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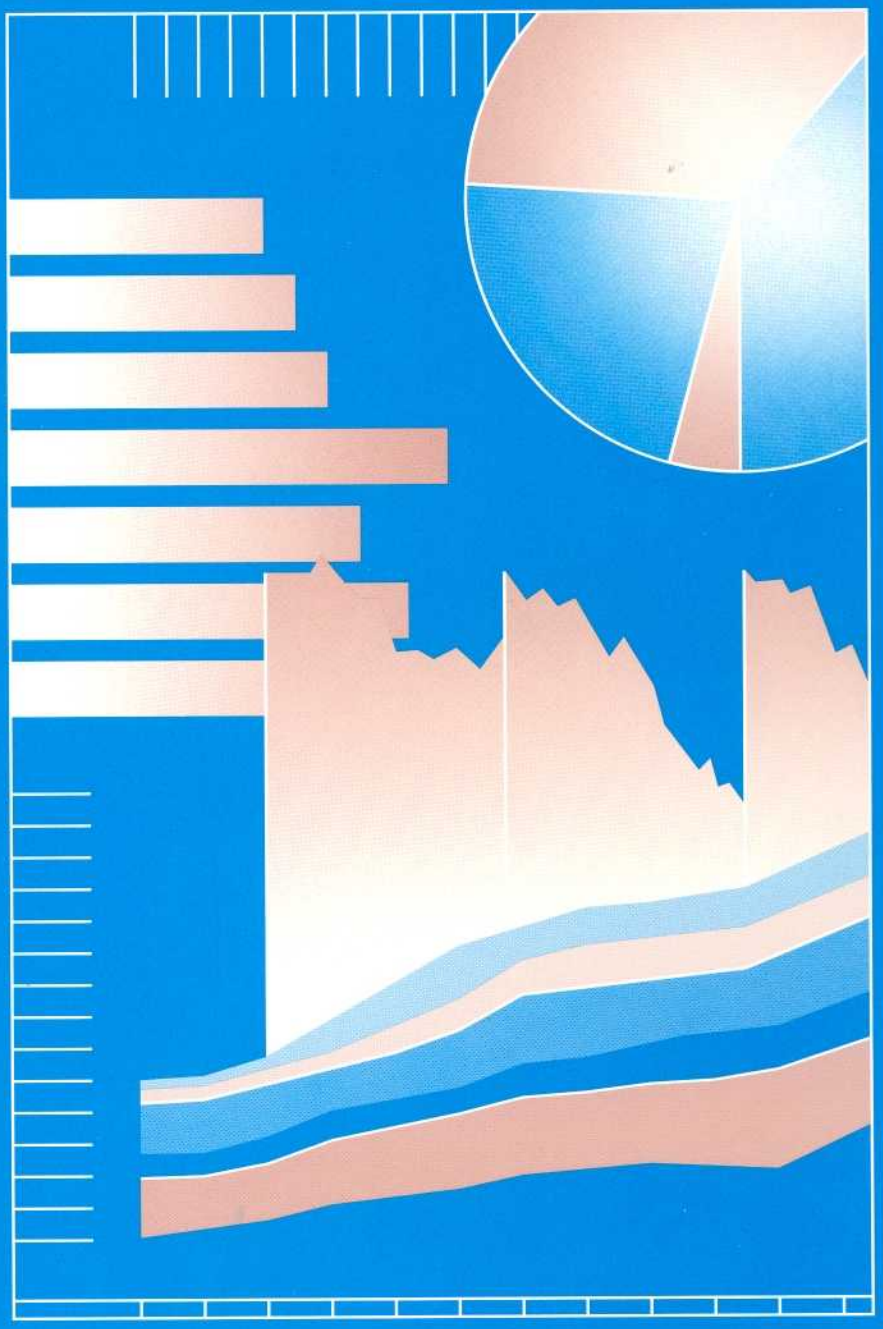

1989

U.S. DEPARTMENT
OF HEALTH AND
HUMAN SERVICES

Public Health
Service

National
Institutes of
Health

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For Administrative Use

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The information set forth in this publication is compiled and amended annually by the financial management staff of the National Cancer Institute and is intended primarily for use by members of the Institute, principal advisory groups to the Institute and others involved in the administration and management of the National Cancer Program. Questions regarding any of the information contained herein may be directed to the Financial Manager, National Cancer Institute, 9000 Rockville Pike, Bethesda, Maryland 20892.

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Year 2000 Goals and Objectives

The National Cancer Institute has established a goal to reduce the United States cancer mortality rate by 50 percent by the year 2000. The ability to meet this goal is based on the knowledge that: (1) smoking is directly responsible for some 30 percent of all cancer deaths; (2) diet and nutrition may be related to 35 percent or more of cancer deaths; (3) screening for breast and cervical cancer has been proven effective in reducing mortality; (4) widespread application of state-of-the-art cancer treatment could reduce the mortality rate for some sites as much as 25 percent; and (5) gains in early detection, diagnosis, and treatment methodologies will continue over the next decade, thereby contributing to an improved five year survival rate and reduced cancer mortality.

The following is an outline of the cancer prevention and control objectives:

Control Area	Brief Rationale	Year 2000 Objective
Prevention/Smoking	The causal relationship between smoking and cancer has been scientifically established.	Reduce the percentage of adults and youths who smoke to 15 percent or less.
Prevention/Diet	Research indicates that high-fat and low-fiber consumption may increase the risk for various cancers. In 1982 NAS reviewed research on diet and cancer and recommended a reduction in fat; more recent studies led NCI to recommend an increase in fiber. Research is underway to verify the causal relationship and to test the impact on cancer incidence.	Reduce average consumption of fat from 40 percent to 30 percent or less of total calories. Increase average consumption of fiber from 8 to 12 grams per day to 20 to 30 grams per day.
Early Detection and Screening/Breast	The effectiveness of breast cancer screening in reducing mortality has been scientifically established in randomized trials.	Increase the percentage of women ages 40 or more who have annual physical breast exam from 80% to 90% and 11% for mammography to 80%.
Early Detection and Screening/Cervical	The effectiveness of cervical screening has been shown to reduce mortality in large populations.	Increase the percentage of women who have a Pap smear at least every 3 years to 86% from 75%.
Early Detection and Screening/Rectum/Colon	The effectiveness of screening for colon and rectal cancers with digital rectal exam, stool blood and proctoscope is under continued study. Case control and mathematic modeling studies indicate mortality reduction with regular sigmoidoscopy examination. Encourage routine application of guidelines.	Increase the percentage who have digital rectal exams from 53% to 76%, stool blood exams from 48% to 75% and proctoscope from 18% to 48%.
Early Detection and Screening/Melanoma	The effectiveness of screening the skin has been shown in other countries to reduce mortality by 20%. Educational effort planned.	Increase the percentage examined for early melanoma. Every person should have skin examined annually. High-risk groups can be identified.
Early Detection and Screening/Prostate	Second leading cause of cancer death in males. Early detection trials are in planning stages using ultrasound as a new diagnostic modality.	All males over 60 years should be regularly examined for early prostate cancer. Increase the utilization of new diagnostic method.

Control Area	Brief Rationale	Year 2000 Objective
Early Detection and Screening/Oral Cancer	Screening for early oral cancer is economical and effective. Can be performed by Dentists as well as physicians.	High risk group is readily identified and can be targeted.
Early Detection and Screening/Testicular Cancer	Early detection is simple. Early treatment produces excellent survival.	All males over 20 years should manually examine testes for lumps or signs of cancer.
Treatment/Transfer of Research Results to Practice	NCI review of clinical trial and SEER data indicates that, for certain cancer sites, mortality in SEER is greater than mortality experienced in clinical trials.	Increase adoption of state-of-the-art treatment, including improved treatment of micrometastases.

Significant Initiatives In 1989

Division of Cancer Biology, Diagnosis and Centers

A New Cancer Suppressor Gene

There is growing evidence that specific genetic changes are associated with the development of several different types of human cancer. In some cases these changes occur in genes whose normal function is to prevent the formation of tumors; these are called tumor suppressor genes. A new tumor suppressor gene, termed NM23, has been discovered that appears to be associated with the metastatic process. Investigators found that breast cancers with a low level of NM23 expression were usually more aggressive; high levels of NM23 were associated with a more favorable prognosis. During the past year, the human NM23 gene has been cloned and the previously unknown protein product of the gene identified. A surprising discovery has been that the human NM23 protein has been conserved over millions of years of evolution, suggesting that it serves a vital function in the cell. The human NM23 protein is nearly identical to a protein involved in normal development and tissue pattern formation in the fruit fly. Mutations in this gene in the fruit fly result in abnormal differentiation and morphology in multiple organs, similar to changes seen during the malignant progression of human cancer. The discovery of NM23, and its association with a gene in the fruit fly, provides an unprecedented link between normal tissue development and metastasis, and offers exciting new opportunities for improvements both in the diagnosis and treatment of metastatic disease.

Hematopoietic Stem Cells

All cells of the immune system ultimately derive from a small population of rapidly dividing, self-renewing cells in the bone marrow called hematopoietic stem cells. The master, or pluripotent, stem cells have in them the capacity to differentiate into any of the immune system cell subsets, depending on which growth factors (usually called colony stimulating factors or CSFs) they encounter. During the past year, progress has been made in characterizing and isolating the pluripotent stem cell in mice and humans. These advances offer great promise for improvements in bone marrow transplantation as a treatment for human cancer as well as insights into the fundamental processes of immune development.

Division of Cancer Treatment

Adoptive Immunotherapy

Adoptive immunotherapy is a treatment approach in which cells with antitumor reactivity are administered to a tumor-bearing host and mediate, either directly or indirectly, the regression of an established tumor. Significant antitumor activity of lymphokine activated killer cells with interleukin-2 (LAK/IL-2) has been reported.

Clinical trials have confirmed the 20 to 25 percent response rate of LAK/IL2 in malignant melanoma and renal cell carcinomas. The results from the first clinical trial of TIL/IL-2/cyclophosphamide were reported. Twenty patients with metastatic malignant melanoma were treated with this therapy, 15 of whom had not previously received IL-2, and five whose tumors had progressed on previous IL-2 therapy. Nine of the 15 (60 percent) who had not previously received IL-2 had objective tumor response and two of the five who had previously been treated with IL-2 responded.

Gene Transfer Trial of Adoptive Immunotherapy

In an attempt to "activate" TIL cells so that they become even more effective in killing tumor cells, scientists from NCI and the National Heart, Lung, and Blood Institute, have received approval for the first clinical trial in which a foreign gene will be transfected into a human cell that will be given to a patient. This study involves insertion of the TNF or IL-2 gene into TIL cells growing in culture, prior to infusion.

A preliminary study, in which the neomycin resistance gene (neo®) is transfected into TIL cells and the cells can be monitored in their journey throughout the body, has recently begun at the NIH. This initial study is examining the feasibility and technical aspects of the transfer of genetic material into human cells.

The implications of this study are far-reaching; if new genes can be successfully inserted into human cells, it may provide a new avenue for the treatment of a variety of diseases caused by the inactivity or complete lack of certain genes, such as sickle cell anemia, cystic fibrosis, and alpha-1 antitrypsinase deficiency, among others. The development of "gene therapy" is one of the most promising and exiciting frontiers in all of medicine as we enter the 1990s.

Adjuvant Therapy of Solid Tumors

The results from recently reported clinical trials indicate that there is an important role for adjuvant therapy in the treatment of several early stage solid tumors. Clinical trials reported in the past year have demonstrated a beneficial effect of adjuvant therapy (in terms of disease-free survival) for women with "node negative" breast cancer (i.e., tumors which have not spread beyond the boundaries of the breast) and for patients with Dukes' C colon cancer (i.e., tumors which have invaded local lymph nodes around the colon).

For women with node negative early stage breast cancer, adjuvant therapy was associated with a 25 to 48 percent relative reduction in relapse rate over the first four years of follow-up in the Clinical Cooperative Group supported National Surgical Adjuvant Breast and Bowel Project.

For Dukes' C colon cancer, adjuvant therapy resulted in a 32 percent relative improvement in five-year disease-free survival over the group of patients not given additional therapy following surgical removal of all detectable disease.

If these treatments were applied generally by community oncologists, up to 4,500 more women would avoid a relapse of their breast cancers every year and up to 2,500 more individuals would survive five years without recurrence of their colon cancer. Thus, the identification and widespread implementation of these treatment approaches constitute key features in the effort to reduce the Nation's cancer mortality rate.

Levamisole & 5-FU

These two drugs given after surgery substantially reduce the death rate for patients with colon cancer that had spread to the adjacent lymph nodes (stage Dukes' C). This therapy significantly improves the outlook for patients whose surgically removed colon cancer was at an advanced stage. Of 107,000 people diagnosed this year with colon cancer, about 21,000 people will have stage Dukes' C.

Study shows that 49 percent of Dukes' C patients who received levamisole and 5-fluorouracil (5-FU), begun after surgery, were alive five years after therapy, compared to only 37 percent of those who received no further treatment after surgery. A second, larger study that confirms these findings is expected to be published shortly and provides data to suggest a one-third reduction in the cancer death rate at about three and a half years.

Levamisole is not yet commercially available, but physicians and surgeons can obtain it from NCI for their patients.

Division of Cancer Etiology

Dietary Mutagens

A number of chemicals known as aminoimidazoazaarenes (AIAs) have been purified from cooked ground beef, a major protein source in the western diet. All but one (PhIP) characterized to date, are very potent mutagens in a bacterial assay system known as the Ames test. PhIP is a relatively weak mutagen, but it is present in ten-fold greater concentrations in cooked beef than any of the other AIAs, and is the most potent AIA in mutagenicity studies utilizing mammalian cells rather than bacteria.

Thus far only three of the AIAs, referred to as IQ, MeIQ and MeIQx, have been evaluated in long-term rodent bioassays, and all three have been found to induce a variety of tumors including tumors of the liver and gastrointestinal system. The toxic effects of this group of chemicals is thought to be based on their metabolism to reactive forms which can react with DNA to form complexes known as adducts. Synthesis of several reactive metabolites of IQ have now been accomplished. Synthesis and characterization of the major DNA-IQ adducts and examination of DNA-IQ adducts in rodents and non-human primates is underway. The role of specific cytochrome P-450s in the metabolic activation of IQ is being evaluated. One such adduct was synthesized and shown to be formed *in vitro* when either of two metabolites reacted with DNA. Recently, several cynomolgus monkeys receiving daily oral doses of IQ at 20 mg/kg were diagnosed with liver tumors. The tumors appeared approximately 30 months following exposure to a latent period similar to the latent period of diethylnitrosamine, the most effective liver carcinogen ever tested in non-human primates.

Radon and Lung Cancer Risk

The papillomaviruses are small DNA-containing viruses which are associated with benign warts and papillomas in a variety of higher vertebrates, including man. There are now 60 human papillomaviruses (HPVs) which have been identified. Approximately 18 of these have been associated with lesions of the human genital tract, several of which have been associated with genital warts which rarely progress to carcinoma. Others have been associated with cervical dysplasia and other pre-neoplastic lesions which may progress to malignancy. HPVs have also been linked to human cervical carcinoma and other anogenital carcinomas including cancer of the penis, vulvar carcinoma, and perianal carcinoma. Recently major advances have been made in understanding the molecular biology of the HPVs. The viral genes which are expressed in cervical cancer tissues have been identified and shown to be at least in part responsible for the malignant characteristics of the cells. Two viral genes, designated E6 and E7, are now recognized to be transforming genes of the HPVs. The E7 protein has been shown to form stable complexes with a cellular protein, the product of the retinoblastoma (RB) gene. The RB gene is missing or inactivated in a variety of human cancers, leading researchers to believe that the RB protein normally acts to regulate cell growth. By binding to the RB protein, E7 may alter the activity of RB, thereby allowing cells to grow in an uncontrolled fashion. Evidence now exists that the E6 gene product also complexes with a cellular protein that, like RB, is also involved in regulating cell growth. The identification of the viral genes which contribute directly to the deregulated growth of the cancer cell and the identification of the cellular protein with which they interact should provide insight for the screening and development of antiviral agents.

Tobacco and Alcohol
A study of age-specific patterns of lung cancer mortality found that rates peaked for white and non-white males born around 1925 to 1930 and for females born around 1935 to 1940, with declining rates among subsequent cohorts. These findings are consistent with smoking patterns for these groups. A similar analysis for oral, esophageal, and laryngeal cancers revealed peak risks among females born around 1915 to 1925, suggesting a role for factors that are perhaps nutritional (in addition to alcohol and tobacco consumption) which have driven trends for these cancers in males.

Alcohol combines with tobacco smoking to cause most cancers of the oral cavity, pharynx, esophagus, and larynx among American men and women. In a nationwide study, high intake of both cigarettes and alcoholic beverages resulted in a greater than 35-fold increase in the risk of oral and pharyngeal cancers. This study also showed that, even among non-smokers, the risk of these cancers rose with increasing alcohol consumption, suggesting that alcohol itself is carcinogenic in humans. In a study in coastal South Carolina, the high intake of moonshine whiskey was implemented in the longstanding elevation of esophageal cancer rates among black American males living in the area.

Division of Cancer Prevention and Control

Cancer Control in Minorities
Among the most vital of NCI's program efforts to reduce cancer mortality are those that are targeted to populations with particularly high risks of cancer mortality. The National Black Leadership Initiative on Cancer (NBLIC) has been particularly successful in mobilizing black community-based and national leaders to spread the word about early detection and prevention of cancer. Now in its follow-up phase, for the first year, the NBLIC will encompass the theme, "Early Detection and Screening," through programmatic activities.

Community-Based Smoking Cessation Programs
The Community Intervention Trial for Heavy Smokers (COMMIT) was initiated in 1986 as a randomized community-based trial involving 11 pairs of communities and more than two million people in the United States and Canada. The trial is testing a protocol of smoking cessation strategies delivered through community organizations and social institutions aimed at heavy smokers—persons who smoke 25 or more cigarettes per day. The results of this major intervention study will provide a model to communities around the Nation. The results from COMMIT will be disseminated through the American Stop Smoking Intervention Study (ASSIST), NCI's large-scale demonstration program to disseminate the results of its smoking and tobacco programs. This demonstration study will involve 20 states or large metropolitan areas and will reach up to 50 million Americans. The program is being jointly conducted by the National Cancer Institute and the American Cancer Society.

Community Clinical Oncology Program
The NCI's Community Clinical Oncology Program (CCOP) affords community physicians and cancer patients the opportunity to participate in cancer treatment and cancer prevention and control clinical trials. In the last year, the CCOPs entered approximately 5,000 patients to NCI-approved treatment trials and 6,700 patients or subjects participated in cancer control studies. A new minority-based CCOP program was initiated in which the Centers will draw more than 50 percent of their new cancer patients from minority groups. CCOPs has also proven to be a source for new research generating 152 concepts and 45 protocols for research in prevention, detection and treatment.

Division of Extramural Activities

Cancer Prevention Awareness
The Comprehensive Minority Biomedical Program (CMBP), jointly with the Office of Cancer Communications, has undertaken a special initiative to heighten awareness about cancer risk prevention in Black Americans. A contract solicitation, aimed at the network of black colleges and universities in a variety of settings and with close ties to the black community, was developed. The aim of the Request for Proposals (RFP) was to provide support to develop and disseminate information through educational programs on what can be done to control or reduce cancer in Black Americans. Two awards have been made to historically black colleges and universities to develop and implement effective diffusion strategies for the dissemination of cancer information to the black population.

Cancer Centers and Cancer Control in Minority Populations
Through the CMBP Cancer Centers Minority Enhancement awards, the Division of Cancer Prevention and Control and DEA seek to expand minority involvement in cancer control research. Cancer centers would promote the participation of minority groups by broadening their operational base to facilitate the expansion of cancer control efforts in early detection, prevention, screening, pretreatment, evaluation, treatment, continuing care and rehabilitation, and the increased involvement of primary care providers to minority populations. Awards have been made to three cancer centers in North Carolina, California and Arizona.

New Initiatives for the Support of Minorities
The NIH program announcement entitled "Initiatives for Underrepresented Minorities in Biomedical Research" expands the previous supplemental program to include undergraduate and graduate students in its scope. Research Supplements for Minority Graduate Research Assistants: provides potential minority researchers with an opportunity for further development of the research capabilities in cancer-related research. Research Supplements for Minority Undergraduate Students: provides an opportunity for any minority student interested in cancer-related research participate in projects for three months during the summer or any other period apart from an academic year.

Office of the Director

Health Communication Internship/Fellowship Program
To increase the number of persons trained in cancer communications, the program provides a variety of training experiences for graduate-level students in health communications. The program provides a variety of training experiences for graduate-level students in health communications. Fellows are located in various parts of the Office of Cancer Communications, where they work with staff members on health education projects, science writing, or medical librarianship.

Prevention Highlights: Meeting the Year 2000 Objectives Fiscal Year 1989

Key Dates:

- 1970-1979—Basic research contributed new knowledge of cancer process including the finding that cancer is multi-staged and that there are at least two distinct stages—initiation and promotion.
- 1980—Establishment of a new division, forerunner of the Division of Cancer Prevention and Control.
- 1981-1982—NCI developed new strategy that focused on cancer prevention and applied research.
- 1983—Year 2000 Goal was established which is based on prevention, early detection, and widespread application of the latest treatment results.

Cancer Network

In 1989, NCI's Cancer Network included the following:

- Cancer Information System (CIS)—a national toll-free telephone service that provides immediate answers to cancer-related questions from cancer patients, families, the public and health professionals.
- Cancer Centers—a program of cancer research centers across the country which significantly contributes to progress in basic research, clinical studies, education, and cancer prevention and control.
- Community Clinical Oncology Program—a program involving community physicians in clinical trials research on cancer treatment, prevention, and control.
- Physicians Data Query (PDQ)—an on-line computer system that provides state-of-the-art information on cancer detection, diagnosis and treatment.
- Cooperative Group Outreach Program (CGOP)—designed to increase patient enrollment in clinical trials and to upgrade the skills of community physicians and other health professionals.
- Surveillance, Epidemiology, and End Results (SEER) Program—population-based cancer registries that permit the monitoring of cancer incidence, mortality and survival, and is a key tool for assessing the progress against cancer.

Prevention Trials

- Since 1982 chemoprevention studies (studies that seek to identify agents which may inhibit cancer from developing or recurring) have initially reviewed over 600 agents. Thirteen of these agents, which include vitamins, minerals, and other natural and synthetic substances, have been tested in clinical trials in humans.
- Current trials are studying diet modification as a means of preventing recurring breast cancer and colon cancer.
- A colon polyp trial with the major objective of determing whether an experimental large bowel cancer "risk reduction" diet (low fat, high fiber, vegetable- and fruit-enriched) will decrease the recurrence rate of large bowel adenomatous polyps. This will be a multi-center randomized controlled trial involving 2,000 men and women. The study has two secondary objectives: (1) to investigate the relationship between the dietary intervention and several putative intermediate endpoints in large bowel carcinogenesis, and (2) to evaluate the correspondence between these intermediate endpoints and subsequent neoplasia (adenoma formation).

Agency Coordination

Formal mechanisms for the exchange of information and coordination among the NCI and other health and environmental agencies include:

- Representation by the Director, Division of Cancer Etiology (DCE), on the National Toxicology Program Executive Committee of the National Institute of Environmental Health Sciences whose mission is the study of the toxicity of chemical and physical agents present in the environment.

- DCE maintains interagency agreements with the U.S. Environmental Protection Agency and the National Institute for Occupational Safety and Health through which collaborative studies on environmental and occupational carcinogenesis are carried out. In addition to managing and serving as project officers on these interagency agreements, DCE staff interface with state agencies, industrial and trade organizations, academic institutions and professional societies, serving a primary role in dissemination of information on environmental problems and industrial exposures in carcinogenesis.

- The Director of the Division of Cancer Etiology chairs the Subcommittee on Research Needs of The Committee to Coordinate Environmental Health and Related Programs (CCEHRP) which addresses common research needs among the agencies.

Smoking

- The Smoking, Tobacco and Cancer Program (STCP) supports 60 large-scale prevention and cessation clinical trials targeted toward smokers who are adolescents, women, in ethnic and minority populations, and smokeless tobacco users.

- Implementation of COMMIT, a large community intervention trial, begun in 11 paired North American communities. It will emphasize the reduction of smoking in people who are heavy smokers.

- Epidemiologists have completed several new projects focused on clarifying the cancer risks associated with various smokeless tobaccos, including snuff, chewing tobacco, exposure to passive smoking, and interventions with other agents.

Nutrition

- The NCI/Giant Food Inc. Supermarket Study to evaluate the effects of shelf labeling, in-store information and advertising on shopping practices and dietary behavior has been completed. Analysis now underway will show the impact of the interventions.

- Studies are being initiated to establish whether blood micronutrient levels accurately reflect tissue micronutrient concentration.

- A fruit and vegetable phytochemical cancer prevention program is being implemented to obtain a better understanding of the role of fruit and vegetable consumption in cancer prevention.

- A nutrition and cancer prevention research program is a new initiative to develop a broadly-based, multi-disciplinary, extramural research program in nutrition and cancer that will provide further insight into the role of nutrition in cancer prevention and control.

- An intramural research laboratory of nutrition is in place. This laboratory will provide leadership in basic research, clinical nutrition, and human metabolism.

Occupational Cancer

Although smoking is undoubtedly the predominant cause of lung cancer, the risk of this cancer may also be related to some occupational exposures. One study found that mortality from lung cancer was elevated among workers employed in a plant producing chromium pigments. In a study of Chinese iron ore miners, the risk of lung cancer among underground miners exposed to radon and silica was four times that of above-ground miners. A study in Missouri found that the occupational risks of lung cancer varied by histologic type. Adenocarcinoma of the lung was elevated among furniture workers, plumbers, printers, and electricians, while squamous-cell cancer of the lung was excessive among fire fighters, brick masons and roofers.

Screening and Early Detection

- Primary care physicians are integrating cancer prevention and control interventions into their usual office practice in two studies. These activities include smoking cessation and diet modification counseling, and screening for cancers of the breast, cervix, colon, rectum, and prostate.

- A program to develop strategies for achieving a significant reduction in cancer morbidity and mortality through early detection is ongoing. Promising methods of surveillance, research, and intervention have been identified for support and evaluation. Collaborative programs have been developed with major national medical organizations to identify and address research gaps and to increase the use of the state-of-the-art early detection methodologies within the practicing medical community.

Information and Public Awareness

- To obtain broad-based community input concerning national progress against cancer, NCI and its National Cancer Advisory Board are conducting a series of regional public participation hearings across the country.

- Through the Partners in Prevention (PIP) network, Cancer Prevention Awareness Program, NCI is stimulating community based programs in smoking, nutrition, and early detection. About 2,000 representatives of national, regional and local organizations are members of the network.

Information Dissemination

As part of its legislated mission, the National Cancer Institute actively supports cancer information dissemination activities. NCI works to ensure that the public, as well as the primary-care physician, is afforded easy access to up-to-date information regarding cancer prevention, detection and diagnosis, and treatment measures.

