nerve cells.

The *Immunopathology Section* explores factors in the modulation of human monocyte functions that may contribute to connective tissue damage associated with inflammatory diseases such as rheumatoid arthritis and periodontal disease. Studies are aimed at understanding how certain enzymes and inhibitors believed to play a major role in the destruction and remodeling of connective tissue are regulated in the human monocyte, part of the body's infection-fighting system.

The Division also supports research in 6 units outside of its laboratories and branches: the Clinical Research Core, DNA Sequencing Core, Gene Targeting Core, Scientific Systems Core, Technology Transfer, and Veterinary Resources Core.

NIH Almanac: Organization

National Institute of Diabetes and Digestive and Kidney Diseases

Mission | Important Events | Legislative Chronology | Director | Programs

Until May 19, 1972, the National Institute of Arthritis and Metabolic Diseases; until June 23, 1981, the National Institute of Arthritis, Metabolism, and Digestive Diseases; and until April 8, 1986, the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases.

Mission

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) conducts and supports research on many of the most serious diseases affecting public health. The Institute supports much of the clinical research on the diseases of internal medicine and related subspecialty fields, as well as many basic science disciplines.

The Institute's Division of Intramural Research encompasses the broad spectrum of metabolic diseases such as diabetes, obesity, inborn errors of metabolism, endocrine disorders, mineral metabolism, digestive and liver diseases, nutrition, urology and renal disease, and hematology. Basic research studies include biochemistry, biophysics, nutrition, pathology, histochemistry, bioorganic chemistry, physical chemistry, chemical and molecular biology, and pharmacology.

NIDDK extramural research is organized into 4 divisions: Diabetes, Endocrinology, and Metabolic Diseases; Digestive Diseases and Nutrition; Kidney, Urologic, and Hematologic Diseases; and Extramural Activities.

The Institute supports basic and clinical research through investigator-initiated grants, program project and center grants, and career development and training awards. The Institute also supports research and development projects and large-scale clinical trials through contracts.

Important Events in NIDDK History

August 15, 1950—President Harry S. Truman signed the Omnibus Medical Research Act into law establishing the National Institute of Arthritis and Metabolic Diseases (NIAMD) in the U.S. Public Health Service. The new Institute incorporated the laboratories of the Experimental Biology and Medicine Institute and expanded to include clinical investigation in rheumatic diseases, diabetes, and a number of metabolic, endocrine, and gastrointestinal diseases.

November 15, 1950—The National Advisory Arthritis and Metabolic Diseases Council held its first meeting and recommended approval of NIAMD's first grants.

November 22, 1950—U.S. Surgeon General Leonard Scheele established NIAMD.

1959—Dr. Arthur Kornberg, former chief of the Institute's enzyme and metabolism section, won the Nobel Prize for synthesizing nucleic acid.

The Institute initiated an intramural research program in gastroenterology and launched an intramural research program in cystic fibrosis with the establishment of the Pediatric Metabolism Branch.

1961—Laboratory-equipped, mobile trailer units began an epidemiological study of arthritis among the Blackfeet and Pima Indians in Montana and Arizona, respectively.

October 16, 1969—The Nobel Prize was awarded to Dr. Marshall W. Nirenberg of the National Heart Institute, who reported his celebrated partial cracking of the genetic code while an NIAMD scientist (1957-1962).

November 1970—The Institute celebrated its 20th anniversary. U.S. Secretary of Defense Melvin R. Laird addressed leaders in the department, representatives from voluntary health agencies and professional biomedical associations, as well as past and present Institute National Advisory Council members.

May 19, 1972—The Institute name was changed to the National Institute of Arthritis, Metabolism, and Digestive Diseases.

October 1972—Christian B. Anfinsen, chief of the Institute's Laboratory of Chemical Biology, shared a Nobel Prize with 2 other American scientists for his demonstration of one of the most important simplifying concepts of molecular biology, that the 3-dimensional conformation of a native protein is determined by the chemistry of its amino acid sequence. A significant part of this research cited by the award was performed while with NIH.

September 1973—The Institute's diabetes centers program was initiated with the establishment of the first Diabetes-Endocrinology Research Centers.

November 1975—After 9 months of investigation into the epidemiology and nature of diabetes mellitus and public hearings throughout the United States, the National Commission on Diabetes delivered its report, the *Long-Range Plan to Combat Diabetes*, to Congress. Recommendations encompassed expansion and coordination of diabetes and related research programs; creation of a diabetes research and training centers program; acceleration of efforts in diabetes health care, education, and control programs; and establishment of a National Diabetes Advisory Board.

April 1976—After a year of study and public hearings, the National Commission on Arthritis and Related Musculoskeletal Diseases issued *The Arthritis Plan*—its report to Congress. The report called for increased arthritis research and training programs, multipurpose arthritis centers, epidemiologic studies and data systems in arthritis, a National Arthritis Information Service, and a National Arthritis Advisory Board.

October 1976—Dr. Baruch Blumberg was awarded the Nobel Prize in Physiology or Medicine for research on the hepatitis B virus protein, the "Australia antigen," which he discovered in 1963 while at the Institute. This advance has proven to be a scientific and clinical landmark in detection and control of viral hepatitis and led to the development of preventive measures against hepatitis and liver cancer.

April 19, 1977—The NIH Director established a trans-NIH program for diabetes, with lead responsibility in NIAMDD.

September 1977—Over $5 million in grants was awarded to 5 institutions to establish Diabetes Research and Training Centers.

October 1977—In response to the recommendation of the National Commission on Diabetes, the National Diabetes Data Group was established within the Institute to collect, analyze, and disseminate data on this disorder to scientific and public health policy and planning associations.

December 1977—Institute grantees Dr. Roger C.L. Guillemin and Dr. Andrew V. Shally shared the Nobel Prize in Physiology or Medicine with a third scientist, Dr. Rosalyn S. Yalow. Guillemin and Shally's prizes were for discoveries related to the brain's production of peptide hormones.

December 1978—A study of cystic fibrosis focused on the need for future research activities, including increased support for clinical and basic research, expansion of specialized cystic fibrosis research resources, emphasis on training of scientific personnel, and coordination of public and private cystic fibrosis research activities.

January 1979—Following 2 years of study and public hearings, the National Commission on Digestive Diseases issued its report, *The National Long-Range Plan to Combat Digestive Diseases.* Recommendations to Congress included the establishment of a National Digestive Diseases Advisory Board, an information clearinghouse, and increased emphasis on educational programs in digestive diseases in medical schools.

December 1979—A task force completed its study and submitted the report, *An Evaluation of Research Needs in Endocrinology and Metabolic Diseases.*

September 1980—Dr. Joseph E. Rall, director of NIAMDD intramural research, became the first person at NIH to be named to the distinguished executive rank in the Senior Executive Service. President Jimmy Carter presented the award in ceremonies at the White House on September 9.

October 15, 1980—NIAMDD celebrated its 30th anniversary with a symposium, "DNA, the Cell Nucleus, and Genetic Disease," and dinner at the National Naval Medical Center. Dr. Donald W. Seldin, chairman of the department of internal medicine, University of Texas Southwestern Medical School, Dallas, was guest speaker.

June 23, 1981—The Institute was renamed National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases.

April 1982—U.S. Department of Health and Human Services (HHS) Secretary Richard S. Schweiker elevated NIADDK's programs to division status, creating 5 extramural divisions and the Division of Intramural Research.

November 1982—Dr. Elizabeth Neufeld received a Lasker Foundation Award. She is cited, along with Dr. Roscoe E. Brady of NINCDS, for "significant and unique contributions to the fundamental understanding and diagnosis of a group of inherited diseases called mucopolysaccharide storage disorders (MPS)."

November 1984—Grants totaling more than $4 million were awarded to 6 institutions to establish Silvio O. Conte Digestive Disease Research Centers. The research centers investigate the underlying causes, diagnoses, treatments, and prevention of digestive diseases.

April 8, 1986—The Institute's Division of Arthritis, Musculoskeletal and Skin Diseases became the core of the new National Institute of Arthritis and Musculoskeletal and Skin Diseases. The NIADDK was renamed the National Institute of Diabetes and Digestive and Kidney Diseases.

June 3, 1986—The National Kidney and Urologic Diseases Advisory Board was established to formulate the long-range plan to combat kidney and urologic diseases.

August 1, 1987—Six institutions were funded to establish the George M. O'Brien Kidney and Urological Research Centers.

December 25, 1987—In response to congressional language on the FY 1988 appropriation for the NIDDK, the institute established a program of cystic fibrosis research centers.

September 16, 1990—NIDDK celebrated its 40th anniversary. Dr. Daniel E. Koshland, Jr., editor of *Science*, was guest speaker.

June, 1991—The NIDDK Advisory Council established the National Task Force on the Prevention and Treatment of Obesity to synthesize current science on the prevention and treatment of obesity and to develop statements about topics of clinical importance that are based on critical analyses of the literature.

September 30, 1992—Three Obesity/Nutrition Research Centers and an animal models core to breed genetically obese rats for obesity and diabetes research were established.

October 12, 1992—Drs. Edwin G. Krebs and Edmond H. Fischer were awarded the Nobel Prize in Physiology or Medicine for their work on "reversible protein phosphorylation." They have received grant support from NIDDK since 1955 and 1956, respectively.

October 30, 1992—In response to congressional language on the Institute's FY 1993 appropriation, the NIDDK initiated a program to establish gene therapy research centers with emphasis on cystic fibrosis.

November 1, 1993—The functions of the NIH Division of Nutrition Research Coordination, including those of the NIH Nutrition Coordinating Committee, were transferred to NIDDK.

October 10, 1994—Dr. Martin Rodbell and Dr. Alfred G. Gilman received the Nobel Prize in Physiology or Medicine for discovering G-proteins, a key component in the signaling system that regulates cellular activity. Dr. Rodbell discovered the signal transmission function of GTP while a researcher in the National Institute of Arthritis and Metabolic Diseases, now NIDDK.

June 22, 1997—Led by NIDDK, NIH and the U.S. Centers for Disease Control and Prevention (CDC) announce the National Diabetes Education Program (NDEP) at the American Diabetes Association annual meeting in Boston. The NDEP's goals are to reduce the rising prevalence of diabetes, the morbidity and mortality of the disease, and its complications.

June 2000—In an effort to reduce the disproportionate burden of many diseases in minority populations, NIDDK initiated an Office of Minority Health Research Coordination.

November 16, 2000—NIDDK celebrated its 50th Anniversary. Professional societies in 8 U.S. locations and Canada sponsored scientific symposia and hosted an NIDDK exhibit. "A New Century of Science. A New Era of Hope" was published to highlight research supported and conducted by NIDDK and concluded the year with a joint scientific symposium at the Society for Cell Biology's 40th Anniversary meeting in December.

June 13, 2003—To avoid confusion with the newly-established NIH Obesity Research Task Force, NIDDK changed the name of its National Task Force on Prevention and Treatment of Obesity, established in 1991, to the Clinical Obesity Research Panel (CORP).

June 2003—The *Report on Progress and Opportunities: Special Statutory Funding for Type 1 Diabetes Research* described recent achievements and major projects that address unmet research needs in type 1 diabetes. From fiscal year 1998 through fiscal year 2008, the special funding program provides a total of $1.14 billion in research funds to supplement other funds for type 1 diabetes research provided through the regular appropriations process.

NIDDK Legislative Chronology

December 11, 1947—Under section 202 of Public Law 78-410, the Experimental Biology and Medicine Institute was established.

August 15, 1950—P.L. 81-692, the Omnibus Medical Research Act, authorized establishment of NIAMDD to "... conduct

researches relating to the cause, prevention, and methods of diagnosis and treatment of arthritis and rheumatism and other metabolic diseases, to assist and foster such researches and other activities by public and private agencies, and promote the coordination of all such researches, and to provide training in matters relating to such diseases...." Section 431 also authorized the U.S. Surgeon General to establish a national advisory council.

May 19, 1972—President Richard M. Nixon signed P.L. 92-305 to bring renewed emphasis to research in digestive diseases by changing the name of the Institute to NIAMDD and by designating a digestive diseases committee within the Institute's National Advisory Council.

August 29, 1972—The National Cooley's Anemia Control Act (PL 92-414) authorized research in the diagnosis, treatment, and prevention of this debilitating inherited disease, also known as thalassemia, occurring largely in populations of Mediterranean and Southeastern Asian origin.

July 23, 1974—P.L. 93-354, the National Diabetes Mellitus Research and Education Act, was signed. The National Commission on Diabetes, called for by this act, was chartered on September 17, 1974. Members were appointed by the Secretary of the U.S. Department of Health, Education and Welfare (HEW) . The Act called for centers for research and training in diabetes and establishment of an intergovernmental diabetes coordinating committee, including NIAMDD and 6 other NIH institutes.

January 1975—The National Arthritis Act of 1974 (P.L. 93-640) was signed into law to further research, education, and training in the field of the connective tissue diseases. The HEW Secretary appointed the mandated National Commission on Arthritis and Related Musculoskeletal Diseases, June 2. The Act required centers for research and training in arthritis and rheumatic diseases and the establishment of a data bank, as well as an overall plan to investigate the epidemiology, etiology, control, and prevention of these disorders.

October 1976—P.L. 94-562, the Arthritis, Diabetes, and Digestive Diseases Amendments of 1976, established the National Diabetes Advisory Board charged with advising Congress and the HEW Secretary on implementation of the "Long-Range Plan to Combat Diabetes," developed by the National Commission on Diabetes. The law also established the National Commission on Digestive Diseases to deal with many problems, including investigation into the incidence, duration, mortality rates, and social and economic impact of digestive diseases.

The National Arthritis Advisory Board, established by the same law, reviews and evaluates the implementation of the *Arthritis Plan*, formulated by the Arthritis Act of 1974. The board advises Congress, the HHS Secretary, and heads of Federal agencies with respect to the plan and other Federal programs relating to arthritis.

December 1980—Title II of the Health Programs Extension Act of 1980, P.L. 96-538, changed the Institute's name to the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases. The Act also established the National Digestive Diseases Advisory Board. The law authorized the National Diabetes Information Clearinghouse, the Diabetes Data Group, and the National Digestive Diseases Information and Education Clearinghouse. In addition, it reauthorized advisory boards for arthritis and diabetes research.

November 20, 1985—The Health Research Extension Act of 1985, P.L. 99-158, changed the Institute name to the National Institute of Diabetes and Digestive and Kidney Diseases. The act also established the National Kidney and Urologic Diseases Advisory Board. The law gave parallel special authorities to all Institute operating divisions, including authorization of the National Kidney and Urologic Diseases Information Clearinghouse; National Kidney, Urologic, and Hematologic Diseases Coordinating Committee; National Kidney and Urologic Diseases Data System; National Digestive Diseases Data System; kidney and urologic diseases research centers; and digestive diseases research centers.

June 10, 1993—The NIH Revitalization Act of 1993, P.L. 103-43, established NIDDK as the lead institute in nutritional disorders and obesity, including the formation of a research and training centers program on nutritional disorders and obesity.

It also provided for the directors of the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National

Institute on Aging, National Institute of Dental Research, and the NIDDK to expand and intensify programs with respect to research and related activities concerning osteoporosis, Paget's disease, and related bone disorders.

July 25, 1997—A House report accompanying H.R. 2264 and Senate report with S. 1061, FY 1998 appropriations bills for Labor/HHS/Education, urged NIH and NIDDK to establish a diabetes research working group to develop a comprehensive plan for NIH-funded diabetes research that would recommend future initiatives and directions. Dr. C. Ronald Kahn, diabetes research working group chairman, presented "Conquering Diabetes, A Strategic Plan for the 21st Century" to the Congress on March 23, 1999.

August 1997—The Balanced Budget Act of 1997 (P.L. 105-33) established a *Special Statutory Funding Program for Type 1 Diabetes Research* . The program provided $30 million per year for fiscal years 1998 through 2002. This funding program augmented regularly appropriated funds that HHS received for diabetes research through the Labor-HHS-Education Appropriations Committees. The NIDDK, through authority granted by the HHS Secretary, has a leadership role in planning, implementing, and evaluating the allocation of these funds.

October 17, 2000—The "Children's Health Act of 2000 (P.L. 106-310) amended the Public Health Service Act with respect to children's health. Title IV, entitled "Reducing Burden of Diabetes Among Children and Youth," section 402, specified that NIH conduct long-term epidemiology studies, support regional clinical research centers, and provide a national prevention effort relative to type 1 diabetes.

December 2000—The Fiscal Year 2001 Consolidated Appropriations Act (P.L. 106-554) extended and augmented the Special Statutory Funding Program for Type 1 Diabetes Research in amount and time, allocating an additional $70 million for Fiscal Year 2001 (for a total of $100 million for Fiscal Year 2001), an additional $70 million for Fiscal Year 2002 (for a total of $100 million for Fiscal Year 2002), and $100 million for Fiscal Year 2003.

October 2002—NIH issued a detailed progress report, *Conquering Diabetes: Highlights of Program Efforts, Research Advances, and Opportunities,* on NIH-funded diabetes research. The report describes research achievements and initiatives since 1999, when the Diabetes Research Working Group published its 5-year plan. The Congressionally established Group made scientific recommendations in 5 areas of extraordinary research opportunity: the genetics of diabetes, autoimmunity and the beta cell, cell signaling and cell regulation, obesity, and clinical research and clinical trials. The Group also made recommendations regarding the microvascular and macrovascular complications of diabetes, the special populations most affected by diabetes, and resource and infrastructure needs to further diabetes research.

December 17, 2002—President Bush signed into law H.R. 5738, a bill that will increase and extend funding for the Special Diabetes Program (formerly P.L. 105-33). The bill provides $750 million for type 1 diabetes research over a period of 5 years (FY 04-FY 08).

December 2002—The Public Health Service Act Amendment for Diabetes (P.L. 107-360) extended and augmented the Special Statutory Funding Program for Type 1 Diabetes Research in time and amount, allocating $150 million per year for fiscal years 2004 through 2008.

December 8, 2003—The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (P.L. 108-173). Title VII, Subtitle D, Section 733 of this law, entitled "Payment for pancreatic islet cell investigational transplants for Medicare beneficiaries in clinical trials," specifies that the Secretary, acting through NIDDK, conduct a pancreatic islet transplantation clinical trial that includes Medicare beneficiaries, and that Medicare cover the routine costs, the transplantation, and appropriate related items and services for the Medicare beneficiaries enrolled in the trial.

October 25, 2004—The Pancreatic Islet Cell Transplantation Act of 2004(P.L. 108-362) amended the Public Health Service Act for the purposes of increasing the supply of pancreatic islet cells for research, and providing for better coordination of Federal efforts and information on islet cell transplantation. A provision of this law specified that the annual reports prepared by the Diabetes Mellitus Interagency Coordinating Committee, which is led by the NIDDK, include an

assessment of the Federal activities and programs related to pancreatic islet transplantation.

September 2004—The reports accompanying the FY 2005 Senate and House Labor, HHS, Education appropriations bills (reports 108-345 and 108-636, respectively) called on the NIH and HHS to establish a national commission on digestive diseases to review the burden of digestive diseases in the United States and develop a long-range research plan to address this burden. The NIH Director subsequently established the National Commission on Digestive Diseases, under NIDDK leadership, in August 2005. Commission activities included public meetings, review of a report by the Digestive Diseases Interagency Coordinating Committee on the burden of digestive diseases in the United States, and the development of a Long-Range Plan for Digestive Diseases Research.

Biographical Sketch of NIDDK Director Griffin P. Rodgers, M.D., M.A.C.P.

Dr. Griffin P. Rodgers was named Director of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)—one of the National Institutes of Health (NIH)—on April 1, 2007. He had served as NIDDK's Acting Director since March 2006 and had been the Institute's Deputy Director since January 2001. Dr. Rodgers also has been chief of the Molecular and Clinical Hematology Branch since 1998; the branch is now administratively managed by NIH's National Heart, Lung and Blood Institute.

Dr. Rodgers received his undergraduate, graduate, and medical degrees from Brown University in Providence, R.I. He performed his residency and chief residency in internal medicine at Barnes Hospital and the Washington University School of Medicine in St. Louis. His fellowship training in hematology/oncology was in a joint program of the NIH with George Washington University and the Washington Veterans Administration Medical Center. In addition to his medical and research training, he earned a master's degree in business administration, with a focus on the business of medicine, from Johns Hopkins University in 2005.

As a research investigator, Dr. Rodgers is widely recognized for his contributions to the development of the first effective- and now FDA approved-therapy for sickle cell anemia. He was a principal investigator in clinical trials to develop therapy for patients with sickle cell disease. He also performed basic research that focused on understanding the molecular basis of how certain drugs induce gamma-globin gene expression. He was honored for his research with numerous awards including the 1998 Richard and Hinda Rosenthal Foundation Award, the 2000 Arthur S. Fleming Award, the Legacy of Leadership Award in 2002, and a Mastership from the American College of Physicians in 2005.

Dr. Rodgers has been an invited professor at medical schools and hospitals in France, Italy, China, Japan, and Korea. He has been honored with many named lectureships at American medical centers and has published over 150 original research articles, reviews, and book chapters and has edited 4 books and monographs.

Dr. Rodgers served as Governor to the American College of Physicians for the U.S. Department of Health and Human Services from 1994 to 1997. He is a member of the American Society of Hematology, the American Society of Clinical Investigation, and the Association of American Physicians, among others. He is the chair of the Hematology Subspecialty Board and is a member of the American Board of Internal Medicine Board of Directors. He is board certified in Internal Medicine, in Emergency Medicine, and in Hematology.

NIDDK Directors

Name	In Office from	To
William Henry Sebrell, Jr.	August 15, 1950	October 1, 1950
Russell M. Wilder	March 6, 1951	June 30, 1953

Floyd S. Daft	October 1, 1953	May 3, 1962
G. Donald Whedon	November 23, 1962	September 30, 1981
Lester B. Salans	June 17, 1982	June 30, 1984
Mortimer B. Lipsett	January 7, 1985	September 4, 1986
Phillip Gorden	September 5, 1986	November 14, 1999
Allen M. Spiegel	November 15, 1999	March 3, 2006
Griffin P. Rodgers	April 1, 2007	present

Research Programs

Division of Intramural Research

The Division of Intramural Research conducts research and training within the Institute's laboratories and clinical facilities in Bethesda, Maryland, and at the Phoenix Epidemiology and Clinical Research Branch in Arizona.

The Division has 12 Branches and 10 Laboratories that cover a wide range of research areas. In addition, there is a section on veterinary sciences, a section on biological chemistry, the Office of Technology Transfer, the Office of Fellow Recruitment and Career Development, and an Administrative Management Branch. Six core laboratories provide scientific support services to investigators.

The Intramural Branches engage in both basic and clinical research on diabetes, bone metabolism, endocrinology, obesity, hematology, digestive diseases, kidney diseases, kidney transplantation ,and genetics. Additionally, the Phoenix Branch develops and applies epidemiologic and genetic methods to the study of diabetes and obesity. The tenth branch addresses mathematical modeling of biological problems.

The Laboratories are engaged in fundamental research related to the Institute's mission in the fields of molecular biology, structural biology, chemistry, cell biology, pharmacology, chemical physics, biochemistry, neuroscience, developmental biology, and mathematical modeling of biological problems.

The Laboratory Animal Science section provides research animal support and collaboration for Institute research programs. The 6 core laboratories provide services to interested NIDDK scientists in the areas of proteomics and mass spectrometry, microarray, chemical biology, mouse metabolism/transgenic support, biotechnological support, and knockout mice.

Division of Diabetes, Endocrinology and Metabolic Diseases

The DEMD supports research and research training related to diabetes mellitus, endocrinology, and metabolic diseases, including cystic fibrosis. In addition, the Division leads the administration of the Trans-NIH Diabetes Program and coordinates federally supported diabetes-related activities.

Diabetes Research Programs

The ***Adipocyte Biology Research Program*** encompasses research that addresses the development and physiology of the adipocyte cell. Specific areas of support include studies on the properties of transcription factors that regulate adipocyte differentiation; research on the consequences of insulin action on adipocyte physiology; and use of animal and tissue culture models to understand adipocyte biology.

The ***Autoimmunity/Viral Etiology of Type 1 Diabetes Research Program*** emphasizes support of investigator-initiated basic and clinical research relating to autoimmune endocrine diseases, including type 1 diabetes and autoimmune thyroid disease (AITD). Applications that address the etiology and pathogenesis of type 1 diabetes, immunology, and viral etiology of diabetes are included. Studies utilizing animal models to further our understanding of type 1 diabetes are of continuing interest to this program. Studies that emphasize autoimmune thyroid disease, including Graves' disease, Hashimoto's thyroiditis, and their complications, are included. Humanized animal models of AITD are also included.

The ***Behavioral/Prevention Research Program*** encompasses individual, family, and community-based strategies aimed at prevention of diabetes and its complications through lifestyle modifications, education, and other behavioral interventions. Particular emphasis is placed on development of culturally sensitive, lifestyle interventions to prevent or treat diabetes in diverse high-risk populations including African Americans, Hispanic Americans, and Native Americans. Specific areas of research include the link between behavior and physical health as it relates to diabetes and complications; approaches to improving health-related behaviors and to enhancing diabetes self-management; and other aspects of diabetes care.

The ***Beta Cell Therapy Research Program*** focuses on research to develop alternative cell or tissue sources, as well as an understanding of the basic mechanisms that support regeneration or neogenesis of pancreatic islets. This program supports research in the following areas:

- Developing methods to expand pancreatic islets or beta cells for transplantation
- Optimizing growth conditions for islet cell proliferation and differentiation
- Deriving pancreatic islets from stem/precursor cells
- Assessing alternative cell or tissue sources by transplantation
- Animal models of islet regeneration and neogenesis.

The ***Clinical Islet Transplantation Consortium*** develops and implements a program of single- and/or multi-center clinical studies, accompanied by mechanistic studies, in islet transplantation with or without accompanying kidney transplantation, for the treatment of type 1 diabetes.

The ***Clinical Research in Type 2 Diabetes Program*** will focus on patient-oriented research (i.e., clinical studies and small clinical trials) related to:

- Pharmacologic interventions and/or lifestyle interventions to prevent or treat type 2 diabetes, including studies relevant to new drug development
- Development of surrogate markers for use in clinical trials for the prevention or treatment of type 2 diabetes
- Cellular therapies for the treatment of type 2 diabetes
- Improving the care of patients with type 2 diabetes

The *Complications of Diabetes Research Program* encompasses basic and clinical research related to acute (e.g., ketoacidosis and hyperosmolar coma) and chronic complications of type 1 and type 2 diabetes. Chronic complications include the vascular complications of diabetes and the effects of diabetes on any organ system. Clinical studies supported under this program include strategies to prevent or treat the complications of diabetes. Supported basic research examines the molecular and cellular mechanisms by which hyperglycemia mediates its adverse effects and the interrelationships among the mechanisms potentially involved in the pathogenesis of complications, including increased polyol pathway flux, alterations of intracellular redox state, oxidative stress, glycation of structural and functional proteins, altered expression of growth factors, enhanced activity of PKC, impaired synthesis of nitric oxide and other vasoactive substances, and altered metabolism of fatty acids.

The ***Developmental Biology Research Program*** supports research related to developmental genetic screens for identifying mutations that affect the formation of tissue such as bone, adipose, endocrine pancreas, or pituitary. Specific areas of support also include signals, signaling pathway components, and transcriptional factors that regulate pattern formation in the embryo, or control the fate, specifications, proliferation, and differentiation of cells in the formation of tissues and organs.

The ***Diabetes Centers Program*** administers 2 types of center awards, the Diabetes Endocrinology Research Centers (DERC) and the Diabetes Research and Training Centers (DRTC). An existing base of high-quality diabetes-related research is a primary requirement for establishment of either type of center. While not directly funding major research projects, both types of center grants provide core resources to integrate, coordinate, and foster the interdisciplinary cooperation of a group of established investigators conducting research in diabetes and related areas of endocrinology and metabolism. The 2 types of centers differ in that the DERC focuses entirely on biomedical research, while the DRTC has an added component in training and translation.

The ***Diabetes Mellitus Interagency Coordinating Committee (DMICC)***, established in 1974 and chaired by the DEMD Director, includes representatives from all Federal departments and agencies whose programs involve health functions and responsibilities relevant to diabetes mellitus and its complications. Functions of the DMICC include coordinating the research activities of NIH and those activities of other Federal programs that are related to diabetes mellitus and its complications ensuring the adequacy and soundness of these activities; and providing a forum for communication and exchange of information necessary to maintain coordination of these activities.

The ***Drug Discovery Program*** supports:

- Interdisciplinary activities and resources that increase understanding of physiological and pathophysiological processes relevant to therapeutic development in diabetes, endocrine, and metabolic disorders
- Research that seeks to elucidate molecular structures or biological pathways that may lead to the identification and validation of targets that can be potentially manipulated by ligands/inhibitors. “Druggable” molecular targets/ pathways
- Studies of the potential bioavailability of compounds, the ability to modulate selectively the function of drug discovery targets, and the ability to translate biological endpoints of preclinical research to the clinic showing high potential for success in later stage drug development
- Development of high-throughput assays based on biologic pathways likely involved in the pathogenesis of diabetes and its complications that could be used to screen molecular libraries for novel therapeutic agents
- Research that seeks to discover new mechanisms of action for therapeutics used for diabetes, endocrine, and metabolic disorders, and the development and validation of disease models to evaluate novel therapeutics for these disorders.

The ***Endocrine Pancreas Research Program*** includes projects to elucidate the basic biology of the endocrine cells of the pancreas, which include alpha, beta, and delta cells within the islet. These include insulin or other hormone synthesis and secretion,;coupling of nutrient sensing to insulin secretion; cell interactions; role of incretins, cytokines, other hormones, and enervation; studies of apoptosis and cell turnover in the adult organ; metabolism, basic signal transduction, and regulation of gene transcription, especially as these areas relate to beta cell and islet function. This program also contains studies in cell culture to bioengineer glucose-responsive hormone-secreting cells or islets for eventual treatment of diabetes.

The ***Environmental Determinants of Diabetes in the Young (TEDDY) Program*** is a multi-center, multi-national, epidemiological study to identify infectious agents, dietary factors, or other environmental exposures that are associated with increased risk of autoimmunity and type 1 diabetes.

The *Genetics of Type 1 Diabetes Research Program* seeks to identify the genes that predispose to the development of type 1 diabetes and studies to determine their mechanism. Specific areas of support include:

- Studies of animal models of type 1 diabetes such as the NOD mouse and the BB rat to identify genes responsible for the development of type 1 diabetes
- Studies of the HLA region that contains the major genetic determinant for type 1 diabetes to understand its contribution to the development of diabetes
- Studies of immune regulatory regions that may contribute to both type 1 diabetes as well as other autoimmune disorders
- Development of genetic resources and patient samples for studies of type 1 diabetes
- Creation of animal models for therapeutic trials

The ***Genetics of Type 2 Diabetes Research Program*** seeks to identify genes that contribute to the development of type 2 diabetes mellitus. Specific areas of support include using animal models to identify diabetes genes; studies using quantitative statistical methods to identify diabetes genes in human populations; and development of genetic resources, patient samples, and methods for studying genetic linkage for diabetes.

The ***Glucose Sensors Research Program*** will contain projects aimed at developing or implementing glucose sensors that can determine glucose concentration in the plasma, interstitial fluid, or other appropriate space in diabetic patients continuously or in repeated samples. This program also includes development of the necessary components of glucose sensors (such as biocompatible materials or fluorescent glucose ligands, new sampling systems, etc.), software, mathematical algorithms and circuitry designed for calibration or insulin pump control, and devices that combine these sensors with insulin delivery systems in a ”closed-loop” artificial pancreas.

The ***Hypoglycemia in Diabetes Research Program*** encompasses clinical and basic studies on the pathogenesis, prevention, treatment, and sequelae (including hypoglycemia unawareness) of hypoglycemia in both type 1 and type 2 diabetes. Specific areas of research include studies to identify the neuronal and hormonal systems involved in recognition and response to hypoglycemia; examine the interplay of counterregulatory endocrine responses; and ascertain the regulatory mechanisms for glucose homeostasis and the cells involved in this regulation.

The ***Insulin Receptor/Structure/Function/Action Research Program*** encompasses studies of the structure, function, and action of the insulin receptor. Specific areas of support include:

- Molecular analysis of ligand binding to receptor
- Activation of the tyrosine kinase
- Subsequent insulin receptor function in signal transduction by serving as a platform for the attachment of downstream signaling molecules involved in insulin action
- Insulin Receptor Signaling proteins (IRS)-1,2,3,4, and other proteins containing Src Homology Domains (e.g., SH2)

The ***Islet Transplantation Research Program*** encompasses studies of therapeutic or preclinical approaches to treat diabetes. Specific areas include: Transplantation of pancreas, pancreatic endocrine cells (islets or beta cells), beta cells in culture or other insulin-producing cells in humans or animal models (including procedures to enhance tolerance, encapsulate/immunoisolate islets or other means to improve transplant survival). The program also includes gene therapy or other approaches to manipulate islets to improve viability, durability, or other aspects of transplantation.

The ***Molecular and Functional Imaging Program*** comprises projects that employ novel molecular and functional imaging techniques to visualize various aspects of diabetes and obesity, endocrinology, metabolism, and metabolic diseases. The emphasis will be on in vivo techniques (PET, MRI, Ultrasound, CT, optical tomography, etc.), with applications serving to tag tissues and cells of interest; study biological processes in vivo; diagnose disease; or monitor progress during therapy. These will be studies either to monitor physiological or metabolic processes, rate of metabolism, blood flow, sites of hormone action, etc., using imaging and spectroscopic techniques or to identify cell types using molecular imaging probes. Another application might be the technology to develop a probe to identify in vivo the sites within the hypothalamus that control satiety.

The ***Mouse Metabolic Phenotyping Program*** contains a consortium of centers with the purpose of phenotyping

mouse models of diabetes and its complications, obesity, or other chronic metabolic diseases. It will include the development of new tests for phenotyping mice, adaptation or miniaturization of existing tests, as well as the performance of these tests to more fully characterize new or existing models of disease. Emphasis is placed on noninvasive or minimally invasive technologies that can be used for longitudinal studies, but this program also includes high-throughput metabolic screens. Examples include glucose and insulin clamps; miniaturized assays for hormones, cytokines, nutrients, or intermediary metabolites; kinetic measures of metabolic processes; immunological parameter; measurements of energy balance, body composition, and activity; measures for metabolic, behavioral, and physiologic abnormalities during disease progression.

The ***National Diabetes Data Group (NDDG)*** serves as the major Federal focus for the collection, analysis, and dissemination of data on diabetes and its complications. Drawing on the expertise of the research, medical, and lay communities, the NDDG initiates efforts to:

- Define the data needed to address the scientific and public health issues in diabetes
- Foster and coordinate the collection of these data from multiple sources
- Identify important data sources on diabetes, and analyze and promulgate the results of these analyses to the scientific and lay public
- Promote the timely availability of reliable data to scientific, medical, and public organizations and individuals
- Modify data reporting systems to identify and categorize more appropriately the medical and socioeconomic impact of diabetes
- Promote the standardization of data collection and terminology in clinical and epidemiologic research
- Stimulate development of new investigator-initiated research programs in diabetes epidemiology.

The ***National Diabetes Education Program (NDEP)***, co-sponsored by the NIDDK and the CDC, is focused on improving the treatment and outcomes for people with diabetes, promoting early diagnosis, and ultimately preventing the onset of diabetes. The goal of the program is to reduce the morbidity and mortality associated with diabetes through public awareness and education activities targeted to the general public, especially those with at risk for type 2 diabetes, people with diabetes and their families, health care providers, and policy makers and payers. These activities are designed to:

- Increase public awareness that diabetes is a serious, common, costly, and controllable disease that has recognizable symptoms and risk factors
- Encourage people with diabetes, their families, and their social support systems to take diabetes seriously and to improve practice of self-management behaviors
- Reduce disparities in health care in racial and ethnic populations disproportionately affected by diabetes
- Alert health care providers to the seriousness of diabetes, effective strategies for its control, and the importance of a team care approach to helping patients manage the disease. Toward these ends, the NDEP is developing partnerships with organizations concerned about diabetes and the health care of its constituents.

The ***Prevention of Type 1 Diabetes Research Program*** includes studies on drug development and cellular therapy that are being proposed to prevent type 1 diabetes. Areas of particular interest are:

- Studies on drug development for type 1 diabetes treatment or prevention
- Studies including the creation of animal models for therapy trials or humans to maintain normal blood glucose levels
- Tolerance induction for prevention of type 1 diabetes
- Immune intervention
- "Humanized" mouse model (development of transgenic NOD with human HLA molecules on the T cells) for type 1 diabetes
- Development of therapies for prevention of Impaired Glucose Tolerance (IGT) or interventions to prevent conversion of IGT to type 1 diabetes
- Drugs designed to enhance peripheral glucose metabolism or reduce hepatic glucose production of type 1 diabetics
- Therapies designed to increase insulin sensitivity of type 1 diabetics.

The ***Type 1 Diabetes Clinical Trials Program*** supports large, multi-center clinical trials conducted under cooperative agreements or contracts. One primary prevention trial has concluded. The Diabetes Prevention Trial Type 1 (DPT-1) was aimed at determining whether it was possible to prevent or delay the onset of type 1 diabetes in individuals determined to be at immunologic, genetic, and/or metabolic risk. It also supported future clinical trials of the Type 1 Diabetes TrialNet, which will conduct intervention studies to prevent or slow the progress of type 1 diabetes, and natural history and genetics studies in populations screened for or enrolled in these studies. The program also supports the Epidemiology of Diabetes Interventions and Complications (EDIC) study, an epidemiologic follow-up study of the subjects previously enrolled in the Diabetes Control and Complications Trial (DCCT).

The ***Type 2 Diabetes Clinical Trials Program*** supports large, multi-center clinical trials conducted under cooperative agreements or contracts. One primary prevention trial is underway. The Diabetes Prevention Program (DPP) is focused on testing lifestyle and pharmacological intervention strategies in individuals at genetic and metabolic risk for developing type 2 diabetes to prevent or delay the onset of this disease.

The ***Type 2 Diabetes in the Pediatric Population Research Program*** encompasses research on the pathophysiology, prevention, and treatment of type 2 diabetes in children. Specific areas of support include studies:

- To describe the epidemiology (incidence, prevalence, risk factors) of type 2 diabetes and its complications in children
- To develop diagnostic criteria to distinguish type 1 and type 2 diabetes in children
- To define the metabolic abnormalities (and the natural history of such abnormalities) in children with type 2 diabetes
- To develop practical, effective strategies for the prevention and/or treatment of type 2 diabetes in children
- To understand the basis for race/ethnic disparities in the incidence of type 2 diabetes in the pediatric population.

Endocrinology Research Programs

The ***Bone and Mineral Metabolism Research Program*** encompasses basic and clinical research on the hormonal regulation of bone and mineral metabolism in health and disease. Specific areas of support include:

- Endocrine aspects of disorders affecting bone, including osteoporosis, Paget's disease, renal osteodystrophy, and hypercalcemia of malignancy
- Pathogenesis, diagnosis, and therapy of parathyroid disorders, including primary or secondary hyperparathyroidism;
- Effects of parathyroid hormone, parathyroid hormone-related protein, calcitonin, vitamin D, estrogen, retinoic acid, growth factors (e.g., IGF-I), glucocorticoids, thyroid hormone, and other systemic or local-acting hormones and their receptors on bone metabolism
- Bone active cytokines (e.g., TGF-b, BMPs, CSF-1)
- Studies of calcium homeostasis, absorption, metabolism, and excretion, including the calcium-activated receptor
- Basic and clinical studies of vitamin D
- Bone morphogenesis, including the roles of developmental factors in bone formation (e.g., hedgehogs, Hox genes)

The ***G-Protein Coupled Receptors Program*** encompasses studies on the G-protein coupled receptor superfamily. Specific areas of support include:

- Cell surface, or 7-transmembrane domain, receptors coupled to GTP-binding ("G")- proteins for signal transduction (e.g., beta-adrenergic receptor)
- Receptor structure
- Receptor down-regulation (homologous desensitization)
- Role(s) of mutated receptors in disease
- Coupling of signaling through the receptor to other membrane-bound effectors and or regulators, such as adenylyl cyclase, ion channels, protein phosphatases or kinases, and other receptors.

Signal transduction through GPCRs also includes mechanisms of regulation of gene expression through nuclear proteins such as the Cyclic Nucleotide Response Element Binding Protein (CREB) and the CREB-binding protein.

The ***Integrative Biology of Obesity Program*** supports both basic and clinical research investigating the neural and endocrine mechanisms contributing to obesity and the pathophysiological consequences of obesity, particularly type 2 diabetes. Also included are studies that explore the neuronal and peptidergic pathways regulating food intake and other behaviors influencing body adiposity. Thus, proposals encompassed by this program will take an integrative approach to the goal of elucidating the physiological and behavioral factors contributing to the etiology of obesity. Clinical studies that expand on basic research findings and/or explore basic mechanisms involved in human obesity are encouraged. Examples of areas of interest include: Neurobiology of human obesity and behavior, neuropeptides and their receptors involved in the regulatory pathways controlling feeding behavior, satiety and energy expenditure, intrauterine and neonatal environment in the development of obesity, and imaging of neural pathways involved in the regulation of food intake.

The ***Intracellular Signal Transduction Research Program*** encompasses research aimed at understanding the structure and function of intracellular signal-transducing molecules. Specific areas of support include:

- Intracellular kinases, phosphatases, and anchoring proteins
- Signaling mechanisms that have altered activity in response to protein phosphorylation, calcium, and cAMP
- Approaches to solving the 3-dimensional structure of signaling proteins including crystallography and NMR
- Functional analysis of these proteins, including comparison of wild-type and naturally occurring or synthetic, mutant proteins, or expression of dominant-negative forms of the proteins
- Microscopic techniques to localize these proteins within cells
- Identification of substrates for these signaling proteins
- Analysis of crosstalk among distinct signal transduction pathways

The ***Neuroendocrinology Research Program*** encompasses research on neuropeptides of the hypothalamus. Specific areas of research support include:

- Physiological response to stress through the hypothalamic-pituitary-adrenal axis
- Neuropeptides and neuropeptide receptor signaling pathways
- Gene regulation in the hypothalamus and pituitary gland
- Diseases of the pituitary including neoplasia
- Hypopituitary dwarfism
- Identification and characterization of novel hypothalamic or pituitary hormones
- Tissue-specific and developmental expression of pituitary and hypothalamic genes
- Pituitary hormone receptors and actions on target tissues (e.g., GH IGF-1 axis)
- Neuropeptide receptors in diagnosis and treatment of disease
- Neuroendocrine-immune interactions

The ***Nuclear Receptor Superfamily Program*** encompasses basic and clinical research on members of the steroid hormone superfamily (also known as the nuclear receptor superfamily). The program includes structure/function studies and the role in signal transduction and regulation of gene expression of:

- Steroid hormones, including glucocorticoids, mineralocorticoids, progesterone, estrogens, androgens (testosterone), and DHEA
- Nuclear receptors, including thyroid hormone, vitamin D, retinoids (RAR, RXR, vitamin A), PPARs, and orphan receptors (LXR, Nur77, COUP-TF, and others).

Topics covered include receptor structure, interaction with cytoplasmic chaperones (e.g., Hsp90, Hsp70, etc.), interaction with ligand, nuclear translocation, binding to hormone response elements, interaction with nuclear accessory proteins (e.g., SRC-1, N-CoR, CBP, histone acetylase/deacetylase, GRIP1, etc.), and regulation of gene expression.

The ***Regulation of Energy Balance and Body Composition Research Program*** encompasses research on regulation of body composition by the hypothalamus and circulating factors. Specific areas of support include:

- Endocrinology of body composition, including interactions between nutrition, exercise, and anabolic hormones
- Neuropeptides and their receptors involved in regulatory pathways controlling feeding behavior, satiety, and energy expenditure
- Interactions between hypothalamicpituitary adrenal axis and peripheral metabolic signals (e.g., insulin), leptin, and glucocorticoids
- Hormones and cytokines involved in wasting syndromes (e.g., cancer, AIDS)
- Endocrine regulation of energy balance via uncoupling proteins
- Hypothalamic integration of peripheral endocrine and metabolic signals

Metabolic Diseases Research Programs

The ***Functional Metabolomics Program*** includes grants focused on the application of technology used to measure large-scale integrated metabolism of cells, tissues, and organ system. These studies can be done in vivo, in isolated tissue, or in cell culture. They have a focus on applying novel technology advancements in measuring and identifying many metabolites within multiple pathways. Emphasis is on discovering new, potentially mechanistic relationships between changes in metabolite profile and the etiology or pathology of specific metabolic diseases or syndromes that fall within NIDDK's scope of research. Important goals include in vivo and translational potential of technology to rapidly analyze and interpret large networks of pathways and fluxes to gain a more complete view of metabolome dynamics.

The ***Gene Therapy and Cystic Fibrosis Centers Program*** supports 3 types of centers: Gene Therapy Centers (P30), Cystic Fibrosis Research Centers (P30), and Specialized Centers for Cystic Fibrosis Research (P50). Gene Therapy Centers provide shared resources to a group of investigators to facilitate development of gene therapy techniques and to foster multidisciplinary collaboration in the development of clinical trials for the treatment of cystic fibrosis and other genetic metabolic diseases. Cystic Fibrosis Research Centers and Specialized Centers for Cystic Fibrosis Research provide resources and support research on many aspects of the pathogenesis and treatment of cystic fibrosis.

The ***Cystic Fibrosis Research Program*** supports investigator-initiated research grants encompassing both fundamental and clinical studies of the etiology, molecular pathogenesis, pathophysiology, diagnosis, and treatment of cystic fibrosis and its complications. Particular areas of emphasis of the program include:

- Characterization of the cystic fibrosis gene, its mutations, and the molecular mechanisms by which mutations cause dysfunction
- Studies of the cystic fibrosis transmembrane regulator (CFTR) protein encoded by the cystic fibrosis gene, including its processing, trafficking, and folding, and the mechanisms by which mutations alter CFTR trafficking and structure/function
- Elucidation of the pathways of electrolyte transport in affected epithelia and the relationship between CFTR and other epithelial ion channels
- Elucidation of the potential roles of CFTR in the transport of molecules other than chloride, posttranslational processing of mucins and other proteins, exocytosis and recycling of cell membranes, subcellular organelle function, and other cellular processes
- Studies of the relationship between genotype and phenotype in cystic fibrosis and identification of genetic or environmental factors that explain the variable clinical presentations and severity of disease
- Delineation of the mechanisms underlying the inflammation and infection characteristic of cystic fibrosis. Analysis of how mutations in the cystic fibrosis gene and alterations in CFTR function result in inflammation and infection
- Research on other clinical manifestations of cystic fibrosis, including the pathophysiologic mechanisms underlying malnutrition and growth failure, impaired fertility, liver disease, and overall physical and psychosocial development. Investigation of approaches to ameliorate the complications of cystic fibrosis
- Development of potential therapeutic approaches to modulating the transport defect in cystic fibrosis and to stabilize mutant CFTR and enhance its targeting and integration into the cell membrane
- Development of safe and effective methods for gene therapy
- Development of animal or cell models useful for studying cystic fibrosis and its therapy

- Evaluation of therapeutic interventions in cystic fibrosis in clinical studies or animal models

The ***Gene Therapy Research Program*** encompasses research aimed at developing basic and applied gene therapy for genetic metabolic diseases. Specific areas of support include:

- Pilot and feasibility studies (R21) to improve gene delivery systems
- Studies of the basic science of AAV, adenovirus, retrovirus, and lentivirus vectors
- Studies of non-viral methods of gene transfer such as liposomes or DNA-conjugates
- Studies to target gene delivery to specific cell types
- Gene therapy of stem cells to treat a genetic metabolic disease

The ***Genomic Resource and Technology Development Program*** supports projects that take advantage of recent development in genetic analysis, genomic-based technologies, and systems biology to propose innovative ways of understanding the biological networks behind diseases of interest to NIDDK, such as metabolic disease. Emphasis will be put on assembling a community of researchers to propose integrated approaches and develop new tools to solve complex problems that are difficult to tackle in a traditional laboratory setting and that require multi-disciplinary teams. Areas of interest include:

- Genome-wide analysis of transcriptional regulatory networks in health and disease
- Tissue development and regeneration
- Functional genomics in disease-relevant organs under normal and pathological conditions
- Forward and reverse chemical genetics to explore regulatory networks involved in disease biology
- Development of high-throughput, cell-based screening platforms to interrogate basic and disease biology
- Development of partnerships and integrated research projects between physicians, geneticists, computational scientists, biochemists, and others, to better identify the underlying causes of complex diseases

The ***Inborn*** *Errors of Metabolism Research Program* encompasses research in the pathophysiology and treatment of genetic metabolic diseases. Specific areas of support include:

- Studies of etiology, pathogenesis, prevention, diagnosis, pathophysiology, and treatment of these diseases
- Characterization of the genes, gene defects, and regulatory alterations that are the underlying causes of these diseases
- Studies of the mutant enzyme and its effect on the structure and function of the protein
- Development of animal models for genetic disease
- Development and testing of dietary, pharmacologic, and enzyme replacement therapies
- Development of stem cell transplantation both prenatally and postnatally as a treatment for metabolic diseases

The ***Integrative Metabolism and Insulin Resistance Program*** comprises grants that study intermediary metabolism and physiology on the whole-body, organ, and cell level. These studies can be done in vivo, in isolated tissues, or in cell culture. They focus on flux and regulation of either a single metabolic pathway, interacting pathways in a cell or organ, or interactions between organs in the whole body. Especially important are in vivo measurements of whole-body flux, such as glucose production or turnover, or blood flow. Examples of important goals for these studies include an understanding of insulin resistance, regulation of gluconeogenesis and glucose disposal, protein turnover rate and regulation, cellular and whole-body lipid fluxes, interaction between carbohydrate and lipid metabolism, rate of tricarboxylic acid cycle flux and energy production in the cell, transcriptional regulation of important flux regulating enzymes or transporters for a given pathway, etc.

The ***Metabolomics Technology Development Roadmap Program*** promotes development of novel technologies to study cellular metabolites, such as lipids, carbohydrates, and amino acids. Knowledge gained from these studies will be used to understand more precisely the role of metabolites in the context of cellular pathways and networks.

The ***Protein Trafficking/Secretion/Processing Research Program*** encompasses research aimed at understanding the mechanisms that account for the fate of proteins after their initial translation. Specific areas of support

include:

- Protein folding
- Post-translational modifications and the enzymes that catalyze them
- Movement of proteins in vesicles from the endoplasmic reticulum through the Golgi and endosomes and their ultimate secretion
- Mechanisms that account for vesicle formation (pinching off) and vesicle fusion, which are paramount to understanding trafficking
- Movement of proteins in the direction opposite of secretion, including endocytosis and retrograde transport
- Proteins and small molecules that regulate protein trafficking
- Proteasomes, ubiquitin conjugation, and the N-end rule

The ***Proteomics in Diabetes, Endocrinology, and Metabolic Diseases Program*** comprises grants that study the structure, mechanism, kinetics, and regulation of isolated purified proteins. This would include x-ray crystallography, mass spectroscopy, electron microscopy, nuclear magnetic resonance, and mutational studies of structure. It also includes studies of subunit interactions and interactions with small regulatory ligands, substrates, intermediates, and products. Of special interest are new technologies for structure determination (especially membrane proteins), crystallization, identification of interacting molecules and proteins, and assignment of function to unknown gene products of interest to the fields of diabetes, endocrinology, and metabolic diseases. High-throughput methods are highlighted. All informatics associated with the field of proteomics are included.

Division of Digestive Diseases and Nutrition

This Division supports research related to liver and biliary diseases; pancreatic diseases; gastrointestinal diseases, including neuroendocrinology, motility, immunology, and digestion in the GI tract; nutrient metabolism; obesity; eating disorders; and energy regulation. The Division provides leadership in coordinating activities related to digestive diseases and nutrition throughout the NIH and with various other Federal agencies.

Gastrointestinal Disease Programs

Investigators supported by the ***Gastrointestinal Motility Program*** focus their research on the structure of gastrointestinal muscles, the biochemistry of contractile processes and mechanochemical energy conversion relations between metabolism and contractility in smooth muscle, the extrinsic control of digestive tract motility, and the fluid mechanics of gastrointestinal flow. Other studies and areas of interest include the actions of drugs on gastrointestinal motility; intestinal obstruction; and diseases such as irritable bowel syndrome (functional digestive disorders), colonic diverticular disease, swallowing disorders, and gastroesophageal reflux.

The research emphasis of the ***Gastrointestinal Mucosa and Immunology Program*** focuses on intestinal immunity and inflammation. Areas of interest include ontogeny and differentiation of gut-associated lymphoid tissue; migratory pathways of intestinal lymphoid cells; humoral antibody responses; cell-mediated cytotoxic reactions and the role of cytotoxic effector cells in chronic intestinal inflammation; genetic control of the immune response at the mucosal surface; immune response to enteric antigens in both intestinal and extra-intestinal sites; granulomatous inflammation; lymphokines and cellular immune regulation; leukotriene/prostaglandin effects on intestinal immune responses; T-cell mediated intestinal cell injury; the intestinal mast cell and its role in intestinal inflammation; approaches to optimal mucosal immunoprophylaxis, including viral, bacterial, and parasitic diseases; diseases such as gluten-sensitive enteropathy, inflammatory bowel disease, and gastritis; malabsorption syndromes; diarrhea; gastric and duodenal ulcers; disease of the salivary glands (excluding cystic fibrosis); the effects of prostaglandins and other treatment modalities on the gastrointestinal tract; and the possible role of prostaglandins or other agents in the pathogenesis and treatment of digestive diseases.

The *Gastrointestinal Neuroendocrinology Research Program* supports basic and clinical studies on normal and abnormal function of both the enteric nervous system and the elements within the central nervous system that control the enteric nervous system. Neuroendocrine studies include histochemical and neurochemical analyses of the

enteric nervous system, electrical properties of enteric ganglia, chemical neurotransmission, neural control of effector function, and extrinsic nervous input. This program places emphasis on gastrointestinal hormones and peptides, including their structure, biological actions, structure-activity relationships, receptors, distribution, quantitation, metabolism, release, correlation with physiological events, deficiency, and the role of time variation in the data collected in the above studies. In addition, the program supports studies on disease conditions associated with excessive or inadequate secretion of neuropeptides.

The ***Gastrointestinal Transport and Absorption Program*** supports research on the process of food digestion, and absorption and transport in the gastrointestinal tract, including the synthesis and assembly of digestive enzymes; the transport of water, ions, sugars, amino acids, peptides, lipids, vitamins, and macromolecules; and the formation, structure, and function of chylomicrons. Other areas of research focus on the regulation of gene expression in the gastrointestinal tract; the structure and function of the gut mucosa; the cytoskeletal structure and contractility in brush borders; the growth and differentiation of gastrointestinal cells in normal and disease states; intestinal transplantation, storage, and preservation; and gastrointestinal tissue injury, repair, and regeneration. Also supported are studies on gastrointestinal diseases such as maldigestion and malabsorption syndromes.

