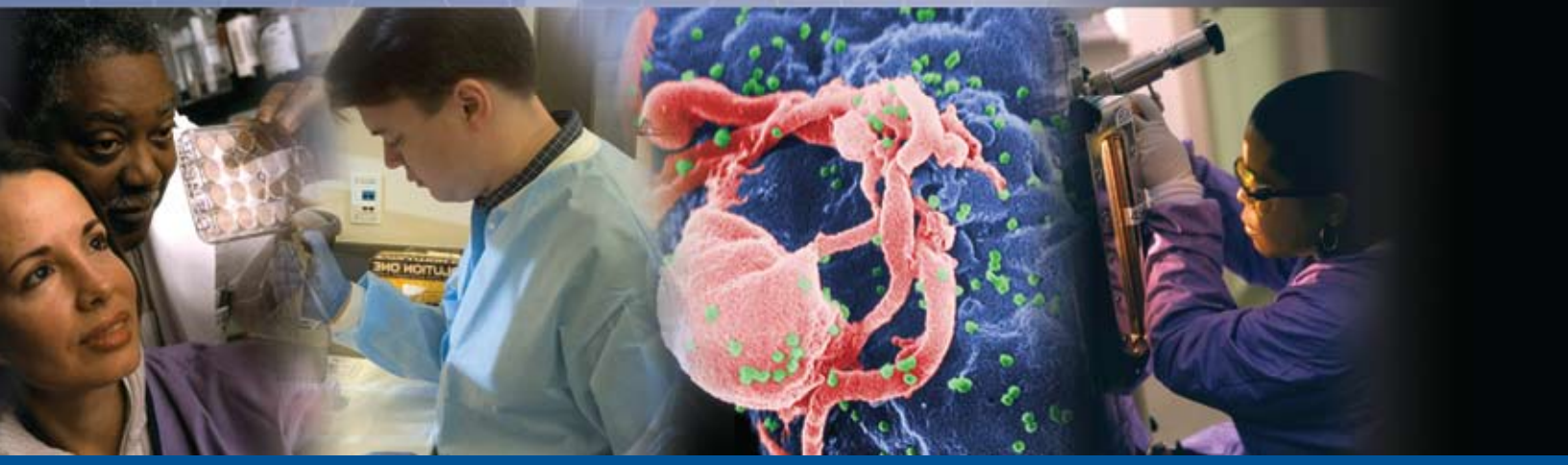
Opportunities

Research and Training Programs for 2009 – 2010
NIAID Division of Intramural Research



National Institute of Allergy and Infectious Diseases

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health

Opportunities

In the NIAID Division of Intramural Research

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health
National Institute of Allergy and Infectious Diseases

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Contents

NIAID Division of Intramural Research Organizational Chart

Office of the Director, DIR

Laboratory of Malaria and Vector Research	Laboratory of Persistent Viral Diseases	Laboratory of Molecular Microbiology	Laboratory of Host Defenses	Laboratory of Human Bacterial Pathogenesis	Laboratory of Molecular Immunology	Laboratory of Clinical Infectious Diseases
Laboratory of Immunogenetics	Laboratory of Intracellular Parasites	Laboratory of Viral Diseases	Laboratory of Infectious Diseases	Malaria Vaccine Development Branch	Laboratory of Parasitic Diseases	Laboratory of Immunopathology
Laboratory of Zoonotic Pathogens	Laboratory of Bacterial Diseases	Laboratory of Allergic Diseases	Laboratory of Virology	Laboratory of Immunology	Laboratory of Cellular and Molecular Immunology	Laboratory of Immunoregulation
Cytokine Biology Section	Research Technologies Branch	Comparative Medicine Branch	Rocky Mountain Veterinary Branch	Office of Training and Diversity	Emerging Viral Pathogens Section	Program in Systems Immunology and Infectious Disease Modeling

Introduction

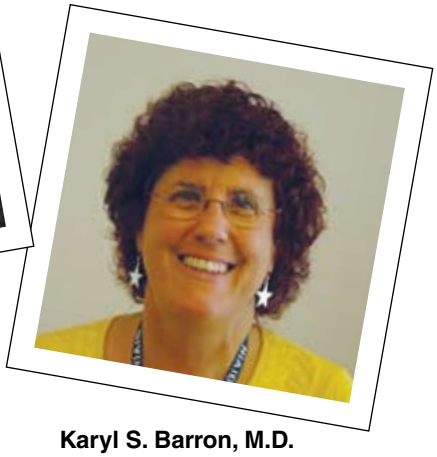
Welcome to the Division of Intramural Research (DIR) at the National Institute of Allergy and Infectious Diseases (NIAID). DIR is the component of the National Institutes of Health (NIH) Intramural Program that conducts basic and clinical research studies in the areas of allergy, immunology, and infectious diseases. Over the years, DIR scientists and support personnel have compiled an outstanding record of research that has given DIR and NIAID a worldwide reputation for scientific excellence.

This book highlights DIR laboratories and investigators and describes the broad spectrum of laboratory and clinical research opportunities for applicants at various stages in their research careers. You also will find general information on NIAID and NIH, application information for research training programs, and Web links where you can get additional information.

Training opportunities in DIR include programs for students and postdoctoral fellows as well as accredited medical fellowship training programs in allergy/immunology and infectious diseases. The training environment in DIR is rich with opportunities to work side-by-side with renowned scientists and with colleagues from every part of the world.

We hope that you will find this book both informative and useful and that you will consider DIR training programs as you plan the next step in your career.

Kathryn C. Zoon, Ph.D.
Director
Division of Intramural
Research, NIAID



Karyl S. Barron, M.D.
Deputy Director
Division of Intramural
Research, NIAID

About DIR

Since its beginnings in 1887, when it was a one-person lab housed in the attic of the Staten Island Marine Hospital in New York, the National Institutes of Health (NIH) has grown to 27 institutes and centers and a budget of approximately $29.5 billion. The National Institute of Allergy and Infectious Diseases (NIAID) is one of the largest institutes at NIH.

The Division of Intramural Research (DIR) is a major component of NIAID. For more than 50 years, DIR has brought together exceptional scientists to conduct basic and clinical research in a wide range of disciplines related to immunology, allergy, and infectious diseases. DIR's purpose is to make scientific discoveries that promote the development of new vaccines, therapeutics, and diagnostics that improve human health. In pursuit of this goal, DIR's research goals are as follows:

- Expand knowledge of immune-system components and functions.
- Define mechanisms responsible for abnormal immune functions, such as immunodeficiency, allergy, and autoimmunity.
- Understand the biology of infectious agents (viruses, bacteria, fungi, and parasites) and the host response to infection.
- Develop strategies to prevent and treat immunologic, allergic, and infectious diseases.

DIR scientists study all aspects of infectious diseases, including the causative agent, vectors, and pathogenesis in human and animal hosts. Clinical research is also integral to the mission of DIR, allowing key lab discoveries to be rapidly translated into methods to prevent, diagnose, or treat disease. DIR researchers are conducting more than 100 clinical trials at the NIH Clinical Center on the Bethesda, MD, campus and at collaborating U.S. and international sites.

Unparalleled Opportunities

DIR is home to a vibrant research community of more than 120 principal investigators who lead research groups composed of staff scientists, physicians, fellows, technical personnel, and students. DIR principal investigators are distinguished in their fields, recognized with numerous awards, and include eight members of the U.S. National Academy of Sciences and eight members of the Institute of Medicine. Trainees, both pre- and postdoctoral physicians and scientists, constitute the largest staff group in DIR, numbering approximately 500 in 2008.

The atmosphere within DIR is one of collegiality, open exchange of ideas, and productive collaboration. Exceptional research facilities provide investigators with access to state-of-the-art instrumentation in imaging, proteomics, genomics, structural biology, and cell analysis, as well as animal genetics. Taken together, DIR is truly a

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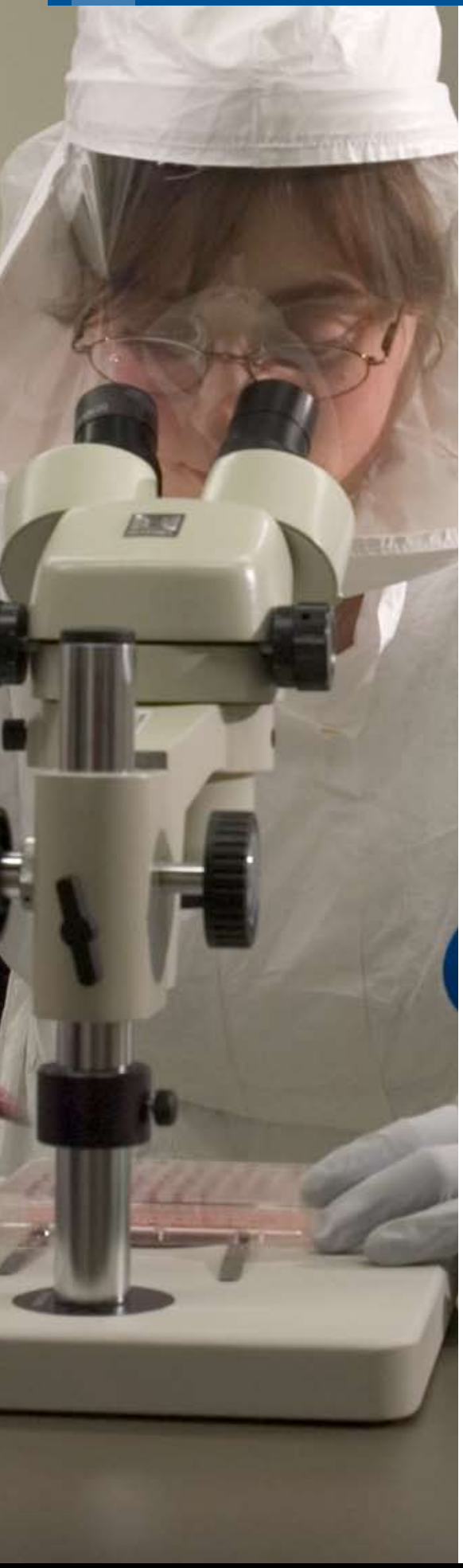


superb scientific setting for research and an unsurpassed training ground for new researchers.

World-Class Facilities

DIR has 20 laboratories that conduct peer-reviewed research and several branches and programs that focus on new research technologies, vaccine development, and animal care. Most DIR labs are located on the NIH campus in Bethesda, MD, and in nearby Rockville, MD.

DIR also has a large research campus in Hamilton, MT, known as the Rocky Mountain Laboratories. The campus features a new facility housing BSL-2, BSL-3, and BSL-4 laboratory space.

Other research amenities available to DIR employees and trainees include the following:

- The NIH Clinical Center, the world's largest hospital devoted exclusively to clinical investigation
- State-of-the-art technology development facilities for protein chemistry, flow cytometry, confocal microscopy, electron microscopy, genomics, and bioinformatics
- Flow cytometry, cell sorting, and multiphoton confocal microscopy technology in a BSL-3 environment, with trained staff to operate the instrumentation safely
- Small-group and individual training in the use of specialized instrumentation and the development of research applications
- In-house facilities to design, conduct, and analyze results from microarray experiments for all species, including microbial pathogens
- Development and breeding of transgenic and knockout mice
- The Comparative Medicine Branch, which manages all aspects of research involving laboratory animals
- Computer networking and teleconferencing facilities, including satellite linkage to DIR-supported facilities at international sites

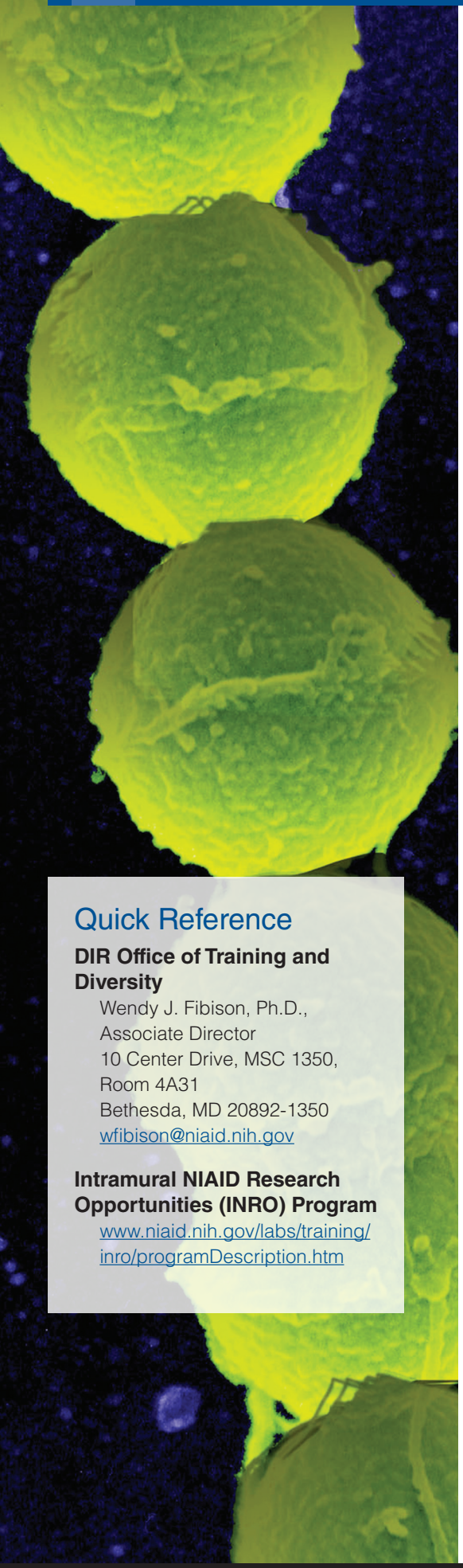
The Edge of Scientific Discovery

DIR has long been at the forefront of research on immunologic, allergic, and infectious diseases. DIR scientists discovered the Lyme disease bacterium, the Norwalk virus responsible for epidemic gastrointestinal disease, and the immunoregulatory cytokine, interleukin 4. DIR scientists have developed vaccines for hepatitis A and E and rotavirus, and they are currently conducting clinical studies of more than 20 vaccine candidates for malaria, dengue, and viral respiratory infections.

DIR laboratory and clinical research on rare immune system diseases led to the discovery of autoimmune lymphoproliferative syndrome and its underlying genetic basis, the discovery of the gene mutation responsible for Job's syndrome, and the development of gene therapies for severe combined immunodeficiency and chronic granulomatous disease.

For more than 25 years, DIR scientists have made important observations about the pathogenesis of HIV/AIDS, including the recent identification of another cellular receptor for HIV—a discovery that may explain the rapid destruction of gut lymphoid cells following infection.

This legacy and continued commitment to research innovation, combined with state-of-the-art facilities and exceptional training opportunities, make DIR an ideal starting point for a scientific career.



Quick Reference

DIR Office of Training and Diversity

Wendy J. Fibison, Ph.D.,
Associate Director
10 Center Drive, MSC 1350,
Room 4A31
Bethesda, MD 20892-1350
wfibison@niaid.nih.gov

Intramural NIAID Research Opportunities (INRO) Program

www.niaid.nih.gov/labs/training/inro/programDescription.htm

DIR Training Programs

NIAID offers many training opportunities for those interested in careers in biomedical research, including Summer Internship Programs in Biomedical Research, post-baccalaureate and post-doctoral programs, and medical rotations and fellowships.