The Physician Data Query (PDQ) system is a database containing treatment recommendations and summary information on all active clinical trials supported by NCI. A sub-system lists physicians and organizations that provide cancer care.

The Cancer Information Service (CIS), known to the public as 1-800-4-CANCER, is staffed by health professionals equipped to respond to public inquiries regarding cancer; often the PDQ system will be consulted. Sometimes, a telephone response will be followed with delivery of a publication or other written material. Heightened public interest in specific cancer risk factors (i.e., Alar, radon, asbestos), results in a flood of calls to this toll-free number.

The CIS consists of a nationwide network of 26 regional offices, 17 of which receive direct NCI funding. In addition to providing direct response to the public, the field offices support NCI's major outreach activities and conduct cancer education programs to meet specific local and regional needs. For example, in support of NCI's mammography initiative in 1989, the CIS launched a major coordinated nationwide media campaign. And, the CIS incorporated NCI's recommendations from the controversial Breast Cancer Clinical Alert when responding to breast cancer inquiries from the public.

In addition to individual mailings of pamphlets/brochures, the NCI widely distributes bulk volumes of pamphlets/brochures to hospitals, supermarkets, physician organizations, etc., for subsequent distribution to the public.

Pamphlets/Brochures Distributed

	CIS Inquiries	Individual	Bulk Volume	PDQ Searches[1]
FY 1989	400,000	97,000	20,000,000	575,000

[1] Approximately 144,000 hours of on-line usage, assumes four searches per hour of on-line use.

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Director's Biography

Dr. Samuel Broder

Dr. Samuel Broder was named Director of the National Cancer Institute by President Reagan on December 22, 1988 and sworn in on January 10, 1989. Dr. Broder is a medical oncologist whose major research interest is clinical immunology, with special attention to the relationship between immune abnormalities and neoplastic diseases.

Before becoming Director, Dr. Broder had been since 1981 Associate Director for the Clinical Oncology Program in NCI's Division of Cancer Treatment. He came to NCI as a clinical associate in the Metabolism Branch of the Division of Cancer Biology and Diagnosis in 1972. In 1975, he became an investigator in the Medicine Branch, DCT, and later returned to the Metabolism Branch as a senior investigator.

Dr. Broder's research has centered on the biology of the immune system with emphasis on abnormal immunoregulation in cancer, and on the relationship between cancer and immunodeficiency states. Dr. Broder and his co-workers identified certain types of suppressor cells which induced immune impairment in some cancer patients. He and his co-workers also identified and characterized neoplasms which arose from helper and suppressor cells. In addition to his cancer research, Dr. Broder and his co-workers have worked on drug development, taking drugs rapidly from the test tube to patients, for the treatment of AIDS and related disorders. Such drugs include AZT, ddC, ddI, and related drugs in the dideoxynucleoside family, used alone and in combination. Dr. Broder is credited with accelerating the development of AZT, the first drug to be found effective in treating AIDS patients and to be approved by the FDA. He has made technology transfer a major theme of his Directorship.

Dr. Broder obtained his undergraduate and medical degrees from the University of Michigan. His internship and residency were at Stanford University. He is board certified in Internal Medicine and in Medical Oncology.

Former Directors of The National Cancer Institute

Dr. Vincent T. DeVita, Jr., M.D. January 1980 – June 1980 (Acting) July 1980 – August 1988	Dr. DeVita joined NCI in 1963 as a Clinical Associate in the Laboratory of Chemical Pharmacology. He served NCI as head of the Solid Tumor Service, Chief of the Medicine Branch, Director of the Division of Cancer Treatment and Clinical Director prior to his appointment as Director of NCI. In September 1988, Dr. DeVita resigned as NCI Director to become Physician-in-Chief at Memorial Sloan-Kettering Cancer Center.
Dr. Arthur Canfield Upton, M.D. July 1977 – December 1979	Prior to his tenure as NCI Director, Dr. Upton served as Dean of the School of Basic Health Sciences at the State University of New York at Stony Brook.
Dr. Frank Joseph Rauscher, Jr., Ph.D. May 1972 – October 1976	Dr. Rauscher served as Scientific Director for Etiology, NCI, prior to his appointment as Director of NCI in 1972.
Dr. Carl Gwin Baker, M.D. November 1969 – July 1970 (Acting) July 1970 – April 1972	During his tenure with PHS, Dr. Baker served as Scientific Director for Etiology, NCI, and as Acting Director of NCI prior to his appointment as Director in July 1970.
Dr. Kenneth Milo Endicott, M.D. July 1960 – November 1969	Dr. Endicott served as Chief of the Cancer Chemotherapy National Service Center, PHS, and as Associate Director, NIH, prior to being appointed Director, NCI in July 1960.
Dr. John Roderick Heller, M.D. May 1948 – June 1960	Dr. Heller joined PHS in 1934 and became Chief of the Venereal Disease Division prior to his appointment as Director of NCI in 1948.
Dr. Leonard Andrew Scheele, M.D. July 1947 – April 1948	Dr. Scheele served in various capacities during his tenure with PHS prior to his appointment as Assistant Chief and, subsequently, Director of NCI in July 1947.
Dr. Roscoe Roy Spencer, M.D. August 1943 – July 1947	Dr. Spencer became NCI's first Assistant Chief and, subsequently, was appointed Director of the Institute in 1943.
Dr. Carl Voegtlin, Ph.D. January 1938 – July 1943	Dr. Voegtlin served as Professor of Pharmacology and Chief of the Division of Pharmacy at the Hygienic Laboratory prior to becoming the first Director of NCI in 1938.

National Cancer Advisory Board

Appointees	Expiration of Appointment
Dr. David Korn, *Chairman* *Stanford University* *Stanford, California*	1990
Dr. Erwin P. Bettinghaus *Michigan State University* *East Lansing, Michigan*	1994
Dr. Roswell K. Boutwell *University of Wisconsin* *Madison, Wisconsin*	1990
Dr. David G. Bragg *University of Utah School of Medicine* *Salt Lake City, Utah*	1994
Mrs. Nancy G. Brinker *Susan G. Komen Foundation* *Dallas, Texas*	1992
Mrs. Helene G. Brown *Jonsson Comprehensive Cancer Center* *Los Angeles, California*	1990
Dr. John R. Durant *Univ. of Alabama in Birmingham* *Birmingham, Alabama*	1992
Dr. Gertrude B. Elion *Burroughs Wellcome Company* *Research Triangle Park, North Carolina*	1990
Dr. Bernard Fisher *University of Pittsburgh* *Pittsburgh, Pennsylvania*	1992
Dr. Phillip Frost *The IVAX Corporation* *Miami, Florida*	1992
Dr. Walter Lawrence, Jr. *Virginia Commonwealth University* *Richmond, Virginia*	1994
Dr. Enrico Mihich *Roswell Park Memorial Institute* *Buffalo, New York*	1990
Mrs. Irene S. Pollin *The Washington Hospital Center* *Bethesda, Maryland*	1992
Dr. Louise C. Strong *M.D. Anderson Hospital and Tumor Institute* *Houston, Texas*	1990
Dr. Howard M. Temin *University of Wisconsin* *Madison, Wisconsin*	*1994*
Dr. Samuel A. Wells, Jr. *Washington University* *St. Louis, Missouri*	1994

Executive Secretary

Mrs. Barbara S. Bynum
National Cancer Institute, NIH
Bethesda, Maryland

Ex Officio Members

The Honorable Louis W. Sullivan, M.D.
Secretary for Health and Human Services

The Honorable Elizabeth H. Dole
Secretary of Labor
Washington, DC

Dr. Allan Bromley
Office of Science and Technology Policy
Washington, DC

Ms. Ann Graham
Consumer Product Safety Commission
Washington, DC

Dr. John Gronvall
Veterans Administration
Washington, DC

Mr. David Newhall, III
Department of Defense
Washington, DC

Dr. J. Donald Millar
National Institute for Occupational Safety and Health
Atlanta, Georgia

Dr. David P. Rall
National Institute of Environmental Health Sciences
Research Triangle Park, North Carolina

Mr. William K. Reilly
Environmental Protection Agency
Washington, DC

Dr. Robert W. Wood
Department of Energy
Washington, DC

Dr. William F. Raub, (Acting)
National Institutes of Health
Bethesda, Maryland

Dr. Frank E. Young
Food and Drug Administration
Rockville, Maryland

Alternates to Ex Officio Members

Dr. Beverly J. Berger
Office of Science and Technology Policy
Washington, DC

Dr. Dorothy A. Canter
National Institute of Environmental Health Sciences
Bethesda, Maryland

Dr. William Farland
Environmental Protection Agency
Washington, DC

Dr. Richard J. Greene
Veterans Administration
Washington, DC

Dr. John R. Johnson
Food and Drug Administration
Rockville, Maryland

Mr. Richard A. Lemen
National Institute for Occupational Safety and Health
Washington, DC

Dr. James S. Robertson
Department of Energy
Washington, DC

Dr. Andrew Ulsamer
Consumer Product Safety Commission
Bethesda, Maryland

Dr. Ralph E. Yodaiken
Department of Labor
Washington, DC

Vice Admiral James A. Zimble
Office of Chief of Naval Operations
Washington, DC

Division Boards of Scientific Counselors

Division of Cancer Biology, Diagnosis and Centers

Arnold J. Levine, Ph.D., *Chairperson*	1990	Margaret L. Kripke, Ph.D.	1993
		Richard G. Lynch, M.D.	1991
		Richard S. Metzgar, Ph.D.	1990
Eugene A. Bauer, M.D.	1992	Harold L. Moses, M.D.	1991
Judith L. Campbell, Ph.D.	1993	Howard K. Schachman, Ph.D.	1992
Susan E. Cullen, Ph.D.	1990	R. Babu Venkataraghavan, Ph.D.	1993
Vittorio Defendi, M.D.	1990	Noel L. Warner, Ph.D.	1993
Leon A. Heppel, M.D., Ph.D.	1991	Carolyn D. Whitfield, Ph.D.	1993

Division of Cancer Treatment

John E. Niederhuber, M.D., *Chairperson*	1990	Mark T. Groudine, M.D., Ph.D.	1990
		William R. Hendee, Ph.D.	1990
		Susan B. Horwitz, Ph.D.	1990
Charles M. Balch, M.D.	1991	Frank M. Huennekens, Ph.D.	1991
Robert L. Baehner	1992	William M. Hryniuk, M.D.	1991
Paul P. Carbonne, M.D.	1993	Ronald Levy, M.D.	1993
Yung-chi Cheng, Ph.D.	1990	John Mendelsohn, M.D.	1990
Phillip Crews, Ph.D.	1993	Kenneth Olden, Ph.D.	1990
James D. Cox, M.D.	1991	JoAnne Stubbe, Ph.D.	1993
Emil Frei, III, M.D.	1990	Ralph R. Weichselbaum, M.D.	1993

Division of Cancer Etiology

Hilary Koprowski, M.D., *Chairperson*	1990	Lawrence Fischer, Ph.D.	1990
		Stephen S. Hecht, Ph.D.	1991
		William T. London, M.D.	1989
Anna D. Barker, Ph.D.	1990	Abraham M. Nomura, M.D.	1992
William F. Benedict, M.D.	1989	David Schottenfeld, M.D.	1992
Janet S. Butel, Ph.D.	1989	Roy Shore, Ph.D.	1989
George W. Casarett, Ph.D.	1990	Moyses Szklo, Ph.D.	1990
Allan H. Conney, Ph.D.	1991	George F. Vande Woude	1989
Pelayo Correa, M.D.	1991	Noel S. Weiss, M.D.	1989
Myron Essex, Ph.D.	1991	Alice S. Whittemore, Ph.D.	1990
James S. Felton, Ph.D.	1992		

Division of Cancer Prevention and Control

Frank L. Meyskens, Jr., M.D. *Chairperson*	1990	Harmon J. Eyre, M.D.	1993
		Lloyd K. Everson, M.D.	1990
		James L. Gaylor, Ph.D.	1991
Sister Mary Madonna Ashton, M.S.	1993	M. Alfred Haynes, M.D., M.P.H.	1993
		James F. Holland, M.D.	1991
Edward Bresnick, Ph.D.	1991	Rumaldo Zapata Juarez, Ph.D.	1993
Philip T. Cole, M.D., Dr. P.H.	1990	Shirley B. Lansky, M.D.	1992
William Darity, Ph.D.	1990	Donald B. McCormick, Ph.D.	1992
Carol N. D'Onofrio, Dr. P.H.	1993	Michael Pertschuk, J.D.	1993
Virginia L. Ernster, Ph.D.	1990	Ross L. Prentice, Ph.D.	1993

Frederick Cancer Research Facility Committee

FCRF Advisory Committee	Edward B. Ziff, Ph.D. *Chairperson*	1992
	J. Thomas August, M.D.	1991
	Renato Baserga, M.D.	1992
	Carmia G. Borek, Ph.D.	1992
	James R. Broach, Ph.D.	1992
	Alexandra M. Levine, M.D.	1991
	Frank Lilly, Ph.D.	1992
	Raymond W. Ruddon, Jr., M.D., Ph.D.	1993
	Steven R. Tannanbaum, Ph.D.	1993
Ad Hoc BSC Representatives	R. Babu Venkatarghavan, Ph.D. (DCBDC)	1993
	James L. Gaylor, Ph.D. (DCPC)	1991
Ex Officio Member of NCAB	Enrico Mihich, M.D.	1990

Executive Committee Members

Dr. Samuel Broder
Director

Dr. Maryann Roper
Deputy Director

Mr. Philip Amoruso
Associate Director for Administrative Management

Dr. Richard Adamson
Director, Division of Cancer Etiology

Mrs. Barbara Bynum
Director, Division of Extramural Activities

Dr. Bruce Chabner
Director, Division of Cancer Treatment

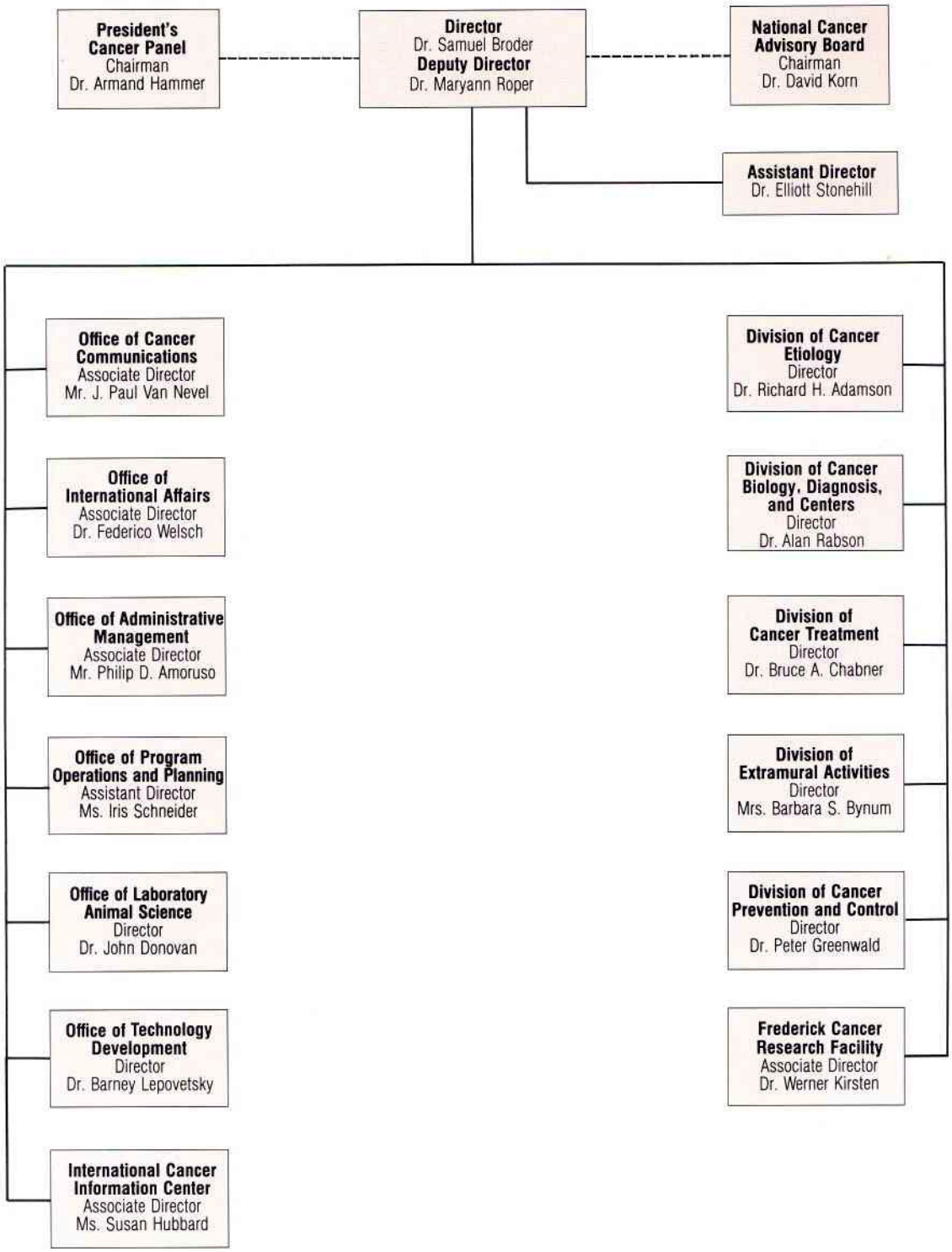
Dr. Peter Greenwald
Director, Division of Cancer Prevention and Control

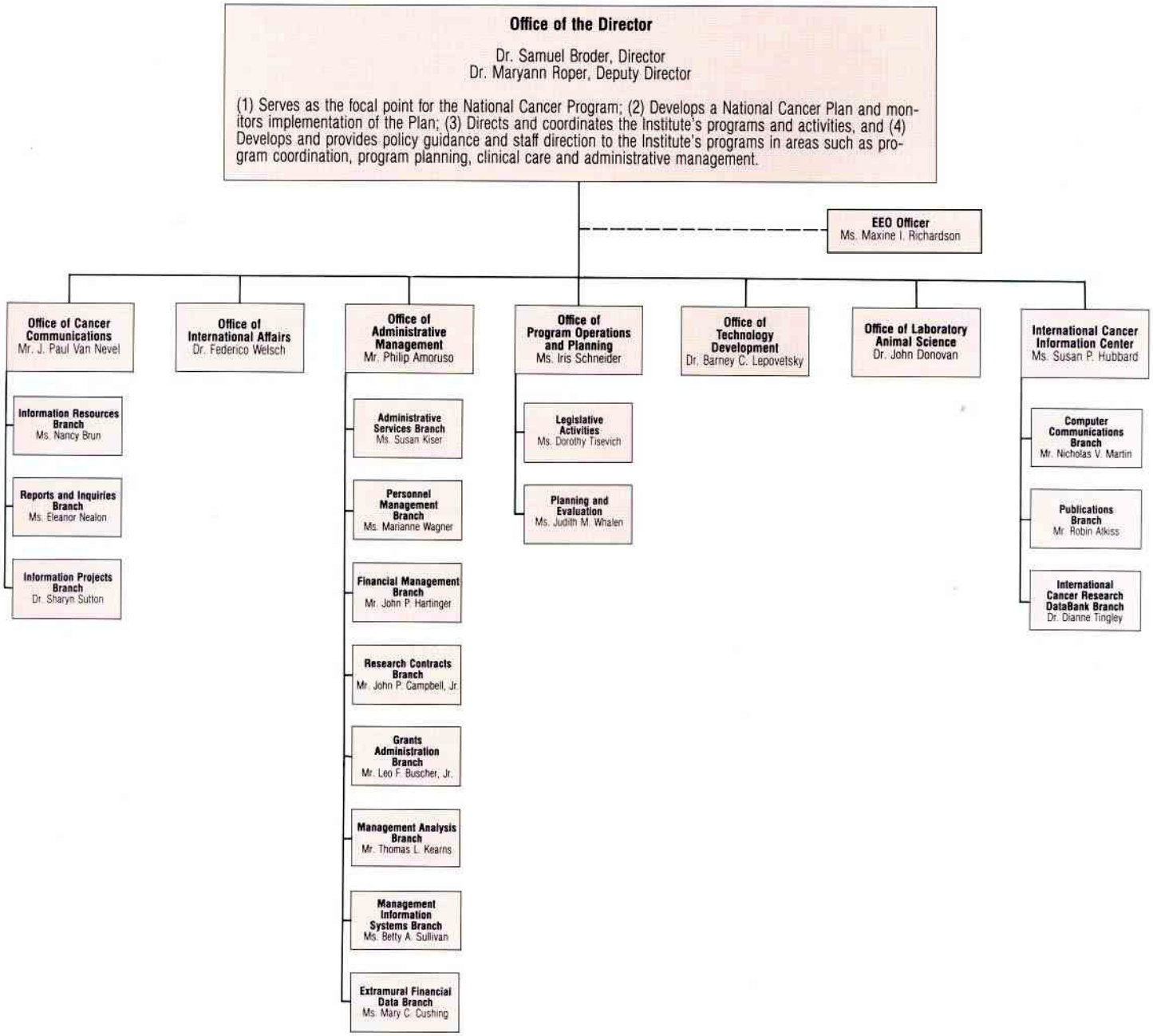
Dr. Werner Kirsten
Associate Director, National Cancer Institute Frederick Cancer Research Facility

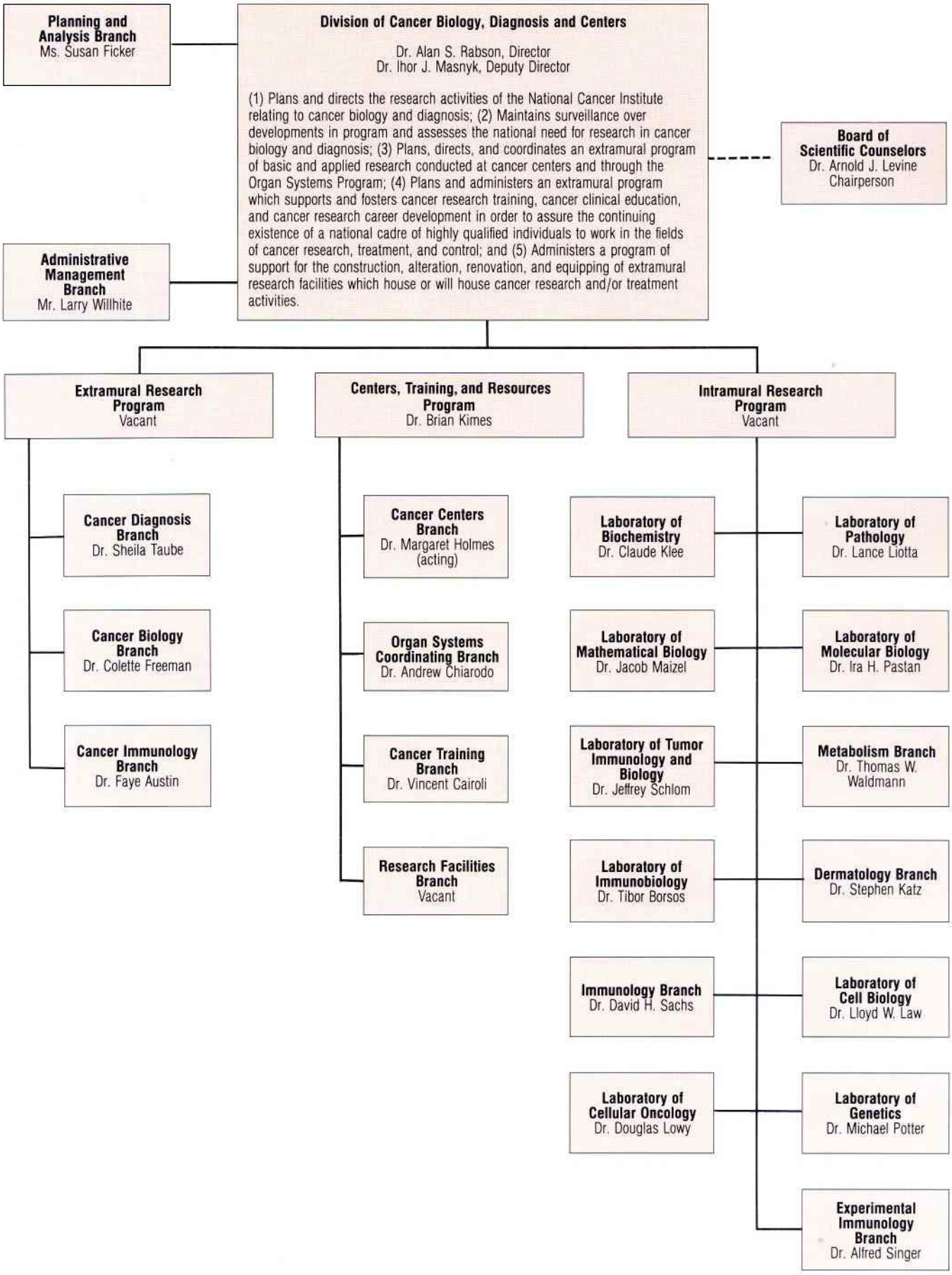
Dr. Alan Rabson
Director, Division of Cancer Biology, Diagnosis and Centers