The ***Acquired Immunodeficiency Syndrome Program*** encourages research into the characterization of intestinal injury, mechanism of maldigestion, and intestinal mucosal functions, as well as hepatic and biliary dysfunction in AIDS. In addition, studies are supported on mechanisms of nutrient dysfunction, deficiencies of various micronutrients nutritional management of the wasting syndrome and other aspects of malnutrition related to AIDS.

The ***Clinical Trials in Digestive Diseases Program*** supports patient-oriented clinical research focusing on digestive diseases. Small clinical studies (pilot), planning grants or phase III clinical trials may be appropriate to this program. The small clinical studies should focus on research that is innovative and/or potentially of high impact. They should lead to full scale clinical trials. Please see the current program announcement for small grants for clinical trials. Phase III clinical trials usually are multi-center and involve several hundred human subjects that are randomized to 2 or more treatments, 1 of which is usually a placebo. The aim of the trial is to provide evidence for support of, or a change in, health policy or standard of care. The interventions/treatments may include pharmacologic, nonpharmacologic, and behavioral interventions given for disease prevention, prophylaxis, diagnosis, or therapy. Areas of emphasis include: *Helicobacter pylori*; inflammatory bowel disease; functional bowel syndrome and constipation; non-ulcer dyspepsia; celiac disease; intestinal failure, short-gut syndrome, and small bowel transplantation.

The ***Digestive Diseases Research Core Centers Program*** provides a mechanism for funding shared resources (core facilities) that serve to integrate, coordinate, and foster interdisciplinary cooperation between groups of established investigators who conduct programs of high quality research that are related to a common theme in digestive disease research. An existing base of high-quality digestive disease-related research is a prerequisite for the establishment of a center. The research emphases of centers in this program presently focus on liver diseases, gastrointestinal motility, absorption and secretion processes, inflammatory bowel disease, structure/function relationships in the gastrointestinal tract, neuropeptides and gut hormones, and gastrointestinal membrane receptors. Due to a restriction on the number of core center grants that can be supported, new center grant proposals will be accepted only in response to a Request for Applications (RFA) announced in the *NIH Guide for Grants and Contracts.*

The ***Pancreas Program*** encourages research into the structure, function, and diseases (excluding cancer and cystic fibrosis) of the exocrine pancreas. Research efforts focus on:

- Neurohormonal factors involved in the regulation of pancreatic exocrine function in response to pathophysiological stimuli
- Studies on receptor and function of intra-cellular signal transducing molecules, coupling to downstream effectors
- Compartmentalization of enzymes, substrates, and their effectors
- Understanding post-translational mechanisms that account for the fate of proteins, including folding, trafficking, and secretion
- Understanding the properties and functions of intracellular and extracellular filamentous suprastructures that are involved in hormone signaling and exocrine pancreatic functionStudies on the biochemistry, etiology, pathogenesis, genetics, epidemiology, diagnosis, treatment, and prevention of disorders of the exocrine pancreas

- Development of experimental models
- Studies relating to development of the exocrine pancreas, including the growth and differentiation factors involved in this process and the characterization, isolation, production, and uses of pancreatic stem cells
- Studies on organ collection, preservation, and transplantation.

The ***Genetics and Genomics of Digestive Diseases Program*** supports research on identification of genes influencing predisposition to diseases of the gut, liver, and exocrine pancreas, as well as studies of control of gene expression during normal development and disease states of these organs.

Epidemiology Research

The ***Epidemiology and Data Systems Program*** serves as a focus for the collection, analysis, and dissemination of data on digestive diseases and their complications. The program:

- Identifies the data needed to address the scientific and public health issues in digestive diseases and nutrition
- Addresses the epidemiology of digestive diseases and nutritional disorders of public health significance, with particular emphasis on national surveys and their follow-up
- Promotes the timely availability of reliable data to pertinent scientific, medical, and public organizations
- Promotes the standardization of data collection and terminology in clinical and epidemiological research
- Works closely with members of the scientific community to develop investigator-initiated research in digestive diseases and nutrition epidemiology.

The program encourages research that addresses risk factors for disease occurrence and disease prognosis or natural history. The program also supports databases and biological repositories that support clinical and epidemiological studies in digestive diseases and nutrition.

Liver Disease Research Programs

The ***Liver and Biliary Program*** supports basic and clinical research on both the normal function and the diseases of the liver and biliary tract. Areas of basic research include:

- Hepatic regeneration; gene therapy; and liver cell injury, fibrosis, and apoptosis
- Basic and applied studies on liver transplantation, including techniques of preservation and storage
- Metabolism of bile acids and bilirubin
- Physiology of bile formation
- Control of cholesterol levels in bile
- Gallbladder and bile duct function.

Areas of disease-oriented research include:

- Cholesterol and pigment gallstones
- Inborn errors in bile acid metabolism
- Chronic hepatitis that evolves from autoimmune, viral, or alcoholic liver disease
- Various liver ailments such as Wilson's disease, primary biliary cirrhosis, primary sclerosing cholangitis, portal hypertension, hepatic encephalopathy, and Crigler-Najjar syndrome.

The ***Clinical Trials in Liver Disease Program*** supports patient-oriented clinical research in liver diseases to evaluate one or more experimental intervention(s) in comparison with a standard treatment and/or placebo control among comparable groups of patients. Experimental interventions may include pharmacologic, nonpharmacologic, and behavioral interventions given for disease prevention, prophylaxis, diagnosis, or therapy. Areas of program emphasis in liver disease include non-alcoholic steatohepatitis (NASH); chronic hepatitis C; primary biliary cirrhosis; primary sclerosing cholangitis; prevention, management, and treatment of portal hypertension; and recurrent liver disease after transplantation. Either pilot

studies or phase III trials may be appropriate. A phase III clinical trial usually involves several hundred or more comparable human subjects, the aim of the trial being to provide evidence for support of, or a change in, health policy or standard of care.

The NIDDK's *HALT-C* (**H**epatitis C **A**ntiviral **L**ong-Term **T**reatment against **C**irrhosis) trial is a multi-center, randomized controlled study designed to determine if long-term treatment with peginterferon in previous non-responders with advanced hepatic fibrosis can prevent cirrhosis and reduce the risk of developing end-stage liver disease and hepatocellular carcinoma. Antiviral therapy with peginterferon and ribavirin leads to a sustained virological response in approximately half of patients with chronic hepatitis C. Patients who achieve a sustained loss of hepatitis C virus (HCV) usually have marked improvements in liver histology. Lesser but important degrees of improvement in liver histology also occur in interferon-treated patients who fail to achieve a virological response. Furthermore, data from a recent controlled study suggest that continuing interferon in non-responder patients can maintain the histological improvements. Interferon therapy may also reduce the incidence of hepatocellular carcinoma and improve survival in patients with cirrhosis.

In this trial, non-responders to previous treatment with interferon, interferon and ribavirin, or peginterferon were retreated initially with peginterferon alfa-2a (Pegasys, Roche Pharmaceuticals) in a dose of 180 mcg/week and ribavirin in a dose of 1,000 to 1,200 mg/day for 24 weeks (the lead-in phase). Those who became HCV RNA negative were continued on treatment for 48 weeks, whereas those who remained HCV RNA positive entered the formal protocol and were randomly assigned either to continue treatment with peginterferon alfa-2a alone (90 mcg/week) for an additional 42 months or be followed without treatment. Patients are followed with outpatient visits and blood tests every three months. Liver biopsies are performed at baseline and after 2 and 4 years of treatment.

The study goal to randomize 900 patients into the controlled phase was achieved in June 2003. This sample size will provide 90% power to detect a decrease in the annual rate of development of cirrhosis or its complications from 6% per year among controls to 3% per year in those treated.

Primary outcome variables to be assessed in the 2 groups of patients include progression to cirrhosis on liver biopsy, development of hepatic decompensation, development of hepatocellular carcinoma, and death.

Secondary outcomes include quality of life and serious adverse events.

The study is being conducted at 10 clinical centers in the United States, with the support of a virology laboratory and a data-coordinating center. The study is also supported by a clinical research and development agreement with Roche Pharmaceuticals and is cosponsored by the National Cancer Institute, the National Institute of Allergy and Infectious Diseases, and the National Center on Minority Health and Health Disparities.

NASH Clinical Research Network—Nonalcoholic fatty liver disease is one of the most common causes of liver disease in the United States, and its prevalence appears to be increasing. In surveillance studies of chronic liver disease, nonalcoholic fatty liver disease is the third most common diagnosis, accounting for 10% of new cases. The spectrum of nonalcoholic fatty liver disease includes simple steatosis, steatosis with inflammation, and what is currently referred to as nonalcoholic steatohepatitis (NASH). The differentiation of simple steatosis from NASH requires liver biopsy, as there are no laboratory tests for this distinction. The diagnosis of NASH requires the presence of fat, inflammation, and centrolobular (zone 3) ballooning degeneration with either pericellular fibrosis or Mallory bodies. This distinction is important because NASH is believed to be a progressive liver disease that can lead to cirrhosis and even hepatocellular carcinoma, whereas simple steatosis or fatty liver is usually non-progressive and benign. In some cases, however, patients with steatosis alone are later found to develop full-blown NASH. Clinical features, serum aminotransferase elevations, and hepatic imaging studies showing changes suggestive of fatty liver are not adequate alone or in combination to distinguish simple steatosis from NASH. These considerations make it difficult to evaluate the natural history and course of nonalcoholic fatty liver disease or better define the need for therapy or intervention. The causes of NASH are not well defined, but it typically occurs in association with obesity, insulin resistance or type 2 diabetes, and hyperlipidemia, suggesting that fatty liver and NASH are hepatic manifestations of the dysmetabolic syndrome, and might better be referred to as metabolic steatohepatitis (MESH). The lack of clear understanding of the pathogenesis of NASH, its natural history, prognostic features, and treatment all underscore the need for clinical and basic research into this important liver disease.

In response to these needs, NIDDK initiated a request for applications (RFA) to create a multicenter study on the natural history, pathogenesis, and therapy of NASH. The RFA was published in February 2001, and 8 clinical centers and a data coordinating center were awarded in September 2002. Cofunding to allow for expansion of the pediatric component was provided by the National Institute of Child Health and Development (NICHD). The NASH Network will create both a prospective and retrospective database of adult and pediatric cases of nonalcoholic fatty liver disease that will be evaluated and followed prospectively in a standardized fashion. A pathology committee has proposed a standardized system for histological grading and staging and has initiated studies of its reliability and reproducibility. The Network has also developed plans to conduct randomized controlled trials of promising therapies of NASH, both in children and in adults. These studies will focus initially on use of insulin-sensitizing agents and vitamin E. Endpoints of therapy will be based on histological improvements using the standardized grading and staging systems that are currently being refined. An important component of the NASH Clinical Research Network is to develop a cohort of patients and a collaborative group of clinical and basic researchers to generate hypotheses and develop ancillary studies using the resources of the database. These ancillary studies may be in the area of laboratory research or clinical investigation and will focus on pathogenesis and determinants of progression and severity.

Biliary Atresia Clinical Research Consortium—Neonatal liver disease affects 1 in 2,500 liver births, and its major cause is biliary atresia. At present, biliary atresia is the single most common reason for liver transplantation in children and is a major challenge for early detection, diagnosis, and management. At the same time, the underlying cause of biliary atresia is unclear. The disease is congenital but does not appear to be familial or inherited. Various hypotheses have been advanced to explain the occurrence of biliary atresia, but none have proven to be true or to lead to a practical means of early detection, diagnosis, treatment, or prevention. Because biliary atresia and other forms of neonatal liver disease are rare, no single referral center in North America cares for enough new patients each year to allow for intensive analysis of etiology and risk factors or to critically assess novel means of diagnosis or treatment. For these reasons, NIDDK established a Biliary Atresia Clinical Research Consortium (BARC). The consortium is charged with establishing and maintaining the infrastructure for accruing sufficient numbers of biliary atresia and neonatal hepatitis patients to perform adequately powered clinical studies. The overall goal of this consortium is to gather clinical and biochemical data and adequate numbers of serum, tissue, and DNA samples in a prospective manner to facilitate research and generate new hypotheses and test existing hypotheses on the pathogenesis and optimal diagnostic and treatment modalities of these disorders. It is also hoped that the establishment of this consortium and the serum and tissue bank will stimulate other scientists to develop an interest in investigating the etiology and pathogenesis of these disorders and collaborate with the consortium, with serum and tissue being made available for appropriate studies. The study is funded by NIDDK and the Office of Rare Disorders. At present, BARC consists of 9 liver disease Clinical Centers and a Data Coordinating Center.

Adult-to-Adult Living Donor Liver Transplantation Cohort Study—Liver transplantation is now the standard of care for patients with end-stage liver disease. At present, more than 4,500 liver transplants are done yearly. Unfortunately, more than 18,000 patients await liver transplantation, and in recent years, the waiting list has continued to grow. As a consequence, the numbers of patients dying on the liver transplant waiting list has grown. The introduction of the MELD system was designed to assign livers to the patients in most critical need for transplantation and, thereby, decrease the waiting list mortality. While this approach may have been partially successful, the continued shortage of cadaveric livers and continued growth of demand for liver transplantation will mean that the mortality rate on the waiting list will continue to be high.

Among possible remedies to the shortage of cadaveric livers for transplantation, living donor liver transplantation is perhaps the most practicable, but also the most controversial. Living donor liver transplantation has become widely accepted for pediatric patients. For children, the left lobe of an adult liver is adequate for transplantation, and left-lobe living donor liver transplantations (particularly from parent to child) have been done successfully for more than a decade. For adults, transplantation of a left lobe of the liver (approximately 20-30% of the liver mass) is usually inadequate to support life, particularly in a patient already suffering from end-stage liver disease. Transplantation of the right lobe (50-60% of the liver mass) can be successful in adults, but the donor operation is accordingly more extensive and more life-threatening. Adult-to-adult living donor liver transplantation was first accomplished in the late 1990s and was introduced into the United States in 1997 and now accounts for approximately 5% of all liver transplants done in the United States. Nevertheless, the donor operation in adult-to-adult liver transplantation is challenging and potentially dangerous.

To address the issues of proper use, relative risks, and potential benefits of adult-to-adult living donor liver transplantation, NIDDK established a multicenter clinical cohort study. The "Adult-to-Adult Living Donor Liver Transplantation Cohort Study" (A2ALL) consists of 9 liver transplant centers experienced in performing living donor liver transplantation and a data

coordinating center responsible for directing and maintaining an infrastructure of a clinical database on patients. The primary goal of A2ALL will be to provide valuable information on the outcomes of living donor liver transplantation. The cohort study will follow both donors and recipients before and after the liver transplant operation to assess clinical outcomes and quality of life. This information is needed to aid decisions made by physicians, patients, and potential donors.

Hepatotoxicity Network—Liver injury due to medications is one of the most common causes of acute liver disease and jaundice. Importantly, the mortality rate of hepatic idiosyncratic drug reactions is quite high, and over half of cases of acute liver failure in the United States are due to medications. Elucidation of the mechanisms of hepatic drug injury, however, is often difficult. Drug-induced liver disease is typically unpredictable, idiosyncratic, and rare. Most of the medications that cause acute liver injury in humans do not produce injury in experimental animals. Attribution of acute liver injury to a medication is frequently difficult: the patient with hepatotoxicity often has multiple other risk factors for liver disease, may be on many potentially hepatotoxic drugs, and may not present until the injury resolved. Drug-induced liver injury is also quite variable in clinical expression. Patterns of injury mimic virtually all other forms of liver disease, including acute viral hepatitis, autoimmune liver disease, bland cholestasis, mixed cholestatic-hepatic syndromes, acute cholangitis, microvesicular steatosis with lactic acidosis, alcohol-like steatohepatitis, and venoocclusive disease. Finally, drugs that cause hepatotoxicity are usually withdrawn from use and are no longer available for study.

Despite the clinical significance of drug-induced liver injury, this form of liver disease is a relatively unstudied area of research. Part of the difficulty in studying drug-induced liver disease is the absence of a sufficient cohort of well-characterized patients in whom to carry out clinical, genetic, immunological, and biochemical investigation. To help develop a prospective database on drug-related hepatotoxicity, NIDDK has established a Hepatotoxicity Clinical Research Network. The Network consists of 5 interactive clinical centers and a data coordinating center. The objective of the Network is to develop standardized definitions and instruments to identify and characterize bone fide cases of drug-induced liver injury. Researchers could then analyze the epidemiology and clinical spectrum of hepatotoxicity and identify cases of medication-induced liver disease prospectively. They could also collect biological samples to study the pathogenesis of hepatotoxicity using biochemical, serological, and genetic techniques. The Network will be expected to collaborate with other investigators in the areas of hepatocyte biology and cell injury as well as pharmacokinetics and pharmacogenetics. A respository will be established for storage of serum, tissue, and DNA samples. The Network will be funded as a pilot phase (3 years) which, if successful, will be extended by future RFAs.

Obesity Research Programs

The ***Bariatric Surgery Clinical Research Consortium*** will provide infrastructure for and facilitate coordinated clinical, epidemiological, and behavioral research in the field of bariatric surgery through the cooperative development of common clinical protocols and a bariatric surgery database. The Consortium will also provide the preliminary data and background for further investigator-initiated research. Consortium goals include a greater understanding of the risks and benefits of bariatric surgery as a treatment; the standardization of definitions and data collection instruments to enhance the ability to provide meaningful evidence-based recommendations for patient evaluation, selection, and follow-up care; basic and clinical studies to explore the mechanisms by which surgery affects obesity-related co-morbid conditions, energy expenditure, nutrient partitioning, appetitive behaviors, and psychosocial factors. Four to six clinical centers and a data coordinating center were funded in September 2003.

The Program on ***Genetics and Genomics of Obesity*** supports research to identify genes that influence obesity and related anatomical, physiological, and behavioral traits such as body fat composition and distribution, metabolic rate, energy balance, food consumption and preference, and physical activity levels, as well as research on patterns of gene expression associated with these traits, and mechanisms of regulation of these patterns. The Program supports research on humans as well as model organisms, encouraging both genome-wide and candidate-gene based approaches exploiting naturally occurring genetic variation as well as artificially induced mutations. Typical approaches include genetic linkage, association, and linkage-disequilibrium studies, QTL mapping, phenotype- and gene-driven mutagenesis screens, and macro- and microarray-based surveys of gene expression.

The ***Obesity and Eating Disorders Program*** emphasizes support of investigator-initiated basic and clinical research relating to biomedical and behavioral aspects of obesity and eating disorders, particularly binge eating disorder and its relationship to obesity. Areas of research interest include investigations of factors that affect food choices, food intake,

eating behavior, appetite, satiety, body composition, nutrient partitioning, physical activity, and energy regulation. The roles of neural and hormonal factors from the molecular to the whole-animal/human level are encompassed within this program if the primary goal of the investigations is to examine their role in the development or maintenance of obesity. The physiological and metabolic consequences of weight loss or weight gain, the effects of exercise and diet composition on appetite and weight control, and the individual variability in energy utilization and thermogenesis are contained within the specific research interests of this program. Investigations incorporating improved methods for assessment of body composition, examination of health risk factors with specific degrees of obesity or body composition, and determination of the effect of exercise on body composition also are supported.

The ***Obesity Prevention and Treatment Program*** supports research that focuses on the prevention and treatment of overweight and obesity in humans. Prevention includes primary and secondary approaches to prevent the initial development of overweight/obesity through control of inappropriate weight gain and increases in body fat, weight maintenance among those at risk of becoming overweight, and prevention of weight regain once weight loss has been achieved. Treatment includes clinical trials evaluating approaches to lose weight or maintain weight loss, including but not limited to behavioral, pharmacologic, and surgical approaches. This program also includes environmental, policy-based, and population-based approaches to the prevention and treatment of obesity.

Look AHEAD: Action for Health in Diabetes is a clinical trial recruiting 5,000 obese individuals with type 2 diabetes into an 11.5-year study that will investigate the long-term health consequences of interventions designed to achieve and sustain weight loss. The primary outcome of the trial is cardiovascular events: heart attack, stroke, and cardiovascular death. The study also will examine the impact of interventions on cardiovascular risk factors, diabetes control, cost effectiveness, quality of life, and a number of additional measures. The Obesity Special Projects program also administers ancillary studies to Look AHEAD. Recruitment for Look AHEAD was expected to end at most centers by the end of 2003.

As a means of encouraging a multidisciplinary approach to obesity and nutrition research, the Division supports ***Obesity/ Nutrition Research Centers (ONRC)***. The goal of an ONRC is to help coordinate and strengthen support for research activities primarily by providing funds for core facilities and associated staff that serve the various projects on a shared basis. This approach ensures that an ONRC has multiple sponsors, both Federal and non-Federal, and thereby reduces the likelihood that the ONRC will become unduly dependent on any one source of funds for its continued operation. The specific objectives of an ONRC include efforts to:

- Create or strengthen a focus in biomedical research institutions for multidisciplinary research in obesity and nutrition
- Develop new knowledge concerning the development, treatment, and prevention of obesity and eating disorders
- Understand control and modulation of energy metabolism
- Understand and treat disorders associated with abnormalities of energy balance and weight management such as in anorexia nervosa, AIDS, and cancer
- Strengthen training environments to improve the education of medical students, house staff, practicing physicians, and allied health personnel about these conditions

To accomplish the overall goal of these centers, the applicant's institution must have an on-going program of excellence in biomedical research related to the study of obesity and associated disorders. Due to a restriction in the number of core center grants that can be supported, new center grant proposals will be accepted only in response to a Request for Applications (RFA) announced in the NIH Guide for Grants and Contracts.

Nutrition Sciences Programs

The ***Nutrient Metabolism Program*** supports basic and clinical studies related to the requirement, bioavailability, and metabolism of nutrients and other dietary components at the organ, cellular, and subcellular levels in normal and diseased states. Specific areas of research interest include:

- Understanding the physiologic function and mechanism of action/interaction of nutrients within the body
- Nutrient influence on gene regulation and expression

- Metabolism and function of nutrient antioxidants
- Effects of environment, heredity, stress, drug use, toxicants, and physical activity on problems of nutrient imbalance and nutrient requirements in health and disease
- Specific metabolic considerations relating to alternative forms of nutrient delivery and use, such as total parenteral nutrition
- Research to improve methods of assessing nutritional status in health and disease

The ***Clinical Trials in Nutrition Program*** supports clinical research on nutrition and eating disorders, focusing on metabolic and/or physiologic mechanisms. Small clinical studies (pilot), planning grants, or phase III clinical trials may be appropriate to this program. The small clinical studies should focus on research that is innovative and/or potentially of high impact. They should lead to full-scale clinical trials. Please see the current program announcement http://grants1.nih.gov/grants/guide/pa-files/PAR-01-056.html for small grants for clinical trials. Phase III clinical trials usually are multi-center and involve several hundred human subjects that are randomized to two or more treatments, one of which is a placebo. The aim of the trial is to provide evidence for support of, or a change in, health policy or standard of care.

A ***Clinical Nutrition Research Unit (CNRU)*** is an integrated array of research, educational, and service activities focused on human nutrition in health and disease. It serves as the focal point for an interdisciplinary approach to clinical nutrition research and for the stimulation of research in areas such as improved nutritional support of acutely and chronically ill persons, assessment of nutritional status, effects of disease states on nutrient needs, and effects of changes in nutritional status on disease. Funding for the CNRU program, which began in 1979, is provided through the core center grant mechanism. Due to a restriction in the number of core center grants that can be supported, new center grant proposals will be accepted only in response to a Request for Applications (RFA) announced in the NIH Guide for Grants and Contracts.

Other Programs

- Conferences
- Small Business Innovation Research (SBIR)
- Small Business Technology Transfer (STTR)
- Training and Career Development

Division of Kidney, Urologic, and Hematologic Diseases

The Division supports research on diseases of the kidney, genitourinary tract, and blood and blood-forming organs, and on the fundamental biology relevant to these organ systems. It funds training and professional development of investigators in disciplines critical for research in these areas.

Kidney Research

The ***Basic Renal Biology Program*** supports research on normal development, structure, and function of the kidney. Areas of emphasis include glomerular function and cell biology, transport physiology and structure-function analysis of transport proteins, and integrated regulation of solute and water excretion. The program supports investigation of adverse effects of nephrotoxic drugs and environmental toxins and mechanisms of hypoxic renal cell injury.

A major area of strength is studies examining intracellular signal transduction for renal hormones and growth factors. In addition to study on mammalian systems, investigation is supported on transport function and development and genomic analysis of membrane transport proteins using simple systems such as bacteria, *C. elegans,* and zebrafish.

The ***Chronic Renal Diseases Program*** supports basic and clinical studies on the etiology, prevention, diagnosis, and treatment of chronic renal diseases. Disease categories receiving particular emphasis include analgesic nephropathy,

polycystic kidney disease, diabetic nephropathy, glomerulonephritis and other immune disorders of the kidney, hypertensive nephrosclerosis, and HIV nephropathy. A major interest in this program is renal diseases that affect children and the effects of chronic renal insufficiency on growth and development of children.

The ***End-Stage Renal Disease Program*** supports investigation on the pathogenesis of the uremic state, on end-stage renal disease treatment by peritoneal and hemodialysis, and on nutrition in renal disease. Investigation on renal transplantation is supported with particular emphasis on nonimmunological renal injury and on methods of increasing organ availability, particularly in minority populations.

The ***Diabetic Nephropathy Program*** supports investigation into the pathogenesis, prevention, and treatment of the kidney disease associated with diabetes mellitus. One major area of emphasis is the identification of genes associated with familial clustering of diabetic kidney disease, through sponsorship of the FIND consortium.

The ***Pediatric Nephrology Program*** supports basic and clinical research on the causes, treatments, and prevention of kidney diseases of children. Research efforts focus on inherited and congenital renal diseases; kidney disease of diabetes mellitus; IgA nephropathy; and kidney disease and hypertension, which starts in early childhood.

The ***Renal Epidemiology Program*** supports investigation into the incidence and prevalence of renal diseases, the factors associated with increased mortality and co-morbidity, and cost-benefit assessment of prevention and treatment strategies.

The ***U.S. Renal Data System (USRDS),*** an information resource for the epidemiology of end-stage renal disease, is supported through this program. USRDS investigation of cost factors in dialysis care is co-funded with the Centers for Medicare and Medicaid Services, formerly known as the Health Care Financing Administration.

Urology Research

The ***Basic Urology Program*** supports basic research on the normal and abnormal development, structure, and function of the genitourinary tract. A major area of interest is investigation of the biology of bladder cells, including studies on transport properties, effects of obstruction on patterns of protein expression, and examination of interactions between urinary pathogens and cells of the urinary tract. The program on prostate biology has particular strengths in investigation of prostate cell growth and mechanisms of growth factor signal transduction.

The ***Clinical Urology Program*** focuses on research that will increase the knowledge of etiology, diagnosis, pathophysiology, therapy, and prevention of major pediatric and adult urological disorders. Non-malignant disorders of the bladder and prostate, including benign prostatic hyperplasia, interstitial cystitis, urinary tract infections, urinary incontinence, and urolithiasis are areas of emphasis, as are the effects of systemic diseases such as diabetes mellitus, spinal cord injury, and multiple sclerosis on these organs. In addition, the program supports studies of diagnostic and therapeutic modalities such as shock-wave and laser lithotripsy, urolithiasis inhibitors, bladder substitution procedures and devices, and prostate growth inhibitor and reduction therapies.

The ***Urologic Diseases Epidemiology Program*** has a major emphasis on developing a source of epidemiological information that may further understanding of natural history, risk factors, and health resource utilization for urologic conditions. Plans are to collect and analyze new and existing data on incidence, prevalence, morbidity, mortality, and health resource utilization associated with various urologic conditions of high public health importance. The information will be presented in a planned publication tentatively titled "Urologic Diseases in America."

Hematology Research

The ***Hematology Program*** supports research into the fundamental processes underlying the normal and pathologic function of blood cells and the reticuloendothelial system. Major areas of interest include:

- Genetic regulation of hemoglobin and other proteins of the blood
- Acquired and inherited anemias
- Cell membrane composition and regulatory processes
- Iron metabolism, storage, and transport
- Hematopoiesis and its regulation by growth factors, including erythropoietin
- Transcription and signaling factors such as the JAK/STAT pathway involved in hematopoietic cell differentiation
- Immunohematology
- Hematopoiesis, hematopoietic stem cell biology, and the expression of differentiation potential of hematopoietic stem cells
- Stem cell plasticity and the cellular, molecular, and genetic mechanisms that allow cells to express plasticity

Emphasis is on the application of fundamental knowledge to current issues such as gene transfer therapy and bone marrow transplantation, and disorders such as sickle cell anemia, thalassemia, hemochromatosis, iron deficiency anemia, thrombocytopenia, and hemolytic anemia.

The ***Chelator Therapy Program*** supports development of new iron chelating drugs for the treatment of transfusion iron overload, such as in Cooley's anemia, sickle cell disease, and other instances of iron overload. A safe and inexpensive orally active iron chelator that effectively promotes iron excretion is needed urgently, since the only currently available drug, desferrioxamine B, is expensive and is painful and cumbersome to administer, leading to widespread non-compliance among the young adult patient population. Pre-clinical toxicity studies of potential iron chelating drugs are performed under the contract mechanism. Grant support is offered for basic research on the kinetics of iron chelation, the identity of the iron pools addressed, and ways to enhance the chelating activity and reduce the toxicity of known iron chelators.

The ***Hematopoietic Lineage Genomics Anatomy Program***—This program has been initiated to merge the fields of hematopoietic cell biology, including erythroid cell physiology, with bioinformatics. The combination of these two fields will: 1) advance the ability to catalog and monitor genes that are expressed during normal and variant hematopoietic cell differentiation, 2) facilitate a more comprehensive understanding of the dynamics of molecular events that occur during differentiation, and most importantly, 3) develop a quantitative model that incorporates known gene expression data into a description of a red blood cell. This model could then be used to test novel expression patterns as they are discovered and also be used as a scaffold from which to devise models for other tissue and organ development.

Genomics Research

The ***Genomics Research Program*** encompasses research on genomics and related technologies in the study of kidney, genitourinary tract, and blood and blood-forming organs. This program also supports model organism genomics research, including the development of genetic tools for high-throughput functional genomics studies. One major programmatic area is the leadership of a major trans-NIH initiative to develop genomics of zebrafish, Danio rerio.

Division of Extramural Activities

The Division of Extramural Activities (DEA) is responsible for coordinating the receipt, referral and scientific review of extramural research applications and proposals before funding, and for the processing of awards for grants, cooperative agreements and contracts. It logs in, assigns and internally distributes all extramural applications and proposals received by the NIDDK, and conducts scientific and technical peer review for grant applications and contract proposals requiring special programmatic consideration. The DEA also manages an acquisitions and general contracting service center that services NIDDK and several other NIH Institutes and Centers as well. The DEA also coordinates the Institute's Committee Management Activities and the meetings of the National Diabetes and Digestive and Kidney Diseases Advisory Council. Finally, the DEA performs and coordinates programmatic analysis and evaluation activities. Organizationally the Division has 3 primary functional components:

The ***Grants Management Branch*** is the focal point for all business-related activities associated with the negotiation,

award, and administration of grants and cooperative agreements within the NIDDK.

The ***Scientific Review Branch*** coordinates the initial scientific peer review of applications submitted in response to Request for Applications (RFAs), training and career awards, program projects, multi-center clinical trials and research contracts, including Loan Repayment Program applications. Most R01s, R21s, Fellowship and SBIR grant applications are reviewed in the Center for Scientific Review.

The ***Office of Acquisitions*** plans, organizes, directs, awards, and administers a comprehensive acquisition program for three Institutes and one Center: NIDDK, the National Institute of Child Health and Human Development (NICHD); the National Institute on Alcohol Abuse and Alcoholism (NIAAA); and the John E. Fogarty International Center (FIC).

NIDDK Office of the Director

The NIDDK director created the ***Office of Minority Health Research Coordination*** to address the burden of diseases and disorders that disproportionately impact the health of minority populations. The OMHRC will help implement the Institute's strategic plan for health disparities and build on the strong partnership with the National Center on Minority Health and Health Disparities at NIH.

The NIDDK ***Office of Obesity Research*** is responsible for coordination of obesity-related research within NIDDK, and carries out its functions through the NIDDK Obesity Research Working Group. The Office is located organizationally under the auspices of the Office of the Director, NIDDK, and its co-directors represent the two divisions with primary responsibility for obesity-related extramural research, the Division of Digestive Diseases and Nutrition (DDN) and the Division of Diabetes, Endocrinology, and Metabolic Diseases (DEM). The Obesity Research Working Group consists of representatives of DDN, DEM, the Division of Kidney, Urologic, and Hematologic Diseases (KUH), the NIDDK Review Branch, the Office of Scientific Program and Policy Analysis (OSPPA), and the Division of Nutrition Research Coordination (DNRC). The responsibilities of the NIDDK Obesity Research Working Group are: 1) to provide a forum for sharing and coordination of trans-NIDDK and trans-NIH obesity research activities; 2) to assist the Director, NIDDK in identifying research opportunities, initiatives, and advances; 3) to identify and plan appropriate workshops and conferences; and 4) to assist in the preparation of obesity-related reports and inquiries.

Under the auspices of the NIDDK Advisory Council, the National Task Force on Prevention and Treatment of Obesity was established in June 1991. In June 2003, the name was changed to the *Clinical Obesity Research Panel (CORP)*. The mission of the CORP is to synthesize current scientifically based information on the prevention and treatment of obesity and to develop statements about topics of clinical importance that are based on critical analyses of the literature. It is composed of leading obesity researchers and clinicians who advise the institute on research needs and sponsor workshops on topics related to the prevention and treatment of obesity. The CORP serves in an advisory capacity to the Weight-control Information Network (WIN).

Health Information and Education Services

National Diabetes Information Clearinghouse (NDIC)
National Digestive Diseases Information Clearinghouse (NDDIC)
National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC)

The 3 clearinghouses serve as information resources for patients, the public, and health professionals concerned with diabetes, digestive diseases, and kidney and urologic diseases. Each was authorized by Congress to increase knowledge and understanding about these areas through the effective dissemination of information. The NDIC was authorized by Congress in 1976, the NDDIC in 1980, and the NKUDIC in 1987.

The clearinghouses answer inquiries; develop, print and distribute publications; and work closely with professional and patient-advocacy organizations and U.S. Government agencies to coordinate informational resources about diabetes, digestive diseases, and kidney and urologic diseases.

The clearinghouses also develop and maintain a free, online bibliographic database of reference materials, audiovisuals, educational materials, and "fugitive" literature in its Reference Collection, as well as an image library of free non-copyrighted images, and linkages to relevant interactive resources.

The clearinghouses provide 2 campaigns to increase awareness and action for people with underdiagnosed or undertreated conditions: celiac disease (www.celiac.nih.gov) and bladder control issues in women (www.kidney.niddk.nih.gov/kudiseases/pubs/bladdercontrol/index.htm).

Addresses are:

- NDIC, 1 Information Way, Bethesda, Maryland 20892-3560, phone: 1-800-860-8747;
- NDDIC, 2 Information Way, Bethesda, Maryland 20892-3570, phone: 1-800-891-5389;
- NKUDIC, 2 Information Way, Bethesda, Maryland 20892-3580, phone: 1-800-891-5390.

National Diabetes Education Program (NDEP)

The *NDEP*, co-sponsored by the NIDDK and the Centers for Disease Control and Prevention (CDC), is focused on improving the treatment and outcomes for people with diabetes, promoting early diagnosis, and ultimately preventing the onset of diabetes. The goal of the program is to reduce the morbidity and mortality associated with diabetes through public awareness and education activities targeted to the general public, especially those with at risk for type 2 diabetes, people with diabetes and their families, health care providers, and policy makers and payers. These activities are designed to 1) increase public awareness that diabetes is a serious, common, costly, and controllable disease that has recognizable symptoms and risk factors; 2) encourage people with diabetes, their families, and their social support systems to take diabetes seriously and to improve practice of self-management behaviors; 3) reduce disparities in health in racial and ethnic populations disproportionately affected by diabetes and 4) alert health care providers to the seriousness of diabetes, effective strategies for its prevention and control, and the importance of a team care approach to helping patients manage the disease. Toward these ends, the NDEP develops partnerships with organizations concerned about diabetes and the health care of its constituents.

NDEP publications are available through the NDEP home page at http://ndep.nih.gov. The mailing address is 1 Diabetes Way, Bethesda, Maryland 20892-3600, phone 800-438-5383.

National Kidney Disease Education Program (NKDEP)

The *NKDEP* addresses the growing problem of kidney disease in this country and aims to reduce the morbidity and mortality caused by kidney disease and its complications. The program is dedicated to raising awareness of the seriousness of kidney disease and its risk factors, the importance of testing those at high risk, and the availability of treatment to prevent or slow the progression of kidney disease to kidney failure.

NKDEP publications are available through the NKDEP home page at www.nkdep.nih.gov.Contact information for the program is as follows:

National Kidney Disease Education Program
3 Kidney Information Way
Bethesda, MD 20892
Toll free 1-866-4-KIDNEY (1-866-454-3639)
Fax: 301-402-8182

E-mail: nkdep@info.niddk.nih.gov

Weight-control Information Network (WIN)

The *WIN* is a national information service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH). WIN was established in 1994 to provide health professionals and consumers with science-based information on obesity, weight control, and nutrition. WIN has also developed the *Sisters Together: Move More, Eat Better* Media program that encourages Black women 18 and over to maintain a healthy weight by becoming more physically active and eating healthier foods. For more information, contact WIN at:

The Weight-control Information Network
1 WIN Way, Bethesda, Maryland 20892-3665
Toll-free number: 1-877-946-4627
Fax: 202-828-1028
Email: win@info.niddk.nih.gov
Internet: www.win.niddk.nih.gov

NIH Almanac: Organization

National Institute on Drug Abuse

Mission | Important Events | Legislative Chronology | Director | Divisions and Offices

Mission

The mission of the National Institute on Drug Abuse (NIDA) is to lead the Nation in bringing the power of science to bear on drug abuse and addiction. In this regard, NIDA addresses the most fundamental and essential questions about drug abuse—from detecting and responding to emerging drug abuse trends and understanding how drugs work in the brain and body to developing and testing new treatment and prevention approaches. NIDA also supports research training, career development, public education, and research dissemination efforts. Through its Intramural Research Program, as well as grants and contracts to investigators at research institutions around the country and overseas, NIDA supports research and training on:

- The neurobiological, behavioral, and social mechanisms underlying drug abuse and addiction;
- The causes and consequences of drug abuse, including impact on society and morbidity and mortality in selected populations (e.g., ethnic minorities, youth, and women);
- The relationship of drug use to problem behaviors and psychosocial outcomes such as mental illness, unemployment, low socioeconomic status, and violence;
- Effective prevention and treatment approaches, including a broad research program designed to develop new treatment medications and behavioral therapies for drug addiction;
- The relationship of drug abuse to cultural and ethical issues such as health disparities; and
- The relationship of drug abuse to the acquisition, transmission, and clinical course of HIV/AIDS, tuberculosis, and other diseases and the development of effective prevention/intervention strategies.

Important Events in NIDA History

1935—A research facility is established in Lexington, KY, as part of a U.S. Public Health Service (USPHS) hospital. It became the Addiction Research Center in 1948.

1972—Drug Abuse Warning Network and National Household Survey on Drug Abuse are initiated under the Special Action Office for Drug Abuse Prevention.

1974—NIDA is established as the Federal focal point for research, treatment, prevention, training, services, and data collection on the nature and extent of drug abuse.

National Drug and Alcohol Treatment Unit Survey begins to identify the location, scope, and characteristics of public and private drug prevention and treatment programs.

1975—The Monitoring the Future Survey, also known as the High School Senior Survey, is initiated to measure prevalence and trends of non-medical drug use and related attitudes of high school seniors and young adults.

NIDA begins its "Research Monograph Series." Each monograph contains scientific papers that discuss a variety of subjects including drug abuse treatment and prevention research.

1976—NIDA establishes the Community Epidemiology Work Group, made up of state and local representatives meeting semiannually with NIDA staff to assess recent drug abuse trends and to identify populations at risk.

1979—The clinical research program moves from Lexington, KY, to the campus of the Francis Scott Key Medical Center (later Johns Hopkins Bayview Medical Center) in Baltimore, MD. The basic science program follows in 1985.

NIDA sponsors the Treatment Outcome Prospective Study (TOPS), which continues through 1987 to evaluate the overall effectiveness of treatment and to identify certain factors as important determinants of drug abuse treatment success, such as length of time in treatment.

1985—NIDA publishes the first issue of its bimonthly newsletter, *NIDA Notes*.

1986—The dual epidemics of drug abuse and HIV/AIDS are recognized by Congress and the Administration, resulting in a quadrupling of NIDA funding for research on both major diseases.

1987—NIDA initiates the National AIDS Demonstration Research projects to study and change the high-risk behaviors of injection drug users not enrolled in drug treatment and their sex partners.

1990—NIDA establishes the Medications Development Program, focusing on developing new medications for treating addiction.

1991—The Monitoring the Future Survey is expanded to include 8th and 10th graders.

NIDA begins data collection for the Drug Abuse Treatment Outcome Study (the successor to TOPS) to assess the effectiveness of treatment in reducing drug abuse and to identify predictors of drug abuse treatment success.

NIDA holds its first research technology transfer conference in Washington, DC: "National Conference on Drug Abuse Research and Practice: An Alliance for the 21st Century."

1992—NIDA joins the National Institutes of Health (NIH).

1993—The Institute obtains FDA approval for LAAM, the first medication approved in a decade for the treatment of opioid addiction.

1995—NIDA researchers clone the dopamine transporter, cocaine's primary site of action in the brain.

The Institute holds the first "National Conference on Marijuana Use: Prevention, Treatment, and Research" in Arlington, VA.

1996—NIDA dedicates the Regional Brain Imaging Center located at the Institute's intramural research center in Baltimore.

1997—NIDA releases *Preventing Drug Use Among Children and Adolescents: A Research-Based Guide*, which described the most successful concepts for preventing drug abuse among young people.

The Institute sponsors "Heroin Use and Addiction: A National Conference on Prevention, Treatment, and Research," in Washington, DC.

1998—NIDA establishes a new Center for AIDS and Other Medical Consequences of Drug Abuse, to coordinate a

comprehensive, multidisciplinary research program aimed at improving the knowledge base on drug abuse and HIV/AIDS and other short and long-term health consequences associated with drug abuse and addiction.

1999—In collaboration with the National Cancer Institute (NCI) and the Robert Wood Johnson Foundation, NIDA creates the Transdisciplinary Tobacco Use Research Centers for studying tobacco use and new ways to combat it and its consequences.

NIDA launches its National Drug Abuse Treatment Clinical Trials Network, to rapidly and efficiently test the effectiveness of behavioral and pharmacological treatments in real-life settings.

NIDA releases *Principles of Drug Addiction Treatment: A Research-Based Guide*, developed for use in local communities. The guide describes the most successful concepts for treating people with drug abuse and addiction problems.

NIDA launches the "NIDA Goes to School" initiative to provide middle school students with accurate information on how drugs affect the brain. As a part of this initiative, more than 18,000 middle schools across the country received a compilation of resource materials.

2000—NIDA distributes its "Clinical Toolbox," a collection of the latest comprehensive science-based publications on drug addiction and its treatment.

2001—The Institute launches the National Prevention Research Initiative to stimulate research that will fill critical gaps in the knowledge and use of science-based drug abuse prevention strategies in communities across the country.

2002—The Institute launches the new peer-reviewed journal *Science and Practice Perspectives* to encourage more collaboration between researchers and practitioners.

The FDA approves buprenorphine for the treatment of opioid dependence. NIDA supported the development of this medication. It is the first form of opioid treatment to be given in a physician's office.

With support from 8 partner agencies in the U.S. Departments of Health and Human Services (HHS) and Justice, NIDA launches a major research initiative called the Criminal Justice Drug Abuse Treatment Studies (CJ-DATS). The goal of CJ-DATS is to establish and use a research infrastructure to develop and test models for an integrated approach to the treatment of incarcerated individuals with drug abuse or addictive disorders.

2003—NIDA releases its newly updated publication, P*reventing Drug Use among Children and Adolescents: A Research-Based Guide for Parents, Educators, and Community Leaders, Second Edition*, which reflects NIDA's expanded research program and knowledge base in the area of drug abuse prevention.

NIDA launches its "NIDA Goes Back to School" campaign and "NIDA for Teens" website in an effort to keep parents, teachers, and teenagers informed on the science behind drug abuse.

2004—NIDA continues to address the gap that exists in the drug abuse treatment field between clinical practice and basic scientific investigation through its "Blending" series of meetings. The 2004 meeting was titled "Blending Clinical Practice and Research: Forging Partnerships in the Great Lakes States to Enhance Drug Addiction Treatment."

NIDA collaborates with the Drug Enforcement Administration and other Federal agencies to design a traveling museum exhibit, which debuted in New York City. This exhibit draws attention to the social, economic, and medical consequences associated with drug abuse.

2005—NIDA expands efforts to understand how drugs of abuse influence brain development through new NIDA research

initiatives and collaborations with other NIH Institutes on pediatric neuroimaging studies.

NIDA launches an HIV/AIDS campaign to raise awareness regarding the links between drug abuse and HIV transmission. As a part of this effort NIDA develops a public service announcement that is aired across the Nation and displayed in Washington DC's Metro system. NIDA also develops a dedicated website, creates a "Research Report," and holds a scientific meeting on drug abuse and HIV/AIDS.

2006—NIDA launches its *Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide*, summarizing proven components for successfully treating drug abusers who have entered the criminal justice system.

2007—NIDA, in collaboration with the Substance Abuse and Mental Health Services Administration (SAMHSA), releases 5 Blending Team products to facilitate the adoption of effective research-based treatment by community practitioners. Products include education and training materials on: treatment protocols using buprenorphine, motivational interviewing, motivational incentives, and the Addiction Severity Index for treatment planning.

NIDA releases its first plain-language booklet explaining the science behind addiction. *Drugs, Brains, & Behavior—The Science of Addiction* discusses the reasons people take drugs, why some people become addicted while others do not, how drugs work in the brain, and how addiction can be prevented and treated. View Image.

NIDA joins with the Robert Wood Johnson Foundation, the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and HBO to produce the Emmy Award-winning documentary titled "Addiction," which explores many elements of drug and alcohol addiction through the eyes of those who are addicted and features the insights of scientific experts working to better understand and treat this devastating disease.

NIDA holds the first national "Drug Facts Chat Day." High school students in schools from 49 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam submitted over 36,000 questions on a wide range of drug abuse-related topics. View Images.

NIDA Legislative Chronology

1966—P.L. 89-793, the Narcotic Addict Rehabilitation Act, provided for increased Federal efforts in the rehabilitation and treatment of narcotic addicts (limited to opiate abusers).

1970—P.L. 91-513, the Comprehensive Drug Abuse Prevention and Control Act, replaced the USPHS Act's definition of "narcotic addict" with a definition of "drug dependent person" to authorize treatment for both narcotic addicts and other persons with drug abuse problems.

1972—P.L. 92-255, the Drug Abuse Office and Treatment Act, created a Special Action Office for Drug Abuse Prevention (SAODAP) in the Executive Office of the President, and authorized the establishment of NIDA within the Department to become operational in 1974. In cooperation with other Federal agencies, especially the National Institute of Mental Health's (NIMH) Division of Narcotic Addiction and Drug Abuse (DNADA), SAODAP established a national network of multi-modality drug abuse treatment programs.

1974—P.L. 93-282, the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment, and Rehabilitation Act Amendments, created the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), which was charged with supervising and coordinating the functions of NIMH, NIDA, and NIAAA. Programs and responsibilities of DNADA and SAODAP were moved to NIDA.

1979—P.L. 96-181, the Drug Abuse Prevention, Rehabilitation, and Treatment Act, mandated that at least 7% in FY 1980 and 10% in FY 1981 of NIDA's Community Programs budget be spent on prevention.

1981—P.L. 97-35, the Omnibus Budget Reconciliation Act, repealed NIDA's formula grants and Community Programs project grants and contracts authorities, and established the Alcohol, Drug Abuse, and Mental Health Services (ADMS) Block Grant program, giving more control of treatment and prevention services to the states.

1986—P.L. 99-570, the Anti-Drug Abuse Act of 1986, increased the Block Grant and created a substance abuse treatment enhancement. The Act also provided increased funds for all NIDA research, particularly AIDS research.

Executive Order 12564 mandated a drug-free Federal workplace program. NIDA became the lead agency, creating its Office of Workplace Initiatives.

1987—P.L. 100-71, Supplemental Appropriations Act of 1987, required HHS (NIDA) to publish guidelines in the Federal Register for Federal drug testing.

1988—P.L. 100-690, the Anti-Drug Abuse Act of 1988, established the Office of National Drug Control Policy (ONDCP) in the Executive Office of the President and authorized funds for Federal, state, and local law enforcement, school-based drug prevention efforts, and drug abuse treatment with special emphasis on injection drug abusers at high risk for AIDS.

1989 and **1990**—P.L. 101-166 and P.L. 101-517, the Departments of Labor, HHS, and Education Appropriations Acts for FY 1990 and 1991, contained identical prohibitions precluding the use of funds provided under these enactments to carry out any program of distributing sterile needles.

1992—P.L. 102-321, the ADAMHA Reorganization Act, transferred NIDA to NIH; earmarked 15% of the Institute's research appropriation for health services research; established a Medication Development Program within NIDA; provided authority to designate Drug Abuse Research Centers for interdisciplinary research on drug abuse and related biomedical, behavioral, and social issues; and created an Office on AIDS at NIDA.

P.L. 102-394, the Departments of Labor, HHS, and Education FY 1993 Appropriations Act, provided that up to $2 million of NIDA research funds be available to carry out section 706 of P.L. 102-321, which required the HHS Secretary, acting through NIDA, to request a National Academy of Sciences study of U.S. programs that provide both sterile hypodermic needles and bleach.

1993—P.L. 103-112, the Department of Labor, HHS and Education FY 1994 Appropriations Act, prohibited the use of funds under the Act for any further implementation of section 706 of P.L. 102-321 (see above) and any program for distributing sterile needles.

1994 and **1996**—P.L. 103-333, the Departments of Labor, HHS, and Education Appropriations Act for FY 1995; P.L. 104-134, the Omnibus Consolidated Rescissions and Appropriations Act for FY 1996; and P.L. 104-208, the Omnibus Consolidated Appropriations Act for FY 1997—each prohibited use of any funds provided in the enactments to carry out any program of distributing sterile needles.

1997—P.L. 105-78, the Departments of Labor, HHS, and Education Appropriation Act for FY 1998, continued prior restrictions on needle-exchange programs through March 31, 1998, permitting funding thereafter of those programs meeting certain statutory requirements including criteria of the HHS Secretary.

1998—P.L. 105-277, the Omnibus Consolidated and Emergency Supplemental Appropriations Act-1999, restored the general prohibition on funds for needle exchange programs; statutorily reestablished ONDCP in the Executive Office of the President with significantly expanded authority over drug control agencies; and required ONDCP to conduct a 4-year (FYs 1999-2002) national anti-drug media campaign aimed at youth.

1999—P.L. 106-113, the Consolidated Appropriations Act-2000, continued the ban on funding of sterile needle and syringe exchange programs; prohibited use of appropriated funds for promotion of legalization of any Schedule I controlled substance; and postponed termination of NIDA's triennial report until 5/15/2000.

2000—P.L. 106-554, the Consolidated Appropriations Act-2001, authorized the Director of NIH to negotiate a long-term lease for research facilities at Baltimore's Bayview Campus, and continued prior prohibitions on funding of sterile needle/ syringe exchange programs and on promotion of legalization of Schedule I controlled substances.

P.L. 106-310, the Children's Health Act of 2000, repealed the Narcotic Addict Rehabilitation Act of 1966 [P.L. 89-793]; waived certain requirements of the Controlled Substances Act to permit qualified physicians to engage in office-based treatment of opiate dependence; and authorized expansion of NIDA research on methamphetamine and increased emphasis on Ecstasy research.

2001—P.L. 107-116, the Departments of Labor, HHS, and Education FY 2002 Appropriations Act, continued prior prohibitions on funding of sterile needle and syringe exchange programs and on legalization of Schedule I controlled substances.

2002—Title II of P.L. 107-273, the Drug Abuse Education, Prevention, and Treatment Act of 2002, authorized NIDA expansion of interdisciplinary research and clinical trials with treatment centers of the National Drug Abuse Treatment Clinical Trials Network; and required a NIDA study on development of medications for amphetamine/methamphetamine addiction.

2003—Division G of P.L. 108-7, the Departments of Labor, HHS, and Education FY 2003 Appropriations Act, continued prior prohibitions on funding of sterile needle and syringe exchange programs and on legalization of Schedule I controlled substances.

2004—P.L. 108-358, the Anabolic Steroids Control Act of 2004 significantly expanded the list of anabolic steroids classified as controlled substances; required a review of Federal sentencing guidelines; and authorized $15 million, for each of the next fiscal years through 2009, for educational programs in schools to highlight the dangers of steroids, with preference given to programs deemed effective by NIDA.

2005—P.L. 109-56, amended the Controlled Substances Act to lift the patient limitations imposed on medical practitioners in group practices regarding the prescribing of drug addiction treatments. Section 2013 of P.L. 109-59, the Safe, Accountable, Flexible, Efficient Transportation Equity Act, directs the Secretary of Transportation to advise and coordinate with other Federal agencies on addressing driving under the influence of controlled substances and, in cooperation with NIH (NIDA), to submit a report to Congress on drug-impaired driving.

2006—P.L. 109-469, the ONDCP Reauthorization Act of 2006, in section 1102, amended the Controlled Substances Act to further relax the patient limitations on provision of drug addiction treatments, allowing medical practitioners to notify the HHS Secretary of need and intent to treat up to 100 patients. Section 1120 required the ONDCP Director to consult with NIH (NIDA) and the National Academy of Sciences in making policy relating to syringe exchange programs.

Biographical Sketch of NIDA Director, Nora D. Volkow, M.D.

Nora D. Volkow, M.D., became Director of the National Institute on Drug Abuse (NIDA) at the National Institutes of Health in May 2003. NIDA supports most of the world's research on the health aspects of drug abuse and addiction.

Dr. Volkow's work has been instrumental in demonstrating that drug addiction is a disease of the human brain. As a research psychiatrist and scientist, Dr. Volkow pioneered the use of brain imaging to investigate the toxic effects of drugs

and their addictive properties. Her studies have documented changes in the dopamine system affecting the actions of frontal brain regions involved with motivation, drive, and pleasure and the decline of brain dopamine function with age. She has also made important contributions to the neurobiology of obesity, attention deficit hyperactivity disorder (ADHD), and the behavioral changes that occur with aging.