Wendy J. Fibison, Ph.D.
Associate Director
Office of Training and Diversity

The DIR Office of Training and Diversity (OTD) sponsors research experiences in our laboratories in Maryland and Hamilton, Montana, through a variety of programs. For example, OTD provides funding for post-baccalaureate and postdoctoral trainees, which includes a stipend and health insurance. A special seminar series and other events are planned for trainees in this program to enhance their research experience in DIR.

Trainees are also able to participate in the numerous career development programs offered by OTD: the NIAID annual fellows' retreat, skill-building workshops, grant-writing seminars, orientation sessions, and individual career counseling.

OTD is committed to increasing the participation of women and populations underrepresented in biomedical research. An annual outreach program, Intramural NIAID Research Opportunities (INRO), seeks to identify talented undergraduate and graduate students interested in NIAID's research and training programs. Applications are open from August 15 to October 15.

Postdoctoral Training

DIR has several options for those interested in postdoctoral laboratory research training. Our programs consist of a minimum of two to three years of research in one of the DIR labs, and both Ph.D. and M.D. candidates can apply.

Available appointments differ slightly in their requirements for citizenship and postdoctoral experience, but all have the same starting point: finding the best research fit for you. Start by reading the descriptions of the labs and investigators in this book and determining which lab or investigator is conducting research in your area of interest.

NIAID Independent Scholars Program

The NIAID Independent Scholars Program brings exceptionally talented young scientists to DIR directly from their Ph.D. training to establish independent research programs within the mentoring framework of a DIR laboratory—all in the belief that exceptional, new Ph.D.s have the ability to carry out highly creative, cutting-edge, and independent research. Scholars receive mentoring from the senior members of an NIAID laboratory to help them develop into the next generation of leaders in immunology and infectious disease research. Positions in the Independent Scholars Program are contingent upon receiving a Ph.D. and are for an initial two years.

Appointment Mechanisms

If you are selected for an NIAID DIR postdoctoral program, you may be appointed under one of several mechanisms, depending on the availability of funding, type of research, and your qualifications. These appointment mechanisms include the following:

- **Postdoctoral Fellowship, including NIH Intramural Research Training Award (IRTA),** requires that you be a U.S. citizen or permanent resident with a doctoral degree and five or fewer years of postdoctoral experience.
- **Research Fellowship** is for highly experienced postdoctoral scientists (generally more than five years of postdoctoral experience) who seek further research training and professional development.
- **NIH Visiting Program (VP)** offers scientists who are not U.S. citizens the opportunity to receive further training or to conduct research in their specialties. Appointments include the **Postdoctoral Fellowship (VP),** which requires that you have a doctoral degree and five or fewer years of relevant postdoctoral experience.

Other Appointments

- **Adjunct Investigator** appointment is possible if you have outside funding and want to enhance your research capabilities in a DIR laboratory. U.S. citizenship is not required.

How To Apply

Postdoctoral Opportunities

Visit www.training.nih.gov/apps/publicForms/postdoctoral/forms/adIndex.aspx?strSearch=NIAID and complete an online application for the program that interests you.

OR

After reading this book, send the following information to the NIAID lab chief or investigator you are interested in working with:

- A cover letter describing your background, research interests, career goals, and the special training or experience you are seeking. Include the date you can begin training, home address, home and office telephone numbers, fax number, and e-mail address.
- A copy of your curriculum vitae and bibliography. Representative publications are welcome.

If you would like your application to be distributed to more than one lab, send this information to the following contact:

Wendy J. Fibison, Ph.D., Associate Director
Office of Training and Diversity
10 Center Drive, MSC 1350, Room 4A31
Bethesda, MD 20892-1350
wfibison@niaid.nih.gov

NIAID Independent Scholars Program

Visit www.niaid.nih.gov/labs/training/scholarsProgram/ for a full description of the program.

Submit a curriculum vitae, contact information for three individuals who will provide letters of recommendation, a one- to two-page summary of your thesis research accomplishments, and a three- to five-page, five-year research plan to the following contact:

Susan K. Pierce, Ph.D., Chair
NIAID Independent Scholars Program Board
spierce@nih.gov

How To Apply

Learn more about predoctoral training programs by visiting the following Web sites:

- **Postbaccalaureate IRTA**
  www.training.nih.gov/student/pre-irta/previewpostbac.asp
- **Predoctoral IRTA**
  www.training.nih.gov/student/pre-irta/previewpostbac.asp
- **Graduate Partnerships Program**
  gpp.nih.gov
- **Year-Off Training Program for Graduate or Medical Students**
  www.training.nih.gov/student/pre-irta/previewinterim.asp
- **Technical IRTA**
  www.training.nih.gov/student/pre-irta/previewtechnical.asp
- **Summer Internships**
  www.training.nih.gov/student/sip/

Complete an online application for the program in which you are interested.

OR

After reading this book, send the following information to the NIAID lab chief or investigator you are interested in working with:

- A cover letter describing your background, research interests, career goals, and the special training or experience you are seeking. Include the date you can begin training, home address, home and office telephone numbers, fax number, and e-mail address.
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10 Center Drive, MSC 1350, Room 4A31
Bethesda, MD 20892-1350
wfibison@niaid.nih.gov

- **Special Volunteer** appointment is suitable if you have funding from a foundation or private grant and wish to conduct research in an NIAID lab.
- **Guest Researcher** program allows you to use NIH facilities, equipment, and resources for your research and training; however, you cannot provide services to NIH.

Predoctoral Training for Students

- **Postbaccalaureate Intramural Research Training Award (IRTA)** provides the opportunity to postpone your application to graduate or medical school so you can get an introduction to biomedical research that may encourage you to pursue a career in the field. To qualify, you must be a U.S. citizen, have graduated from a fully accredited U.S. college or university, and have held the degree for no more than two years. Also, you must intend to apply to graduate or medical school in biomedical research during your time at NIAID.

- **Predoctoral IRTA** is for students who have already been accepted into a doctoral program. To qualify, you must be accepted into or enrolled in a graduate, doctoral, or medical degree program and want to delay or interrupt your education for an interim research experience before entering school.
- **Graduate Partnerships Program** links NIH to national and international universities in the training of graduate students. You have the academic environment of a university and the breadth and depth of research at NIH.
- **Year-Off Training Program for Graduate or Medical Students** allows you to spend a year engaged in biomedical research at NIH if you are currently enrolled in graduate or medical school, with the understanding that you will return to your degree-granting institution within one year. U.S. citizens or permanent residents who have permission from their institutions are eligible.
- **Technical IRTA** is for applicants with a bachelor's or master's degree in a biomedical research field. It is a two-year program designed to help you develop the advanced skills and techniques in basic and applied research necessary to be a highly trained research support professional.
- **Summer Internships** in an NIAID laboratory can enhance your knowledge and understanding of the world of biomedical research and help you plan your academic goals. DIR offers 10- to 12-week summer internships for high school, college, graduate, and medical students. An online application for the following summer is available in early November. The application deadline is March 1.

Clinical Training Opportunities

Training Programs

NIAID offers three-year medical fellowships in ACGME-approved training programs in infectious diseases and allergy/immunology. These programs aim to develop clinical and basic research skills in physicians who are well-grounded in clinical medicine and are pursuing a career in biomedical research.

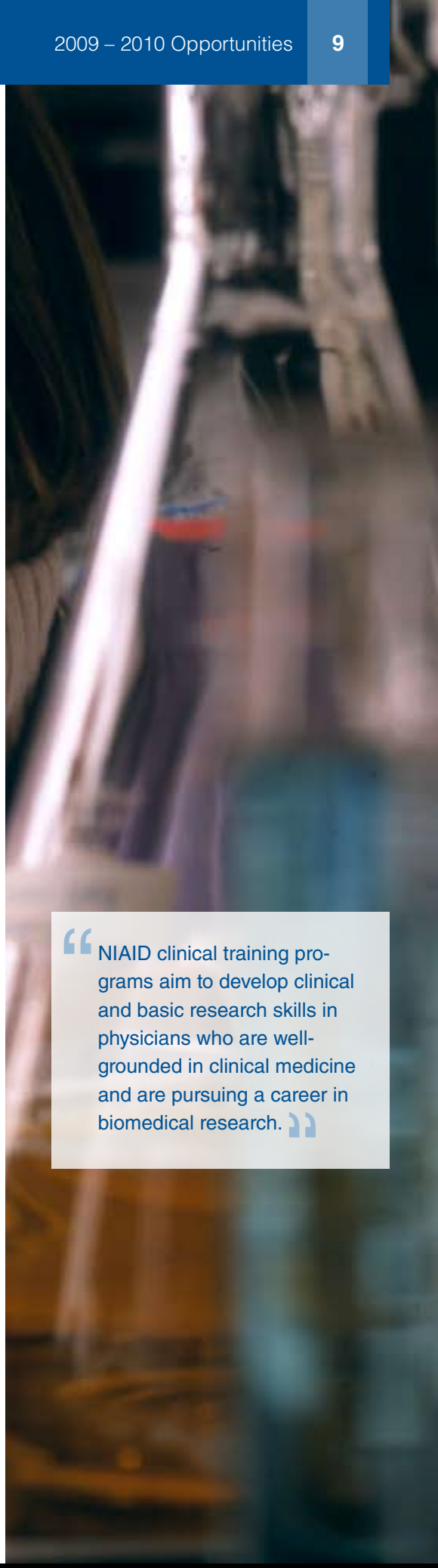
Before beginning a fellowship, applicants must have completed three years of residency training in an approved internal medicine program (or in pediatrics for the allergy and immunology training program) in the United States or Canada. Qualified individuals may apply for a student loan repayment program that currently repays up to $35,000 per year of eligible student debt.

The three-year NIAID programs comprise one year of clinical responsibilities and two years in research. All trainees spend two or three months of the first year caring for patients at the NIH Clinical Center, the nation's largest hospital devoted to clinical research. All NIAID patients participate in research protocols conducted by DIR investigators.

Patients enter the Clinical Center with various diseases, including the following:

- Autoimmune diseases
- Genetic and acquired immunodeficiencies
- Disorders of neutrophil and monocyte function
- Severe, acute, and chronic viral infections, including herpes simplex, Epstein-Barr virus, and HIV
- Eosinophilic gastrointestinal diseases
- Hypereosinophilic syndromes
- Allergic diseases, including asthma, anaphylaxis, and mast cell disorders
- Parasitic diseases
- Mycoses

During the next 9 to 10 months of training, fellows join traditional consultation services and didactic rotations at NIH and other medical institutions in the Baltimore, MD, and Washington, DC, metropolitan areas. Following clinical training, fellows conduct research in any one of the intramural laboratories at NIAID or in other NIH laboratories or programs.



> "NIAID clinical training programs aim to develop clinical and basic research skills in physicians who are well-grounded in clinical medicine and are pursuing a career in biomedical research."

How To Apply

Applicants to the allergy/immunology and infectious diseases training programs should follow the instructions in ERAS at www.aamc.org/students/eras/start.htm.

In addition to what is included in the application package, DIR requests the following:

- A personal statement describing the program to which you wish to apply, your background, your research interests, your career goals, and the special training or experience you are seeking at NIH
- Copies of your medical school/graduate school transcripts

Allergy and Immunology Training Program

Candidates should apply for the program 18 months prior to entry in July. The application deadline in ERAS is January 31. Applicants must be on track to complete an ACGME-approved residency in internal medicine or pediatrics at the time they enter the program. Interviews are held between November and April.

Kelly D. Stone, M.D., Ph.D., Director
Allergy and Immunology Training Program
10 Center Drive, MSC 1899, Room 12C103
Bethesda, MD 20892-1899
301-435-0993
301-480-5757 (fax)
stonek@niaid.nih.gov

Infectious Diseases Training Program

Applications are accepted only via ERAS. The program participates in the National Resident Matching Program. Programs and applicants to the match submit final selections in the third week of May in the year before the start date of the fellowship. Interviews are held during the six months prior to the match.

Kala Viswanathan, Program Administrator
Infectious Diseases Training Program
10 Center Drive, MSC 1882,
Room 11N234
Bethesda, MD 20892-1882
301-496-3461
301-480-0050 (fax)
kvish@niaid.nih.gov

Continued on page 11

Allergy and Immunology Training Program

The Allergy and Immunology Training Program is designed to train fellows in the care of children and adults with immunologic diseases, including allergy, immunodeficiency, and autoimmune diseases. Fellows have a well-rounded clinical experience in their first year of training and subsequently develop a research program to advance the care of these patients.

The Allergy and Immunology Training Program accepts applications from residents in internal medicine or pediatrics who have completed training in the United States or Canada and who are not J-1 visa holders. H-1 visa holders may apply. Applications for the program are made through the Electronic Residency Application System (ERAS), and the program participates in the National Resident Matching Program.

Trainees who wish to become board-eligible in allergy and immunology are required to do the following:

- Complete in-patient and out-patient rotations at the NIH Clinical Center, Walter Reed Army Medical Center, the Johns Hopkins Hospital, and Children's National Medical Center during their first year of training.
- Participate in monthly continuity clinics during their second year of training.
- Provide allergy and immunology consultation to the NIH Clinical Center.
- Attend the core basic and clinical immunology conferences and case conferences of the training program.
- Attend monthly journal clubs.
- Take American Board of Allergy and Immunology certification preparatory courses.

Infectious Diseases Training Program

The Infectious Diseases Training Program accepts applications from residents in internal medicine who have completed training in the United States or Canada and who are not J-1 visa holders. H-1 visa holders may apply. The first year of the training program is entirely clinical.

Three years of residency training are required. Applicants who wish to pursue the ABIM Research Pathway, and who have the approval of the director of their respective internal medicine residency program, may apply for a fellowship to begin after two years of residency. Applicants accepted under the Research Pathway must spend four years in fellowship to be eligible for certification in both internal medicine and infectious diseases.

Applications are accepted from August 1 of the second year before the fellowship begins up to the deadline date for the National Resident Matching Program, usually in May of the year before the start date of the fellowship. Vacancies not filled through the match are open for application after the match.

Trainees who wish to become board-eligible in infectious diseases are required to do the following:

- Spend eight months of their first year on infectious-disease consultation services at the NIH Clinical Center, the Johns Hopkins Hospital, the George Washington University Medical Center, Georgetown University Medical Center, and Washington Hospital Center.
- Learn hospital epidemiology and diagnostic microbiology.
- Attend journal club and case conferences regularly.
- Attend a continuity clinic for HIV-infected patients.

NIAID Clinical Research Transition Program

The NIAID Clinical Research Transition Program provides opportunities for physicians to gain clinical and translational research experience in association with a DIR laboratory. Applicants must have an M.D. or an M.D./Ph.D., be board-eligible or board-certified in a subspecialty (or equivalent), and qualify for credentialing from the NIH Clinical Center.

Candidates may choose the laboratory in which they will carry out their program, contingent upon approval from the lab chief and the DIR Director. Appointments are for three to five years; accepted participants will be reviewed throughout their appointments by a committee composed of DIR investigators with clinical research interests. Participants will also be paired with a senior clinical investigator who will serve as a mentor.

The application package must include a curriculum vitae, the names of three references, a two-page research proposal, and a letter of support from the accepting NIAID lab chief. Submit application materials via e-mail to:

Karyl S. Barron, M.D.
kbarron@niaid.nih.gov

Competitive candidates will be asked to present their research accomplishments and plans to the search committee.

Visit www.niaid.nih.gov/about/organization/dir/ClinicalResearchTransition.htm for more information.