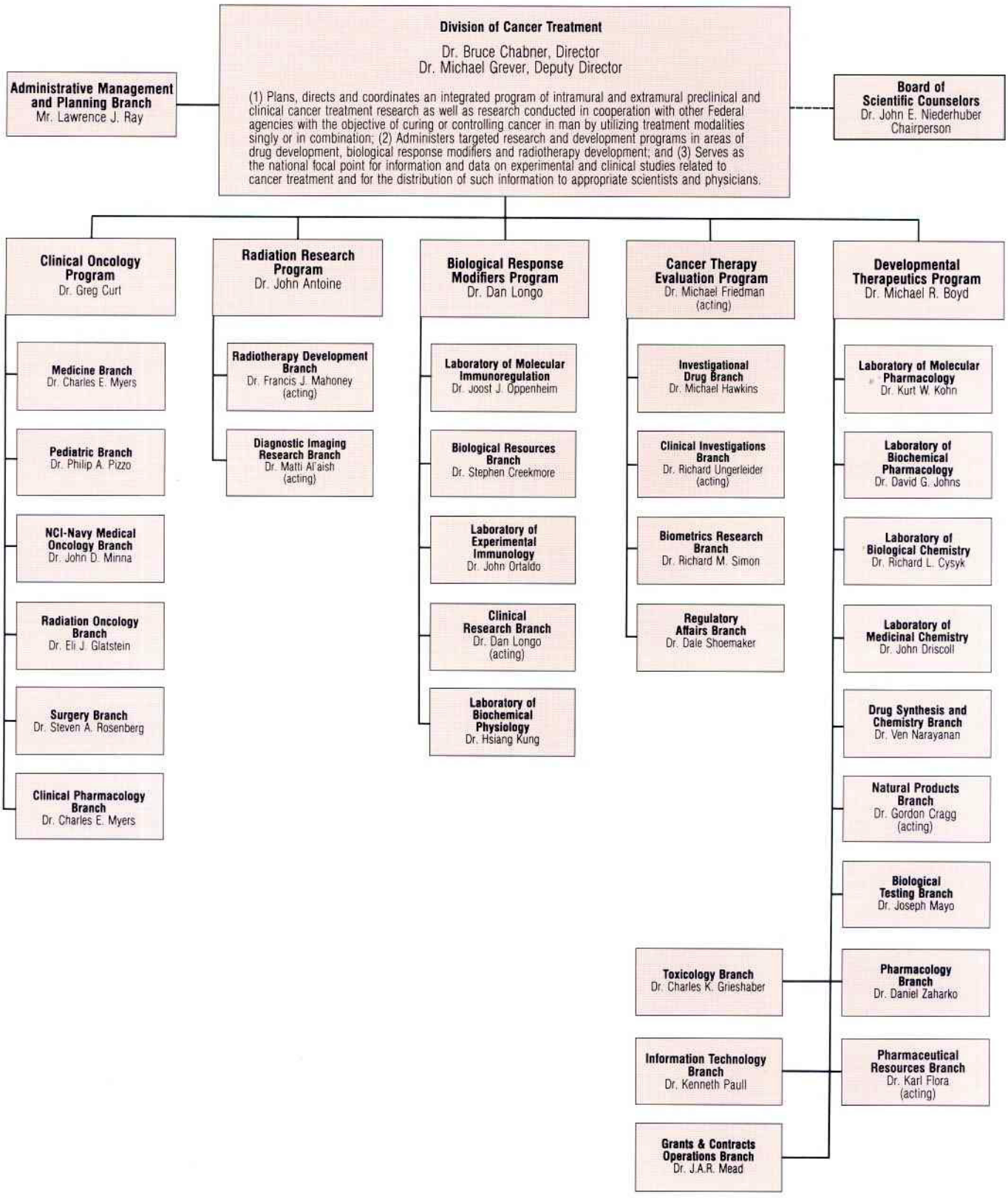
Ms. Iris Schneider
Executive Secretary

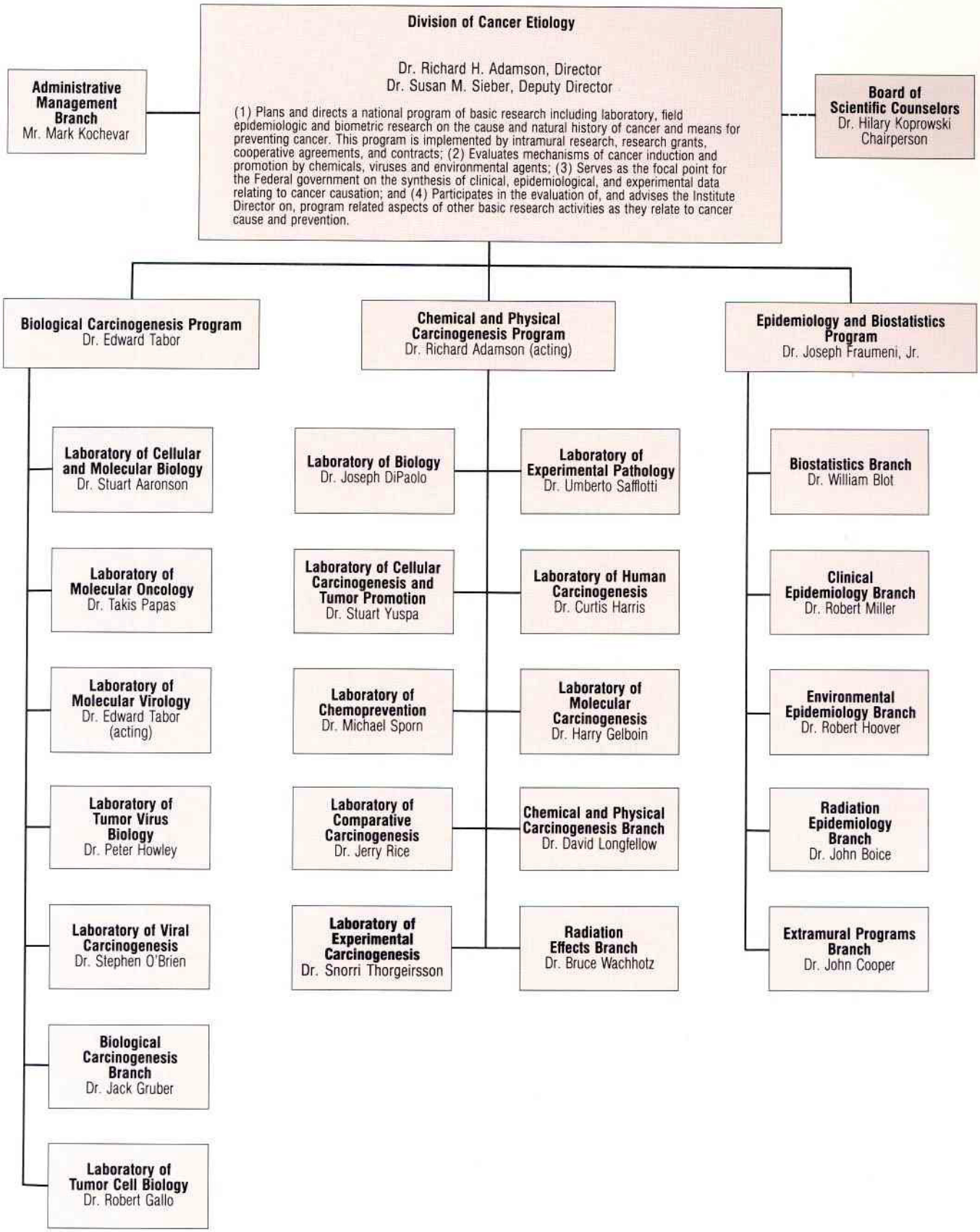
National Cancer Institute Organization

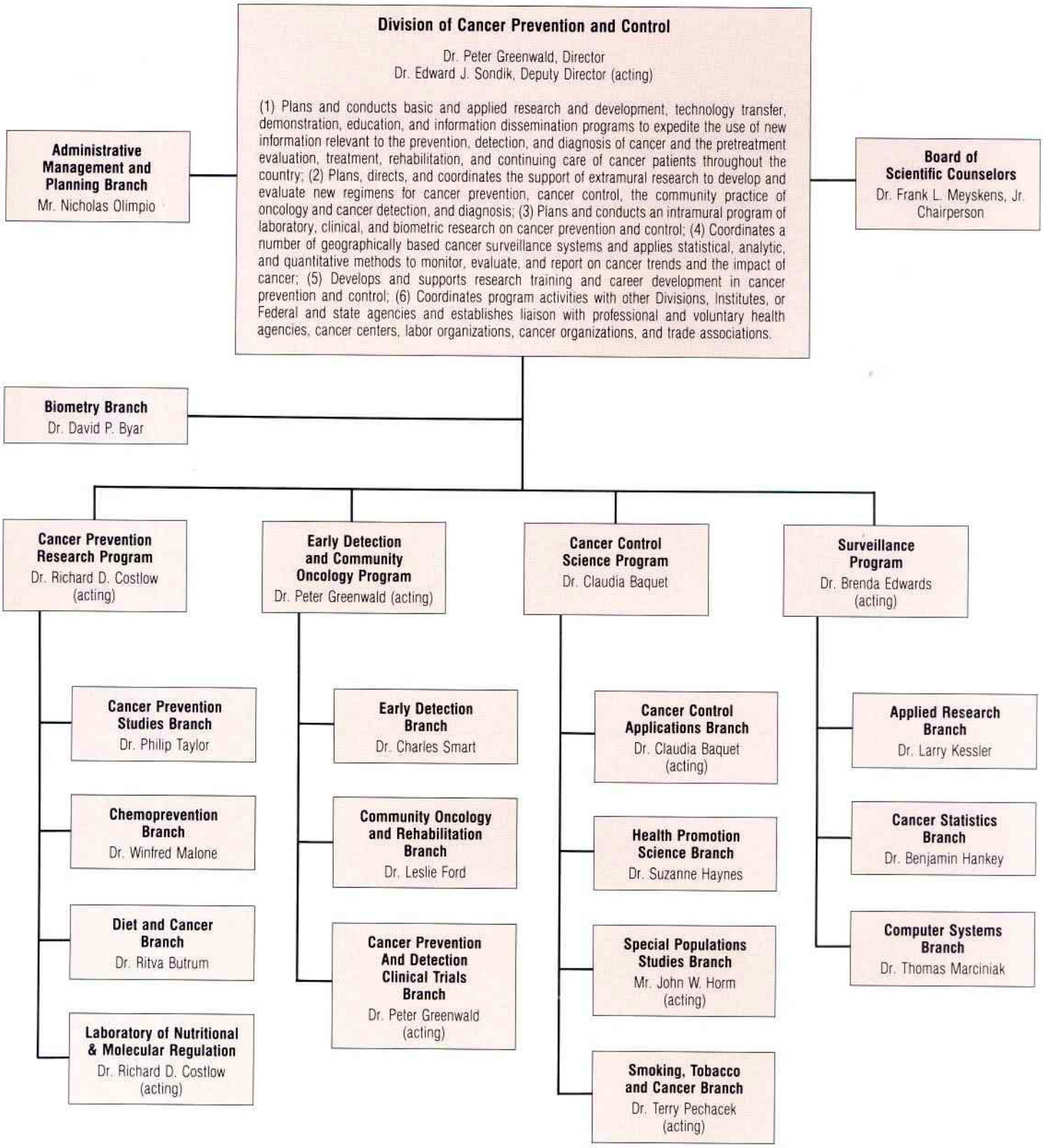


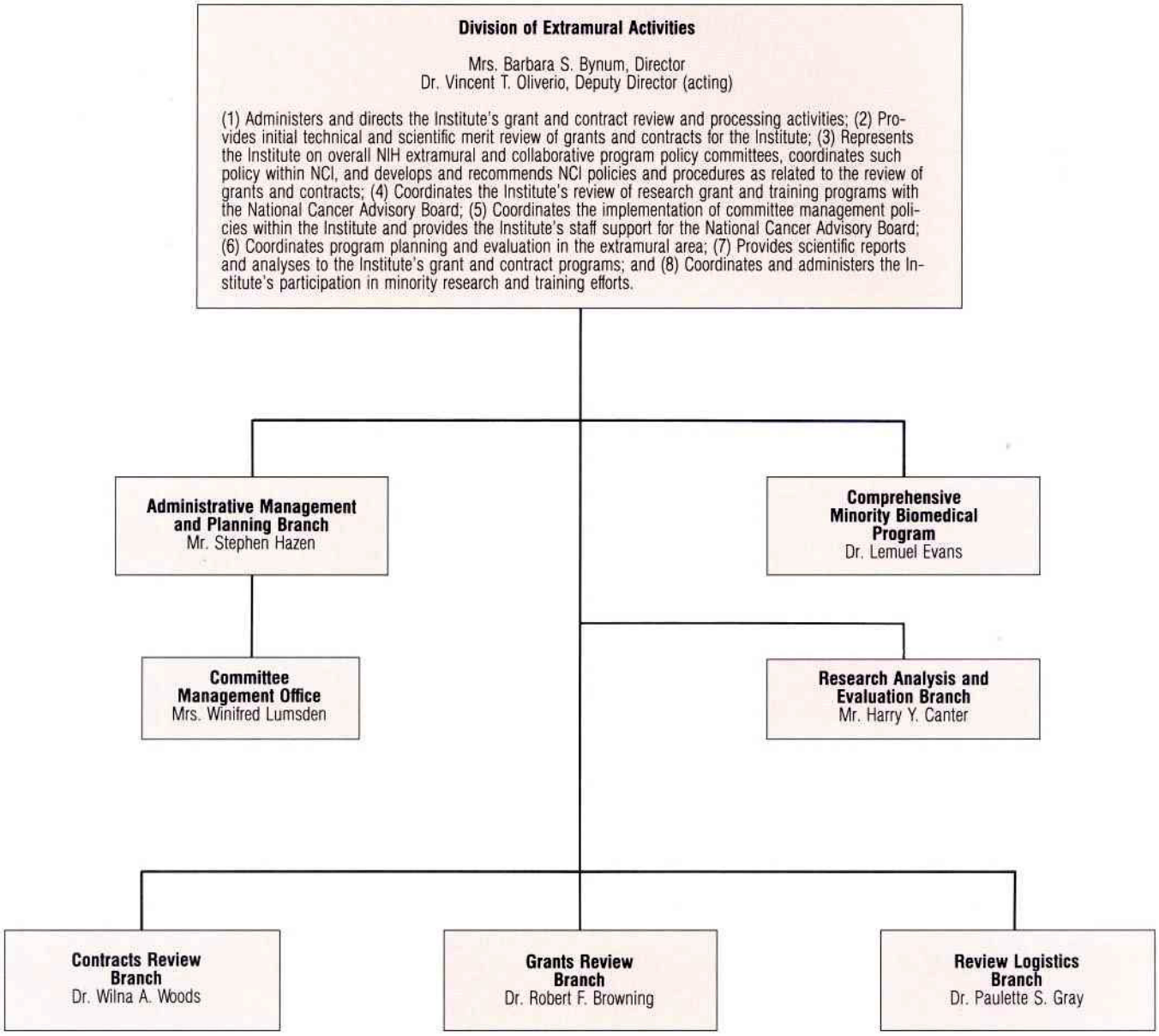

Office of the Director
Dr. Samuel Broder, Director
Dr. Maryann Roper, Deputy Director
(1) Serves as the focal point for the National Cancer Program; (2) Develops a National Cancer Plan and monitors implementation of the Plan; (3) Directs and coordinates the Institute's programs and activities, and (4) Develops and provides policy guidance and staff direction to the Institute's programs in areas such as program coordination, program planning, clinical care and administrative management.
EEO Officer
Ms. Maxine I. Richardson
Office of Cancer Communications
Mr. J. Paul Van Nevel
Information Resources Branch
Ms. Nancy Brun
Reports and Inquiries Branch
Ms. Eleanor Nealon
Information Projects Branch
Dr. Sharyn Sutton
Office of International Affairs
Dr. Federico Welsch
Office of Administrative Management
Mr. Philip Amoruso
Administrative Services Branch
Ms. Susan Kiser
Personnel Management Branch
Ms. Marianne Wagner
Financial Management Branch
Mr. John P. Hartinger
Research Contracts Branch
Mr. John P. Campbell, Jr.
Grants Administration Branch
Mr. Leo F. Buscher, Jr.
Management Analysis Branch
Mr. Thomas L. Kearns
Management Information Systems Branch
Ms. Betty A. Sullivan
Extramural Financial Data Branch
Ms. Mary C. Cushing
Office of Program Operations and Planning
Ms. Iris Schneider
Legislative Activities
Ms. Dorothy Tisevich
Planning and Evaluation
Ms. Judith M. Whalen
Office of Technology Development
Dr. Barney C. Lepovetsky
Office of Laboratory Animal Science
Dr. John Donovan
International Cancer Information Center
Ms. Susan P. Hubbard
Computer Communications Branch
Mr. Nicholas V. Martin
Publications Branch
Mr. Robin Atkiss
International Cancer Research DataBank Branch
Dr. Dianne Tingley


Planning and Analysis Branch
Ms. Susan Ficker
Division of Cancer Biology, Diagnosis and Centers
Dr. Alan S. Rabson, Director
Dr. Ihor J. Masnyk, Deputy Director
(1) Plans and directs the research activities of the National Cancer Institute relating to cancer biology and diagnosis; (2) Maintains surveillance over developments in program and assesses the national need for research in cancer biology and diagnosis; (3) Plans, directs, and coordinates an extramural program of basic and applied research conducted at cancer centers and through the Organ Systems Program; (4) Plans and administers an extramural program which supports and fosters cancer research training, cancer clinical education, and cancer research career development in order to assure the continuing existence of a national cadre of highly qualified individuals to work in the fields of cancer research, treatment, and control; and (5) Administers a program of support for the construction, alteration, renovation, and equipping of extramural research facilities which house or will house cancer research and/or treatment activities.
Board of Scientific Counselors
Dr. Arnold J. Levine
Chairperson
Administrative Management Branch
Mr. Larry Willhite
Extramural Research Program
Vacant
Centers, Training, and Resources Program
Dr. Brian Kimes
Intramural Research Program
Vacant
Cancer Diagnosis Branch
Dr. Sheila Taube
Cancer Biology Branch
Dr. Colette Freeman
Cancer Immunology Branch
Dr. Faye Austin
Cancer Centers Branch
Dr. Margaret Holmes (acting)
Organ Systems Coordinating Branch
Dr. Andrew Chiarodo
Cancer Training Branch
Dr. Vincent Cairoli
Research Facilities Branch
Vacant
Laboratory of Biochemistry
Dr. Claude Klee
Laboratory of Mathematical Biology
Dr. Jacob Maizel
Laboratory of Tumor Immunology and Biology
Dr. Jeffrey Schlom
Laboratory of Immunobiology
Dr. Tibor Borsos
Immunology Branch
Dr. David H. Sachs
Laboratory of Cellular Oncology
Dr. Douglas Lowy
Laboratory of Pathology
Dr. Lance Liotta
Laboratory of Molecular Biology
Dr. Ira H. Pastan
Metabolism Branch
Dr. Thomas W. Waldmann
Dermatology Branch
Dr. Stephen Katz
Laboratory of Cell Biology
Dr. Lloyd W. Law
Laboratory of Genetics
Dr. Michael Potter
Experimental Immunology Branch
Dr. Alfred Singer

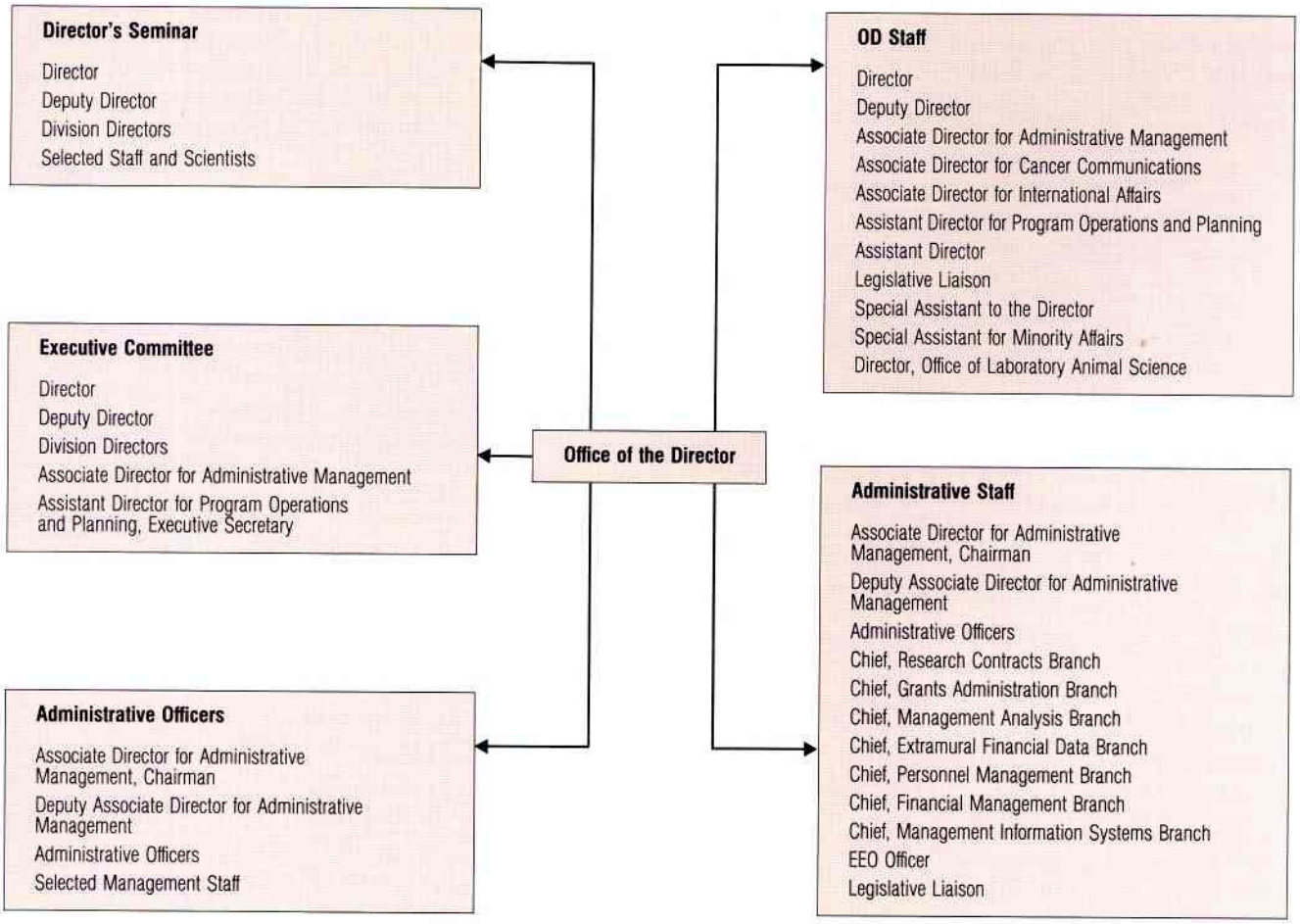

Division of Cancer Treatment
Dr. Bruce Chabner, Director
Dr. Michael Grever, Deputy Director
(1) Plans, directs and coordinates an integrated program of intramural and extramural preclinical and clinical cancer treatment research as well as research conducted in cooperation with other Federal agencies with the objective of curing or controlling cancer in man by utilizing treatment modalities singly or in combination; (2) Administers targeted research and development programs in areas of drug development, biological response modifiers and radiotherapy development; and (3) Serves as the national focal point for information and data on experimental and clinical studies related to cancer treatment and for the distribution of such information to appropriate scientists and physicians.
Administrative Management and Planning Branch
Mr. Lawrence J. Ray
Board of Scientific Counselors
Dr. John E. Niederhuber
Chairperson
Clinical Oncology Program
Dr. Greg Curt
Medicine Branch
Dr. Charles E. Myers
Pediatric Branch
Dr. Philip A. Pizzo
NCI-Navy Medical Oncology Branch
Dr. John D. Minna
Radiation Oncology Branch
Dr. Eli J. Glatstein
Surgery Branch
Dr. Steven A. Rosenberg
Clinical Pharmacology Branch
Dr. Charles E. Myers
Radiation Research Program
Dr. John Antoine
Radiotherapy Development Branch
Dr. Francis J. Mahoney
(acting)
Diagnostic Imaging Research Branch
Dr. Matti Al'aish
(acting)
Biological Response Modifiers Program
Dr. Dan Longo
Laboratory of Molecular Immunoregulation
Dr. Joost J. Oppenheim
Biological Resources Branch
Dr. Stephen Creekmore
Laboratory of Experimental Immunology
Dr. John Ortaldo
Clinical Research Branch
Dr. Dan Longo
(acting)
Laboratory of Biochemical Physiology
Dr. Hsiang Kung
Cancer Therapy Evaluation Program
Dr. Michael Friedman
(acting)
Investigational Drug Branch
Dr. Michael Hawkins
Clinical Investigations Branch
Dr. Richard Ungerleider
(acting)
Biometrics Research Branch
Dr. Richard M. Simon
Regulatory Affairs Branch
Dr. Dale Shoemaker
Developmental Therapeutics Program
Dr. Michael R. Boyd
Laboratory of Molecular Pharmacology
Dr. Kurt W. Kohn
Laboratory of Biochemical Pharmacology
Dr. David G. Johns
Laboratory of Biological Chemistry
Dr. Richard L. Cysyk
Laboratory of Medicinal Chemistry
Dr. John Driscoll
Drug Synthesis and Chemistry Branch
Dr. Ven Narayanan
Natural Products Branch
Dr. Gordon Cragg
(acting)
Biological Testing Branch
Dr. Joseph Mayo
Toxicology Branch
Dr. Charles K. Grieshaber
Pharmacology Branch
Dr. Daniel Zaharko
Information Technology Branch
Dr. Kenneth Paull
Pharmaceutical Resources Branch
Dr. Karl Flora
(acting)
Grants & Contracts Operations Branch
Dr. J.A.R. Mead


Division of Cancer Etiology
Dr. Richard H. Adamson, Director
Dr. Susan M. Sieber, Deputy Director
(1) Plans and directs a national program of basic research including laboratory, field epidemiologic and biometric research on the cause and natural history of cancer and means for preventing cancer. This program is implemented by intramural research, research grants, cooperative agreements, and contracts; (2) Evaluates mechanisms of cancer induction and promotion by chemicals, viruses and environmental agents; (3) Serves as the focal point for the Federal government on the synthesis of clinical, epidemiological, and experimental data relating to cancer causation; and (4) Participates in the evaluation of, and advises the Institute Director on, program related aspects of other basic research activities as they relate to cancer cause and prevention.
Administrative Management Branch
Mr. Mark Kochevar
Board of Scientific Counselors
Dr. Hilary Koprowski
Chairperson
Biological Carcinogenesis Program
Dr. Edward Tabor
Chemical and Physical Carcinogenesis Program
Dr. Richard Adamson (acting)
Epidemiology and Biostatistics Program
Dr. Joseph Fraumeni, Jr.
Laboratory of Cellular and Molecular Biology
Dr. Stuart Aaronson
Laboratory of Molecular Oncology
Dr. Takis Papas
Laboratory of Molecular Virology
Dr. Edward Tabor
(acting)
Laboratory of Tumor Virus Biology
Dr. Peter Howley
Laboratory of Viral Carcinogenesis
Dr. Stephen O'Brien
Biological Carcinogenesis Branch
Dr. Jack Gruber
Laboratory of Tumor Cell Biology
Dr. Robert Gallo
Laboratory of Biology
Dr. Joseph DiPaolo
Laboratory of Cellular Carcinogenesis and Tumor Promotion
Dr. Stuart Yuspa
Laboratory of Chemoprevention
Dr. Michael Sporn
Laboratory of Comparative Carcinogenesis
Dr. Jerry Rice
Laboratory of Experimental Carcinogenesis
Dr. Snorri Thorgeirsson
Laboratory of Experimental Pathology
Dr. Umberto Saffiotti
Laboratory of Human Carcinogenesis
Dr. Curtis Harris
Laboratory of Molecular Carcinogenesis
Dr. Harry Gelboin
Chemical and Physical Carcinogenesis Branch
Dr. David Longfellow
Radiation Effects Branch
Dr. Bruce Wachholz
Biostatistics Branch
Dr. William Blot
Clinical Epidemiology Branch
Dr. Robert Miller
Environmental Epidemiology Branch
Dr. Robert Hoover
Radiation Epidemiology Branch
Dr. John Boice
Extramural Programs Branch
Dr. John Cooper