Dr. Volkow was born in Mexico, attended the Modern American School, and earned her medical degree from the National University of Mexico in Mexico City, where she received the Premio Robins award for best medical student of her generation. Her psychiatric residency was at New York University, where she earned the Laughlin Fellowship Award as one of the 10 Outstanding Psychiatric Residents in the USA.

Dr. Volkow spent most of her professional career at the U.S. Department of Energy's Brookhaven National Laboratory in Upton, NY, where she held several leadership positions including director of nuclear medicine, chairman of the medical department, and associate director for life sciences. In addition, Dr. Volkow was a professor in the department of psychiatry and associate dean of the medical school at the State University of New York-Stony Brook.

Dr. Volkow has published more than 355 peer-reviewed articles and more than 60 book chapters and non-peer-reviewed manuscripts, and has also edited 3 books on the use of neuroimaging in studying mental and addictive disorders.

During her professional career, Dr. Volkow has been the recipient of multiple awards, including her selection for membership in the Institute of Medicine in the National Academy of Sciences. She was recently named one of *Time* magazine's "Top 100 People Who Shape our World" and was included as one of the 20 people to watch by *Newsweek* magazine in its "Who's Next in 2007" feature. She was also named "Innovator of the Year" by *U.S. News & World Report* in 2000.

NIDA Directors

Name	In Office from	To
Robert L. DuPont	1973	1978
William Pollin	1979	1985
Charles R. Schuster	1986	1992
Richard A. Millstein (Acting)	1992	1994
Alan I. Leshner	1994	2001
Glen R. Hanson (Acting)	2001	2003
Nora D. Volkow	2003	Present

Divisions and Offices

Office of the Director

The Office of the Director leads the Institute by setting research and programmatic priorities. Further, cross-cutting initiatives are coordinated through special offices within the Office of the Director.

The Special Populations Office has two goals: (1) to address the research training and career development needs of underrepresented minorities and others (women, individuals with disabilities, etc.) in drug abuse research and (2) to ensure that minority issues in drug abuse research are adequately represented in the work supported by NIDA.

The AIDS Research Program office provides direction and leadership for the development of a progressive HIV/AIDS research portfolio that addresses the unique dimensions of drug abuse as it relates to HIV/AIDS. The development and implementation of such research program is guided by several factors including, but not limited to, the epidemiology of the HIV/AIDS pandemic, the evolution of HIV/AIDS diagnoses and treatment, and the role of drug abuse and related behaviors in HIV/AIDS.

The NIDA International Program fosters international cooperative research and the exchange of scientific information by drug abuse researchers around the globe. NIDA's international objectives include promoting international research activities; supporting research training and exchange opportunities globally; communicating and disseminating science-based information on drug abuse; and supporting international research collaboration.

Division of Epidemiology, Services, and Prevention Research

The Division of Epidemiology, Services, and Prevention Research (DESPR) plans, stimulates, develops, and supports a broad extramural research program to study: (1) the nature, patterns, and consequences of drug use among general, special, community-based, and subpopulations; (2) innovative sampling, data collection, and analytic methodologies designed to support epidemiologic and prevention and early intervention and services research; (3) prevention of drug use and addiction, and services research including the prevention of medical/social/psychological sequelae of drug use; (4) behavioral and social science research in the context of communities and defined populations, including the consequences of drug use such as delinquency and violence; (5) services research on the impact of the organization, financing, and management of treatment programs and services systems on quality, cost, access, and outcomes of care; and (6) economic modeling and configuration of the treatment system.

Division of Basic Neuroscience and Behavior Research

The primary goal of the Division of Basic Neuroscience and Behavioral Research (DBNBR) is to support an extramural program of research in the basic biomedical and behavioral sciences that relates to the public health problem of drug abuse and addiction. The supported research provides an understanding of the neurobiological and behavioral effects of drugs of abuse. Research focuses on the molecular, neurobiological, and genetic mechanisms of addiction, drug craving, effects of drugs on behavior and cognition, long-term chronic effects of drugs, and drug metabolism. Basic research concerned with understanding the complex interrelationship between HIV/AIDS progression and transmission and drug abuse is also supported. The research supported by DBNBR provides important fundamental information for developing prevention and treatment interventions for drug abuse and addiction.

Division of Clinical Neuroscience and Behavioral Research

The Division of Clinical Neuroscience and Behavioral Research (DCNBR) supports a broad range of research focused on translating addiction science related to brain, behavior, and health through an integrated research program in clinical neuroscience, development, and behavioral treatment, including HIV/AIDS-related factors. This division has 3 research branches that develop and administer national research and research training programs:

The Clinical Neuroscience Branch advances research directed toward understanding the neurobiological substrates of drug abuse and addiction processes, characterizing how abused drugs affect the structure and function of the human central nervous system, biological etiology, i.e. studies that seek to define the individual differences in neurobiological, genetic, and neurobehavioral factors that confer increased vulnerability and/or resilience to drug abuse, the transitions from use to abuse to addiction, and drug-related disorders.

The Behavioral and Brain Development Branch focuses primarily on normal behavioral and neurobiological development and research designed to ameliorate or prevent the negative developmental outcomes that result from drug exposure and factors associated with drug use and abuse.

The Behavioral and Integrative Treatment Branch advances research programs directed toward the development, refinement, and testing of behavioral/psychosocial treatments and complementary/alternative interventions for drug abuse, alone and in combination with medications for drug addiction. An overall focus of this program is on strategies to attract drug abusers to treatment, retain them in treatment, and help them avoid relapse.

Center for the Clinical Trials Network

The Center for Clinical Trials Network (CCTN) supports and leads a network of 16 Regional Research Training Centers (RRTCs) and 240 Community Treatment Programs (CTPs) in a bi-directional effort to bridge the gap between the science of drug treatment and its practice through the study of scientifically based treatments in real-world settings. This Clinical Trials Network (CTN) serves as a resource and forum for (1) multi-site efficacy and effectiveness trials of promising medications and behavioral interventions; (2) researchers who use the CTN as a platform for studies supported outside of the CCTN; (3) NIDA-supported training using pre- and postdoctoral and career awards mechanisms; (4) secondary analyses of its rich database; (5) rapidly addressing emerging public health needs; and (6) the systematic transfer of research findings, both positive and negative, to treatment programs, clinicians, and patients.

Division of Pharmacotherapies and Medical Consequences of Drug Abuse

The Division of Pharmacotherapies and Medical Consequences of Drug Abuse (DPMCDA) plans and directs studies necessary to identify, evaluate, develop, and obtain FDA marketing approval for new medications for the treatment of drug dependence and addiction and other brain and behavioral disorders. DPMCDA develops and administers a national program of basic and clinical pharmaceutical research to develop innovative pharmacological treatment approaches. DPMCDA also collaborates with the pharmaceutical and chemical industry in the United States and other Nations and the Federal medications development programs and works closely with FDA in assuring that research designed to show the clinical efficacy of new compounds is evaluated and approved in the most expeditious manner possible. DPMCDA also coordinates and provides leadership with respect to HIV/AIDS research activities, and other medical/psychiatric consequences of drug use (including such areas as prevention of HIV transmission, HIV treatment, and/or treatment and prevention of other medical/psychiatric conditions associated with drug use).

Intramural Research Program

NIDA's Intramural Research Program (IRP) is located in Baltimore. Originally known as the Addiction Research Center, IRP conducts multidisciplinary research on basic biological and behavioral mechanisms that underlie drug abuse and addiction, including its causes and adverse consequences. Research is also supported on treatments for drug addiction and HIV transmission of injection drug users. Studies range from molecular to laboratory research with animals to clinical studies with human volunteers. The program employs the latest technology—including positron emission tomography—to study the action of drugs in the human brain and transgenic species to better understand the role of genes in drug abuse. The intramural program also serves as a national and international training center for young investigators in the drug abuse field.

Office of Science Policy and Communications

The Office of Science Policy and Communications (1) provides leadership and direction in planning, coordinating, analyzing, and evaluating the Institute's scientific research programs; (2) heads the Research Training Committee (RTC), which consists of staff representatives from all NIDA divisions, offices, and centers to support the development of research scientists through various stages of their careers; (3) represents the Institute's research and research training programs to other government agencies, the Congress, scientific and professional organizations, and the public; (4) evaluates, analyzes, and develops policy options in regard to the Institute's scientific research and research training activities; (5) prepares briefing materials and testimony for congressional hearings and serves as liaison with the Congress, the White House, and other significant Federal and governmental agencies; (6) prepares reports, develops responses, and provides information on legislative efforts, responds to congressional inquiries and analyzes legislative proposals for the NIDA Director; (7) advises the Director on national drug abuse policy issues; (8) conducts relevant public affairs activities and collaborates with a variety of public and private entities to enhance knowledge and awareness of NIDA's program and findings; (9) provides liaison with scientific and professional groups and private organizations; and (10) develops and disseminates publications

designed to communicate the current science regarding drug abuse.

Office of Extramural Affairs

NIDA's Office of Extramural Affairs (1) provides advice and guidance to the NIDA Director regarding the Institute's peer and objective review process; (2) provides scientific analyses of the Institute's extramural research program, assessing the breadth and scope of the Institute's research activities; (3) administers the peer and objective review of all extramural grant applications; (4) administers the concept and peer review of all contract proposals; (5) administers the National Advisory Council on Drug Abuse second level review of extramural support mechanisms and advises on overall NIDA program and policy manners; (6) coordinates and assures the development of program policies and rules relating the Institute's extramural activities, including Institute responsibility for inquiries and investigations into misconduct in science; (7) coordinates Institute activities under the Privacy Act, including supervision of issuance of Confidentiality Certificates; and (8) administers the Institute's committee management function under the National Advisory Council Act.

Office of Planning and Resources Management

The Office of Planning and Resources Management (1) provides all administrative and management support services to the Institute in such areas as financial planning, analysis, and management; administrative services; personnel management; information resources management; grants and contract management; administrative management policies, procedures, and guidelines; (2) develops and monitors the implementation of program policies and plans and evaluates progress in meeting established Institute objectives; (3) develops data requirements pertinent to short- and long-range program planning and develops the Institute's program evaluation policy; (4) administers the Institute's program evaluation system for all Institute employees; and (5) maintains responsibility for all management and administrative policy studies, reports, analyses, and program objectives.

NIH Almanac: Organization

National Institute of Environmental Health Sciences

Research Triangle Park, N.C.

Mission | Notable Research Accomplishments and Milestones at NIEHS | Director | Programs

Mission

The mission of the National Institute of Environmental Health Sciences (NIEHS) is to reduce the burden of human illness and disability by understanding how the environment influences the development and progression of human disease. To have the greatest impact on preventing disease and improving human health, NIEHS focuses on basic science, disease-oriented research, global environmental health, and multidisciplinary training for researchers. NIEHS achieves its mission through:

Extramural research and training, funded by grants and contracts, to scientists, environmental health professionals, and other groups worldwide; intramural research conducted by scientists at the NIEHS facility and in partnership with scientists at universities and hospitals; toxicological testing and test validation by the National Toxicology Program; and outreach and communications programs that provide reliable health information to the public and scientific resources to researchers.

Important Events in NIEHS History

June 7, 1960—A study group on the Public Health Service (PHS) mission and organization states that environmental health problems require increased public and private effort, and predicts that a central laboratory facility would be needed.

November 1, 1961—The Committee on Environmental Health Problems recommends to PHS that a national center be established to undertake integrated research and other activities related to environmental health.

September 1964—In the wake of the best-selling book by Rachel Carson, *Silent Spring*—which forecast the deaths of birds and possibly people from the use of persistent chemicals—Congress authorizes funds to plan a central environmental health research facility.

January 7, 1965—The U.S. Surgeon General announces the establishment of the Division of Environmental Health Sciences as a part of the National Institutes of Health.

September 26, 1967—A deed for 509.25 acres within Research Triangle Park, N.C., is presented to the Surgeon General for a permanent site for the Division of Environmental Health Sciences.

January 12, 1969—The Secretary of the then-Department of Health, Education, and Welfare (HEW) elevates the division to Institute status—as the National Institute of Environmental Health Sciences.

April 1972—The first edition of *Environmental Health Perspectives*, an NIEHS scientific journal, is issued.

April 1977—Construction begins on NIEHS' $65.7 million facility.

November 15, 1978—HEW Secretary Joseph Califano announces the establishment of the National Toxicology Program.

July 14, 1981—U.S. Department of Health and Human Services (HHS) Secretary Richard Schweiker approves the reorganization of NIEHS, transferring the National Cancer Institute's Division of Cancer Cause and Prevention bioassay program to NIEHS.

October 5, 1981—The National Toxicology Program is made a permanent activity of HHS.

November 20, 1985—NIEHS is established in law by the Health Research Extension Act of 1985 (Public Law 99-158).

September 14, 1994—NIEHS and collaborators at the University of Utah announce identification of the first breast cancer gene, BRCA1. View Image.

October 10, 1994—Martin Rodbell, NIEHS scientist emeritus and former scientific director, is named co-recipient of the 1994 Nobel Prize in Physiology or Medicine for his work in discovering G-proteins, which transmit signals between cells. View Image.

May 12, 1995—NIEHS announces isolation and cloning of a gene that suppresses the spread of prostate cancer.

December 6, 1995—Experiments conducted by NIEHS researchers show that phenolphthalein, a widely used laxative, causes ovarian and other cancers in laboratory rats and mice.

February 6, 1996—NIEHS scientists report that people who are missing the gene GST11 are more likely to get myelodysplastic syndrome, or MDS—a serious, often fatal, bone marrow disease.

July 2, 1996—NIEHS researchers find that women who douche more than once a week are about 30% less likely to conceive in a given month than those who do not.

October 29, 1996—The newly completed 4-story laboratory "F Module" is dedicated on the celebration of NIEHS' 30th anniversary.

October 17-18, 1997—NIEHS' Environmental Genome Project is announced to an international audience of scientists. The project is described as one to explore the gene variations (called "polymorphisms," which means "many forms") that influence people's susceptibility to environmental exposures that cause disease in some people, none in others.

1998—NIEHS' Marine and Freshwater Research Centers and the U.S. Navy sponsor the ocean-theme United States Pavilion, complete with an iceberg, at the World Expo in Lisbon, Portugal.

August 10, 1998—NIEHS and the Environmental Protection Agency jointly fund the creation of 8 Children's Environmental Health Research Centers.

June 22, 1999—The new Interagency Coordinating Committee on the Validation of Alternative Methods—a group formed by NIEHS, the National Toxicology Program (which is headquartered at NIEHS), and other health and regulatory agencies—for the first time concludes that, in many chemical tests, a non-animal test can replace the use of laboratory animals in a key test of whether a chemical is likely to burn or corrode human skin. Acceptance of this alternative test is followed on **December 28, 1999** by acceptance by regulatory agencies of the Murine Local Lymph Node Assay for products causing allergic contact dermatitis, which greatly reduced the number of guinea pigs used in testing.

May 9, 2000—The First National Allergen Survey, led by NIEHS scientists in collaboration with the U.S. Department of Housing and Urban Development, finds more than 45% of U.S. housing stock has bedding with dust mite allergen concentrations that exceed 2 micrograms per gram of dust, a level associated with the development of allergies.

December 14, 2000—NIEHS-supported researchers at The Johns Hopkins University School of Public Health publish research findings showing a strong correlation between exposure to particulate matter air pollution and death from all causes including cardiovascular and respiratory illnesses. These analyses provide evidence that particulate matter pollution continues to cause adverse health outcomes and strengthens the argument for maintaining air quality standards for this pollutant.

January 2001—Grantees from the University of Southern California publish reports showing modest increases in ambient ozone concentration are associated with increases in school absenteeism.

September 2001—NIEHS-supported grantees in and around New York City joined forces to monitor exposures and advise clean-up crews and residents exposed to hazardous working and living conditions resulting from the terrorists attacks on the World Trade Center. Air monitoring stations were established, and many research studies were begun to determine possible adverse health effects. Grantees from the NIEHS Worker Safety and Education Program were on-site immediately following the collapse of the buildings to provide advice and assistance for protecting the health of the clean-up crews.

November 5, 2001—NIEHS awards $37 million to 5 academic research organizations to form a Toxicogenomics Research Consortium with the Institute's own National Toxicogenomics Center. Building a library of known toxins and the genes they turn "on" or "off," the Center seeks to use an array of cloned genes to review chemicals for toxicity. Further down the road, the technology may be used on individual patients to tailor preventive, diagnostic and treatment methods.

July 3, 2002—An NIEHS analysis of data from 7 European cities suggests that healthy young couples need not jump into expensive reproductive assistance too soon. The study showed that better than 90% of the couples who failed to achieve a pregnancy in their first year of unprotected intercourse achieved conception before a second year was out—without medical assistance.

August 29, 2002—NIEHS-supported researchers at the University of California at San Diego discover that *B. anthracis* evades the host immune system, using a toxin called lethal factor (LF) to destroy macrophages and spread throughout the body. These results may explain why anthrax infections proceed nearly undetected until the patient is very sick and near death.

April 17, 2003—NIEHS grantees at the Cincinnati-Children's Hospital Medical Center and the University of Rochester Medical Center find that IQ scores for children with blood lead levels at 10 micrograms/dl were 7.4 points lower than for children at 1 microgram/dl. Surprisingly, the study also concludes that as blood lead increased from 10 to 30 micrograms/dl, there was a more modest decline in IQ scores, indicating that more damage occurs at lower levels for any given exposure. These results emphasize the importance of prevention and add further evidence that there is indeed no safe level of lead exposure.

October 18, 2004—A new study that will look at 50,000 sisters of women diagnosed with breast cancer opens for enrollment across the United States. The largest study of its kind, the Sister Study will investigate environmental and genetic causes of breast cancer.

December 10, 2004—Grantees at the Harvard School of Public Health and Brigham and Women's Hospital demonstrate that lifetime lead exposure may increase the risk of developing cataracts, the leading cause of blindness. Men with high levels of lead in the tibia, the larger of the 2 leg bones below the knee, had a 2.5-fold increased risk for cataracts.

May 2005—A comparison study across 7 different laboratories demonstrates how scientists can get more consistent and reliable results when using gene chips, or microarray technologies. Microarrays allow researchers to see which genes are

active in both normal and diseased cells. In the past, scientists have had trouble comparing microarray data from different sources. The new study shows that using a standardized process and commercially manufactured microarrays (rather than microarrays made in-house by each lab) leads to the best reproducible results.

May 10, 2005—NIEHS releases "A National Toxicology Program for the 21st Century: A Roadmap for the Future." The Roadmap outlines a plan to strategically position the National Toxicology Program at the forefront for providing scientific data and for guiding the interpretation of those data to maximize their impact on public health. A meeting was held at the National Academy of Sciences to reflect on the history of the National Toxicology Program and its impact on public health since its establishment in 1978 and unveil the plans and directions for the program's future.

June 1, 2005—NIEHS brings together national and community leaders with researchers to sort out how a child's environment increases the risk for obesity and to identify ways the environment can be changed to address this health epidemic. More than 700 people gathered for a 2-day conference, "Environmental Solutions to Obesity in America's Youth."

February 8, 2006—Two NIH Initiatives Launch Intensive Efforts to Determine Genetic and Environmental Roots of Common Diseases. One initiative boosts NIH funding for a multi-institute effort to identify the genetic and environmental underpinnings of common illnesses. The other initiative launches a public-private partnership between NIH, the Foundation for the National Institutes of Health, and major pharmaceutical and biotechnology companies, especially Pfizer Global Research & Development of New London, CT, and Affymetrix Inc. of Santa Clara, CA, to accelerate genome association studies to find the genetic roots of widespread sicknesses.

May 1, 2006—The NIEHS Director unveils a new strategic plan aimed at challenging and energizing the scientific community to use environmental health sciences to understand the causes of disease and to improve human health. The plan, *New Frontiers in Environmental Sciences and Human Health*, fundamentally changes the way NIEHS approaches research. The new strategy emphasizes research focused on complex human disease, and calls for inter-disciplinary teams of scientists to investigate a broad spectrum of disease factors, including environmental agents, genetics, age, diet, and activity levels.

October 25, 2006—A teleconference with the NIEHS Director, leading scientific experts, and the media preceded a 2-day meeting at which researchers announce they have successfully sequenced the DNA of 15 mouse strains most commonly used in biomedical research. More than 8.3 million genetic variations, or single nucleotide polymorphisms (SNPs), were discovered among the genomes of the 15 mouse strains, and the data are now available on a public website.

May 16, 2007—Researchers announce that there is strong evidence a chemical referred to as hexavalent chromium, or chromium 6, causes cancer in laboratory animals when it is consumed in drinking water. The two-year study conducted by the National Toxicology Program shows that animals given hexavalent chromium developed malignant tumors. Earlier studies had shown that hexavalent chromium causes lung cancer in humans in certain occupational settings as a result of inhalation exposure. The new findings show that it can also cause cancer in animals when administered orally.

October 9, 2007—A report issued by the National Academies of Sciences recognizes the importance of toxicogenomics in predicting effects on human health and recommends the integration of toxicogenomics into regulatory decision making. Toxicogenomic technologies provide tools to better understand the mechanisms through which environmental agents initiate and advance disease processes. They can also provide important information to help identify individuals who are more susceptible to disease risks posed by certain environmental agents than the general population.

Biographical Sketch of NIEHS Acting Director Samuel H. Wilson, M.D.

Samuel H. Wilson joined the NIEHS as Deputy Director in 1996. He was named Acting Director on August 20, 2007. He was instrumental in helping develop NIEHS' programs in genetic susceptibility, functional genomics, children's health research, minority institutions' research, and community outreach. Dr. Wilson also has strengthened partnerships between the NIEHS and other federal agencies concerned with environmental health. He received his training in medicine and biochemistry at Harvard Medical School, and began his research career at the NIH in 1970. In 1991, he moved to the extramural community

to found a center focused in the areas of genetic toxicology and structural biology. An active researcher, Dr. Wilson is the principal investigator of the DNA Repair and Nucleic Acid Enzymology Group in the Laboratory of Structural Biology at the NIEHS. He has authored more than 300 research articles.

NIEHS Directors

Name	In Office from	To
Paul Kotin	November 1, 1966	February 28, 1971
David P. Rall	March 1, 1971	October 1, 1990
David G. Hoel (Acting)	October 1990	June 1991
Kenneth Olden	June 18, 1991	May 21, 2005
David A. Schwartz	May 22, 2005	August 19, 2007
Samuel H. Wilson (Acting)	August 20, 2007	Present

Programs

The NIEHS Office of the Director provides additional oversight and program development in the following areas:

Exposure Biology Program of the NIH Genes and Environment Initiative

The NIEHS leads the Exposure Biology Program, one of the two main components of the NIH Genes and Environment Initiative. The Exposure Biology Program focuses on the development of innovative technologies to measure environmental exposures, diet, physical activity, psychosocial stress, and addictive substances that contribute to the development of disease.

Exposure Biology Program of the National Children's Study

The NIEHS leads the Exposure Biology Program as it relates to the National Children's Study (http://www.nationalchildrensstudy.gov/). The study is designed to examine the effects of environmental influences on the health and development of more than 100,000 children across the United States, following them from before birth until age 21. The Exposure Biology Program focuses on the development of innovative technologies to measure environmental exposures, diet, physical activity, psychosocial stress, and addictive substances that contribute to the development of disease.

NIH Roadmap Epigenomics Program

The goals of the NIH Roadmap Epigenomics Program are to create an international committee; develop standardized platforms, procedures, and reagents for epigenomics research; conduct demonstration projects to evaluate how epigenomes change; develop new technologies for single-cell epigenomic analysis and in vivo imaging of epigenetic activity; and create a public data resource to accelerate the application of epigenomics approaches. Dr. Wilson is co-chair of this program.

NAS/NRC Review of Implementation of the NIEHS Strategic Plan

The NIEHS is engaged with the National Academy of Sciences National Research Council in a review of the implementation

of the 2006 NIEHS Strategic Plan. The goal of this effort is to review progress to date of the Institute in implementing the plan, and to assess whether the focus and balance of the plan's goals continue to be appropriate to the mission and direction of the NIEHS.

Education and Biomedical Research Development

This office is the focal point of the NIEHS for establishing goals and developing programs to assure participation and success in NIEHS research and training programs, minority training and environmental health research issues, and community outreach initiatives. Included in these activities are K-12 environmental health sciences education programs, minority health research and training programs, environmental health research and training programs at minority institutions, and research and training programs that address low-income and underserved populations. Marian Johnson-Thompson directs the office and also chairs the NIEHS Institutional Review Board.

NanoHealth Enterprise Initiative

The NIEHS is engaged in efforts to establish an NIH NanoHealth Enterprise. This broad-based initiative is designed to investigate the fundamental physico-chemical interactions of ENM with biological systems, and the use of nanotechnology research as a tool for exploring cellular and molecular structure function relationships. The initiative outlines an integrated, interdisciplinary program that draws upon the expertise and interests of the NIH Institutes and Centers, along with other public and private partners to address critical research needs for the safe development of nanoscale materials and devices.

Standing Committee on Identifying and Quantifying Environmental Health Risks

The NIEHS supports the creation of a Standing Committee on Identifying and Quantifying Environmental Health Risks within the National Academy of Sciences National Research Council. The goal of this committee is to provide a public forum for communication among government, industry, non- governmental groups, the academic community, and the public about scientific advances that can be used in the identification, quantification, and management of the impacts of environmental agents on human health.

Translational Research in DNA Repair

As part of the implementation of the NIEHS Strategic Plan, the ODD works with the Division of Extramural Research and Training to implement an initiative designed to foster translational research in DNA repair. The program is designed to serve as a model for translation of cross-disciplinary basic research results to clinical practice.

Implementation of the NTP Vision and Roadmap

The NIEHS Office of the Director is engaged in a long-term collaboration with the National Toxicology Program to assist in efforts to achieve the program's Vision & Roadmap of future activities, particularly contributing to the development of new tools for high-throughput screening and new animal models of genetic susceptibility.

Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine

The NIEHS was instrumental in the establishment of the National Academy of Sciences Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine, and continues to sponsor the panel with the NIEHS acting director as a member. The Roundtable was established to provide a mechanism for parties interested in environmental health from the academic, industrial, and federal research perspectives to meet and discuss sensitive and difficult issues of mutual interest in a neutral setting. The purpose is to foster dialogue and discussion among sectors and institutions, and to illuminate issues, not resolve them. Among the landmark publications in the Roundtable's history is the seminal 2001 report, *Rebuilding the Unity of Health and the Environment: A New Vision of Environmental Health for the 21st Century*.

NIH Almanac: Organization

National Institute of General Medical Sciences

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Institute of General Medical Sciences (NIGMS) primarily supports basic research that lays the foundation for advances in disease diagnosis, treatment, and prevention. The Institute's research training programs help provide the next generation of scientists.

NIGMS is one of the National Institutes of Health (NIH), the principal medical research agency of the Federal Government. NIH is a component of the U.S. Department of Health and Human Services.

Each year, NIGMS-supported scientists make many advances in understanding fundamental life processes. In the course of answering basic research questions, these investigators increase our knowledge about the mechanisms and pathways involved in certain diseases. Institute grantees also develop important new tools and techniques, some of which have medical applications. In recognition of the significance of their work, a number of NIGMS grantees have received the Nobel Prize and other high scientific honors.

NIGMS is organized into divisions and a center that support research and research training in a range of scientific fields. One division has the specific mission of increasing the number of biomedical and behavioral scientists who are members of underrepresented minority groups.

NIGMS was established in 1962. In fiscal year 2007, the Institute's budget was $1.9 billion. The vast majority of this money goes to fund grants to scientists at universities, medical schools, hospitals, and research institutions throughout the country. At any given time, NIGMS supports over 4,400 research grants—about 10% of the grants funded by NIH as a whole. NIGMS also supports approximately 25% of the trainees who receive assistance from NIH.

The Institute places great emphasis on supporting investigator-initiated research grants. It funds a limited number of research center grants in selected fields, including structural genomics, trauma and burn research, and systems biology. In addition, NIGMS supports several important scientific resources, including the NIGMS Human Genetic Cell Repository and the Protein Data Bank.

In recent years, NIGMS has launched initiatives in structural genomics (the Protein Structure Initiative), pharmacogenetics, and computational modeling of infectious disease outbreaks. The Institute also has several "glue grants" that promote the collaborative approaches increasingly needed to solve complex problems in biomedical science. NIGMS participates in the NIH Roadmap for Medical Research, a series of far-reaching initiatives designed to transform the nation's medical research capabilities and speed the movement of research discoveries from the bench to the bedside.

NIGMS research training programs recognize the interdisciplinary nature of biomedical research today and stress approaches that cut across disciplinary and departmental lines. Such experience prepares trainees to pursue creative research careers in a wide variety of areas.

Certain NIGMS training programs address areas in which there are particularly compelling needs. One of these, the Medical

Scientist Training Program, produces investigators who hold the combined M.D.-Ph.D. degree and are well trained in both basic science and clinical research. Other programs train scientists to conduct research in rapidly growing areas like biotechnology and at the interfaces between fields such as chemistry and biology and behavioral and biomedical sciences.

NIGMS also has a Pharmacology Research Associate Program, in which postdoctoral scientists receive training in pharmacology in laboratories at the NIH or Food and Drug Administration.

Important Events in NIGMS History

July 16, 1958—The Secretary, DHEW, approved establishment of the Division of General Medical Sciences.

October 17, 1962—Congress authorized establishment of the National Institute of General Medical Sciences.

January 30, 1963—The DHEW Secretary approved establishment of NIGMS.

October 8, 1963—The National Advisory General Medical Sciences Council held its first meeting.

October 13, 1982—NIGMS celebrated its 20th anniversary by establishing the DeWitt Stetten, Jr., Lecture. Dr. David S. Hogness, Stanford University, gave the first lecture.

October 1, 1989—Administration of the Minority Biomedical Research Support Program was transferred to NIGMS from the NIH Division of Research Resources.

May 14, 2001—NIGMS created the Center for Bioinformatics and Computational Biology.

NIGMS Legislative Chronology

October 17, 1962—Public Law 87-838 authorized the Surgeon General to establish an institute to conduct and support research and research training in the general or basic medical sciences and in related natural or behavioral sciences that have significance for two or more other institutes of NIH, or that lie outside the general areas of responsibility of any other institute.

Biographical Sketch of NIGMS Director Jeremy M. Berg, Ph.D.

Dr. Berg became the NIGMS director in November 2003. Prior to his appointment, he directed the Institute for Basic Biomedical Sciences at The Johns Hopkins University School of Medicine in Baltimore, Maryland, where he also served as a professor and director of the Department of Biophysics and Biophysical Chemistry. In addition, he directed the Markey Center for Macromolecular Structure and Function and co-directed the W.M. Keck Center for the Rational Design of Biologically Active Molecules at the university.

Dr. Berg's research focuses on the structural and functional roles that metal ions, especially zinc, have in proteins. He has made major contributions to understanding how zinc-containing proteins bind to the genetic material DNA or RNA and regulate gene activity. His work, and that of others in the field, has led to the design of metal-containing proteins that control the activity of specific genes. These tailored proteins are valuable tools for basic research on gene function, and such proteins could one day have medical applications in regulating genes involved in diseases, as well. Dr. Berg has also made contributions to our understanding of systems that target proteins to specific compartments within cells and to the use of

sequence databases for predicting aspects of protein structure and function.

Dr. Berg served on the faculty at Johns Hopkins from 1986-2003. Immediately before his faculty appointment, he was a postdoctoral fellow in biophysics at the university. His honors include a Presidential Young Investigator Award (1988-1993), the American Chemical Society Award in Pure Chemistry (1993), the Eli Lilly Award for Fundamental Research in Biology Chemistry (1995), and the Maryland Outstanding Young Scientist of the Year (1995). He also received teaching awards from both medical students and graduate students and served as an advisor to the Johns Hopkins Postdoctoral Association since its founding.

Dr. Berg received B.S. and M.S. degrees in chemistry from Stanford University in 1980 and a Ph.D. in chemistry from Harvard University in 1985. He is the coauthor of more than 130 research papers and 3 textbooks, *Principles of Bioinorganic Chemistry*, *Biochemistry (5th Edition)*, and *A Clinical Companion to Accompany Biochemistry*.

NIGMS supported Dr. Berg's research from 1986-2003.

NIGMS Directors

Name	In Office from	To
Clinton C. Powell	July 1962	July 1964
Frederick L. Stone	August 1964	April 1970
DeWitt Stetten, Jr.	October 1970	August 1974
Ruth L. Kirschstein	September 1974	July 1993
Marvin Cassman (Acting)	July 1993	August 1996
Marvin Cassman	August 1996	May 2002
Judith H. Greenberg (Acting)	May 2002	November 2003
Jeremy M. Berg	November 2003	Present

Major Programs

Division of Cell Biology and Biophysics

The Division of Cell Biology and Biophysics seeks greater understanding of the structure and function of cells, cellular components, and the biological macromolecules that make up these components. The research it supports ranges from studies of single molecules to work in structural genomics and proteomics. The long-term goal of the division is to find ways to prevent, treat, and cure diseases that result from disturbed or abnormal cellular activity. The division has three components: the Biophysics Branch, the Cell Biology Branch, and the Structural Genomics and Proteomics Technology Branch.

Biophysics Branch

This branch supports studies in the areas of biophysics, a discipline that uses techniques derived from the physical sciences to examine the structures and properties of biological substances. Areas of emphasis in biophysical research include the

determination of the structures of proteins and nucleic acids; studies of the structural features that determine macromolecular conformation; the structural analysis of macromolecular interactions and of ligand-macromolecular interactions; bioinformatics as it relates to protein and nucleic acid structure; the development of physical methodology for the analysis of molecular structure; and the development and use of theoretical methods to investigate biological systems. Other research interests include the development and refinement of instruments needed to conduct research in the areas described above. These include nuclear magnetic resonance spectroscopy, X-ray crystallography and other scattering techniques, optical spectroscopy and other forms of microscopy. This branch also supports the development of new bioanalytical methods and biomaterials.

Cell Biology Branch

This branch supports general studies on the molecular and biochemical activities of cells and subcellular components, as well as on the role of cellular dysfunction in disease. Emphasis is placed on research with applications to more than one cell type, model system, or disease state, as well as research that does not fall within the disease-oriented mission of another NIH component. Representative studies include those on plasma and intracellular membranes, receptors, and signal transduction mechanisms; the structure and function of the cytoskeleton; cell motility; the regulation of protein and membrane synthesis and activation of cell growth; subcellular organelles; cell division; and lipid biochemistry.

Structural Genomics and Proteomics Technology Branch

This branch supports studies that take a genomics or computational approach to determining protein structures and functions. Such research includes the development of high-throughput methods for protein structure determination, bioinformatics as it relates to the analysis of protein structures en masse, and the development of mass spectroscopy and other tools for the rapid analysis of biological molecules. The branch is responsible for monitoring the research centers and research grants associated with the NIGMS Protein Structure Initiative (PSI). This responsibility also includes developing a database of model structures and a repository for the distribution of materials resulting from the PSI. View image.

Division of Genetics and Developmental Biology

The Division of Genetics and Developmental Biology supports studies directed toward gaining a better understanding of the fundamental mechanisms of inheritance and development. The results of these studies form the foundation for advances in diagnosing, preventing, treating, and curing human genetic and developmental disorders. Most of the projects supported by the division make use of model organisms, which speed advances in understanding human biological processes.

The division consists of the Genetic Mechanisms Branch and the Developmental and Cellular Processes Branch. The 2 branches are closely linked and share substantial regions of overlap. Areas under active investigation are: chromosome organization and mechanics; developmental biology and genetics; DNA replication, recombination, and repair; epigenetics; extrachromosomal inheritance; mechanisms of mutagenesis; neurogenetics and the genetics of behavior; population genetics, evolution, and the genetics of complex traits; protein synthesis; regulation of cell growth, cell division, cell death, and differentiation; RNA transcription and processing; and stem cell biology.

Along with its research and research training activities, the division supports the Human Genetic Cell Repository, which maintains and distributes cell lines and DNA samples—from people both with and without genetic disorders—to research scientists.

Division of Minority Opportunities in Research

The Division of Minority Opportunities in Research (MORE) administers research and research training programs aimed at increasing the number of minority biomedical and behavioral scientists. Support is available at the undergraduate, graduate, postdoctoral, and faculty levels, as well as for education and research infrastructure improvements.

The division has 3 branches: Minority Access to Research Careers (MARC), Minority Biomedical Research Support (MBRS), and MORE Special Initiatives.

MARC Branch

The MARC Branch offers special research training support to 4-year colleges and universities, with substantial enrollments of such minorities as African Americans, Hispanic Americans, Native Americans (including Alaska Natives), and natives of the U.S. Pacific Islands. The branch's goals are to increase the number and competitiveness of underrepresented minorities engaged in biomedical research by strengthening the science curricula at minority-serving institutions and increasing the research training opportunities for students and faculty at these institutions.

MBRS Branch

To increase the number of researchers who are members of minority groups underrepresented in the biomedical sciences, the MBRS Branch awards grants to 2- or 4-year colleges, universities, and health professional schools with substantial enrollments of minorities. These grants support research by faculty members, strengthen the institutions' biomedical research capabilities, and provide opportunities for students to work as part of a research team.

MORE Special Initiatives Branch

This branch develops and launches new research and research training programs and other initiatives for minority scientists. These include the Bridges to the Future Programs (Bridges to the Baccalaureate and Bridges to the Doctorate) that are co-sponsored by the NIH National Center on Minority Health and Health Disparities. The branch is also responsible for organizing meetings and other activities that build networks among individuals and educational institutions to promote minority participation in sponsored research.

Division of Pharmacology, Physiology, and Biological Chemistry

The Division of Pharmacology, Physiology, and Biological Chemistry supports a broad spectrum of research and research training aimed at improving the molecular-level understanding of fundamental biological processes and discovering approaches to their control. Research supported by the division takes a multifaceted approach to problems in pharmacology, physiology, biochemistry, and biorelated chemistry that are either very basic in nature or that have implications for more than one disease area. The goals of supported research include an improved understanding of drug action and mechanisms of anesthesia; pharmacogenetics and mechanisms underlying individual responses to drugs; new methods and targets for drug discovery; advances in natural products synthesis; an enhanced understanding of biological catalysis; a greater knowledge of metabolic regulation and fundamental physiological processes; and the integration and application of basic physiological, pharmacological, and biochemical research to clinical issues in anesthesia, clinical pharmacology, and trauma and burn injury. The division also supports quantitative studies of complex systems involving areas within its scope.

Biochemistry and Biorelated Chemistry Branch

This branch supports basic research in areas of biochemistry, such as enzyme catalysis and regulation, bioenergetics and redox biochemistry, and glycoconjugates. It also supports research in areas of biorelated chemistry, such as organic synthesis and methodology, as well as bioinorganic and medicinal chemistry. Examples of biochemical investigations include studies of the chemical basis of the regulation and catalytic properties of enzymes, intermediary metabolism, the chemical and physical properties of the cellular systems for electron transport and energy transduction, and the biosynthesis and structure of carbohydrate-containing macromolecules. Examples of chemical investigations include the development of strategies for natural products synthesis, studies of the structure and function of small molecules, the chemistry of metal ions in biological systems, the development of novel medicinal agents or mimics of macromolecular function, and the creation of new synthetic methodologies. The branch also supports studies in biotechnology. This work focuses on the development of biological catalysts, including living organisms, for the production of useful chemical compounds, medicinal or diagnostic agents, or probes of biological phenomena.

Pharmacological and Physiological Sciences Branch

This branch supports research in pharmacology, anesthesiology, and the physiological sciences. Studies range from the molecular to the organismal level, and can be clinical in nature. In the pharmacological sciences and anesthesiology, important areas being studied are the effects of drugs on the body and the body's effects on drugs, as well as how these effects vary from individual to individual. This includes traditional investigations of the absorption, transport, distribution, metabolism, biotransformation, and excretion of drugs, as well as drug delivery strategies and determinants of bioavailability. It also includes a newer focus on pharmacogenetics, linking phenotype to genotype in drug action. Understanding the mechanisms of drug interactions with receptors and signal transduction mechanisms is another major focus of this section. This includes studies of soluble and membrane-bound receptors and channels, secondary and tertiary messenger systems, mediator molecules, and their regulation and pharmacological manipulation. Examples of studies in the physiological sciences include basic and clinical investigations directed toward improving understanding of the total body response to injury, including the biochemical and physiological changes induced by trauma. Research supported in this section includes studies on the etiology of post-traumatic sepsis and the mechanisms of immunosuppression, wound healing, and hypermetabolism following injury. This section also supports research in basic molecular immunobiology which focuses on using cells of the immune system to study fundamental cellular and molecular mechanisms.

Division of Extramural Activities

The Division of Extramural Activities is responsible for the grant-related activities of the Institute, including the receipt, referral, and advisory council review of applications as well as grant funding and management. It maintains an overview of the Institute's scientific and financial status and advises the NIGMS director and other key staff on policy matters and on the planning, development, and scientific administration of Institute research and training programs. The division recommends budget allocations for the various NIGMS programs. It also acts as a liaison with other NIH components for activities relating to grant application assignments and foreign grants.

Center for Bioinformatics and Computational Biology The Center for Bioinformatics and Computational Biology supports research and research training in areas that join biology with the computer sciences, engineering, mathematics, and physics. Toward this end, the center develops and manages programs in computational biology, such as the generation of mathematical models of biological networks, the development of modeling and simulation tools, the conduct of basic theoretical studies related to network organization and dynamic processes, and the development of methods for the analysis and dissemination of computational models. The center also defines the Institute's needs for database development and applications, and it collaborates with other NIH components and Federal agencies in developing policies in this area. Other center activities include the support of multidisciplinary collaborations and of workshops, courses, and specialized meetings. The center oversees NIH's Biomedical Information Science and Technology Initiative (BISTI) through its management of the BISTI Consortium (BISTIC). The goal of this initiative is to make optimal use of computer science and technology to address problems in biology and medicine. BISTIC is composed of senior-level representatives from the NIH Institutes and Centers and representatives of other Federal agencies concerned with bioinformatics and computer-based applications.

NIH Almanac: Organization

National Institute of Mental Health

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The mission of the National Institute of Mental Health (NIMH) is to reduce the burden of mental illness and behavioral disorders through research on mind, brain, and behavior.

In the United States, mental disorders collectively account for more than 15% of the overall "burden of disease"—a term that encompasses both premature death and disability associated with mental illness. Mental disorders occur across the lifespan, from very young childhood into old age.

Investments made over the past 50 years in basic brain and behavioral science have positioned NIMH to exploit recent advances in neuroscience, molecular genetics, behavioral science, and brain imaging; to translate new knowledge about fundamental processes into researchable clinical questions; and to initiate innovative clinical trials of new pharmacological and psychosocial interventions, with emphasis on testing their effectiveness in the diagnostically complex, diverse group of patients typically encountered in front-line service delivery systems. NIMH-funded investigators also seek new ways to translate results from basic behavioral science into research relevant to public health, including the epidemiology of mental disorders, prevention and early intervention research, and mental health service research.

Diverse scientific disciplines contribute to the design and evaluation of treatments and treatment delivery strategies that are relevant and responsive to the needs of people with or at risk for mental illness. A thrust of this research is to eliminate the effects of disparities in the availability of and access to high-quality mental health services. These disparities, which impinge on the mental health status of all Americans, are felt in particular by many members of ethnic/cultural, minority groups, and by women, children, and elderly people.

In this era of opportunity, NIMH is strongly committed to scientific programs to educate and train future mental health researchers, including scientists trained in molecular science, cognitive and affective neuroscience, mental health clinical sciences, and other disciplines urgently needed in studies of mental illness and the brain.

Mechanisms of Support. NIMH provides leadership at a national level for research on brain, behavior, and mental illness.

Under a rigorous and highly competitive process, the institute funds research project and research center grants and contracts awarded to individual investigators and to public and private institutions. NIMH also maintains and conducts a diversified program of intramural and collaborative research in its own laboratories and clinical research units at NIH.

NIMH's informational and educational activities include the dissemination of information and education materials on mental illness to health professionals and the public; professional associations; international, national, state, and local officials; and voluntary organizations working in the areas of mental health and mental illness.

Important Events in NIMH History

1946—On July 3 President Harry Truman signed the National Mental Health Act, which called for the establishment of a National Institute of Mental Health. The first meeting of the National Advisory Mental Health Council was held on August 15. Because no federal funds had yet been appropriated for the new institute, the Greentree Foundation financed the meeting.

1947—On July 1 the U.S. Public Health Service (PHS) Division of Mental Hygiene awarded the first mental health research grant (MH-1) entitled "Basic Nature of the Learning Process" to Dr. Winthrop N. Kellogg of Indiana University.

1949—On April 15 NIMH was formally established; it was 1 of the first 4 NIH institutes.

1955—The Mental Health Study Act of 1955 (Public Law 84-182) called for "an objective, thorough, nationwide analysis and reevaluation of the human and economic problems of mental health." The resulting Joint Commission on Mental Illness and Health issued a report, *Action for Mental Health,* that was researched and published under the sponsorship of 36 organizations making up the Commission.

1961—*Action for Mental Health*, a 10-volume series, assessed mental health conditions and resources throughout the United States "to arrive at a national program that would approach adequacy in meeting the individual needs of the mentally ill people of America." Transmitted to Congress on December 31, 1960, the report commanded the attention of President John F. Kennedy, who established a cabinet-level interagency committee to examine the recommendations and determine an appropriate Federal response.

1963—President Kennedy submitted a special message to Congress—the first Presidential message to Congress on mental health issues. Energized by the President's focus, Congress quickly passed the Mental Retardation Facilities and Community Mental Health Centers Construction Act (P.L. 88-164), beginning a new era in Federal support for mental health services. NIMH assumed responsibility for monitoring the Nation's community mental health centers (CMHC) programs.

1965—During the mid-1960s, NIMH launched an extensive attack on special mental health problems. Part of this was a response to President Johnson's pledge to apply scientific research to social problems. The Institute established centers for research on schizophrenia, child and family mental health, and suicide, as well as crime and delinquency, minority group mental health problems, urban problems, and later, rape, aging, and technical assistance to victims of natural disasters. A provision in the Social Security Amendments of 1965 (P.L. 89-97) provided funds and a framework for a new Joint Commission on the Mental Health of Children to recommend national action for child mental health.

Also in this year, staffing amendments to the CMHC act authorized grants to help pay the salaries of professional and technical personnel in federally funded community mental health centers.

Alcohol abuse and alcoholism did not receive full recognition as a major public health problem until the mid-1960s, when the National Center for Prevention and Control of Alcoholism was established as part of NIMH; a research program on drug abuse was inaugurated within NIMH with the establishment of the Center for Studies of Narcotic and Drug Abuse.

1967—NIMH separated from NIH and was given Bureau status within PHS by reorganization effective January 1. However, NIMH's intramural research program, which conducted studies in the NIH Clinical Center and other NIH facilities, remained at NIH under an agreement for joint administration between NIH and NIMH.

On August 13 U.S. Department of Health, Education, and Welfare (HEW) Secretary John W. Gardner transferred St. Elizabeth's Hospital, the Federal government's only civilian psychiatric hospital, to NIMH.

1968—NIMH became a component of PHS's Health Services and Mental Health Administration (HSMHA).

1970—Dr. Julius Axelrod, an NIMH researcher, won the Nobel Prize in Physiology or Medicine for research into the chemistry of nerve transmission for "discoveries concerning the humoral transmitters in the nerve terminals and the mechanisms for their storage, release, and inactivation." He found an enzyme that stopped the action of the nerve

transmitter noradrenaline—a critical target of many antidepressant drugs—in the synapse.

In a major development for people with manic-depressive illness (bipolar disorder), the U.S. Food and Drug Administration (FDA) approved the use of lithium as a treatment for mania, based on NIMH research. The treatment led to sharp drops in inpatient days and suicides among people with this serious mental illness and to immense reductions in the economic costs associated with bipolar disorder.

Also during this year, the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment, and Rehabilitation Act (P.L. 91-616) established the National Institute of Alcohol Abuse and Alcoholism within NIMH.

1972—The Drug Abuse Office and Treatment Act established a National Institute on Drug Abuse within NIMH.

1973—NIMH went through a series of organizational moves. The Institute temporarily rejoined NIH on July 1 with the abolishment of HSMHA. Then, the HEW secretary administratively established the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA)—composed of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institute on Drug Abuse (NIDA), and NIMH—as the successor organization to HSMHA.

1974—ADAMHA was officially established on May 4 when President Nixon signed P.L. 93-282.

1975—The community mental health centers program was given added impetus with the passage of the CMHC amendments of 1975.

1977—President Jimmy Carter established the President's Commission on Mental Health on February 17 by Executive Order No. 11973. The commission was charged to review the mental health needs of the Nation, and to make recommendations to the President as to how best to meet these needs. First Lady Rosalyn Carter served as the Honorary Chair of the commission.

1978—The 4-volume Report to the President from the President's Commission on Mental Health was submitted.

1980—The Epidemiologic Catchment Area (ECA) study, an unprecedented research effort that entailed interviews with a nationally representative sample of 20,000 Americans, was launched. The field interviews and first-wave analyses were completed in 1985. Data from the ECA provided an accurate picture of rates of mental and addictive disorders and services usage.

The Mental Health Systems Act—based on recommendations of the President's Commission on Mental Health and designed to provide improved services for persons with mental disorders—was passed. NIMH also participated in development of the National Plan for the Chronically Mentally Ill, a sweeping effort to improve services and fine-tune various Federal entitlement programs for those with severe, persistent mental disorders.

1981—President Ronald Reagan signed the Omnibus Budget Reconciliation Act of 1981. This act repealed the Mental Health Systems Act and consolidated ADAMHA's treatment and rehabilitation service programs into a single block grant that enabled each State to administer its allocated funds. With the repeal of the community mental health legislation and the establishment of block grants, the Federal role in services to the mentally ill became one of providing technical assistance to increase the capacity of State and local providers of mental health services.

Dr. Louis Sokoloff, an intramural NIMH researcher, received the Albert Lasker Award in Clinical Medical Research for developing a new method of measuring brain function that contributed to basic understanding and diagnosis of brain diseases. His technique, which measures the brain's use of glucose, made possible exciting new applications to positron emission tomography, or PET scanning, the first imaging technology that permitted scientists to "observe" and obtain visual images of the living, functioning brain.

Dr. Roger Sperry, a longtime NIMH research grantee, received the Nobel Prize in Medicine or Physiology for discoveries regarding the functional specialization of the cerebral hemispheres, or the "left" and "right" brain.

1983—NIMH-funded investigator Fernando Nottebohm discovered the formation of new neurons in brains of adult song-birds; this evidence of "neurogenesis" opened an exciting and clinically promising new line of research in brain science. It was 15 years, however, before investigators reported finding evidence for continued neurogenesis in the brains of adult human subjects.

1987—Administrative control of St. Elizabeth's Hospital is transferred from the NIMH to the District of Columbia. NIMH retained research facilities on the grounds of the hospital.

1989—Congress passed a resolution, subsequently signed as a proclamation by President George Bush, designating the 1990s as the "Decade of the Brain."

The NIMH Neuroscience Center and the NIMH Neuropsychiatric Research Hospital, located on the grounds of St. Elizabeth's Hospital, were dedicated on September 25.

1992—Congress passed the ADAMHA Reorganization Act (P.L. 102-321), abolishing ADAMHA. The research components of NIAAA, NIDA, and NIMH rejoined NIH, while the services components of each institute became part of a new PHS agency, the Substance Abuse and Mental Health Services Administration (SAMHSA). The return to NIH and the loss of services functions to SAMHSA necessitated a realignment of the NIMH extramural program administrative organization. New offices are created for research on Prevention, Special Populations, Rural Mental Health, and AIDS.

1993—NIMH established the Silvio O. Conte Centers program to provide a unifying research framework for collaborations to pursue newly formed hypotheses of brain-behavior relationships in mental illness through innovative research designs and state-of-the-art technologies.

NIMH established the Human Brain Project to develop—through cutting-edge imaging, computer, and network technologies—a comprehensive neuroscience database accessible via an international computer network.

1994—Intramural Research Program Revitalization—The House Appropriations Committee mandated that the director of NIH conduct a review of the role, size, and cost of all NIH intramural research programs. NIMH and the National Advisory Mental Health Council initiated a major study of the NIMH Intramural Research Program. The planning committee recommended continued investment in the Intramural Research Program and recommended specific administrative changes; many of these were implemented upon release of the committee's final report. Other changes—for example, the establishment of a major new program on Mood and Anxiety Disorders—have been introduced in the years since.

1996—NIMH, with the National Advisory Mental Health Council, initiated systematic reviews of several areas of its research portfolio, including the genetics of mental disorders; epidemiology and services for child and adolescent populations; prevention research; clinical treatment; and services research. At the request of the NIMH director, the Council established programmatic groups in each of these areas. NIMH continued to implement recommendations issued by these work groups.

NIMH increased the priority placed on research on childhood mental disorders and clinical neuroscience and initiated efforts to expand research in these areas.

NIMH expanded its efforts to safeguard and improve the protections of human subjects who participate in clinical mental health research.

1996-1998—NIMH initiated planning for integration of the Institute's peer review system for neuroscience, behavioral and social science, and AIDS research applications into the overall NIH peer review system.

1997—NIMH realigned its extramural organizational structure to capitalize on new technologies and approaches to both basic and clinical science, as well as immense changes to health care delivery systems, while retaining the Institute's focus on mental illness. The new extramural organization resulted in 3 research divisions: Basic and Clinical Neuroscience Research; Services and Intervention Research; and Mental Disorders, Behavioral Research, and AIDS.

1997-1999—NIMH refocused career development resources on early careers and added new mechanisms for clinical research.

1999—The NIMH Neuroscience Center/Neuropsychiatric Research Hospital was relocated from St. Elizabeth's Hospital in Washington, DC to the NIH Campus in Bethesda, MD, in response to the recommendations of the 1996 review of the NIMH Intramural Research Program by the IRP Planning Committee.

The first White House Conference on Mental Health, held June 7 in Washington, DC, brought together national leaders, mental health scientific and clinical personnel, patients, and consumers to discuss needs and opportunities. NIMH developed materials and helped organize the conference.

NIMH convened its fourth rural mental health research conference in August. "Mental Health at the Frontier: Alaska," was held in Anchorage, with visits by researchers and program representatives to several towns and villages. The aim was to solicit assistance in the development of a research agenda focusing on mental health issues for people who live in rural or frontier areas, with a focus on the needs of Alaska Natives.

NIMH hosted "Dialogue: Texas," which was the first in a series of mental health forums to solicit input from the public on the direction of future research at NIMH and to highlight current research. Held in San Antonio, the forum provided Texas consumers, researchers, care providers, and policymakers the opportunity to discuss mental health issues of greatest concern. The meeting focused on Latino and Hispanic populations.

U.S. Surgeon General David Satcher released *The Surgeon General's Call To Action To Prevent Suicide*, in July, and the first Surgeon General's Report on Mental Health, in December. NIMH, along with other Federal agencies, collaborated in the preparation of both of these landmark reports.