Continued from page 10

Selection Process

Candidates are selected for interview on the basis of their clinical and/or research credentials and research interests. Interview visits to the NIH campus are designed to introduce potential trainees to NIH preceptors and to provide the candidate with the opportunity to explore in detail the nature of the research he or she might conduct.

A selected candidate is offered a position that may be based on a number of funding mechanisms, depending on availability of funding, the type of research to be conducted, and the qualifications of the candidate.

> Fellows accepted into the infectious diseases or allergy and immunology training program and who have substantial student loans are eligible to apply for loan repayment.

Loan Repayment Programs

Fellows accepted into the infectious diseases or allergy and immunology training program and who have substantial student loans are eligible to apply for loan repayment. There are both competitive and noncompetitive repayment programs.

General Loan Repayment Program

The NIH General Loan Repayment Program (LRP), authorized by Congress in 1993, was established to attract highly qualified professionals, particularly physicians, to conduct research at NIH. Unlike previously authorized LRPs that targeted specific areas or types of research, such as AIDS or clinical research, this program supports research in a variety of scientific disciplines.

The General LRP may repay up to a maximum of $35,000 per year toward participants' outstanding eligible education loans. In return, participants must sign a contract agreeing to conduct qualified research activities as NIH employees for a maximum of three years.

The NIH General Research LRP for ACGME Fellows is a pilot initiative of $20,000 per year in loan repayments, currently available for fellows employed by NIH in subspecialty and residency training programs accredited by ACGME.

AIDS Loan Repayment Program

AIDS research at NIAID encompasses work on the etiological agent, pathogenesis, therapeutics, vaccine development, and epidemiology and natural history of HIV infection. AIDS research will continue to require dedicated, well-trained basic and clinical scientists.

The educational debt repayment program was instituted to permit qualified postdoctoral physicians and scientists to enter this area of research. In exchange for loan repayment benefits, researchers must agree to participate in AIDS research for a minimum of two years. Continuation contracts for additional years may be entered subsequently. To be eligible, you must be a citizen of the United States or a permanent resident; hold a Ph.D., M.D., D.O., D.D.S., D.M.D., D.V.M., A.D.N./B.S.N., or equivalent degree; and have qualifying educational debt in excess of 20 percent of your annual NIH basic pay or stipend at the effective date of program participation.

Clinical Research Loan Repayment Program for Individuals From Disadvantaged Backgrounds

The NIH Clinical Research Loan Repayment Program (CR-LRP) is designed to recruit highly qualified physicians, nurses, and scientists from disadvantaged backgrounds to serve as clinical researchers. Eligibility requirements for the CR-LRP are the same as those for the AIDS Loan Repayment Program, with two additional criteria: 1) You must be from a disadvantaged background, and 2) You must be awarded clinical privileges by the Clinical Center Medical Board or other credentialing board upon NIH employment.

An individual from a disadvantaged background is defined as one who comes from a family with an income below low-income thresholds or from an environment that inhibited (but did not prevent) him or her from obtaining the knowledge, skill, and ability required to enroll in and graduate from a health professions school. The income level considers family size and Bureau of the Census statistics, with annual adjustments for changes in the Consumer Price Index. The Department of Health and Human Services adjusts this level for use in all health professions programs and publishes this information periodically in the *Federal Register*.

Quick Reference

NIH General Loan Repayment Program

2 Center Drive, MSC 0230
Bethesda, MD 20892-0230
866-849-4047
866-849-4046 (fax)
www.lrp.nih.gov

Tenure and Tenure Track in NIAID

The primary purpose of an NIH fellowship is to provide time-limited research training, clinical training, and/or career development opportunities to postdoctoral scientists. At the end of the training period, the majority of fellows will leave NIH to pursue careers at institutions in the United States or abroad. More permanent positions may be available through tenure-track or tenured appointments. Opportunities for such appointments arise when research in a specific area is needed to fulfill the NIAID intramural mission.

Tenure at NIH consists of a permanent position and a long-term commitment of salary, personnel, and the research resources needed to conduct an independent research program within the scope of the NIH mission. Scientists obtain tenure in one of two ways: 1) The scientist is recruited from outside NIH for a tenured position after compiling an extensive research record at another institution, or 2) The scientist successfully competes for and completes a tenure-track appointment at NIH and is advanced to tenure.

Following nationwide recruitment efforts, candidates for both tenured and tenure-track positions are selected by a search committee and approved by the NIH Deputy Director of Intramural Research. While traditional tenure and tenure-track positions are created by the hiring laboratory, NIAID's new Clinical Tenure-Track Program will periodically conduct searches for outstanding clinical researchers who would be good candidates for the clinical tenure track and meet the mission of NIAID. Successful clinical tenure-track candidates are then matched to an NIAID laboratory.

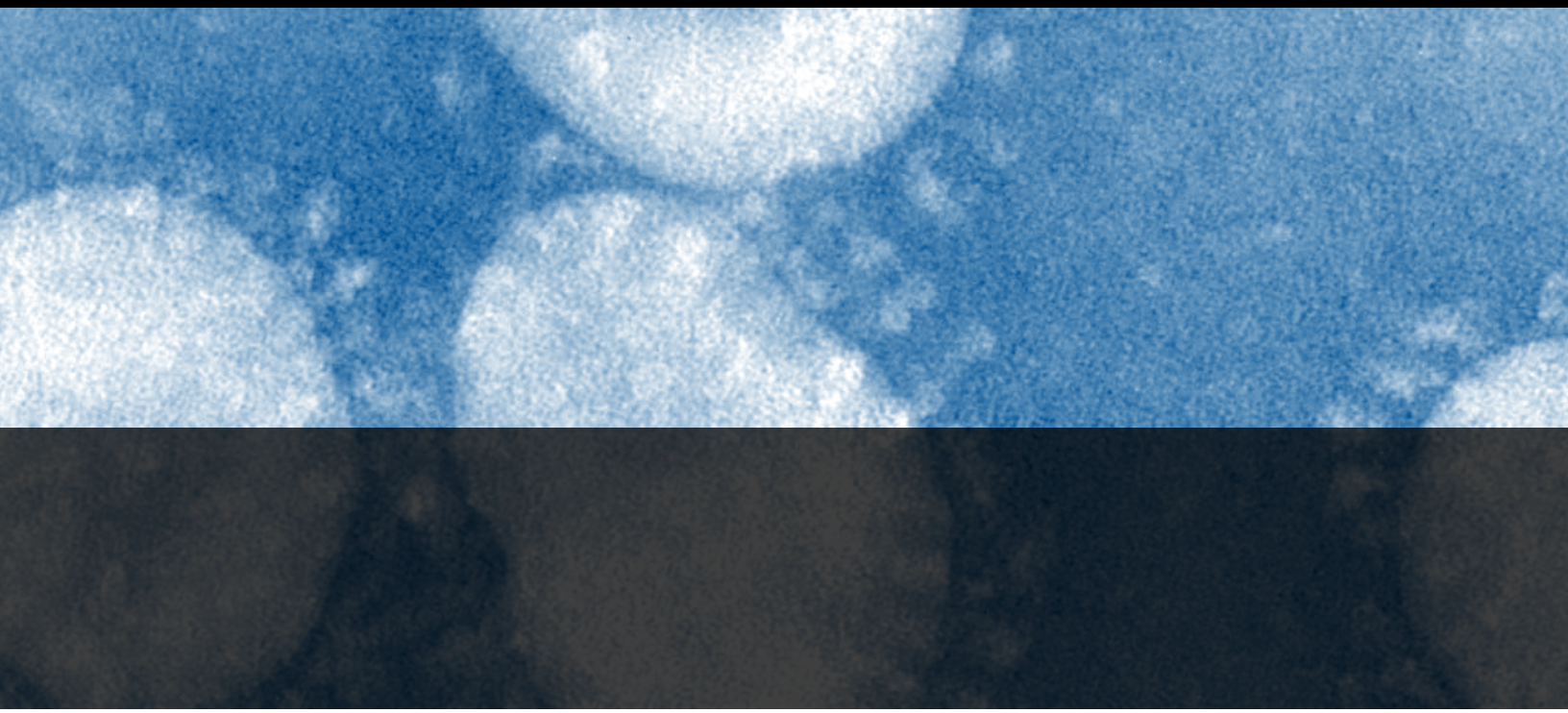
Tenure-track candidates are given six years to establish themselves as independent scientists before being evaluated for tenure; clinical tenure-track candidates are given up to eight years. The NIAID Board of Scientific Counselors (BSC) reviews the candidate's performance and qualifications for tenure at the midpoint of the tenure-track clock and decides whether the candidate should be continued in tenure track or advanced for accelerated tenure decision. The BSC reviews the candidate's performance again at the completion of the tenure-track clock and decides if the candidate should be recommended for tenure.

If a candidate is recommended for tenure by the BSC and the NIAID Promotion and Tenure Committee or by a search committee, and the DIR Director concurs, the request is forwarded to the NIH Central Tenure Committee, which is chaired by the NIH Deputy Director for Intramural Research, for approval.

Timeline for Nontenured Staff at NIH

The initial fellowship appointment is for a period of two to three years. This may be renewed at the request of the host laboratory, if it is mutually beneficial to do so. It is the usual policy of NIH that postdoctoral trainees should not remain at NIH for more than five years. The overall limitation is not more than eight years, regardless of appointment mechanism, unless the postdoctoral trainee is approved for tenure track or a permanent appointment.

DIR Laboratories and Branches



Comparative Medicine Branch

Randy Elkins, D.V.M.; Diplomate, ACLAM; Chief

www.niaid.nih.gov/labs/aboutlabs/cmb

301-496-0560

Branch Sections and Units

Office of the Chief
Randy Elkins, D.V.M.; Diplomate, ACLAM

Research Support Activities

Research to understand and develop new treatments for allergies and infectious diseases may require the use of laboratory animals. NIAID is committed to using animals only when alternative methods are unavailable. The institute fully complies with all federal rules, regulations, and policies pertaining to the care and use of animals in medical research.

The care and treatment of animals can profoundly affect experimental results. An animal's environment, its daily care, the presence or absence of disease-causing organisms, and the amount of pain or distress that an animal experiences can affect the validity of research data. NIAID's intramural scientists are sensitive to the impact of these factors on their research and also understand their ethical responsibility for ensuring that the animals they use receive high-quality care. All NIAID scientists conducting research involving animals must attend an NIH training course that offers a broad perspective on current issues relating to animals and provides specific information on techniques and procedures.

The Comparative Medicine Branch (CMB) provides daily care to the animals maintained within the DIR animal facilities in Bethesda and Rockville, MD. Additionally, CMB assists the NIAID Animal Care and Use Committee with oversight of NIAID's animal program, including intramural contracts and inter- and intra-agency agreements involving animals. CMB also is responsible for assisting NIAID scientists with issues related to animals, overseeing the construction and renovation of animal facilities, and assisting with planning for future animal-related requirements.

Randy Elkins, D.V.M.; Diplomate, ACLAM

Associate Director for Laboratory Animal Resources, DIR

Director, Animal Program, DIR
Chief, Comparative Medicine Branch

www.niaid.nih.gov/labs/aboutlabs/cmb/niaidVeterinarians/elkins.htm

relkins@niaid.nih.gov

Dr. Elkins obtained his D.V.M. from the University of Missouri College of Veterinary Medicine in 1974. He completed a one-year internship in large animal surgery at the University of California School of Veterinary Medicine, Veterinary Medical Teaching Hospital. Following several years of clinical practice in California, he completed a residency in comparative pathology at the U.S. Army Medical Research Institute of Infectious Diseases in Frederick, MD.

He joined the NIAID Laboratory of Infectious Diseases as a senior staff veterinarian in 1992 and was promoted to head of its Experimental Primate Virology Section in 1997. In 2000, Dr. Elkins was appointed DIR Associate Director for Nonhuman Primate Research and, in 2001, DIR Associate Director for Laboratory Animal Resources and Animal Program Director. He became specialty board-certified by the American College of Laboratory Animal Medicine in 1996.

Major Areas of Research

- Biostability of research models and issues related to animal welfare
- Murine norovirus, *Spironucleus muris*, cryopreservation of rabbit germplasm, and idiopathic ulcerative dermatitis of B6 mice

Cytokine Biology Section

Kathryn C. Zoon, Ph.D., Chief

www.niaid.nih.gov/labs/aboutlabs/cytokineBiology/

301-496-3006

Sections and Units

Office of the Chief
Kathryn C. Zoon, Ph.D.

Research Activities

The Cytokine Biology Section (CBS) conducts basic and translational research on human interferon (IFN). Our studies examine the structure and function of human IFN-alphas by using a variety of methods, including protein engineering, gene expression microarrays, proteomics, and bioassays. CBS is composed of an interactive group of doctoral-level and interdisciplinary scientists who work in a state-of-the-art building.

The laboratory program focuses on the following:

- Identifying the structure and function of both naturally occurring and protein-engineered human IFN-alphas
- Examining the interaction of IFN-alpha with its receptor
- Studying the signal transduction pathways of IFN-alphas by using gene expression microarrays and proteomics
- Studying the biological effects of IFN-alphas

Kathryn C. Zoon, Ph.D.
Director, DIR
Chief, Cytokine Biology Section
www.niaid.nih.gov/labs/aboutlabs/cytokineBiology/
kzoon@niaid.nih.gov

Dr. Zoon obtained her B.S. cum laude and her Ph.D. in biochemistry from The Johns Hopkins University. Her research focuses on the structure and function of human IFNs. She is an associate editor of the *Journal of Interferon Research* and author or co-author of more than 100 publications. She was past president of the International Society for Interferon and Cytokine Research (2000 – 2001), served on the board of directors for the Foundation for Advanced Education in the Sciences (FAES), and was the first vice president of FAES. Prior to joining NIAID in June 2004, Dr. Zoon was principal deputy director of the Center for Cancer Research at the National Cancer Institute, director of the Center for Biologics Evaluation and Research at the FDA, and a member of the NIH Scientific Directors. She has received numerous awards and is a member of the Institute of Medicine.

Major Areas of Research

- Production and characterization of protein-engineered human IFNs
- Interaction of Type I human IFNs with the Type I human IFN receptor
- Signal transduction mechanisms and biological activities of Type I and II human IFNs

Emerging Viral Pathogens Section

Peter Jahrling, Ph.D., Chief
301-631-7201

Sections and Units

Office of the Chief
Peter Jahrling, Ph.D.

Research Activities

The Emerging Viral Pathogens Section (EVPS) conducts basic research to elucidate the pathophysiological processes associated with the severe morbidity caused by infections with viral hemorrhagic fevers and other Category A pathogens. In addition to developing animal models by using authentic microbial agents, EVPS develops treatment strategies that include vaccines, antimicrobials, immunoprophylaxis, and inhibitors of the coagulation cascade and cytokine storm to reverse the consequences of viral infection. Pathogen discovery is also a component of EVPS activities.

Countermeasure development and improved medical outcomes are the objectives of this research initiative. Generic solutions to broad classes of microbial agents should emerge from an understanding of disease processes. Thus, EVPS will assess a broad spectrum of diseases, including newly discovered pathogens, for commonalities amenable to generic intervention strategies.