Division of Cancer Prevention and Control
Dr. Peter Greenwald, Director
Dr. Edward J. Sondik, Deputy Director (acting)
(1) Plans and conducts basic and applied research and development, technology transfer, demonstration, education, and information dissemination programs to expedite the use of new information relevant to the prevention, detection, and diagnosis of cancer and the pretreatment evaluation, treatment, rehabilitation, and continuing care of cancer patients throughout the country; (2) Plans, directs, and coordinates the support of extramural research to develop and evaluate new regimens for cancer prevention, cancer control, the community practice of oncology and cancer detection, and diagnosis; (3) Plans and conducts an intramural program of laboratory, clinical, and biometric research on cancer prevention and control; (4) Coordinates a number of geographically based cancer surveillance systems and applies statistical, analytic, and quantitative methods to monitor, evaluate, and report on cancer trends and the impact of cancer; (5) Develops and supports research training and career development in cancer prevention and control; (6) Coordinates program activities with other Divisions, Institutes, or Federal and state agencies and establishes liaison with professional and voluntary health agencies, cancer centers, labor organizations, cancer organizations, and trade associations.
Administrative Management and Planning Branch
Mr. Nicholas Olimpio
Board of Scientific Counselors
Dr. Frank L. Meyskens, Jr.
Chairperson
Biometry Branch
Dr. David P. Byar
Cancer Prevention Research Program
Dr. Richard D. Costlow (acting)
Early Detection and Community Oncology Program
Dr. Peter Greenwald (acting)
Cancer Control Science Program
Dr. Claudia Baquet
Surveillance Program
Dr. Brenda Edwards (acting)
Cancer Prevention Studies Branch
Dr. Philip Taylor
Chemoprevention Branch
Dr. Winfred Malone
Diet and Cancer Branch
Dr. Ritva Butrum
Laboratory of Nutritional & Molecular Regulation
Dr. Richard D. Costlow (acting)
Early Detection Branch
Dr. Charles Smart
Community Oncology and Rehabilitation Branch
Dr. Leslie Ford
Cancer Prevention And Detection Clinical Trials Branch
Dr. Peter Greenwald (acting)
Cancer Control Applications Branch
Dr. Claudia Baquet (acting)
Health Promotion Science Branch
Dr. Suzanne Haynes
Special Populations Studies Branch
Mr. John W. Horm (acting)
Smoking, Tobacco and Cancer Branch
Dr. Terry Pechacek (acting)
Applied Research Branch
Dr. Larry Kessler
Cancer Statistics Branch
Dr. Benjamin Hankey
Computer Systems Branch
Dr. Thomas Marciniak


Division of Extramural Activities
Mrs. Barbara S. Bynum, Director
Dr. Vincent T. Oliverio, Deputy Director (acting)
(1) Administers and directs the Institute's grant and contract review and processing activities; (2) Provides initial technical and scientific merit review of grants and contracts for the Institute; (3) Represents the Institute on overall NIH extramural and collaborative program policy committees, coordinates such policy within NCI, and develops and recommends NCI policies and procedures as related to the review of grants and contracts; (4) Coordinates the Institute's review of research grant and training programs with the National Cancer Advisory Board; (5) Coordinates the implementation of committee management policies within the Institute and provides the Institute's staff support for the National Cancer Advisory Board; (6) Coordinates program planning and evaluation in the extramural area; (7) Provides scientific reports and analyses to the Institute's grant and contract programs; and (8) Coordinates and administers the Institute's participation in minority research and training efforts.
Administrative Management and Planning Branch
Mr. Stephen Hazen
Comprehensive Minority Biomedical Program
Dr. Lemuel Evans
Committee Management Office
Mrs. Winifred Lumsden
Research Analysis and Evaluation Branch
Mr. Harry Y. Canter
Contracts Review Branch
Dr. Wilna A. Woods
Grants Review Branch
Dr. Robert F. Browning
Review Logistics Branch
Dr. Paulette S. Gray

Information Flow for Program Implementation



Intramural Review Process

Board of Scientific Counselors						
BSC Approves Site Visit Schedule	Chairman, BSC Selects Site Visit Chairman Site Visit Chairman Selects Site Visit Team	BSC Site Visit Team Reviews Material Prepared by Division	BSC Site Visit Team Inspects and Reviews Laboratory	Site Visit Team Prepares Report and Presents it to BSC. After Review and Approval, BSC Transmits Final Recommendations to the Division Director.		
Step 1 Scheduling and Approval	**Step 2** Team Selection Site Visit	**Step 3** Preparation for Site Visit	**Step 4** Site Visit	**Step 5** Site Visit Report and Recommendations	**Step 6** Implementation of Recommendations	**Step 7** Follow-up Report
NCI Divisions						
Division Prepares Proposed Site Visit Schedule		Division Prepares Background Material on Laboratory to be Site Visited and Sends to Site Visit Team	Site Visit Preparation by Laboratory		Division Implements Recommendations Contained in Site Visit Report	Division Prepares Report to BSC on Actions Taken

Research Positions at the National Cancer Institute[1]

The National Cancer Institute recognizes that one of the most valuable resources to be drawn upon in the fight against cancer is the wealth of scientific talent available in the U.S. and around the world. In an effort to attract and maintain the highest quality scientific staff, two personnel systems are used: the U.S. Civil Service System and the PHS Commissioned Corps. In addition, the Staff Fellowship Program and the NIH Visiting Program have been designed to meet special needs. Other special programs are available for those who qualify.

Position	Eligibility	Annual Salary	Mechanism of Entry
I. Civil Service			
A. Civil Service (tenured)	Appropriate advanced education, experience and knowledge needed by NCI to conduct its programs.	Minimum starting Ph. D.—$41,121 Physicians—$48,162 Maximum $75,500	Office of Personnel Management; Contact Division Director or Laboratory Chief in area of interest or the NCI Personnel Office.
II. Special Appointment of Experts and Consultants			
A. Special Appointment of Experts and Consultants (non-tenured appointment which can be extended up to 4 years)	Applicants shall possess outstanding experience and ability as to justify recognition as authorities in their particular fields of activity.	Equivalent to the salary range of GS-13 and above—Maximum $75,500	Recommendation by Division Directors. Final approval rests with the Director, NCI.
III. Medical Staff Fellows			
A. Medical Staff Fellows	Appointment for 2 or 3 years with an additional 1-year extension for an initial 2-year appointment. Graduate of accredited medical or osteopathic school and completion of internship. Completion of 2 or 3 years of clinical training beyond the M.D. degree and demonstrated outstanding ability to conduct successfully, preestablished programs in both clinical and laboratory research.	$37,000-$41,000	Apply to the Medical Staff Fellowship Program Office, National Institutes of Health, Clinical Center, Building 10, Room IC292, Bethesda, MD 20892.
B. Medical Staff Fellows in Pharmacology (PRAT Fellows). For physicians committed to research careers in pharmacological sciences, or clinical pharmacology.	Appointment for 2 or 3 years with an additional 1-year extension for an initial 2-year appointment. Graduate of accredited medical or osteopathic school and completion of internship. Completion of 2 or 3 years of clinical training beyond the M.D. degree and demonstrated outstanding ability to conduct successfully, preestablished programs in both clinical and laboratory research.	$37,000-$41,000	Apply to the Medical Staff Fellowship Program Office, National Institutes of Health, Clinical Center, Building 10, Room IC292, Bethesda, MD 20892.
IV. Visiting Program (limited tenure)[2]			
A. Visiting Fellow (maximum 3 years)	1-3 years postdoctoral experience or training.	Entrance stipend $25,000-$28,000	Contact Division Director or Laboratory Chief in area of interest.
B. Visiting Associate (1 year with renewals to end of project)	3+ years postdoctoral experience or training with appropriate knowledge needed by NCI.	$23,846-$44,957	Contact Division Director or Laboratory Chief in area of interest.
C. Visiting Scientist (duration of project)	6+ years postdoctoral experience with appropriate specific experience and knowledge needed.	$34,580-$75,500	Contact Division Director or Laboratory Chief in area of interest.
V. Staff Fellowships			
A. Staff Fellowship	Physician or other doctoral degree equivalent (awarded within last 5 years) and who has less than 7 years of relevant research experience. U.S. citizen or non-citizen eligible for naturalization within 4 years. Maximum 7-year appointment.	Staff Fellows Physicians $28,000-$38,056 Other Doctorates $24,000-$43,345 Senior Staff Fellows Physicians $32,000-$52,825 Other Doctorates $28,000-$45,234	Contact Director or Laboratory Chief in area of interest or the NCI Personnel Office.

[1]Does not necessarily indicate that positions are currently available at the National Cancer Institute.
[2]Under most circumstances, the various visiting programs are limited to non-citizens.

Position	Eligibility	Annual Salary	Mechanism of Entry
VI. Civil Service Summer Employment Programs			
A. Summer Clerical Program	Must be 18 years of age or older (16 if high school graduate). Noncitizens may compete provided they have permanent visa status and are from countries allied with the U.S.	GS-1 through GS-4. Grade is based on education and/or experience.	Apply to NIH on or before March 15.
B. Summer Undergraduate Program	Students majoring in biological and/or physical sciences or related field, or applicants with appropriate experience. Noncitizens may compete provided they have permanent visa status and are from countries allied with the U.S.	GS-1 through GS-4. Grade is based on education and/or experience.	Apply to NIH by March 15.
C. Summer Graduate Program	College graduate, graduate student planning to attend graduate school, faculty member or equivalent experience and/or education. Noncitizens may compete provided they have permanent visa status and are from countries allied with the U.S.	GS-5 through GS-12. For some occupations superior scholastic work may qualify for a higher grade level.	Apply to NIH by March 15.
D. Summer Employment for Needy Youth	Educationally and economically disadvantaged youths in their formative years (must have reached 16th birthday). Disabled students are not required to meet economic criteria. Noncitizens may compete provided they have permanent visa status and are from countries allied with the U.S.	Federal minimum wage.	Register with the local office of the State Employment service and apply to NCI.
E. Summer Employment Program for Native Americans Under the Job Training Partnership Act	Participants must be Native American or of Native American descent and unemployed, under-employed, or economically disadvantaged. Must reside within the states of Tennessee, Kentucky, or the District of Columbia.	Paid by the United South and Eastern Tribes, Inc. (USET) depending on education and experience.	Apply to USET for referral to NCI.
VII. Special Programs			
A. Guest Researcher sponsored by organization other than NIH, PHS	Usually a scientist, engineer or other scientifically trained specialist who would benefit from the use of NCI facilities in furthering his/her research. Cannot perform services for NCI.	Established by sponsoring organization.	Contact Division Director or Laboratory Chief in area of interest; also apply to sponsoring agency, e.g., American Cancer Society, Eleanor Roosevelt Cancer Foundation, Leukemia Society of America, Inc., etc.
B. COSTEP Program (operates year-round). Maximum 120 days per 12-month period.	U.S. citizen. Must have completed one year of study in a medical, dental or veterinary school, or a minimum of two years of baccalaureate program in a health-related field such as engineering, nursing, pharmacy, etc. May be enrolled in a master's or doctoral program in a health-related field (designated by the Assistant Secretary for Health). Physical requirements of PHS Commissioned Corps. Plans to return to college.	Pay and allowance of a Junior Assistant Health Service Officer.	Apply to COSTEP, Commissioned Personnel Operations Division, Parklawn Building, 5600 Fishers Lane, Rockville, MD 20857.
C. Fogarty International Scholars in Residence Program.	International reputation, productivity, demonstrated ability in biomedical field.	$60,000 for 1 year.	Recommendation to Fogarty Center by Institute Director or any senior tenured member of the NIH scientific staff.
D. Stay-in-School Program	Economically disadvantaged students who are attending accredited schools on a full-time or substantially full-time basis, and are in good academic standing. (Must have reached 16th birthday.) Disabled students are not required to meet economic criteria.	Salary is commensurate with duties assigned and student's education and/or experience.	Register with the local office of the State Employment service and apply to NCI. No deadline required for applying. However, no new appointments are made between May 1 to August 30.

Position	Eligibility	Annual Salary	Mechanism of Entry
E. The Federal Junior Fellowship Program	Graduating high school senior in a public or private school in the Metro Wash., D.C. area. Must be in upper 10% of graduating class, have applied for admission to an accredited college or university and need financial assistance to attend school. Must be a U.S. citizen or a native of American Samoa or Swains Island.	GS-1 through GS-4.	Nominations are submitted directly to the Office of Personnel Management by high school principals or counselors
VIII. Other Training Programs			
A. Cancer Prevention Fellowship Program (Three-year non-tenured civil service position).	1) M.D., D.D.S., Ph.D., or other doctoral degree in a related discipline (epidemiology, biostatistics, and the biomedical, nutritional, public health or behavioral sciences); 2) U.S. citizen or resident alien eligible for citizenship within four years.	First year for an M.D. or D.O. $26,000-$37,000 for Ph.D. $18,000-$31,000.	Program Director, CPFP, Executive Plaza South, Room T41, Bethesda, Maryland 20892.
B. Biotechnology Fellow	Physicians with little or no experience or training in fundamental research, but with an interest in biotechnology including its application to prevention and new treatment and diagnostic techniques, would be eligible. Ph.D. scientists with little or no experience or training in clinically related programs but with an interest in clinical applications of fundamental research methodology related to biotechnology would also be eligible. Typically, these candidates will have less than three years postdoctoral experience. The Biotechnology Training Program is established for United States citizens, or resident aliens who will be eligible for U.S. citizenship within four years.	First year Ph.D. $19,000-$25,000 Physicians $30,000-$34,000	Contact Division Director or Laboratory Chief in area of interest.
C. Cancer Nurse Training Program	Applications will be accepted from graduates of NLN accredited baccalaureate nursing programs. Each candidate must submit academic transcripts demonstrating a minimum of a "B" average in undergraduate work, three references regarding their academic and clinical capability, a letter describing their interest in the program, and a Personal Qualification Statement, SF-171. The program is also available to all new graduate applicants to the Cancer Nursing Service; some may not be aware of the program prior to their contact with Clinical Center.	Stipends for the program will be $1,700 per month.	Contact the Division of Cancer Treatment.
D. Student Research Training Program	The review and selection of candidates, as well as the day-to-day administration of the fellowships, will be the responsibility of each Division's Administrative Office. Must be bona-fide high school, college, medical school, or graduate student. Must be 16 years of age, must have a cumulative GPA of 2.75 or above, must be either a U.S. citizen or resident alien. The length of the training fellowships may vary from 2 to 6 months, not to exceed 6 months during any one 12-month period.	Stipends are based on education and experience at a pay range of $802-$1,872 per month.	Contact Division Director or Laboratory Chief in area of interest. Application deadlines are March 1 for spring/summer months and October 1 for fall/winter months.
E. Special Volunteer Program	Volunteer service may be accepted for direct patient care, clerical assignments, technical assistance, or any other activities necessary to carry out the authorized functions of the NCI. Applicants must be at least 16 years of age.	N/A	Contact the NCI Personnel Office.

Position	Eligibility	Annual Salary	Mechanism of Entry
F. General Fellowship Program	M.D., Ph.D. or equivalent degrees as well as pre-doctoral candidates pursuing graduate work with the aim of achieving a doctoral degree. U.S. citizens, permanent residents, or foreign citizens are eligible.	Salary is commensurate with duties assigned and candidate's education and/or experience.	Contact Division Director or Laboratory Chief in area of interest.
G. Cancer Epidemiology and Biostatistics Training Program	M.D.s and Ph.D.s with an interest in and an aptitude for epidemiology and/or biostatistical research in cancer. Ph.D. candidates in approved doctoral programs in epidemiology or biostatistics whose research would be the source of their dissertation. Master's level scientists whose degree is in a discipline related to epidemiology or biostatistics. Must be U.S. citizen or resident alien who will be eligible for U.S. citizenship within four years.	Starting salary: M.D. $26,000 Ph.D. $18,000 Master's level $17,000	Contact the Administrative Office of the Division of Cancer Etiology.
H. Intramural Research Training Award (IRTA)	Appointments for 1 or 2 years with a maximum of 3 years to candidates with physician or other doctoral degree in the biomedical, behavioral or related sciences and 3 or fewer years of relevant postdoctoral research experience.	$24,000-$27,000	Contact Division Director or Laboratory Chief in area of interest.

Number of Deaths for the Five Leading Cancer Sites By Age Group and Sex

All Ages		Under 15		15-34		35-54		55-74		75+	
Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Lung	Breast	Leukemia	Leukemia	Leukemia	Breast	Lung	Breast	Lung	Lung	Lung	Colon & Rectum
84,961	40,534	383	284	773	668	8,805	8,391	53,995	25,126	21,979	14,596
Colon & Rectum	Lung	Brain & CNS	Brain & CNS	Non-Hodgkin's Lymphoma	Leukemia	Colon & Rectum	Lung	Colon & Rectum	Breast	Prostate	Breast
27,969	40,415	244	198	470	472	2,221	4,961	14,758	20,166	15,888	11,308
Prostate	Colon & Rectum	Endocrine	Endocrine	Brain & CNS	Brain & CNS	Non-Hodgkin's Lymphoma	Colon & Rectum	Prostate	Colon & Rectum	Colon & Rectum	Lung
27,261	28,893	107	97	459	325	1,281	1,952	11,066	12,174	10,791	10,218
Pancreas	Pancreas	Non-Hodgkin's Lymphoma	Soft Tissue	Hodgkin's Disease	Cervix	Brain & CNS	Ovary	Pancreas	Ovary	Pancreas	Pancreas
11,403	12,053	97	40	300	324	1,251	1,669	6,673	6,445	3,571	5,506
Leukemia	Ovary	Bone	Kidney	Melanoma Skin	Non-Hodgkin's Lymphoma	Pancreas	Cervix	Stomach	Pancreas	Bladder	Ovary
9,662	11,728	46	36	273	213	1,120	1,401	4,445	5,784	3,376	3,473

Source: Mortality tape (1986) from National Center for Health Statistics.

Relationship of Cancer to Leading Causes of Death in the United States

Rank	Cause	Number of Deaths	Crude Death Rate per 100,000 Population	Percent of Total Deaths
	ALL CAUSES	2,105,361	873.2	100.0
1	Diseases of Heart	765,490	317.5	36.4
2	CANCER	469,376	194.7	22.3
3	Cerebrovascular	149,643	62.1	7.1
4	Accidents	95,277	39.5	4.5
5	Bronchitis, Emphysema & Asthma	76,559	31.8	3.6
6	Pneumonia & Influenza	69,812	29.0	3.3
7	Diabetes Mellitus	37,184	15.4	1.8
8	Suicide	30,904	12.8	1.5
9	Cirrhosis of Liver	26,159	10.9	1.2
10	Atherosclerosis	22,706	9.4	1.1
11	Nephritis & Nephrosis	21,767	9.0	1.0
12	Homicide	21,731	9.0	1.0
13	Septicemia	18,795	7.8	0.9
14	Diseases of Infancy	18,391	7.6	0.9
15	Congenital Anomalies	12,638	5.2	0.6
	Other & Ill-defined	268,919	111.5	12.8

Source: National Center for Health Statistics, 1986.

Estimated New Cancer Cases and Deaths by Sex for All Sites 1989*

	Estimated New Cases			Estimated Deaths		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**
All Sites	1,010,000*	505,000*	505,000*	502,000	266,000	236,000
Buccal Cavity & Pharynx **(ORAL)**	30,600	20,600	10,000	8,650	5,775	2,875
Lip	4,200	3,700	500	100	75	25
Tongue	6,000	3,900	2,100	1,950	1,300	650
Mouth	11,700	7,000	4,700	2,600	1,600	1,000
Pharynx	8,700	6,000	2,700	4,000	2,800	1,200
Digestive Organs	227,800	115,200	112,600	123,000	64,400	58,600
Esophagus	10,100	7,200	2,900	9,400	6,900	2,500
Stomach	20,000	11,900	8,100	13,900	8,200	5,700
Small Intestine	2,700	1,400	1,300	900	500	400
Large Intestine } **(COLON-RECTUM)**	107,000	50,000	57,000	53,500	26,000	27,500
Rectum }	44,000	23,000	21,000	7,800	4,000	3,800
Liver & Biliary Passages	14,500	7,500	7,000	11,400	5,800	5,600
Pancreas	27,000	13,000	14,000	25,000	12,500	12,500
Other & Unspecified Digestive	2,500	1,200	1,300	1,100	500	600
Respiratory System	171,600	114,000	57,600	147,100	96,900	50,200
Larynx	12,300	10,000	2,300	3,700	3,000	700
LUNG	155,000	101,000	54,000	142,000	93,000	49,000
Other & Unspecified Respiratory	4,300	3,000	1,300	1,400	900	500
Bone	2,100	1,200	900	1,300	700	600
Connective Tissue	5,600	3,000	2,600	3,000	1,400	1,600
SKIN	27,000**	14,500**	12,500**	8,200†	5,200	3,000
BREAST	142,900***	900***	142,000***	43,300	300	43,000
Genital Organs	181,800***	109,900	71,900***	52,200	29,100	23,100
Cervix Uteri } **(UTERUS)**	13,000***	—	13,000***	6,000	—	6,000
Corpus, Endometrium }	34,000	—	34,000	4,000	—	4,000
Ovary	20,000	—	20,000	12,000	—	12,000
Other & Unspecified Genital, Female	4,900	—	4,900	1,100	—	1,100
Prostate	103,000	103,000	—	28,500	28,500	—
Testis	5,700	5,700	—	350	350	—
Other & Unspecified Genital, Male	1,200	1,200	—	250	250	—
Urinary Organs	70,200	49,000	21,200	20,200	12,900	7,300
Bladder	47,100	34,500	12,600	10,200	6,900	3,300
Kidney & Other Urinary	23,100	14,500	8,600	10,000	6,000	4,000
Eye	1,900	1,000	900	300	150	150
Brain & Central Nervous System	15,000	8,200	6,800	11,000	6,000	5,000
Endocrine Glands	12,600	3,700	8,900	1,750	775	975
Thyroid	11,300	3,000	8,300	1,025	375	650
Other Endocrine	1,300	700	600	725	400	325
Leukemias	27,300	15,200	12,100	18,100	9,800	8,300
Lymphocytic Leukemia	13,000	7,500	5,500	7,000	3,900	3,100
Granulocytic Leukemia	13,300	7,200	6,100	10,600	5,600	5,000
Monocytic Leukemia	1,000	500	500	500	300	200
Other Blood & Lymph Tissues	51,800	27,000	24,800	27,400	14,100	13,300
Hodgkin's Disease	7,400	4,200	3,200	1,500	900	600
Non-Hodgkin's Lymphomas	32,800	16,800	16,000	17,300	8,900	8,400
Multiple Myeloma	11,600	6,000	5,600	8,600	4,300	4,300
All Other & Unspecified Sites	41,800	21,600	20,200	36,500	18,500	18,000

NOTE: The estimates of new cancer cases are offered as a rough guide and should not be regarded as definitive. Especially note that year-to-year changes may only represent improvements in the basic data. ACS six major sites appear in boldface caps.

** Carcinoma in situ and non-melanoma skin cancers are not included in totals. Carcinoma in situ of the uterine cervix accounts for more than 50,000 new cases annually, and carcinoma in situ of the female breast accounts for more than 10,000 new cases annually. Non-melanoma skin cancer accounts for more than 500,000 new cases annually.*

*** Melanoma only* **** Invasive cancer only.* *† Melanoma 6,000; other skin 2,200*

INCIDENCE ESTIMATES ARE BASED ON RATES FROM NCI SEER PROGRAM 1983-1985.

The Cost of Cancer

The annual cost of cancer is calculated in three components: the direct cost of care for patients with cancer; the cost of the productivity lost while persons are away from their work in connection with treatment or disability, so-called morbidity costs; and the value of lost productivity due to premature mortality. Detailed costs by specific cancer site are not available at the present time. However, it is possible to estimate the total cost of the disease through national figures on health care expenditures, from the results of surveys on morbidity, and from statistics on mortality.