In the late 1990s, NIMH began to strengthen its efforts to include the public in its priority setting and strategic planning processes, instituting a variety of approaches to ensure increased public participation.

The NIMH expanded and revitalized its public education and prevention information dissemination programs, including information on suicide, eating disorders, and panic disorder, in addition to the ongoing Institute educational program, Depression: Awareness, Recognition, and Treatment (D/ART).

NIMH also launched an initiative to educate people about anxiety disorders, to decrease stigma and trivialization of these disorders, and to encourage people to seek treatment promptly.

NIMH included members of the public on its scientific review committees reviewing grant applications in the clinical and services research areas.

2000—NIMH created the Council Work Group on Training for Diversity in February to ensure adequate opportunities for minorities to pursue research careers, and to track the success of related Institute programs.

NIMH launched a 5-year communications initiative in March called the Constituency Outreach and Education Program, enlisting nationwide partnerships with state organizations to disseminate science-based mental health information to the public and health professionals, and increase access to effective treatments.

In March, NIMH assisted First Lady Hillary Rodham Clinton in conducting a meeting on the Safe Use of Medication to Treat Young Children.

NIMH co-hosted 2 town meetings in Chicago on the mental health needs of minority youth and related research. The first meeting, held in April, focused on behavioral, emotional, and cognitive disorders; the impact of violence; the criminalization of youth with treatment needs; service system issues; barriers to treatment; and barriers to research. The July 2000 meeting addressed the prevention of sexually transmitted diseases, such as HIV, and the role of the family and society in stemming the spread of HIV, as well as the increase in violence. Members of the general public, parents, teachers, school officials, guidance counselors, and professionals in the health, family assistance, social services, and juvenile justice fields attended the meetings.

NIMH organized the 14th International Conference on Challenges for the 21st Century: Mental Health Services Research, held in Washington, DC in July, to address how to meet mental health service needs nationwide most effectively,reduce health disparities, and provide equitable treatments in an era of managed care.

Dr. Eric Kandel and Dr. Paul Greengard, each of whom has received NIMH support for more than 3 decades, shared the Nobel Prize in Physiology or Medicine with Sweden's Dr. Arvid Carlsson. Dr. Kandel received the prize for his elucidating research on the functional modification of synapses in the brain. Initially using the sea slug as an experimental model but later working with mice, he established that the formation of memories is a consequence of short- and long-term changes in the biochemistry of nerve cells. Further, he and his colleagues showed that these changes occur at the level of synapses. Dr. Greengard was recognized for his discovery that dopamine and several other transmitters can alter the functional state of neuronal proteins. These findings made it clear that signaling between neurons could alter their function not only in the short term but also in the long term. Also, he learned, such changes could be reversed by subsequent environmental signals.

Dr. Nancy Andreasen, a psychiatrist and long-time NIMH grantee, receives the National Medal of Science for her groundbreaking work in schizophrenia and for joining behavioral science with neuroscience and neuroimaging. The Presidential Award is one of the nation's highest awards in science.

2001—In Pittsburgh, NIMH convened more than 150 clinical and basic scientists with expertise relevant to the study of mood disorders to help develop a Research Strategic Plan for Mood Disorders. A public forum held in conjunction with the meeting focused on the frequent co-occurrence of depression with general medical illnesses.

NIMH launched several long-term, large-scale, multi-site, community-based clinical studies to determine the effectiveness of treatment for bipolar disorder (also called manic-depressive illness); depression in adolescents; antipsychotic medications in the treatment of schizophrenia, and management of psychotic symptoms and behavioral problems associated with Alzheimer's disease; and subsequent treatment alternatives to relieve depression.

The Surgeon General released a Report on Children's Mental Health indicating that the nation is facing a public crisis in the mental health of children and adolescents. The National Action Agenda outlines goals and strategies to improve services for children and adolescents with mental and emotional disorders. NIMH, along with other Federal agencies, collaborated in the preparation of this report.

2002—NIMH published a national conference report entitled "Mental Health and Mass Violence: Evidence-Based Early Psychological Intervention for Victims/Survivors of Mass Violence: A Workshop to Reach Consensus on Best Practices." While most people recover from a traumatic event in a resilient fashion, the report indicates that early psychological intervention guided by qualified mental health caregivers can reduce the harmful psychological and emotional effects of exposure to mass violence in survivors. NIMH and the Department of Defense, along with other Federal agencies and the Red Cross, collaborated in the preparation of this report.

2003—Real Men. Real Depression campaign launched to raise awareness about depression in men and create an understanding of the signs, symptoms, and available treatments. The campaign was designed to inspire other men to seek help after hearing from real men talking about their experiences with depression, treatment, and recovery.

2004—The Treatment of Adolescent Depression Study (TADS), one of NIMH's 4 large-scale practical clinical trials, yielded important first phase results. The clinical trial of 439 adolescents with major depression found a combination of medication and psychotherapy to be the most effective treatment over the course of the 12-week study. The study compared cognitive-behavioral therapy with fluoxetine, currently the only antidepressant approved by the FDA for use in children and adolescents.

2005—Results from the first phase of the Clinical Antipsychotic Trials of Intervention Effectiveness research program (CATIE), the second of NIMH's 4 large-scale practical clinical trials, provided, for the first time, detailed information comparing the effectiveness and side effects of 5 medications—both new and older medications—that are currently used to treat people with schizophrenia. Overall, the medications were comparably effective but were associated with high rates of discontinuation due to intolerable side effects or failure to control symptoms adequately. Surprisingly, the older, less expensive medication used in the study generally performed as well as the newer medications. The NIMH-funded study included more than 1,400 people.

NIMH and the National Alliance for Research on Schizophrenia and Depression (NARSAD) collaborated to help launch the Schizophrenia Research Forum, an online resource—www.schizophreniaforum.org —that aims to advance research in schizophrenia and related diseases. NARSAD is one of the largest donor-supported organizations that funds research on the brain and behavioral disorders.

In the first few weeks after Hurricane Katrina, and later Hurricane Rita, staff from NIMH traveled to the southern Gulf Coast region to provide immediate mental health treatment and prevention services to storm survivors and emergency response staff serving affected communities. In total, NIMH sent 26 scientists, clinicians, nurses, and social workers. Staff provided care to city police and fire squads, allowing these men and women to continue to perform vital services to the city. Others provided treatment assessment and evaluation for children and adolescents who were evacuated from the Mississippi gulf area.

2006—NIMH launched the inaugural edition of *Inside NIMH*, a new electronic newsletter designed to be published three times each year following meetings of the National Advisory Mental Health Council. The e-newsletter provides the latest news on funding opportunities and policies at NIMH, as well as highlights of research breakthroughs, new tools for mental health research, and public education efforts.

At the open session of the September meeting of NIMH's National Advisory Mental Health Council, Dr. John March, principal investigator of NIMH's TADS program, provided the latest findings of the study, which suggested that even after 18 weeks, the combination of medication and psychotherapy continued to provide the fastest, most effective outcome. Psychotherapy alone could be a viable option for adolescents unable to take medication, but required 6 extra months to achieve the same improvement as treatments involving medication.

Results from the first phase of NIMH's CATIE study focused on Alzheimer's disease yielded evidence that commonly prescribed antipsychotic medications used to treat Alzheimer's patients with delusions, aggression, hallucinations, and other similar symptoms can benefit some patients, but they appear to be no more effective than a placebo when adverse side effects are considered. The study provided the first real-world test of antipsychotic medications prescribed for these patients.

Results from the NIMH-funded Sequenced Treatment Alternatives to Relieve Depression (STAR*D) research program, the nation's largest clinical trial for depression (and the third of NIMH's 4 practical clinical trials), reported a series of results over the course of the year. The program included 2,876 participants. Phase 1 results, which used flexible adjustment of dosages based on quick and easy-to-use clinician ratings of symptoms and patient self-ratings of side effects, helped clinicians to track "real world" patients who became symptom-free and to identify those who were resistant to the initial treatment over the course of 14 weeks. Phase 2 results showed that 1 in 3 depressed patients who previously did not achieve remission using an antidepressant became symptom-free with the help of an additional medication and 1 in 4 achieved remission after switching to a different antidepressant. Phases 3 and 4 together showed that patients with treatment-resistant depression had a modest chance of becoming symptom-free when they tried different treatment strategies after 2 or 3 failed treatments.

Dr. Aaron T. Beck,—professor emeritus of psychiatry at the University of Pennsylvania, the founder of cognitive therapy, and a long-time NIMH grantee—was named the recipient of the prestigious Lasker Award for Clinical Medical Research. Dr. Beatriz Luna, director of the Laboratory for Neurocognitive Development at the University of Pittsburgh and an NIMH grantee, was among the 12 NIH researchers honored by the Presidential Early Career Awards for Scientists and Engineers (PECASE) Program. The PECASE awards are the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers.

2007—Building on previous research, several studies in the NIMH Intramural Research Program have shown that the drug ketamine relieves depression within hours and helped to clarify a possible mechanism behind this finding. While ketamine itself probably won't come into use as an antidepressant because of its side effects, the new results move scientists considerably closer to understanding how to develop faster-acting antidepressant medications. Current medications to treat depression can take weeks to have an effect.

Findings from another NIMH clinical study—The Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD)—revealed that people receiving medication treatment for bipolar disorder are more likely to get well faster and stay well if they also receive intensive psychotherapy.

A simulation study, conducted by Dr. Philip Wang of Harvard University (currently at NIMH) and colleagues, revealed that providing a minimal level of enhanced care for employees' depression would result in a cumulative savings to employers of $2,898 per 1,000 workers over 5 years. Savings from reduced absenteeism and employee turnover and other benefits of the intervention began to exceed the costs of the program by the second year, yielding a net savings of $4,633 per 1,000 workers.

NIMH Legislative Chronology

1929—P.L. 70-672 established 2 Federal "narcotics farms" and authorized a Narcotics Division within PHS.

1930—P.L. 71-357 redesignated the PHS Narcotics Division to the Division of Mental Hygiene.

1939—P.L. 76-19 transferred PHS from the Treasury Department to the Federal Security Agency.

1946—P.L. 79-487, the National Mental Health Act, authorized the Surgeon General to improve the mental health of U.S. citizens through research into the causes, diagnosis, and treatment of psychiatric disorders.

1949—NIMH was established April 15.

1953—Reorganization plan No. 1 assigned PHS to the newly created Department of Health, Education, and Welfare.

1955—P.L. 84-182, the Mental Health Study Act, authorized NIMH to study and make recommendations on mental health and mental illness in the U.S. The act also authorized the creation of the Joint Commission on Mental Illness and Health.

1956—P.L. 84-830, the Alaska Mental Health Enabling Act, provided for territorial treatment facilities for mentally ill individuals in Alaska.

1963—P.L. 88-164, the Mental Retardation Facilities and Community Mental Health Centers Construction Act, provided for grants for assistance in the construction of community mental health centers nationwide.

1965—P.L. 89-105, amendments to P.L. 88-164, provided for grants for the staffing of community mental health centers.

1966—P.L. 89-793, Narcotic Addict Rehabilitation Act of 1966, launched a national program for long-term treatment and rehabilitation of narcotic addicts.

1967—P.L. 90-31, Mental Health Amendments of 1967, separated NIMH from NIH and raised it to bureau status in PHS.

1968—NIMH became a component of the newly created Health Services and Mental Health Administration.

P.L. 90-574, The Alcoholic and Narcotic Addict Rehabilitation Amendments of 1968, authorized funds for the construction and staffing of new facilities for the prevention of alcoholism and the treatment and rehabilitation of alcoholics.

1970—P.L. 92-211, Community Mental Health Centers Amendments of 1970, authorized construction and staffing of centers for 3 more years, with priority on poverty areas.

P.L. 91-513, Comprehensive Drug Abuse Prevention and Control Act of 1970, expanded the national drug abuse program by extending the services of federally funded community treatment centers to non-narcotic drug abusers as well as addicts.

P.L. 91-616, Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment, and Rehabilitation Act, authorized the establishment of a National Institute on Alcohol Abuse and Alcoholism within NIMH.

1972—P.L. 92-255, Drug Abuse Office and Treatment Act of 1972, provided that a National Institute on Drug Abuse be established within NIMH.

1973—NIMH rejoined NIH.

NIMH later became a component of the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA).

1974—P.L. 93-282, authorized the establishment of ADAMHA.

1978—P.L. 95-622, the Community Mental Health Centers Extension Act of 1978.

1979—P.L. 96-88, the Department of Education Organization Act, created the Department of Education and renamed HEW the Department of Health and Human Services (HHS).

1980—P.L. 96-398, the Mental Health Systems Act, reauthorized the community mental health centers program.

1981—P.L. 97-35, the Omnibus Reconciliation Act, repealed P.L. 96-398 and consolidated ADAMHA's treatment and rehabilitation programs into a single block grant that enabled each State to administer allocated funds.

1983—P.L. 98-24, Alcohol Abuse Amendments of 1983, consolidated the current authorization for ADAMHA and the institutes into a new title V of the PHS act.

1984—P.L. 98-509, Alcohol Abuse, Drug Abuse, and Mental Health Amendments, authorized funding for block grants for fiscal years 1985 through 1987, as well as extending the authorizations for Federal activities in the areas of alcohol and drug abuse research, information dissemination, and development of new treatment methods.

1991—P.L. 99-550, PHS act, contained the requirement for State Comprehensive Mental Health Services Plan.

1992—P.L. 102-321, the ADAMHA Reorganization Act, abolished ADAMHA, created the Substance Abuse and Mental Health Services Administration, and transferred NIMH research activities to NIH.

2000—P.L. 106-310, The Children's Health Act of 2000, Title I Autism, instructed the Director of NIH to carry out this section through the Director of NIMH and in collaboration with other agencies that the Director determined appropriate. The Act expands, intensifies, and coordinates activities of the NIH with respect to research on autism, including the establishment of not less than 5 centers of excellence that conduct basic and clinical research into autism. The Act also mandated that the Secretary, DHHS establish an Interagency Autism Coordinating Committee (IACC) to coordinate autism research and other efforts within the Department. Authority to establish the IACC was delegated to the NIH. The NIMH was designated the NIH lead for this activity.

2006—P.L. 109-416, the Combating Autism Act of 2006, authorized expanded activities related to autism spectrum disorder (ASD) related research, surveillance, prevention, treatment, and education. Specifically, the Act authorizes research under NIH to address the entire scope of ASD; authorizes a review of regional centers of excellence for autism research and epidemiology; authorizes activities to increase public awareness, improve use of evidence-based interventions, and increase early screening for autism; and calls on the Interagency Autism Coordinating Committee to enhance information sharing.

Biographical Sketch of NIMH Director, Thomas Insel, M.D.

Thomas R. Insel, M.D., is Director of the National Institute of Mental Health (NIMH), the component of the National Institutes of Health charged with generating the knowledge needed to understand, treat, and prevent mental disorders. With a budget of over $1.4 billion, the NIMH leads the nation's research on disorders that affect an estimated 44 million Americans, including 1 in 5 children.

Immediately prior to his appointment as Director, which marks his return to NIMH after an 8-year hiatus, Dr. Insel was professor of psychiatry at Emory University. There, he was founding director of the Center for Behavioral Neuroscience, one of the largest science and technology centers funded by the National Science Foundation and, concurrently, director of an NIH-funded Center for Autism Research. From 1994 to 1999, he was director of the Yerkes Regional Primate Research Center in Atlanta. While at Emory, Dr. Insel continued the line of research he had initiated at NIMH studying the neurobiology of complex social behaviors in animals. Early in his NIMH research career, which extended from 1979 to 1994, Dr. Insel conducted clinical research on obsessive-compulsive disorder (OCD), conducting some of the first treatment trials for OCD using the selective serotonin reuptake inhibitors (SSRI) class of medications. He has published over 200 scientific articles and 4 books, including the *Neurobiology of Parental Care* (with Michael Numan) in 2003.

Dr. Insel has served on numerous academic, scientific, and professional committees, including 10 editorial boards. He is a member of the Institute of Medicine, a fellow of the American College of Neuropsychopharmacology, and is a recipient of several awards [A. E. Bennett Award from the Society for Biological Psychiatry, Curt Richter Prize from the International Society of Psychoneuroendocrinology, Outstanding Service Award from the U.S. Public Health Service, and a Distinguished Investigator Award from the National Alliance for Research on Schizophrenia and Depression (NARSAD)]. Dr. Insel graduated from the combined B.A.-M.D. program at Boston University in 1974. He did his internship at Berkshire Medical Center, Pittsfield, MA, and his residency at the Langley Porter Neuropsychiatric Institute at the University of California, San Francisco.

NIMH Directors

Name	In Office from	To
Robert H. Felix	1949	1964
Stanley F. Yolles	1964	1970

Bertram S. Brown	1970	1977
Herbert Pardes	1977	1984
Shervert H. Frazier	1984	1986
Lewis L. Judd	1988	1992
Frederick K. Goodwin	1992	1994
Rex William Cowdry (Acting)	1994	1996
Steven E. Hyman	1996	2001
Richard K. Nakamura (Acting)	2001	2002
Thomas R. Insel	2002	Present

NIMH Programs

http://www.nimh.nih.gov/about/organization/index.shtml

In 2004, NIMH reorganized the extramural research program structure into 5 divisions (from the previous 3), enabling the Institute to fully exploit recent scientific breakthroughs, increase cross-disciplinary collaboration, and facilitate translation of basic science discoveries into new interventions.

Office of the Director

http://www.nimh.nih.gov/about/organization/od/index.shtml

Office on AIDS

This office coordinates all NIMH research and activities working towards a better understanding of the causes, diagnosis, treatment, and prevention of HIV/AIDS. The office also cooperates with voluntary and professional health organizations, other NIH components, and Federal agencies, to identify national research needs and opportunities directed towards meeting AIDS-related public health goals.

Office of Constituency Relations and Public Liaison

This office oversees the NIMH's public liaison and outreach efforts, including requesting and receiving public input on the Institute's activities, as well as promoting and coordinating Institute interactions with patient advocacy, professional, scientific, and community-based organizations with specific interests in NIMH's mission and programs. The office also monitors mental health-related legislation and issues, and reviews all mental health-related reports to the Congress and other Federal agencies. On request, the office develops analyses and serves as a principal point of contact for interactions with NIH and Departmental staff, as well as with senior staff of the Office of the President and other Federal agencies.

Office of Global Mental Health

This office coordinates, participates in, and reports on international activities with respect to mental health research, such as tracking international grants, identifying opportunities and establishing partnership/collaborative agreements with other domestic and international organizations and government agencies, and working with NIMH extramural and intramural program staff to develop global projects and provide technical consultation to the international mental health community.

Office of Prevention

This office promotes NIMH research programs concerning the prevention of mental disorders and the promotion of mental health by developing, planning, executing, and assessing national programs, including the coordination of cross-Institute prevention research and representing the Institute in NIH, Departmental, cross-agency, private, and international prevention efforts.

Office of Resource Management

This office directs the Institute's resource allocation and management improvement processes by overseeing program planning and financial management, acquisition management, information resource management, management policy and procedure development, interpretation and implementation, the provision of general administrative services throughout the Institute, and personnel operations.

Office of Rural Mental Health

This office supports research activities and provides information on conditions unique to people living in rural areas, including research on the delivery of mental health services to such areas. Also, the office coordinates related Departmental research and activities with public and nonprofit entities.

Office of Science Policy, Planning, and Communications (OSPPC)

This office plans and directs a comprehensive strategic agenda for national mental health policy, including science program planning and related policy evaluation, research training and coordination, and technology and information transfer. In order to develop and assess NIMH strategic plan and portfolio management, OSPPC plans and implements portfolio analysis, scientific disease coding, and program evaluations. OSPPC also creates and implements the Institute's communication efforts, including information dissemination, media relations, and internal communications. The office proposes and guides science education activities concerned with informing the scientific community and public about diagnosis, treatment, and prevention of mental and brain disorders. In addition, the office is responsible for managing issues related to the Freedom of Information Act (FOIA), correspondence control, and clearance services for the Institute.

Office for Special Populations

This office develops research policies and programs to assure increased emphasis on the mental health needs of women, minorities, and other special populations. The office supports programs of basic and applied social and behavioral research on the mental health problems of special populations; studies the effects of discrimination on institutions and individuals, including majority institutions and individuals; supports and develops research designed to eliminate institutional discrimination; and provides increased emphasis on the concerns of special populations in the Institute's training, service delivery, and research programs.

Division of Neuroscience and Basic Behavioral Science (DNBBS)

http://www.nimh.nih.gov/about/organization/dnbbs/index.shtml

The DNBBS supports research programs in the areas of basic neuroscience, genetics, basic behavioral science, research training, resource development, technology development, drug discovery, and research dissemination. In cooperation with other components of the Institute and the research community, the division has the responsibility of ensuring that relevant basic science knowledge is generated and then harvested improve diagnosis, treatment, and prevention of mental and behavioral disorders.

Office of Cross-Cutting Science and Scientific Technology

This office provides the programmatic lead on numerous scientific activities that cut across divisions, NIH institutes and centers, and agencies. These activities include, but are not limited to, the following: NIMH Small Business Research Program coordination; NIH Blueprint for Neuroscience Research; NIH BISTIC (Biomedical Information Science and Technology Initiative Consortium); NIH BECON (BioEngineering CONsortium); NIH Nano Task Force; and the United States-European Commission Task Force on Biotechnology. In addition, the office coordinates NIMH involvement in several NIH Roadmap initiatives (Interdisciplinary Research, Bioinformatics and Computational Biology, and Nanomedicine). The office also supports research and development of scientific technologies related to brain and behavioral research, including software (such as informatics tools and resources), hardware (such as devices and instrumentation), and wetware (such as novel genetic methods or bioactive and molecular imaging agents).

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

The SBIR Program supports research and development by small businesses of innovative technologies that have the potential to succeed commercially or provide significant societal benefit. In the DNBBS, the SBIR and STTR programs support research and the development of tools related to basic brain and behavioral science, genetics, and drug discovery and development relevant to the mission of NIMH.

Office of Research Training and Career Development

This office supports research training at the pre-doctoral, postdoctoral, and early investigator level of career development in basic neuroscience, basic behavioral science, and other areas relevant to the focus of the DNBBS. The office's primary goal is to ensure that sufficient, highly trained research investigators will be available to address basic and clinical research questions pertinent to mental health and mental illness and thereby to reduce the burden of mental and behavioral disorders.

Genomics Research Branch (formerly the Office of Human Genetics and Genetic Resources)

The Genomics Research Branch plans, supports, and administers programs of research including the identification, localization, and function of genes and other genomic elements that produce susceptibility to mental disorders. Research projects use genetic epidemiological methods, population-based sampling; longitudinal cohort and extended-family study designs; and genomic approaches to identify genetic, biological, and environmental risk factors and biomarkers for diagnosis, prognosis, drug efficacy, and pharmacogenomics of mental disorders. The branch also supports the creation and distribution of research resources, including the development of novel statistical and bioinformatics tools and the NIMH Human Genetics Initiative, a repository of DNA extracted from blood and immortalized cell lines and associated clinical information for use in genetic studies of mental disorders.

Molecular, Cellular, and Genomic Neuroscience Research Branch

This branch plans and administers research programs that elucidate the genetic, molecular, and cellular mechanisms underlying brain development, neuronal signaling, synaptic plasticity, circadian rhythmicity, and the influence of hormones and immune molecules on brain function. Other supported activities include drug discovery, identification of novel drug targets, development of functional imaging ligands, development of imaging probes as potential biomarkers, testing of models for assessing novel therapeutics, and studies of mechanisms of action of therapeutics in animals and humans.

Behavioral Science and Integrative Neuroscience Research Branch

This branch supports innovative research—including empirical, theoretical, and modeling approaches—on cognitive, affective, social, motivational, and regulatory systems and their development across the lifespan in humans, in nonhuman primates, and in other animals. Relevant reduced and model systems approaches are also supported. Basic research in these areas provides a foundation for new insights into the nature and origins of mental and behavioral disorders and for the development of improved treatment and prevention interventions.

Molecular Libraries and Imaging Roadmap Program

This program provides infrastructure support and coordination for the NIH Roadmap Molecular Libraries Screening Centers Network and for related technology development projects. The program supports research on biological assay implementation, high-throughput screening to identify active compounds, synthetic chemistry and probe development, and informatics.

Division of Adult Translational Research and Treatment Development (DATR)

http://www.nimh.nih.gov/about/organization/datr/index.shtml

The DATR supports programs aimed at understanding the pathophysiology of adult and late-life mental illness and hastening the translation of behavioral science and neuroscience advances into innovations in clinical care. The division supports a broad research portfolio, which includes studies of the phenotypic characterization and risk factors for major psychiatric disorders; clinical neuroscience to elucidate etiology and pathophysiology of these disorders; and psychosocial, psychopharmacologic, and somatic treatment development. The division includes the following programs and branches:

SBIR and STTR Programs

The SBIR program supports research and development by small businesses of innovative technologies that have the potential to succeed commercially or to provide significant societal benefits; the STTR program has the same objectives but requires academic research involvement. In the DATR, the SBIR and STTR programs support research aimed at facilitating the validation and commercialization of new methods of assessing psychopathology, measuring treatment response to therapeutic agents or approaches, and the clinical development of novel psychopharmacological or psychosocial approaches to the treatment of adult and late life mental illness.

Research Training and Career Development Program

This program supports research training at the pre-doctoral, post-doctoral, and early-investigator levels of career development in areas relevant to the DATR. These areas include adult psychopathology and psychosocial interventions, clinical neuroscience, geriatrics, translational research focusing on adults, and experimental therapeutics and treatment mechanisms related to mental illness. The program's primary goal is to ensure that sufficient numbers of highly trained, independent investigators will be available to address the complexities of adult psychopathology and translational research.

Traumatic Stress Research Program

This program is the DATR/NIMH point of contact for disaster/terrorism/biodefense-related research, supporting studies on biopsychosocial risk/protective factors for psychopathology after traumatic events and on interventions for post-traumatic stress disorder (PTSD) in adults. The program also oversees research spanning and integrating basic science, clinical practice, and health care system factors, including interventions and service delivery, regarding the effects of mass trauma and violence (e.g., war, terrorism, and natural and technological disaster) on children, adolescents, and adults.

Adult Psychopathology and Psychosocial Intervention Research Branch

This branch promotes translational research that is directed toward an understanding of how the development, onset, and course of adult psychopathology may be studied in terms of dysfunction in fundamental biobehavioral mechanisms such as emotion, cognition, motivational processes, and interpersonal relationships. The branch emphasizes studies that combine approaches from neuroscience and behavioral science to elucidate the role of psychosocial factors in the alterations of brain functioning associated with mental disorders and to produce integrative models of risk, disorder, and recovery.

Clinical Neuroscience Research Branch

This branch supports research, training, and resource development programs aimed at understanding the neural basis of mental disorders. Specifically supported are human and animal studies on the molecular, cellular, and systems level of brain function designed to elucidate the pathophysiology of mental disease and to translate these findings to clinical diagnosis, treatment, and prevention strategies.

Geriatrics Research Branch

This branch supports research in the etiology and pathophysiology of mental disorders of late life (such as Alzheimer's disease and related dementias, neuroregulatory and hemostatic disorders, and menstrual cycle disorders), the treatment and recovery of persons with these disorders, and the prevention of these disorders and their consequences. The program encourages collaborative multidisciplinary research programs using the tools of molecular neuroscience, cognitive sciences, and social and behavioral sciences to facilitate the translation of basic science and preclinical research to clinical research.

Experimental Therapeutics Branch

This branch supports multidisciplinary research and resource development on novel pharmacological approaches to treat mental disorders, evaluation of existing treatments for new clinical uses, novel somatic treatments, and other areas related to treatment. The branch also engages in cross-Institute activities to identify specific bottlenecks in the development of novel treatments for mental disorders and collaborates with academic, industry, and regulatory agencies to develop programmatic approaches to hasten the availability of better treatments to reduce the burden of mental illness.

Division of Developmental Translational Research (DDTR)
formerly the Division of Pediatric Translational Research and Treatment Development
http://www.nimh.nih.gov/about/organization/ddtr/index.shtml

The DDTR supports programs of research and research training with the ultimate goal of preventing and curing childhood psychopathology. The division stimulates and promotes an integrated program of research across basic behavioral/ psychological processes, environmental processes, brain development, pediatric psychopathology and therapeutic interventions. DDTR also supports research that employs a developmental perspective on a variety of related basic behavioral processes and the psychopathology that arises from their dysfunction. These efforts to translate knowledge from basic research to a new understanding of clinical disorders share the goal of developing novel treatment and prevention strategies. The division includes the following programs and branches:

SBIR and STTR Programs

The SBIR program supports research and development by small businesses of innovative technologies that have the potential to succeed commercially or to provide significant societal benefits. The STTR program has the same objectives but requires academic research involvement. In the DDTR, the SBIR and STTR programs support research aimed at the development and validation of new methods and techniques to advance understanding, prevention, and treatment of child psychopathology.

Research Training and Career Development Program

This program supports research training at the pre-doctoral, post-doctoral, and early investigator level of career development in areas relevant to the DDTR, such as neurodevelopmental disorders, psychosocial stress, and affective and regulatory disorders. The program's primary goal is to ensure that sufficient numbers of highly trained, independent investigators will be available to address the complexities of developmental psychopathology.

Child Abuse and Neglect Program

This program supports research in child abuse and neglect, a subject worthy of special attention in NIMH because of the profound impact that abuse and neglect have on children's immediate and long-term mental health. This program emphasizes research that helps identify risk and protective factors that influence the development of psychopathology, aims to develop novel treatment and prevention strategies, and addresses familial aspects of traumatic stress as risk factors for psychopathology in children and adolescents.

Autism STAART Centers

NIMH supports interdisciplinary research centers through an NIH cooperative agreement in the Studies to Advance Autism Research and Treatment (STAART) Program, in cooperation with 4 other components of NIH—the National Institute of Child Health and Human Development, National Institute of Neurological Disorders and Stroke, National Institute on Deafness and Other Communication Disorders, and National Institute of Environmental Health Sciences. By evaluating and treating patients, as well as enrolling them in clinical trials, each center helps to expand the research base on the causes, diagnosis, early detection, prevention, and treatment of autism.

Neurodevelopmental Disorders Branch

This branch supports research of childhood psychiatric disorders such as attention deficit hyperactivity disorder, schizophrenia, obsessive-compulsive disorder, and autistic spectrum disorders, as well as development of more effective prevention and treatment strategies for these disorders. The branch also funds research on human neurodevelopment and on basic biobehavioral processes involved in these disorders, such as attentional and perceptual processing, executive function, inhibitory controls (e.g., sensory gating), social cognition and communication, and affiliative behaviors.

Psychosocial Stress and Related Disorders Branch

This branch supports research leading to a fuller understanding of pathological conditions in childhood and adolescence such as oppositional defiant disorder, post-traumatic stress disorder, anxiety disorders, and pathological shyness, as well as the development of more effective prevention and treatment strategies. In addition, the branch sponsors research on aggression, fear, inhibitory controls, learning, memory, caregiver-child relationships, the effects of acute and chronic stress, and other related issues.

Affective and Regulatory Disorders Branch

This branch provides support to research on pathological conditions in childhood and adolescence such as eating disorders, sleep disorders, major depressive disorder, dysthymia, suicide attempt and completion, and bipolar disorder, as well as on the development of more effective prevention and treatment strategies. The branch also funds research on biobehavioral processes, including emotion and mood regulation, feeding and appetite regulation, circadian rhythms, and developmental changes in neurobehavioral regulation (such as CNS maturation and neuroendocrine development), as well as environmental influences that have implications for risk or resilience, susceptibility to disorder, or strategies for preventing or treating disorders.

Division of AIDS Health and Behavior Research (DAHBR)

http://www.nimh.nih.gov/about/organization/dahbr/index.shtml

The DAHBR supports research programs that focus on developing and disseminating behavioral interventions that prevent HIV/AIDS transmission, clarifying the pathophysiology and alleviating the neuropsychiatric consequences of HIV/AIDS infection, and using a public health model to reduce the burden of mental illness from medical co-morbidities, non-adherence to treatment, societal stigma, health disparities, and unhealthy behaviors. The division includes the following programs and branches:

SBIR and STTR Programs

The SBIR program supports research and development by small businesses of innovative technologies that have the potential to succeed commercially or to provide significant societal benefits. The STTR program has the same objectives but requires academic research involvement. In the DAHBR, the SBIR and STTR programs support research aimed at changing risky behaviors, promoting strategies to reduce AIDS transmission, elucidating the pathophysiology of HIV-related neuropsychiatric dysfunction, and investigating processes that influence adherence to treatment in individuals with HIV.

Research Training and Career Development Program

This program supports research training at the pre-doctoral, post-doctoral, and early-investigator level of career development in areas relevant to the DAHBR, such as research on treatment adherence and behavior change in patients with mental disorders. The program's primary goal is to ensure that sufficient numbers of highly trained independent investigators will be available to address the complexities of health behaviors involved in mental illness.

Center for Mental Health Research on AIDS

This center supports domestic and international studies to develop behavior change and prevention strategies to reduce the transmission of HIV and other sexually transmitted diseases. To accomplish this goal, the center oversees research in developing and testing interventions to reduce the neuropsychiatric morbidity associated with HIV infection, clarifying the pathophysiology of HIV infection of the central nervous system (CNS) and associated motor/cognitive disturbances, developing therapeutic agents to prevent or reverse the effects of HIV on the CNS, improving the effectiveness and efficiency of mental health services relevant to HIV infection and people living with HIV and co-occurring mental illness, and other related areas.

Health and Behavioral Research Branch

This branch supports research on a range of health behaviors in people with mental disorders, such as identifying potent, modifiable risk and protective factors for mental disorders that may guide the development and initial testing of theory-driven interventions. Interventions may comprise prevention, treatment, or rehabilitation and include biological, pharmacological, behavioral, psychosocial, or environmental components. Examples of supported research areas include adherence to interventions for mental disorders, ethics in mental disorders research, and functional assessment in people with mental disorders.

Division on Services and Intervention Research (DSIR)

http://www.nimh.nih.gov/about/organization/dsir/index.shtml

The DSIR supports 2 critical areas of research: intervention research to evaluate the effectiveness of pharmacologic, psychosocial (psychotherapeutic and behavioral), somatic, rehabilitative, and combination interventions on mental and behavior disorders; and mental health services research on organization, delivery (process and receipt of care), related health economics, delivery settings, clinical epidemiology, and the dissemination and implementation of evidence-based interventions into service settings. The division also provides biostatistical analysis and clinical trials operations expertise for research studies; analyzes and evaluates national mental health needs and community research partnership opportunities; and supports research on health disparities. The division includes the following programs and branches:

SBIR and STTR Programs

The SBIR program supports research and development by small businesses of innovative technologies that have the potential to succeed commercially or to provide significant societal benefits. The STTR program has the same objectives but requires academic research involvement. In the DSIR, the SBIR and STTR programs support research and development of tools related to clinical trials (including preventive, treatment, and rehabilitative interventions alone or in combination), clinical epidemiology, services research, effectiveness research, health disparities (including rural populations), and the

dissemination of evidence-based treatments and research into services and clinical practice in areas directly related to the mission of NIMH.

Office of Research Training and Career Development

This office supports research training at the pre-doctoral, post-doctoral, and early-investigator levels of career development in areas relevant to the DSIR. Areas of emphasis include research related to clinical trials (including preventive, treatment, and rehabilitative interventions alone or in combination) and adapting interventions and demonstrating their utility in broad populations (e.g., ethnic and racial groups, co-morbid disorders) for various service settings (e.g., primary care, schools, public sector). The office's primary goal is to ensure that sufficient, highly trained research investigators will be available to address interventions and services research questions pertinent to mental health and mental illness and thereby to reduce the burden of mental and behavioral disorders.

Clinical Trials Operations and Biostatistics Unit

This unit serves as the operations focal point for collaborative clinical trials on mental disorders in adults and children. The unit is responsible for overseeing both contract-supported and cooperative agreement-supported multisite clinical trial protocols, as well as special projects undertaken by NIMH. In addition, the unit manages over-arching matters related to clinical trials operations, such as the coordination of the ancillary protocols across the large trials and the implementation of NIMH policy for dissemination of public access datasets. The unit also consults Institute staff and grantees/contractors on biostatistical matters related to appropriateness of study design, determination of power and sample size, and approaches to statistical analysis of data from NIMH-supported clinical trials.

Adult Treatment and Preventive Intervention Research Branch

This branch supports research evaluating therapeutic (acute, maintenance, and preventive) and adverse effects of psychosocial, psychopharmacologic, and somatic interventions of proven efficacy in the treatment of mental disorders in adult populations. For example, the branch has administered trials evaluating modified or adapted forms of interventions for use with special populations (such as women, or specific ethnic or racial groups), in new settings (public sector, primary care, workplace, other non-academic sites), through new methods of treatment delivery (e.g., web or computer-based). Studies look beyond symptom reduction to include short- and long-term assessment of functioning and other outcome measures that can help identify disorder subgroups more likely to benefit from treatment, to determine the optimal length of treatment, and to evaluate the long-term impact of interventions.

Child and Adolescent Treatment and Preventive Intervention Research Branch

This branch plans, supports, and administers research programs to evaluate the effectiveness of mental health preventive, treatment, and rehabilitative interventions (alone or in combination) for children and adolescents. The branch also supports research addressing the long-term effectiveness of known successful interventions, including their role in preventing relapse and recurrence of mental disorders. Types of intervention research supported by the branch include the full range of behavioral, psychotherapeutic, pharmacologic, and non-pharmacologic somatic or complementary/alternative approaches for which acute efficacy has been demonstrated, as well as rehabilitation or other adjunctive interventions.

Services Research and Clinical Epidemiology Branch

This branch administers programs of research, training, and infrastructure development, across the lifespan, on all mental health services research issues, including but not limited to: services organization, delivery (process and receipt of care), and related health economics at the individual, clinical, program, community, and systems levels in specialty mental health, general health, and other delivery settings (such as the workplace); interventions to improve the quality and outcomes of care, including diagnostic, treatment, preventive, and rehabilitation services; enhanced capacity for conducting services research; clinical epidemiology of mental disorders across all clinical and service settings; and dissemination and implementation of evidence-based interventions into service settings.

Division of Extramural Activities (DEA)
http://www.nimh.nih.gov/about/organization/dea/index.shtml

The DEA provides leadership and advice in developing, implementing, and coordinating extramural programs and policies; represents the Institute on extramural program and policy issues within HHS and with outside organizations; provides scientific and technical peer and objective review of applications for grants, cooperative agreements, and contracts; provides information and guidelines for grant applications; oversees National Advisory Mental Health Council activities and provides committee management services.

Division of Intramural Research Programs (DIRP)
http://intramural.nimh.nih.gov/

The DIRP is the internal research division of the NIMH. Intramural scientists conduct research ranging from studies into mechanisms of normal brain function—conducted at the behavioral, systems, cellular, and molecular levels—to clinical investigations into the diagnosis, treatment, and prevention of mental illness. Major disease entities studied throughout the lifespan include mood disorders and anxiety, schizophrenia, obsessive-compulsive disorder, attention deficit hyperactivity disorder, and pediatric autoimmune neuropsychiatric disorders. Because of its outstanding resources, unique funding mechanisms, and location in the nation's capital, the DIRP is viewed as a national resource, providing unique opportunities in mental health research and research training.

NIH Almanac: Organization

National Institute of Neurological Disorders and Stroke

Mission | Important Events | Legislative Chronology | Director | Divisions

Originally National Institute of Neurological Diseases and Blindness. Name changed 1968 to National Institute of Neurological Diseases and Stroke; March 1975 to National Institute of Neurological and Communicative Disorders and Stroke; and October 1988 to present name.

Mission

The National Institute of Neurological Disorders and Stroke (NINDS) is one of 27 Institutes and Centers comprising the National Institutes of Health (NIH). NIH, located in Bethesda, Maryland, is an agency of the Public Health Service within the U.S. Department of Health and Human Services. Created by the U.S. Congress in 1950, NINDS has occupied a central position in the world of neuroscience for more than 50 years.

The mission of NINDS is to reduce the burden of neurological disease—a burden borne by every age group, every segment of society, and people all over the world.

To accomplish this goal, the Institute supports and conducts research on the healthy and diseased nervous system; fosters the training of investigators in the basic and clinical neurosciences; and seeks better understanding, diagnosis, treatment, and prevention of neurological disorders.

The Institute's extramural program supports thousands of research project grants and research contracts. Institutional training grants and individual fellowships support hundreds of scientists in training and provide career awards that offer a range of research experience and support for faculty members at various levels. Scientists in the Institute's laboratories and clinics in Bethesda conduct research in the major areas of neuroscience and on many of the most important and challenging neurological disorders, and collaborate with scientists in several other NIH Institutes.

This is a time of accelerating progress and increasing hope in the battle against brain disease. Advances in understanding the nervous system are beginning to pay off in the form of treatments for previously intractable problems such as spinal cord injury, acute stroke, multiple sclerosis, epilepsy, and Parkinson's disease, to name a few. It is fortunate that scientific progress is matched by unprecedented public commitment to research. NINDS is aware that increased public support and funding require visionary leadership and effective stewardship of the resources entrusted to the Institute.

The NINDS vision is:

- To lead the neuroscience community in shaping the future of research and its relationship to brain diseases.
- To build an intramural program that is the model for modern collaborative neuroscience research.
- To develop the next generation of basic and clinical neuroscientists through inspiration and resource support.
- To seize opportunities to focus our resources to rapidly translate scientific discoveries into prevention, treatment, and cures.
- To be the first place the public turns to for authoritative neuroscience research information.

Important Events in NINDS History

1950—On August 15 President Harry S. Truman signed Public Law 81-692, establishing the National Institute of Neurological Diseases and Blindness (NINDB).

1951—NINDB received its first budget of $1,232,253.

1953—The NINDB budget became a line item in the NIH budget.

1953-54—An intramural program of clinical investigation was initiated, including medical neurology, surgical neurology, and electroencephalography. Training programs in neurology and ophthalmology were initiated.

1955—Basic science training grants were initiated.

1956—The intramural clinical investigations program was expanded to include work in ophthalmology.

1957—Training programs in otolaryngology and pediatric neurology began.

Field investigations involving collaborative and cooperative clinical studies began and the initial phase of the Collaborative Perinatal Project was started.

1960—The joint intramural basic research program of NINDB and the National Institute of Mental Health (NIMH) was divided and organized into 2 basic research laboratory programs.

1961—First program projects and clinical research centers in stroke and communicative disorders were supported.

1962—Funds were appropriated for professional and technical information assistance. Training grants in neurosurgery and neuroradiology were initiated.

1963—Developmental graduate training grants were initiated.

1965—A head injury research program was established.

1966—The stroke research program was expanded; additional grants for clinical research centers were awarded. An antiepileptic drug testing program began.

1967—Vision outpatient research centers were established. A program of research in neural control mechanisms and prostheses was initiated.

1968—The Institute was renamed the National Institute of Neurological Diseases and Stroke. The NINDS blindness program became the nucleus of the National Eye Institute.

1969—Research Building 36—dedicated by the U.S. Department of Health, Education, and Welfare (HEW) Secretary Robert H. Finch—was occupied by NINDS and NIMH research laboratories.

1971—Programs in applied neurological research (epilepsy, head injury), infectious diseases, and biometry were added to the Collaborative and Field Research Division.

1973—Two new communicative disorders programs began with establishment of an intramural Laboratory of Neuro-

Otolaryngology and a section on communicative disorders in the Collaborative and Field Research Division.

1974—Laboratories for neuroimmunology and neuropharmacology were established.

1975—NINDS was renamed the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS).

The Institute reorganized into 6 units for intramural research, fundamental neurosciences, communicative disorders, neurological disorders, stroke and trauma, and extramural activities.

1976—Dr. D. Carleton Gajdusek, chief, Laboratory of Central Nervous System Studies, was awarded the Nobel Prize in Physiology or Medicine for work on atypical slow viruses.

1979—A neuroepidemiology section and a section of neurotoxicology were established within the Intramural Research Program. NINCDS substantially expanded extramural support of research studies using positron emission tomography.

1982—The Institute's Neurological Disorders Program was replaced by 2 new program units: convulsive, developmental, and neuromuscular disorders and demyelinating, atrophic, and dementing disorders.

1984—NINCDS established the Senator Jacob Javits Neuroscience Awards, which provide research grant support for up to 7 years in the basic and clinical neurosciences and communicative sciences.

A Laboratory of Neurobiology and a Laboratory of Experimental Neuropathology were established within the Intramural Research Program.

1986—A Laboratory of Neural Regeneration and Implantation was established within the Intramural Research Program.

1987—NINCDS programs were renamed divisions, reflecting major areas of research interest: communicative and neurosensory disorders; convulsive, developmental, and neuromuscular disorders; demyelinating, atrophic, and dementing disorders; fundamental neurosciences; stroke and trauma; extramural activities; and intramural research.

A Clinical Neuroscience Branch was established within the Division of Intramural Research.

1988—The communicative disorders program became the nucleus of the National Institute of Deafness and Other Communication Disorders. NINCDS was renamed the National Institute of Neurological Disorders and Stroke.

1989—On July 25 President George H.W. Bush signed P.L. 101-58, declaring the 1990s the "Decade of the Brain."

1990—A Stroke Branch was established within the Division of Intramural Research.

1998—NINDS formed 7 planning panels comprising neuroscience leaders. Panel members outlined opportunities for research investment.

1999—NINDS published *Neuroscience at the New Millennium: Priorities and Plans for the NINDS, Fiscal Years 2000-2001*.

2000—The Parkinson's Disease Research Agenda was developed.

2001—NINDS celebrated its 50th anniversary with a 2-day scientific symposium, "Celebrating 50 Years of Brain Research: New Discoveries, New Hope."

The Stroke Progress Review Group was created.

The Research Agenda for Epilepsy was developed.

2002—The Report of the Stroke Progress Review Group was published.

2004—The new National Neuroscience Research Center opened.

NINDS Legislative Chronology

August 15, 1950—Public Law 81-692 established NINDB "for research on neurological diseases (including epilepsy, cerebral palsy, and multiple sclerosis) and blindness."

August 16, 1968—Public Law 90-489 renamed the NINDB the National Institute of Neurological Diseases.

October 24, 1968—Public Law 90-636 changed the name of the Institute to the National Institute of Neurological Diseases and Stroke.

October 25, 1972—Public Law 92-564 established a temporary National Commission on Multiple Sclerosis supported by NINDS.

March 14, 1975—Part 8 of a HEW Statement of Organization, Functions, and Delegations of Authority was amended to change the title of NINDS to the National Institute of Neurological and Communicative Disorders and Stroke.

July 29, 1975—Public Law 94-63 established 2 temporary commissions to be supported by NINCDS: Commission for the Control of Epilepsy and Its Consequences, and Commission for the Control of Huntington's Disease and Its Consequences.

October 28, 1988—Public Law 100-553 changed the name of NINCDS to the National Institute of Neurological Disorders and Stroke.

June 10, 1993—Public Law 103-43 added language on Multiple Sclerosis research to the legislative mandate of the NINDS.

November 13, 1997—Public Law 105-78, the Morris K. Udall Parkinson's Disease and Research Act, added language authorizing increased Parkinson's disease research and training, including research centers.

November 17, 2000—Public Law 106-310, the Children's Health Act of 2000, amended the Public Health Service Act with regard to a wide range of issues affecting children's health. Specifically relevant to the NINDS mission were authorizing provisions for the expansion of autism research, including research centers of excellence, and the establishment of an interagency Autism Coordinating Committee; the establishment of a Pediatric Research Initiative; the development of a pediatric research loan repayment program; the conduct of a national longitudinal study of environmental influences on children's health and development; the study of risk factors for childhood cancers, including malignant tumors of the central nervous system; the support of research with respect to cognitive disorders and neurobehavioral consequences arising from traumatic brain injury; and the expansion and coordination of muscular dystrophy research.

December 18, 2001—Public Law 107-084, the Muscular Dystrophy Community Assistance, Research, and Education Amendments of 2001, or the "MD-CARE Act," amended the Public Health Service Act to provide for the expansion and coordination of research with respect to various forms of muscular dystrophy, including the establishment of research centers of excellence and an interagency coordinating committee.

Biographical Sketch of NINDS Director Story C. Landis Ph.D.

Dr. Landis has been Director of the National Institute of Neurological Disorders and Stroke since September 1, 2003. As Director, she oversees an annual budget of $1.5 billion and a staff of more than 900 scientists, physician-scientists, and administrators.

Dr. Landis received her B.A. in biology from Wellesley College in 1967 and her master's degree (1970) and her Ph.D. (1973) from Harvard University. She held postdoctoral fellowships at the National Institute of Mental Health and Harvard Medical School and also held faculty positions at Harvard Medical School and Case Western Reserve University. At Case Western Reserve, she was responsible for the creation of a Department of Neurosciences. Under 5 years of her leadership, the program achieved worldwide acclaim and a reputation for excellence. In 1995, Dr. Landis joined NINDS as Scientific Director and was responsible for the direction and excellence of research conducted in the Institute's intramural program.

Dr. Landis's own research is aimed at understanding how functional connections form in the developing nervous system. Starting with evidence of surprising plasticity and environmental influences obtained in cell culture systems, her work has focused on dissecting the cellular interactions that drive synapse formation in the peripheral nervous system and on identifying the molecular mechanisms responsible.

Dr. Landis has received distinction as an Established Investigator of the American Heart Association, a Javits Neuroscience Investigator, and a MacKnight Senior Investigator, and as an elected Fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. Dr. Landis has served on numerous scientific advisory committees, including selection and review committees for the NIH and the Howard Hughes Medical Institute. In 2002, she was named the President-Elect of the Society for Neuroscience.

NINDS Directors

Name	In Office from	To
Pearce Bailey	1951	1959
Richard L. Masland	1959	1968
Edward F. MacNichol, Jr.	September 1, 1968	1973
Donald B. Tower	May 31, 1974	February 1, 1981
Murray Goldstein	December 23, 1982	October 1, 1993
Patricia A. Grady (Acting)	September 1993	August 31, 1994
Zach W. Hall	September 1, 1994	December 31, 1997
Audrey S. Penn (Acting)	January 1, 1998	July 31, 1998
Gerald D. Fischbach	August 1, 1998	January 31, 2001
Audrey S. Penn (Acting)	February 1, 2001	August 31, 2003

Story C. Landis	September 1, 2003	Present

Major Divisions

The Institute is organized into a division of extramural research and a division of intramural research.

Division of Extramural Research

The Division of Extramural Research funds grants, cooperative agreements, and contracts to support research, research training, and career development. The Division is organized into work groups known as “program clusters.” The clusters were organized around critical, cross-cutting scientific topics that hold great promise for advancing knowledge and reducing the burden of neurological disease. The current scientific clusters are: Repair and Plasticity; Systems and Cognitive Neuroscience; Channels, Synapses, and Circuits; Neurogenetics; Neural Environment; and Neurodegeneration. and In addition, the Extramural Division includes the Clinical Trials group, the Office of Minority Health and Research, the Technology Development group; and the Office of International Activities. It also includes the Office of Training and Career Development, which manages programs to meet the future needs of neuroscience.

The Division monitors developments in these program areas; assesses the national need for research on the cause, prevention, diagnosis, and treatment of disorders of the brain and nervous system; and pursues technological development, the application of research findings, and research training and career development. The Division also (a) determines program priorities, (b) collaborates with other institutes of the NIH on specific research efforts, (c) prepares reports and analyses of national needs to assist NINDS staff and advisory groups in carrying out their responsibilities and in developing new areas of emphasis, and (d) consults with extramural scientists, voluntary health organizations, and professional associations in identifying research needs and developing programs to meet these needs.

The Division coordinates training of young investigators in all basic and clinical neurological research areas. This includes institutional and individual training programs as well as support through research career development awards and clinical investigator development awards.

Repair and Plasticity

http://www.ninds.nih.gov/funding/areas/repair_and_plasticity/index.htm

- To understand mechanisms of plasticity in the healthy nervous system and explore implications for repair.
- To develop interventions to modify the course of injury and disease progression, and improve functional outcome in individuals following injury to the nervous system.
- To understand the course of degeneration and repair following spinal cord injury and brain injury on timescales ranging from seconds to years.
- To develop interventions to permit spinal cord tracts to regrow past an injury site and establish functional connections distally.
- To understand the role of endogenous neurogenesis and to promote development of stem cell biology to repair the nervous system.
- To promote the development of neural prosthetic devices designed to restore function after neurological injury or disease.

Systems and Cognitive Neuroscience

http://www.ninds.nih.gov/funding/areas/systems_and_cognitive_neuroscience/index.htm

- To encourage and support research on higher brain functions,, such as learning, memory, language, cognition, emotion, movement, attention, regulation of the wakefulness-sleep cycle, food intake, body weight, sensory perception, and response to pain.

- To provide grant opportunities in such fields as pain research and neuroinformatics.
- To support non-invasive functional imaging research such as PET (positron emission tomography), fMRI (functional magnetic resonance imaging), simultaneous multi-electrode array in vivo, electrophysiological recordings of brain and muscle activity, as well as combinations of imaging with EEG and MEG.
- To encourage efforts in translational research in developing adaptive and rehabilitative strategies for functional sensorimotor recovery in patients with motor or sensory impairment as a result of neurological disorders such as stroke.
- To promote the identification of biological markers for neurological diseases.
- To initiate, plan, and implement workshops to gather and disseminate knowledge in these domains, which will identify opportunities and insights on rehabilitation and treatment approaches.

Channels, Synapses, and Circuits

http://www.ninds.nih.gov/funding/areas/channels_synapses_and_circuits/index.htm

- To initiate and support basic and translational research on ion channels, transporters, and pumps implicated in neuronal function and disease.
- To advance basic and translational research in mechanisms of synaptic transmission, development, and plasticity, including research on function and dysfunction of the neuromuscular junction.
- To support basic, translational, and clinical studies in epilepsy and epileptogenesis.
- To implement the epilepsy benchmarks (http://www.ninds.nih.gov/funding/research/epilepsyweb/index.htm).
- To support research on the pathogenesis and treatment of inherited/acquired neuropathies, muscular dystrophies, and other neuromuscular disorders, including myasthenia gravis.
- To promote the development of new methodologies for basic research, including genetic models, high-resolution structural studies of membrane proteins, optical recording, neuroimaging, and neuroinformatics tools.

Neurogenetics

http://www.ninds.nih.gov/funding/areas/neurogenetics/index.htm

- To promote efforts to identify genes and susceptibility loci for neurological diseases.
- To promote investigation of the mechanisms by which genetic variants cause or contribute to risks for neurological disease.
- To develop gene-based assays, diagnostics, and therapeutics for neurological disorders.
- To develop cutting-edge tools and resources for neurogenetic research.
- To promote basic and translational research in neurogenetics and genomics.
- To investigate the genetic basis of normal neural development, function, and perturbations that can lead to neurological disorders.
- To promote and assist in the training of neuroscientists in molecular medicine.
- To educate the scientific and lay communities in the ethical, legal, and social issues in neurogenetics.
- To engage patient voluntary and advocacy groups in partnerships to promote research in neurogenetics.