Peter Jahrling, Ph.D.
Chief, Emerging Viral Pathogens Section
jahrlingp@niaid.nih.gov

Dr. Jahrling received his Ph.D. in medical microbiology from Cornell Medical College. Upon graduation, he served as an Army officer at the U.S. Army Medical Research Institute of Infectious Diseases, where he specialized in viral hemorrhagic fevers requiring BSL-4 containment. After fulfillment of his military obligation, Dr. Jahrling converted to civilian status and was eventually appointed scientific advisor for the institute. In 2005, Dr. Jahrling accepted appointments as chief scientist of the NIAID Integrated Research Facility in Frederick, MD, and chief of the Emerging Viral Pathogens Section.

Major Areas of Research

- Development of animal models for human diseases involving Category A viral pathogens
- Evaluation of immunization strategies and therapeutic interventions based on antiviral drugs, passive immunization, and targeted reversal of pathophysiological processes
- Isolation and characterization of viral agents associated with previously uncharacterized diseases (pathogen discovery)

Laboratory of Allergic Diseases

Dean D. Metcalfe, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lad/
301-496-2165

Sections and Units

Office of the Chief
Dean D. Metcalfe, M.D.

Mast Cell Biology Section
Dean D. Metcalfe, M.D.

Molecular Signal Transduction Section
Kirk M. Druey, M.D.

Adverse Reactions to Vaccines and Biologics Unit
Calman Prussin, M.D.

Eosinophil Biology Section
Helene Rosenberg, M.D., Ph.D.

Research Activities

The Laboratory of Allergic Diseases (LAD) conducts basic and clinical research on immunologic diseases with an emphasis on disorders of immediate hypersensitivity, which include the spectrum of classic allergic diseases. LAD is composed of an interactive group of Ph.D.s, M.D.s, research nurses, technicians, and administrative staff, who work in contemporary laboratories adjacent to NIAID's clinical facilities. Scientific personnel are engaged in research aimed at elucidating events in mast cell-dependent, IgE-mediated allergic inflammatory reactions.

Basic research efforts are directed at studying the growth, differentiation, and activation of mast cells, basophils, and eosinophils; animal models of allergic inflammation; mast-cell, basophil, T-cell, and eosinophil surface receptors; signal transduction pathways in inflammation; and the biological manifestations of effector-cell activation in tissues.

Clinical research is directed toward understanding the genetic basis and pathogenesis of immediate hypersensitivity and the role of mast cells, basophils, eosinophils, and T lymphocytes and their cytokines in this process. Efforts are then undertaken to translate basic and clinical research findings into novel immunomodulatory and anti-inflammatory approaches to the treatment of allergic and immunologic disorders, including anaphylaxis, eosinophilic gastrointestinal diseases, and systemic mast cell disorders.

Dean D. Metcalfe, M.D.

Chief, Laboratory of Allergic Diseases
Chief, Mast Cell Biology Section, LAD
Associate Director, Allergy and Immunology Training Program

www.niaid.nih.gov/labs/aboutlabs/lad/mastCellBiologySection/metcalfe.htm

dmetcalfe@niaid.nih.gov

Dr. Metcalfe received his M.D. from the University of Tennessee and his M.S. in microbiology from the University of Michigan, where he also did a residency in internal medicine. Dr. Metcalfe then trained in allergy and immunology during a fellowship at NIAID, followed by training in rheumatology while a fellow in immunology at the Robert Brigham Hospital in Boston. He is a past president of the American Academy of Allergy, Asthma, and Immunology and a past chair of both the American Board of Allergy and Immunology and the ACGME Residency Review Committee for Allergy and Immunology.

Major Areas of Research

- Regulation of mast-cell proliferation and activation
- Systemic mastocytosis and disorders due to genetic abnormalities in KIT
- Anaphylaxis

Kirk M. Druey, M.D.

Chief, Molecular Signal Transduction Section, LAD

www.niaid.nih.gov/labs/aboutlabs/lad/molecularSignalTransductionSection/

kdruey@niaid.nih.gov

Dr. Druey received his M.D. from Rush Medical College in Chicago. In 1992, following a residency in internal medicine at The New York Hospital/Cornell Medical Center, Dr. Druey became a postdoctoral fellow in the NIAID Laboratory of Immunoregulation. He joined the Laboratory of Allergic Diseases in 1997 to lead the Molecular Signal Transduction Section.

Major Areas of Research

- Regulation of signaling mediated by heterotrimeric G proteins
- Role of RGS proteins in leukocyte trafficking in allergic inflammation
- Role of G proteins and RGS proteins in bronchial reactivity in asthma

Calman Prussin, M.D.

Chief, Adverse Reactions to Vaccines and Biologics Unit, LAD

www.niaid.nih.gov/labs/aboutlabs/lad/adverseReactionsUnit/

calman@nih.gov

Major Areas of Research

- Human allergen-specific T-cell responses
- Eosinophilic gastroenteritis pathogenesis and treatment
- Food allergy pathogenesis and treatment
- Immunological therapy of allergic diseases

Dr. Prussin received his M.D. at the University of Southern California (USC) Keck School of Medicine and completed his internal medicine residency at Los Angeles County-USC Medical Center. Following a postdoctoral fellowship in the NIAID Laboratory of Cellular and Molecular Immunology, he completed his allergy and immunology (A&I) clinical fellowship at NIH (1991 – 1995). In 1996, Dr. Prussin joined the Laboratory of Allergic Diseases as head of the Clinical Allergy Unit. From 2000 to 2007, Dr. Prussin was the associate director of the A&I Fellowship Training Program. In 2007, he was named chief of the Adverse Reactions to Vaccines and Biologics Unit.

Helene F. Rosenberg, M.D., Ph.D.

Chief, Eosinophil Biology Section, LAD

www.niaid.nih.gov/labs/aboutlabs/lad/eosinophilBiologySection/

hrosenberg@niaid.nih.gov

Major Areas of Research

- Eosinophils and their role in innate immune responses
- Molecular biology of the Ribonuclease A gene superfamily
- Inflammatory responses to and novel therapies for severe respiratory virus infection

Dr. Rosenberg obtained her M.D. and Ph.D. from the joint program at The Rockefeller University and Cornell University Medical College. Following postdoctoral research at Harvard University, she joined NIH in 1991 and became a section chief in 2002.

Laboratory of Bacterial Diseases

Stephen H. Leppla, Ph.D., Acting Chief
301-496-9954

Sections and Units

Office of the Chief
Stephen H. Leppla, Ph.D.

Bacterial Toxins and Therapeutics Section
Stephen H. Leppla, Ph.D.

Research Activities

The Laboratory of Bacterial Diseases (LBD) studies bacterial diseases related to biodefense pathogens. Research focuses on identification and analysis of bacterial virulence factors and their genetic regulation; structure-function analysis of bacterial proteins and other factors; disease pathogenesis; and development of diagnostics, vaccines, and therapeutics.

Stephen H. Leppla, Ph.D.

Acting Chief, Laboratory of Bacterial Diseases

Chief, Bacterial Toxins and Therapeutics Section, LBD

sleppla@niaid.nih.gov

Major Areas of Research

- Structure-function relationships in bacterial protein toxins and the roles of toxins and other virulence factors in contributing to bacterial pathogenesis
- Bacterial gene regulation, interactions of bacteria and toxins with animal cells and tissues, the effects of toxins on host physiology, and the molecular mechanisms of toxin action
- Use of basic-research results in the design of vaccines and therapeutics

Dr. Leppla earned a B.S. in biology from the California Institute of Technology and a Ph.D. in biochemistry from the University of Wisconsin. After postdoctoral study at the University of California-Berkeley and Brown University, he became a research scientist at the U.S. Army Medical Research Institute of Infectious Diseases in Frederick, MD. He moved to NIH in 1989 and to NIAID in 2003.

Laboratory of Cellular and Molecular Immunology

Ronald H. Schwartz, M.D., Ph.D., Chief

www.niaid.nih.gov/labs/aboutlabs/lcmi/

301-496-1257

Sections and Units

Office of the Chief
Ronald H. Schwartz, M.D., Ph.D.

T-Cell Activation Section
Ronald H. Schwartz, M.D., Ph.D.

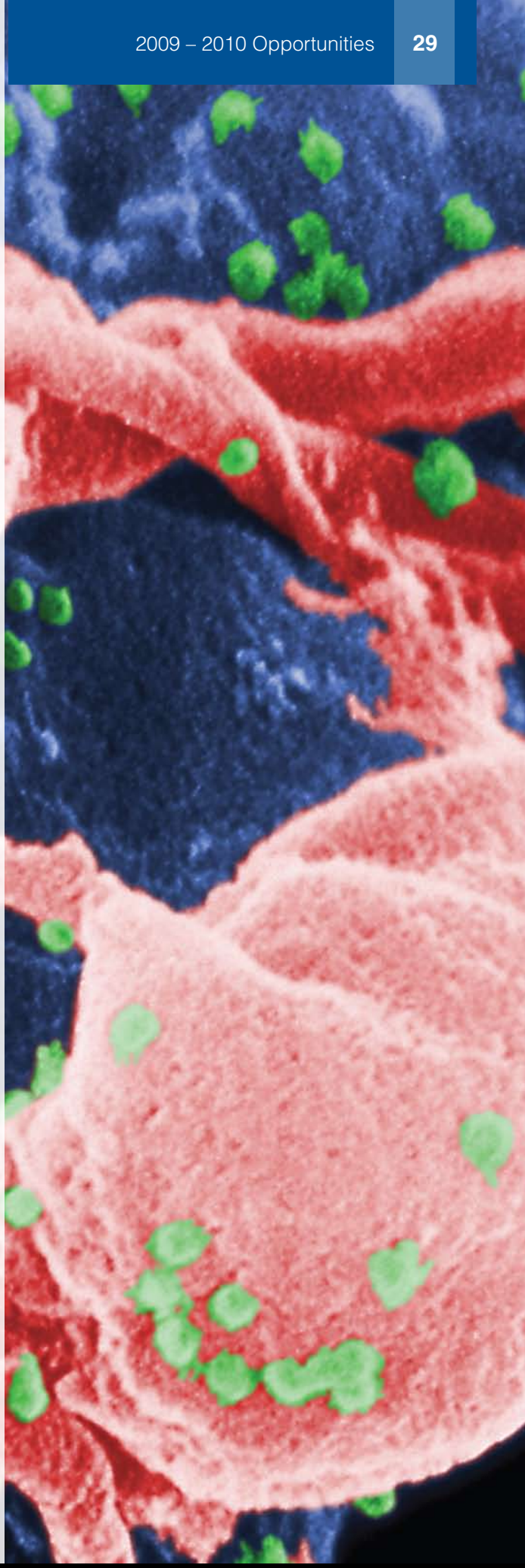
T-Cell Development Section
B. J. Fowlkes, Ph.D.

T-Cell Tolerance and Memory Section
Polly Matzinger, Ph.D.

T-Cell Biophysics Unit
Rajat Varma, Ph.D.

Research Activities

Scientists in the Laboratory of Cellular and Molecular Immunology (LCMI) study the development, activation, tolerance, memory, and differentiation of thymus-derived (T) lymphocytes. Research projects currently focus on the role of the Notch protein in lineage commitment in the thymus and periphery, the role of danger and co-stimulatory signals in T-cell activation and tolerance, the molecular events involved in gene activation following T-cell receptor ligation, the molecular regulation of transcription of the interleukin 2 gene, and the molecular and cellular aspects of both T-cell clonal anergy and adaptive tolerance. The laboratory offers educational training in immunology through summer tutorials and weekly journal and data clubs. In addition, there is research training in techniques such as flow cytometry, signal transduction biochemistry, fluorescence microscopy, and lymphocyte cell culture. All research is carried out using mouse models.



Ronald H. Schwartz, M.D., Ph.D.
Chief, Laboratory of Cellular and Molecular Immunology

Chief, T-Cell Activation Section, LCMI

www.niaid.nih.gov/labs/aboutlabs/lcmi/tCellActivationSection/

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Major Areas of Research

- T-cell anergy, tolerance, and activation
- Molecular regulation of interleukin 2 gene expression

Dr. Schwartz graduated from Cornell University with a B.S. in chemistry (summa cum laude) in 1965. He graduated cum laude from Harvard Medical School in 1970. He completed a Ph.D. at the Institute of Microbiology in 1973 on the interaction of synthetic polypeptides with macrophage RNA. He came to NIH in 1972 and was appointed as a staff scientist in the U.S. Public Health Service, working on separation procedures for cells in the immune system. In 1974, Dr. Schwartz was appointed a research associate in the NIAID Laboratory of Immunology, where he began his work on immune response gene control of T-cell proliferative responses in mice. He became a tenured senior investigator in 1976 and subsequently made a number of seminal observations on the nature of the processed antigen recognized by T cells. In 1986, he became chief of the Laboratory of Cellular and Molecular Immunology and subsequently discovered the tolerance phenomenon of T-cell clonal anergy. His laboratory also discovered the CD4 natural killer 1.1 T cell. He is currently working on understanding an *in vivo* model of T-cell anergy called adaptive tolerance and dissecting the regulation of interleukin 2 gene activation in CD4+ T cells.

B. J. Fowlkes, Ph.D.
Chief, T-Cell Development Section, LCMI

www.niaid.nih.gov/labs/aboutlabs/lcmi/tCellDevelopmentSection/

bfowlkes@nih.gov

Major Areas of Research

- T-cell development
- Thymic selection
- T-lineage commitment

After receiving an M.S. from the Medical College of Virginia for studies in *Drosophila* genetics, Dr. Fowlkes conducted research on cancer at the National Cancer Institute and on immunology at NIAID before receiving her Ph.D. for studies on thymocyte differentiation at The George Washington University. She joined the Laboratory of Cellular and Molecular Immunology in 1987, was tenured as a senior investigator in 1990, and was made chief of the T-Cell Development Section in 1992. Since 1999, she has served as adjunct professor of genetics and of microbiology/immunology at The George Washington University. She serves on numerous editorial and scientific advisory boards and is a recipient of a Roche Basic Science Award, NIH Merit Award, and the American Association of Immunology Investigator Award for outstanding contributions to immunology.

Polly Matzinger, Ph.D.

Chief, T-Cell Tolerance and Memory Section, LCMI

www.niaid.nih.gov/labs/aboutlabs/lcmi/tCellToleranceMemorySection/

pmatzinger@niaid.nih.gov

Dr. Matzinger obtained her Ph.D. in biology from the University of California-San Diego, for the study of T-cell tolerance. Following four years of postdoctoral research at Cambridge University, England, and six years at the Basel Institute of Immunology, Switzerland, she joined the Laboratory of Cellular and Molecular Immunology in 1989 and became a section chief in 1995. Her research focuses on the fundamental principles by which the immune system operates. Dr. Matzinger serves on numerous editorial boards and is a member of the advisory board for the Council for the Advancement of Science Writing. An award-winning filmmaker, she also writes and speaks to lay as well as scientific audiences.

Major Areas of Research

- Immunologic memory
- Danger model of immunity
- Immune tolerance

Rajat Varma, Ph.D.

Chief, T-Cell Biophysics Unit, LCMI

www.niaid.nih.gov/labs/aboutlabs/lcmi/TCellBiophysicsUnit/

varmarajat@niaid.nih.gov

Dr. Varma received his Ph.D. in cell biology from the National Center for Biological Sciences, India, where he studied the organization of GPI-anchored proteins in living cells using optical techniques such as FRET microscopy. His postdoctoral training took place at the Skirball Institute for Biomolecular Medicine, New York University, where his research work focused on the relationship between T-cell receptor triggering and signaling in microclusters. He joined the Laboratory of Cellular and Molecular Immunology in winter 2007.