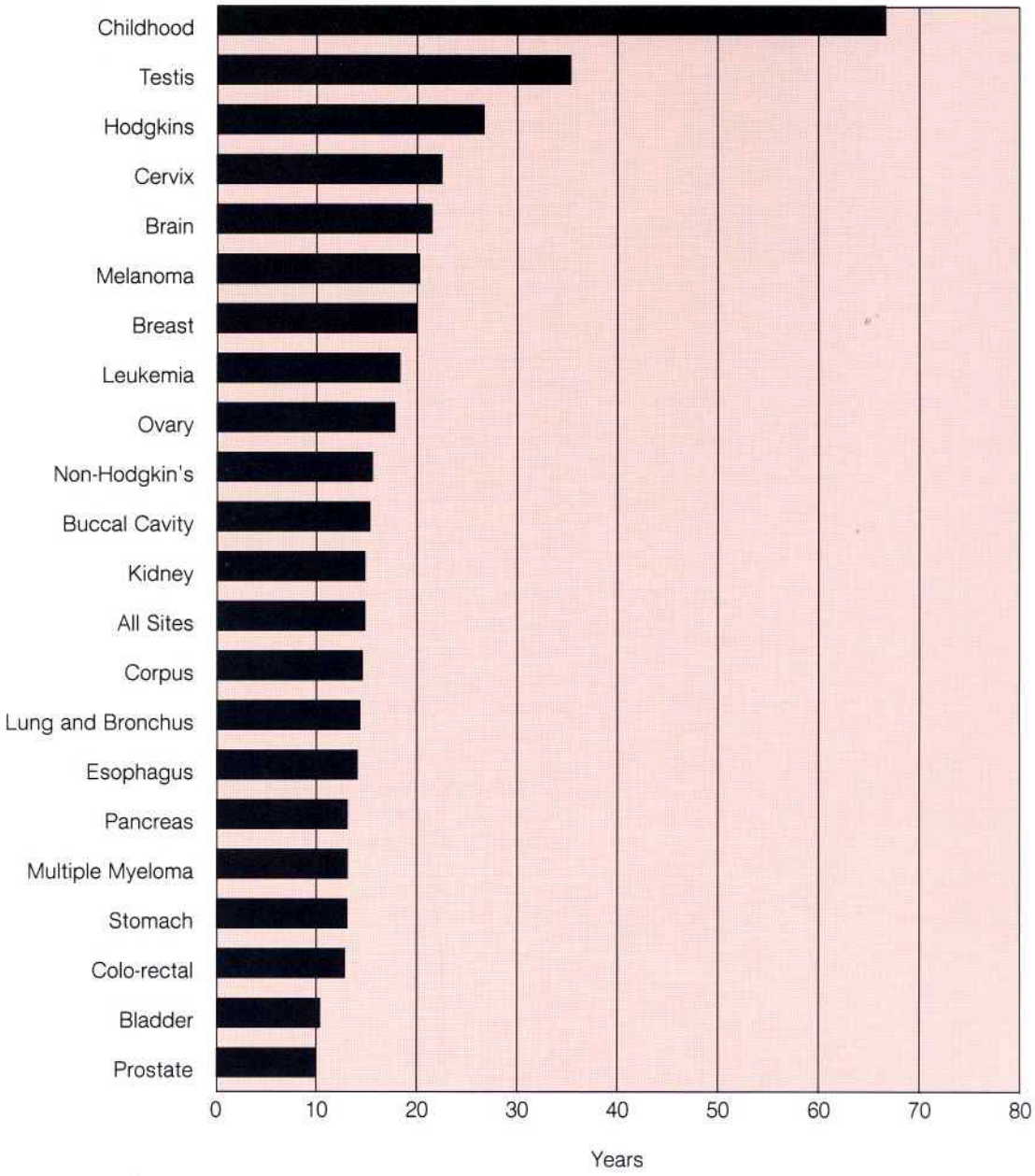
The most recent figures for the annual cost of cancer have been supplied by the National Center for Health Statistics. These figures are as follows for 1987:

All Costs in Millions	Total Cost	Direct Cost	Morbidity Cost	Mortality Cost
All Cancers	$ 83,532	$ 26,333	$ 9,876	$ 47,323
All Health Care	$846,054	$442,600	$136,723	$266,731
Percent Relationship of Cancer to Total	10%	6%	7%	18%

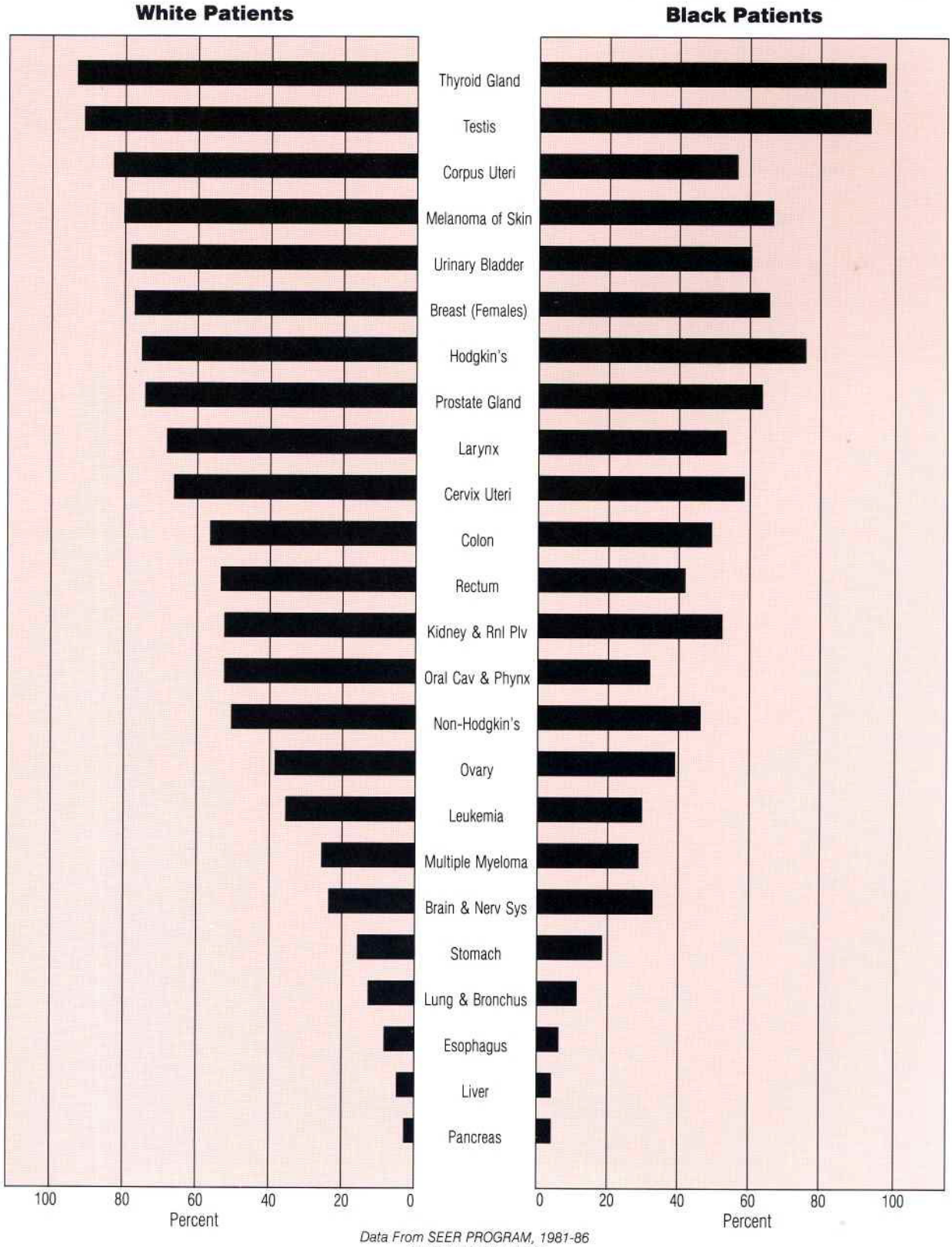
The figures show that cancer accounts for 10 percent of the total cost of disease in the United States and that its share of the total cost of premature death is about 18 percent of all causes of death. Mortality costs are computed as the loss of expected lifetime earnings of the decedent, which is relatively low for persons over age 65. Some 66 percent of all cancer deaths occur in persons 65 and over. (In these figures the future earnings were discounted at a rate of four percent to account for the time value of fiscal resources.)

The following table—Average Years of Life Lost Per Person Due to Cancer Deaths, All Races, Both Sexes, 1987—reflects site-specific information supporting the data presented on this page.

Average Years of Life Lost Per Person Due To Cancer Deaths All Races, Both Sexes, 1987

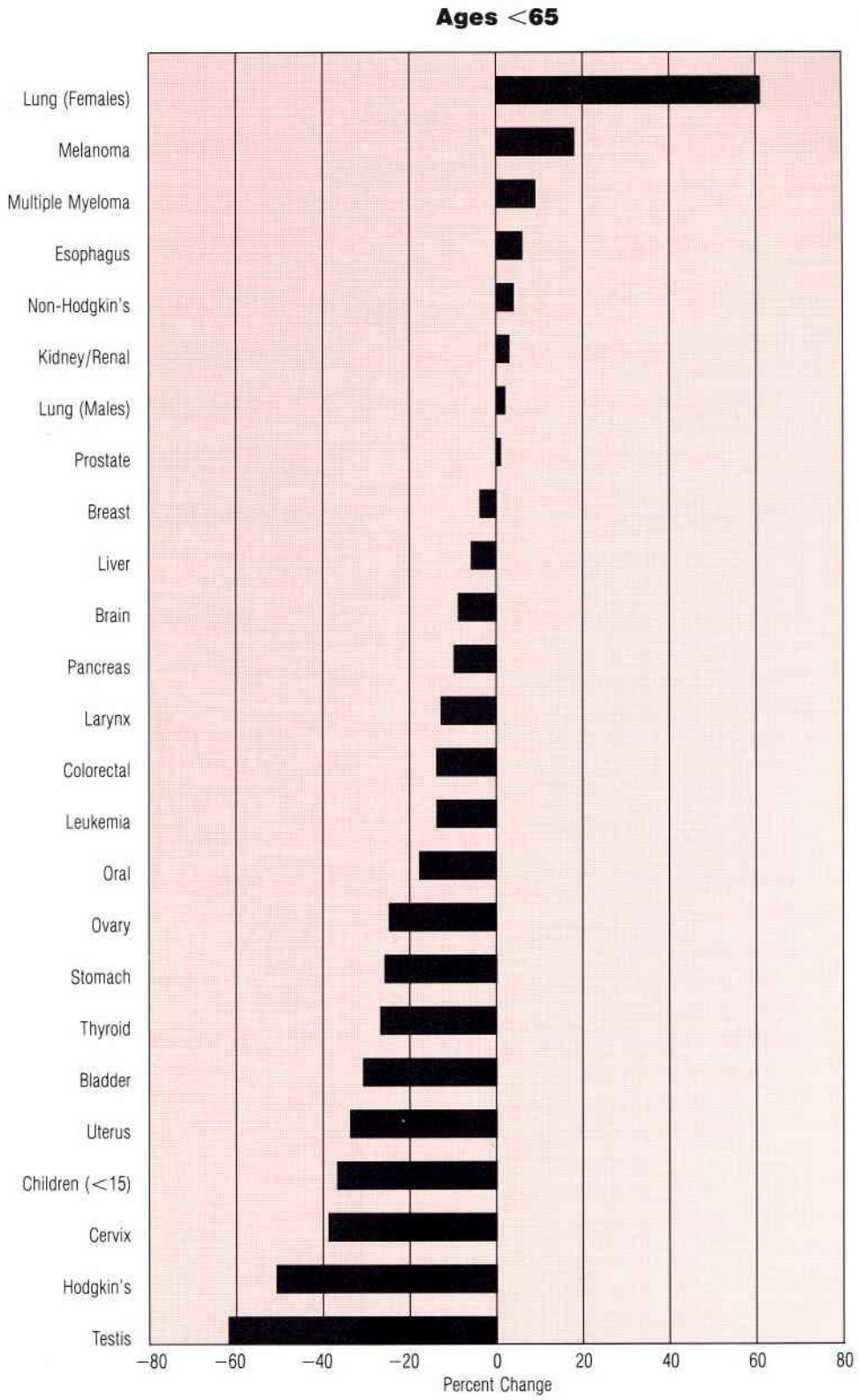


5-Year Relative Survival Rates White versus Black Patients



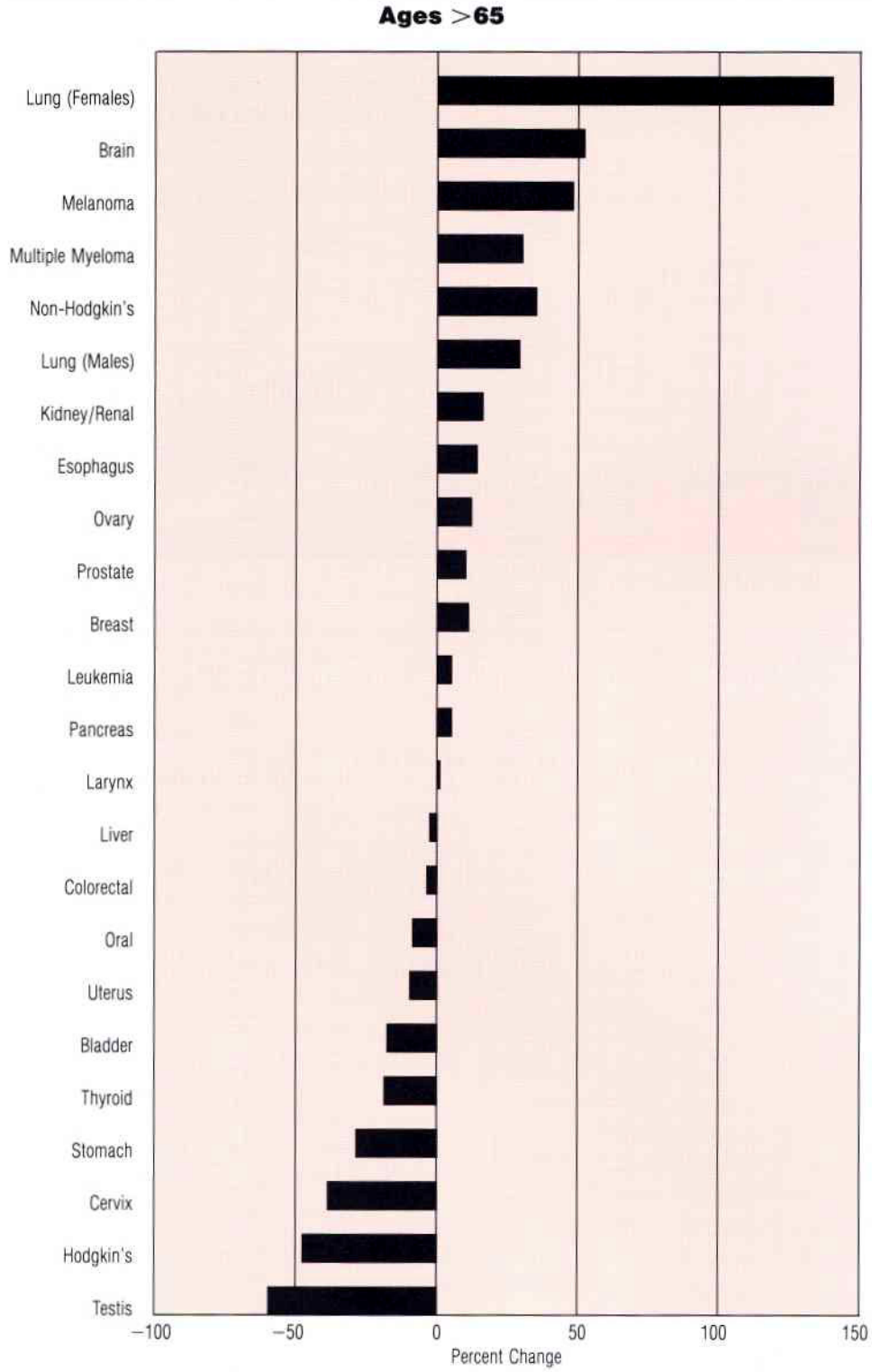
Data From SEER PROGRAM, 1981-86
MALES AND FEMALES

Cancer Mortality Rates
Changes from 1973 to 1986



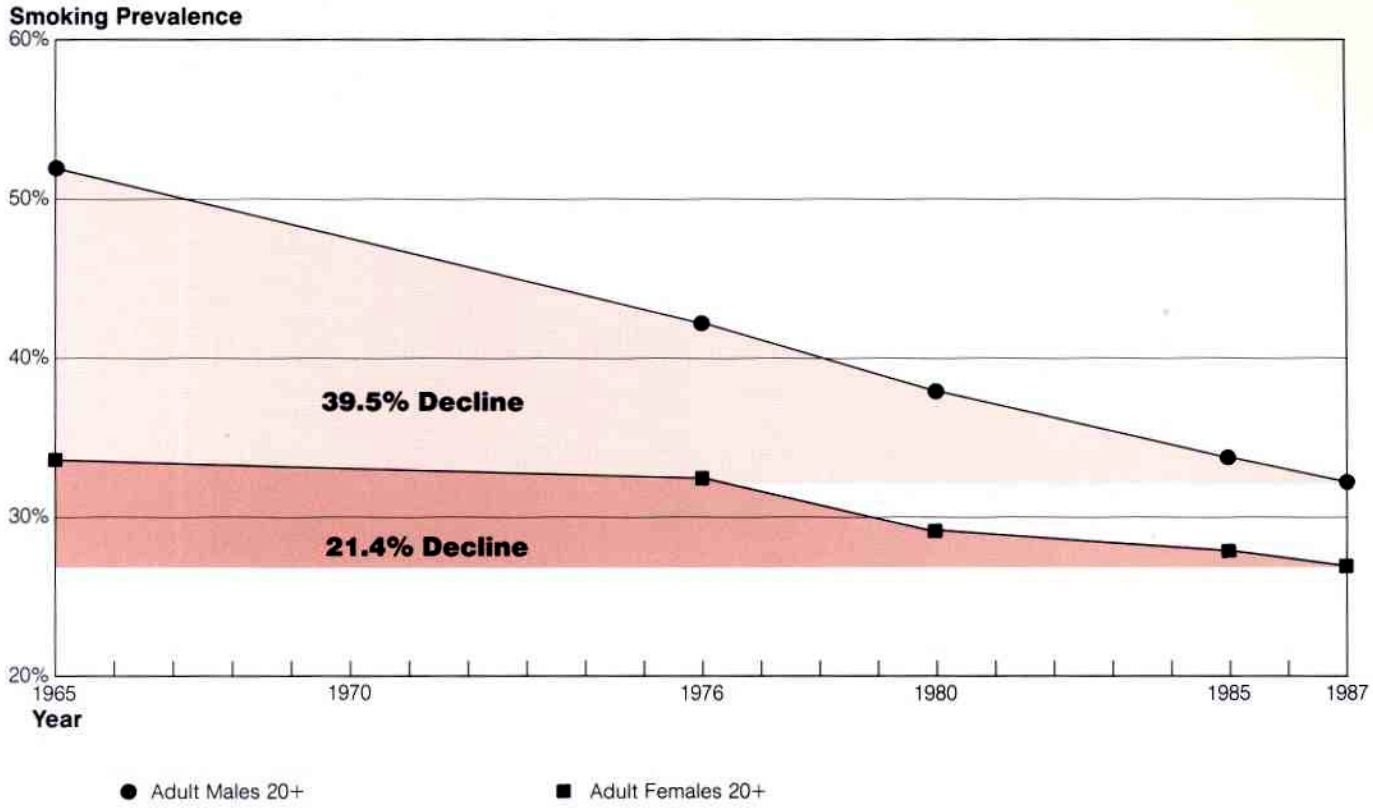
Note:
Progress and problems: This graph illustrates percent changes in the annual death rate for a wide range of cancers. Cancers to the right of the zero axis have had increased cancer mortality rates, those to the left have had decreased mortality rates. If the graph is turned counter-clockwise on its side, the bars pointing down show the major tumors in which a significant reduction in annual death rate has occurred. Progress is apparent: a reduction has occurred in the annual death rates since 1973 in both common and uncommon cancers. This definitely shows progress in the age group under 65, albeit more progress needs to be made.

Cancer Mortality Rates
Changes from 1973 to 1986



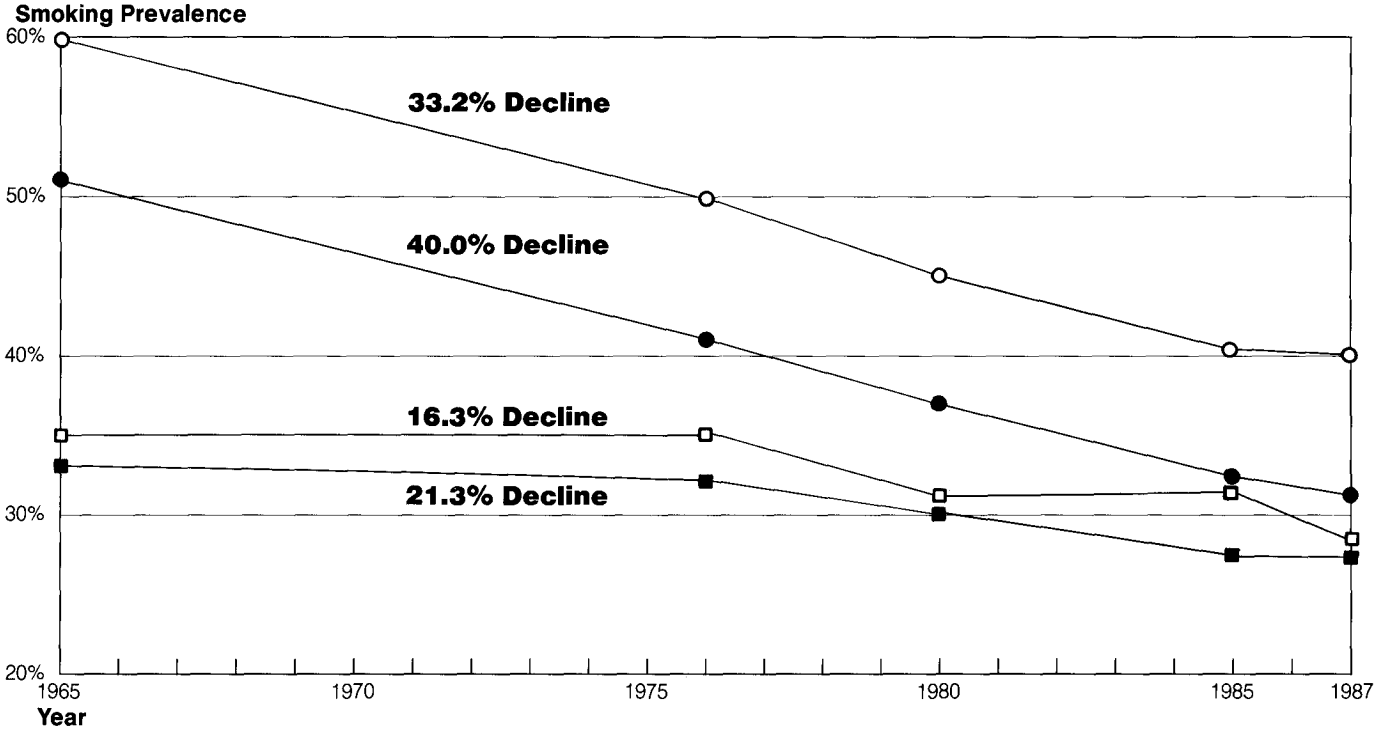
Note:
Progress and problems: Comparing this chart to that for individuals under 65, it is clear that not as much progress is being made in reducing cancer death rates in older groups. The cancer deaths to the right of the zero axis have risen, those to the left have decreased. This graph should be compared to the accompanying graph addressing changes in mortality rates for people under age 65. Issues such as low-income, patterns of medical care, and other related factors are thought to be important considerations in the older population.

Prevalence of Cigarette Smoking Among Adult Males and Females



Age-adjusted to US 1970 Population

Prevalence of Cigarette Smoking Among Black and White Adults



Age-adjusted to US 1970 Population

1989 Budget Data

Major Steps In Budget Formulation and Review Process

	January	February	March	April	May	June	July	August	September	October	November	December
NCI STAFF[1]	NCI Director's Meeting—establish budget policy for upcoming fiscal year; review operating plans for current fiscal year Submit Congressional Justification for next fiscal year		Formulation of Preliminary Budget for two years in the future for both the By-Pass Budget, which is submitted directly to the President, and the budget submitted within the Administration's guidelines Congressional testimony by Director, NCI			NCI Director's Meeting—establish specific division levels for upcoming fiscal year		Formulation of By-Pass Budget Formulation of budget within Administration guidelines		Formulation of President's Budget		
NCAB[2]					Review and revise Preliminary Budget for two fiscal years in future				Review By-Pass Budget Submitted Directly to President		Division presentations of program activity for fiscal year just completed	
BSC[3]	Review operating plans for current fiscal year and policies from NCI Director's Meeting					Review and advise on implementation of divisional programs			Annual Division Budget Review current and upcoming year			

[1]*Executive Committee and key administrative staff*
[2]*National Cancer Advisory Board—Presidential appointees*
[3]*Board of Scientific Counselors—outside NCI peer review bodies for each of four operating divisions*

(Dollars in Thousands)

A. Actual Obligations Resulting From Appropriated Funds:

FY 1989 Appropriation	$1,571,879
Less:	
AZT Transfer	(1,530)
Lapse	(7)
ACTUAL NCI OBLIGATIONS	**1,570,342**

B. Reimbursable Obligations:

Major Components—

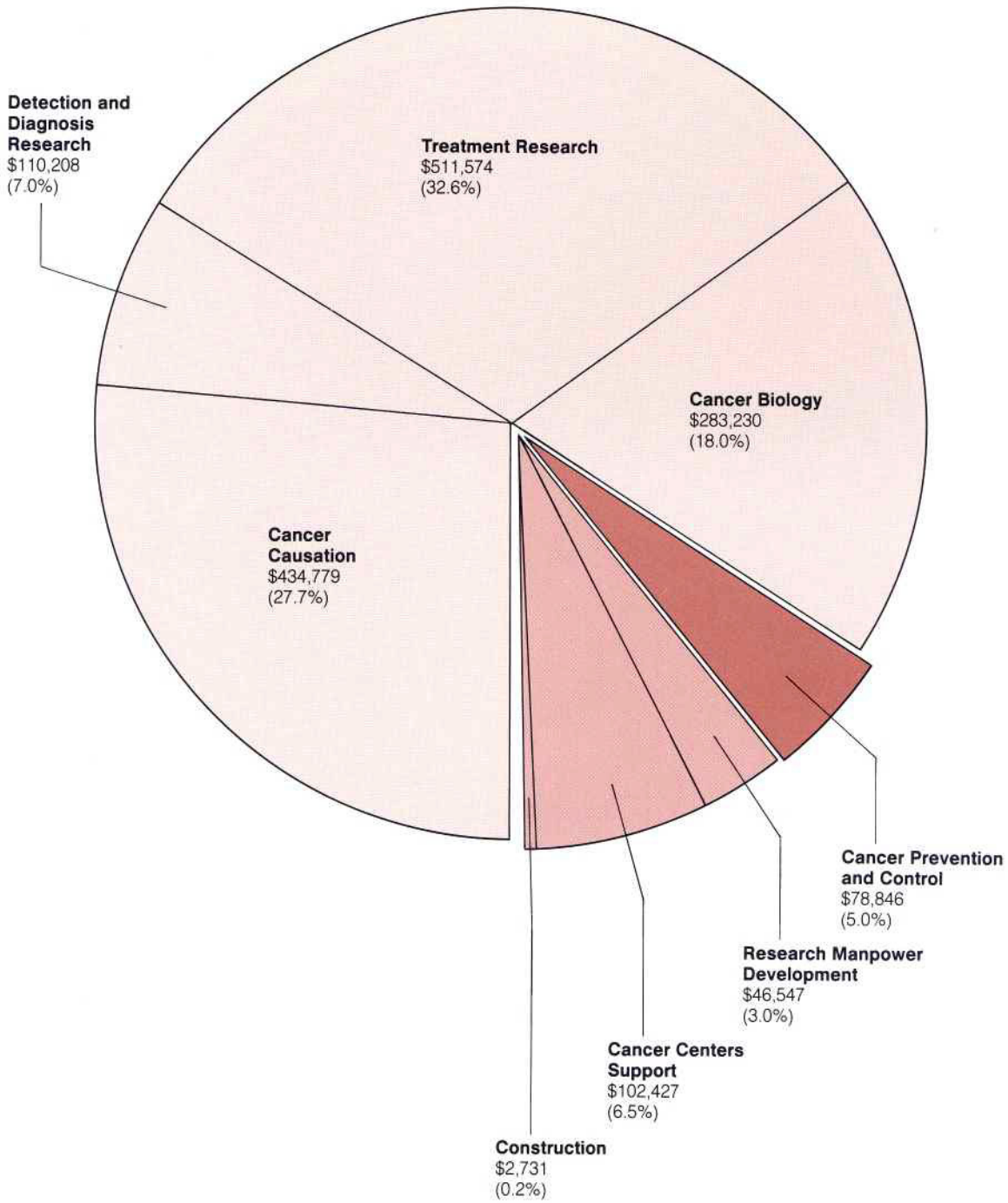
• Acquired Immune Deficiency Syndrome (AIDS): Office of the Director, NIH	977
• Academic Research Enhancement Award from Office of the Director, NIH	258
• Salary Reimbursement from Office of the Director, NIH	1,719
• Other Reimbursements	1,061
Reimbursements	4,015

C. Total NCI Obligations: $1,574,357

Fiscal Year 1989 Program Structure

(Dollars in Thousands)

TOTAL DOLLARS
$1,570,342



RESEARCH $1,339,791 (85.3%)