Neural Environment

http://www.ninds.nih.gov/funding/areas/neural_environment/index.htm

- To encourage studies on the role of diverse cell populations of the nervous system and mechanisms of cell-cell interaction responsible for the normal function and maintenance of the nervous system as an organ, including the function of glial cells, brain blood supply, and flow of cerebrospinal fluid (CSF).
- To encourage research on infectious, immune, and inflammatory mechanisms in nervous system disorders such as multiple sclerosis, prion diseases, stroke, brain tumors, and neuroAIDS.
- To encourage studies to identify the molecular mechanisms of cell injury and death in the nervous system.
- To foster studies on vascular mechanisms of neurological disorders; vascular development in the central nervous system (CNS); and the role of microvascular endothelia, extracellular matrix, and cells of hematopoietic origin within the CNS.
- To promote the development of diagnostics and of therapies that will prevent, arrest, or reverse autoimmune neurological disorders such as multiple sclerosis.

- To expand studies on the mechanisms of blood-brain and brain-CSF barrier functions and of cell migration (and/or trafficking) into the CNS in stroke, immune disorders, brain tumors, and CNS infections.
- To encourage the development of animal models for infectious and immune disorders, CNS and peripheral nervous system tumors, and stroke (e.g., transgenic or knockout/in models, viral models).
- To encourage the study of normal glial or progenitor/stem cell populations and their role in the development or treatment of CNS and peripheral nervous system tumors.
- To promote the study of biomarkers for vascular, tumorigenic, and immune diseases of the nervous system.
- To strongly encourage bi-directional translational research that transfers insights gained from basic research and clinical investigations.

Neurodegeneration

http://www.ninds.nih.gov/funding/areas/neurodegeneration/index.htm

- To stimulate basic and clinical research on the mechanisms of neuron death and neurodegeneration underlying a wide range of neurodegenerative disorders including Parkinson's and Alzheimer's diseases, amyotrophic lateral sclerosis, Huntington's disease, frontotemporal dementia, progressive supranuclear palsy and Pick's disease, Lewy body diseases, multiple system atrophy, corticobasal degeneration, etc.
- To encourage the translation of basic research to the development and testing of therapeutics for the treatment and cure of neurodegenerative diseases.
- To encourage gene discovery and population-based epidemiological studies of neurological disorders in order to elucidate the natural history of neurodegeneration and to identify biomarkers for neurodegenerative disorders.
- To support the rigorous testing of candidate therapies in controlled clinical trials in conjunction with the NINDS Clinical Trials Group.
- To promote the development of advanced research technologies necessary for achieving new breakthroughs in neurodegeneration research.
- To promote the development of representative models of human neurodegenerative diseases to support gene and drug discovery research.

Clinical Trials

http://www.ninds.nih.gov/funding/areas/clinical_trials/index.htm

- To promote the development of clinical interventions for neurological disorders and stroke.
- To stimulate the translation of findings in the laboratory to clinical research and clinical interventions.
- To ensure measures for protection of human subjects and safety monitoring.
- To encourage innovation in clinical research methodology.
- To support the development of neurology clinical researchers with training in biostatistics, epidemiology, and clinical trial methodology.

Office of Minority Health and Research

www.ninds.nih.gov/funding/areas/office_of_minority_health_and_research/index.htm

- To assist in the overall development of state-of-the-art neuroscience research programs at minority-serving institutions.
- To foster innovative and effective partnerships and collaboration between minority-serving institutions and established neuroscience laboratories at Federal and non-Federal research institutions.
- To provide support to develop and sustain competitively funded neuroscience research projects and programs at minority-serving institutions.
- To create, support, and maintain a stimulating academic and intellectual milieu to inspire and prepare diverse students and fellows to pursue research careers in neuroscience. To enhance the diversity of the biomedical research workforce through supporting individuals from underrepresented ethnic/racial minority groups or disadvantaged backgrounds, individuals with disabilities, and individuals re-entering the research workforce.
- To aid the Institute in achieving its goals of decreasing health disparities in neurological disorders.

Technology Development

http://www.ninds.nih.gov/funding/areas/technology_development/index.htm

Anticonvulsant Screening Program: http://www.ninds.nih.gov/funding/research/asp/index.htm

NINDS High Throughput Drug Screening Service Facility for Neurodegeneration at Southern Research Institute: http://www.ninds.nih.gov/funding/areas/technology_development/HTS_Facility.htm

Counterterrorism Research: http://www.ninds.nih.gov/funding/research/counterterrorism/index.htm

- To advance understanding of the basic molecular and cellular mechanisms of nervous system function through the development and use of new technologies, such as gene microarrays and other genetic tools, proteomics, electrode arrays, imaging, and informatics.
- To facilitate the discovery and development of new therapeutic interventions for neurological disorders through the use of molecular libraries, screening assays, and gene transfer.
- To develop new molecular, cellular, and animal models of neurological function and disease.
- To facilitate testing of chemical compounds as mechanistic tools and as therapeutic candidates with high-throughput screening and in vivo testing for efficacy and toxicity.
- To facilitate advances in neuroscience research through sharing and distribution of data and resources.
- To promote the development of novel and powerful computational tools and theoretical neuroscience approaches for the analysis, interpretation, and modeling of complex neural data within and across all levels of organization.
- To develop new and improved medical countermeasures against chemical threat agents.

Office of Training and Career Development

http://www.ninds.nih.gov/funding/areas/training_and_career_development/index.htm

The Training Office provides support for the research training and career development of outstanding young investigators during the predoctoral, postdoctoral, and early faculty phases of their careers. Future discoveries that will lead to a reduction in the burden of neurological disorders will require an outstanding cadre of scientists in basic, clinical, and translational research. Thus, support for training in all of these realms is a high priority at NINDS.

Office of International Activities

http://www.ninds.nih.gov/funding/areas/office_of_international_activities/index.htm

- To identify significant global health issues as they relate to neurological disorders and stroke.
- To develop creative approaches that promote international research in the neurosciences.
- To stimulate international activities with other NIH Institutes and Centers, other domestic and foreign government agencies, and non-governmental organizations.
- To encourage international neuroscience collaborations, training, and capacity building through grants, short-term travel supplements, and international conferences.
- To coordinate bilateral and multilateral activities under agreements between the U.S. and other countries.

Division of Intramural Research

A full description of the NINDS Division of Intramural Research can be found at http://intra.ninds.nih.gov.

Additional information on NIH neuroscience programs, including programs sponsored by the NINDS, is available at http://neuroscience.nih.gov.

NIH Almanac: Organization

National Institute of Nursing Research

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The mission of the National Institute of Nursing Research (NINR) is to promote and improve the health of individuals, families, communities, and populations. NINR supports and conducts clinical and basic research and research training on health and illness across the lifespan. The research focus encompasses health promotion and disease prevention, quality of life, health disparities, and end-of-life. NINR seeks to extend nursing science by integrating the biological and behavioral sciences, employing new technologies to research questions, improving research methods, and developing the scientists of the future.

NINR accomplishes its mission through research on preventing, delaying the onset, and slowing the progression of disease and disability. This includes finding effective approaches to achieving and sustaining a healthy lifestyle, easing the symptoms of illness, improving quality of life for patients and caregivers, eliminating health disparities, and addressing issues at the end of life.

NINR supports basic research relevant to its mission, in order to provide a sound scientific basis for changes in clinical practice. In keeping with the importance of nursing practice in various settings, NINR's major emphasis is on clinical research.

NINR programs are conducted primarily through grants to investigators across the country. On the NIH campus, the NINR Intramural Research Program focuses on health promotion and symptom management and also provides research training opportunities.

NINR fosters collaborations with many other disciplines in areas of mutual interest such as long-term care for older people, the special needs of women across the lifespan, genetic testing and counseling, biobehavioral aspects of the prevention and treatment of infectious diseases, and the impact of environmental influences on risk factors for chronic illnesses.

The NINR Strategic Plan: An Overview

Developed with the input of scientists, clinicians, experts in health care and public policy and other stakeholders, and members of the public, the NINR Strategic Plan for 2006-2010 provides a blueprint for continuing to elevate the contributions of nursing research within the health care sciences.

Nursing science offers a rich mix of topic areas for research that can be viewed in the context of diseases and disorders, phases of the lifespan, and population groups. To address current health care needs of the nation, the Strategic Plan lists 4 key, cross-cutting areas of research emphasis:

- promoting health and preventing disease;
- improving quality of life through self-management, symptom management, and caregiving;
- eliminating health disparities; and
- taking the lead in end-of-life research.

The Plan also outlines 4 objectives to advance science:

- integrating biological and behavioral science;
- adopting, adapting, and generating new technologies;
- improving methods for future scientific discoveries; and
- developing scientists for today and tomorrow.

Central to the themes of nursing research and practice are the important roles of the patient, the family, other caregivers, and the community in promoting health and managing disease. The Strategic Plan is available for downloading from our website: http://www.ninr.nih.gov/.

Important Events in NINR History

November 10, 1985—Public Law 99-158, the Health Research Extension Act of 1985, became law, overriding a presidential veto. Among other provisions, the law authorized the National Center for Nursing Research (NCNR) at NIH.

April 18, 1986—The U.S. Department of Health and Human Services (HHS) Secretary announced the establishment of NCNR at NIH.

December 3, 1986—Members of the NCNR Advisory Council were appointed by the HHS Secretary.

February 17, 1987—The first meeting of the NCNR Advisory Council was held.

May 30, 1988—The NCNR Advisory Council was renamed the National Advisory Council for Nursing Research.

June 10, 1993—P.L. 103-43, the NIH Revitalization Act of 1993, became law. Among other provisions, it elevated NCNR to full status as an NIH Institute.

June 14, 1993—The HHS Secretary signed the Federal Register notice establishing the National Institute of Nursing Research (NINR).

1997—The NIH Director designated NINR as the lead NIH institute to coordinate collaborative research on end-of-life palliative care.

Summer 2000—NINR holds its first Summer Genetics Institute.

2003—NINR Director Dr. Patricia A. Grady named co-chair of the Interdisciplinary Research component of the NIH Roadmap for Medical Research.

2004—NINR Director Dr. Grady named co-chair of NIH Public Trust Initiative.

December 2004—NINR co-sponsored the NIH State of the Science conference, *Improving End-of-Life Care*, bringing together almost 1,000 health care practitioners from around the world.

2006—NINR celebrates its 20th anniversary at NIH. View Image.

NINR Legislative Chronology

November 10, 1985—P.L. 99-158, the Health and Research Extension Act of 1985, became law. Its provisions included the establishment of NCNR to support research and research training related to patient care.

1986—A series of continuing resolutions (P.L. 99-500, P.L. 99-599) established NCNR as a separate NIH appropriation.

June 10, 1993—NCNR was redesignated as an NIH institute under a provision in P.L. 103-43, the NIH Revitalization Act of 1993.

Biographical Sketch of NINR Director Patricia A. Grady, Ph.D., R.N.

Dr. Patricia A. Grady was appointed Director, NINR, on April 3, 1995. She earned her undergraduate degree in nursing from Georgetown University in Washington, DC. She pursued her graduate education at the University of Maryland, receiving a master's degree from the School of Nursing and a doctorate in physiology from the School of Medicine.

An internationally recognized researcher, Dr. Grady's scientific focus has primarily been in stroke, with emphasis on arterial stenosis and cerebral ischemia. She was elected to the Institute of Medicine in 1999 and is a member of several scientific organizations, including the Society for Neuroscience, the American Academy of Nursing, and the American Neurological Association. She is also a fellow of the American Heart Association Stroke Council.

In 1988, Dr. Grady joined NIH as an extramural research program administrator in the National Institute of Neurological Disorders and Stroke (NINDS) in the areas of stroke and brain imaging. Two years later, she served on the NIH Task Force for Medical Rehabilitation Research, which established the first long-range research agenda for the field of medical rehabilitation research. In 1992, she assumed the responsibilities of NINDS Assistant Director. From 1993 to 1995, she was Deputy Director and Acting Director of NINDS. Dr. Grady served as a charter member of the NIH Warren Grant Magnuson Clinical Center Board of Governors.

Before coming to NIH, Dr. Grady held several academic positions and served concurrently on the faculties of the University of Maryland School of Nursing and School of Medicine.

Dr. Grady has authored or co-authored numerous articles and papers on hypertension, cerebrovascular permeability, vascular stress, and cerebral edema. She is an editorial board member of the major stroke journals. Dr. Grady lectures and speaks on a wide range of topics, including future directions in nursing research, developments in the neurological sciences, and Federal research opportunities.

Dr. Grady has been recognized with several prestigious honors and awards for her leadership and scientific accomplishments, including the first award of the Centennial Achievement Medal from Georgetown University School of Nursing and Health Sciences, being named the inaugural Rozella M. Schlotfeld distinguished lecturer at the Frances Payne Bolton School of Nursing at Case Western Reserve University, and receiving the honorary degree of Doctor of Public Service from the University of Maryland. Dr. Grady was named the Excellence in Nursing Lecturer by the Council on Cardiovascular Nurses of the American Heart Association. In 2005, Dr. Grady received Doctor of Science, Honoris Causa degrees from the Medical University of South Carolina and Thomas Jefferson University, and Columbia University School of Nursing honored her with its prestigious Second Century Award for Excellence in Health Care.

Dr. Grady is a past recipient of the NIH Merit Award and received the Public Health Service Superior Service Award for her exceptional leadership.

NINR Directors

Name	In Office from	To
Doris H. Merritt (Acting)	April 18, 1986	June 1987
Ada Sue Hinshaw	June 6, 1987	June 30, 1994
Suzanne S. Hurd (Acting)	July 1, 1994	April 2, 1995
Patricia A. Grady	April 3, 1995	Present

Major Programs

Office of Extramural Programs

The Office of Extramural Programs manages the funding activities of NINR that occur outside of NIH, in research institutions across the country and internationally. A major program priority is the integration of biological and behavioral research. Three dimensions—promoting health and preventing disease, managing the symptoms and disability of illness, and improving the environments in which care is delivered—cut across the 7 broad science areas:

- Cardiopulmonary and Critical Care Science
- Chronic Conditions and Infectious Diseases
- End-of-Life and Long-Term Care
- Health Behavior and Minority Health
- HIV/AIDS and Oncology
- Neuroscience
- Reproductive, Child, and Family Health

A full description of the NINR extramural activities is available on our website at: http://www.ninr.nih.gov/ResearchAndFunding/DEA/OEP/.

Research Training and Career Development

NINR supports National Research Service Awards (NRSAs) for pre- and postdoctoral training through individual awards and institutional grants, as well as senior fellowships for experienced investigators. This support ensures that there will be an adequate pool of well-trained nurse scientists to meet future research needs.

For career development, NINR offers the Mentored Research Scientist Development Award—Nursing (K01) mechanism. This award is available to doctorally prepared students who pursue a mentored research experience with an expert sponsor to gain expertise in an area new to the candidate or to demonstrably enhance the candidate's scientific career.

In addition, the NINR Career Transition Award (K22) provides up to 3 years of support for research training in an NINR or NIH intramural laboratory, followed by 2 years of support for an independent program of research in an extramural institution. It is anticipated that awardees will subsequently obtain a research project grant to support the continuation of their work.

In addition, NINR participates in the NIH Pathway to Independence (PI) Award. This award offers another excellent opportunity for young investigators. It uses the combination K99/R00 funding mechanism, and is designed to facilitate receiving an R01 award earlier in an investigator's research career. Like the K22, the PI Award provides up to 5 years of support consisting of 2 phases: 1-2 years of mentored support for highly promising, postdoctoral research scientists,

followed by up to 3 years of independent support contingent on securing an independent research position. Award recipients will be expected to compete successfully for independent R01 support from NIH during the career transition award period.

NINR also funds minority research career awards that offer mentored research experiences. Under this training mechanism, minority investigators have addressed such issues as serious developmental problems in Mexican migrant infants; culturally appropriate community-level youth suicide prevention programs for American Indian rural youth; improvement of awareness of prostate cancer screening among African American men; and ways to identify triggers or markers for increased risk for sudden death in Asian heart failure patients.

For investigators and institutions with relatively new programs of research, NINR supports Nursing Science Centers focused on building research teams for the future. These Centers support the initial enhancement of research capacity at institutions with emerging research programs using the P20 grant mechanism. For investigators and institutions with several years of demonstrated research success, NINR supports Nursing Centers of Excellence. These Centers consist of several medium-sized developmental or foundational research projects organized around shared resources and research infrastructure using the P30 grant mechanism. In 2007, NINR introduced the Program Project (P01) Grants, for investigators and institutions with proven and long-established research programs. These grants will serve as platforms for conducting innovative, high-impact research on topics of critical importance, supporting shared resources and collaborative effort for several large research projects. The initial P01 Grants will focus on collaborative research into chronic illness by supporting the development of:

- interventions to improve the quality of life, promote health, and prevent disease in persons living with chronic illness,
- interventions to improve the health and quality of life of informal caregivers,
- relevant research methodology and shared resources.

In addition, NINR has developed a CD-ROM program titled "Discover Nursing Research." This program describes nursing research through interviews with current nurse scientists and doctoral students, as a way to improve the understanding of nursing research and recruit nurses into research careers.

Intramural Research Program

NINR continues to build its campus-based Intramural Research Program (IRP) to help the scientific community take full advantage of the resources, infrastructure, and mentoring opportunities available at NIH. The IRP seeks to understand the underlying biological mechanisms of a range of symptoms, their effect on patients, and how patients respond to interventions. It comprises 2 major activities: the Symptoms Management Branch and Research Training. Recent scientific efforts in the Symptoms Management Branch have included evaluating the efficacy of novel interventions for managing symptoms associated with cancer treatment and exploring the molecular and genetic mechanisms that influence an individual's response to analgesic treatment for acute pain. NINR laboratories leverage the benefits of the highly collaborative research environment of the NIH intramural research community, wherein fruitful scientific partnerships can be readily established.

Under IRP Research Training activities, training is provided through several mechanisms, including the novel Career Transition Award. This award affords a unique career development opportunity by providing research fellows with both intramural and extramural training toward the goal of achieving status as an independent investigator. The IRP also supports the Graduate Partnerships Program, which supports the pre-doctoral training of future scientists through university partnerships. As part of this program, students from U.S. or international universities conduct part, or all, of their dissertation research activities within the IRP.

Additionally, the IRP conducts the NINR Summer Genetics Institute (SGI), which provides a foundation in molecular genetics for use in research and clinical practice, and is open to graduate nursing students, faculty, and advanced practice nurses. SGI participants complete 2 months of classroom instruction, laboratory time, and research training in genetic concepts and techniques. They also attend a seminar series to focus on a wide range of ethical, social, legal, and public policy issues. As of 2007, a total of 139 students have graduated, and they have published more than 100 peer-reviewed articles. This program is approved for 12 hours of graduate credit in nursing at the doctoral level.

An online Research Training Workshop targets doctorally prepared nurses and provides them with knowledge and skill development for submitting competitive grant applications for research funding.

Leadership in End-of-Life Research

In recent years, many factors have converged to increase public and professional interest in issues surrounding the end of life.

The 1997 report from the Institute of Medicine, *Approaching Death: Improving Care at the End of Life*, found widespread dissatisfaction with end-of-life care and many gaps in our scientific knowledge of this phase of life. In response, NINR sponsored a workshop on the symptoms of terminal illness. Later that year, the NIH Director designated NINR as the lead Institute within NIH for end-of-life research. NINR studies on the management of pain and other symptoms, family decision-making, caregiving, advance planning, and maintaining the health and function of the elderly and the critically ill provided an important base of knowledge on which to build. NINR has sponsored several community events to get input on concerns related to end-of-life issues.

In December 2004, NINR co-sponsored the NIH State of the Science conference, *Improving End-of-Life Care*, bringing together almost 1,000 health care practitioners from around the world. This conference served to evaluate the current state of the science in end-of-life care and to determine future directions for research. It also highlighted the interactions among patients, caregivers, and the health system, and their effects on outcomes. The consensus statement from this conference is available at: http://consensus.nih.gov/2004/2004EndOfLifeCareSOS024main.htm.

NINR also helps to lead the HHS End of Life Scientific Interest Group (EOL SIG). The purpose of this Interest Group is:

1. To provide a means for HHS agencies interested in end-of-life research to coordinate planning activities,
2. To provide a means for communicating these HHS activities to the broader community interested in end-of-life research.

The link to the EOL SIG website is available from the NIH website at: http://www.nih.gov/sigs/.

NINR and trans-NIH Initiatives

NINR plays an active role in several trans-NIH initiatives, including:

- The NIH Roadmap for Medical Research
- The NIH Public Trust Initiative
- The NIH Pain Consortium
- The NIH Neuroscience Blueprint

The NIH Roadmap is based on the idea that bringing new disciplines together holds the best promise of opening up new and currently unimagined scientific avenues of inquiry. Under the Roadmap theme of Research Teams for the Future, NINR Director Dr. Grady co-chairs the Interdisciplinary Research Working Group. The goal of this initiative is to lower institutional barriers that impede research progress and to challenge individual disciplines to work together to provide new ways of solving complex problems in the biomedical sciences. Nursing science's experience and expertise in collaborative research will be a benefit to all of NIH as this initiative continues to move forward. NINR also participates in the Clinical Research Training initiatives, toward the goal of training a highly skilled workforce of investigators who have strong backgrounds in multidisciplinary clinical research.

Dr. Grady serves as the co-chair of the NIH Public Trust Initiative. The goal of the initiative is to improve the public's health

by promoting trust in biomedical and behavioral research. In national polls, the public consistently ranks nurses among the most trusted professionals, so this is a good fit for NINR. One national survey by Research!America found that almost 60% of respondents think that taxpayers pay for most of the medical research done in this country. However, less than 5% could name NIH as the primary agency of taxpayer-funded medical research, and over 80% did not know which agency manages these funds. This indicates that many people are not aware of the function of NIH or its 27 individual Institutes and Centers. NIH cannot control public perceptions about research, but it can improve its communication and interaction with the public by translating research knowledge into practice and disseminating findings through the Internet and other vehicles, as a way for the public to learn and care about the work of NINR and NIH.

NINR is a key member of the NIH Pain Consortium, which Dr. Grady co-chairs. The consortium promotes collaboration among the many NIH Institutes and Centers that conduct or fund pain research. NINR is also a member of the NIH Neuroscience Blueprint, which is designed to develop resources (i.e., people, tools, methods, knowledge bases) for the advancement of research in neuroscience. NINR involvement in these areas opens further avenues of research to NINR-supported investigators.

For more information about nursing research and NINR, please visit the new NINR website at: http://www.ninr.nih.gov/.

NIH Almanac: Organization

National Library of Medicine

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Library of Medicine (NLM), the world's largest research library of the health sciences, serves scientists, health professionals, and the public.

The Library has a statutory mandate from Congress to apply its resources broadly to the advancement of medical and health-related sciences. It collects, organizes, and makes available biomedical information to investigators, educators, practitioners, and the public and carries out programs designed to strengthen existing and develop new medical library services in the United States. It conducts research in health communications, supports medical informatics, and provides information services and sophisticated tools in the areas of molecular biology and toxicology/environmental health. The Library creates Web-based services for the general public containing information from the NIH and other reliable sources.

Important Events in NLM History

1836—The Library of the Office of the Surgeon General of the Army was established (the present NLM).

1865—John Shaw Billings, M.D., was assigned to supervise the Surgeon General's Library, which he developed into a national resource of biomedical literature.

1879—The first volume of *Index Medicus* was published.

January 1922—The Library of the Office of the Surgeon General (Army) was renamed Army Medical Library.

April 1952—The Army Medical Library was renamed the Armed Forces Medical Library.

October 1, 1956—The Armed Forces Medical Library was designated the National Library of Medicine and placed under PHS.

December 1961—The new building at 8600 Rockville Pike was dedicated.

January 1964—The Medical Literature Analysis and Retrieval System (MEDLARS) became operational at NLM.

October 22, 1965—The Medical Library Assistance Act gave NLM the responsibility of helping the Nation's medical libraries through a grant program and created a Regional Medical Library Network.

January 1, 1967—A Toxicology Information Program was established at NLM in response to recommendations of the President's science advisory committee.

1968—NLM became a component of NIH. The Lister Hill National Center for Biomedical Communications, NLM's R&D component, was created by Congress.

October 1971—MEDLINE (MEDLARS Online) was initiated to provide online access to a major portion of the MEDLARS database.

May 22, 1980—NLM's Lister Hill National Center for Biomedical Communications building was dedicated. The new building, adjacent to the Library, houses NLM's research and development components, as well as its toxicology and biotechnology programs.

February 5, 1986—Grateful Med, a PC-based user-friendly software for accessing MEDLARS, was introduced to the health community.

October 1993—NLM's Internet WWW site appeared (www.nlm.nih.gov).

November 25, 1994—The "Visible Human Male," a large computer dataset of images based on a cadaver, was introduced. The "Visible Human Female" appeared 1 year later.

June 26, 1997—All web-based access to NLM's MEDLINE was made free.

October 1998—MedlinePlus created to provide access to consumer health information.

December 2004—The last issue of *Index Medicus* is published.

NLM Legislative Chronology

August 3, 1956—An amendment to Title III of the PHS act, the National Library of Medicine Act, placed the Armed Forces Medical Library under the PHS, and renamed it the National Library of Medicine (P.L. 84-941).

October 22, 1965—The Medical Library Assistance Act of 1965 (P.L. 89-291) was signed into law, authorizing NLM's extramural programs of grant assistance to help expand and improve the Nation's medical library and health communications resources, technology, and manpower for service to the health community.

August 3, 1968—Public Law 90-456 authorized the designation of the Lister Hill National Center for Biomedical Communications.

November 4, 1988—Public Law 100-607 authorized the establishment of a National Center for Biotechnology Information at the NLM.

June 10, 1993—Public Law 103-43 authorized the establishment of the National Information Center on Health Services Research and Health Care Technology at NLM.

Biographical Sketch of NLM Director Donald A.B. Lindberg, M.D.

Dr. Lindberg assumed the directorship of NLM in August 1984. He received his A.B. degree (magna cum laude) from Amherst College and his M.D. degree from the College of Physicians and Surgeons of Columbia University. He received his

specialty training in anatomic and clinical pathology at Columbia-Presbyterian Medical Center in New York. He also holds honorary degrees from Amherst College, State University of New York Health Science Center (Syracuse), and the University for Health Sciences, Medical Informatics and Technology (Innsbruck, Austria).

Following early research in experimental pathology, he later began a long-term investigation of the use of computers in medicine, founding in 1963 one of the Nation's first medical computer centers at the University of Missouri in Columbia. Prior to joining the Library, Dr. Lindberg was director of the Information Science Group at Missouri and he taught pathology there from 1962 until his present appointment. He also served as chairman of the department of information science at the university's School of Library and Information Science.

Dr. Lindberg has published extensively in the fields of pathology and medical information. He is the author of two books—*The Computer and Medical Care* (1968) and *The Growth of Medical Information Systems in the United States*.

From 1992 to 1995 he served in the concurrent position of director of the National Coordination Office for High Performance Computing and Communications, Executive Office of the President. In 1996 he was appointed by the HHS Secretary as the U.S. national coordinator for global health care applications (G-7).

Directors of NLM

Name	In Office from	To
Frank B. Rogers	1956	1963
Martin M. Cummings	1964	August 1984
Donald A.B. Lindberg	August 1984	Present

Major Programs

MEDLARS

The Library's computer-based MEDLARS was established in January 1964 to achieve rapid access to NLM's vast store of biomedical information. Today this is accomplished through the web: provision of online search services through MEDLINE/PubMed, NLM Gateway, MedlinePlus, and other databases and services.

Web-based Services

MEDLINE was put on the Web free using the PubMed system in 1997. Heavy use by the public led to the development in 1998 of an extensive consumer health information service called MedlinePlus. Databases of gene sequence and other molecular information, clinical trials information, and toxicology and environmental health, are also on the Web. The NLM Web site is at www.nlm.nih.gov.

National Network of Libraries of Medicine

To provide more efficient dissemination of biomedical information, NLM has developed a network arrangement through which interlibrary loan and other information services can be shared efficiently by medical libraries. The National Network of Libraries of Medicine (NNLM) consists of eight Regional Medical Libraries and more than 5,000 hospital and other medical libraries. Although NLM remains the heart of the network, more and more services are being provided directly through the network. The NNLM toll-free number is 1-800-338-7657.

Lister Hill National Center for Biomedical Communications

The center explores the use of computer, communication, and audiovisual technologies to improve the organization, dissemination, and utilization of biomedical information, and is the focus of the Library's high performance computing and communications initiatives.

Toxicology and Environmental Health Information Program

The general objectives of the program are to create computer-based toxicology and environmental health data banks from scientific literature and from files of collaborating industrial, academic, and governmental agencies, and to establish toxicology information services for scientists and the public.

National Center for Biotechnology Information

The NCBI, created in 1988, builds databases and information analysis/retrieval systems for genomic information and does research into advanced information-handling methods for biotechnology and related information.

National Information Center on Health Services Research and Health Care Technology

The goal of this program is to create information services that make the results of health services research readily available —including clinical guidelines, technology assessments, and health care technology.

Extramural Programs

The extramural grant and contract programs of NLM were originally authorized by the Medical Library Assistance Act of 1965 (P.L. 89-291) to provide better health information services through grant support to the Nation's medical libraries. The act, since extended by Congress, offers assistance for library resources, research in biomedical communications, biomedical publications, and training for research careers in medical informatics. Research project grants in medical informatics are awarded under authority of title III, part A, sec. 301, of the PHS act.

NIH Almanac: Organization

Center for Information Technology

Mission | Important Events | Director | Programs

Mission

The Center for Information Technology's (CIT) mission is to provide, coordinate, and manage information technology and to advance computational science.

CIT supports NIH's research and management programs with efficient, cost-effective administrative and high-powered scientific computing, software development, networking, and telecommunications services. CIT also provides bioinformatics support through its scientists, engineers, and mathematicians. Among its activities, the CIT:

- engages in collaborative research and provides collaborative support to NIH investigators in the area of computational bioscience
- provides efficient, cost-effective information systems and networking services
- provides state-of-the-art scientific and administrative computing facilities
- identifies new computing technologies with innovative applications to biomedical research
- creates, purchases, and distributes software applications
- provides NIH staff with computing information, expertise, and training
- provides data-processing and high-performance computing facilities, integrated telecommunications data networks, and services to the U.S. Department of Health and Human Service (HHS) and other Federal agencies
- serves as a data center to HHS and other Federal agencies
- develops, administers, and manages NIH systems and provides consulting services to NIH Institutes and Centers in support of administrative and business applications

Important Events in CIT History

1954—A central data-processing facility is established in the NIH Office of the Director under Dr. Harold Dorn, combining EAM (punched card) equipment and biometric expertise.

1956—The biometric facility becomes the Biometrics Branch in the new Division of Research Services (DRS).

May 1956—The NIH Director establishes a committee on electronic data processing and computers.

1958—NIH installs its first electronic digital computer as an experimental device.

March 1960—The U.S. Surgeon General approves the establishment of a Computation and Data Processing Branch in DRS.

October 1961—NIH installs its first "second generation" computer.

April 1963—The NIH Director appoints a steering committee to undertake a comprehensive study of data-processing activities at NIH.

The NIH steering committee recommends the establishment of a Division of Computer and Information Sciences, subsequently changed to the Division of Computer Research and Technology (DCRT), including provision for the transfer of the Computation and Data Processing Branch, DRS, to the new organization.

1964—DCRT is established, with James King as Interim Acting Director.

1966—Dr. Arnold W. Pratt is named DCRT's first Director.

April 1966—Components of the "third-generation" computer system are installed.

April 1969—NIH research community receives the first time-sharing computers.

June 1969—Minicomputers designed by DCRT are installed in NIH laboratories.

May 1979—An interagency agreement between the U.S. Department of Health, Education and Welfare and the General Services Administration establishes the NIH Central Computer Utility as a Federal Data Processing Center.

April 1983—The Personal Workstation Project is founded to determine how effectively NIH personnel can use personal computers.

1988—The Convex Unix-based supermini-computer is installed, and the network task group is created.

1990—Extensive networking (NIHnet) is installed at NIH, providing connectivity for 60 local area networks.

March 1992—HHS Secretary Lewis Sullivan, in a letter to Congress, commits to creating a new office to improve management and coordination of NIH's information resources.

June 1992—The NIH Director approves creation of the Office of Information Resources Management (OIRM) in the NIH Office of the Director.

Dr. Francis W. Hartel is selected as the NIH Senior IRM official and the Director of OIRM.

September 1993—The Information Systems Security Officers committee is established to handle NIH IT security issues.

January 1994—DCRT celebrates its 30th anniversary.

February 1994—The NIH Help Desk is inaugurated to help NIH customers obtain computer-related information.

October 1994—OIRM sponsors the first NIH Internet conference on legal and policy issues related to the increased use of Internet resources.

May 1995—DCRT sponsors Internet Expo Day to help NIH staff discover the World Wide Web and its enormous potential to disseminate and exchange information.

June 1995—The NIH Director approves a revised charter for the IRM Council and increases its role in providing

management leadership on NIH-wide information technology (IT) initiatives.

July 1995—OIRM, the National Science Foundation, and the World Wide Web Federal Consortium sponsor a Federal Webmaster workshop on legal, ethical, and security issues related to increased Web use by Federal agencies.

August 1995—The first NIH electronic store is established to provide efficient acquisition of personal computers, hardware, software, and online components to NIH personnel.

1996—A telecommunications committee is established to provide the IRM Council with advice about crosscutting telecommunication issues affecting a large number of NIH staff. Issues include telephone features and services, pagers, cellular services, video teleconferencing, remote access, audio conferencing, and switchboard operator services.

Responsibilities are shared by DCRT and the Telecommunications Branch located in NIH's Office of Research Services.

DCRT introduces a subscription-based program for the acquisition and distribution of brand-name software to NIH and HHS personnel, with the result of significant cost reduction for software licensing.

The NIH Director names Anthony Itteilag, the NIH Deputy Director for Management, to serve as interim NIH CIO.

Dona R. Lenkin is appointed to serve as OIRM Acting Director and alternate NIH CIO.

May 1996—The IRM Council establishes the NIH Year 2000 Work Group (Y2K) to provide NIH with leadership and direction on initiatives modifying computer systems and applications to accommodate problems related to a 2-digit date field.

June 1996—NIH's Computer Center is designated as a major HHS data center.

July 1996—The NIH Data Warehouse, which provides a one-stop-shop graphical user interface to NIH administrative and accounting information, is introduced to NIH.

August 1996—The Information Technology Management Reform Act of 1996 (ITMRA, also known as the Clinger-Cohen Act) becomes effective. ITMRA assigns overall responsibility for the acquisition and management of government IT resources to the Director, Office of Management and Budget. Additionally, ITMRA gives authority to heads of executive agencies to acquire IT resources and directs agencies to appoint a Chief Information Officer (CIO) to provide advice to each agency on the effective management of IT investments.

September 1996—The NIH Director's leadership forum on the management of IT at NIH forms an IT Central Committee (ITCC) to provide recommendations on improving the management of NIH IT resources.

December 1996—A final ITCC report is submitted to the NIH Director. The report recommends appointing a CIO and combining DCRT, OIRM, and the Telecommunications Branch into a single organizational structure.

1997—A review of NIH's administrative structure, conducted in response to a request from Congressman John Porter (Ill.), is completed. The report recommends that the NIH implement the ITCC recommendations by appointing a permanent CIO and establishing a CIO organization.

NIH's first electronic magazine, *LiveWire*, is launched by DCRT. The online magazine offers easy access to key services and computer information.

July 1997—DCRT introduces the NIH Human Resources Information and Benefits System, a Web service that gives employees easy access to personnel data, including benefits, salary, awards, leave, savings, performance, and retirement.

September 1997—DCRT completes consolidation of 2 HHS data centers—the Program Support Center Information Technology Service and the Administration for Children and Families National Computer Center—into the NIH Computer Center.

October 1997—Vice President Albert Gore awards OIRM staff the National Performance Review "Hammer" Award for the development of an automated security risk assessment tool for networks.

November 1997—DCRT inaugurates SILK (Secure Internet-Linked) technology to provide Web access to enterprise data.

February 1998—The Center for Information Technology (CIT) is formed, combining the functions of the DCRT, OIRM, and the Telecommunications Branch.

March 1998—Alan S. Graeff is named NIH's first CIO and Director of the newly formed CIT.

April 1998—CIT's OIRM sponsors an IT security conference to provide IT security officers and others with essential information for moving toward the 21st century.

CIT renames its original acquisition and distribution project to the Software Distribution Project (SDP). The SDP provides software to more than 24,000 customers, including more than 80% of all NIH personnel.

October 1998—The NIH IT Board of Governors is established to advise the NIH and the NIH CIO on NIH-wide IT management and to make recommendations on IT activities and priorities.

January 1999—CIT completes development of the predecessor to the TELESYNERGY(TM) Medical Consultation WorkStation, a multimedia, medical imaging workstation. This system provides an electronic imaging environment, utilizing a prototype Asynchronous Transfer Mode (ATM) telemedicine network. The TELESYNERGY environment includes a scientific workstation as the computing platform that transmits simultaneous high-resolution images to all sites participating in a medical consultation.

May 1999—The Information Technology Management Committee (ITMC) is formed to develop and communicate recommendations and decisions at the NIH Institute and Center level, provide a forum for building consensus across the NIH, and serve as an umbrella organization to the NIH IT process management and technical committees.

December 1999—NIH successfully prepares for the Year 2000, thus bringing to fruition 4 years of effort preparing for the largest information management project in history. The NIH strategy of aggressive renovation and validation of information systems, biomedical equipment, facilities, utilities, and telecommunications provides a smooth transition that ensures the integrity of the NIH mission.

2000—CIT renames the Software Distribution Project (SDP) to the Information Systems Designated Procurement (iSDP) to acquire and deliver brand-name software, hardware, and services to NIH and HHS personnel. The iSDP takes advantage of large-volume purchasing agreements to provide significantly discounted prices to its customers. The iSDP also saves its participants time and money by eliminating the need to search for the best information systems deals. iSDP provides major software titles, hardware, and services to more than 54,000 customers, including 84% of HHS personnel and all of NIH.

January 2000—CIT joins forces with the National Cancer Institute (NCI) in a pioneering TELESYNERGY collaboration to reach out to distant community hospitals. Patients in remote areas are now able to participate in selected NCI phase I and

phase II protocols. Collaborating sites, with TELESYNERGY Systems either installed or under construction, include hospitals in Fort Lauderdale, Florida; Wheeling, West Virginia; Belfast, Northern Ireland, United Kingdom; and Dublin, the Republic of Ireland

2001—The NIH Incident Response Team is the first civilian Federal agency to receive the prestigious Office of Personnel Management Guardian Award for exceptional contributions in ensuring the confidentiality, availability, and integrity of NIH information resources.

2002—Dr. John F. (Jack) Jones, Jr., joins CIT as Chief IT Architect for NIH, to focus on NIH enterprise systems critical to the mission of NIH and lead Enterprise Architecture.

CIT takes a leadership role in forging NIH's strategy for common services, including hosting the improved and expanded NIH Portal.

CIT supports the development and staged implementation of the NIH Portal as a single, user-friendly customizable Web interface by which data and documents can be readily accessed by NIH staff and associated personnel.

CIT successfully implements the NIH Administrative Restructuring Advisory Committee (ARAC) recommendations for IT Consolidation (Phase I).

2003—The NIH Information Technology Working Group (ITWG), established by the NIH Director as part of the NIH Steering Committee, provides governance and oversight on NIH IT management issues. As an advisory group to the NIH Director, NIH Steering Committee, and NIH CIO on IT management, the ITWG establishes governance over the 5 IT Domain Areas below, representing the areas where decisions need to be made at the intersection of business and information technology.

- IT Principles Domain—includes alignment of IT to the NIH mission, corporate policies, and oversight of the use of IT, and determination of ownership of IT initiatives
- IT Infrastructure Strategies Domain—includes the IT “public utility” and secure, robust, and manageable common services
- IT Architecture Domain—includes data standards and application standards
- Business Application Needs Domain—includes all enterprise, non-scientific administrative, grants/extramural, and Intramural IT systems
- IT Investment and Prioritization Domain—includes funding mechanisms and priorities

2004—CIT successfully implements the NIH ARAC recommendations for IT Consolidation Phase II; CIT continues to implement and oversee NIH enterprise-wide applications like:

- Integrated Time and Attendance System (ITAS)
- NIH Enterprise Common Services (NECS), including NIH Login and NIH Portal
- NIH Intramural Data Base (NIDB)
- Contractor Performance System (CPS)
- Vulnerability Tracking System (VTS)
- Human Resources Data Base (HRDB)

2005—Dr. Jones assembles domain teams from across NIH to examine the technology and standards needs of areas that are about to undergo significant consolidation, such as e-mail systems and wireless networks.

2006—Al Whitley is named Deputy Director of CIT.

CIT becomes the technical owner of the NIH Enterprise Ethics System (NEES), the comprehensive automation of the NIH

Ethics Program. NEES provides the means to submit, review, track, and report on all ethics-related reports and requests along with supporting documentation. Because of the size and complexity of the overall system, the product is delivered in phases. The first release of NEES is implemented in FY 2006 and focuses on the Public Financial Disclosure Report, referred to as the SF-278.

2007—CIT implements NIH NEES Release 1.5, which enables all remaining functions required for the review and certification of the SF-278 Public Financial Disclosure Report.

CIT designs a new system for the helix.nih.gov general purpose scientific platform that hosts applications in response to technology needs of the NIH research community. This includes introducing 1024 new processors for the Biowulf cluster and completing plans to upgrade the Helix shared memory system. 48 additional nodes are integrated into the Infiniband network of the Biowulf cluster, thus reducing queue times for the most demanding parallel molecular dynamics applications. In addition, new hardware to replace helix.nih.gov is delivered and applications are installed, configured, and tested.

The NIH Intramural Database (NIDB) collects, stores, and reports data from the NIH Intramural Research Program, permitting its oversight, administration of research policies, and responsiveness to inquiries from NIH management and outside sources, such as Congress. In FY 2007 there are over 50,000 search requests, and almost 200,000 individual report requests are made. Functionality is added to NIDB to meet Research, Condition, and Disease Categorization (RCDC) project and Trans-NIH requirements to FY2007 NIH bibliography. Refinements to NIDB are added to increase capture of PubMed references. Functionality is added to Webservices (NCBI) to deal with permissions for the dbGAP database.

NIDB meets all reporting requirements for NIH, supporting and exceeding expectations by enabling a new reporting feature for researchers to split reports, thus giving more granularity and accuracy in RCDC coding. This heavily used new feature results in requests for 724 new reports¾a 169% increase in new report requests in 2007, resulting in a 17% increase in total reports.

The CIT Web Development Project updates and standardizes the design for all CIT Web pages to present users with a streamlined and uniform look for CIT online. To achieve this, all CIT Web content (with the exception of some applications) is migrated from CIT servers to a Microsoft Content Management System and is evaluated to be Section 508 compliant. http://cit.nih.gov/

In August 2007, NIH and the U.S. Department of Veteran Affairs (VA) sign an interagency agreement that VA (with 240,000 employees) has adopted the NIH ITAS to replace their T&A system. CIT is responsible for the implementation of ITAS for the VA.

CIT accomplishes the closure of a multi-year project to federate with the HHS's consolidated and outsourced email system. As part of this Federation task (which is a requirement on the Performance Management Appraisal Program of the NIH Director and NIH CIO for 2007), the NIH successfully provides for a synchronized email directory service, a synchronized calendar service, email vaulting services, email disaster recovery services, and the doubling of the default mailbox size at the NIH from 100 to 200 MB.

In FY2007, CIT initiates a formal process improvement methodology in its Division of Enterprise and Custom Applications (DECA), with the objective of aligning CIT applications development processes with industry best practices for process improvement.

CIT establishes a framework and develops policies, procedures, and templates for the multiple phases of a process improvement software development life cycle and 2 phases on the software management life cycle. During the fiscal year, a suite of project management practices are established. Processes, tools, and artifacts align the DECA PM Methodology with the HHS Enterprise Performance Life Cycle (EPLC) Framework. Quality Assurance (QA) and Configuration Management (CM) functions are established.

In April 2007, the NIH Data Town interface is retired and a new nVision interface is implemented to create a single, central

Web site—the nVision Data Warehouse Portal. Data Warehouse business areas and reporting tools, such as Budget and Finance, Human Resources, Research Contracts and Grants, Staff Training and Development, Budget Tracking, Manager's Desktop Assistant, and Workforce Planning Trends that were previously housed on Data Town are co-located with the nVision business areas to form the new nVision Data Warehouse portal page.

CIT Directors

Name	In Office from	To
James King (Acting)	N/A	N/A
Dr. Eugene Harris (Acting)	N/A	August 1966
Dr. Arnold W. Pratt	August 1966	May 1990
Dr. David Rodbard	November 1990	April 1996
William L. Risso (Acting)	April 1996	March 1998
Alan S. Graeff	March 1998	November 2005
Dr. John F. Jones, Jr. (Acting)	November 2005	Present

NIH Chief Information Officers

Name	In Office from	To
Alan S. Graeff	March 1998	November 2005
Dr. John F. Jones, Jr. (Acting)	November 2005	present

Programs

CIT consists of the Office of the Director (OD), the Division of Computational Bioscience (DCB), the Division of Customer Support (DCS), the Division of Computer System Services (DCSS), the Division of Enterprise and Custom Applications (DECA), and the Division of Network Systems and Telecommunications (DNST). CIT also directly funds and supports the NIH Office of the Deputy Chief Information Officer (ODCIO), and the Office of the Chief IT Architect (OCITA).

Office of the Director (OD)

The Office of the Director plans, directs, coordinates, and evaluates the Center's programs, policies, and procedures and provides analysis and guidance in the development of systems for the effective use of IT techniques and equipment in support of NIH programs.

CIT also provides a rich portfolio of collaboration products and services, including:

- Conference Room Automation and AV Services
- Federal Video Relay Service (FedVRS)
- NIH Web Collaboration
- Podcasting
- TeleConferencing Services
- Videocasting Services
- VideoTeleConferencing (VTC)

Office of the Deputy Chief Information Officer (ODCIO)

The Deputy Chief Information Officer advises the CIO on the direction and management of significant NIH IT program and policy activities under relevant Federal statutes, regulations, and policies. The ODCIO also develops, implements, manages, and oversees NIH IT activities related to IT legislation, regulations, and NIH and other Federal policies:

- ODCIO directs NIH's IT capital planning processes with regard to major IT investments and provides leadership to NIH Institutes and Centers to enhance and strengthen their IT program management so they comply with legislative and policy requirements.
- The office serves as principal NIH liaison to HHS, its Operating Divisions and other Federal agencies on IT matters.
- ODCIO identifies critical IT issues and analyzes, plans, leads, and manages the implementation of special HHS or Federal initiatives as they relate to the management of NIH's IT resources. ODCIO also collaborates with NIH managers responsible for IT-related functions, in particular, IT security.
- ODCIO staffs and supports NIH's Incident Response Team (IRT). The IRT serves as the focal point for IT security incidents by identifying and characterizing incidents and providing immediate diagnostic and corrective action when appropriate.

Office of the Chief IT Architect (OCITA)

The Office of the Chief IT Architect manages the NIH Enterprise Architecture program, which reports directly to the NIH Chief Information Officer.

The mission for the NIH enterprise architecture program is to develop a comprehensive plan for IT support at NIH that acknowledges the need for both conforming and diverse business processes.

NIH can realize important business through an effective enterprise architecture program. The NIH Enterprise Architecture provides a framework for building (or acquiring) and implementing NIH information systems that directly support the NIH mission, and that link NIH’s IT assets with its mission.

Following the guidelines and specifications not only ensures investments that directly align with the NIH mission but also facilitates system interoperability across all NIH systems. http://enterprisearchitecture.nih.gov/

NIH Enterprise Architecture helps:

- Build a common understanding of NIH’s future IT direction
- Identify systems and information needed to support NIH business processes
- Define NIH’s technology infrastructure
- Document the management processes for aligning IT to business

Division of Computational Bioscience (DCB)

DCB is a research and development organization that provides scientific and technical expertise in computational science and engineering to support biomedical research activities at the NIH:

- DCB applies the concepts and technologies of computer, engineering, physical, and mathematical science to biomedical applications including the areas of image processing, bioinformatics, genetic databases, structural biology, scientific visualization, medical imaging, telemedicine, signal processing, biomedical instrumentation, and biomathematics.
- DCB develops computational methods and tools for solving biomedical laboratory and clinical research problems.
- DCB promotes the application of high-performance computing and high-speed communications to biomedical research and provides these resources for the NIH scientific staff.
- DCB evaluates the overall effectiveness of these programs and represents CIT to the national Information Technology Research and Development (IT R&D) Program.

Division of Computer System Services (DCSS)

DCSS plans, implements, operates, and supports centrally owned or administered computing resources for NIH enterprises use, ensuring interoperability among those resources and between them and other computing facilities owned by customer organizations.

- DCSS promotes awareness and efficient and effective use of these computing resources by customer personnel through training, presentations, consultations, and documentation.
- DCSS investigates new and emerging computing requirements of customer programs. It conducts research and development to identify, evaluate, and adapt new computer architectures and technologies to meet identified customer requirements and to enhance current service offerings.
- Additionally, where appropriate, DCSS manages and operates departmental computing resources for NIH, Office, or Center use.

Division of Customer Support (DCS)

DCS provides centralized, integrated computer support services to the NIH computing community:

- DCS advocates customer needs to CIT management and represents services and policies to CIT's customers.
- It plays an active and participatory role in supporting desktop computing to the end-user in the areas of software and hardware, including internet, communications, and access technologies.
- The Division also coordinates and oversees CIT's Training Program for the benefit of the NIH computing community. The training program is delivered at no charge to the user.
- In addition to providing a central account establishment and management services for access to CIT systems, DCS also manages the NIH Help Desk and implements problem tracking systems.

Division of Enterprise and Custom Applications (DECA)

DECA supports the NIH enterprise business process through the development and management of transaction and decision-support environments for administrative and business applications of NIH, such as procurement, budget, accounting, and human resource activities, as well as systems that support extramural and intramural business processes:

- The Division provides complete information systems management services to the NIH including technical project management, systems analysis, programming, data integration and conversion, quality assurance, testing, and production support.
- DECA also provides the NIH community with World Wide Web development, support services, and consulting services for applications development.

Division of Network Systems and Telecommunications (DNST)

DNST directs the engineering, design, implementation, and support of network infrastructure and services for the NIH-wide area network (NIHnet) to facilitate the use of scientific, administrative, and other business applications:

- DNST manages and directs NIH telecommunications systems and technical requirements for the NIH ICs and implements telecommunications programs to meet the needs of the NIH community.
- The Division researches, develops, and tests next-generation networking/ telecommunications technologies and develops and supports applications using new network technologies, such as telemedicine and video conferencing.
- It provides consulting, guidance and support to the ICs, helping them to meet their network requirements.
- To improve the information infrastructure on networking/telecommunications activities, DNST serves as liaison to the NIH ICs and other DHHS components.
- DNST serves as a focal point for telecommunications service orders, and develops and disseminates recommended standards, policies, and procedures for the nationwide implementation and management of NIH networking and telecommunications systems.

The Division also develops, implements, and supports remote access services to NIHnet, provides technical support for wireless services, and a 24-hour telephone/network support service.

NIH Almanac: Organization

Center for Scientific Review

Mission | Important Events | Director

Mission

The Center for Scientific Review's (CSR's) key mission is to see that NIH grant applications receive fair, independent, expert, and timely reviews—free from inappropriate influences—so NIH can fund the most promising research.

The Center specifically:

- Serves as the central receipt point for all research and training grant applications submitted to NIH. Also receives some of the applications submitted to other components of the U.S. Department of Health and Human Services (HHS) and refers them to these components;
- Assigns all NIH applications to the appropriate NIH institutes or centers for consideration for funding and also to the scientific review groups within CSR or other institutes or centers for review;
- Provides the scientific merit review of most research grant and fellowship applications submitted to NIH;
- Provides staff support to the Office of the Director, NIH, in the formulation of grant and award policies and procedures; and
- Assists other NIH components in providing information on the NIH peer review system and information about the research grant and fellowship application process and procedures to the scientific community, Congress, other NIH staff, and the general public.

Important Events in CSR History

1944—Public Health Service (PHS) Act (Public Law 78-410, sec. 301, July 1) authorized the Surgeon General to "make grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals for such research projects as are recommended by the National Advisory Health Council, or, with respect to cancer, recommended by the National Advisory Cancer Council." The Act also authorized the award of fellowships in the health sciences.

1946—The Research Grants Office was established January 1 under authority of section 301 of the PHS Act to administer several research projects transferred to PHS at the end of World War II and to operate a program of extramural research grants and fellowship awards. The office was elevated to division status at the end of 1946.

The Division of Research Grants (DRG) was responsible for operating and administering a program of extramural research and training through grants-in-aid of research in the biomedical and health-related sciences. DRG retained the operating responsibility until each successive institute was established and took over the programs in its categorical fields. The National Cancer Institute, which already ran an extramural research program on its own, continued to do so.

DRG was instructed by the National Advisory Health Council to establish study sections for scientific and technical review of research grant applications, and to explore neglected areas of research in the health sciences.

1958—Responsibility for research grant and training programs in noncategorical areas, operated by the division since 1946, was transferred to the new Division of General Medical Sciences (DGMS). DRG then reorganized to concentrate on the review of research grant and fellowship applications, coordination of all extramural programs operated by the institutes

and DGMS, and operation of the health research facilities program and grants management.

1961—The Grants Associates Program began recruitment and training of professional staff for the extramural branches of all PHS granting divisions, with DRG serving as a primary training focus.

1962—DRG was assigned overall responsibility for coordinating policies and practices for administration of grants and awards for all PHS extramural programs.

1965—The Civil Rights Liaison Office was established.

1966—DRG assumed additional responsibilities for review with the transfer from the institutes of the committee on scientific publications, the NCI collaborative research panel, the environmental sciences review committee, and the review functions of 6 panels of the U.S.-Japan Cooperative Medical Science program.

1968—DRG expanded the computer-based central data system, information for management planning analysis and coordination (IMPAC), to include the fellowship programs in addition to research, training grant, and research career award programs.

1969—DRG became a part of the Office of the Associate Director for Extramural Research and Training. Grants management responsibilities were transferred to the Office of Financial Management in the Office of the Associate Director for Administration.

1970—DRG coordinated the initial review of all U.S. Food and Drug Administration applications for research grants.

1971—The computer retrieval of information on scientific projects (CRISP) system was designed to provide scientific and associated grant identification information.

1978—The Extramural Associates Program was established under the Intergovernmental Personnel Act (P.L. 91-648) to promote participation of ethnic minorities and women in NIH-supported research.