Major Areas of Research

- Use of quantitative imaging and spectroscopic tools to study various aspects of TCR signaling
- Relationship between TCR-triggering events at the cell surface and transcription-factor activity in the nucleus
- Information transfer among subunits of multi-subunit receptors, such as antigen and cytokine receptors, from ligand binding to signal transduction

Laboratory of Clinical Infectious Diseases

Steven M. Holland, M.D., Chief

www.niaid.nih.gov/labs/aboutlabs/lcid/

301-451-9019

Sections and Units

Office of the Chief
Steven M. Holland, M.D.

Immunopathogenesis Section
Steven M. Holland, M.D.

Tuberculosis Research Section
Clifton E. Barry III, Ph.D.

Clinical Mycology Section
John E. Bennett, M.D.

Medical Virology Section
Jeffrey I. Cohen, M.D.

Bacterial Pathogenesis Section
Sandip Datta, M.D.

Molecular Microbiology Section
Kyung (June) Kwon-Chung, Ph.D.

Epidemiology Group
D. Rebecca Prevots, Ph.D.

Research Activities

The Laboratory of Clinical Infectious Diseases (LCID) conducts clinical and basic studies of important infectious and immunologic diseases. Sections of the laboratory focus on mycobacterial, bacterial, viral, and fungal infections, as well as the acquired and congenital immune disorders associated with infection susceptibility and resistance. The program integrates clinical, cellular, and molecular investigation, including animal models, human natural history, and therapeutic trials. The defining feature of LCID is the focus on patients and their infections to develop a comprehensive understanding of natural history, pathogenesis, pathophysiology, and management of disease.

Training of physicians and scientists is central to the LCID mission. The NIAID Infectious Diseases Training Program and the NIH Clinical Center Infectious Disease Consultation Service are located in LCID and are involved in all aspects of both clinical and laboratory activities. The integration of these programs into LCID is critical to the educations of basic scientists and clinical fellows alike. The laboratory focuses on infections that are recurrent or chronic, as these provide insight into both host and pathogen. Major research areas include the following:

- Immune defects of phagocytes
- Cytokines in the pathogenesis and therapy of infections
- Mechanisms of bacterial pathogenesis
- Tuberculosis drug discovery, mechanisms of action, and resistance
- Mechanisms of fungal pathogenesis
- Pathogenesis, treatment, and vaccines for human herpesviruses
- Pathogenesis and treatment of autoimmune lymphoproliferative syndrome (ALPS)
- Diagnosis and treatment of Lyme disease

Steven M. Holland, M.D.

Chief, Laboratory of Clinical Infectious Diseases

Chief, Immunopathogenesis Section, LCID

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sholland@niaid.nih.gov

Dr. Holland received his M.D. from The Johns Hopkins University School of Medicine in 1983, where he stayed on as a resident in internal medicine, assistant chief of service in medicine, and fellow in infectious diseases. He came to NIH in 1989 as a National Research Council Fellow in the NIAID Laboratory of Molecular Microbiology. In 2004, he became chief of the Laboratory of Clinical Infectious Diseases. His therapeutic and research programs are characterized by a fully integrated approach to infectious disease, incorporating molecular genetics of the host and pathogen as well as mechanisms of pathogenesis that allow the development and trial of novel therapeutics. The integrated bench-to-bedside model is reflected in the involvement of M.D. and Ph.D. trainees in laboratory work and clinical study, which together add insight into mechanisms of action and avenues of therapy.

Major Areas of Research

- Immune defects of phagocytes: chronic granulomatous disease, Job's syndrome, and leukocyte adhesion deficiency
- Cytokines in the pathogenesis and therapy of infections
- Susceptibility to disseminated mycobacterial infections
- Mechanisms of mycobacterial and bacterial pathogenesis

Clifton E. Barry III, Ph.D.

Chief, Tuberculosis Research Section, LCID

www.niaid.nih.gov/labs/aboutlabs/lcid/tuberculosisResearchSection/

cbarry@mail.nih.gov

Dr. Barry received his Ph.D. in organic and bioorganic chemistry in 1989 from Cornell University. Following postdoctoral research at The Johns Hopkins University, Dr. Barry joined NIAID's Rocky Mountain Laboratories. In 1998, he was tenured as chief of the Tuberculosis Research Section. His multidisciplinary laboratory includes chemists, biologists, and clinicians dedicated to improving chemotherapy for tuberculosis patients. Dr. Barry is a member of several editorial boards and has authored more than 100 research publications.

Major Areas of Research

- TB drug discovery
- Mechanism of action of anti-TB agents
- Drug resistance in *Mycobacterium tuberculosis*
- Chemical biology of the interaction of TB and humans
- Clinical trials of therapies in drug-resistant TB patients
- Molecular imaging of chemotherapy and clinical trials in TB patients
- Advanced diagnostics solutions for TB

John Bennett, M.D.

Chief, Clinical Mycology Section, LCID

Director, Infectious Disease Training Program

www.niaid.nih.gov/labs/aboutlabs/lcid/clinicalMycologySection/

jb46y@nih.gov

Major Areas of Research

- Molecular mechanisms of azole resistance in *Candida* species
- Cryptococcosis in previously normal patients
- Idiopathic CD4 lymphocytopenia
- Clinical trials of antifungal agents

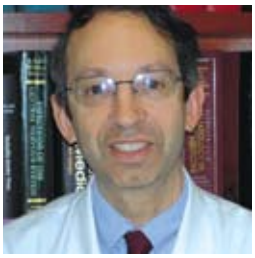
Dr. Bennett received his B.S. in chemistry (cum laude) from Stanford University; he earned his M.D. (Alpha Omega Alpha) from The Johns Hopkins University School of Medicine. Dr. Bennett is board-certified in internal medicine and infectious disease. His other honors include master in the American College of Physicians; former president of the Infectious Diseases Society of America; charter president of the Greater Washington Infectious Diseases Society; member of the American Society for Clinical Investigation and the American Association of Physicians; co-editor of six editions of *Principles and Practice of Infectious Diseases*; and consultant to the CDC, American College of Physicians-American Society of Internal Medicine, U.S. Public Health Association, FDA, and Department of Defense.

Jeffrey I. Cohen, M.D.

Chief, Medical Virology Section, LCID

www.niaid.nih.gov/labs/aboutlabs/lcid/medicalVirologySection/

jcohen@niaid.nih.gov



Major Areas of Research

- Pathogenesis of human herpesvirus infections *in vitro* and *in vivo*
- Identification of cellular proteins that interact with herpesviruses
- Development of vaccines against human herpesviruses
- Studies of new compounds to inhibit herpesvirus infections

Dr. Cohen received his M.D. from The Johns Hopkins University and was an intern and resident in medicine at Duke University. Following a medical staff fellowship at NIH, he was a clinical fellow in infectious diseases at the Brigham and Women's Hospital, Boston, and an instructor in medicine at Harvard University. He returned to NIH, where he is chief of the Medical Virology Section in the Laboratory of Clinical Infectious Diseases.

Sandip Datta, M.D.

Chief, Bacterial Pathogenesis Section, LCID

www.niaid.nih.gov/labs/aboutlabs/lcid/bacPathogenSection/

dattas@niaid.nih.gov

Dr. Datta received his M.D. from the University of California-San Francisco in 1996. He then trained in internal medicine and infectious diseases at the University of California-San Diego (UCSD). After his postdoctoral fellowship, Dr. Datta was appointed as assistant professor of medicine at UCSD in 2004. He joined the Laboratory of Clinical Infectious Diseases as tenure-track chief of the Bacterial Pathogenesis Section in February 2008.

Major Areas of Research

- Host defense against bacteria
- Development of adaptive immunity after bacterial infection
- Interaction of innate and adaptive immune systems after bacterial infection

Kyung (June) Kwon-Chung, Ph.D.

Chief, Molecular Microbiology Section, LCID

www.niaid.nih.gov/labs/aboutlabs/lcid/molecularMicrobiologySection/

june_kwon-chung@nih.gov

Dr. Kwon-Chung is a member of the American Society for Microbiology, the International Society of Human and Animal Mycology, and the Medical Mycological Society of the Americas. She is on the advisory/review boards for the Mycology Division of the International Union of Microbiological Societies and served on the Molecular Pathogenic Mycology Award Program Advisory Committee of the Burroughs Wellcome Fund. She is currently on the editorial board for the *Revisita Iberoamericana de Mycologia*. She is a fellow of the American Association for the Advancement of Science and the recipient of the International Society of Human and Animal Mycology Award, Lucille George's Award, Medical Mycological Society of the Americas Award (Rhoda Benham Award), NIH Director's Award, Distinguished Scholar Award from Ewha Womans University, Sung-Ji Award from the Korean National Academy of Science, and Compatriot Scholar Award in Korea.

Major Areas of Research

- Biology of pathogenic fungi
- Molecular genetic aspects of *Cryptococcus neoformans* virulence factors
- Pathobiology of *Aspergillus fumigatus*

Epidemiology Group, LCID

D. Rebecca Prevots, Ph.D., Chief

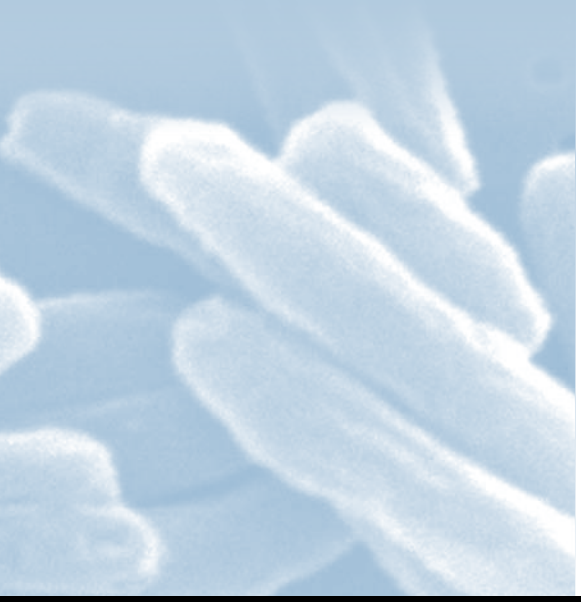
www.niaid.nih.gov/labs/aboutlabs/lcid/epidemiology/

The Epidemiology Group leads and supports research of relevance to the mission of NIAID and the Laboratory of Clinical Infectious Diseases. The group seeks to partner with lab and clinical staff to apply appropriate study designs and analytic approaches to identify and understand risk factors for disease susceptibility. General research approaches include the following:

- Analysis of national morbidity and mortality datasets (e.g., hospital discharge datasets) to develop and test hypotheses regarding disease prevalence, trends, and risk factors
- Integrated analysis of clinical and microbiologic data, using multivariate methods to identify relative host and pathogen contributions to infection and disease
- Application of tools from molecular biology and genetics to population-based study designs to identify markers of infection, disease susceptibility, and progression

Ongoing research projects include the following:

- Epidemiology of nontuberculous mycobacteria (NTM) in the United States
- Trends in NTM-associated hospitalizations in the United States
- Evaluation of rapid, low-cost diagnostic methods for detection of tuberculosis (TB) and multidrug-resistant TB in Mozambique and Brazil
- Antibiotic prescription patterns and cost of treatment of NTM
- Antigenic and clonal diversity of *Neisseria meningitidis* group B in Brazil



Laboratory of Host Defenses

Harry L. Malech, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lhd/
301-451-8176 or 301-496-2819

Sections and Units

Office of the Chief
Harry L. Malech, M.D.

Genetic Immunotherapy Section
Harry L. Malech, M.D.

Clinical Pathophysiology Section
John I. Gallin, M.D., M.A.C.P.

Monocyte Trafficking Unit
Sharon H. Jackson, M.D.

Clinical Immunology Unit
Ashish Jain, M.D.

Molecular Defenses Section
Thomas L. Leto, Ph.D.

Mucosal Immunity Section
Warren Strober, M.D.

Human Immunological Diseases Unit
Helen C. Su, M.D., Ph.D.

Description of Research Program

The Laboratory of Host Defenses (LHD) studies the immune functions essential for host defense against infection. LHD also studies the genetics and pathophysiology of inherited primary immune deficiencies. These abnormalities may be associated with recurrent infections and/or dysfunctions of immune homeostasis, which the lab investigates in clinical protocols.

LHD clinical investigations aim to develop new diagnostic and therapeutic approaches to the management or correction of immune dysfunction in patients. These investigations include the following:

- Discovery of the gene mutations causing primary immune deficiencies and autoimmune disorders
- Detection and treatment of associated infections
- Determination of the basis for excessive inflammation and associated autoimmune symptoms
- Use of cytokines, monoclonal antibodies, gene transfer technologies, and other therapeutics to modify or correct immune function, prevent infection, and reduce inflammation
- Application of gene therapy, as well as allogeneic or autologous stem cell and immune cell transplantation, for correction of disorders of immune function

Harry Malech, M.D.
Chief, Laboratory of Host Defenses
Chief, Genetic Immunotherapy Section, LHD
www.niaid.nih.gov/labs/aboutlabs/lhd/geneticImmunotherapySection/
hmalech@nih.gov

Dr. Malech's research program aims to develop gene therapy and hematopoietic stem cell transplantation approaches to the treatment of a variety of inherited primary immune deficiencies (PIDs). Associated with this is the diagnosis and treatment of infections, inflammation, autoimmunity, pulmonary dysfunction, and growth failure that may complicate management of PIDs.

Major Areas of Research

- Clinical trials and basic research of gene therapy using *ex vivo* transduction of autologous CD34+ hematopoietic stem cells
- Allogeneic transplantation using matched-sibling or matched-unrelated donor hematopoietic stem cell grafts with subablative marrow conditioning plus alloimmune tolerance induction regimens
- Chronic granulomatous disease (CGD)
- X-linked severe combined immune deficiency
- Leukocyte adhesion deficiency
- WHIM syndrome
- Acute and chronic graft versus host disease
- Gene therapy vectors and approaches (lentivectors and *in vivo* approaches)
- Biology of engraftment of hematopoietic stem cells and the role of the CXCR4 chemokine receptor
- Excessive inflammation and associated autoimmune symptoms with PIDs

John I. Gallin, M.D., M.A.C.P.
Director, NIH Clinical Center
Chief, Clinical Pathophysiology Section, LHD
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Dr. Gallin earned his M.D. at Cornell University Medical College. He served as NIAID Scientific Director from 1985 to 1994. From 1991 to 1993, Dr. Gallin was the founding chief of NIAID's Laboratory of Host Defenses (LHD). He remains chief of LHD's Clinical Pathophysiology Section. His lab studies the genetic basis for several forms of CGD and the use of interferon-gamma to reduce life-threatening infections in CGD. His group also defined the mutation in neutrophil-specific granule deficiency and in IRAK-4 deficiency. In 1994, Dr. Gallin was appointed director of the NIH Clinical Center. Author of more than 300 research articles, he has received numerous awards and served on many editorial boards. Dr. Gallin is a member of the American Society for Clinical Investigation, the Association of American Physicians, and the Institute of Medicine. He is also a Master of the American College of Physicians.

Major Areas of Research

- Inflammation
- Phagocyte dysfunction

Sharon H. Jackson, M.D.