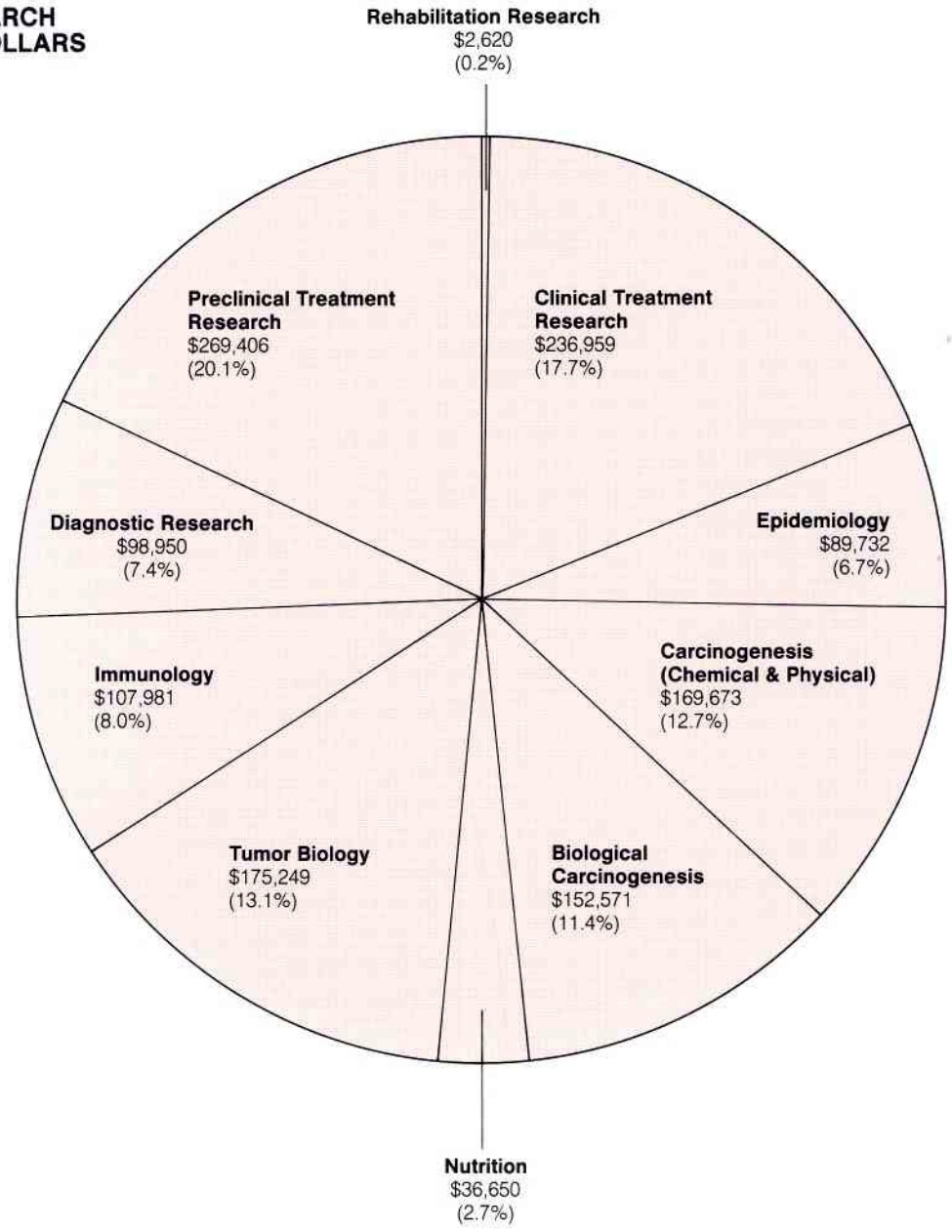
RESOURCE DEVELOPMENT $151,705 (9.7%)

CANCER PREVENTION AND CONTROL $78,846 (5.0%)

NCI Research Programs
Fiscal Year 1989

(Dollars in Thousands)

TOTAL RESEARCH PROGRAM DOLLARS
$1,339,791

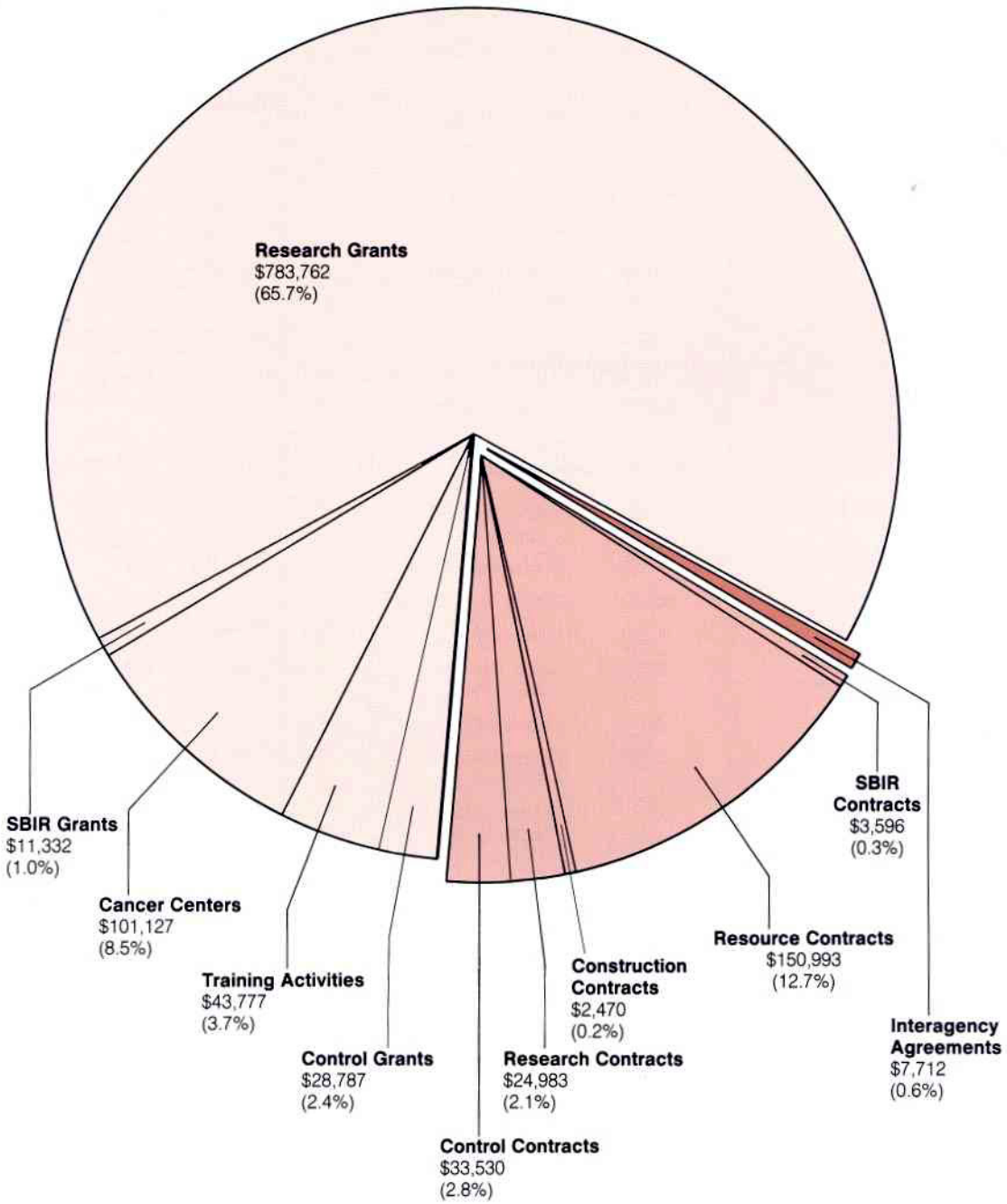


		Percent of Total
Research Programs	$1,339,791	85.3
Resource Development		
Cancer Centers	102,427	6.5
Research Manpower Development	46,547	3.0
Construction	2,731	0.2
Cancer Prevention and Control	78,846	5.0
Total NCI	$1,570,342	100.0

NCI Extramural Funds
Fiscal Year 1989

(Dollars in Thousands)

TOTAL EXTRAMURAL
$1,192,069



GRANTS $968,785 (81.3%)

CONTRACTS $215,572 (18.1%)

INTERAGENCY AGREEMENTS $7,712 (0.6%)

TOTAL INTRAMURAL/RMS	$378,273
TOTAL NCI	$1,570,342

Fiscal Year 1989 Total Dollars by Mechanism

(Dollars in Thousands)

Amount	Mechanism	Percent of Total
Research Project Grants		
$377,164	Traditional	24.0%
188,015	Program Projects	12.0
105	New Investigators	—
21,244	First Awards	1.4
32,353	Merit Awards	2.1
11,332	SBIR Grants	0.7
52,973	Outstanding Investigator	3.4
18,884	RFAs	1.2
20,939	Coop Agreements	1.3
723,009	Total	46.0
Cancer Centers Grants		
101,127	Center Core Grants	6.4
Other Research Grants		
3,190	Instrumentation Grants	0.2
325	Conference Grants	—
60,152	Clinical Coop Group	3.8
1,250	Small Grants	0.1
2,793	Comp. Min. Bio. Supp. Prog.	0.2
4,375	Scientific Evaluation	0.3
2,983	Cancer Education Program	0.2
	Research Career Programs	
2,448	RCDA	0.2
63	RCA	—
1,309	Phys. Invest. Awds.	0.1
803	Preventive Oncology	0.1
3,017	Clin. Invest. Awds.	0.2
7,640	Subtotal Careers	0.5
82,708	Total	5.3
Total		
906,844	Research Grants	57.7%

Amount	Mechanism	Percent of Total
Training Program		
29,251	NRSA Institutional	1.9%
3,903	NRSA Individual	0.2
33,154	Total	2.1
Research and Development Contracts		
175,976	Research and Resource Contracts	11.2
7,712	Interagency Agreements	0.5
3,596	SBIR Contracts	0.2
187,284	Total	11.9
Cancer Prevention and Control		
	Grants	
459	Rehabilitation	—
28,328	Cancer Control	1.8
28,787	Subtotal Grants	1.8
33,530	Contracts	2.1
11,783	Inhouse	0.8
74,100	Total	4.7
Inhouse		
294,085	Intramural Research	18.7
72,405	Research Management and Support	4.6
366,490	Total	23.3
Construction		
2,470	Contracts	0.2
Total		
$1,570,342	NCI	100.0%

Fiscal Year 1989 Division Obligations by Mechanism

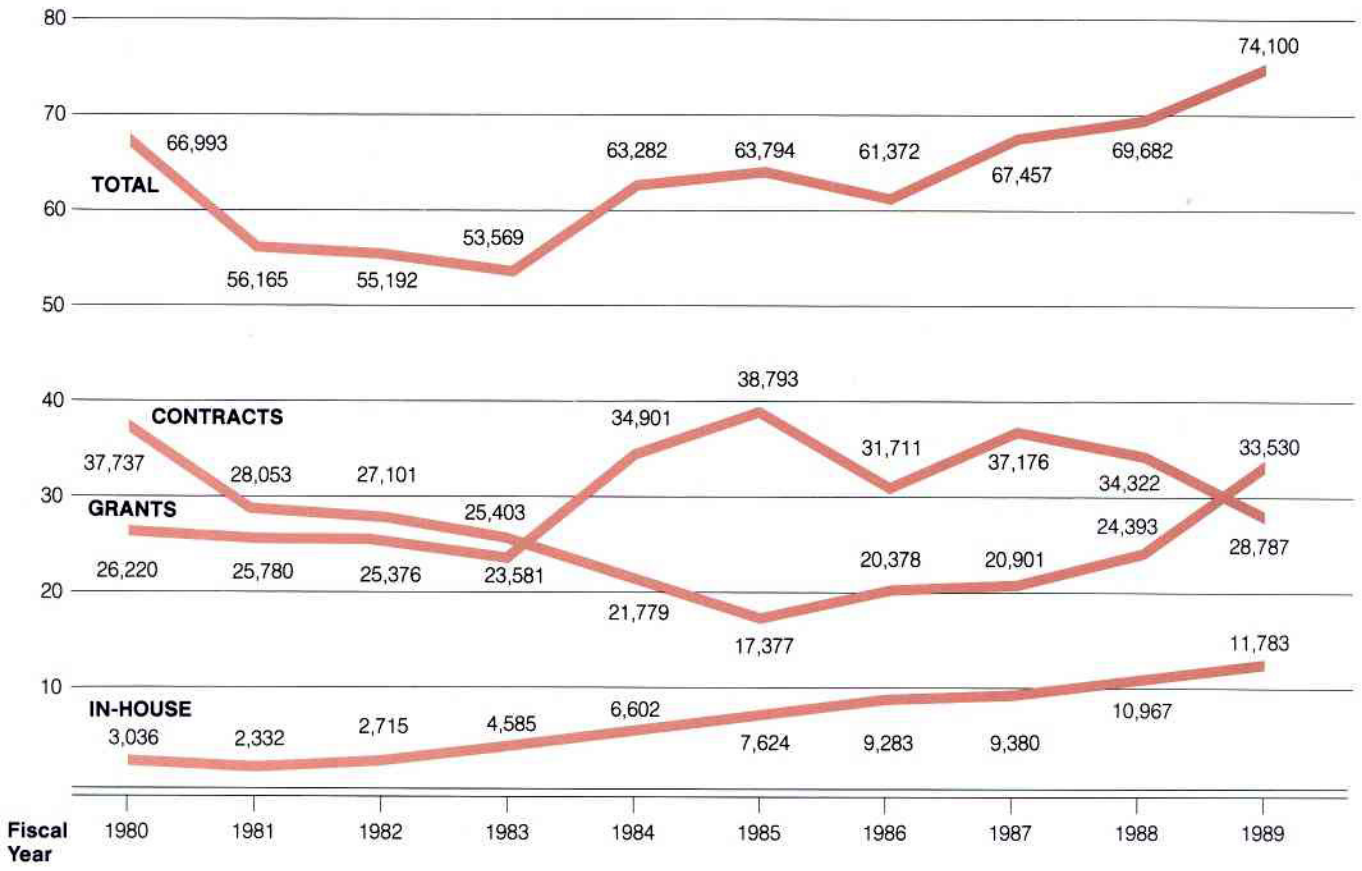
(Dollars in Thousands)

	DCBDC	DCT	DCE	AIDS Task Force	DCPC	DEA	FCRF	OD	Program Support	TOTAL NCI
Research Grants:										
Research Project Grants	$223,757	$224,926	$213,960		$48,591	$443				$711,677
SBIR Grants	2,752	7,443	803		334					11,332
Subtotal, Research Project Grants	226,509	232,369	214,763		48,925	443				723,009
Cancer Centers Grants	100,554					573				101,127
Other Research Grants:										
Clinical Cooperative Groups		59,278				874				60,152
Cancer Education Program	2,983									2,983
Career Program	7,640									7,640
Instrumentation Grants	3,190									3,190
Conference Grants	96	69	117		32	11				325
Small Grants			774		476					1,250
Minority Biomedical Support						2,793				2,793
Scientific Evaluation						4,375				4,375
Subtotal, Other Research Grants	13,909	59,347	891		508	8,053				82,708
Subtotal, Research Grants	340,972	291,716	215,654		49,433	9,069				906,844
NRSA Fellowships	32,828					326				33,154
Research and Development Contracts:										
R&D Contracts	5,620	74,964	34,505	$672	12,819	659	$51,000	$3,449		183,688
SBIR Contracts		1,612	1,312		672					3,596
Subtotal, Contracts	5,620	76,576	35,817	672	13,491	659	51,000	3,449		187,284
Cancer Prevention and Control:										
Grants										
Rehabilitation Grants					459					459
Cancer Control					28,285	43				28,328
Subtotal, Grants					28,744	43				28,787
Control Contracts					33,530					33,530
Inhouse					11,783					
Total, Prevention & Control					74,057	43				74,100
Inhouse[1]	53,370	76,705	65,796	1,125	3,164	5,779	1,573	39,029		246,541
NIH Management Fund									$102,969	102,969
Construction									2,470	2,470
All Other[2]									16,980	16,980
Division Totals	$432,790	$444,997	$317,267	$1,797	$140,145	$15,876	$52,573	$42,478	$122,419	$1,570,342

[1]Includes Research Management and Support and Intramural Research.
[2]Includes central assessments for General Expense, Program Evaluation and NCI General Account (covers costs associated with trans-NCI activities e.g., telephones.)

Cancer Prevention and Control Obligations by Mechanism Fiscal Year 1980–1989

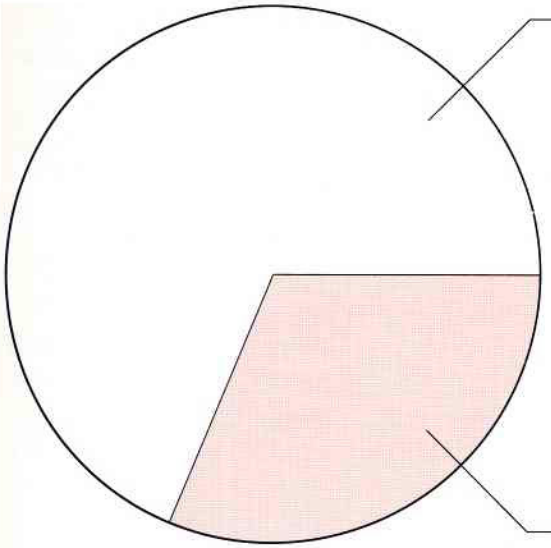
(Dollars in Thousands)



Reimbursement to NIH Management Fund Fiscal Year 1989

(Dollars in Thousands)

TOTAL NIH SERVICES
$324,080



DISTRIBUTION OF NCI SERVICES $102,969

Standard Level User Charges (SLUC)
$2,937 (2.9%)
Building rental including utilities
Guard services for rental buildings

Other Research Services $20,591 (20.0%)
Procurement Services
Safety Services
Engineering Services
Biomedical Engineering Services
Veterinary Resources Services
Library Services

Division of Research Grants $4,771 (4.6%)
Initial Scientific Review of Applications
Assignment of Research Grant Applications Among Institutes

Clinical Center $67,894 (65.9%)
Admissions and Follow-up
Anesthesiology
Diagnostic X-Ray
Nuclear Medicine
Clinical Pathology
Blood Bank
Rehabilitation Medicine
Pharmacy
Medical Records
Nursing Services
Patient Nutrition Service
Housekeeping Services
Laundry
Social Work

Division of Computer Research and Technology $6,776 (6.6%)
Research & development program in which concepts & methods of computer science are applied to biomedical problems
(In addition, services are rendered to the NIH community on a fee-for-service basis.)

The Management Fund provides for the financing of certain common research and administrative support activities which are required in the operations of NIH.

Special Sources of Funds

CRADAs
As a result of the Federal Technology Transfer Act of 1986, government laboratories are now authorized to enter into Cooperative Research and Development Agreements (CRADAs) with private sector entities. Licensing agreements are usually incorporated into the CRADA document, which addresses patent rights attributable to research supported under the CRADA.

Royalty Income
NCI can now retain royalty income generated by the patents related to NCI-funded research. A major portion of this royalty income is used to reward employees of the laboratory, to further scientific exchange and for education and training in accordance with the terms of the Act. A portion of the receipts is used to support the National Technical Information Service (NTIS), Department of Commerce, who handles the processing and collection phases. Support is also provided to NIH to cover their associated expenses.

History of Funding
(dollars in thousands)

	Year Received	Years Available	Obligated Funds Received*	Inventor Payments	Other Uses
Royalty Income:	1988	1988/1989	$982	$427	$555
	1989	1989/1990	813	294	519

*Does not include assessments by NIH and NTIS.

Status of Unconditional Gift Fund Fiscal Year 1989

(Dollars in Thousands)

Funds Available	Regular	$ 418
	Special	2,455
	Total	$2,873
Activities Funded	Patient Emergency Fund	$ 30
	Medical Staff Quarters	9
	Conference Support	20
	Fellowships	90
	Research Equipment	27
	Official Entertainment	34
	Printing	4
	Research Support for Breast Cancer LAK, and AIDS	2,182
	Total	2,396
Balance		$477

AIDS

Acquired Immunodeficiency Syndrome (AIDS) Key Discoveries

The National Cancer Institute has assumed a leading role in Acquired Immunodeficiency Syndrome (AIDS) research since the disease was first recognized in 1981. Because of the research programs and administrative mechanisms already in place, investigators were able to rapidly apply existing methods in drug screening and advances in cancer virus research technology to study AIDS. Key discoveries by NCI investigators include:

- Isolation of HTLV-III (now called human immunodeficiency virus or HIV), a retrovirus, which was found to be the primary cause of AIDS.
- Development, testing and successful clinical trials of the drug azidothymidine (AZT), confirming its effectiveness as an anti-retroviral agent against AIDS.
- Many new compounds have been identified which are active against the AIDS virus in tissue culture experiments. These compounds include both synthetic drugs and natural products. Several of these will soon be entering the initial phases of development. Two additional drugs, dideoxcytidine and dideoxyadenosine, are currently in early clinical trials and show promise as anti-retroviral agents.
- Demonstration in clinical trials that dideoxyinosine (ddI) has activity against HIV infection. ddI has been approved by the FDA for Treatment IND use in AIDS patients who are intolerant to or failing treatment with AZT.
- AZT has been shown to be very effective in children with AIDS and/or AIDS-related complex (ARC). All children who had neurological symptoms due to the AIDS virus showed dramatic improvement. In addition, NCI is testing new compounds in clinical trials for activity against HIV in children. Early clinical studies of ddI and dideoxycytidine (ddC) in children reveals that these drugs may be effective in the treatment of AIDS and ARC.
- The recent isolation and purification of the reverse transcriptase enzyme from HIV. This viral enzyme assembles DNA based on the directions it "reads" from a viral RNA blueprint. This step is critical in allowing the AIDS virus to establish itself in causing infection. The discovery, therefore, has important implications for anti-retroviral drug development.
- Increased understanding of how the growth of the AIDS virus is controlled. In particular, scientists have learned that the *tat* gene can trigger the AIDS virus to replicate at an increased rate. Thus, manipulation of the *tat* gene could lead to control of the growth of the virus.
- Recent improvement in the screening technique through a laboratory procedure that amplifies the HIV. This provides a much more sensitive test for the AIDS virus, and may permit its detection and intervention much earlier.
- An analysis of cofactors that may influence the manifestation of clinical AIDS showed that the single most important predictor among antibody-positive individuals is the level of the helper T-cell count. The lower the count, the higher the attack rate of clinical AIDS.
- Demonstration that the AIDS virus gains access to target tissues via the T4 cell surface molecule, and that entry of the virus occurs preferentially in activated cells. Monocytes/macrophages have also been identified as target cells for HIV infection.
- Isolation of a human virus similar to the one that naturally infects the African green monkey and is closely related to the HIV virus. This new virus, called HTLV-IV, has led to a series of studies and unique models of infections of non-human primates and man by HTLV-related viruses. They are important for a better understanding of the biology and transmission of this family of viruses, and in establishing the origin and a vaccine for AIDS.
- Demonstration that prevention of a common, spontaneous retrovirus-induced immunosuppressive disease in rhesus monkeys (Simian Acquired Immunodeficiency, SAIDS) is now possible through vaccination.
- The use of the anticancer drug, Trimetrexate, and the finding that it is effective in treating *Pneumocystis carinii* pneumonia. This pneumonia afflicts more than 40 percent of AIDS patients and is often the immediate cause of death.

- A multi-center study of male hemophiliacs has more precisely identified predictors for an increased risk of developing AIDS; particularly a decline in certain lymphocytes, the appearance of HIV antigen, and increased levels of alpha-interferon. The decline in immunity is associated with an increase in infectivity of female spouses. This represents a major risk factor in the sexual transmission of HIV.
- Statistical methods for estimating cumulative numbers of persons infected with HIV and projecting the size of the AIDS epidemic were developed and applied to several groups.
- The CD4 AIDS virus receptor on the surface of human T-cells has been found to be physically associated with a proto-oncogene known as p^{56} lck; the protein product of which is a tyrosine-specific protein kinase. The efficacy of daily intramuscular injections of recombinant CD4 in preventing progression of simian AIDS in rhesus monkeys has been demonstrated. This protein may be useful as a therapeutic agent for the treatment of human AIDS.
- The first crystal structure of a retroviral protease has been determined and successfully used to predict the structure of the HIV protease and substrate using supercomputer methodology.
- Identification of portions of the AIDS virus envelope that are recognized by cytotoxic and helper T-cells and which elicit immune responses in normal and symptomatic HIV-infected individuals.

Acquired Immunodeficiency Syndrome (AIDS) Funding by Functional Category Fiscal Year 1989

(Dollars in Thousands)

I. Basic Science Research	
A. Biomedical Research	
1. HIV and HIV genome	$ 24,192
2. Immunology	7,728
3. Blood/Blood products	34
5. Animal models & related studies	3,037
Subtotal, Biomedical Research	35,741
D. Therapeutic Agents	
1. Development	35,128
2. Clinical Trials	23,487
Subtotal, Therapeutic Agents	58,615
E. Vaccines	
1. Development	14,390
2. Clinical Trials	0
Subtotal, Vaccines	14,390
TOTAL, BASIC SCIENCE RESEARCH	107,996
II. Risk Assessment and Prevention	
A. Surveillance	
1. Diseases associated with HIV	7,206
2. HIV surveys (incidence, prevalence)	0
3. Knowledge, attitudes, behaviors	0
Subtotal, Surveillance	7,206
B. Population-Based Research	
1. Transmission	
a. Sexual	1,582
b. Intravenous drug abusers	0
c. Hemophiliac populations	797
d. Blood recipient/donor studies	0
e. Perinatal infection	1,292
f. Occupationally related	0
g. Other/Miscellaneous	3,207
Subtotal, Transmission	6,878
2. Natural history and cofactors	167
Subtotal, Population-Based Research	7,045
Total, Risk Assessment and Prevention	**14,251**
Total, NCI	**$122,247**

Note: New functional codes of AIDS activities were developed by PHS at the request of Dr. Mason, Deputy Secretary of HHS. The new functional categories are intended to identify AIDS research in terms of "deliverables."