1983—The Scientific Review Branch, Referral Branch, and Office of Research Manpower were consolidated into the Referral and Review Branch.

DRG became the central information source for the new Small Business Innovative Research (SBIR) Program and coordinated the scientific review of SBIR applications.

1995/96—DRG moved from the Westwood Building, where it had been since 1965, to the Rockledge Center, located near the NIH campus in Bethesda. Most of the Information Systems Branch was transferred to the Office of Extramural Research in the Office of the Director, NIH.

1997—Under a new Director, Dr. Ellie Ehrenfeld, DRG underwent a major reorganization and received a new name: the Center for Scientific Review (CSR). The name change reflected the Center's primary mission—scientific review of grant applications—and signaled an expanded focus on developing and implementing flexible and innovative ways for referral and scientific review. The Center was divided into 3 review divisions (Molecular and Cellular Mechanisms; Physiological Systems; and Clinical and Population-based Studies) plus the Division of Receipt and Referral; the Division of Management Services; the Office of Planning, Analysis, and Evaluation; and the Office of Outreach.

CSR also began a thorough examination of its Integrated Review Groups (IRGs) and their study sections. CSR received assistance from 2 types of external advisory groups that reported to the CSR Advisory Committee: (1) IRG working groups,

which were established to evaluate individual IRGs (2) the Panel on Scientific Boundaries for Review (PSBR), which was established to assess the overall structure and function of the IRGs.

The review activities of the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, and the National Institute of Mental Health—at that time all components of the Alcohol, Drug Abuse, and Mental Health Administration—began to be integrated into CSR.

1999—The PSBR completed its Phase 1 report, which defined organizing principles for a rigorous yet fair review and provided recommendations for reconfiguring the IRGs. In addition, 8 IRG Working Groups were developed or under development to assess current IRGs.

2000—Phase 2 of the PSBR effort was initiated to implement the Panel's recommendations. A Study Section Boundary (SSB) Team of extramural scientists with a small number of NIH and CSR staff members was formed to design the first new IRG (Hematology). A 3-year plan was developed to initiate additional SSB Teams and complete the reorganization of the 24 IRGs proposed by PSBR.

A reviewer survey was distributed to all CSR review groups to assess reviewer satisfaction and workload burdens. Ninety percent of the respondents reported that they were at least "satisfied" with their service, and a majority of respondents reported that they were "very satisfied." Reviewers indicated that it takes an average of 30 hours to prepare an average of 6 written critiques and an additional 8 hours to prepare as a reader of approximately 2.5 applications.

2001—Major strides were made in completing CSR evaluation and reorganization efforts. IRG Working Group reports for nearly all existing IRGs were completed. Three SSB Teams completed the design of their IRGs: Hematology; Biology of Development and Aging; Musculoskeletal, Oral and Skin Sciences; and Cardiovascular Sciences. SSB Teams were developed to design 4 additional IRGs.

The number of CSR study sections increased to 153 with the addition of new review groups in the areas of biomedical information science and technology development, epidemiology, muscle biology, and oncological sciences. CSR also developed 12 new study sections to review fellowship applications.

2002—CSR further advanced its efforts to reorganize its IRGs. SSB Teams completed the design for 8 of the remaining 12 IRGs to be reorganized: (1) Bioengineering Sciences and Technologies; (2) Surgical Sciences, Biomedical Imaging, and Bioengineering; (3) Oncological Sciences; (4) Digestive Sciences; (5) Immunology; (6) Renal and Urological Sciences; (7) Endocrinology, Metabolism, Nutrition, and Reproductive Sciences; and (8) Infectious Diseases and Microbiology.

Responding to the need to advance clinical research, CSR recruited a Special Advisor on Clinical Research Review, Dr. Theodore Kotchen, who is professor of medicine and epidemiology and associate dean for clinical research at the Medical College of Wisconsin.

Strides were made in using new technologies to enhance CSR reviews. All chartered study sections were given access to the Internet Assisted Peer Review System, which allows reviewers to post their critiques and later read the critiques posted by others in their study section. In addition, the vast majority of CSR reviewers were given CDs with electronic copies of the grant applications to be considered by their review panel. The CDs are easier to transport and are bookmarked for easy navigation.

2003—Important milestones were reached in CSR's reorganization efforts. SSB teams completed their recommendations for the last IRGs to be designed: (1) Respiratory Sciences; (2) Genes, Genomes, and Genetics, (3) Biological Chemistry and Macromolecular Biophysics; and (4) Cell Biology. CSR also implemented its first redesigned IRG—the Hematology IRG—and advanced efforts to implement other IRGs.

Dr. Ellie Ehrenfeld stepped down as CSR's Director. Dr. Elias Zerhouni appointed CSR's Deputy Director, Dr. Brent Stanfield, to be the new Acting Director.

A CSR-coordinated effort to develop new ways to encourage, review, and fund innovative research grant applications was advanced and incorporated into the NIH Roadmap for Medical Research initiative.

CSR restructured its 3 review divisions into 4 new divisions: (1) Division of Biologic Basis of Disease, (2) Division of Molecular and Cellular Mechanisms, (3) Division of Physiology and Pathology, and (4) Division of Clinical and Population-Based Studies.

In an effort to make the review focus of study sections more transparent, CSR gave names to study sections that were previously designated by their IRG affiliation and a number.

The Internet Assisted Review system was built into IMPAC, the grants system used by NIH. Reviewers now access the system through the NIH Commons, the venue for electronic communications between NIH and its principal investigators.

2004—The formal design stage for reorganizing CSR's scientific review groups as proposed by PSBR was completed in January 2004 after the CSR Advisory Committee endorsed the guidelines for the last groups to be reorganized. Study sections within all but 3 of the new IRGs met at least once.

CSR advanced outreach efforts to educate applicants, reviewers, and NIH staff by developing (1) an online video of a mock study section; (2) a new CSR exhibit booth, which was deployed at 6 major scientific meetings across the country; (3) CSR's first Annual Report; and (4) a new CSR logo.

All CSR study sections used the Internet-Assisted Review Peer Review system, and CSR helped advance pilot studies for the electronic submission of grant applications.

CSR's Special Advisor on Clinical Research Review (1) completed a study of review outcomes for clinical vs. nonclinical research applications and published the results in the *Journal of the American Medical Association*, (2) initiated a mechanism to track review outcomes of clinical grant applications on an ongoing basis, (3) developed a Web page to provide "Advice to Investigators Submitting Clinical Research Applications," (3) helped revise the review criteria for NIH grant applications to improve the assessment of clinical research applications, and (4) provided presentations on the review of these applications at five meetings of clinical scientists.

The CSR Advisory Committee held its last meeting on September 20, 2004. A new Peer Review Advisory Committee will advise the CSR and NIH on peer review issues and operations.

2005—The Peer Review Advisory Committee held its first meetings to provide comprehensive guidance to the NIH Director, CSR Director, and Deputy Director for Extramural Research on all NIH peer review policies and operations.

Dr. Antonio Scarpa assumed the responsibilities of CSR's Director on July 1, 2005.

CSR received the first electronic grant applications via grants.gov and prepared to receive most applications by October 1, 2006.

A new payment system was developed to replace the Scientific Review and Evaluation Awards system. Under the new system, reviewers attending study section meetings receive their honoraria and "flat-rate" reimbursements for meals and incidental expenses without having to submit vouchers. Reviewers will no longer need to submit vouchers for hotel expenses, which will be paid directly by NIH. All reviewer payments will be made electronically.

2006—CSR accelerated the release of summary statements to applicants and the ICs. Ninety-seven percent of its summary statements were released according to a new schedule: summary statements for new investigators submitting a

RO1 should be posted within 10 days of the study section meeting and all other summary statements should be released within 30 days of the study section meeting. Applicants used to receive their summary statements between 1-3 months after their study section meetings.

CSR's Scientific Review Evaluation Award Office reduced NIH travel costs by issuing reviewers nonrefundable airline tickets instead of refundable tickets. Scientists flying to CSR review meetings were allowed to make one change per trip, with NIH covering the costs. Between June and December 2006, NIH saved $5.2 million. When this practice is expanded to all CSR and NIH reviewers, NIH will save over $10 million a year.

Two Web-based electronic modes for reviewing grants were deployed by CSR to improve the recruitment of well-qualified reviewers who find it difficult to travel to review meetings: online asynchronous discussions (secure chat rooms), and video-enhanced discussions.

CSR published data that suggests slight but significant differences in the scoring of clinical and nonclinical research applications are not related to (1) the percent of clinical applications assigned for review to a review group, (2) the greater costs of clinical research, or (3) the clinical research experience of the reviewers. The findings were described in "Outcomes of NIH Peer Review of Clinical Grant Applications," by Theodore Kotchen, et al., published in the January 2006 issue of the *Journal of Investigative Medicine*.

2007—As NIH expanded its ability to receive grant applications electronically, CSR adjusted its administrative systems and practices. The R01 grant application was made electronic this year, and the majority of grant applications received by CSR were submitted electronically. CSR also advanced its ability to automatically assign applications to its scientific review groups using new text-fingerprinting software.

After the success of a pilot to shorten the review cycle for new investigators applying for an R01 grant, CSR shortened the review cycle for all new applicants for R01 grants. A shorter cycle will allow some of these more than 10,000 applicants to reapply in the next review round instead of having to wait out a review cycle. The ultimate goal is to offer this opportunity to all applicants who need to revise their applications so the best science can advance more quickly.

CSR hosted 6 one-day Open House Workshops in 2007 to solicit input from about 1,000 leaders of the scientific community and other stakeholders. This input was used to better align CSR's scientific review groups with rapid changes in their respective scientific fields. Summary reports were posted on the CSR Web site for public comment.

Scientific Review Administrators were given a new name to better characterize their true role and their important scientific contributions to NIH peer review. They are now called Scientific Review Officers (SROs).

CSR began a reorganization of its 4 review divisions, by creating a fifth division and reorganizing the review groups in its Division of Clinical and Population-Based Studies, which has a new name: the "Healthcare, Population and Behavioral Sciences Division." The fifth review division was created to cluster neuroscience IRGs from 3 CSR divisions into 1 new division: the Division of Neuroscience, Development, and Aging. Consolidating CSR's neuroscience IRGs will enhance staff interactions; encourage shared recruitment of new SROs and reviewers; improve the balancing of workloads; advance interactions with the NIH and the neuroscience community. CSR also created a new neuroscience IRG—Emerging Technologies and Training in Neurosciences—creating a home for new study sections focused on molecular neurogenetics and neurotechnology as well as special emphasis panels to review fellowship and small business applications.

To enhance reviewer recruitment, CSR developed a new registry of experienced senior scientists who would make good reviewers, based on recommendations from scientific societies and institutions. This new tool will help SROs to more quickly identify experienced volunteer reviewers and provide societies and institutions with additional input into the peer review process.

Biographical Sketch of CSR Director Antonio Scarpa, M.D., Ph.D.

On March 21, 2005, Dr. Antonio Scarpa was named Director of the Center for Scientific Review (CSR) at the National Institutes of Health (NIH). He now leads CSR's efforts to better manage the receipt and referral of NIH grant applications and coordinate their review in CSR peer review groups. Dr. Scarpa has served as a permanent member of 3 NIH peer review committees between 1983 and 2003 as well as a member of peer review committees for the American Heart Association.

He came to NIH from Case Western Reserve University in Cleveland, where he was the David and Inez Myers Professor and chair of the Department of Physiology. He oversaw the development of a small physiology and biophysics department into one now ranked among the best in the country. His research there was focused on the cellular and molecular mechanisms of ion transport and homeostasis and the metabolic consequences induced by transport. His studies were supported by grants from the National Heart, Lung, and Blood Institute; the National Institute on Alcohol Abuse and Alcoholism; and the National Institute of Diabetes and Digestive and Kidney Diseases, as well as the American Heart Association.

Dr. Scarpa has more than 225 peer-reviewed publications and has edited or co-edited 9 books or special journal supplements. He has been an officer or board member of many scientific societies, including the Biophysical Society, the Federation of American Societies for Experimental Biology, and the Association of American Medical Colleges. Over the years, Dr. Scarpa also has served on the editorial boards of 13 scientific journals and served as editor or co-editor for 5 journals.

Dr. Scarpa received his M.D. and Ph.D. (Libera Docenza) in general pathology from the University of Padua School of Medicine, and he conducted postdoctoral studies at the Weizmann Institute of Science in Israel, the University of Utrecht in The Netherlands, and the University of Pennsylvania in Philadelphia. Dr. Scarpa continued his research and academic career for 17 years at the University of Pennsylvania before moving to Case Western Reserve in 1986.

CSR Directors

Name	In Office from	To
Cassius James Van Slyke	January 1946	December 1, 1959
David E. Price	1948	1950
Ernest M. Allen	1951	1960
Dale R. Lindsay	1960	1963
Eugene A. Confrey	October 1963	1969
Stephen P. Hatchett	1969	August 1976
Carl D. Douglass	August 1976	December 1985
Jerome G. Green	January 1986	June 1, 1995
Ellie Ehrenfeld	January 1997	September 30, 2003
Brent Stanfield (Acting)	October 1, 2003	June 30, 2005
Antonio Scarpa	July 1, 2005	present

NIH Almanac: Organization

John E. Fogarty International Center for Advanced Study in the Health Sciences

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Mission

The John E. Fogarty International Center (FIC), the international component of the NIH, addresses global health challenges through innovative and collaborative research and training programs and supports and advances the NIH mission through international partnerships. In the nearly 40 years since its establishment, the Fogarty International Center has grown from modest roots—Fogarty's first-year budget totaled $500,000—to a globe-encircling enterprise that provides $64 million to fund research, training, and capacity-building that extends to over 100 countries and involves some 5,000 scientists in the U. S. and abroad.

Important Events in FIC History

October 22, 2007—In an effort to focus attention on global health, Fogarty joined with the Council of Science Editors (CSE) to promote its 2007 international theme issue on poverty and human development. Fogarty, in conjunction with the National Library of Medicine, hosted the event at NIH to coincide with the simultaneous publication of related research by more than 235 scientific journals in 37 countries. At least 1,000 articles were disseminated, representing research projects taking place in 85 nations. View Image.

Legislative Chronology

January 18, 1967—Rep. Melvin Laird (Wisc.) proposed that Congress establish an international research and study center at NIH as a memorial to the late Rep. John E. Fogarty (R.I.). President Lyndon B. Johnson subsequently announced that he was seeking funds to establish the John E. Fogarty International Center for Advanced Study in the Health Sciences.

February 26, 1968—Departmental approval was given to establish the Fogarty International Center.

March 16, 1968—Official notice was published in the Federal Register.

July 1, 1968—President Lyndon Johnson issued an Executive Order establishing the John E. Fogarty International Center for Advanced Study in the Health Sciences at the National Institutes of Health. The NIH Office of International Research was abolished and several of its functions were transferred to FIC.

June 1979—The Task Force to Assess the Missions and Functions of the Fogarty International Center reported to the director, NIH, on its year-long study of the center, reaffirming FIC's importance as the focus for international aspects of biomedical and behavioral research at NIH, and recommending specific measures for strengthening and broadening its programs.

June 1982—FIC was designated a World Health Organization Collaborating Center for Research and Training in

Biomedicine.

September 1985—The first meeting of the FIC Advisory Board was held.

November 1985—FIC was established in law (Public Law 99-158, sec. 482).

Biographical Sketch of Fogarty Director Roger I. Glass, M.D., Ph.D.

Dr. Glass was named Director of the Fogarty International Center and Associate Director for International Research by NIH Director Dr. Elias A. Zerhouni on March 31, 2006. Dr. Glass formally took office on June 11, 2006.

Dr. Glass graduated from Harvard College in 1967, received a Fulbright Fellowship to study at the University of Buenos Aires in 1967, and received his M.D. from Harvard Medical School and his M.P.H. from the Harvard School of Public Health in 1972. He joined the Centers for Disease Control and Prevention (CDC) in 1977 as a medical officer assigned to the Environmental Hazards Branch. He received his doctorate from the University of Goteborg, Sweden, in 1984, and joined the National Institutes of Health Laboratory of Infectious Diseases, where he worked on the molecular biology of rotavirus. In 1986, Dr. Glass returned to the CDC to become Chief of the Viral Gastroenteritis Unit at the National Center for Infectious Diseases.

Dr. Glass's research interests are in the prevention of gastroenteritis from rotaviruses and noroviruses through the application of novel scientific research. He has maintained field studies in India, Bangladesh, Brazil, Mexico, Israel, Russia, Vietnam, China, and elsewhere. His research has been targeted toward epidemiologic studies to anticipate the introduction of rotavirus vaccines. He is fluent and often lectures in 5 languages.

Dr. Glass has received numerous awards including the prestigious Charles C. Shepard Lifetime Scientific Achievement Award, presented by the CDC in recognition of his 30-year career of scientific research application and leadership. Other honors include the U.S. Department of Health and Human Services (HHS) Secretary's Award for Distinguished Service, the Outstanding Unit Citation from the National Center for Infectious Diseases, the Outstanding Service Medal from the U.S. Public Health Service, and a Commendation Medal from the U.S. Public Health Service. He is a member of the Institute of Medicine (an arm of the National Academy of Sciences), the American Academy of Microbiology, the American Society of Microbiology, the American Association for the Advancement of Science, the American Society of Virology, and the American Epidemiological Society. Dr. Glass is also a fellow in the Infectious Disease Society and the American College of Epidemiology.

Dr. Glass has co-authored more than 400 research papers and chapters. He is married to Barbara Stoll, M.D., the George W. Brumley, Jr. Professor and Chair of the Department of Pediatrics at Emory University School of Medicine and the Medical Director of the Children's Healthcare of Atlanta at Egleston. He and his wife have 3 children.

FIC Directors

Name	In Office from	To
Milo D. Leavitt, Jr.	June 16, 1968	July 1978
Leon Jacobs	July 1, 1978	June 29, 1979
Edwin D. Becker (Acting)	July 1979	April 1980
Vida H. Beaven (Acting)	April 1980	January 1981

Claude Lenfant	February 1981	July 1982
Mark S. Beaubien (Acting)	July 1, 1982	January 1984
Craig K. Wallace	January 1984	December 1987
Carl Kupfer (Acting)	January 1, 1988	July 1988
Philip E. Schambra	August 1988	September 30, 1998
Gerald T. Keusch	October 1, 1998	December 31, 2003
Sharon H. Hrynkow (Acting)	January 1, 2004	May 2006
Roger I. Glass, M.D., Ph.D.	May 30, 2006	

Research and Research Training Programs

Training Grants

AIDS International Training and Research Program

This program supports HIV/AIDS-related research training to strengthen the capacity of institutions in low- and middle-income countries to conduct multidisciplinary biomedical and behavioral research to address the AIDS epidemic in the collaborating country. Grants are awarded to U.S. and developing country institutions with strong HIV-related research training experience and with HIV-related research collaborations with institutions in low- and middle-income countries. These institutions, in partnership with their foreign collaborating institutions, identify health scientists, clinicians, and allied health workers from the foreign countries to participate in their joint research training programs. Individuals from foreign nations who wish to become trainees must apply to the project director of an awarded grant.

NIH/Fogarty Clinical Research Training Scholars Program

The Fogarty International Center in collaboration with the National Institute of Allergy and Infectious Diseases, the National Center on Minority Health and Health Disparities, the National Cancer Institute, the National Institute on Drug Abuse, the National Institute of Nursing Research, and the National Institute of Child Health and Human Development is offering a 1-year clinical research training experience for graduate-level U.S. students in the health professions.

Fogarty International Collaborative Trauma and Injury Research Training Program

This program addresses the research needs related to the growing burden of morbidity and mortality in the developing world due to trauma and injury. The program is supported by Fogarty, 7 NIH partners, the CDC's National Center for Injury Prevention and Control, the Pan American Health Organization, and the World Health Organization (WHO). It addresses training across the range of basic to applied science, the epidemiology of risk factors, acute care and survival, rehabilitation, and long-term mental health consequences.

Framework Programs for Global Health

This new initiative builds global health research capacity in the United States and abroad. Through the Framework Programs for Global Health, institutions create administrative frameworks to bring multiple schools (such as engineering, business, chemistry, biology, communication, public health, medicine, and environmental studies) together on the topic of Global Health and develop multidisciplinary Global Health curricula for undergraduates, graduates and professional school students. Each program leverages and enhances currently funded Global Health projects at the institution supported by NIH and other sponsors, as well as encourages new training opportunities, collaborations, and research.

Global Infectious Disease Research Training Program

This program enables institutions in the United States or in developing foreign countries to support current and future collaborative research-related training on infectious diseases that are predominately endemic in or impact upon people living

in developing countries.

Informatics Training for Global Health

This initiative supports the development of informatics training programs that will contribute to global health research and informatics capacity in low- and middle-income countries in partnership with U.S. institutions.

International Research Ethics Education and Curriculum Development Award

This program allows domestic or foreign institutions to develop graduate curricula and provide training in international bioethics related to performing research in developing countries.

International Clinical, Operational, and Health Services Research and Training Award

This program supports training to facilitate collaborative, multidisciplinary, international clinical, operational, health services, and prevention science research between U.S. institutions and those in low- and middle-income nations.

International Clinical, Operational, and Health Services Research and Training Award for AIDS and Tuberculosis

This program supports research training to strengthen the capacity of institutions to conduct clinical, operational, and health services research. These institutions are located in low- and middle-income countries where AIDS, TB, or both are significant problems. In Phase I, one-year planning grants to support the development of full research training applications in Phase II are awarded to institutions in low- and middle-income countries with strong HIV- or TB-related research experience. In Phase II, grants to support a research training program are awarded to Phase I awardees and to their United States or other developed country institutional partner with whom they have strong HIV- or TB-related research collaborations. Individuals who wish to become trainees must apply to the project director of an awarded grant.

International Collaborative Genetics Research Training Program

This program supports innovative genetics research training programs in the context of existing scientific collaborations between U.S. and low- and middle-income country researchers to begin to build a critical mass of scientists, health professionals, and academics with human genetics expertise and a sustainable research environment at the collaborating foreign institution.

International Training and Research Program in Environmental and Occupational Health

This program enables U.S. universities and non-profit research institutions to support international training and research programs for scientists from developing nations in general environmental health and occupational health. This is an institutional training grant. Applications are accepted from U.S. institutions in response to a specific request for applications which is published once every 5 years; the first awards were made in 1995. Individuals from foreign countries who wish to become trainees must apply to the project director of an awarded grant.

Global Research Training in Population Health

This program supports international research training for scientists from low- and middle-income nations in population-related sciences. This is an institutional training grant. Individuals from foreign countries who wish to become trainees must apply to the project director of an awarded grant.

Research Grants

Brain Disorders in the Developing World: Research Across the Lifespan

This program supports collaborative research and capacity building projects on brain disorders throughout life, relevant to low- and middle-income nations. Funded projects focus on neurological disorders and function (including sensory, motor, cognitive, and behavioral) and the impairment they lead to throughout life. R21 grants provide support to conduct pilot studies and to organize, plan for, prepare, and assemble an application for a more comprehensive R01 grants. R01 awards involve substantial collaboration between developed and developing country investigators and incorporate both research and capacity building.

Ecology of Infectious Diseases

This program funds interdisciplinary research projects that strive to elucidate the underlying ecological and biological mechanisms that govern the relationships relationships, environmental changes, and the transmission dynamics of infectious diseases. The focus of this program is on the development of predictive models for the emergence and transmission of diseases in humans and other animals, and ultimately to facilitate the development of strategies to prevent or control them.

Fogarty International Research Collaboration Award (FIRCA)

This program provides funds ($32,000/year direct costs) to foster international research partnerships between NIH-supported U.S. scientists and their collaborators in countries of the developing world. The FIRCA program aims to benefit the research interests of both the U.S. and foreign collaborators while increasing research capacity at the foreign site. U.S. scientists who have an eligible NIH grant may apply as Principal Investigators. Former FIRCA foreign collaborators may also apply as Principal Investigators. All areas of biomedical, behavioral, and social science research supported by NIH are eligible FIRCA research topics.

Global Health Research Initiative Program for New Foreign Investigators (GRIP)

This initiative promotes productive re-entry of NIH-trained foreign investigators into their home countries as part of a program to enhance the scientific research infrastructure in developing countries, to stimulate research on high priority health-related issues in these countries, and to advance NIH efforts to address health issues of global import. The GRIP provides partial salaries to the foreign researcher returning home and support for research projects.

International Cooperative Biodiversity Groups

This program integrates drug discovery from natural products with conservation of biodiversity and scientific and economic development in host countries. The program is jointly funded by the National Institutes of Health, the National Science Foundation, and the Foreign Agriculture Service of the U.S. Department of Agriculture.

International Tobacco and Health Research and Capacity Building Program

This program encourages transdisciplinary approaches to the international tobacco epidemic to reduce the global burden of tobacco-related illness. The program is designed to promote international cooperation between investigators in the U.S. and other high-income nation(s) pursuing research programs on tobacco control, and scientists and institutions in low- and middle-income nation(s), where tobacco consumption is a current or anticipated public health urgency.

Stigma and Global Health Research Program

The purpose of this program is to stimulate interdisciplinary, investigator-initiated research on the role of stigma in health, and on how to intervene to prevent or mitigate its negative effects on the health and welfare of individuals, groups and societies world-wide.

Fogarty Organization

http://www.fic.nih.gov/about/organization.htm

Division of International Relations (DIR)

Fogarty serves as the coordinating link between NIH and other U.S. agencies, foreign governments, and international organizations, on international biomedical research matters. DIR facilitates the development of new partnerships between U. S. scientists and institutions and counterparts abroad to advance research and training in the biomedical and behavioral sciences. DIR works on behalf of Fogarty and the whole of NIH to identify opportunities for collaboration with foreign science funding agencies, the U.S. Department of State, other U.S. technical agencies, and international organizations. Additionally, DIR fosters and facilitates international cooperation in biomedical research by disseminating information on foreign biomedical research activities to the NIH research institutes and informing foreign agencies and institutions, including WHO, about the international activities of the NIH; initiating, developing, and supporting, in cooperation with other NIH offices, new activities to address international health problems; preparing background materials for NIH senior staff participation in international meetings and discussions; providing advice to the NIH director and deputy director and to senior staff of the

NIH research institutes on policies and procedures relating to international activities; assisting the institutes by obtaining clearances for awards requiring State Department approval and by interpreting HHS and State Department procedures relating to international travel; serving as a channel for communications to and from U.S. embassies abroad and foreign embassies in Washington; and coordinating responses to inquiries on international issues.

Division of International Epidemiology and Population Studies

This Division plans, designs, and conducts studies to examine factors affecting the application of health science advances for the benefit of populations, particularly in developing countries. The Division performs research in the epidemiology and mathematical modeling of infectious diseases. Primary concentrations include cross-national studies of mortality patterns with special emphasis on influenza-associated disease and vector-borne and vaccine-preventable diseases.

Division of International Science Policy, Planning, and Evaluation

This Division plans and conducts studies relevant to the programmatic and policy directions of Fogarty and that complement the research activities of the categorical institutes of the NIH. The Division also advises the Fogarty Director on the development, analysis, and evaluation of the Center's programs and on international science policy issues.

Division of International Training and Research

This Division administers research and research training grants and fellowships programs, which are active in over 100 countries.

NIH Almanac: Organization

National Center for Complementary and Alternative Medicine

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Mission

The National Center for Complementary and Alternative Medicine (NCCAM) is dedicated to exploring complementary and alternative healing practices in the context of rigorous science; training complementary and alternative medicine (CAM) researchers; and disseminating authoritative information to the public and professionals.

To fulfill its mission, NCCAM supports a broad-based portfolio of research, research training, and educational grants and contracts, as well as various outreach mechanisms to disseminate information.

Research

NCCAM's primary responsibility is to conduct and support basic and clinical research using well-established tools of rigorous scientific design, conduct, and oversight. These studies involve investigator-initiated projects as well as NCCAM-solicited applications. Examples include large, multi-center clinical trials; specialty research centers; studies of therapies from whole medical systems (e.g., Ayurvedic medicine and traditional Chinese medicine); and studies in the 4 domains of CAM: manipulative and body-based therapies, biologically based practices, mind-body medicine, and energy medicine. The Center carries out these activities independently and in collaboration with other NIH Institutes and Centers, other government agencies, domestic and international research institutions, and industry.

Training

NCCAM supports a full spectrum of predoctoral, postdoctoral, and career awards to develop a cadre of skilled investigators from both the CAM and conventional communities. The goal is to train individuals to apply the tools of exacting science to CAM systems and modalities. Institutional awards are available to support research fellows. Mentored Research Career Development Awards provide opportunities to clinicians and research scientists to develop skills for conducting rigorous research and to pursue careers as investigators. Limited support is also provided for research conferences.

Information Dissemination

Distributing scientifically based information on CAM research, practices, and findings is central to the NCCAM mission. This is accomplished through:

- Operating the NCCAM Information Clearinghouse
- Producing publications, such as fact sheets, a newsletter, and an e-bulletin
- Offering a Web site at nccam.nih.gov
- Sponsoring lectures, conferences, an online continuing education program, and other outreach activities
- Exhibiting at events around the United States and the world

- Co-sponsoring, with the National Library of Medicine, the *CAM on PubMed* database, at nlm.nih.gov/nccam/camonpubmed.html
- Outreach to health care providers and the public with an educational campaign, "Time to Talk," that promotes a dialogue about CAM.

Important Events in NCCAM History

October 1991—The U.S. Congress passes legislation (P.L.102-170) that provides $2 million in funding for fiscal year 1992 to establish an office within the National Institutes of Health (NIH) to investigate and evaluate promising unconventional medical practices. Dr. Stephen C. Groft is appointed Acting Director of the new Office of Alternative Medicine (OAM).

September 1992—A Workshop on Alternative Medicine is convened in Chantilly, Virginia, to discuss the state of the art of major areas of alternative medicine and to direct attention to priority areas for future research activities.

October 1992—Dr. Joseph J. Jacobs is appointed first Director of the OAM.

June 1993—The NIH Revitalization Act of 1993 (P.L.103-43) formally establishes the OAM within the Office of the Director, NIH, to facilitate study and evaluation of complementary and alternative medical practices and to disseminate the resulting information to the public.

December 1993—The Alternative Medicine Program Advisory Council is established.

September 1994—Dr. Alan I. Trachtenberg is appointed Acting Director of the OAM.

January 1995—Dr. Wayne B. Jonas, is appointed the second Director of the OAM.

October 1996—A Public Information Clearinghouse is established.

November 1996—The OAM is designated a World Health Organization Collaborating Center in Traditional Medicine.

October 1998—NCCAM is established by Congress under Title VI, Section 601 of the Omnibus Appropriations Act of 1999 (P.L. 105-277). This bill amends Title IV of the Public Health Service Act and elevates the status of the OAM to an NIH Center.

January 1999—Dr. William R. Harlan is named Acting Director of NCCAM.

February 1999—The U.S. Secretary of Health and Human Services (HHS) signs the organizational change memorandum creating NCCAM and making it the 25th independent component of the NIH. The NCCAM Director is vested with broad decision-making authority, especially concerning financial and administrative management and fiscal and review responsibility for grants and contracts.

May 1999—The NCCAM Trans-Agency CAM Coordinating Committee (TCAMCC) is established by the NCCAM Director to foster the Center's collaboration across the HHS and other Federal agencies. This committee supersedes a trans-agency committee established by the NIH Director in 1997.

August 1999—The National Advisory Council on Complementary and Alternative Medicine (NACCAM) is chartered.

October 1999—Dr. Stephen E. Straus is appointed the first Director of NCCAM.

September 2000—NCCAM's first strategic plan is published.

February 2001—NCCAM and the National Library of Medicine launch *CAM on PubMed*, a comprehensive Internet source of research-based information on CAM.

May 2004—NCCAM and the National Center for Health Statistics of the U.S. Centers for Disease Control and Prevention announce findings from the largest nationally representative survey to date on Americans' use of CAM (part of the 2002 National Health Interview Survey).

January 2005—The National Academies' Institute of Medicine releases a report, *Complementary and Alternative Medicine in the United States*, that was requested by NCCAM and Federal partners and that focuses on the scientific and policy implications of the widespread use of CAM.

February 2005—NCCAM publishes its second strategic plan, *Expanding Horizons of Health Care: Strategic Plan 2005-2009*, following a year-long process of input from the public, staff, and groups of outside experts.

November 2006—The Center's founding Director, Dr.Stephen E. Straus, steps down and becomes Senior Advisor to NIH Director Dr. Elias A. Zerhouni. Dr. Ruth L. Kirschstein is named Acting Director of NCCAM.

May 2007—NCCAM establishes an Integrative Medicine Consult Service at the NIH Clinical Center.

January 2008—Dr. Josephine P. Briggs is named second Director of NCCAM.

NCCAM Legislative Chronology

October 1991—Public Law 102-170 provided $2 million to the National Institutes of Health (NIH) to establish an office and advisory panel to recommend a research program that would investigate promising unconventional medical practices.

June 1993—Public Law 103-43, the NIH Revitalization Act of 1993, established the OAM within the Office of the Director of NIH. The purpose of the Office was to facilitate the evaluation of alternative medical treatment modalities and to disseminate information to the public via an information clearinghouse.

October 1998—Public Law 105-277, the Omnibus Consolidated and Emergency Supplemental Appropriations Act, elevated the status and expanded the mandate of the OAM by authorizing the establishment of NCCAM. This act amended Title IV of the Public Health Service Act.

Biographical Sketch of NCCAM Director Josephine P. Briggs, M.D.

Josephine P. Briggs, M.D., received her A.B. *cum laude* in biology from Harvard-Radcliffe College and her M.D. from Harvard Medical School. She completed her residency training in internal medicine and nephrology at the Mount Sinai School of Medicine, New York, NY, where she was also chief resident in the Department of Internal Medicine and a fellow in clinical nephrology. She then held a research fellowship in physiology at Yale School of Medicine, New Haven, CT, working with Dr. Fred Wright and Dr. Gerhard Giebisch. After completing her fellowship at Yale, Dr. Briggs was a research scientist for 7 years at the Physiology Institute at the University of Munich, Germany.

In 1985, Dr. Briggs moved to the University of Michigan, Ann Arbor, where she held several academic positions, including associate chair for research in the Department of Internal Medicine and professorships in the Division of Nephrology, Department of Internal Medicine, and the Department of Physiology. Dr. Briggs joined the National Institutes of Health (NIH) in 1997 as director of the Division of Kidney, Urologic, and Hematologic Diseases at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), where she oversaw extramural research activities. While at NIDDK, she co-chaired an NIH Roadmap Committee on Translational Core Resources. In 2006, she accepted a position as senior scientific officer at the Howard Hughes Medical Institute.

Dr. Briggs' research interests include the renin-angiotensin system, diabetic nephropathy, circadian regulation of blood pressure, and the effect of antioxidants in kidney disease. She has published more than 130 research articles and has served on the editorial boards of several journals including the *Journal of Laboratory and Clinical Medicine*, *Seminars in Nephrology*, and *Hypertension* and was deputy editor for the *Journal of Clinical Investigation*. She is an elected member of the American Association of Physicians and the American Society of Clinical Investigation and a fellow of the American Association for the Advancement of Science. She is a recipient of many awards and prizes, including the Volhard Prize of the German Nephrological Society, the Alexander von Humboldt Scientific Exchange Award, and NIH Director's Awards for her role in the development of the Trans-NIH Type I Diabetes Strategic Plan and her leadership of the Trans-NIH Zebrafish committee.

NCCAM Directors

Name	In Office from	To
William R. Harlan (Acting)	January 1999	October 1999
Stephen E. Straus	October 1999	November 2006
Ruth L. Kirschstein (Acting)	November 2006	January 2008
Josephine P. Briggs	January 2008	Present

Major Offices and Divisions

The **Office of the Director** plans, directs, coordinates, and evaluates the development of programs and activities of the Center. Within the Office:

- The *Office of Policy, Planning, and Evaluation* reports on NCCAM's scientific initiatives and programs, and oversees congressional testimony and the implementation of the Freedom of Information Act.
- The *Office of Communications and Public Liaison* handles activities pertaining to the dissemination of information about NCCAM and CAM. Its work includes operating the Information Clearinghouse, serving as liaison with the media, and implementing education and outreach initiatives.
- The *Office of Administrative Operations* is responsible for financial management, administrative operations, and grants management, including the design and implementation of innovative business and management systems.

The **Division of Extramural Activities** develops, implements, and coordinates extramural programs and policies within NCCAM, other NIH Institutes, and the extramural community. It also coordinates meetings of NCCAM's advisory council and manages the Center's committee management activities. Within the Division, 2 Offices have a specialized focus:

- The *Office of Scientific Review* coordinates the receipt, referral, and scientific review of grants, cooperative agreements, and research contracts.

- The *Office of Grants Management* oversees the processing of grant, cooperative agreement, and contract awards.

The **Division of Extramural Research and Training** is primarily responsible for scientific management of NCCAM's portfolio of Federally supported research grants and fellowships. In addition, the Division:

- Provides guidance in developing research, research training, and career development programs;
- Designs and develops specific CAM research projects, announced through such mechanisms as Requests for Applications (RFAs); and
- Coordinates with other components of NIH in research endeavors.

Within the Division, 3 offices have a specialized focus:

- The *Office of Special Populations* oversees NCCAM's activities pertaining to the HHS Initiative to Eliminate Racial and Ethnic Disparities in Health.
- The *Office of International Health Research* oversees NCCAM's global scientific research activities.
- The *Office of Clinical and Regulatory Affairs* helps plan, coordinate, and monitor NCCAM's clinical trials; serves as a resource for investigators; and oversees staff and grantee compliance with all Federal guidelines pertaining to research using human subjects.

The **Division of Intramural Research** conducts clinical, translational, and basic research on the efficacy, safety, and mechanisms of action of diverse CAM modalities; facilitates integration of effective CAM and conventional practices into the interdisciplinary health care system at the NIH Clinical Center; and fosters development of research and training curricula that include information about safe and effective CAM and conventional practices. Within the Division, 3 sections have a specialized focus: the Endocrinology Section, the Diabetes Unit, and the Oncology Program.

NIH Almanac: Organization

National Center on Minority Health and Health Disparities

Mission | Important Events | Legislative Chronology | Director

Mission

The National Center on Minority Health and Health Disparities (NCMHD) promotes minority health and leads, coordinates, supports, and assesses the NIH effort to reduce and ultimately eliminate health disparities. The NCMHD works independently and in partnership with the NIH Institutes and Centers and with other Federal agencies and grassroots organizations in minority and in other medically underserved communities to:

- Conduct and support basic, clinical, social and behavioral health disparities research;
- Promote infrastructure development and training;
- Foster emerging programs;
- Disseminate information; and
- Reach out to minority and other health disparities communities.

Important Events in NCMHD History

1990—The Office of Research on Minority Health (ORMH) was established, with the encouragement of Congress, by the Director, National Institutes of Health (NIH).

1991—The ORMH convened an advisory Fact-Finding Team (FFT) to conduct three regional conferences with grassroots constituencies. The FFT issued a report with 13 recommendations from the community that guided the initial efforts of the ORMH.

1992—The *Minority Health Initiative* (MHI), the centerpiece of the ORMH agenda, was launched and initially funded at $45 million. This multi-year biomedical and behavioral research and research training program co-funds through its partnerships 1) interventions to improve prenatal health and reduce infant mortality; 2) studies of childhood and adolescent lead poisoning; HIV infection and AIDS; and alcohol and drug use; 3) research in adult populations focused on cancer, diabetes, obesity, hypertension, cardiovascular diseases, mental disorders, asthma, visual impairments, and alcohol abuse; and 4) training for faculty and for students at all stages of the educational pipeline—from precollege and undergraduate through graduate and postdoctoral levels.

1992—The ORMH initiated a study designed to present an overview of NIH extramural research training programs for minority students and to assess the feasibility of conducting a trans-NIH assessment of these programs.

1993—Public Law 103-43, the Health Revitalization Act of 1993, established the Office of Research on Minority Health in the Office of the Director, NIH.

1994—The National Conference on Minority Health Research and Research Training was held in Chicago.

1996—Conferences were held in Honolulu, Hawaii; Miami, Florida; and Puerto Rico to inform ORMH constituencies of the

progress made, to solicit feedback on those achievements, and to obtain information on the needs of minority populations.

1997—The Advisory Committee on Research on Minority Health was established to provide advice to the Director, ORMH, and to the Director, NIH, regarding research and research training with respect to minority health issues.

1998—The first meeting of the Advisory Committee on Minority Health was held.

2000—The ORMH celebrated its 10th anniversary.

2000—The National Center on Minority Health and Health Disparities was established by the passage of the Minority Health and Health Disparities Research and Education Act of 2000, Public Law 106-525, which was signed by the President of the United States on November 22, 2000.

2001—Dr. John Ruffin was sworn in as the first director of the National Center on Minority Health and Health Disparities.

2001—Programs mandated by Congress were implemented to expand the infrastructure of Institutions committed to health disparities research and to encourage the recruitment and retention of highly qualified minority and other scientists in the fields of biomedical, clinical, behavioral, and health services research: (1) *the Endowment Program,* (2) *the Loan Repayment Program for Health Disparities Research,* and (3) *the Extramural Clinical Research Loan Repayment Program for Individuals from Disadvantaged Backgrounds.*

2002—The Congressionally mandated program, *Project EXPORT—Centers of Excellence*, was launched.

2002—The first National Advisory Council of the NCMHD was convened.

2002—The NCMHD assumed responsibility for the Research Infrastructure in Minority Institutions Program (RIMI).

2003—The first *NIH Strategic Research Plan and Budget to Reduce and Ultimately Eliminate Health Disparities* was issued.

2005—The NCMHD assumed responsibility for the Minority International Research Training Program (MIRT) and renamed it the Minority Health and Health Disparities International Research Training Program (MHIRT).

2005—The NCMHD Community-Based Participatory Research (CBPR) was established. This program supports community-based participatory research intervention studies to reduce health disparities caused by diseases or conditions affecting minority and other health disparities communities. NCMHD is currently funding 25 CBPR three-year planning grants.

2005—The National Research Council of the National Academies released the report *Assessment of NIH Minority Research and Training Programs: Phase 3*. The report was the culmination of a series of assessments and analyses of the NIH minority research and training programs initiated by the ORMH, the predecessor to the NCMHD. This report examined the effectiveness of the programs and provided recommendations for improvement.

2006—The Institute of Medicine of the National Academies issued the report *Examining the Health Disparities Research Plan of the National Institutes of Health: Unfinished Business*. The NCMHD requested this report to assess the adequacy of the NIH Health Disparities Strategic Plan in achieving the goals and objectives; to evaluate the adequacy of coordination among the NIH Institutes and Centers in developing the strategic plan; and to obtain recommendations to help NIH achieve the objectives of the strategic plan.

2007—The NCMHD Centers of Excellence in Partnerships for Community Outreach, Research on Health Disparities and

Training (Project EXPORT), was re-competed for the first time. The program was also renamed the NCMHD Centers of Excellence program.

NCMHD Legislative History

1993—P.L. 103-43, the Health Revitalization Act of 1993, established the Office of Research on Minority Health in the Office of the Director of the National Institutes of Health.

2000—P.L. 106-525, Minority Health and Health Disparities Research and Education Act of 2000, established the National Center on Minority Health and Health Disparities.

Biographical Sketch of NCMHD Director John Ruffin, Ph.D.

Dr. John Ruffin is the Director of the National Center on Minority Health and Health Disparities. He is a well-respected leader and visionary in the field of health disparities. He has devoted his professional life to improving the health status of minority populations in the United States and to developing and supporting educational programs for minority researchers and health care practitioners. His success has been due in large part to his ability to motivate others and gain the support of key individuals and organizations, as well as to his expertise in strategic planning, administration, and the development of numerous collaborative partnerships. For over 15 years, he has led the transformation of the NIH minority health and health disparities research agenda from a programmatic concept to an institutional reality. He has served as the Associate Director for Minority Programs, Office of Minority Programs; and the Associate Director for Research on Minority Health, Office of Research on Minority Health. As the NIH federal official for minority health disparities research, through multi-faceted collaborations, he has planned and brought to fruition the largest biomedical research program in the nation to promote minority health and other health disparities research and training. He has spearheaded the development of the first comprehensive Health Disparities Strategic Plan at NIH. His efforts have impacted local, regional, national and even international communities and have resulted in a growing portfolio of:

- Research, training, and capacity building programs
- Health professionals and scientists of racial/ethnic minority populations
- Centers of Excellence conducting cutting-edge health disparities research
- Endowment awards to academic institutions and
- Community-based participatory research initiatives

Dr. Ruffin has been committed to conceptualizing, developing and implementing innovative programs that create new learning opportunities and exposure for minority and health disparity students and faculty, as well as minority-serving institutions. In his quest to eliminate health disparities, the hallmark of his approach is to foster and expand strategic partnerships in alliance with the NIH Institute and Center directors, various Federal and state agencies, community organizations, academic institutions, private sector leaders, and international governments and non-governmental organizations.

His life-long commitment to academic excellence, improving minority health and promoting training and health disparities research, has earned him distinguished national awards. Dr. Ruffin has received an honorary doctor of science degree from Spelman College, Tuskegee University, and the University of Massachusetts, Boston. He has been recognized by: the National Medical Association, the Society for the Advancement of Chicanos and Native Americans in Science; the Association of American Indian Physicians, the Hispanic Association of Colleges and Universities; the Society of Black Academic Surgeons; and the National Science Foundation. The John Ruffin Scholarship Program is an honor symbolic of his legacy for academic excellence bestowed by the Duke University Talent Identification Program. He has also received the Samuel L. Kountz Award for his significant contribution to increasing minority access to organ and tissue transplantation; the NIH Director's Award; the National Hispanic Leadership Award; Beta Beta Beta Biological Honor Society Award; the Department of Health and Human Services' Special Recognition Award; and the U.S. Presidential Merit Award.

NCHMD Directors

Name	In Office from	To
John Ruffin	January 2001	Present

NIH Almanac: Organization

National Center for Research Resources

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The National Center for Research Resources (NCRR) provides laboratory scientists and clinical researchers with the environments and tools they need to understand, detect, treat, and prevent a wide range of diseases. With this support, scientists make biomedical discoveries, translate these findings to animal-based studies, and then apply them to patient-oriented research. Ultimately, these advances result in cures and treatments for both common and rare diseases. NCRR connects researchers with one another and with patients and communities across the nation. These connections bring together innovative research teams and the power of shared resources, multiplying the opportunities to improve human health. Together, NCRR's 4 integrated and complementary divisions accelerate and enhance research along the entire continuum of biomedical science.

Important Events in the Division of Research Resources* (DRR) History (*Predecessor to NCRR)

1962—On April 13, U.S. Surgeon General Dr. Luther L. Terry announced the creation of the Division of Research Facilities and Resources (DRFR), officially established on June 15.

In June, the Regional Primate Research Centers transferred from the National Heart Institute to DRFR.

1967—The Biotechnology Resources Program (BRP) was established with the transfer of Centers for Biomedical Computing and Bioengineering to DRFR from another NIH component. BRP funded the first Centers in Mass Spectrometry and Nuclear Magnetic Resonance.

1969—DRFR, in the U.S. Public Health Service (PHS) Bureau of Health Professions Education and Manpower Training, was renamed the Division of Research Resources (DRR).

1970—DRR was removed from the Bureau of Health Professions Education and Manpower Training and became an independent NIH division.

1972—The Minority Biomedical Research Support Program was formed.

1975—The NIH Director approved a broadened mission for the division and an internal reorganization.

1979—The BRP funded the first synchrotron facility for use in X-ray crystallography by NIH investigators.

1980—The Minority High School Student Research Apprentice Program began.

1985—The Research Centers in Minority Institutions Program was established.

The Biological Models and Materials Research Section was created in DRR's Animal Resources Program.

1986—The only national laboratory dedicated to biomedical applications of fluorescence was funded at the University of Illinois.

1987—The Pittsburgh Supercomputer Center was funded.

1988—The Research Facilities Improvement Program began.

1989—The Biological Models and Materials Resources Section of the Animal Resources Program became the Biological Models and Materials Research Program.

The Minority Biomedical Research Support Program was transferred from DRR to NIH's National Institute of General Medical Sciences (NIGMS).

Important Events in NCRR History

1990—On February 15, Dr. Louis W. Sullivan, Secretary of the U.S. Department of Health and Human Services (HSS), approved the merger of the Division of Research Resources and the NIH Division of Research Services to form the National Center for Research Resources (NCRR).

NCRR's extramural programs included: Biological Models and Materials Research, Biomedical Research Support, Biomedical Research Technology, Animal Resources, General Clinical Research Centers (GCRCs), Research Centers in Minority Institutions, and Research Facilities Improvement. NCRR intramural resources included: the Biomedical Engineering and Instrumentation Program, the Library Branch, the Medical Arts and Photography Branch, and the Veterinary Resources Program.

The Center received appropriated funding for the Research Centers in Minority Institutions (RCMI) Program, which had been previously administered by DRR but funded by the Office of the Director, NIH, since the program's inception in 1985.

NCRR supported the First Annual Research Centers in Minority Institutions' International AIDS Symposium focused on AIDS in minority populations in the United States, Africa, and Latin America.

1991—The Science Education Partnership Award (SEPA) Program was established.

The Center sponsored a workshop of multidisciplinary experts in structural biology research, which generated recommendations for future directions in the report *Technologies for the Future: Opportunities and Needs in Structural Biology and Molecular Medicine.*

1993—NCRR began the Science Teaching Enhancement Award Program, a 2-year pilot program to create a corps of master teachers to form institutional partnerships that would improve biology education at the pre-college level.

The Institutional Development Award (IDeA) Program and the Research Facilities Improvement Program were established, as mandated by the NIH 1993 Revitalization Act. NCRR discontinued the Biomedical Research Support Grant Program.

1994—The Minority K-12 Teachers and High School Students Program was initiated to replace the Minority High School Student Research Apprentice Program.

NCRR convened expert biomedical investigators, academic administrators, and staff to develop NCRR's first comprehensive strategic plan, *NCRR: A Catalyst for Discovery, A Plan for the National Center for Research Resources.*

The Center released *Technologies for the Future—Biomedical Computing: A Critical Tool for Research,* describing opportunities in key biomedical computing areas such as neural systems and biomolecular simulations.

1995—NCRR's 5th anniversary was marked with a "Partnership for Discovery Symposium" to highlight biomedical advances accomplished with NCRR support.

The Center collaborated with the NIH Office of Research on Minority Health to establish the Research Infrastructure in Minority Institutions (RIMI) Initiative, a demonstration project to assist non-doctoral degree minority institutions to develop their research infrastructure, primarily through collaborations with research-intensive universities.

NCRR reorganized the original 7 extramural programs into: Biomedical Technology, Clinical Research, Comparative Medicine, and Research Infrastructure.

The Center established the RCMI Clinical Research Infrastructure Initiative (RCRII) to enable RCMI-eligible institutions with affiliated medical schools to develop their clinical research infrastructure.

Three National Gene Vector Laboratories were established with joint funding by NCRR; the National Cancer Institute (NCI); the National Heart, Lung, and Blood Institute (NHLBI); the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK); and the NIH Office of AIDS Research.

The NCRR Web site was created to enhance researchers' access to information on research resources and scientific opportunities.

1996—An agreement was formalized between the NIH/NCRR Shared Instrumentation Grant Program and the National Science Foundation's Multi-user Equipment Program to jointly review and fund single scientific instruments costing more than $500,000.

The *Evaluation of the NIH Shared Instrumentation Grant (SIG) Program: Reports from Users* was issued.

1997—NCRR published the *National Survey of Laboratory Animal Use, Facilities, and Resources.*

NCRR's intramural programs transferred to the NIH Division of Intramural Research Services within the NIH Office of Research Services.

The "Neuroscience Technology Development Workshop" participants recommended new scientific opportunities NCRR should pursue in order to develop research resources to enhance neuroscience research activities.

The *NCRR Reporter,* a quarterly magazine formerly published by DRR as the *Reporter,* celebrated its first 20 years of publication.

1998—A comprehensive 5-year strategic plan, *NCRR—A Catalyst for Discovery—A Plan for the National Center for Research Resources: 1998-2003,* was published.

The minority clinical associate physician and clinical research scholar career development elements of the GCRC Program were merged into the Clinical Associate Physician Career Program.

NCRR established the NIH Chimpanzee Management Program (ChiMP).

1999—NCRR established the Nation's eighth Regional Primate Research Center (RPRC) at the Southwest Foundation for Biomedical Research—the first center to be added to the RPRC network since the 1960s.

NCRR established the Mutant Mouse Regional Resource Centers Program.

NCRR established a career-enhancing award in Mouse Pathobiology Research for veterinarians engaged in pathobiology. The award protects time devoted to pathobiology research studies in genetically altered mice and enhances mentoring activities to increase the pool of future mouse pathobiologists.

The first annual scientific meeting of NCRR-supported comparative medicine resource directors was hosted by the Miami National Resource for Aplysia, University of Miami.

Eight "collaboratory" projects were initiated within the NCRR-supported Biomedical Technology Resource Centers to demonstrate and evaluate the efficiency and effectiveness of conducting multi-investigator research utilizing the Internet.

Through a collaboration with the Cystic Fibrosis (CF) Foundation, several NCRR-supported GCRCs became part of a CF treatment and diagnostic center network, enhanced by an NCRR-funded GCRC Data Management Unit to collate and analyze the CF clinical trial results.

A full-scale biosafety level-4 (BL4) laboratory—partially funded by NCRR—was dedicated at the Southwest Foundation for Biomedical Research in Texas. It is 1 of 4 federally supported BL4 labs nationwide, but the only such facility dedicated to basic molecular studies and investigation of long-term pathogenesis of deadly microbes.

2000—NCRR and several other NIH components cofunded a number of new initiatives to enhance research priority areas such as bioengineering (including nanotechnologies) and biocomputing (including informatics), and new animal models.

NCRR established a number of new faculty mentoring and student training grant opportunities, utilizing existing NIH funding mechanisms, to encourage medical students to pursue clinical research careers and research veterinarians to become independent researchers.

As part of the IDeA Program, NCRR established Centers of Biomedical Research Excellence (COBRE) at independent institutions located in states with historically low aggregate success rates for obtaining NIH grants. The COBRE Program funds independent research centers focused on specific scientific themes to increase research capacity.

2001—NCRR launched the Biomedical Informatics Research Network (BIRN), a shared network of neuroimaging databases that serves as a test bed for development of hardware, software, and protocols for mining data in a site-independent manner for both basic and clinical research.

The first NIH-wide High-End Instrumentation Grant Program was established to enable institutions to purchase instruments that cost more than $1 million.

A Research Subject Advocate (RSA) Program, established at the GCRCs, informs patients and volunteers about the research studies in which they participate and facilitates the timely reporting of serious adverse events to appropriate oversight boards and agencies.

Islet Cell Resource Centers were established to isolate, characterize, and distribute human pancreatic islets for transplantation into patients with type I diabetes and for basic research protocols.