Chief, Monocyte Trafficking Unit, LHD

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Dr. Jackson received her M.D. from the State University of New York, Buffalo, in 1988. She completed a pediatric residency at Mount Sinai Hospital in New York and subspecialty training in allergy and immunology at NIAID. Dr. Jackson joined the Laboratory of Host Defenses in 1992 for the research component of her allergy and immunology fellowship, during which she developed the autosomal recessive $p47^{phox}$ knockout mouse model of chronic granulomatous disease. Since 1996, her research has focused on mechanisms for induction of host resistance to infection and inflammation. Ongoing investigations focus on characterizing the role of ROS in T-lymphocyte homeostasis and function. The interrelated objectives of the research program are 1) characterizing NADPH oxidase ($p47^{phox}$) and NADPH oxidase-derived ROS regulation of T-cell function, 2) characterizing the role of the NADPH oxidase ($p47^{phox}$) in regulating the molecular communication signals between dendritic cells and T cells, and 3) investigating the role of NADPH oxidase ($p47^{phox}$) and NADPH oxidase-derived ROS in the pathogenesis of chronic inflammatory and autoimmune diseases.

Major Areas of Research

- Inflammation
- Leukocyte trafficking
- NADPH oxidase/CGD

Ashish Jain, M.D.

Chief, Clinical Immunology Unit, LHD

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Dr. Jain received his medical degree from the State University of New York, Stony Brook, in 1992 and completed his training in internal medicine at the New England Medical Center, Boston. He was a fellow in the allergy and immunology clinical training program at NIAID, and he completed postdoctoral training in the laboratory of Dr. Warren Strober. Dr. Jain joined the tenure track in 2002.

Major Areas of Research

- Inherited immune deficiency with specific interests in ectodermal dysplasia with immune deficiency, hyper-IgM syndromes, and common-variable immune deficiency
- Delineating pathways leading to activation and regulation of NF-kappa B-mediated immune functions
- Clinical trials using CD40 agonists to treat patients with CD40 ligand deficiency

Thomas L. Leto, Ph.D.

Chief, Molecular Defenses Section, LHD

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Major Areas of Research

- Nox family NADPH oxidases
- Reactive oxygen-dependent innate immune mechanisms in phagocytic cells and on mucosal surfaces
- Role of reactive oxygen in health and disease (host defense, inflammation, and signal transduction)

Dr. Leto received his Ph.D. in biochemistry from the University of Virginia for studies on mechanisms of cell membrane assembly. He followed this work with postdoctoral studies at Yale University on membrane cytoskeleton interactions. Dr. Leto joined NIAID in 1988 and became a senior investigator in the Laboratory of Host Defenses in 1996.

Warren Strober, M.D.

Chief, Mucosal Immunity Section, LHD

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Major Areas of Research

- Basic studies of mucosal immunity, mucosal inflammation, and inflammatory bowel diseases such as ulcerative colitis and Crohn's disease
- Studies of immunodeficiency such as common variable immunodeficiency and hyper-IgM syndrome; studies of the immunobiology of interleukin 12
- Studies of innate immunity in the mucosal immune system

Dr. Strober obtained his medical degree from the University of Rochester and completed an internship and residency at Strong Memorial Hospital. He has served as NIAID Deputy Scientific Director and as the interim scientific director of the National Institute of Arthritis and Musculoskeletal and Skin Diseases. Dr. Strober is the recipient of numerous awards, including the Distinguished Achievement Award of the American Gastroenterological Association and the U.S. Public Health Service Distinguished Achievement Medal. He has served as chair of the American Board of Allergy and Immunology and as president of the Society for Mucosal Immunity.

Helen Su, M.D., Ph.D.
Chief, Human Immunological Diseases Unit, LHD

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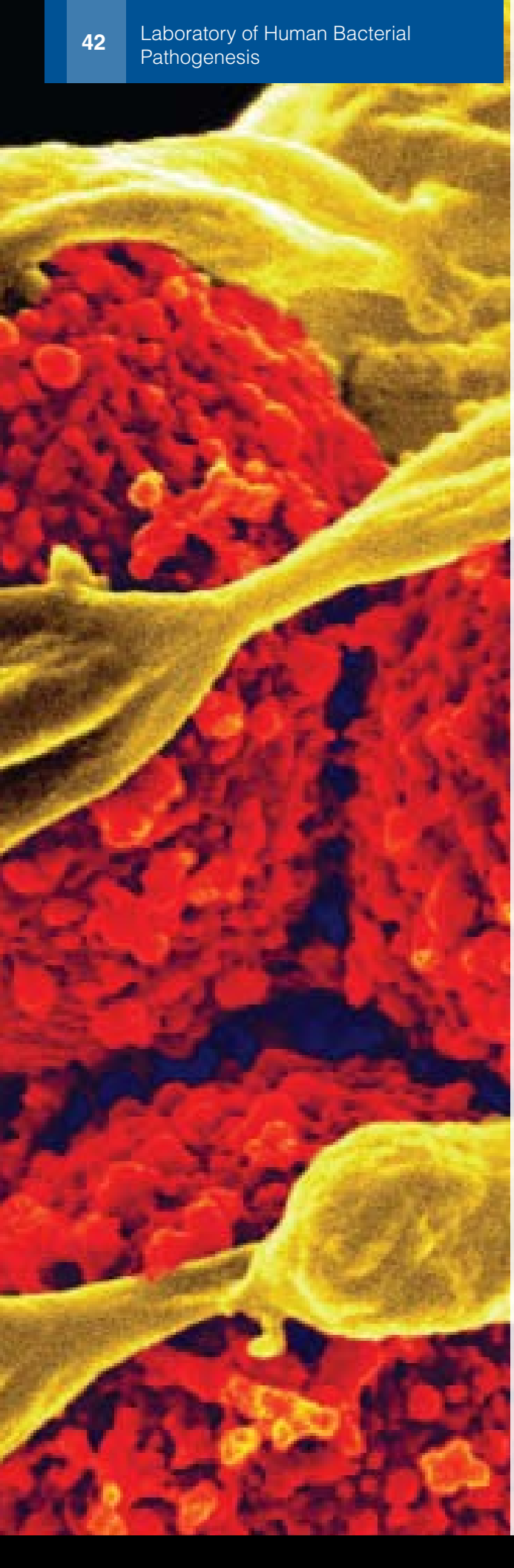
Dr. Su received her M.D. and Ph.D. from Brown University. She completed training in pediatrics at St. Louis Children's Hospital, Washington University, and subspecialty training in allergy and immunology at NIAID. After postdoctoral training with Dr. Michael Lenardo in the Laboratory of Immunology, she joined the Laboratory of Host Defenses in 2007 as a tenure-track clinical investigator.

Major Areas of Research

- Defining poorly characterized primary human immunodeficiencies and autoimmune diseases
- Elucidating the molecular regulation of lymphocytes of the human immune system



Laboratory of Human Bacterial Pathogenesis

Frank R. DeLeo, Ph.D., Acting Chief
www.niaid.nih.gov/labs/aboutlabs/lhbp/
406-363-9448

Sections and Units

Office of the Chief
Frank R. DeLeo, Ph.D.

Pathogen-Host Cell Biology Section
Frank R. DeLeo, Ph.D.

Pathogen Molecular Genetics Section
Michael Otto, Ph.D.

Research Activities

The Laboratory of Human Bacterial Pathogenesis (LHBP) studies the molecular basis of human bacterial pathogenesis in its broadest sense. Research projects currently focus on *Staphylococcus*-host interactions, with special emphasis on the virulence mechanisms of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA).

LHBP scientists study mechanisms of staphylococcal virulence, innate immune response to pathogenic bacteria, and the role of neutrophils in host defense. In addition, mechanisms of immune evasion, such as the formation of biofilms, are a major area of investigation. Genome-wide strategies are used, such as high-throughput DNA sequencing and expression-array analysis.

LHBP research goals are as follows:

- Understand the fundamental molecular mechanisms of bacterial pathogen-host interactions.
- Develop new or improved strategies to control bacterial infections.
- Identify host genetic factors influencing disease character.
- Define the cell biology of pathogen-host interactions.

Frank R. DeLeo, Ph.D.

Acting Chief, Laboratory of Human Bacterial Pathogenesis

Chief, Pathogen-Host Cell Biology Section, LHBP

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Dr. DeLeo received his Ph.D. in microbiology from Montana State University in 1996, studying the molecular basis of superoxide generation by human neutrophils. He did his postdoctoral training in the area of innate immunity and infectious disease in the department of medicine at the University of Iowa (1996 – 2000). Dr. DeLeo joined the staff at NIAID's Rocky Mountain Laboratories in 2000. He currently serves on the editorial board of the *Journal of Immunology*.

Major Areas of Research

- Neutrophil biology and function
- Neutrophil-bacteria interactions, with special emphasis on the interaction of MRSA and human neutrophils
- *Staphylococcus aureus* virulence mechanisms
- Clinically related research performed in collaboration with DIR laboratories in Bethesda, MD

Michael Otto, Ph.D.

Chief, Pathogen Molecular Genetics Section, LHBP

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motto@niaid.nih.gov

Dr. Otto received his M.S. in biochemistry in 1993 from the University of Tuebingen, Germany. In 1998, he earned his Ph.D. in microbiology from the same institution. Dr. Otto joined the Laboratory of Human Bacterial Pathogenesis in July 2001 as a principal investigator.

Major Areas of Research

- Physiology of staphylococcal biofilms and biofilm-associated infection
- Molecular basis of immune evasion mechanisms in *Staphylococci:* exopolymers, proteases, toxins, antimicrobial peptide resistance, etc.
- Community-associated MRSA: virulence determinants and epidemiology
- Gene regulatory processes during pathogen-host interaction

Laboratory of Immunogenetics

Susan K. Pierce, Ph.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lig/

301-496-9589

Sections and Units

Office of the Chief
Susan K. Pierce, Ph.D.

Lymphocyte Activation Section
Susan K. Pierce, Ph.D.

Autoimmunity and Functional Genomics Section
Silvia Bolland, Ph.D.

Receptor Cell Biology Section
John Coligan, Ph.D.

Chemotaxis Signaling Section
Tian Jin, Ph.D.

Molecular and Cellular Immunology Section
Eric O. Long, Ph.D.

Structural Immunology Section
Peter D. Sun, Ph.D.

Research Activities

Research in the Laboratory of Immunogenetics (LIG) is broadly focused on the cellular and molecular mechanisms that underlie the receptor-mediated activation of immune cells. Research in LIG encompasses a wide spectrum of experimental approaches, from the structural determination of immune-cell receptors to genetic analysis of autoimmune phenotypes to live cell imaging of the behavior of chemotactic receptors.

Research programs are focused on identifying genes that confer susceptibility and resistance to autoimmune disease and understanding how they function; determining the molecular basis of the initiation of receptor signaling in the activation of B cells and NK cells and in chemotaxis by using cutting-edge technologies in live cell imaging; understanding the structural basis of NK-cell recognition of their target cells; and determining the mechanisms involved in the generation and maintenance of immunological memory in malaria through studies carried out at field sites in Africa.

Laboratory members are highly interactive, creating a unique environment in which structural biology, molecular biology, and cell biology interface. Interactions within LIG are facilitated by weekly work-in-progress presentations detailing recent advances and future directions of LIG fellows and students. The members of LIG also host distinguished research scientists who are invited each week to present their research and interact with fellow scientists.

Susan K. Pierce, Ph.D.

Chief, Laboratory of Immunogenetics

Chief, Lymphocyte Activation Section, LIG

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Dr. Pierce was recruited to NIAID in 1999 to head the Laboratory of Immunogenetics. Prior to joining NIAID, Dr. Pierce was a member of the faculty at Northwestern University in the department of biochemistry and molecular and cell biology, where she held the William and Gayle Cook Chair in the Biological Sciences.

Major Areas of Research

- Initiation of cell-receptor and regulation signaling
- Generation and maintenance of immunological memory in malaria

Silvia Bolland, Ph.D.

Chief, Autoimmunity and Functional Genomics Section, LIG

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Dr. Bolland received her Ph.D. in molecular biology from the University of Cantabria, Spain, and received postdoctoral training at Harvard and The Rockefeller University. She joined the Laboratory of Immunogenetics in September 2001. She is the recipient of an S.L.E. Foundation Career Development Award and a Novel Research Grant Award from the Lupus Research Institute.

Major Areas of Research

- Identification of new genetic modifiers of systemic autoimmune disease
- Dose effect of toll-like receptor genes and its role in autoimmune pathologies
- Inhibitory signaling pathways mediated by the IgG Fc receptor (Fc gamma RIIB) and the phosphoinositol 5-phosphatase (SHIP)

John E. Coligan, Ph.D.

Chief, Receptor Cell Biology Section, LIG

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Major Areas of Research

- Transcriptional regulation of the CD94/NKG2A and NKG2D/DAP10 receptors expressed by NK and T cells
- Role of TOSO (or FAIM3) in regulating lymphocyte activation-induced cell death
- Determination of the ligands and function of orphan lymphoid/myeloid cell inhibitory receptors, in particular LAIR-1, CD300a, and CD300lf
- Determination of how ITIM-bearing receptors maintain expression (traffic) and inhibit activating signals

Dr. Coligan received his Ph.D. from Indiana University and did postdoctoral research at the City of Hope Research Institute. After two years as an assistant professor at The Rockefeller University, he was a founding member of the Laboratory of Immunogenetics (LIG) in 1977. He has served as head of the Biological Resources Branch and Laboratory of Molecular Structure. In 1998, he joined the Laboratory of Allergic Diseases and became chief of the Receptor Cell Biology Section. In 2007, this section moved to the LIG. He is the recipient of the DHHS Superior Service Award and NIH Director's Award.

Tian Jin, Ph.D.

Chief, Chemotaxis Signal Section, LIG

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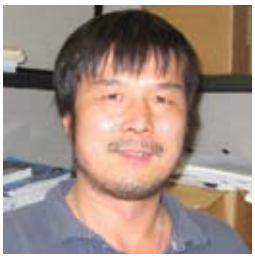

Major Areas of Research

- Determination of the molecular mechanisms of a GPCR signaling network that mediates chemotaxis
- Exploration of the molecular machinery controlling phagosome maturation in phagocytosis
- Analysis of CD4 and CCR5 receptors at the single-molecule level during the formation of the HIV entry complex

Dr. Jin received his B.S. in biology from Beijing University in 1984 and his Ph.D. from the department of biochemistry at the Robert Wood Johnson Medical School, University of Medicine and Dentistry of New Jersey, in 1994. From 1994 to 2000, he was a postdoctoral fellow in the department of biological chemistry at the The Johns Hopkins University School of Medicine. Dr. Jin was appointed instructor in the department of cell biology and anatomy at Johns Hopkins in 2001. In July 2001, he joined the Laboratory of Immunogenetics as a tenure-track investigator.

Eric O. Long, Ph.D.

Chief, Molecular and Cellular Immunology Section, LIG

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elong@nih.gov

Dr. Long received his Ph.D. from the University of Geneva, Switzerland, in 1976. After a postdoctoral fellowship at the National Cancer Institute and a junior faculty position at the University of Geneva, he was recruited in 1983 to NIH as a tenure-track investigator in the Laboratory of Immunogenetics. In 1988, he became chief of the Molecular and Cellular Immunology Section. Dr. Long is a recipient of the NIH Director's Award and is a member of the NIH Immunology Interest Group Steering Committee and of the *Journal of Biological Chemistry* editorial board.