Acquired Immunodeficiency Syndrome (AIDS) Funding by Activity Fiscal Year 1989

(Dollars in Thousands)

By Mechanism:	Amount
Research Project Grants	$ 12,718
Cancer Center Grants	3,555
R&D Contracts	51,212
Intramural Research	51,403
Research Management and Support	3,359
Total, NCI	$122,247

By Research Program:	Amount
Causation Research	$ 56,361
Detection and Diagnosis Research	365
Treatment Research	58,155
Cancer Biology	3,811
Total Research	118,692
Resource Development	
Cancer Center Grants	3,555
Total, NCI	$122,247

By Division:	Amount
Division of Cancer Biology, Diagnosis and Centers	$ 3,811
Division of Cancer Treatment	42,444
Division of Cancer Etiology	38,939
Division of Cancer Prevention and Control	3,555
Frederick Cancer Research Facility	15,770
AIDS Vaccine Task Force	1,797
Division of Extramural Activities	860
Office of the Director	2,217
NIH Management Fund*	12,854
Total, NCI	$122,247

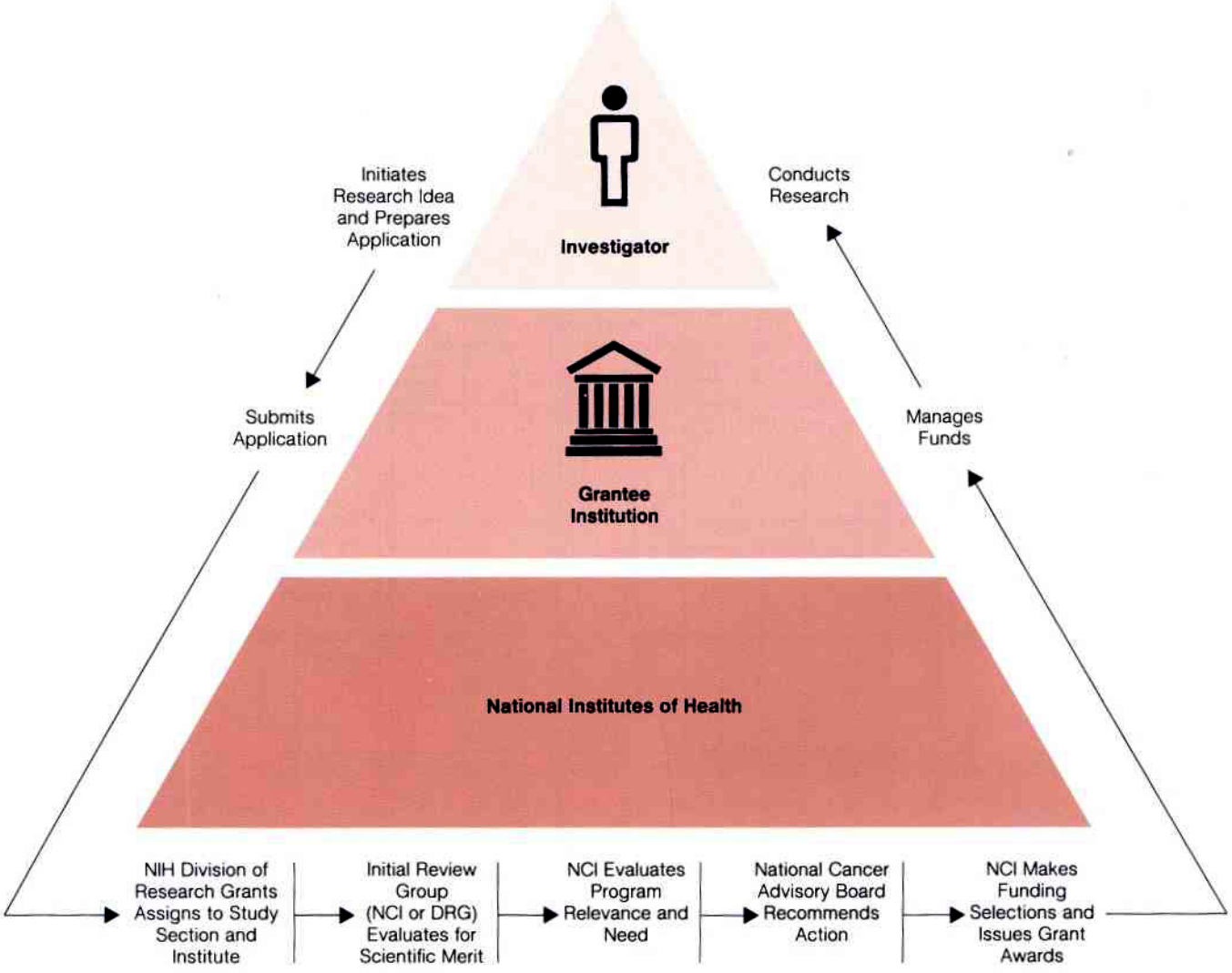
*Supports common services shared by NIH Institutes; in this case is used principally for support costs associated with NCI's activities at the NIH Clinical Center.

Acquired Immunodeficiency Syndrome (AIDS) Funding History Fiscal Years 1982-1989

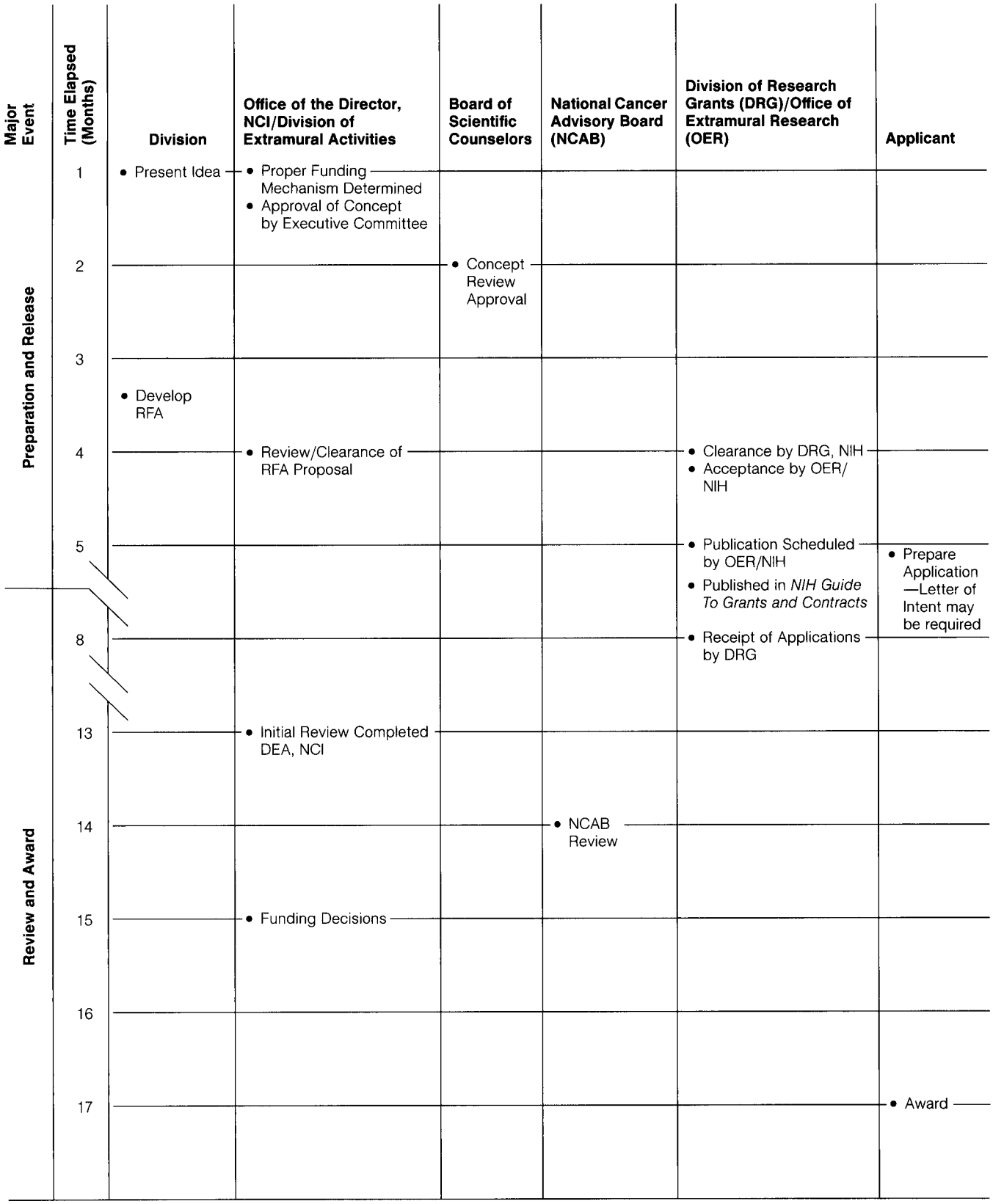
(Dollars in Thousands)

Fiscal Year	NCI Amount	NIH Amount	% NCI To NIH
1982	$2,406	$3,355	72%
1983	9,790	21,668	45%
1984	16,627	44,121	38%
1985	26,874	63,737	42%
1986	45,050	134,667	33%
1987	63,755	260,907	24%
1988	89,944	473,285	19%
1989	122,247	627,076	19%

NCI Grants Process

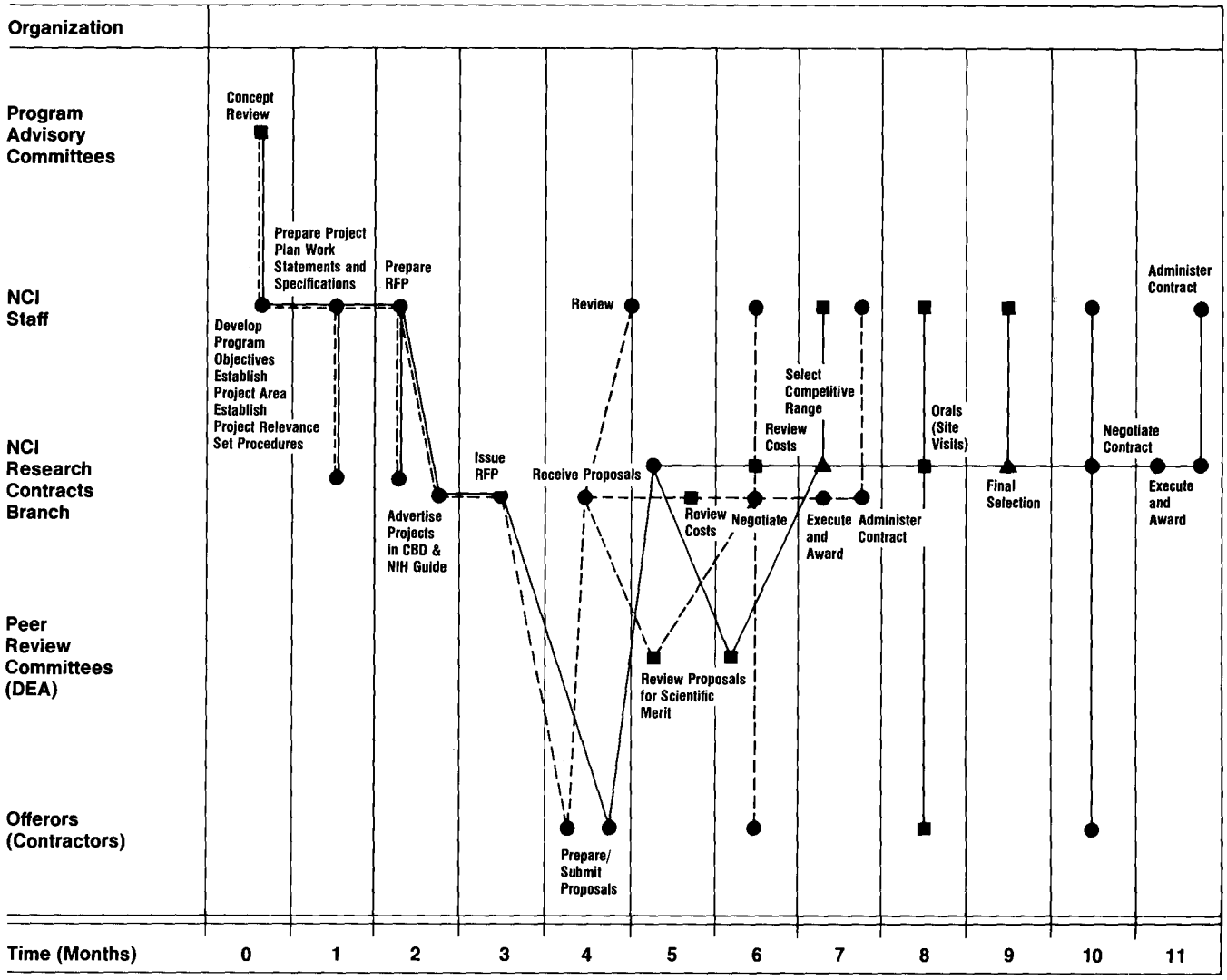


NCI Request for Application (RFA): The Process



NOTE: RFAs for AIDS research follow an expedited review and award process.

NCI Contract Award Process—Under Cancer Act of 1971

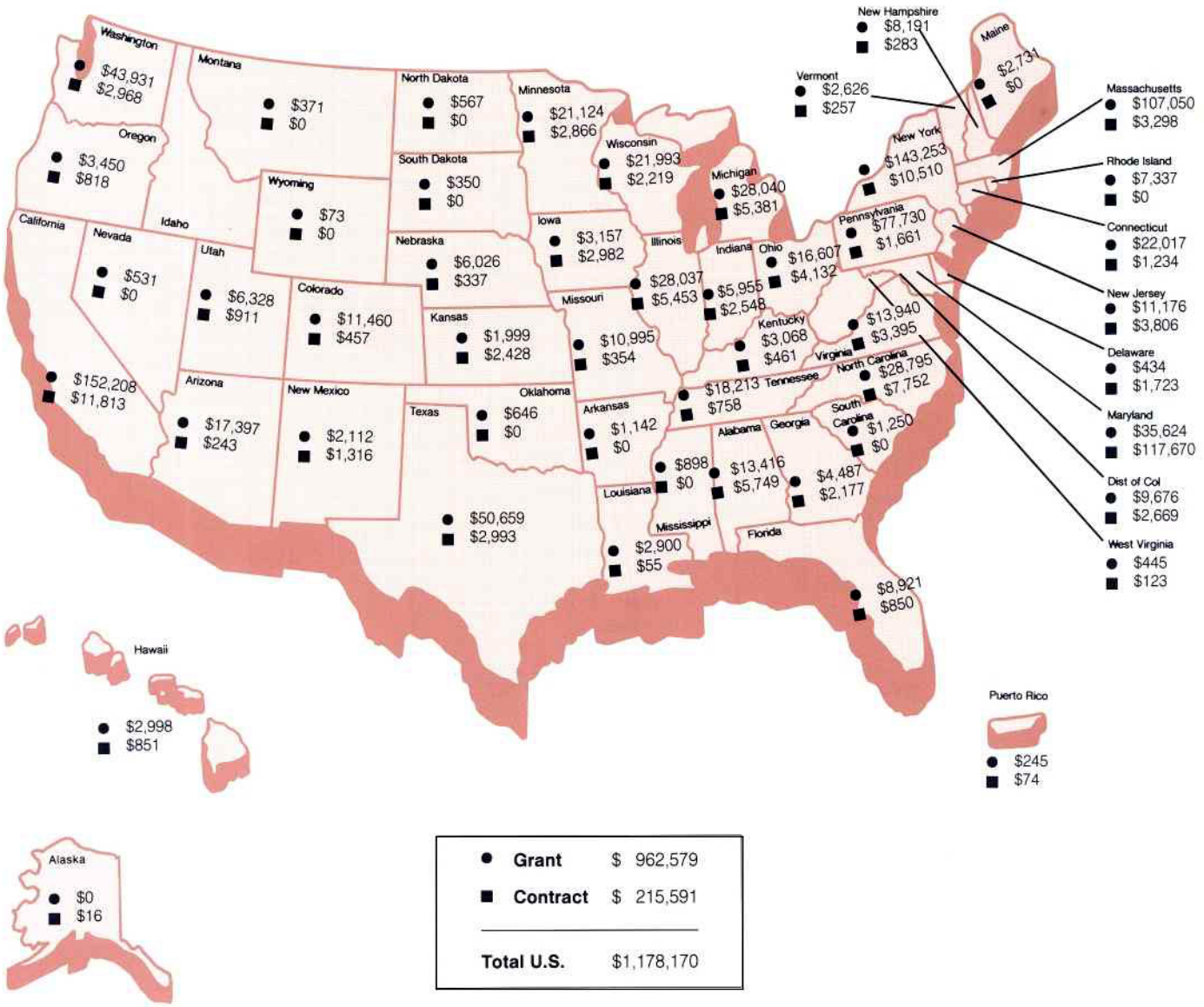


Note: Simultaneous Activities By More Than One Organization Indicate Cooperative Efforts

Legend:
- ● Operation
- ■ Review
- ▲ Decision
- ——— Normal Competitive Flow
- _ _ _ Non-Competitive Contracts
- * Ad-Hoc Committees May Be Used Includes Non-Government Employees

Grant and Contract Awards by State Fiscal Year 1989

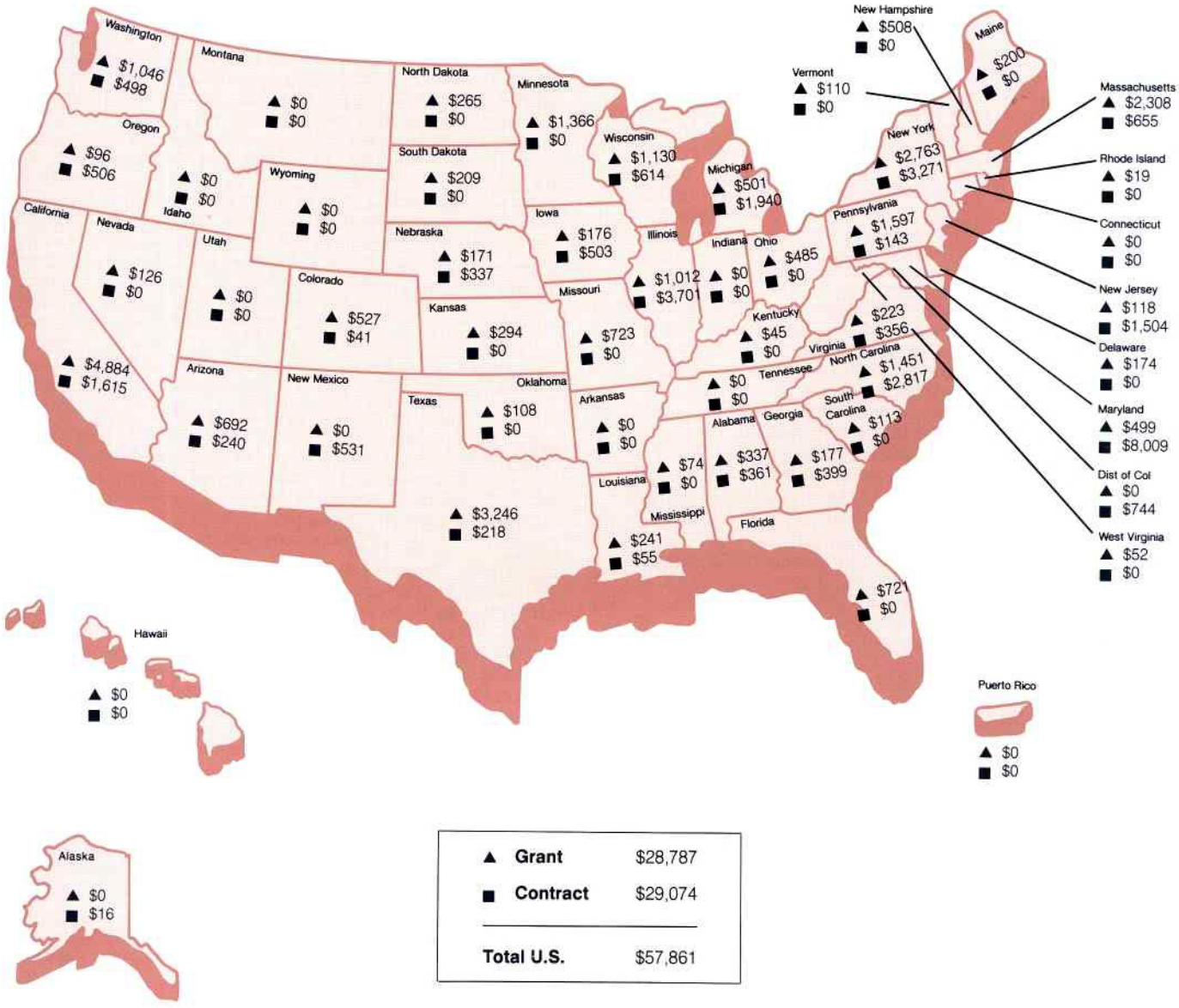
(Dollars in Thousands)



Note Contract figures exclude foreign contracts $6,946; Grant figures exclude foreign grants $6,205 and Scientific Evaluation, $4,375.

Cancer Prevention and Control Grant and Contract Awards by State Fiscal Year 1989

(Dollars in Thousands)



▲ **Grant**	$28,787
■ **Contract**	$29,074
Total U.S.	$57,861

Note: Contract figures exclude foreign contracts $4,456; Grant figures exclude foreign grants $0.

Institutions Receiving More than $5,000,000 in NCI Support Fiscal Year 1989

(Dollars in Thousands)

State	Institution	Grants	Contracts	Construction	Total NCI
Alabama	University of Alabama System	$9,012	$1,456	$0	$10,468
	Southern Research Institute	3,548	4,293	0	7,841
Arizona	University of Arizona	15,077	240	0	15,317
California	University of California	66,371	2,245	0	68,616
	Stanford University	19,051	273	0	19,324
	University of Southern California	17,057	743	0	17,800
	Scripps Clinic and Research Foundation	7,578	0	0	7,578
	Salk Institute for Biological Studies	6,333	0	0	6,333
	Kaiser Foundation Hospitals	4,680	1,299	0	5,979
	La Jolla Cancer Research Foundation	5,144	0	0	5,144
Colorado	University of Colorado System	5,741	0	0	5,741
Connecticut	Yale University	20,469	191	0	20,660
DC	U.S. Department of Army	74	5,635	0	5,709
Illinois	University of Chicago	13,050	6	0	13,056
	University of Illinois	5,224	1,847	0	7,071
Iowa	University of Iowa	2,501	2,982	0	5,483
Maryland	Program Resources, Inc.	0	53,062	0	53,062
	Johns Hopkins University	25,168	512	0	25,680
	Bionetics Research, Inc.	0	16,989	0	16,989
	Westat, Inc.	0	8,450	0	8,450
	Information Management Services	0	5,743	0	5,743
Massachusetts	Dana-Faber Cancer Institute	26,565	220	0	26,785
	Harvard University	16,913	0	0	16,913
	Massachusetts Institute of Technology	11,045	0	0	11,045
	Brigham and Women's Hospital	8,508	0	0	8,508
	Massachusetts General Hospital	8,255	0	0	8,255
	University of Massachusetts	4,299	832	0	5,131
Michigan	University of Michigan	13,491	137	0	13,628
	Wayne State University	6,423	0	0	6,423
	Michigan Cancer Foundation	3,092	2,374	0	5,466
Minnesota	University of Minnesota	11,989	62	0	12,051
	Mayo Foundation	8,440	733	0	9,173
Missouri	Washington University	5,962	100	0	6,062
Nebraska	University of Nebraska System	5,444	337	0	5,781
New Hampshire	Dartmouth College	7,988	0	0	7,988
New York	Memorial Sloan-Kettering Cancer Center	30,881	2,014	0	32,895
	Columbia University	15,919	0	0	15,919
	New York State Department of Health	13,824	838	0	14,662
	Yeshiva University	11,325	0	0	11,325
	American Health Foundation	9,641	1,478	0	11,119
	University of Rochester	10,729	0	0	10,729
	New York University	10,676	0	0	10,676
	State University of New York	7,486	345	0	7,831
	Cold Spring Harbor Laboratory	7,795	0	0	7,795
	Cornell University	5,406	407	0	5,813
North Carolina	Duke University	14,321	0	0	14,321
	University of North Carolina System	11,588	1,475	0	13,063
	Research Triangle Institute	174	5,158	0	5,332
Pennsylvania	University of Pittsburgh	13,336	540	0	13,876
	University of Pennsylvania	12,570	0	0	12,570
	Wistar Institute of Anatomy and Biology	11,153	0	0	11,153
	Institute for Cancer Research	10,022	0	0	10,022
	Fox Chase Cancer Center	7,902	264	0	8,166
	Pennsylvania State University	5,998	0	0	5,998
Tennessee	St. Jude Children's Research Hospital	8,178	0	0	8,178
	Vanderbilt University	6,799	0	0	6,799
Texas	University of Texas System	37,898	1,899	0	39,797
	Baylor College of Medicine	5,318	0	0	5,318
	Cancer Therapy and Research Center	5,097	0	0	5,097
Utah	Utah State Higher Education System	6,278	634	0	6,912
Washington	Fred Hutchinson Cancer Research Center	30,015	1,987	0	32,002
	University of Washington	9,884	968	0	10,852
Wisconsin	University of Wisconsin System	18,608	1,676	0	20,284
	Total	$703,313	$130,444	$0	$833,757
	Percent of Total Awarded Above	84.4%	15.6%	0.0%	100.0%
	Total NCI Fiscal Year 1989 Obligations	$1,570,342			
	Percent of Total NCI Obligations	44.8%	8.3%	0.0%	53.1%

Cancer Centers Funding History

(Dollars in Thousands)

Fiscal Year	Center Support	Percent Increase
1984	$ 79,273	—
1985	84,957	7.2%
1986	88,426	4.0
1987	95,819	8.3
1988	100,427	4.8
1989	101,127	0.7

Cancer centers supported by the NCI multi-disciplinary research programs at academic and other organizations, are one of the key elements of the research infrastructure for cancer research. They comprise some of the most prestigious cancer research institutions in the country. As a group, they are engaged in all aspects of cancer research, including basic, clinical and cancer control research, also serving as a stable resource for training new cancer investigators.

During FY 1989, the NCAB Subcommittee on Cancer Centers advised NCI on a clearer definition of the characteristics of a comprehensive cancer center, guidelines for peer-review evaluation, and funding for comprehensive centers as well as other cancer center designations.

Criteria for Comprehensiveness

Together with scientific excellence and leadership, the essential characteristics of a comprehensive cancer center include:

1) **Basic Laboratory Research:** A critical mass of integrated personnel, laboratory facilities and financial support for basic research is essential. The center should promote interdisciplinary interactions between scientists engaged in cancer research, including critical collaborations between basic and clinical investigators. A significant portion of research support should be from sources that utilize peer review.

2) **Basic/Clinical Research Linkage (Technology Transfer):** A center should facilitate the transfer of exciting laboratory discoveries into innovative clinical applications, including clinical treatment and prevention. Further, once a unique opportunity is identified, a distinguishing feature of comprehensive cancer centers is the ability to stimulate interactions either as basic/clinical collaborative research within the center, or as collaborative research between elements of the center and other organizations, e.g., research institutions or the biotechnology industry.

3) **Clinical Research:** A clinical research program utilizing patient resources of the institution and its region is essential. Ideally, such studies involve relevant center laboratories as well. A center should be a major source of innovative clinical studies which can later be exported to clinical cooperative groups or into general medical practice.

4) **High-Priority Clinical Trial Research:** There exists a critical need for expeditious completion of clinical trials of major importance. In order to address this problem, centers should play a leading role in clinical trials when high national priority is identified by a mutually satisfactory process involving the centers and the NCI. Although a center may not enter patients in every trial so identified, it is expected that every center will contribute significantly to the National Cancer Program as a whole.

5) **Cancer Prevention and Control Research:** Cancer control is the reduction of cancer incidence, morbidity, and mortality through an orderly sequence from research on interventions and their impact in defined populations to the broad, systematic application of the research results. The center's plans may relate to any or all phases of cancer prevention and control research. A comprehensive center should develop linkages with appropriate organizations to move toward the demonstration phase when it is feasible and opportune. Involvement in cancer control on a regional and national basis, if funds were available, would be required in competing renewal applications. As with other areas of research, comprehensive cancer centers would be expected to have peer-reviewed research in cancer prevention and control. Cancer prevention and control research also includes epidemiologic research and research on cancer etiology in humans.