A network of National Gene Vector Laboratories (NGVLs) was established to produce clinical-grade vectors for human gene transfer protocols and to perform related toxicology studies for Phase I and Phase II human clinical gene transfer protocols.

The Mutant Mouse Regional Resource Centers network began accepting transgenic animals from researchers to add to its collection for broad dissemination to the biomedical research community.

As part of the Institutional Development Awards (IDeA) Program, NCRR established Biomedical Research Infrastructure Network (BRIN) grants to help IDeA institutions attract established investigators, develop the research skills of resident investigators, alter and renovate laboratories, and purchase modern equipment.

The NCRR began providing Science Education Partnership Awards (SEPA) to science centers and museums nationwide to enhance the reach of unique health-related education programs.

2002—NCRR, along with 5 other NIH components, issued infrastructure enhancement awards to increase the capacity for basic research using human embryonic stem cells for preclinical investigations. The awards, which support entities listed on the NIH Human Embryonic Stem Cell Registry, are designed to increase the supplies and access to cells that are self-renewing and well characterized for quality controls.

A private, nonprofit organization received a contract to establish and operate a sanctuary for chimpanzees no longer needed for biomedical research. The Chimpanzee Health Improvement, Maintenance, and Protection (CHIMP) Act of December 2000 mandated such a sanctuary.

NCRR expanded breeding of Specific-Pathogen-Free (SPF) Rhesus Macaques in response to a national shortage and demand for these models. To explore alternatives to the use of rhesus macaques in biomedical research, experts met at the National Academy of Sciences in Washington, D.C. to develop recommendations intended to alleviate scientific demands for rhesus macaques.

The 8 Regional Primate Research Centers were renamed as National Primate Research Centers (NPRCs) to reflect their enhanced emphasis on providing nonhuman primates and related resources to biomedical scientists nationwide.

The Argonne National Laboratory's Advanced Photon Source (APS) and the NCRR-supported Northeastern Collaborative Access Team, or NE-CAT, agreed to build 3 experimental stations, known as beamlines, at the APS for synchrotron radiation research to study protein complexes and other biomolecular structures.

The Rat Resource and Research Center (RRRC), established at the University of Missouri (Columbia), serves as a resource for the study of rat models for biomedical research worldwide. The RRRC imports, cryopreserves, produces, and distributes high-quality laboratory rats.

2003—To address the challenges inherent in diagnosing and treating rare diseases, NCRR and other NIH components established the Rare Disease Clinical Research Network, which consists of 7 Rare Diseases Clinical Research Centers and a Data and Technology Coordinating Center. Each research center consists of a consortium of clinical investigators partnering with patient-support groups and institutions within and outside of the United States that have agreed to work together studying a group of rare diseases. The data-coordinating center works with the sites to integrate various kinds of data including genetic, microarray, clinical, laboratory, and imaging.

A Biomedical Computing Science and Technology Program was established by NCRR and 16 other NIH components to provide support for fundamental research as well as the development and application of new biocomputing tools or technologies. The program promotes research and development in computational science and technology that supports rapid progress in areas of scientific opportunity in biomedical research.

The Stroke Prevention/Intervention Research Program (SPIRP) was established to identify racial and geographical disparities related to stroke and cerebrovascular disease and to establish programs aimed at reducing or eliminating these disparities. The SPIRP is funded by the NCRR, NHLBI, and the National Institute of Neurological Disorders and Stroke.

NCRR and the NIH National Center on Minority Health and Health Disparities awarded a grant to Tuskegee University to complete its National Center for Bioethics in Research and Health Care. The grant allows the university to provide research and teaching facilities for faculty, researchers, and visiting scholars for studies in bioethics, public health, and integrated bioscience programs. The Center is the Nation's first bioethics institute dedicated to addressing issues that involve African Americans and other vulnerable or disadvantaged populations.

IDeANET began with the funding of a test-bed consortium of 6 IDeA states (called the Lariat Project) to provide increased connectivity for high-bandwidth science applications and facilitate collaborations among these and other institutions. IDeANET enhances IT infrastructure by providing support for staff in bioinformatics and data management cores, computer hardware and software, and Internet2 broad-bandwidth access for biomedical applications. It is intended to relieve strategic bottlenecks in connectivity entering states and improve Internet performance at many sites throughout the IDeA states.

A Viper Resource Center was established at Texas A&M University in Kingsville, Texas, to provide a resource of more than 400 venomous snakes. The snake venoms—a rich, stable source of biomedically important proteins such as disintegrins, metalloproteases, and fibrinolytic enzymes—are of particular interest because they can alter the shape, orientation, and movement of cells, and may play a role in the treatment of cancer, heart attacks, and strokes.

A National Swine Research and Resource Center was established at the University of Missouri-Columbia to serve as a national repository and distribution center for genetically modified swine. The Center houses 150-250 pathogen-free swine and cryopreserves genetic material and reproductive cells so that important swine models can be rederived as needed. Because the anatomy and physiology of pigs are remarkably similar to humans, the animals are ideal models for studying diabetes, cardiovascular disease, and obesity.

The Drosophila Genomics Resource Center (DGRC), housed at the Center for Genomics and Bioinformatics at Indiana University in Bloomington, was created to assist researchers in applying genomics in the model organism *Drosophila* by assuring economical access to quality-controlled genomics materials. The DGRC produces and distributes DNA microarray slides for gene expression analyses; tests new and alternative genomics technologies; facilitates the collection and analysis of array expression data; and collects and distributes other reagents and materials essential for *Drosophila* genomics research, including large clone sets, common transformation vectors, and cell lines.

Three new resources were developed to integrate technologies that enhance the study of proteomics and glycomics, 2 emerging fields that seek to identify and uncover the structures, functions, and interactions of the thousands of proteins (proteomics) or carbohydrates (glycomics) found in cells. The new resources are the Proteomics Research Resource for Integrative Biology at Pacific Northwest National Laboratory, Integrated Technology Resource for Biomedical Glycomics at the University of Georgia, and the Integrated Proteome Technologies for Pathway Mapping resource at the University of Michigan, which houses a high-throughput robotic analysis system.

Tulane University, in New Orleans, established a center for the preparation, quality testing, and distribution of adult stem cells. The Center prepares and distributes a continuous supply of marrow stromal cells derived from adult human and rat bone marrow, using standardized protocols.

2004—A comprehensive 5-year strategic plan, *2004-2008 Strategic Plan: Challenges and Critical Choices,* was published, based on the input of biomedical investigators, high-level administrators in research organizations, scholarly organizations, and NIH senior program staff. The Strategic Plan is intended to guide NCRR's priorities for investments, including local and national networks, research resources, technology development, instrumentation, biological models, and biomedical informatics tools to facilitate research intended to prevent, alleviate, or treat human disease.

NCRR funded the first national center for high-throughput genotyping dedicated solely to large-scale SNP (single nucleotide polymorphism) analysis. This high-capacity resource allows U.S. researchers to quickly and cost-effectively carry out large-

scale studies of genetic variation in humans and animals to advance disease gene identification. Research on genetic variation is aimed at improving the diagnosis and treatment of numerous diseases of humans that may have significant genetic components—such as type I diabetes, schizophrenia, and some types of cancer—by identifying specific genetic markers, or genotypes, that are associated with particular diseases or responses to drug therapies.

Using existing resources and centers, NCRR began serving as a significant partner in many NIH Roadmap initiatives, including those under the theme of Re-engineering the Clinical Research Enterprise. Additionally, NCRR is the lead Center partnering with other NIH components to support Exploratory Centers for Interdisciplinary Research, which seeks to lower the artificial barriers that divide researchers and impede scientific progress. NCRR is also the lead NIH component supporting National Technology Centers for Networks and Pathways to develop new technologies to study the dynamics of molecular interactions within cells. NCRR also supports the National Centers for Biomedical Computing initiative, which will build the computational infrastructure for biomedical computing, ranging from basic research in computational science to providing the tools and resources needed by biomedical and behavioral researchers.

The Resources for X-Ray Tomography of Whole Cells was established by NCRR and the U.S. Department of Energy at the Lawrence Berkeley National Laboratory in Berkeley, California. Employing the new field of cryo X-ray tomography, in which samples are rapidly frozen and viewed using a transmission X-ray microscope, researchers will be able to create and examine high-resolution, 3-dimensional images of the inside of cells.

The Stanford Synchrotron Radiation Laboratory at Stanford University in California received a $58 million upgrade with support from NCRR, NIGMS, and the U.S. Department of Energy. The upgrade project essentially rebuilt the existing storage ring—the machine in which electrons circulate at nearly the speed of light, producing visible and invisible forms of light called synchrotron radiation. This venture, which increased the brightness of the synchrotron radiation by 1 or 2 orders of magnitude, was begun in 1999 and completed in mid-December 2003.

The University of North Carolina, Chapel Hill, received support to further develop and make more widely available a Genome Fingerprint Scanning Program. The tool allows researchers to match mass spectrometry data directly to raw, unannotated genetic sequences to identify proteins and locate novel genes. Proteomics, the study of how proteins interact and respond to changing conditions in complex systems, is increasingly being used to help decipher diseases such as cancer, diabetes, and Alzheimer's disease.

Comprehensive Centers on Health Disparities were established to systematically address one or more of the health disparities that negatively impact racial and ethnic minority populations served by the grantee institutions. The new centers are: Meharry Medical College in Nashville; Charles R. Drew University of Medicine and Science in Los Angeles; and the Puerto Rico consortium, which consists of the 3 accredited medical schools in Puerto Rico (the University of Puerto Rico School of Medicine, the Universidad Central del Caribe School of Medicine, and the Ponce School of Medicine.) The health disparities to be studied include a variety of cancers (breast, prostate, and colorectal); diabetes mellitus; renal disease; infant mortality; AIDS; and cerebrovascular and cardiovascular diseases.

2005—In October, NCRR (on behalf of NIH) launched a new NIH Roadmap for Medical Research initiative—the Clinical and Translational Science Awards (CTSAs)—designed to speed the process by which biomedical discoveries are translated into effective medical care for patients. Developed with extensive input from the scientific community, the awards will help institutions nationwide create an academic home for clinical and translational science. CTSAs will provide an opportunity for institutions to develop critical resources and integrate clinical and translational science across multiple disciplines and academic departments, schools, clinical and research institutes, and hospitals. By lowering barriers among disciplines and encouraging creative, innovative approaches to solve complex medical problems, the new CTSAs are expected to fundamentally transform the conduct of clinical and translational science in the United States and usher in a new approach for preemptive medical care.

The Science Education Partnership Awards (SEPA) Program awarded approximately $22 million to fund 21 SEPA projects. The SEPA Program serves K-12 students and teachers, as well as science centers and museums across the country. Many of the funded projects provide opportunities for underserved and/or minority populations to pursue science careers. In addition, SEPA partnerships develop projects that educate the general public about health and disease, with the aim of helping people make better lifestyle choices as new medical advances emerge.

NCRR expanded its Islet Cell Resource (ICR) Program to provide cells for basic research studies. Previously, human islet cells had only been provided for clinical transplantation. The cells will be made available to researchers for basic science studies at no cost, if their proposals are approved by the ICR's Administrative and Bioinformatics Coordinating Center. With support from NCRR, NIDDK, and the Juvenile Diabetes Research Foundation, a consortium of ICR Centers isolate, purify, and characterize human pancreatic islets for use in scientific research and for subsequent transplantation into patients with type I diabetes and for basic research protocols.

The RCMI Program celebrated its 20th anniversary. Launched in 1985 with Congressional support, the RCMI Program fosters environments that are conducive to excellence in basic, clinical, and behavioral research. Through training and career development opportunities, the RCMI program also establishes a critical mass of scientists that more closely reflect the growing ethnic and cultural diversity of the U.S. population.

The Biomedical Technology Resource Centers Program awarded $18.2 million to create 2 new centers to develop new image-guided therapies and to further biochemistry studies of diseases such as alcoholism and cancer. Brigham and Women's Hospital of Boston will receive $15 million over 5 years in a cooperative agreement to establish a national Image Guided Therapy Center. The new resource will provide a unique, "1-stop-shopping" research, training, and service center that will develop and make available to scientists and clinicians image processing and display tools; dynamic and adaptive Magnetic Resonance Imaging methods; novel therapy techniques; and image-guided robotics. Through the second award, NCRR provided Indiana University in Bloomington with $3.2 million over 3 years to launch the National Center for Glycomics and Glycoproteomics to advance the study of carbohydrate molecules. A relatively new field that uses sophisticated tools and methods, glycomics is the study of complex sugar molecules that are attached to many proteins and lipids found in the blood, on the surfaces of cells, and in other places in the human body.

The High-End Instrumentation (HEI) Program awarded 11 grants totaling $18 million to fund the purchase of new state-of-the-art equipment required to advance biomedical research. Awarded to research institutions around the country, the one-time grants support the acquisition of instruments that cost more than $750,000, with a maximum of $2 million each. Since its inception in 2002, the HEI Program has provided 62 awards and 2 supplements to biomedical research institutions in 23 states, totaling $95,652,561.

The WiCell Research Institute in Wisconsin was awarded $16.1 million over 4 years to fund a National Stem Cell Bank. The Bank will consolidate many of the federally funded eligible human embryonic stem cell lines in one location, reduce the costs that researchers have to pay for the cells, and maintain quality control over the cells. The Stem Cell Bank will provide scientists affordable and timely access to federally approved human embryonic stem cells and other technical support that will make it easier for scientists to obtain the cell lines currently listed on the NIH Human Embryonic Stem Cell Registry.

Through its Research Facilities Improvement Program (RFIP), NCRR awarded nearly $30 million for 10 construction projects across the country. The grants will allow institutions to construct new laboratory space, improve research imaging capabilities, renovate existing infrastructure systems, and create facilities for research animals. The FY 2005 RFIP awards will fund the design, construction, and fixed equipment costs for new research facilities.

The University of North Carolina, Chapel Hill—funded by a 5-year NCRR grant totaling $2.46 million—launched the National Gnotobiotic Rodent Research Center, significantly expanding the existing Mutant Mouse Regional Resource Center at the university. The Center will provide scientists across the nation with access to gnotobiotic mice and rats, which will allow more precise explorations of how genes interact with the environment. Gnotobiotic organisms either are germ-free or have some contaminants that are known to the experimenter. Gnotobiotic techniques serve to produce germ-free and disease-free laboratories.

Chimp Haven, the first federally funded chimpanzee sanctuary, opened on October 28, 2005. The sanctuary, funded by an NCRR contract, provides lifetime care for federally owned or supported chimpanzees that are no longer needed for biomedical research. NCRR also awarded construction grants so that Chimp Haven could develop and build a state-of-the-art facility that closely resembles the chimpanzees' natural habitat. At capacity, Chimp Haven will be able to accommodate about 175 chimpanzees. The sanctuary was established in response to the Chimpanzee Health Improvement, Maintenance, and Protection (CHIMP) Act of December 2000, which authorized $30 million in Federal dollars for the sanctuary.

2006—In October, NIH created a national consortium that will transform how clinical and translational research is conducted, ultimately enabling researchers to provide new treatments more efficiently and quickly to patients. Led by NCRR, this new consortium, funded through Clinical and Translational Science Awards (CTSAs), begins with 12 academic health centers located throughout the nation. An additional 52 awardees are receiving planning grants to help them prepare applications to join the consortium. When fully implemented in 2012, about 60 institutions will be linked together to energize the discipline of clinical and translational science. The new program draws on NIH's earlier initiatives to re-engineer the clinical research enterprise, one of the key objectives of the NIH Roadmap for Medical Research. The CTSA Consortium has developed a Web site (ctsaweb.org) to ensure access to CTSA resources, enhance communication, and encourage information sharing.

NCRR provided $24.29 million over 5 years to the University of California, Irvine, for continued support to the Biomedical Informatics Research Network (BIRN). Currently a consortium of 28 universities and 37 research groups, BIRN is leveraging and sharing distributed tools, software applications, techniques, data, and expertise that extend beyond the boundaries of individual laboratories. This major NCRR initiative, involving both basic and clinical investigators, is initially concentrating on research involving neuroimaging, but the tools and technologies developed will ultimately be applicable to other disciplines.

The Rare Diseases Clinical Research Network (RDCRN), an initiative of the NIH Office of Rare Diseases and NCRR—in collaboration with many NIH Institutes, facilitates clinical research of rare diseases. More than 20 studies opened at approximately 50 sites across the United States and in several other countries including the United Kingdom, Japan, and Brazil. The RDCRN has received 5-year funding awards totaling $71 million.

As part of the NIH Roadmap for Medical Research, NCRR led the establishment of a comprehensive Web portal containing the results of the Inventory and Evaluation of Clinical Research Networks (IECRN) initiative. It is designed to promote collaboration among networks and facilitate identification of networks for clinical studies. The Web site provides clinical researchers and the public with an online database containing profiles of all existing clinical research networks.

As part of its ongoing effort to build a public, genome-wide library of "knockout" mouse models for the study of human disease, NIH awarded a total of $800,000 for deposition of existing knockout mice to 2 public mouse repositories to acquire genetically engineered mouse lines not yet widely accessible to researchers. In the 2 decades since recombinant DNA technology was first used to produce lines of mice in which specific genes have been disrupted, or "knocked out," such mice have proven to be one of the most powerful tools available to study the function of genes and to create animal models of human disease. To facilitate sharing, NCRR supports a network of public repositories that archive and distribute mouse strains.

NIH also awarded a set of cooperative agreements, totaling up to $52 million over 5 years, to launch the Knockout Mouse Project. The goal of this program is to build a comprehensive and publicly available resource of knockout mutations in the mouse genome. NCRR is one of the 19 NIH Institutes, Centers, and Offices contributing to the Knockout Mouse Project.

NCRR provided nearly $20 million to fund 18 Science Education Partnership Awards (SEPA) across the nation. The SEPA projects are designed to inform the public about health issues, foster science literacy, and encourage students to consider careers in the health sciences.

The High-End Instrumentation (HEI) Program awarded 14 grants totaling $21.5 million to fund the purchase of new state-of-the-art equipment required to advance biomedical research. Awarded to research institutions around the country, the one-time grants support the acquisition of instruments that cost more than $750,000, with a maximum of $2 million each. High-end instruments supported in this round of funding include supercomputers, nuclear magnetic resonance spectrometers, and cryo-electron microscopes. Since its inception in 2002, the HEI Program has provided 76 awards and 2 supplements to biomedical research institutions in 24 states, totaling $118,206,581.

NCRR provided $117.3 million to fund 4 new and 7 continuing Centers of Biomedical Research Excellence (COBRE). The awards support multidisciplinary centers—each concentrating on one general area of research—that strengthen institutional

biomedical research capability and enhance research infrastructure. COBREs are a component of the IDeA Program, designed to improve the competitiveness of investigators in states that historically have not received significant levels of competitive NIH research funding.

NCRR provided nearly $5 million to the National Center for X-ray Tomography, located at the U.S. Department of Energy's Lawrence Berkeley National Laboratory Advanced Light Source. This new center features a first-of-its-kind X-ray microscope that will enable scientists to perform "CAT scans" on biological cells, just one of many unprecedented capabilities for cell and molecular biology studies.

Ten institutions nationwide received awards totaling $30 million from NCRR's Research Facilities Improvement Program. The grants will allow construction of new laboratory space and upgrades to research-imaging facilities, among other improvements.

With co-funding from NCRR, NCI, and the National Institute of Biomedical Imaging and Bioengineering, Brigham and Women's Hospital of Boston received $15 million over 5 years to establish a national Image Guided Therapy Center. This unique resource will allow physicians to see deep beneath the skin during surgical procedures through imaging techniques such as CT scanning, ultrasound, and endoscopy.

Indiana University in Bloomington received $3.2 million of NCRR funding over 3 years to launch the National Center for Glycomics and Glycoproteomics. The Center will study specific sugars (i.e., complex signaling molecules found throughout the body) that are critical for reproduction, growth and development, and the ability to fight infection. The Center also will create and share new tools to unravel the structures of these molecules and how they work. Scientists will use these to study both basic biology and diseases from cancer to alcoholism.

NCRR sponsored or co-sponsored 4 workshops (*Ensuring the Inclusion of Clinical Research in the National Health Information Network, Supporting Connectivity for Biomedical Research: Executive Session, Genetic Tools for Optimizing the Use of Rhesus Macaques for Translational Research,* and *Navigating the Translational Researcher Through a Complex of Animal and Biological Resources*) and 1 conference (*NIH Conference on Knowledge Environments for Biomedical Research*) for the biomedical research community. Information on these meetings is available on the NCRR Workshops Web Site (http://www.esi-bethesda.com/ncrrworkshops/).

2007— In April, NIH Director Dr. Elias A. Zerhouni named Dr. Barbara Alving to be the director of NCRR. Dr. Alving joined NIH in 1999. She has previously served as the Acting Director of NCRR and NHLBI.

In September, NCRR expanded the Clinical and Translational Science Awards (CTSA) consortium from 12 to 24 academic health centers. The consortium's major goal is to speed the translation of laboratory discoveries into treatments for patients. Currently, the CTSA consortium is working to address three major priorities: standardizing clinical research informatics, streamlining institutional review board processes, and developing national curricula for clinical and translational science. Through CTSA solicitations, academic health centers will have the opportunity to build on their existing resources and transform into this integrated program over a period of years. When fully implemented in 2012, 60 institutions will be linked together to energize the discipline of clinical and translational science. View Image.

The recently launched CTSA Web site (CTSAweb.org) features resources, news, and general information about the CTSA consortium. It aims to enhance communication and encourage sharing of resources provided by CTSA members. The site includes detailed information on each CTSA participating institution, training activities sponsored by the CTSAs, publications, upcoming meetings, community engagement activities, and a fact sheet about the CTSAs.

NCRR provided nearly $20.5 million to fund 21 new Science Education Partnership Awards (SEPA) across the nation. SEPA projects are designed to inform the public about health issues, foster science literacy, and encourage students to consider careers in the health sciences. Through mobile laboratories, portable science kits, planetarium films, and online activities, SEPA projects provide hands-on, inquiry-based instruction on topics such as cardiovascular risk factors, genetic testing, and

diabetes treatment and prevention. Participants will study multiple research-related issues, learn about the clinical trials process, and examine their own health and lifestyle choices. This year's awards bring the SEPA portfolio to 72 active projects that span the country, from Maine to Florida and from Alaska to Texas. SEPA projects address a wide range of subject matter, from basic questions about biology to how clinical research is conducted.

Scientists have now added a third primate to the list of sequenced genomes: the rhesus macaque, *Macaca mulatta.* This old-world monkey is the nonhuman primate most widely used in biomedical studies focusing on major diseases, such as AIDS and diabetes. Its genome sequence is reported in the April 13, 2007, issue of *Science*. The sequencing, funded by NIH's National Human Genome Research Institute (NHGRI), was performed at the Baylor College of Medicine Human Genome Sequencing Center in Houston; the Genome Sequencing Center at Washington University in St. Louis; and the J. Craig Venter Institute in Rockville, Maryland. It was based on the DNA from a single individual—a female rhesus macaque housed at the NCRR-funded NPRC at the Southwest Foundation for Biomedical Research in San Antonio, Texas. The California, Oregon, and Yerkes NPRCs, also funded by NCRR, contributed additional biological samples used in the study. View Image.

The High-End Instrumentation (HEI) Program awarded 14 grants totaling $20.65 million to fund cutting-edge equipment required to advance biomedical research. Awarded to research institutions around the country, the 1-time grants support the purchase of sophisticated instruments costing more than $750,000. The maximum award is $2 million. High-end instruments supported in this round of funding include a 7-tesla human MRI and spectroscopy system, several MRI scanners, nuclear magnetic resonance spectrometers, and equipment for developing and producing positron emission tomography tracers. View Image.

NIH provided $4.8 million to establish and support a repository for its Knockout Mouse Project. This award is the final component of a more than $50 million trans-NIH initiative to increase the availability of genetically altered mice and related materials. The University of California, Davis and Children's Hospital Oakland Research Institute in Oakland, California, will collaborate to preserve, protect, and make available about 8,500 types of knockout mice and related products to the research community. The repository—funded by NCRR, NHGRI, and the National Institute of Allergy and Infectious Diseases—will archive, maintain, and distribute up to 8,500 strains of embryonic stem cell clones, live mouse lines, frozen embryos and sperm, and vectors, while assuring product quality and availability for all materials. The 4-year grant supports the establishment and operation of the repository.

NCRR provided $9.5 million over 3 years to launch a Translational Research Network that will increase the opportunity for multi-site clinical and translational research among minority and other collaborating institutions throughout the nation. Investigators at these institutions are focused on cancer, diabetes, renal disease, infant mortality, HIV/AIDS, and cardiovascular diseases—all of which disproportionately affect minority populations. Translational research conducted within the network will cover a wide range. Some will focus on applying discoveries generated during research in the laboratory to clinical trials. Others will emphasize developing and implementing best practices in disease prevention and intervention in local community settings. By providing computer-based tools for analyzing and managing clinical research data, recruiting for clinical trials, and sharing information with patients, the network will enable clinical and translational researchers to collaborate more efficiently with each other and their communities.

The NIH Roadmap for Medical Research funded 9 interdisciplinary research consortia to help integrate different disciplines to address health challenges that have been resistant to traditional research approaches. These consortia will develop new ways to think about challenging biomedical problems, and they will provide a stimulus for changing the culture of academic research such that interdisciplinary research becomes the norm. The consortia address several current barriers to interdisciplinary research. The strategies for accomplishing this include: 1) dissolving departmental boundaries within institutions; 2) providing recognition of team leadership within the projects; 3) cross-training students in multiple disciplines; and 4) changing the NIH approach to administering interdisciplinary research. The consortia consist of multiple research projects with several principal investigators, core research support facilities, training, career development, and education components. These components will be divided among several NIH Institutes and Centers for programmatic oversight. To maintain the interdisciplinary research program as a whole, the grants will remain linked electronically through unique identifiers, and NCRR and the NIH Office of Portfolio Analysis and Strategic Initiatives (OPASI) will oversee the entire program.

NCRR provided nearly $33 million to fund 3 new Institutional Development Awards (IDeA). The awards support multidisciplinary centers—each concentrating on one general area of research—that strengthen institutional biomedical research capability and enhance research infrastructure. The new centers are being established at the University of Oklahoma Health Sciences Center to study diabetes (especially in Native American populations); Rhode Island Hospital to study cartilage, joint health, and repair mechanisms; and University of Kansas Medical Center to study molecular regulation of cell development and differentiation. View Image.

Dr. Jay Hove, an NCRR grantee at the University of Cincinnati, became 1 of 12 NIH-supported scientists to receive the Presidential Early Career Award for Scientists and Engineers at the outset of his scientific career. Dr. Hove's innovative research through the years has combined advances in optics, engineering, and biomedicine to describe—for the first time—the dynamic flow interactions that occur in both sick and healthy animal models. In 2006, NCRR provided Dr. Hove with $1.53 million to build on these innovations. With this funding, Dr. Hove plans to create a state-of-the-art, cross-platform technology for 4-D imaging (3-D plus real time) that would study how fluids, such as blood, flow in the zebrafish, a widely used animal model for biomedical research.

Researchers at the Oregon Health and Science University's NPRC—funded by NCRR—made a significant breakthrough in efforts to develop human stem cell therapies to combat devastating diseases. For the first time, scientists successfully derived embryonic stem cells by reprogramming the genetic material of skin cells from rhesus macaque monkeys. This advance—supported over several years by NCRR—builds on studies aimed at understanding the basic biology of stem cells and at developing methods to investigate nonhuman primate models of disease. These studies have the potential to accelerate progress in the field of regenerative medicine.

A team of University of Wisconsin-Madison researchers led by Dr. James Thomson reported the genetic reprogramming of human skin cells to create cells apparently indistinguishable from embryonic stem cells. This alternative to the embryo-based cloning technique shows that human skin cells can be reprogrammed into so-called induced pluripotent stem cells (iPS cells) that look and act like embryonic stem cells, although more tests are needed to confirm the precise similarity. These iPS cells could be used to generate patient-specific stem cells. Using this new reprogramming technique (inserting viral genes into adult human skin cells), the Wisconsin group developed 8 new stem cell lines. Scientists still need to determine what risks might be associated with using these virally transformed cells. Thomson is a core scientist at the NCRR-funded Wisconsin NPRC. The base grant to the NPRC has supported the isolation and analysis of monkey stem cells for many years, which helped lay the foundation for the recent work with the human iPS cells.

In order to formulate the Center's 2009-2013 Strategic Plan, NCRR requested input from the scientific community on key research and resource questions to determine the promising areas of biomedical research. From July to September 2007, more than 500 responses were received, representing a wide range of interests. Examples of these responses included interest in fostering collaborations between CTSA institutions and NCRR Centers; integrating informatics resources; increasing the availability and range of animal models; enhancing training opportunities for clinicians and veterinarians; enhancing opportunities for developing institutions to partner with research-intensive institutions and increase technology database development; expanding imaging resources; and encouraging partnerships with industry and pharmaceutical companies. In December 2007, NCRR held a planning forum that convened expert biomedical investigators, academic administrators, and staff to discuss these recommendations, which will drive the development of the Center's 2009-2013 Strategic Plan.

NCRR released a multimedia presentation—*Harnessing Innovation to Advance Human Health* (QuickTime Movie 6KB)—that provides an overview of the Center's mission, grant programs, and resources.

NCRR sponsored 4 conferences (Fostering Collaborative Community-Based Clinical and Translational Research, Improving Genetic Resources for the Rhesus Macaque, The 25th Annual Symposium for Nonhuman Primate Models for AIDS, and Development and Use of Nonhuman Primate Embryonic Stem Cell Lines) for the biomedical research community. Information on these meetings is available on the NCRR Workshops Web Site (http://www.esi-bethesda.com/ncrrworkshops/).

NCRR Legislative Chronology

July 30, 1956—The Health Research Facilities Act of 1956 (Title VII of the PHS act) authorized a PHS program of Federal matching grants to public and nonprofit institutions for the construction of health research facilities. Congress extended title VII through 1971. No grants were made under this authority after 1969.

August 19, 1959—Congress appropriated $2 million to establish 2 primate research centers.

September 15, 1960—Public Law 86-798 amended the PHS act to authorize grants-in-aid to universities, hospitals, laboratories, and other public and nonprofit institutions to strengthen their programs of research and research training in sciences related to health. The act also authorized the use of funds appropriated for research or research training to be set aside by the Surgeon General in a special account for general research support grants. Passage of this law resulted in the Biomedical Research Support Program.

July 29, 1971—The Minority Biomedical Research Support Program was created with $2 million from the Senate Appropriations Committee under authority of sec. 301(c) of the amended PHS act.

October 3, 1984—The Research Centers in Minority Institutions Program was created with a $5 million congressional appropriation to the NIH Office of the Director. DRR was given administrative authority for the program.

December 22, 1987—Public Law 100-202 provided $23,935,000 for the "repair, renovation, modernization, and expansion of existing research facilities, and for the purchase of associated equipment." The accompanying report, H.R. 100-498, directed that the money be spent on improving AIDS research facilities. The Research Facilities Improvement Program was created in DRR in response to this legislation.

November 6, 1990—Public Law 101-613, NIH Revitalization Act of l990, mandated new programs, specified program funding levels, and reauthorized existing activities.

June 10, 1993—Public Law 103-43, NIH Revitalization Act of l993, provided the statutory authority to redesignate DRR as NCRR and the authority to fund construction of biomedical and behavioral research facilities, with a special provision for centers of excellence and regional centers for research utilizing nonhuman primates. It also authorized the Institutional Development Award Program, which supports programs in states that historically have been unsuccessful in competing for NIH grants.

November 13, 2000—The Clinical Research Enhancement Act of 2000, which is Title II of the Public Health Improvement Act [Minibus] (P.L. 106-505), provided the NCRR Director with statutory authority to award grants for the establishment of GCRCs. The bill also required the NIH Director to establish a Loan Repayment Program to encourage recruitment of new clinical investigators and to award grants that will enhance clinical research career development.

November 13, 2000—The Twenty-First Century Research Laboratories Act, which is Title III of the Public Health Improvement Act [Minibus] (P.L. 106-505), authorized $250 million for FY 2001 to the NCRR Director to make grants or contracts to public and nonprofit private entities to expand, remodel, renovate, or alter existing research facilities or to construct new research facilities, including centers of excellence. It also authorized such sums as necessary for FY 2002 and FY 2003. In addition, the Act created, in statute, a specific authorization for NCRR's Shared Instrumentation Grant Program, authorizing $100 million for FY 2000 and such sums as necessary for subsequent fiscal years.

December 20, 2000—The Chimpanzee Health Improvement, Maintenance, and Protection Act (P.L. 106-551) required NIH to enter into a contract with a nonprofit private entity for the purpose of operating a sanctuary system for the long-term care of chimpanzees that are no longer needed in research conducted or supported by the Federal government. The law provides for standards for permanent retirement of chimpanzees into the system, including prohibiting using sanctuary chimpanzees for research except in specified circumstances.

January 15, 2007—President George W. Bush signed into law the NIH Reform Act of 2006. Of specific importance to NCRR, the legislation enhances the Clinical and Translational Science Awards by requiring the establishment of a mechanism to preserve independent funding and infrastructure for pediatric clinical research centers.

December 26, 2007—President Bush signed into law P.L. 110-170, the Chimp Haven is Home Act. Provisions would modify the program for the sanctuary system for surplus chimpanzees by terminating the authority for the removal of chimpanzees from the system for research purposes.

Biographical Sketch of NCRR Director Barbara M. Alving, M.D.

Dr. Barbara M. Alving is the Director of the National Center for Research Resources (NCRR) at the National Institutes of Health. She earned her medical degree—*cum laude*—from Georgetown University School of Medicine, where she also completed an internship in internal medicine. She received her residency training in internal medicine at the Johns Hopkins University Hospital, followed by a fellowship in hematology.

Dr. Alving then became a research investigator in the Division of Blood and Blood Products at the U.S. Food and Drug Administration. In 1980, she joined the Department of Hematology at the Walter Reed Army Institute of Research and became Chief of the Department in 1992. She left the Army at the rank of Colonel in 1996 to become the Director of the Medical Oncology/Hematology section at Washington Hospital Center in Washington, D.C.

In 1999, she joined the NIH National Heart, Lung, and Blood Institute (NHLBI), serving as the Director of the extramural Division of Blood Diseases and Resources until becoming the Deputy Director of the Institute in September 2001. From September 2003 until February 1, 2005, she served as the Acting Director of NHLBI while also serving as the Director of the Women's Health Initiative (2002-2006). In April 2005, Dr. Alving joined NCRR, serving as the Acting Director until being named Director in April of 2007.

Dr. Alving is a Professor of Medicine at the Uniformed Services University of the Health Sciences in Bethesda, a Master in the American College of Physicians, a former member of the subcommittee on Hematology of the American Board of Internal Medicine, and a previous member of the FDA Blood Products Advisory Committee. She is a co-inventor on 2 patents, has edited 3 books, and has published more than 100 papers in the areas of thrombosis and hemostasis.

NCRR Directors

Name	In Office from	To
Barbara M. Alving	April 2007	Present
Barbara M. Alving (Acting)	April 2005	March 2007
Judith L. Vaitukaitis	September 1992	March 2005
Robert A. Whitney, Jr.	November 1988	August 1992

DRR* Directors
(*NCRR's predecessor organization)

Name	In Office from	To
Betty H. Pickett	October 1982	October 1988
James F. O'Donnell (Acting)	January 1981	September 1982
Thomas G. Bowery	November 1969	December 1981
Thomas J. Kennedy	July 1965	November 1969
Frederick L. Stone	July 1962	June 1965

Major Extramural Programs

Division of Biomedical Technology

Biomedical Technology Research Resources

The Division of Biomedical Technology supports the development of a broad spectrum of technologies, techniques, and methods through 50 Biomedical Technology Research Resources (BTRRs) at academic and other research institutions nationwide. The BTRRs develop versatile new technologies and methods that help researchers who are studying virtually every human disease, each creating innovative technologies in 1 of 5 broad areas: informatics and computation, optics and spectroscopy, imaging, structural biology, and systems biology. They are complemented by programs providing research project grants to individual investigators and small businesses, often focusing on high-risk, high-reward technological innovation.

These resources create critical, often unique technology and methods at the forefront of their respective fields, and apply them to a broad range of basic, translational, and clinical research. This is accomplished through a synergistic interaction of technical and biomedical expertise, both within the resources and through intensive collaborations with other leading laboratories.

BTRRs serve a unique purpose in the broad context of NIH-funded research. They represent a critical mass of technological and intellectual resources with a strong focus on service and training for outside investigators, as well as dissemination of technologies, methods, and software. Their goal is to promote the widespread and routine application of the cutting-edge technologies they develop across the full spectrum from bench to bedside.

Biomedical Informatics Research Network (BIRN)

The NCRR-funded Biomedical Informatics Research Network (BIRN) uses emerging technologies to enhance collaborative efforts that integrate data, expertise, and unique technologies from research centers across the country. The collaborative infrastructure is used by BIRN test beds to create new tools and procedures that enable multi-site studies and also benefit single-laboratory research. The tools and datasets, and the underlying collaborative infrastructure, are publicly available. Collaborations within BIRN include scientists in a large number of biomedical sub-disciplines as well as computer scientists and engineers who are creating this cyberinfrastructure.

BIRN tools currently focus on neuroscience and are available to researchers worldwide as they pursue the causes and new treatments of Alzheimer's disease, schizophrenia, major depression, attention deficit hyperactivity disorder, and autism. However, researchers in other medical fields, including cardiology and cancer, can also benefit from this infrastructure to

support collaborative research and sharing of data and applications.

Shared Instrumentation Grant (SIG)

The SIG Program provides funding—using the S10 funding mechanism—to institutions to purchase commercially available, expensive, technologically sophisticated equipment for use by groups of NIH-supported researchers. Shared use of these high-sensitivity and high-resolution instruments, essential to understanding fundamental biological processes, optimizes this Federal investment. The SIG mechanism provides between $100,000 and $500,000 for the purchase of such instruments.

High-End Instrumentation (HEI)

Rapid technological development has led to the production of a new generation of advanced instruments. As the capabilities of these high-sensitivity, high-resolution instruments increases, so does their cost. To meet the investigators needs for this advanced technology, in FY 2002, NCRR began the High-End Instrumentation (HEI) Program, which allows institutions to acquire equipment that costs more than $750,000. The maximum award is $2.0 million. The HEI grant program complements the Shared Instrumentation Grant Program and also uses the S10 funding mechanism.

Division for Clinical Research Resources

The NCRR Division for Clinical Research Resources funds biomedical research institutions to establish and maintain specialized clinical research facilities and to train the clinical researchers of tomorrow. It is leading efforts to help institutions create a new integrated discipline of clinical and translational sciences through the Clinical and Translational Science Awards (CTSA) program. Additionally, the Division provides clinical-grade biomaterials that enable clinical and patient-oriented research, supports the development of clinical research informatics, and improves the nation's understanding of medical research through Science Education Partnership Awards. The Division supports these resources through the following programs:

Clinical and Translational Science Awards

The Clinical and Translational Science Award (CTSA) program is designed to more rapidly and efficiently transfer discoveries made in the laboratory into new treatments for patients. Through the CTSAs, academic health centers are working together as a consortium to design clinical research informatics tools, forge new partnerships with health care organizations, expand outreach to minority and medically underserved communities, develop better designs for clinical trials, and train the next generation of clinical and translational researchers, including physicians, researchers, and nurses. Additionally, each CTSA is creating an academic home at each grantee institution for clinical and translational research.

CTSA program information can be found on the NCRR Web site at: www.ncrr.nih.gov/ctsa.asp. For more information about the consortium, visit CTSAweb.org.

General Clinical Research Centers (GCRCs)

NCRR funds a national network of 44 General Clinical Research Centers (GCRCs) that provide settings for medical investigators to conduct safe, controlled, state-of-the-art, in-patient and out-patient studies of both children and adults. GCRCs also provide infrastructure and resources that support several career development opportunities. GCRC staff includes research nurses, dietitians, biostatisticians, technicians, and administrative personnel who provide a supportive environment for patients and help investigators by facilitating the day-to-day research process. The GCRC network will gradually be transformed under the new CTSA program, described above.

National Gene Vector Laboratories (NGVLs)

NCRR provides core funding for a group of National Gene Vector Laboratories (NVGLs) that serve as a resource for researchers seeking adequate quantities of clinical-grade vectors for human gene transfer protocols.

The NGVLs include vector-production centers at Baylor College of Medicine, City of Hope National Medical Center and Beckman Research Institute, and Indiana University, which also serves as the coordinating center for all the laboratories. Two additional laboratories conduct toxicology studies for approved investigators. These laboratories are located at the Southern Research Institute and the University of Florida.

Rare Diseases Clinical Research Network

The Rare Diseases Clinical Research Network, an initiative of the NIH Office of Rare Diseases and NCRR—in collaboration with many NIH Institutes, facilitates clinical research of rare diseases through support for 1) collaborative clinical research in rare diseases; 2) training of clinical investigators in rare diseases research; 3) distributed clinical data management that incorporates novel approaches and technologies for data management, data mining, and data sharing across rare diseases, data types, and platforms; and 4) access to information related to rare diseases for basic and clinical researchers, academic and practicing physicians, patients, and the lay public. Each of the 10 Rare Diseases Clinical Research Consortia addresses a subset of rare diseases and works closely with relevant patient support organizations, while the Data and Technology Coordinating Center provides innovative approaches to incorporate standards and technologies for data exchange among sites, partners, and resources.

Center for Genotyping and Analysis

The Center for Genotyping and Analysis is the first national center for high-throughput genotyping dedicated solely to large-scale SNP (single nucleotide polymorphism) analysis. Located at the Eli and Edythe L. Broad Institute of MIT and Harvard University in Cambridge, Massachusetts, the Center serves as a high-capacity resource so that U.S. researchers can quickly and cost-effectively carry out large-scale studies of genetic variation in humans and animals to advance disease gene identification.

Islet Cell Resource (ICR) Centers

In 2001, NCRR established a network of 10 ICR Centers to isolate, purify, and characterize human pancreatic islets for subsequent transplantation into patients with type 1 diabetes. Following competitive applications in 2006, the ICR Center Consortium was reconfigured to consist of 7 production and testing centers and an Administrative and Bioinformatics Coordinating Center for storage and communication of data, program analysis, and equitable distribution of islets to basic scientists. The centers purify, store, and ship islets under good laboratory practice to investigators for clinical studies and for basic science research. In addition, they conduct comparative studies on purification methods, shipping, storage, and potency assays on purified islets. The islet purification program supports the NIAID-NIDDK-sponsored Clinical Islet Transplantation Study of islet efficacy in Type 1 Diabetes.

Human Tissues and Organs Resource

The Human Tissues and Organs Resource Cooperative Agreement supports a procurement network developed by the National Disease Research Interchange—a not-for-profit organization. By collaborating with various medical centers, hospitals, pathology services, eye banks, tissue banks, and organ procurement organizations, the Resource provides a wide variety of human tissues and organs—both diseased and normal—to researchers for laboratory studies. Such samples include tissues from the central nervous system and brain; cardiovascular system; endocrine system; and eyes, bone, and cartilage.

Science Education Partnership Award (SEPA)

The SEPA Program encourages scientists to work with educators and other organizations to improve students' (K-12) and the public's understanding of the health sciences. The award supports development of a variety of model programs in

biomedical and behavioral science education that make it feasible for scientists, educators, media, and community leaders to partner in order to promote science by increasing science literacy. Past models have included a national video education program, a traveling and fixed museum exhibit about AIDS and other health issues, biotechnology research experiences for students and teachers, and health-promoting outreach programs for inner-city and rural communities. The SEPA program also funds mobile laboratories outfitted with state-of-the-art biotechnology equipment that provide opportunities for science education directly to students at their schools.

Division of Comparative Medicine

The NCRR Division of Comparative Medicine provides scientists with essential resources—including specialized laboratory animals, research facilities, training, and other tools—that enable health-related discoveries. Animal models are a critical part of the biomedical research continuum to bridge the gap between basic science and human medicine. Division programs support the maintenance and distribution of primate, rodent, aquatic, and comparative animal models and resources. The division also funds a unique training program aimed at providing research training for veterinarians and veterinary students.

Nonhuman Primates

Nonhuman primates are critical components in translational research because of their close physiological similarities to humans. They are used in hypothesis-based research to enable discoveries that allow investigators to relate their research findings directly to human health. Nonhuman primates are also used in pre-clinical, applied research studies to test therapeutic approaches and vaccines. NCRR funds and oversees a network of 8 National Primate Research Centers (NPRCs), which provide the animals, facilities and expertise to enable studies of nonhuman primates. In addition, applied research grants help develop technologies and reagents that are complementary to, and synergize with, the research activities at the rest of the NPRCs and at other sites. Key research areas include infectious diseases (particularly AIDS), neurobiology, bio-defense, and regenerative medicine. Finally, the Chimpanzee Sanctuary Program provides housing and lifetime care for chimpanzees no longer needed for research.

Rodents

Rodents play a central role in research that can translate into treatments for human disease. Mice share much in common with human genetics, development, physiology, behavior, and disease and are used to predict promising directions in biomedical research. NCRR's laboratory rodents program funds development of genetically engineered rodents and research rodent colonies, facilities that distribute rodents and related biological materials, and new ways to study, diagnose, and eliminate laboratory rodent disease.

Aquatics

Some aquatic animals serve as models for studying human development, behavior, and disease. With short reproductive cycles and transparent eggs that are easily observed as they develop, zebrafish are useful for research. Other aquatic models include marine slugs, squid, and octopi. NCRR's aquatic models program funds development and maintenance of critical genetic stocks, biological materials, and online information for researchers.

Comparative Models

Comparative models that add flexibility and ease of manipulation in the early stages of the translational discovery process include fruit flies and round worms, which are genetically well characterized and inexpensive and can undergo many genetic manipulations. Results from experiments involving these less complex models can help scientists decide whether to pursue similar research with higher species. NCRR's Comparative Models Program supports development and use of new and improved models that complement those more traditionally used to study human diseases.

Genetic, Biological, and Information Resources

NCRR supports a variety of sources for genetic analysis services, array technology, and databases. This program also supplies critical biological materials, such as stem cells, enzymes, and proteinases, as well as online information on model organisms.

Research Training and Career Development Programs

Molecular and genomic studies using animal models help lay the foundation for translational research that benefits human health. Scientists with a background in veterinary medicine contribute unique expertise and important knowledge and skills to this paradigm. To address the significant shortage of trained veterinary researchers, NCRR funds National Research Science Award programs specifically aimed at biomedical research trainees with a veterinary background; NCRR is the only unit within NIH to fulfill this need. These programs either introduce veterinary students to research during a summer session, allow veterinary students to immerse in a full-time pursuit of research studies for an entire academic year, or encourage newly graduated veterinarians to pursue research studies for three postdoctoral years, frequently leading to an advanced degree.

Division of Research Infrastructure

The Division of Research Infrastructure develops and invigorates the nation's research capacity and infrastructure at all stages of research—from basic discoveries in the laboratory to advanced treatments for patients. The Division sponsors the following programs:

Research Centers in Minority Institutions (RCMI)

The RCMI Program is an initiative that provides grants to institutions that award doctoral degrees in health-related fields and that have a 50% or greater enrollment of students from minority communities underrepresented in the biomedical sciences. These communities include African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders. Because many RCMI investigators study diseases that disproportionately affect minority populations—such as a variety of cancers, diabetes, AIDS, and cardiovascular diseases—the program serves the dual purpose of increasing the number of minority scientists engaged in biomedical research and enhancing studies on minority health.

Specifically, the RCMI program supports faculty development and provides resources to acquire advanced instrumentation, modify laboratories for competitive research, and support core research facilities. The program also expands the capacity for clinical research in RCMI institutions that have affiliated medical schools through the Clinical Research Infrastructure Initiative. This program encourages minority scientists to participate in clinical investigations and increases volunteer participation by minorities in clinical research studies.

Institutional Development Award (IDeA)

The IDeA Program was initiated by Congress to broaden the geographical distribution of NIH grant funding for biomedical and behavioral research. Through this Program, NCRR fosters health-related research and improves the competitiveness of investigators in states that historically have not received significant levels of competitive research funding from NIH. The IDeA Program supports multidisciplinary centers or collaborative partnerships that increase an institution's capacity to conduct cutting-edge biomedical research. Specifically, the IDeA Program establishes Centers of Biomedical Research Excellence within an institution to explore multidisciplinary research themes and foster mentoring opportunities. It also creates networks within a state that share multidisciplinary, thematic scientific goals. Funding for these IDeA Networks of Biomedical Research Excellence supports statewide partnerships that include undergraduate and graduate/professional institutions.

Research and Animal Facilities Improvements

Research Facilities Improvement grants increase the nation's ability to conduct state-of-the-art research by providing

competitive funding to modernize and construct research facilities that support basic and/or clinical investigations. Funding has supported the construction of cancer laboratories; improved research imaging capabilities; and much more. Through the Animal Facilities Improvement Program, NCRR provides institutional funding to improve animal research facilities, including facility upgrades and the development of programs and policies related to laboratory animal care and use.

NCRR Information Dissemination

A new NCRR multimedia presentation—*Harnessing Innovation to Advance Human Health* (QuickTime Movie 6KB) how the Center brings together diverse research teams to realize the full potential of shared biomedical resources. Featuring NCRR's support to unique and essential research and resources, this project was made possible by grantees who provided photographs and video footage of NCRR-funded laboratories, technologies, resource centers, and animal models.

The *NCRR Reporter* is a quarterly publication of the National Center for Research Resources. Its purpose is to foster communication, collaboration, and resource sharing in areas of current interest to scientists and others in the biomedical field. Subscriptions to the electronic (e-mail) and print editions of the *NCRR Reporter* are available free of charge. Subscribe to the *E-Reporter* by using the *NCRR Reporter subscriber page* on the NIH LISTSERV Web site. Subscribe to the print edition by contacting the NCRR Information Officer at info@ncrr.nih.gov.

The Clinical and Translational Science Awards (CTSA) Consortium has developed a Web site (ctsaweb.org) to ensure access to CTSA resources, enhance communication, and encourage information sharing.

NIH Almanac: Organization

NIH Clinical Center

Mission | Important Events | Legislative Chronology | Director | Programs

Mission

The NIH Clinical Center (CC) is the clinical research hospital for the National Institutes of Health. Through clinical research, physician-investigators translate laboratory discoveries into better treatments, therapies and interventions to improve the nation's health.

Clinical and laboratory research is conducted shoulder-to-shoulder at the CC and this tandem approach drives all aspects of its operations. The first patients were admitted in 1953. More than one-quarter million patients from across the nation have participated in clinical research studies here. In 2006 their care accounted for about 6,000 inpatient admissions and more than 95,000 outpatient visits.

Late in 1997, Vice President Al Gore and Senator Mark O. Hatfield broke ground for the new Mark O. Hatfield Clinical Research Center. The center, completed in 2004, houses 240 inpatient beds, 90 day-hospital stations and research labs. Together, the Magnuson and Hatfield centers provide the environment today's researchers need to spark new medical discovery.

Important Events in CC History

November 1948—Construction of the Clinical Center was started.

June 22, 1951—The cornerstone ceremony was officiated by Oscar R. Ewing, Federal security administrator. President Harry S. Truman was the honored guest.

July 2, 1953—The CC was dedicated by DHEW Secretary Oveta Culp Hobby.

July 6, 1953—The first patient was admitted to the Clinical Center.

1954—The Clinical Center's diagnostic x-ray department acquires the only Schnonander angiocardiographic unit in the U. S. It takes films in two planes at the rate of six films per second, permitting a graphic demonstration of contrast substances as they pass through the heart, making diagnosis faster and more accurate.

1957—The Clinical Pathology Department starts an approved residency training program, admitting its first two residents. Develops the first automated machine for counting red and white blood cells (until then counted manually), from which later comes the Coulter counter.

1957—The Blood Bank publishes its first research paper, delineating the post-transfusion hepatitis problem, firing the first salvo in a long but largely successful campaign.

1959—A new, circular surgical wing (10A) begins construction, adding 45,000 square feet.

September 5, 1963—A new surgical wing for cardiac and neurosurgery was dedicated by Dr. Luther L. Terry, Surgeon General. The two cardiac operating rooms are unique in being dedicated to cardiac surgery, with special systems for monitoring, lighting, communications, and storage and retrieval of large amounts of research data. Open-heart surgery can be viewed through an observation room directly above, on the third floor. Disposable surgical gloves are also introduced.

1963—The Blood Bank moves to a new circular building (the "fish bowl"); blood collections begin on the NIH campus.

1964—Harvey Alter (Clinical Center) and Baruch Blumberg (NIDDK) codiscover the Australian antigen, which Blumberg later shows to be the surface coating of the hepatitis B virus, leading to the isolation of this medically important virus. Blumberg later wins Nobel Prize. Alter does pioneering work in the causes and prevention of blood-transmitted infections, which helps lead to the discovery of the virus that causes hepatitis C and the development of screening methods that will reduce the risk of transfusion-transmitted hepatitis.

1964—John L. Doppman and associates in diagnostic radiology report the first successful imaging of the arteries that supply the spinal cord. The technique of spinal angiography makes surgical intervention possible where spinal arterial malformations, lesions, or tumors cause paralysis.

1965—Clinical Pathology (CPD) acquires a Control Data 3200 computer, which fills a room the size of a small living room. Some instruments are placed online; other data are entered on key-punched cards. CPD begins using computers to manipulate lab data and report test results.

1966—A Department of Nuclear Medicine is established in the Clinical Center, headed by Jack Davidson, to centralize imaging facilities for patients in any institute. Radiation Safety, Diagnostics, and the Whole Body Counter Division become part of Nuclear Medicine and the old Radiation Safety Division is abolished. President Lyndon B. Johnson visits the new department.

1966—Wanda S. Chappell, chief nurse in the Blood Bank, comes up with a simple but ingenious method for separating blood platelets (the smallest blood cells) from blood plasma, so that the platelets can be used for transfusion to leukemia patients and the rest of the blood can be used by others, including patients undergoing open heart surgery.

1966—Additions to the Clinical Center (a library, cafeteria) are begun.

1968—Diagnostic radiologist John L. Doppman develops a method for locating the parathyroid, a group of glands (each about the size of a BB pellet) that regulates calcium metabolism.

1968—The first cancer patient enters the laminar flow room on 13 East.

July 2, 1969—A dedication ceremony was held to name the Clinical Center's Jack Masur Auditorium.

1970—The Blood Bank switches to an all-volunteer donor system, adding a test for hepatitis B surface antigen. Those two measures alone reduce the hepatitis rate from 30 percent before 1970 to about 11 percent after. Later, when it adds more sensitive tests for hepatitis B, hepatitis B virtually disappears as a problem in the Blood Bank.

1972—Clinical Pathology's Richard B. Friedman develops a computer program to teach students to diagnose illnesses by having the computer report symptoms, inform on test availability and cost, test results, and reactions to treatment.