Major Areas of Research

- Signaling pathways in lymphocyte activation
- Regulation through inhibitory receptors
- Imaging of NK cell immune synapses

Peter D. Sun, Ph.D.

Chief, Structural Immunology Section, LIG

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Dr. Sun obtained his Ph.D. from the Molecular Biology Institute, University of Oregon, for the study of structure and thermostability of phage T4 lysozyme using X-ray crystallography. He then joined the National Institute of Diabetes and Digestive and Kidney Diseases for his postdoctoral training in 1991, focusing on the structure and function of cytokines. In particular, he determined the crystal structure of human TGF-beta2. He joined NIAID in 1994.

Major Areas of Research

- Structural immunology
- Structure of immune synapses

Laboratory of Immunology

William E. Paul, M.D., Chief
Ronald N. Germain, M.D., Ph.D., Deputy Chief
www.niaid.nih.gov/labs/aboutlabs/li/
301-496-5046

Sections and Units

Office of the Chief
William E. Paul, M.D.
Ronald N. Germain, M.D., Ph.D.

General Immunology Section
William E. Paul, M.D.

Lymphocyte Biology Section
Ronald N. Germain, M.D., Ph.D.

Molecular Development of the Immune System Section
Michael J. Lenardo, M.D.

Molecular Biology Section
David H. Margulies, M.D., Ph.D.

Integrative Immunobiology Unit
Stefan A. Muljo, Ph.D.

Cellular Immunology Section
Ethan M. Shevach, M.D.

Structural Immunobiology Unit
Tsan (Sam) Xiao, Ph.D.

Research Activities

The major research activities of Laboratory of Immunology (LI) scientists focus on the basic genetics, molecular biology, cell biology, and cellular immunology of the immune system. Important topics of interest are how dysregulation of the immune system results in autoimmune and immunodeficiency diseases and what strategies might be valuable for vaccine development. Specific areas of current investigation are as follows:

- Early lymphocyte development
- MHC molecule structure and function
- Structure of microbial sensors and immunoevasins
- Antigen processing
- T-cell and cytokine receptor signal transduction
- Apoptotic cell death
- Regulation and activity of cytokines
- Mechanisms of action of regulatory T cells
- Control of autoimmune responses
- Lymphocyte dynamics in health and disease
- Imaging immune responses *in vivo*

William E. Paul, M.D.

Chief, Laboratory of Immunology

Chief, General Immunology Section, LI

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Chief of the Laboratory of Immunology (LI) since 1970, Dr. Paul served as director of the NIH Office of AIDS Research and as NIH Associate Director for AIDS Research from 1994 to 1997. He is a member of the editorial boards of the *Annual Review of Immunology, Immunity,* and the *Proceedings of the National Academy of Sciences.* He is a member of the National Academy of Sciences, its Institute of Medicine, and the Association of American Physicians; he is also a fellow of the American Academy of Arts and Sciences. He was president of the American Association of Immunologists and the American Society for Clinical Investigation. His honors include the Founders Prize, Texas Instruments Foundation; 3M Life Sciences Award, Federation of American Societies for Experimental Biology; and Abbott Laboratories Award in Clinical and Diagnostic Immunology. He is an adjunct professor at the University of Pennsylvania School of Medicine and a Raymond & Beverly Sackler Senior Professor by Special Appointment at Tel Aviv University.

Major Areas of Research

- Cytokines: characterization, regulation of production, mode of action, and mechanism of receptor function
- Regulation of lymphocyte activation, differentiation, and proliferation
- Lymphocyte dynamics in health and in chronic infection, including HIV
- Immunologic memory and strategies for vaccine development

Ronald N. Germain, M.D., Ph.D.

Deputy Chief, Laboratory of Immunology

Chief, Lymphocyte Biology Section, LI

Director, PSIIM

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Dr. Germain received his Sc.B. and Sc.M. from Brown University in 1970 and his M.D. and Ph.D. from Harvard Medical School and Harvard University in 1976. From 1976 to 1982, he served as an instructor, assistant professor, and associate professor of pathology at Harvard Medical School. From 1982 to 1987, he worked as a senior investigator in the Laboratory of Immunology (LI). In 1987, he was appointed chief of the Lymphocyte Biology Section. Since 1994, Dr. Germain has also served as deputy chief of LI. In 2006, he became director of the NIAID Program in Systems Immunology and Infectious Disease Modeling.

Major Areas of Research

- T-cell receptor signaling in response to peptide/MHC molecule binding
- Computational modeling of T-cell ligand discrimination
- Control of immune cell migration and cell-cell interaction *in vivo* by structural and chemical cues
- Intravital imaging, analysis, and modeling of immune cell dynamics

Michael J. Lenardo, M.D.

Chief, Molecular Development of the Immune System Section, LI

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Major Areas of Research

- Molecular regulation of immune homeostasis
- CD4+ T-cell depletion in HIV infection
- Tolerance and autoimmunity

Dr. Lenardo graduated with a B.A. from The Johns Hopkins University and an M.D. from Washington University, St. Louis. He performed clinical work in internal medicine and research at the University of Iowa and received postdoctoral training at the Whitehead Institute for Biomedical Research at the Massachusetts Institute of Technology. He established an independent research unit in the Laboratory of Immunology in 1989 and became a senior investigator and section chief in 1994. Dr. Lenardo serves on several editorial boards and has given numerous lectures around the world on his work on the molecular regulation of immune homeostasis. His work focuses on lymphocyte apoptosis, autoimmunity, and HIV pathogenesis. He also serves as director of the NIH-Oxford-Cambridge Scholars program for doctoral training.

David H. Margulies, M.D., Ph.D.

Chief, Molecular Biology Section, LI

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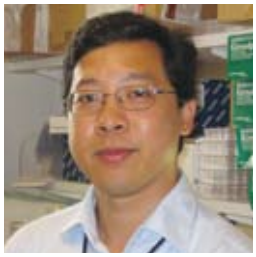
dmargulies@niaid.nih.gov

Dr. Margulies received an A.B. from Columbia University in 1971. In 1978, he earned his M.D. and Ph.D. from the Albert Einstein College of Medicine. From 1978 to 1980, he served as a resident in medicine at Columbia/Presbyterian Medical Center. From 1980 to 1983, he worked as a research associate in the Laboratory of Molecular Genetics at the National Institute of Child Health and Human Development. From 1983 to 1987, he was an investigator in the NIAID Laboratory of Immunoregulation. In 1987, he became a senior investigator.

Major Areas of Research

- MHC class I and class II molecules, whose function is to present antigens to T lymphocytes
- Viral immunoevasins and related molecules, in particular those encoded by cytomegaloviruses that mimic MHC-I molecules in structure and function to modulate the immune response as decoy receptors or by other mechanisms
- T-cell receptors, which by clonal expression confer antigen and MHC specificity for the activation of T cells
- NK cell receptors, cell surface molecules of effector cells of the innate immune system that mediate recognition of tumor and virally infected cells via the level and composition of MHC-I molecules on the NK cell target



Stefan A. Muljo, Ph.D.

Chief, Integrative Immunobiology Unit, LI

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Dr. Muljo joined the Laboratory of Immunology in July 2008 to head the Integrative Immunobiology Unit. He earned his Ph.D. from the Graduate Program in Immunology at The Johns Hopkins University School of Medicine. Part of his dissertation work was performed at the department of molecular and cell biology in the division of immunology and pathogenesis, University of California-Berkeley. This was followed by a postdoctoral fellowship at the Immune Disease Institute (formerly the Center for Blood Research), Harvard Medical School. He is interested in how gene expression is orchestrated as cells differentiate from stem cells into effector cells in the immune system. In particular, his laboratory will study how these systems are controlled by the endogenous RNA interference machinery (e.g., micro-ribonucleoprotein silencing complexes).

Major Areas of Research

- Small untranslated RNAs: characterization under physiological and pathological conditions, regulation of production, mechanisms of action, and identification of cognate targets
- Gene expression and its regulation in hematopoietic stem cells and during cellular differentiation
- Application of small RNAs for modulating or enhancing immune responses
- MicroRNA expression profiling to identify novel biomarkers

Ethan M. Shevach, M.D.

Chief, Cellular Immunology Section, LI

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Dr. Shevach received his M.D. from Boston University in 1967. Following clinical training, he joined the Laboratory of Immunology as a senior staff fellow in 1972, was appointed a senior investigator in 1973, and became a section chief in 1987. Dr. Shevach served as editor-in-chief of the *Journal of Immunology* from 1987 to 1992 and editor-in-chief of *Cellular Immunology* from 1996 to 2007. He received the 2004 William B. Coley Award for Distinguished Research in Basic and Tumor Immunology.

Major Areas of Research

- Pathogenesis and treatment of autoimmune diseases
- Suppressor/regulatory T-cell function
- Cytokine networks in autoimmunity

Tsan (Sam) Xiao, Ph.D.
Chief, Structural Immunobiology Unit, LI

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xiaot@niaid.nih.gov

Major Areas of Research

- Structural studies of innate immune receptors, such as the toll-like receptors, nod-like receptors, and rig-like receptors, in complex with their ligands and downstream effector molecules
- Biophysical characterization of protein-protein interactions involved in innate immune signaling
- Investigation of the crosstalk between innate and adaptive immune systems through studies of innate immune signaling in dendritic cells and macrophages

Dr. Xiao received his Ph.D. in molecular biophysics from the University of Texas Southwestern Medical Center at Dallas, where he studied essential signal transducing molecules involved in *Drosophila* innate immunity and development. Following his postdoctoral research on integrins at the Immune Disease Institute (formerly the Center for Blood Research), Harvard Medical School, he joined the Laboratory of Immunology in spring 2006.

Laboratory of Immunopathology

Herbert C. Morse III, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lip/
301-496-6379

Sections and Units

Office of the Chief
Herbert C. Morse III, M.D.

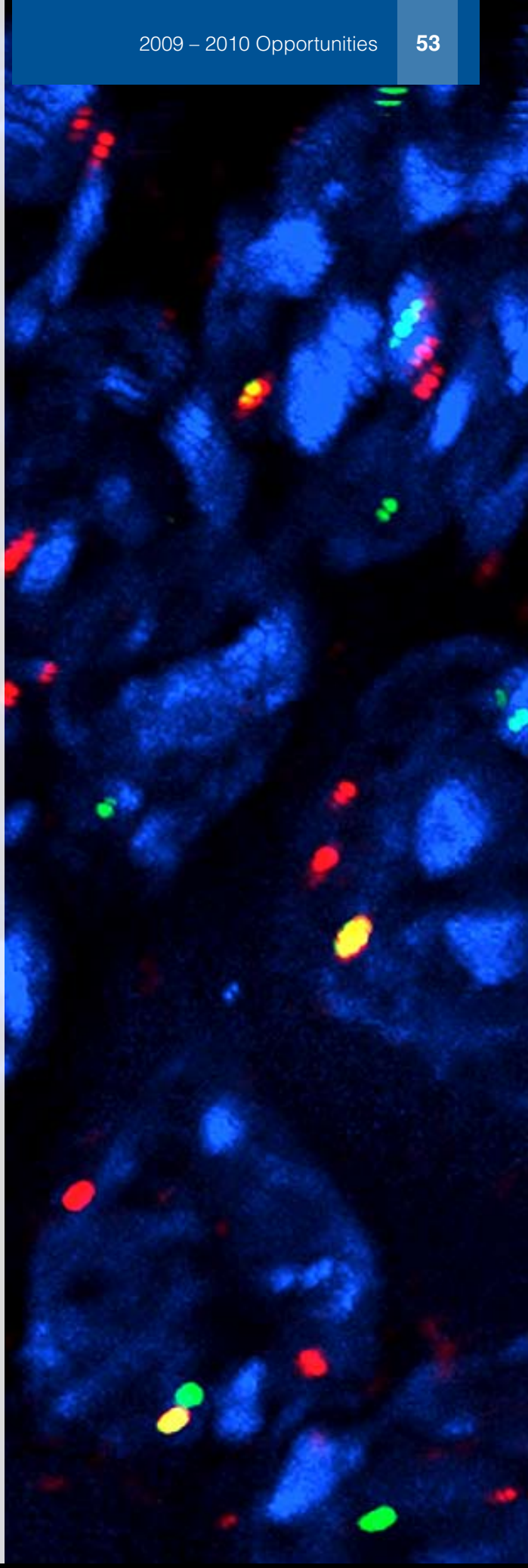
Virology and Cellular Immunology Section
Herbert C. Morse III, M.D.

Molecular Pathology Section
Victor V. Lobanenkov, Ph.D.

Research Activities

The Laboratory of Immunopathology (LIP) studies the molecular and cellular mechanisms involved in normal development and differentiation and in neoplastic transformation. Basic studies using techniques from molecular and cell biology, immunology, and pathology are combined with observations of mice with naturally occurring or induced mutation or high-level retrovirus expression to model processes that develop in humans.

Major current emphases include studies of mouse models of leukemia and B-cell lineage lymphomas. Other studies are focused on the roles of CTCF and BORIS in the epigenetics of normative biology and cancer.



Herbert C. Morse III, M.D.

Chief, Laboratory of Immunopathology

Chief, Virology and Cellular Immunology Section, LIP

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Major Areas of Research

- Mouse models of retroviral pathogenesis
- Normal hematopoietic differentiation
- Mechanisms of lymphoma/leukemia development in mice and humans

Dr. Morse graduated from Harvard Medical School and then completed his internship and residency at Peter Bent Brigham Hospital, Boston. Following postdoctoral studies at NIAID, he joined the Laboratory of Viral Diseases in 1980 and became chief of the Laboratory of Immunopathology in 1985.

Victor V. Lobanenkov, Ph.D.

Chief, Molecular Pathology Section, LIP

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Major Areas of Research

- Three classes of CTCF/BORIS-binding in epigenetic regulation
- Regulation of BORIS and its targets in cellular and viral genomes
- Translational research of BORIS repressors and of anti-BORIS immune response directed to cancer diagnostics, therapy, and anti-tumor vaccination

Dr. Lobanenkov received an M.A. in nuclear physics from the Institute of Physics in 1977 and a Ph.D. in experimental oncology from the Cancer Research Center, Moscow, in 1981. He was molecular carcinogenesis team leader in the All-Union Cancer Center of the former U.S.S.R. and a visiting scholar at the Royal Cancer Hospital, London, until 1990, where he discovered avian CTCF. He was invited to the Fred Hutchinson Cancer Research Center in Seattle as a foreign faculty-in-residence funded by NIH grants. In 1999, he became chief of the Molecular Pathology Section in the Laboratory of Immunopathology; identified CTCF in *Drosophila*, mice, and man; and characterized the novel BORIS+CTCF gene family universally involved in epigenetic regulation of mammalian cellular and viral genomes. His section works to understand how genome-wide, CTCF/BORIS-binding sequences regulate different functions, including inter- and intra-chromosomal 3-D DNA-looping interactions, mono-allelic expression of imprinted and non-imprinted genes, X-chromosome inactivation, and regulation of stem/germ-cell-specific promoters associated with targeted DNA demethylation.

Laboratory of Immunoregulation

Anthony S. Fauci, M.D., Chief

www.niaid.nih.gov/labs/aboutlabs/lir/

301-496-1124

Sections and Units

Office of the Chief
Anthony S. Fauci, M.D.

Immunopathogenesis Section
Anthony S. Fauci, M.D.

HIV-Specific Immunity Section
Mark Connors, M.D.