6) **Education, Training, and Providing Updates on Current Technology:** It is essential that the center be a focal point for research training and for continuing education for health care professionals locally and within the region. In addition, the center should offer training in state-of-the-art technology (procedures or instrumentation) to the extent of its capabilities. An important additional part of this educational effort would be to establish programs to train new investigators in cancer prevention and/or control research.

7) **Information Services:** The comprehensive center should have an established patient education program and the ability to provide patients and their families with up-to-date information on local as well as national resources that may be needed. In addition, the center should participate in a Cancer Information Service (CIS) in the area, giving accurate information on cancer prevention, diagnosis, treatment, and rehabilitation to patients, the public, and health professionals. Through the CIS, or center staff, each center should heighten public awareness of the importance of participation in prospective clinical trials.

8) **Community Service and Outreach:** It is essential that a comprehensive center should define the community it serves and maintain productive outreach efforts in that community. A comprehensive center should take steps to identify cancers of high frequency within the community it serves and carry out appropriate cancer prevention and control activities for such cancers. In addition, comprehensive cancer centers should conduct programs of cancer prevention and control activities relevant to the needs of populations within the community with disproportionate cancer incidence and death rates, e.g., minorities, people over 65, etc.

Cancer Centers by State

State	Grantee Institution
Alabama	University of Alabama at Birmingham
Arizona	University of Arizona
California	University of Southern California
	Salk Institute for Biological Studies
	University of California at Los Angeles
	Northern California Cancer Center
	University of California San Diego
	La Jolla Cancer Research Foundation
	California Institute of Technology
	Beckman Research Institute/City of Hope
	Charles R. Drew University of Medicine & Science
Colorado	University of Colorado Health Sciences Center
Connecticut	Yale University
District of Columbia	Howard University
Florida	University of Miami
Illinois	University of Chicago
	Illinois Cancer Council
Indiana	Purdue University, West Lafayette
Kentucky	University of Kentucky
Maine	Jackson Laboratory
Maryland	Johns Hopkins University
Massachusetts	Dana-Farber Cancer Institute
	Worcester Foundation for Experimental Biology
	Massachusetts Institute of Technology
Michigan	Wayne State University
	University of Michigan at Ann Arbor
Minnesota	Mayo Foundation
Nebraska	University of Nebraska Medical Center
New Hampshire	Dartmouth College
New York	Sloan-Kettering Institute for Cancer Research
	University of Rochester
	Yeshiva University
	New York University (2)
	Columbia University of New York
	Roswell Park Memorial Institute (2)
	American Health Foundation
	Cold Spring Harbor Laboratory
North Carolina	Wake Forest University
	Duke University
	University of North Carolina at Chapel Hill
Ohio	Ohio State University
	Case Western Reserve University
Pennsylvania	Fox Chase Cancer Center
	Wistar Institute of Anatomy and Biology
	Temple University
	University of Pennsylvania
	University of Pittsburgh at Pittsburgh
Rhode Island	Roger Williams General Hospital
Tennessee	St. Jude Children's Research Hospital
Texas	University of Texas System Cancer Center
Utah	University of Utah
Vermont	University of Vermont & State Agricultural College
Virginia	Virginia Commonwealth University
	University of Virginia at Charlottesville
Washington	Fred Hutchinson Cancer Research Center
Wisconsin	University of Wisconsin Madison (2)

NCI Foreign Research Grants and Contracts Fiscal Year 1989

(Dollars in Thousands)

Country	Number Grants	Grant $	Number Contracts	Contract $	Total Dollars Awarded	Percent of Total Dollars Awarded
Australia	5	$392	0	$0	$392	3.0%
Belgium	2	274	0	0	274	2.1
Canada	30	2,408	4	630	3,038	23.1
China	1	6	5	1,276	1,282	9.7
Denmark	0	0	3	164	164	1.2
Finland	0	0	2	3,639	3,639	27.7
France	7	1,205	0	0	1,205	9.2
Israel	7	524	1	62	586	4.5
Italy	2	324	0	0	324	2.5
Jamaica	0	0	1	590	590	4.5
Japan	1	38	1	170	208	1.6
Sweden	6	552	4	208	760	5.8
Switzerland	2	133	0	0	133	1.0
Trinidad	0	0	1	207	207	1.6
United Kingdom	6	349	0	0	349	2.7
Total Foreign	**69**	**6,205**	**22**	**6,946**	**13,151**	**100.0%**

Selected Minority Focused Activities Fiscal Year 1989

Objectives:

- Reduce cancer incidence, morbidity and mortality in minority populations by increasing their involvement in the planning and implementation of intervention programs.
- Increase the number of minority patients involved in NCI-supported clinical trials in order to improve survival and cure rates in these populations.
- Enhance the intervention capabilities of minority researchers and influence them to develop careers as cancer investigators.
- Heighten awareness about cancer risk and prevention.
- Pursue basic research intended to understand the etiology and biology of cancer in defined minority populations.

Strategy:

The National Cancer Institute (NCI) has developed mechanisms to broaden participation by minority institutes and individuals in cancer-related research and training activities. It seeks to enhance the effectiveness of cancer treatment and control programs in reaching the minority community and other historically underserved segments of the general population, through the following:

Comprehensive Minority Biomedical Program

(CMBP)—Promotes broadened participation by minorities in cancer-related research and training through minority-focused programmatic efforts which cross divisional lines within the Institute. It also seeks to enhance the effectiveness of programs in cancer treatment and control in reaching the minority community and other historically underserved segments of the general population.

- ***Minority Investigator Supplement Awards:***
  The Minority Investigator Supplement award is designed to encourage participation in cancer-related research by members of underrepresented ethnic American minorities and will enable the NCI/CMBP to provide additional funds to NCI grantees who initiate an application to support minority researchers in their cancer research projects. This initiative is now included in the NIH program announcement entitled "Initiatives for Underrepresented Minorities in Biomedical Research," and has been expanded to include undergraduate and graduate students in its scope.
- ***Minority Satellite Supplement Award:***
  A special initiative designed to expand the number of minority patients in clinical trials and treatment programs. Eight supplemental awards, involving seventeen satellites, were made in 1989.
- ***Co-funding:***
  Minority Access to Research Careers provides fellowships to minority students to pursue training related to cancer research. Through co-funding with the ***Minority Biomedical Research Support*** program NCI provides support for specific cancer-related projects at participating minority institutions.
- ***Support for Meeting Attendance:***
  Encourages participation by minority researchers in annual meetings by providing travel support through the American Association of Cancer Research.
- ***Cancer Information Dissemination:***
  Initiates, with the Office of Cancer Communications, model strategies for the dissemination of cancer information to the Black populations by utilizing minority institutions, especially historically Black colleges.
- ***Cancer Centers Minority Enhancement Award:***
  Provide support for the expansion of the involvement of minority populations in cancer control research.

Cancer Control Intervention Research

- Primary prevention of cancer in Blacks by identifying the long-term effectiveness of smoking prevention or cessation intervention programs.
- Identification and remedy of key factors that contribute to avoidable mortality for specific cancer sites in the Black population.
- Establishment of a Research Network for the Black Population to stimulate research on important scientific and social issues relevant to this population.
- Increased data collection efforts on cancer in Hispanics.
- Establishment of a Hispanic Cancer Control intervention research program.
- Primary prevention of cancer in Alaskan Natives, American Indians and Hawaiian Natives by identifying the long-term effectiveness of tobacco use prevention, cessation intervention programs and dietary modification programs.
- Identification and remedy of key factors that contribute to avoidable mortality for specific cancer sites in the Alaskan Native, American Indian, and Hawaiian Native populations.
- Established and implemented a cancer surveillance system for Alaskan Natives.
- Development of a cancer prevention and control advisory group for Alaskan Natives, Hawaiian Natives and American Indians.
- Initiation of an interagency agreement between Indian Health Service (IHS) and NCI to conduct studies in cancer prevention and to provide descriptive cancer epidemiology of American Indians.
- Development of a Research Network for the Hispanic Population to stimulate research in cancer prevention and control for Hispanics.
- Through the National Black Leadership Initiative, established six regional coordinators for the purpose of disseminating cancer prevention and control information, intervention technology, and health care services research results.
- Development of a project to stimulate research on the cancer and intervention needs of underserved populations.

Appropriations of the NCI 1938-1990

14.7%
$3,167,567,720

1938 through 1967 $1,507,194,220
1968 183,356,000
1969 185,149,500
1970 190,486,000
1971 230,383,000
1972 378,794,000
1973 492,205,000

85.3%
$18,404,862,500

1974 551,191,500
1975 . . . . . 691,666,000[1]
1976 761,727,000
"TQ" . . . . . 152,901,000[2]
1977 815,000,000
1978 . . . . . 872,388,000[3]
1979 937,129,000
1980 . . . . . 1,000,000,000[4]
1981 . . . . . 989,355,000[5]
1982 . . . . . 986,617,000[6]
1983 . . . . . 987,642,000[7]
1984 . . . . . 1,081,581,000[8]
1985 1,183,806,000
1986 . . . . . 1,264,159,000[9]
1987 . . . . . 1,402,837,000[10]
1988 . . . . . 1,469,327,000[11]
1989 . . . . . 1,593,536,000[12]
1990 . . . . . 1,664,000,000[13]

Total
(1938–1990) $21,572,430,220

Transition Quarter ("TQ")—July 1, 1976 through September 30, 1976. The Interim Period in the changing of the Federal Fiscal Year from July 1 through June 30 to October 1 through September 30.

[1] Includes $18,163,000 for training funds provided by Continuing Resolution.

[2] Includes $3,201,000 for training funds provided by Continuing Resolution.

[3] Includes $20,129,000 for training funds provided by Continuing Resolution.

[4] 1980 appropriation authorized under a Continuing Resolution.

[5] Reflects 1981 rescission of $11,975,000.

[6] Amount included in Continuing Resolution. Includes $47,988,000 transferred to the National Institute of Environmental Health Sciences for the National Toxicology Program.

[7] Appropriated under Continuing Resolution and Supplemental Appropriation Bill.

[8] Includes $23,861,000 for training funds provided by a Continuing Resolution and $4,278,000 in a Supplemental Appropriation Bill.

[9] Includes $6,000,000 from a Supplemental Appropriation Bill.

[10] Authorized under Omnibus Continuing Resolution.

[11] Authorized under Omnibus Continuing Resolution.

[12] Appropriation prior to reduction contained in G.P. 517 (–$19,122,000) and G.P. 215 (–$2,535,000) and P.L. 100-436, Section 213, (–$1,013,000).

[13] Appropriation prior to reduction contained in P.L. 101-166 (–$6,839,000) and P.L. 101-239 (–$22,829,000).

By-Pass Budget Requests 1973-1991

Fiscal Year	Request
1973	$ 550,790,000
1974	640,031,000
1975	750,000,000
1976	898,500,000
1977	948,000,000
1978	955,000,000
1979	1,036,000,000
1980	1,055,000,000
1981	1,170,000,000
1982	1,192,000,000
1983	1,197,000,000
1984	1,074,000,000
1985	1,189,000,000
1986	1,460,000,000
1987	1,570,000,000
1988	1,700,000,000
1989	2,080,000,000
1990	2,195,000,000
1991	2,410,000,000

Budget History by Mechanism Selected Fiscal Years 1972, 1980, 1989

(Dollars in Thousands)

	1972 Actual		1980 Actual		1989 Actual	
	Dollars	**Percent of Total**	**Dollars**	**Percent of Total**	**Dollars**	**Percent of Total**
Group I—Investigator Initiated:						
Regular Research Grants	$60,073	19.0%	$216,081	30.9%	428,844	38.0%
Small Grants	—	—	—	—	1,250	0.1
Clinical Cooperative Groups	10,102	3.2	36,884	5.3	60,152	5.3
Program Projects—PO1's	39,260	12.4	104,643	14.9	188,015	16.6
Cancer Education Program	—	—	10,906	1.6	2,983	0.3
Research Career Program	2,026	0.6	5,014	0.7	7,640	0.7
Fellowships and Training	18,395	5.8	27,260	3.9	33,154	2.9
Organ Site	638	0.2	17,554	2.5	—	—
Cancer Centers-Core Support	10,090	3.2	67,421	9.6	101,127	9.0
Other Center Support Grants	1,089	0.3	591	0.1	—	—
Cooperative Agreements	—	—	—	—	20,939	1.9
Minority Biomedical Support	—	—	1,980	0.3	2,793	0.2
Outstanding Investigator Grant	—	—	—	—	52,973	4.7
First Awards	—	—	—	—	21,244	1.9
Subtotal	141,673	44.7	488,334	69.8	921,114	81.5
(Small Business Grants)					(11,332)	(1.0)
Group II—Co-Initiated:						
RFAs	—	—	6,683	1.0	18,884	1.7
Research Contracts	46,802	14.8	55,265	7.8	24,983	2.2
Subtotal	46,802	14.8	61,948	8.8	43,867	3.9
(Small Business Contracts)	—	—	—	—	(3,596)	(0.3)
Group III—NCI-Initiated						
Resource Support Contracts	63,194	20.0	115,425	16.5	154,589	13.7
Interagency Agreements	12,053	3.8	18,740	2.7	7,712	0.7
Subtotal	75,247	23.8	134,165	19.2	162,301	14.4
Group IV—Other Resources						
Planning Grants	1,698	0.5	221	0.0	—	—
Construction Grants	47,004	14.9	10,814	1.5	—	—
Construction Contracts	3,999	1.3	2,470	0.2	2,470	0.2
Subtotal	52,701	16.7	15,653	2.2	2,470	0.2
Total	316,423	100.0	700,100	100.0	1,129,752	100.0
% Total NCI		84.3		73.1		71.9
In-House Research	25,696	6.8	98,665	10.3	191,711	12.2
Management & Support	33,246	8.9	95,735	10.0	186,562	11.9
(NIH Management Fund)	(12,910)	(3.4)	(39,549)	(4.1)	(102,969)	(6.6)
Cancer Control (Grants & Contracts)	—	—	63,663	6.6	62,317	4.0
Subtotal	58,942	15.7	258,063	26.9	440,590	28.1
Total NCI	375,365	100.0	958,163	100.0	1,570,342	100.0
Transfers:						
Diagnostic Radiation	(2,800)	(0.8)	(3,611)	(0.4)	—	—
National Toxicology Program	—	—	(43,495)	(4.5)	—	—

Comparison of Dollars, Positions and Space Fiscal Years 1972–1989

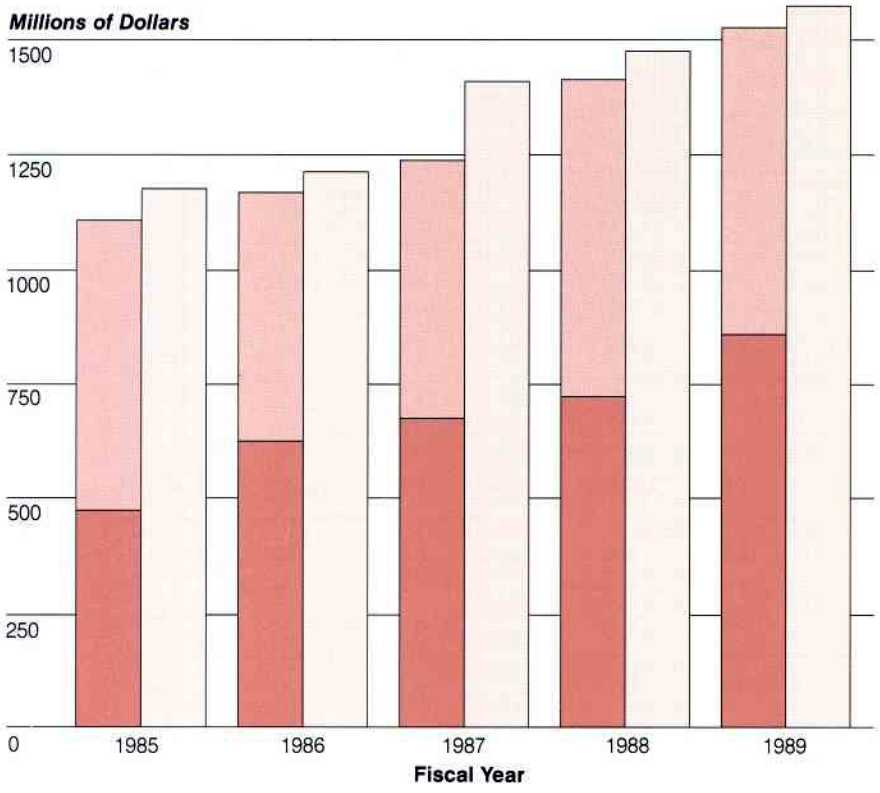
	Dollars			Positions			Space		
	Obligations ($000's)	**Percent of Increase Over Base Year**	Percent of Increase Over Prior Year	Actual Full-Time Permanent Employees	**Percent of Increase Over Base Year**	Percent of Increase Over Prior Year	Allocated Space (Square Feet)*	**Percent of Increase Over Base Year**	Percent of Increase Over Prior Year
1972	378,636	Base Year	—	1,665	Base Year	—	329,587	Base Year	—
1973	431,245	13.9	13.9	1,736	4.3	4.3	357,972	8.6	8.6
1974	581,149	53.5	34.8	1,805	8.4	4.0	381,436	15.7	6.6
1975	699,320	84.7	20.3	1,849	11.1	2.4	382,485	16.0	0.3
1976	760,751	100.9	8.8	1,955	17.4	5.7	387,324	17.5	1.3
1977	814,957	115.2	7.1	1,986	19.3	1.6	428,285	29.9	10.6
1978	872,369	130.4	7.0	1,969	18.3	−0.9	491,725	49.2	14.8
1979	936,969	147.5	7.4	1,973	18.5	0.2	493,156	49.6	0.3
1980	998,047	163.6	6.5	1,837	10.3	−6.9	467,730	41.9	−5.2
1981	989,338	161.3	−0.9	1,815	9.0	−1.2	472,633	43.4	1.0
1982	986,564	160.6	−0.3	1,703	2.3	−6.2	477,782	45.0	1.1
1983	986,811	160.6	0.03	1,731	4.0	1.6	484,093	46.9	1.3
1984	1,081,460	185.6	9.6	1,698	2.0	−1.9	466,890	41.7	−3.6
1985	1,177,853	211.1	8.9	1,596	−4.1	−6.0	466,890	41.7	0.0
1986	1,210,284	219.6	2.8	1,573	−5.5	−1.4	465,790	41.3	−0.2
1987	1,402,790	270.5	15.9	1,642	−1.4	4.4	465,790	41.3	0.0
1988	1,468,435	287.8	4.7	1,708	2.6	4.0	458,556	39.1	−1.6
1989	1,570,342	314.7	6.9	1,701	2.2	−0.4	483,778	46.8	5.5

Personnel Resources

Fiscal Year	Number of FTEs[1]	Number of Employees
1984	2,416	2,371
1985	2,230	2,195
1986	2,101	2,096
1987	2,110	2,272
1988	2,283	2,302
1989	2,173	2,201

[1] Full-Time Equivalents

National Cancer Institute
Obligations and Outlays
Fiscal Years 1985–1989



Prior Year Outlays

Current Year Outlays

Current Year Obligations

Obligations: *Orders placed, grants and contracts awarded, salaries earned and similar financial transactions which legally utilize or reserve an appropriation for expenditure.*
Outlays: *Payments (cash or checks) made from current or prior year appropriations.*

NCI Total Research Project Grants Fiscal Years 1983–1989

(Dollars in Thousands)

Fiscal Year	Type Awarded	Requested Number	Requested Amount	Recommended Number	Recommended Amount	Awarded Number	Awarded Amount	Percent Funded[1]
1983	Competing[2]							
	New	2,229	$323,572	1,844	$215,945	529	$55,316	28.7
	Renewal	783	160,881	763	113,664	358	56,698	46.9
	Board Supplement	23	2,492	15	727	3	110	20.0
	Subtotal	3,035	$486,945	2,622	$330,336	890	$112,124	33.9
	Noncompeting					1,923	294,019	
	Total					**2,813**	**$406,143**	
1984	Competing							
	New	2,113	$310,433	1,773	$207,996	558	$68,376	31.5
	Renewal	774	179,764	745	135,253	416	90,140	55.8
	Board Supplement	13	1,766	11	788	3	105	27.3
	Subtotal	2,900	$491,963	2,529	$344,037	977	$158,621	38.6
	Noncompeting					1,869	302,626	
	Total					**2,846**	**$461,247**	
1985	Competing							
	New	2,400	$398,621	2,042	$282,590	599	$83,691	29.3
	Renewal	782	183,483	758	140,472	416	84,708	54.9
	Board Supplement	19	1,659	13	850	2	65	15.4
	Subtotal	3,201	$583,763	2,813	$423,912	1,017	$168,464	36.2
	Noncompeting					1,964	348,011	
	Total					**2,981**	**$516,475**	
1986	Competing[2]							
	New	2,354	$392,028	1,997	$277,698	564	$84,470	28.2
	Renewal	787	198,814	765	160,021	385	77,012	50.3
	Board Supplement	12	775	10	366	1	14	10.0
	Subtotal	3,153	$591,617	2,772	$438,085	950	$161,496	34.3
	Noncompeting					2,111	397,664	
	Total					**3,061**	**$559,160**	
1987	Competing[2]							
	New	2,034	$390,474	1,782	$292,044	557	$97,643	31.3
	Renewal	898	241,189	882	195,014	504	120,550	57.1
	Board Supplement	7	731	7	429	0	0	0
	Subtotal	2,939	$632,394	2,671	$487,487	1,061	$218,193	39.7
	Noncompeting					2,042	424,960	
	Total					**3,103**	**$643,153**	
1988	Competing[2]							
	New	2,167	$419,638	1,857	$316,789	470	$83,083	25.3
	Renewal	951	262,675	932	226,227	506	122,229	54.3
	Board Supplement	15	1,717	12	1,404	3	66	25.0
	Subtotal	3,133	$684,030	2,801	$544,420	979	$205,378	35.0
	Noncompeting					2,078	460,025	
	Total					**3,057**	**$665,403**	
1989	Competing[2]							
	New	2,290	$474,978	2,090	$385,584	402	$73,081	19.2
	Renewal	823	246,172	802	202,283	324	85,645	40.4
	Board Supplement	14	2,883	9	1,485	2	49	22.2
	Subtotal	3,127	$724,033	2,901	$589,352	728	$158,775	25.1
	Noncompeting					2,374	564,234	
	Total					**3,102**	**$723,009**	

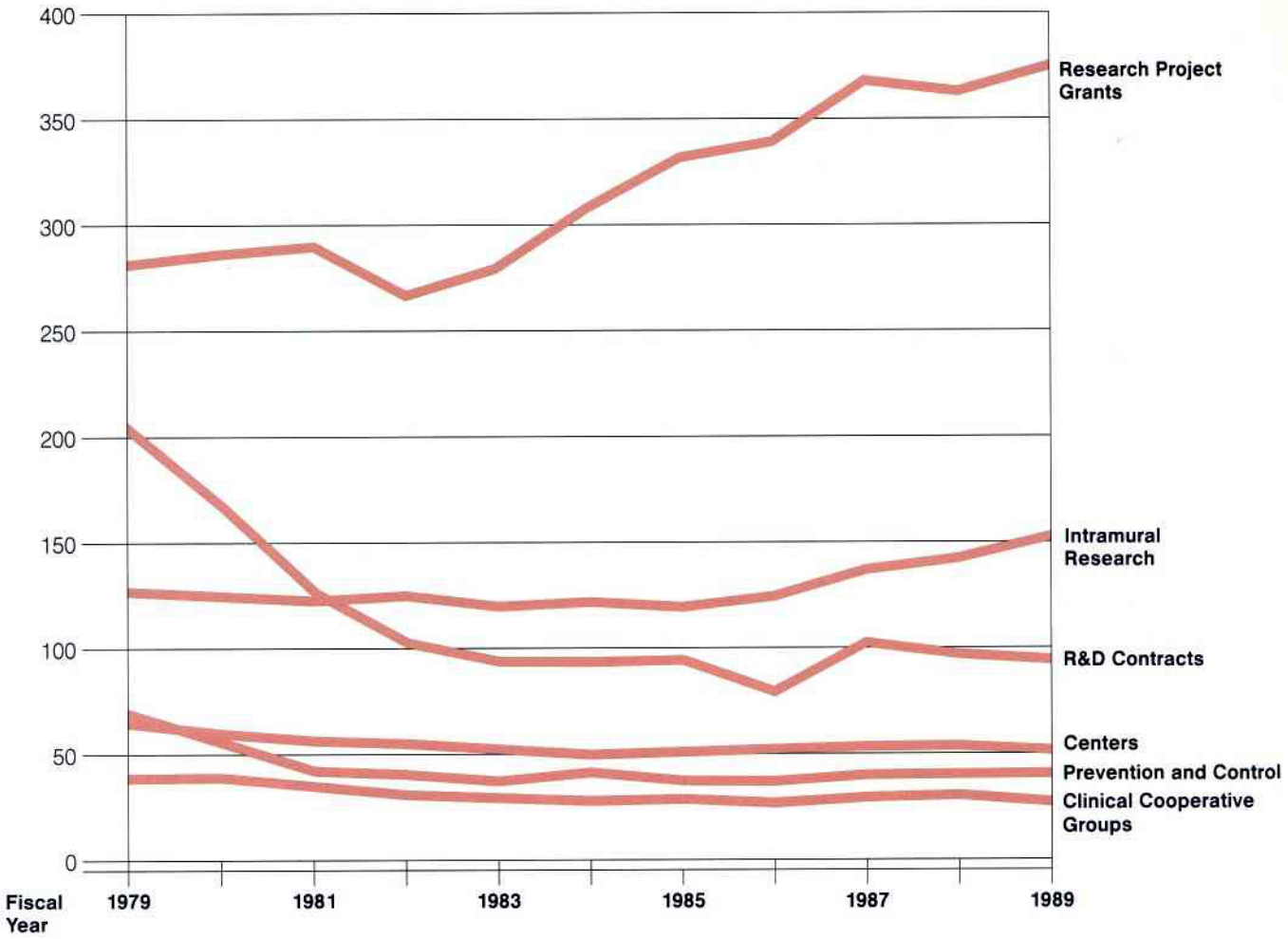
Note: Includes R01 traditional grants, P01 program projects, R23 new investigator research awards, R29 First Awards, R35 Outstanding Investigator Grants, R37 MERIT awards, U01 Cooperative Agreement Awards, R01 and U01 awards of RFA's and R43/R44 Small Business Innovative Research awards.

[1] *Percent Funded; Number Awarded ÷ Number Recommended*

[2] *Because of fiscal restraints, grants were awarded below recommended levels.*

Constant Dollar Trends Obligations By Mechanism Fiscal Years 1979-1989

(Dollars in Millions)



1979 Constant Dollars in Millions

NATIONAL CANCER INSTITUTE