1972—Blood Bank scientists develop a test for AU antigen–agent associated with hepatitis. The test will be used nationally.

1974—The Clinical Center Blood Bank develops a nationally recognized program in automated blood collection (apheresis), tissue typing (HLA), and an international reputation for research studies of red cell serology and hepatitis.

1976—The new medical information system (MIS) goes live, one nursing unit at a time.

April 1977—Construction of the ambulatory care research facility was started.

September 1977—*Medicine for the Layman*, a series of health seminars for the public, is launched

November 1977—The Critical Care Medicine Department was established.

1977—The Blood Bank establishes therapeutic apheresis/exchange programs that for decades will improve the lifespan and welfare of patients with such illnesses as sickle cell disease, hyperlipidemia, and autoimmune disorders. It also establishes the first automated platelet-pheresis center, collecting platelets for transfusion from volunteer donors using automated instrumentation.

October 22, 1981—The outpatient clinic facility was dedicated. The research hospital was renamed the Warren Grant Magnuson Clinical Center, in honor of the former chairman of the Senate Committee on Appropriations, who has actively supported biomedical research at NIH since 1937. (P.L. 96-518.)

1981—As part of the design for the new ACRF, Clinical Pathology services (previously scattered) are brought under one roof—working together in one vast open room, except for specialized functions sequestered for safety purposes (such as the containment of radionuclides).

1982—A new surgical facility opens on the second floor of the ACRF, with more space for equipment, larger operating suites, two viewing galleries, and better delivery systems. Surgical Services performs more than 2,000 cancer, eye, and general surgical procedures a year. A surgical intensive care unit (2J) opens in conjunction with new surgical suites. Nurses in the new nursing unit face new challenges in caring for patients in septic shock and providing such therapies as continuous veno-venous hemofiltration (CVVH), hemodynamic monitoring, and ventilator support.

September 20, 1982—The NIA Laboratory of Neurosciences was dedicated.

1983—Clinical Pathology creates an immunology service, reflecting growing demand for sophisticated antibody and cellular-level diagnostic services.

March 22, 1984—The first magnetic resonance imaging unit became operational for patient imaging.

October 1984—NCI's Radiation Oncology Building was dedicated.

1984—Clinical Center Blood Bank is renamed the Department of Transfusion Medicine (DTM) because its activities extend well beyond traditional blood banking. DTM achieves the first transmission of HIV (HTLV III) to a primate through transfusion and describes the HIV seronegative window.

April 13, 1985—Two cyclotrons were delivered to the underground facility operated by the Nuclear Medicine Department.

1986—As a charter member of the National Marrow Donor Program (NMDP), on December 2 the Clinical Center signs an agreement to become one of the first donor centers participating in the NMDP.

November 20, 1987—The Lipsett Amphitheater in the clinic was dedicated.

September 14, 1990—A 4-year-old patient with adenosine deaminate deficiency was the first to receive gene therapy treatment.

April 8, 1991—The Department of Transfusion Medicine opened its state of the art facility.

1991—A thrombosis unit is established in Clinical Pathology's hematology service to help manage patients with coagulopathies. A virology section is redeveloped within Clinical Pathology's microbiology service. The original viral diagnostic unit had long since lapsed, for lack of clinical utility, but with the development of new diagnostic methodologies and new therapies, the need for such a service has become increasingly apparent.

June 1992—The A-wing addition was completed, adding NCI and NIAID labs focusing on AIDS research.

July 1993—The hematology/bone marrow unit opened to improve transplant procedures and develop gene therapy techniques.

May 1994—First multi-institute unit designed and staffed for children opened.

1995—Diagnostic Radiology installs a 20,000-pound magnetic resonance scanner in the courtyard outside Transfusion Medicine.

February 1996—Details on clinical research studies conducted at the Clinical Center are made available on the World Wide Web (http://clinicalstudies.info.nih.gov/), increasing opportunities for physicians to participate in NIH clinical investigations.

November 1996—A Board of Governors was appointed by the Secretary of HHS, marking a new governing system for the Clinical Center.

July 1997—Transfusion Medicine Department launches a 3,000-square feet model core [cGMP] cell processing facility, created to meet increasing investigative needs for cell products used in research into new cellular therapies such as immunotherapy, gene therapy, stem cell transplantation, and pancreatic islet cell transplantation.

July 1997—To meet increasing investigative needs for cell products used in immunotherapy, gene therapy, and stem cell transplantation, a cell processing facility was created.

November 4, 1997—Vice President Al Gore and Senator Mark O. Hatfield attended groundbreaking ceremonies for the Mark O. Hatfield Clinical Research Center. The new center, which will include a modern research facility with a 250-bed hospital, outpatient care capability and research laboratories, is scheduled to be completed in 2004.

1999—Clinical Pathology Department is renamed Department of Laboratory Medicine. A new laboratory information system is put in place for Laboratory Medicine, Transfusion Medicine, and the Pathology Lab.

2000—The NIDDK and the Clinical Center (in collaboration with Walter Reed Army Medical Center, the Naval Medical Research Center, and the Diabetes Research Institute of the University of Miami) launch a new kidney, pancreas, and islet transplant program. The idea is to test novel therapies that may eliminate the need for the immunosuppressive drugs patients take to keep their bodies from rejecting new transplanted organs. Soon after the program starts, Allan Kirk performs the NIH's first successful kidney transplant procedure and David Harlan performs one of the first successful islet allotransplants in the United States.

2000—Clinical Center launches a new Pain and Palliative Care Consult Service.

2000—Harvey Alter, Department of Transfusion Medicine, receives the Lasker Award "for pioneering work leading to the discovery of the virus that causes hepatitis C and the development of screening methods that reduced risk associated with transfusion-associated hepatitis in the United States from 30 percent in 1970 to virtually zero in 2000." Alter, who is also elected to the National Academy of Sciences, shares the award with Chiron's Michael Houghton.

2000—The Imaging Sciences Program takes first steps toward filmless radiology, unveiling the pilot phase of its new Picture Archiving and Communication System (PACS) and Radiology Information System (RIS). RIS is a sophisticated patient tracking system, which will track patient arrival and departure times, the start and end of exams, and when reports are dictated, read, and signed. It is expected to reduce patient waiting times, improve image availability, and minimize loss and misidentification of images and reports. Images stored in PACS/RIS originate from procedures and exams conducted in the Diagnostic Radiology, Nuclear Medicine, and PET Departments. They include CT scans, MR scans, PET scans, nuclear medicine scans, ultrasound examinations, and digital radiography examinations.

2001—A second bone marrow transplant unit opens to support NCI protocols.

2002—DTM establishes a model program for collecting blood from subjects with hereditary *hemochromatosis*. This program supplies 10% of the hospital's red cell needs.

October 29, 2002—Groundbreaking ceremony was held for the Edmond J. Safra Family Lodge at NIH. Located steps away from the Mark O. Hatfield Clinical Research Center, the lodge will provide a comfortable home away from home for the families and caretakers of Clinical Center patients.

2004—As recommended by the NIH Director's Blue Ribbon Panel on the Future of Intramural Clinical Research, the former Clinical Center Board of Governors assumed a new and larger identity, becoming the NIH Advisory Board for Clinical Research. The Board will oversee all intramural clinical research, while continuing its oversight of Clinical Center resources, planning and operations.

August 21, 2004—The new $32-million Clinical Research Information System goes live.

September 22, 2004—Dedication ceremony held for the Mark O. Hatfield Clinical Research Center. In attendance are former Sen. Mark O. Hatfield, DHHS Secretary Tommy G. Thompson, Sen. Paul Sarbanes, (D. MD) Sen. Paul Harkins, (D. Io) and Rep. C.W. Bill Young (R. Fla), Chairman of the House Appropriations Committee.

April 2, 2005—Patients are moved into the Mark O. Hatfield Clinical Research Center and the building becomes fully operational.

May 26, 2005—An opening ceremony is held for the Edmond J. Safra Family Lodge, offering a temporary residence for families and loved ones of adult patients receiving care at the NIH Clinical Center. The Lodge opens its doors to guests on June 1.

January 25, 2007—A ribbon-cutting ceremony is held for a new NIH metabolic clinical research unit that provides researchers from multiple institutes the opportunity to study obesity and related conditions, such as diabetes, heart disease and certain cancers. An important component of the NIH Strategic Plan for Obesity Research, the unit and work conducted there generates new knowledge regarding the physiology, prevention, and treatment of obesity.

CC Legislative Chronology

July 1, 1944—Public Law 78-410, the Public Health Service Act, authorized establishment of the Clinical Center.

July 8, 1947—Under P.L. 80-165, research construction provisions of the Appropriations Act for FY 1948 provided funds "For the acquisition of a site, and the preparation of plans, specifications, and drawings, for additional research buildings and a 600-bed clinical research hospital and necessary accessory buildings related thereto to be used in general medical research."

Biographical Sketch of CC Director John I. Gallin, M.D.

Dr. Gallin was appointed director of the NIH Clinical Center in 1994. During his tenure, a new research hospital for the Clinical Center, the Mark O. Hatfield Clinical Research Center, has been conceived, designed, constructed and made ready to occupy. The NIH Clinical Center serves the clinical research needs of 17 of NIH's institutes and centers and is the largest clinical research hospital in the world.While serving as Clinical Center director, Dr. Gallin has remained an active clinician and researcher. His primary research interest is rare hereditary immune disorders of the phagocytic cells, cells critical to inflammation. One of these disorders, chronic granulomatous disease (CDG), has been a focus of his attention and his laboratory has described the genetic basis forseveral forms of CGD and has done pioneering research that has reduced life-threatening bacterial and fungal infections in CGD patients. He has published more than 290 articles in scientific journals and has edited the leading textbooks on inflammation and clinical research.

Dr. Gallin graduated *cum laude* from Amherst College and earned his medical degree at Cornell University Medical College. After a medical internship and residency at New York University's Bellevue Hospital Medical Center, he received postdoctoral training in basic and clinical research in infectious diseases at the NIH from 1971-1974. He then served at Bellevue as senior chief medical resident for two years before returning to the NIH. In 1985, Dr. Gallin began a nine-year period as scientific director of intramural activities at the National Institute of Allergy and Infectious Diseases (NIAID); he also was chief of NIAID's Laboratory of Host Defenses from 1991 to 2003, and he continues as chief of the lab's clinical pathology section. Among Dr. Gallin's many awards and honors, the U.S. Public Health Service named him Physician Executive of the Year in 2001. In 2002, the Society for Leukocyte Biology gave him its Bonazinga Award for lifetime achievement in research. He holds memberships in the American Society for Clinical Investigation, the Association of American Physicians, and the Institute of Medicine of the National Academy of Sciences.

Clinical Center Directors

Name	In Office from	To
Jack Masur	1948 1956	1951 1969
John A. Trautman	1951	1954
Donald W. Patrick	1954	1956
Thomas C. Chalmers	1970	1973
Robert S. Gordon, Jr.	1974	1975
Mortimer B. Lipsett	1976	1982
John L. Decker	1983	1990
Saul Rosen (Acting)	1990	1994
John I. Gallin	May 1, 1994	present

Major Programs

Clinical Research. Clinical Center departments conducting and supporting clinical research are: Anesthesia and Surgical Services; Clinical Pathology; Critical Care; Hospital Epidemiology; Imaging Sciences (comprising Diagnostic Radiology, the Laboratory of Diagnostic Radiology Research, Nuclear Medicine, and Positron Emissions Tomography Departments); Nursing; Pharmacy; Rehabilitation Medicine; and Transfusion Medicine.

Patient Care and Support. Departments that provide direct care and support for patients include Housekeeping and Fabric Care; Information Systems; Materials Management; Medical Record; Nutrition; Outpatient; Social Work; and Spiritual Ministry, along with the Patient Representative Program. The Clinical Center operates a guest house for families involved with clinical research here.

Office of the Director. Programs within this office support the management and operational needs of the CC, including administrative management and planning; patient recruitment and public liaison; communications; the children's school; clinical bioethics; hospital safety; facilities management; financial management; human resources; and technology transfer.

Education. The Clinical Center has assumed a broad role in helping prepare the next generation of clinical researchers and strengthen educational opportunities for today's physician-scientists. New programs include "Introduction to the Principles and Practice of Clinical Research"; postdoctoral training in clinical pharmacology; a clinical bioethics fellowship; training in biomedical imaging research; and a collaboration with the School of Medicine at Duke University that leads to graduate degree.

NIH Almanac: Appropriations

Amounts in thousands of dollars

FY	NCI	NHLBI	NIDCR	NIDDK[1]	NINDS[2]	NIAID	NIGMS	NICHD[3]	NEI	NIEHS[4]	NIA	NIAMS	NIDCD	NIMH[5]
1938	400													
1939	400													
1940	570													
1941	570													
1942	565													
1943	535													
1944	530													
1945	561													
1946	549													
1947	1,821													
1948	14,500													
1949	14,000													
1950	18,900	10,725	1,780											9,234
1951	20,086	14,200	1,955											14,200
1952	19,657	10,083	1,618											9,813
1953	17,887	12,000	1,650											10,474
1954	20,237	15,168	1,740	7,000	4,500	5,738								11,741
1955	21,737	16,668	1,990	8,270	7601	6,180								14,030
1956	24,978	18,898	2,176	10,840	9,861	7,775								18,052
1957	48,432	33,396	6,026	15,885	18,650	13,299								30,006
1958	56,402	35,936	6,430	20,385	21,387	17,400								38,457
1959	75,268	45,613	7,420	31,215	29,403	24,071								49,853
1960	91,257	62,237	10,019	46,862	41,487	34,054								67,470
1961	111,000	86,900	15,500	61,200	56,600	44,000								91,923
1962	142,836	132,912	17,340	81,831	70,812	56,091		3,036						107,711
1963	155,742	147,398	21,199	103,388	83,506	66,142		3,523						139,517
1964	144,340	132,404	19,689	113,679	87,675	68,723		(34,000)						170,990
1965	150,011	124,824	20,083	113,050	87,821	69,847		42,696						186,068
1966	163,768	141,462	23,677	123,203	101,153	77,987	127,188	55,024						226,588
1967	175,656	164,770	28,308	135,687	116,296	90,670	145,113	64,922		24,298				
1968	183,356	167,954	30,307	143,954	128,633	94,422	160,284	68,621		17,289				
1969	185,150	166,928	29,984	143,888	128,935	96,841	163,514	73,127		17,820				
1970	181,454	160,634	28,754	131,761	97,315	97,342	148,294	76,095	22,828	17,423				
1971	233,160	194,925	35,440	137,986	103,502	102,368	160,194	94,760	30,032	20,151				
1972	378,794	232,627	43,388	153,337	116,732	109,117	173,474	116,427	37,132	26,436				
1973	492,205	300,000	46,991	167,316	130,672	113,414	183,171	130,429	38,562	30,956				
1974	527,486	289,550	43,959	153,561	121,358	111,089	168,329	125,455	41,177	28,397				
1975	691,666	324,630	50,033	173,514	142,498	119,452	187,400	142,435	44,133	35,171				
1976	761,727	370,013	51,291	179,516	144,446	126,852	187,312	136,404	50,212	37,660	19,288			
1976TQ	152,901	58,763	7,854	43,719	34,272	27,638	34,078	24,201	4,038	9,519	8,743			
1977	815,000	396,661	55,573	219,600	155,500	141,000	205,000	145,543	64,000	51,141	30,000			
1978	872,388	447,909	61,728	260,253	178,438	162,341	230,796	166,390	85,400	64,241	37,305			
1979	937,129	510,526	65,213	302,767	212,365	191,328	277,628	197,630	105,192	78,080	56,911			
1980	999,869	527,488	68,303	341,206	241,966	215,364	312,468	208,953	112,989	83,893	69,988			
1981	989,355	549,693	71,114	369,462	252,533	232,077	333,764	220,628	117,983	93,491	75,608			
1982	986,617	559,637	71,983	368,191	265,901	235,895	339,862	226,309	127,374	106,270	81,903			
1983	987,642	624,259	79,292	413,492	297,064	279,129	369,813	254,324	141,901	164,867	93,996			
1984	1,081,581	704,939	88,674	464,026	335,883	319,596	415,937	276,046	155,131	180,597	115,292			
1985	1,183,806	805,269	100,688	543,576	396,885	370,965	482,260	313,295	181,678	194,819	144,521			
1986	1,203,369	822,292	98,841	544,858	414,727	366,964	492,630	307,958	186,705	188,986	149,762			
1987	1,402,837	930,001	117,945	511,124	490,233	545,523	570,916	366,780	216,637	209,294	177,681	138,713		
1988	1,469,327	965,536	126,297	534,733	534,692	638,800	632,676	396,811	224,947	215,666	194,746	147,679		
1989	1,570,349	1,045,509	130,709	559,494	472,292	740,257	682,213	425,375	231,170	223,403	222,639	159,891	94,166	
1990	1,634,332	1,072,354	135,749	581,477	490,409	832,977	681,782	442,914	236,533	229,234	239,455	168,930	117,583	
1991	1,714,784	1,126,942	148,918	615,272	541,743	906,251	760,010	478,956	253,241	241,028	323,752	193,247	134,935	
1992	1,962,587	1,188,593	158,417	658,925	577,938	959,082	816,844	518,251	268,978	248,575	383,382	203,047	148,789	
1993	1,981,351	1,214,793	161,301	681,342	600,078	979,471	832,581	527,788	276,188	251,187	399,924	212,456	154,814	583,651
1994	2,082,267	1,277,880	169,520	716,054	630,650	1,065,593	875,511	555,195	290,260	264,249	420,303	223,280	162,823	613,444
1995	1,913,819	1,257,374	162,430	726,949	627,045	535,199	876778	512,165	291,095	266,566	431,991	228,176	166,660	542,200
1996	2,248,000	1,354,946	182,923	770,582	680,902	1,168,483	946,896	594,547	313,933	288,378	453,541	241,655	176,383	660,549
1997	2,381,149	1,432,529	195,825	815,607	726,407	1,256,659	998,387	631,365	332,597	308,487	485,806	257,003	188,345	701,107
1998	2,547,314	1,531,061	209,415	900,860	780,713	1,351,655	1,065,947	674,766	355,691	330,108	519,279	274,760	200,695	750,241
1999	2,925,247	1,792,509	234,183	1,020,559	902,680	1,569,063	1,197,026	750,485	395,595	375,494	596,126	307,960	229,735	860,638
2000	3,314,554	2,029,424	268,811	1,168,476	1,029,376	1,778,038	1,354,420	858,291	450,300	442,449	686,479	349,968	263,771	973,146
2001	3,754,456	2,298,512	306,211	1,399,684	1,175,854	2,041,698	1,535,378	975,766	510,352	564,810	785,590	396,460	300,418	1,106,305
2002	4,181,233	2,572,667	342,664	1,562,144	1,326,666	2,342,313	1,724,799	1,111,674	580,713	645,422	892,267	448,248	341,675	1,246,640
2003	4,592,348	2,793,733	371,636	1,722,730	1,456,476	3,606,789	1,847,000	1,205,927	633,148	697,767	993,598	486,143	370,382	1,341,014
2004	4,739,255	2,878,691	383,282	1,821,803	1,501,207	4,155,447	1,904,838	1,242,361	653,052	710,701	1,024,754	501,066	382,053	1,381,774

2005	4,825,258	2,941,201	391,829	1,863,584	1,539,448	4,303,641	1,944,067	1,270,321	669,070	724,347	1,051,990	511,157	394,260	1,411,933
2006	4,793,356	2,921,757	389,336	1,854,925	1,534,757	4,315,801	1,935,618	1,264,769	666,756	720,240	1,046,631	507,932	383,458	1,403,515
2007	4,797,639	2,922,929	389,703	1,855,868	1,535,545	4,268,708	1,935,808	1,254,707	667,116	721,119	1,047,260	508,240	393,668	1,404,494

Note: Excludes subsequent transfers of funds (real and comparable).

Only current appropriations are shown. Excludes the Division of Regional Medical Programs, transferred to the Health Services and Mental Health Administration in 1968. Excludes the Division of Biologic Standards, transferred to FDA in 1973

[1] Beginning with the FY 1998 Appropriation, includes amounts authorized to the NIDDK for Type 1 diabetes research.

[2] Starting in 1970, excludes funds for blindness, established as a separate appropriation, the "National Eye Institute."

[3] Congress authorized the transfer of $34,000 from other NIH appropriations to establish the "National Institute of Child Health and Human Development." Starting in 1976, excludes funds for aging, established as a separate appropriation, the "National Institute on Aging."

[4] In FY 2001, NIH began receiving a separate appropriation for Superfund Research activities at NIEHS.

[5] NIMH separated from NIH in 1967 and was raised to bureau status in PHS, became a component of PHS's Health Services and Mental Health Administration (HSMHA), later became a component of ADAMHA (successor organization of HSMHA), and rejoined the NIH in 1993.

[6] Funding for General Research and Services (GR&S) is shown for FY 1938 to FY 1962, at which time the Division of Research Facilities and Resources (DRFR) was established. In 1969, the Bureau of Health Manpower was renamed the Bureau of Health Professions Education and Manpower Training (BEMT). Within the BEMT, the Division of Research Resources (DRR) was established. Functions of DRFR were transferred to this new Division. In 1970, DRR transferred out of this Bureau. Renamed the National Center for Research Resources in 1990.

[7] Starting in 1966, excludes funds for the newly established "National Institute of General Medical Sciences." Starting in 1970, excludes the "Office of International Operations," transferred to the "National Institute of Allergy and Infectious Diseases" and the "John E. Fogarty International Center for Advanced Study in the Health Sciences."

[8] Prior to 1970, funds were included under the National Institutes of Health Management Fund. Separate NIH appropriation enacted in 1970.

[9] Prior to 1970, Buildings and Facilities funds were included under PHS. Separate NIH appropriation enacted in 1970.

[10] "Office of AIDS Research."

NIH Almanac: Appropriations

Section 1 | Section 2

Amounts in thousands of dollars

FY	NIDA	NIAAA	NINR	NHGRI	NIBIB	NCRR[6,7]	NCCAM	NCMHD	FIC	NLM	OD[8]	B&F[9]	OAR[10]	Total
1938						64								464
1939						64								464
1940						137								707
1941						141								711
1942						135								700
1943						743								1,278
1944						2,205								2,555
1945						2,274								2,835
1946						2,866								3,415
1947						6,254								8,075
1948						10,126								24,626
1949						14,540								28,540
1950						12,075								52,714
1951						14,314								64,755
1952						15,757								56,928
1953						16,599								58,610
1954						4,675								70,999
1955						4,675								81,151
1956						5,929								98,509
1957						12,122								177,816
1958						14,026								210,423
1959						28,974								291,817
1960						45,994								399,380
1961						83,900								551,023
1962						127,637								737,170
1963						159,826								876,718
1964						163,869								901,369
1965						164,759								959,159
1966						60,469								1,100,519
1967						68,534								1,014,254
1968						81,141			500					1,076,461
1969						84,810			600	18,160				1,109,757
1970						67,925			2,775	19,251	7,541	1,615		1,061,007
1971						66,320			3,666	21,440	8,903			1,212,847
1972						74,981			4,307	24,127	11,712	3,565		1,506,156
1973						75,073			4,666	28,568	12,042	8,500		1,762,565
1974						129,426			4,767	25,871	12,000	8,000		1,790,425
1975						127,200			5,589	28,850	17,326	3,000		2,092,897
1976						130,265			5,705	29,065	18,370	54,000		2,302,126
1976TQ						20,282			1,135	6,572	4,642	750		439,107
1977						137,500			7,992	35,234	16,394	67,400		2,544,078
1978						145,095			8,483	37,619	18,900	65,650		2,842,936
1979						154,164			8,989	41,431	19,673	30,950		3,189,976
1980						169,196			8,987	43,979	21,036	3,250		3,428,935
1981						175,627			9,124	44,666	22,531	11,750		3,569,406
1982						184,177			9,205	45,035	23,618	9,898		3,641,875
1983						213,917			10,147	51,943	24,683	17,500		4,023,969
1984						243,177			11,336	49,613	26,720	25,040		4,493,588
1985						304,025			11,728	55,910	38,304	21,730		5,149,459
1986						292,523			11,054	55,322	111,961	14,259		5,262,211
1987			20,000			322,860			11,420	61,838	57,208	31,900		6,182,910
1988			23,380			368,153			15,651	67,910	61,819	47,870		6,666,693
1989			29,133			358,076			15,790	73,731	72,076	38,492		7,144,764
1990			33,513	59,538		353,734			15,516	81,861	107,419	61,042		7,576,352
1991			39,722	87,418		335,255			17,519	91,408	95,651	168,687		8,276,739
1992			44,929	104,762		314,213			19,593	99,088	141,854	103,840		8,921,687
1993	403,806	176,619	48,119	106,239		312,468			19,733	113,031	190,325	108,731		10,335,996
1994	425,201	185,617	51,018	128,701		331,915			21,677	119,981	233,605	111,039		10,955,773
1995	290,029	181,150	48,164	151,518		284,693			14,646	125,303	217,882	114,120	1,333,570	11,299,522
1996	458,112	198,401	55,814	169,768		390,298			25,292	140,936	26,1072	146,151		11,927,562
1997	489,160	211,870	59,721	189,529		415,095			26,557	150,828	286,810	200,000		12,740,843
1998	527,175	227,175	63,597	217,704		453,883			28,289	161,185	296,373	206,957		13,647,843
1999	602,874	259,575	69,788	264,707		554,446			35,402	181,189	306,356	197,519		15,629,156
2000	685,781	292,369	89,522	335,527		676,557	68,390		43,494	214,068	282,000	165,376		17,820,587
2001	780,833	340,453	104,328	382,112		817,253	89,138	130,096	50,482	246,351	211,800	153,790		20,458,130
2002	886,718	383,615	120,366	428,758	111,861	1,011,262	104,451	157,563	56,859	276,091	235,113	204,600		23,296,382
2003	961,721	416,051	130,584	464,995	278,279	1,138,821	113,407	185,714	63,465	300,135	266,232	628,687		27,066,782

2004	990,953	428,669	134,724	479,073	287,129	1,179,058	116,978	191,471	65,382	317,315	327,504	88,972	27,887,512
2005	1,006,419	438,277	138,072	488,608	298,209	1,115,090	122,105	196,159	66,632	315,146	358,046	110,288	28,495,157
2006	1,000,029	435,930	137,342	486,049	296,810	1,099,101	121,465	195,405	66,378	314,910	478,066	81,081	28,461,417
2007	1,000,621	436,259	137,404	486,491	296,887	1,133,240	121,576	199,444	66,446	320,850	1,046,901	81,081	29,030,004

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[10] "Office of AIDS Research."

The NIH Almanac: Staff

Charts

Employment

Year	Number of employees	Year	Number of employees	Year	Number of employees	Year	Number of employees
1930	140	1950	2,888	1970	13,243	1990	16,181
1931	150	1951	3,012	1971	14,002	1991	16,947
1932	165	1952	3,277	1972	13,789	1992	17,405
1933	139	1953	3,888	1973	12,931	1993	18,664
1934	160	1954	4,621	1974	13,318	1994	17,210
1935	159	1955	5,412	1975	13,897	1995	16,537
1936	183	1956	6,334	1976	14,495	1996	16,440
1937	695	1957	7,215	1977	14,658	1997	16,551
1938	912	1958	7,145	1978	14,610	1998	16,565
1939	1,048	1959	8,484	1979	14,439	1999	16,993
1940	1,137	1960	9,109	1980	14,634	2000	17,615
1941	1,367	1961	10,175	1981	14,984	2001	18,250
1942	1,456	1962	11,037	1982	14,869	2002	18,923
1943	1,352	1963	11,511	1983	15,449	2003	18,837
1944	1,144	1964	11,822	1984	15,212	2004	18,363
1945	1,090	1965	12,194	1985	14,799	2005	18,056
1946	1,436	1966	12,643	1986	14,479	2006	18,179
1947	1,505	1967	11,730	1987	15,243	2007	18,442
1948	2,245	1968	13,105	1988	15,486		
1949	2,937	1969	13,350	1989	15,206		

Source: Office of Human Resources, NIH.

Full-Time Civil Service Employees by GS, ST, SES[2], and Wage Grade

Year	GS	ST	SES	Wage Grade
1948	1,397	---	---	---
1949	1,760	---	---	---
1950	1,603	1	---	7
1951	1,712	4	---	8
1952	1,848	7	---	9
1953	2,248	8	---	9
1954	2,735	13	---	9

1955	3,513	19	---	890
1956	4,164	30	---	995
1957	4,682	44	---	1,080
1958	4,989	45	---	1,147
1959	5,324	53	---	1,184
1960	5,570	58	---	1,445
1961	6,226	82	---	1,597
1962	6,976	90	---	1,736
1963	7,294	96	---	1,780
1964	7,690	92	---	1,764
1965[3]	7,979	95	---	1,777
1966[4]	8,037	92	---	1,828
1967	7,315	79	---	1,847
1968	8,365	81	---	1,864
1969[4]	8,081	80	---	1,781
1970	8,063	86	---	1,665
1971	8,474	90	---	1,935
1972[4]	8,376	89	---	1,487
1973	8,047	84	---	1,489
1974	8,257	72	---	1,598
1975	8,398	71	---	1,622
1976	8,490	77	---	1,650
1977	8,331	79	---	1,526
1978	8,552	80	---	1,510
1979	8,447	5	190	1,538
1980	8,492	5	183	1,614
1981	8,800	5	179	1,598
1982	8,614	4	170	1,544
1983	8,873	3	167	1,559
1984	8,815	3	169	1,442
1985	8,650	3	170	1,397
1986	8,734	2	171	1,329
1987	9,354	1	172	1,313
1988	9,654	2	175	1,234
1989	9,635	2	177	1,197
1990	10,295	6	189	1,240
1991	10,908	7	190	1,188
1992	11,193	10	195	1,114
1993	12,172	15	226	1,094
1994	11,538	15	219	986
1995	10,007	13	208	873
1996	10,282	13	190	839
1997	10,611	13	180	793
1998	10,839	11	170	767
1999	11,205	8	172	733
2000	11,562	8	150	685
2001	11,888	8	134	641
2002	12,961	8	116	608
2003	12,092	8	116	598
2004	11,633	7	86	467

2005	11,444	7	70	414
2006	12,002	5	61	314
2007	11,844	4	60	333

[2] As of Sept. 1.

[3] As of Oct. 1.

[4] Civil Service Reform Act of 1978.

Source: Office of Human Resources, NIH.

NIH Almanac: Major NIH Lectures

The constant exchange of ideas is crucial to progress in medical research. Findings in one field often unexpectedly affect thinking in others. To encourage this exchange of ideas in its own laboratories, NIH hosts more than 1,200 scientific lectures each year by its own researchers and by distinguished visiting scientists from other research institutions. Here are a few highlights of the many lectures NIH hosted in 2007.

The NIH Director's Lectures

Speakers nominated by researchers and scientific interest groups throughout NIH, and approved by the NIH Director.

- "A Default Mode of Brain Function: History of an Evolving Idea"—Marcus E. Raichle, April 11, 2007
- Mark Davis, May 2, 2007

David E. Barmes Global Health Lecture

This annual lecture honors the late Dr. David E. Barmes, a World Health Organization expert in oral health, special expert for international health in the National Institute of Dental and Craniofacial Research (NIDCR) Office of International Health, and ardent spokesman for global health. Established in 2001, the lecture series is jointly sponsored NIDCR and NIH's Fogarty International Center.

- "Climate Change and Health"—Margaret Chan, December 10, 2007

Cantoni Memorial Lecture Series

This lecture series honors Giulio Leonardo Cantoni, who joined the National Institutes of Mental Health in 1954 as the Chief of the Laboratory of Cellular Pharmacology, now the Laboratory of General and Comparative Biochemistry. He directed that laboratory until 1994.

- "Biology & Biochemistry of Small RNA"—Phillip A. Sharp, October 22, 2007

John Doppman Memorial Lecture for Imaging Sciences

This annual lecture honors the memory of a devoted physician, researcher, and teacher who spent more than 30 years at NIH and was chief of the Clinical Center's Diagnostic Radiology Department.

- "Image-Guided Cancer Treatment: The Science and Vision of an Emerging Field"—J. William Charboneau, October 31, 2007

Gordon Lecture

Named in honor of Robert S. Gordon, Jr., former Assistant Surgeon General of the U.S. Public Health Service and Special Assistant to former NIH Director James Wyngaarden. Topics focus on clinical research and epidemiology.

- "Hormones and Breast Cancer: Etiology vs. Ideology"—Robert Hoover, May 16, 2007

Joseph J. Kinyoun Lecture

Established by the National Institute of Allergy and Infectious Diseases in 1979 to honor Dr. Kinyoun, who established in 1887 the Laboratory of Hygiene on Staten Island, the predecessor of the National Institutes of Health.

- "How We Sense Microbes"—Bruce Beutler, October 25, 2007

Florence Mahoney Lecture

Sponsored by the National Institute on Aging, the series recognizes Mrs. Mahoney's lifetime commitment to medical research and its benefits to people worldwide. Florence Stephenson Mahoney is widely known for her dedicated efforts in shaping national health science policy, particularly with respect to aging.

- "Protein Misfolding in Aging and Neurodegenerative Disease"—Richard I. Morimoto, March 21, 2007

G. Burroughs Mider Lecture

Established in 1968 in honor of the first NIH director of laboratories and clinics. The lecture is presented by an NIH intramural scientist to recognize and appreciate outstanding contributions to biomedical research.

- "Emerging fluorescence technologies for analysis of protein localization and organelle dynamics"—Jennifer Lippincott-Schwartz, April 4, 2007

Sayer Vision Research Lecture

Dr. Jane Sayer, an NIH research scientist in NIDDK, established the Sayer Vision Research Lecture and Award at the Foundation for the National Institutes of Health, in partnership with NEI, to honor her family and the memory of her parents, Winthrop and Laura Sayer. The lecture and award series will provide an opportunity for honorees to explore areas of interdisciplinary collaboration that may lead to advances in diverse medical specialties relevant to vision research.

- "G protein-coupled receptor signaling in phototransduction"—Krzysztof Palczewski, October 5, 2007

DeWitt Stetten Jr., Lecture

Established by NIGMS in 1982 and presented annually in honor of Dr. Stetten, the third NIGMS director.

- "Physiology and Immunology of the Cholinergic Anti-inflammatory Pathway"—Kevin J. Tracey, October 24, 2007

Matilda White Riley Lecture

Named for noted NIH social scientist who died in 2004 at age 93 to honor her extraordinary life and work in behavioral and social research.

- "Integrative Health: A Pathway Approach"—Carol D. Ryff and Burton H. Singer, June 6, 2007

NIH Almanac: Nobel Laureates

Nobel Laureates

Read about the NIH Scientists who have won Nobel prizes.

Laureate	Field	Year	Supporting NIH Institute (s)
Mario R. Capecchi, U.S.A., and Oliver Smithies, U.S.A. (shared with M. J. Evans, U.K.)	Physiology or Medicine	2007	NIGMS, NHLBI, NIDDK, NCI, NICHD
Roger D. Kornberg, U.S.A.	Chemistry	2006	NIGMS, NIAID, NCI
Andrew Z. Fire, U.S.A., and Craig C. Mello, U.S.A.	Physiology or Medicine	2006	NIGMS, NICHD
Robert H. Grubbs, U.S.A., and Richard R. Schrock, U.S.A. (shared with Yves Chauvin, France)	Chemistry	2005	NIGMS
Richard Axel, U.S.A., and Linda B. Buck, U.S.A.	Physiology or Medicine	2004	NIDCD, NCI, NIAID, NIMH, NINDS, NIDDK
Irwin A. Rose, U.S.A., Avram Hershko, Israel (shared with Aaron Ciechanover, Israel)	Chemistry	2004	NIAMD, NCI, NIAAA, NIGMS, NIDDK
Roderick MacKinnon , U.S.A., and Peter Agre, U.S.A.	Chemistry	2003	NHLBI, NEI, NIAAA, NIGMS, NCRR, NINDS, NIDDK
Paul C. Lauterbur, U.S.A. (shared with P. Mansfield, U.K.)	Physiology or Medicine	2003	NCRR, NCI, NHLBI, NIGMS, NIMH
John B. Fenn, U.S.A. (shared with K. Tanaka, Japan and K. Wüthrich, Switzerland)	Chemistry	2002	NIGMS
H. Robert Horvitz, U.S.A. (shared with S. Brenner, U.S.A. and J.E. Sulston, U.K.)	Physiology or medicine	2002	NIGMS, NCI, NICHD
Leland H. Hartwell, U.S.A. (shared with P.M. Nurse and R.T. Hunt, U.K.)	Physiology or medicine	2001	NIGMS, NCI, NCRR
K. Barry Sharpless, U.S.A. (shared with W.S. Knowles, U.S.A. and R. Noyori, Japan)	Chemistry	2001	NIGMS, NHLBI
Paul Greengard, U.S.A. (shared with E. Kandel, U.S.A. and A. Carlsson, Sweden)	Physiology or medicine	2000	NIMH, NIA, NIDA, NINDS, NIAAA, NHLBI, NIAMS

Erik R. Kandel, U.S.A. (shared with P. Greengard, U.S.A. and A. Carlsson, Sweden)	Physiology or medicine	2000	NIMH, NIGMS, NINDS, NCRR
James J. Heckman, U.S.A. (shared with D. McFadden, U.S.A.)	Economic sciences	2000	NICHD, NIMH
Daniel L. McFadden, U.S.A. (shared with J. Heckman, U.S.A.)	Economic sciences	2000	NIA
Günter Blobel, U.S.A.	Physiology or medicine	1999	NIGMS, NCI
Robert Furchgott, U.S.A. (shared with L. Ignarro and F. Murad, U.S. A.)	Physiology or medicine	1998	NIGMS, NHLBI, NINDS
Louis Ignarro, U.S.A. (shared with F. Murad and R. Furchgott, U.S. A.)	Physiology or medicine	1998	NHLBI, NIAMS, NICHD
Ferid Murad, U.S.A. (shared with L. Ignarro and R. Furchgott, U.S.A.)	Physiology or medicine	1998	NIGMS, NHLBI, NIDDK
Paul D. Boyer, U.S.A. (shared with J.C. Skou,)	Chemistry	1997	NIGMS, NIDDK
Jens C. Skou, Denmark (shared with P.D. Boyer)	Chemistry	1997	NINDS
Stanley B. Prusiner, U.S.A. Physiology or medicine	Physiology or medicine	1997	NINDS, NIA, NCRR, NIGMS
Edward B. Lewis, U.S.A. (shared with C. Nusslein-Volhard, Germany, and E.F. Wieschaus, U.S. A.)	Physiology or medicine	1995	NICHD, NIGMS
Eric F. Wieschaus, U.S.A. (shared with E.B. Lewis, U.S.A., and C. Nusslein-Volhard, Germany)	Physiology or medicine	1995	NICHD
Alfred G. Gilman, U.S.A. (shared with M. Rodbell, U.S.A.)	Physiology or medicine	1994	NIGMS, NINDS
Martin Rodbell, U.S.A. (shared with A.G. Gilman, U.S.A.)	Physiology or medicine	1994	NIEHS, NIDDK
George A. Olah, U.S.A.	Chemistry	1994	NCI, NIGMS
Phillip A. Sharp, U.S.A. (shared with R. Roberts, U.K.)	Physiology or medicine	1993	NIGMS, NCI, NIAID, DRS, NCRR
Richard Roberts, U.K. (shared with P.A. Sharp, U.S.A.)	Physiology or medicine	1993	NCRR, NLM, NCHGR, NCI, NIGMS
Robert W. Fogel, Ph.D.	Economic Sciences	1993	NIA
Kary B. Mullis, U.S.A. (shared with M. Smith, Canada)	Chemistry	1993	NHBLI, NIAID, NIGMS

Michael Smith, Canada (shared with K.B. Mullis, U.S.A.)	Chemistry	1993	NIGMS
Edwin G. Krebs, U.S.A (shared with E.H. Fisher, U.S.A.)	Physiology or medicine	1992	NIDDK, NIGMS, NIAMS
Edmond H. Fisher, U.S.A. (shared with E.G. Krebs, U.S.A.)	Physiology or medicine	1992	NIDDK, NIGMS, NIAMS
Gary Becker, U.S.A.	Economics	1992	NICHD
Elias J. Corey, U.S.A.	Chemistry	1990	NIGMS, NCRR, NCI, NHLBI, NIAID
E. Donnall Thomas, U.S.A. (shared with J.E. Murray, U.S.A.)	Physiology or medicine	1990	NCI, NIAID, NIDDK
Joseph E. Murray, U.S.A. (shared with E.D. Thomas, U.S.A.)	Physiology or medicine	1990	NHLBI, NIAID
Sidney Altman, U.S.A. (shared with T. Cech, U.S.A.)	Chemistry	1989	NIGMS, NICHD
Thomas Cech, U.S.A. (shared with S. Altman, U.S.A.)	Chemistry	1989	NIGMS, NCI
J. Michael Bishop, U.S.A (shared with H.E. Varmus, U.S.A.)	Physiology or medicine	1989	NCI
Harold E. Varmus, U.S.A. (shared with J.M. Bishop, U.S.A.)	Physiology or medicine	1989	NCI, NIAID
Susumu Tonegawa, Japan	Physiology or medicine	1987	NIAID
Donald J. Cram, U.S.A. (shared with C.J. Pederson, U.S.A., and Jean-Marie Lehn, France)	Chemistry	1987	NIGMS
Stanley Cohen, U.S.A. (shared with R. Levi-Montalcini, U.S.A./Italy)	Physiology or medicine	1986	NICHD, NIGMS
Rita Levi-Montalcini, U.S.A./Italy (shared with S. Cohen, U.S.A.)	Physiology or medicine	1986	NIMH, NINDS
Herbert A. Hauptman, U.S.A. (shared with J. Karle, U.S.A.)	Chemistry	1985	NIGMS, NIADDK, NHLBI, DRR
Michael S. Brown, U.S.A. (shared with J.L. Goldstein, U.S.A.)	Physiology or medicine	1985	NHLBI, NIGMS, DRR
Joseph L. Goldstein, U.S.A. (shared with M.S. Brown, U.S.A.)	Physiology or medicine	1985	NHLBI, NIGMS, DRR
R. Bruce Merrifield, U.S.A.	Chemistry	1984	NIDDK
Henry Taube, U.S.A.	Chemistry	1983	NIGMS
Sune Bergstrom, Sweden (shared with J. R. Vane, U.K. and B. Samuelsson, Sweden)	Physiology or medicine	1982	NHLBI, NLM, NICHD

John R. Vane, U.K. (shared with S. Bergstrom and B. Samuelsson, Sweden)	Physiology or medicine	1982	DRG, NIGMS, NIMH
Aaron Klug, U.K.	Chemistry	1982	NIAID
Roald Hoffmann, U.S.A. (shared with K. Fukui, Japan)	Chemistry	1981	NIGMS
David H. Hubel, U.S.A. (shared with T. N. Wiesel, U.S.A./Sweden, and R. W. Sperry, U.S.A.)	Physiology or medicine	1981	NEI, NIGMS, NINDS, DRR
Torsten N. Wiesel, U.S.A./Sweden (shared with D. H. Hubel and R. W. Sperry, U.S.A.)	Physiology or medicine	1981	NEI, DRR, NINDS
Paul Berg, U.S.A. (shared with W. Gilbert, U.S.A., and F. Sanger, U.K.)	Chemistry	1980	NIGMS, NCI
Walter Gilbert, U.S.A. (shared with P. Berg, U.S.A., and F. Sanger, U.K.)	Chemistry	1980	NIGMS, NIDDK
Baruj Benacerraf, U.S.A. (shared with G. D. Snell, U.S.A., and J. Dausset, France)	Physiology or medicine	1980	NIAID, NCI
George D. Snell, U.S.A. (shared with B. Benacerraf, U.S.A., and J. Dausset, France)	Physiology or medicine	1980	NIAID, NCI
Jean Dausset, France (shared with B. Benacerraf and G. D. Snell, U.S. A.)	Physiology or medicine	1980	NIAID, NCI
Herbert C. Brown, U.S.A. (shared with G. Wittig, W. Germany)	Chemistry	1979	NIGMS
Hamilton O. Smith, U.S.A. (shared with D. Nathans, U.S.A., and W. Arber, Switzerland)	Physiology or medicine	1978	NIGMS, NIAID
Daniel Nathans, U.S.A. (shared with H. O. Smith, U.S.A., and W. Arber, Switzerland)	Physiology or medicine	1978	NIGMS, NCI
Roger C. L. Guillemin, U.S.A. (shared with A. V. Schally and R. S. Yalow, U.S.A.)	Physiology or medicine	1977	NIDDK, NICHD, DRR
Andrew V. Schally, U.S.A. (shared with R. C. L. Guillemin and R. S. Yalow, U.S.A.)	Physiology or medicine	1977	NIDDK, NICHD, NIGMS
D. Carleton Gajdusek, U.S.A. (shared with B. S. Blumberg, U.S.A.)	Physiology or medicine	1976	NINDS
Baruch S. Blumberg, U.S.A. (shared with D. C. Gajdusek, U.S.A.)	Physiology or medicine	1976	NHLBI, NCI

William N. Lipscomb, U.S.A	Chemistry	1976	NIGMS, DRG
David Baltimore, U.S.A. (shared with R. Dulbecco and H. M. Temin, U.S.A.)	Physiology or medicine	1975	NIAID, NCI
Renato Dulbecco, U.S.A. (shared with D. Baltimore and H. M. Temin, U.S.A.)	Physiology or medicine	1975	NIAID, NCI
Howard M. Temin, U.S.A. (shared with D. Baltimore and R. Dulbecco, U.S.A.)	Physiology or medicine	1975	NCI
Albert Claude, Belgium (shared with C. de Duve, Belgium, and G. E. Palade, U.S.A.)	Physiology or medicine	1974	NCI
George E. Palade, U.S.A. (shared with C. de Duve and A. Claude, Belgium)	Physiology or medicine	1974	NHLBI, NIGMS
Christian de Duve, Belgium (shared with A. Claude, Belgium, and G. E. Palade, U.S.A.)	Physiology or medicine	1974	NICHD, NIGMS, NHLBI, NIA
Gerald M. Edelman, U.S.A. (shared with R. R. Porter, U.K.)	Physiology or medicine	1972	NIDDK, NIAID, NICHD
Rodney R. Porter, U.K. (shared with G. M. Edelman, U.S.A.) " 1972 NIAID	Physiology or medicine	1972	NIAID
Christian B. Anfinsen, U.S.A. (shared with S. Moore and W. H. Stein, U.S.A.)	Chemistry	1972	NHLBI, NIDDK
Stanford Moore, U.S.A. (shared with C. B. Anfinsen and W. H. Stein, U.S.A.)	Chemistry	1972	NIGMS, NINDS
William H. Stein, U.S.A. (shared with C. B. Anfinsen and S. Moore, U.S.A.)	Chemistry	1972	NIGMS
Earl W. Sutherland, Jr., U.S.A	Physiology or medicine	1971	NIGMS, NHLBI, NIDDK
Julius Axelrod, U.S.A. (shared with B. Katz, U.K., and U. von Euler, Sweden)	Physiology or medicine	1970	NHLBI, NIMH
Ulf von Euler, Sweden (shared with J. Axelrod, U.S.A., and B. Katz, U. K.)	Chemistry	1970	NINDS
Luis Leloir, Argentina	Chemistry	1970	NIGMS, NIAID
Max Delbruck, U.S.A. (shared with A. D. Hershey and S. Luria, U.S.A.)	Physiology or medicine	1969	NIGMS

Alfred D. Hershey, U.S.A. (shared with M. Delbruck and S. Luria, U.S. A.)	Physiology or medicine	1969	NIGMS, NCI, NICHD
Salvador Luria, U.S.A. (shared with M. Delbruck and A. D. Hershey, U.S. A.)	Physiology or medicine	1969	NIAID, NIGMS, NCI
Robert W. Holley, U.S.A. (shared with H. G. Khorana and M. W. Nirenberg, U.S.A.)	Physiology or medicine	1968	NIGMS, NCI
H. Gobind Khorana, U.S.A. (shared with R. W. Holley and M. W. Nirenberg, U.S.A.)	Physiology or medicine	1968	NIGMS, NCI, NIAID
Marshall W. Nirenberg, U.S.A. (shared with R. W. Holley and H. G. Khorana, U.S.A.)	Physiology or medicine	1968	NHLBI
Lars Onsager, U.S.A.	Chemistry	1968	NIGMS
Haldan K. Hartline, U.S.A. (shared with G. Wald, U.S.A., and R. Granit, Sweden)	Physiology or medicine	1967	NINDS, NEI
George Wald, U.S.A. (shared with H. K. Hartline, U.S.A., and R. Granit, Sweden)	Physiology or medicine	1967	NINDS, NEI
Charles B. Huggins, U.S.A. (shared with P. Rous, U.S.A.)	Physiology or medicine	1966	NCI, NIDDK, NIGMS
Jacques L. Monod, France (shared with F. Jacob and A. Lwoff, France)	Physiology or medicine	1965	NIAID
Robert B. Woodward, U.S.A.	Chemistry	1965	NIGMS, NHLBI, DRG, NIDDK
Konrad Bloch, U.S.A. (shared with F. Lynen, Germany)	Physiology or medicine	1964	NIGMS, NHLBI, DRG
James D. Watson, U.S.A. (shared with F. H. C. Crick and M. H. F. Wilkins, U.K.)	Physiology or medicine	1962	NIGMS, NIDDK, NCI, DRR, NIAID
John C. Kendrew, U.K. (shared with M. F. Perutz, U.K.)	Chemistry	1962	NIDDK
Melvin Calvin, U.S.A.	Chemistry	1961	DRG, NCI
Peter B. Medawar, U.K. (shared with F. M. Burnet, Australia)	Physiology or medicine	1960	NIAID
Arthur Kornberg, U.S.A. (shared with S. Ochoa, U.S.A.)	Physiology or medicine	1959	NIGMS, NIAID, NCI, NIDDK, NIA
Severo Ochoa, U.S.A. (shared with A. Kornberg, U.S.A.)	Physiology or medicine	1959	NIDDK, NIGMS, NCI, DRG

George W. Beadle, U.S.A. (shared with J. Lederberg and E. L. Tatum, U.S.A.)	Physiology or medicine	1958	NIGMS, NHLBI
Joshua Lederberg, U.S.A. (shared with G. W. Beadle and E. L. Tatum, U.S.A.	Physiology or medicine	1958	NIGMS, NIAID, NINDS, NICHD, DRR, NCI
Edward L. Tatum, U.S.A. (shared with G. W. Beadle and J. Lederberg, U.S.A.)	Physiology or medicine	1958	NIGMS, NCI
Dickinson W. Richards, Jr., U.S.A. (shared with A. Cournand, U.S.A., and W. Forssmann, Germany)	Physiology or medicine	1956	NIDDK, NCI, NHLBI, NIGMS
Vincent du Vigneaud, U.S.A.	Chemistry	1955	NHLBI, NCI, NIGMS, DRG
Thomas H. Weller, U.S.A. (shared with J. F. Enders and F. C. Robbins, U.S.A.)	Physiology or medicine	1954	NIAID, NIGMS
Linus C. Pauling, U.S.A.	Chemistry	1954	NIGMS, NHLBI, DRG, NIAID, NCI
Fritz A. Lipmann, U.S.A. (shared with H. A. Krebs, U.K.)	Physiology or medicine	1953	NIGMS, NCI
Philip S. Hench, U.S.A. (shared with E. C. Kendall, U.S.A., and T. Reichstein, Switzerland)	Physiology or medicine	1950	NIGMS
E. O. Lawrence, U.S.A.	Physics	1939	NCI

NIH Scientists

1968 - Dr. Marshall W. Nirenberg, National Heart, Lung, and Blood Institute, shared the Nobel Prize in Physiology or Medicine for discovering the key to deciphering the genetic code. Dr. Nirenberg and two other researchers, working independently, with whom he shared the prize, made major advances in understanding the chemical mechanisms by which genetic language or information is translated into various proteins that determine the nature and characteristics of all living things. Dr. Nirenberg was the first NIH Nobelist and also the first Federal employee to receive a Nobel Prize.

1970 - Dr. Julius Axelrod, National Institute of Mental Health, shared the Nobel Prize in Physiology or Medicine with two scientists from England and Sweden for independent research into the chemistry of nerve transmission. The three were cited for their "discoveries concerning the humoral transmitters in the nerve terminals and the mechanisms for their storage, release and inactivation." Specifically, Dr. Axelrod found an enzyme that terminates the action of the nerve transmitter, noradrenaline. He also demonstrated that some antidepressant drugs act by preventing the reuptake of noradrenaline and thus prolong its action in the brain.

1972 - Dr. Christian B. Anfinsen (formerly with the National Institute of Arthritis, Metabolism, and Digestive Diseases) won the Nobel Prize in Chemistry for his work "on ribonuclease, especially concerning the connection between the amino acid sequence and the biologically active conformation." Dr. Anfinsen provided the first clue to the structure of ribonuclease by demonstrating that it is comprised of a single polypeptide chain. He and his colleagues at Rockefeller University (with whom he shared the prize) demonstrated that the information required to fold the polypeptide chain of ribonuclease into the specific three-dimensional form of the active enzyme resides in the sequence of amino acids. Therefore, it became clear that this protein could be synthesized in the laboratory by joining the proper amino acids in the

correct order and then allowing the chain of amino acids to fold spontaneously. This led to the first synthesis of an enzyme from chemicals in the laboratory. Such studies are basic to an understanding of normal life processes as well as of inherited metabolic diseases.

1976 - Dr. D. Carleton Gajdusek, National Institute of Neurological Disorders and Stroke, shared the Nobel Prize in Physiology or Medicine with Dr. Baruch S. Blumberg, of the Institute for Cancer Research in Philadelphia. They won the award for their discoveries concerning new mechanisms for the origin and dissemination of infectious diseases. Dr. Blumberg was at NIH (with the National Institute of Arthritis and Metabolic Diseases) in the 1960s, and did part of his prizewinning research at NIH.

1994 - Dr. Martin Rodbell, National Institute of Environmental Health Sciences, shared the Nobel Prize in Physiology or Medicine with Dr. G. Alfred Gilman of the University of Texas Southwestern Medical Center in Dallas, Texas. Dr. Rodbell dis- covered in 1970 that signal transmission requires a cellular molecule called GTP. In 1977 Dr. Gillman identified the proteins to which GTP binds and named them "G proteins." They are a family of proteins bound to the cell surface membranes that serve as intermediaries between incoming signals and cellular proteins that respond to these signals. Dr. Rodbell conducted this research while an intramural scientist with the National Institute of Arthritis and Metabolic Diseases (now NIDDK).

NIH Almanac: Past Issues

If you have questions about past issues of the NIH Almanac, or you need more information about the history of NIH's programs and activities, please contact the Office of NIH History at history@nih.gov.

The Office of NIH History works with all NIH components to foster documentation, preservation, and interpretation of the history of the National Institutes of Health.