Clinical Research Section
Richard T. Davey Jr., M.D.

B-Cell Molecular Immunology Section
John H. Kerhl, M.D.

Clinical and Molecular Retrovirology Section
H. Clifford Lane, M.D.

Viral Pathogenesis Unit
Paolo Lusso, M.D., Ph.D.

International HIV/STD Section
Thomas C. Quinn, M.D.

Immune Activation Section
Ulrich K. Siebenlist, Ph.D.

Research Activities

The major theme of the Laboratory of Immunoregulation (LIR) continues to be the elucidation of cellular and molecular mechanisms regulating the human immune response in health and disease. A major component of these efforts is the study of the immunopathogenic mechanisms of HIV infection and disease progression. The rational design of strategies aimed at the prevention and treatment of HIV infection depends on delineating how HIV destroys the immune system. The laboratory's investigation of host factors involved in the evolution of HIV disease indicates that HIV pathogenesis is a multifactorial and multiphasic process.

Studies on the fundamental nature of normal B-cell and T-cell activation continue to be important ongoing components of the LIR research agenda. Progress continues to be made in understanding the role of dysregulated immunity in the vasculitic syndromes, allowing the design and execution of rational therapeutic strategies for these disease states.

Anthony S. Fauci, M.D.

Director, NIAID

Chief, Laboratory of Immunoregulation

Chief, Immunopathogenesis Section, LIR

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Major Areas of Research

- Roles of latently infected, resting CD4+ T cells, B cells, and innate immunity in the pathogenesis and treatment of HIV disease
- Role of HIV envelope signaling in viral replication and immune dysfunction
- Impact of the immunoregulatory CD4+CD25+ T-cell subset on the host response to HIV infection
- Novel approaches to the inhibition of HIV binding and entry into CD4+ T cells
- Novel approaches to the treatment of recently acquired and chronic HIV infection

Dr. Fauci received his A.B. from the College of the Holy Cross and his M.D. from Cornell University Medical College. He then completed an internship and residency at The New York Hospital-Cornell Medical Center. In 1968, Dr. Fauci came to NIH as a clinical associate in the NIAID Laboratory of Clinical Investigation (LCI). In 1980, he was appointed chief of the Laboratory of Immunoregulation, a position he still holds. Dr. Fauci became director of NIAID in 1984. He serves as one of the key advisors to the White House and U.S. Department of Health and Human Services on global AIDS issues, and on initiatives to bolster medical and public health preparedness against emerging infectious disease threats such as pandemic influenza.

Mark Connors, M.D.

Chief, HIV-Specific Immunity Section, LIR

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Major Areas of Research

- Cellular immune response to HIV
- Mechanisms of immunologic control of HIV in rare patients termed long-term nonprogressors or “elite controllers”
- Mechanisms of broad cross-neutralization of HIV

Dr. Connors received his M.D. from Temple University and was trained in pediatrics at Tuft’s New England Medical Center. He joined the NIAID Laboratory of Infectious Diseases in 1989 to study the immune response to respiratory syncytial virus. He was trained in infectious diseases at the NIH Clinical Center and at the Children’s Hospital of Philadelphia. He joined the Laboratory of Immunoregulation in 1994 to study the human immune response to HIV. Dr. Connors has published a series of discoveries that have laid the framework for current understanding of immunologic control of HIV in some rare patients and loss of immunologic control in the majority of infected patients.

Richard T. Davey Jr., M.D.
Deputy Clinical Director, NIAID
Chief, Clinical Research Section, LIR
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rdavey@mail.nih.gov

Dr. Davey received his M.D. from Columbia University and trained in internal medicine at Boston University Hospital and in infectious diseases at NIAID. He joined the NIAID intramural AIDS program in 1987.

Major Areas of Research

- Treatments for HIV infection and their consequences, including immune-based therapies and treatment interruption strategies
- Studies of immune function, immunodeficiency, and pathogenesis of HIV disease
- Investigations into the complications of HIV infection or its treatment, including opportunistic infections, hepatitis B and C, and drug toxicities

John H. Kehrl, M.D.
Chief, B-Cell Molecular Immunology Section, LIR
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jkehrl@niaid.nih.gov

Dr. Kehrl received his M.D. from Wayne State University and completed training in internal medicine at Yale New Haven Hospital. He joined the NIAID Laboratory of Clinical Investigation as a clinical associate in 1980 and the Laboratory of Immunoregulation (LIR) in 1981. In 1991, Dr. Kehrl was tenured at NIAID; he became a section chief in LIR in 1994. He is a member of Alpha Omega Alpha, the American Federation for Clinical Research, the American Society for Clinical Research, and the American Association of Immunologists.

Major Areas of Research

- G-protein signaling and the role of RGS proteins
- Lymphocyte trafficking
- Cell migration

H. Clifford Lane, M.D.

Clinical Director, NIAID

Chief, Clinical and Molecular Retrovirology Section, LIR

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Major Areas of Research

- Pathogenesis of HIV infection emphasizing mechanisms of immunodeficiency
- Immunologic approaches to therapy for HIV infection

Dr. Lane received his M.D. from the University of Michigan in 1976. He then completed an internship and residency at the University of Michigan Hospital, Ann Arbor. In 1979, Dr. Lane came to NIH as a clinical associate in the Laboratory of Immunoregulation (LIR). In 1985, he was appointed deputy clinical director of NIAID; in 1989, he became the chief of the Clinical and Molecular Retrovirology Section of LIR, a position he still holds. In 1991, Dr. Lane became clinical director of NIAID and, in 1998, was promoted to the rank of assistant surgeon general in the U.S. Public Health Service. He is currently on the editorial boards of the *Journal of Acquired Immune Deficiency Syndromes* and *Clinical Immunology and Immunopathology.*

Paolo Lusso, M.D., Ph.D.

Chief, Viral Pathogenesis Unit, LIR

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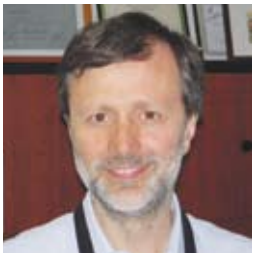

Major Areas of Research

- Pathogenesis of human viral infections, particularly HIV-1 and herpesviruses
- Viral receptors
- Role of chemokines and other natural antiviral factors in HIV-1 disease
- Novel approaches to the development of HIV-1 entry inhibitors
- Study of highly conserved HIV-1 neutralization epitopes as potential vaccine targets

Dr. Lusso received his M.D. from the University of Turin and his Ph.D. from the Ministry of Scientific and Technologic Research, Rome. He is a board-certified specialist both in internal medicine and in infectious diseases. He came to NIH in 1986 to work in the Laboratory of Tumor Cell Biology at the National Cancer Institute. He returned to Italy in 1994, where he was the chief of the Laboratory of Human Virology at the San Raffaele Scientific Institute in Milan until 2007. He was appointed senior investigator in the Laboratory of Immunoregulation in 2008. In 2004, he was elected member of the European Molecular Biology Organization.

Thomas C. Quinn, M.D., M.Sc.

Chief, International HIV/STD Section, LIR

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Dr. Quinn obtained his M.D. from Northwestern University. He was a research associate in infectious diseases in NIAID's Laboratory of Parasitic Diseases and completed a fellowship in infectious diseases at the University of Washington. Since 1981, he has been assigned to the division of infectious diseases at Johns Hopkins, where he became a professor of medicine in 1991. His awards include the Alpha Omega Alpha Epidemiology Research Award, Charles C. Shepard Science Award, James H. Nakano Citation for Outstanding Scientific Publication, U.S. Public Health Service (PHS) Outstanding Service Award, PHS Meritorious Service Award, and PHS Distinguished Service Award. Dr. Quinn is a member of the Institute of Medicine and the National Academy of Sciences and is a fellow of the American Association of the Advancement of Science.

Major Areas of Research

- Definition of the unique epidemiologic, clinical, virologic, and immunologic features of HIV-1 and HIV-2 infections in developing countries and the United States
- Assessment of biomedical interventions to control HIV, including circumcision, prevention of mother-to-child transmission, pre-exposure prophylaxis, and vaccine development
- Assessment of the frequency of *Chlamydia trachomatis* infections in selected populations using noninvasive sensitive nucleic acid amplification assays for diagnosis
- Study of the immunopathogenesis of *C. trachomatis* and *C. pneumoniae* infections

Ulrich Siebenlist, Ph.D.

Chief, Immune Activation Section, LIR

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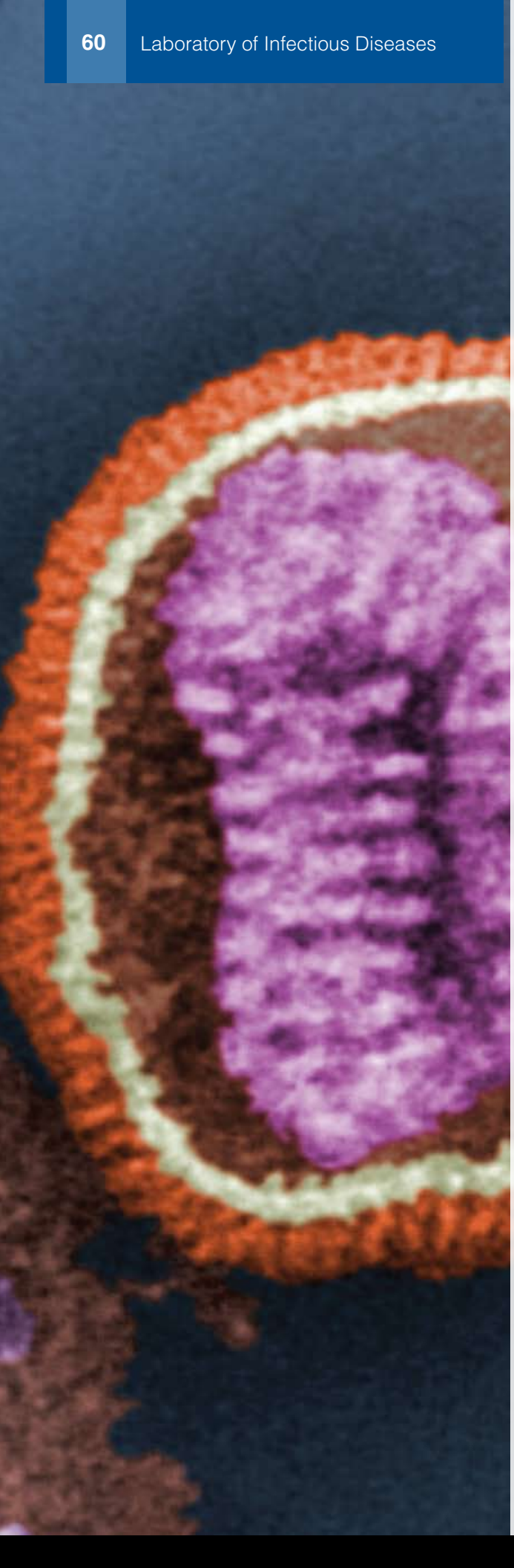
Dr. Siebenlist received his Ph.D. at Harvard University, studying protein-DNA interactions with Nobel Laureate Dr. Walter Gilbert. As a postdoctoral fellow in Dr. Philip Leder's laboratory at both NIH and Harvard Medical School, Dr. Siebenlist studied immunoglobulin gene structures and the regulation of the myc oncogene. He then joined the Laboratory of Immunoregulation. His current research focuses on molecular mechanisms underlying immune activation in health and disease using mouse models.

Major Areas of Research

- NF-kappa B transcription factors: elucidation of signaling pathways and transcriptional activation in immunologic contexts
- Roles of NF-kappa B factors and their regulators in establishment of central tolerance, in development of B cells, and in acute inflammatory reactions, including sepsis
- Mechanisms underlying diseases mediated by the interleukin 17 family of cytokines, including asthma, allergy, and rheumatoid arthritis



Laboratory of Infectious Diseases

Brian R. Murphy, M.D., and Robert H. Purcell, M.D., Co-Chiefs

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Sections and Units

Office of the Co-Chiefs
- Brian R. Murphy, M.D.
- Robert H. Purcell, M.D.

Respiratory Viruses Section
- Brian R. Murphy, M.D.
- Peter L. Collins, Ph.D.
- Alexander G. Pletnev, Ph.D.
- Kanta Subbarao, M.B.B.S., M.P.H.
- Jeffery Taubenberger, M.D., Ph.D.

Hepatitis Viruses Section/Molecular Hepatitis Section
- Robert H. Purcell, M.D.
- Suzanne U. Emerson, Ph.D.
- Patrizia Farci, M.D.

Picornavirus Replication Section
- Ellie Ehrenfeld, Ph.D.

Epidemiology Section
- Albert Z. Kapikian, M.D.
- John T. Patton, Ph.D.
- Kim Y. Green, Ph.D.
- Yasutaka Hoshino, D.V.M.

Molecular Viral Biology Section
- Ching-Juh Lai, Ph.D.

Research Activities

Studies in the Laboratory of Infectious Diseases (LID) focus on viruses that play an important role in diseases of the respiratory and gastrointestinal tracts, the liver, and the reticuloendothelial system. Currently, LID uses viral genetics and molecular biology to express protective viral antigens and to attenuate viral mutants that may prove useful for prevention of disease. A number of promising subunit and live attenuated viral vaccines and virus-specific immunotherapies are under development and are being evaluated in animals and humans.

LID conducts research directed toward defining the cause and epidemiology of viral diseases and developing means for their control. LID engages in a wide range of research activities—from identification and antigenic characterization of viruses that cause disease of the respiratory and gastrointestinal tracts and the liver to basic molecular studies of viral structure, function, and genome organization.

Brian R. Murphy, M.D.

Co-Chief, Laboratory of Infectious Diseases
Chief, Respiratory Viruses Section, LID

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Dr. Murphy received his M.D in 1969 from the University of Rochester and did an internship at Stanford University before joining NIH in 1970. He has headed the Respiratory Viruses Section since 1983 and became co-chief of the Laboratory of Infectious Diseases in 2001. He serves on the editorial boards of *Virology* and the *Journal of Virology.*

Major Areas of Research

- Recovery of human parainfluenza viruses (HPIVs) type 1, 2, and 3 from cDNA and development of sets of attenuating mutations that permit efficient replication in tissue culture but restricted replication *in vivo*
- Use of HPIVs as vectors of other viral antigens such as respiratory syncytial virus (RSV), human metapneumovirus, and measles virus
- Recovery of dengue virus (DENV) types 1, 2, 3, and 4 from cDNA and development of mutations that restrict replication
- Production of antigenic chimeric viruses bearing structural proteins of DENV 1, 2, or 3 on attenuated DENV 4 backbone and development of a tetravalent vaccine for DENV
- Development of attenuated mutants of tick-borne encephalitis virus, West Nile virus, and La Crosse bunyavirus
- Development of attenuated RSV vaccine candidates

Robert H. Purcell, M.D.

Co-Chief, Laboratory of Infectious Diseases
Chief, Hepatitis Viruses Section, LID

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Dr. Purcell obtained a master's degree in biochemistry from Baylor University and completed a medical degree and pediatric internship at Duke University and Hospital. His research focuses on the hepatitis viruses, with special emphasis on their molecular biology, epidemiology, and control. He is the author or co-author of more than 700 publications and a member of the National Academy of Sciences.

Major Areas of Research

- Seroepidemiology and molecular epidemiology
- Pathogenesis and animal models of human disease
- Active and passive immunoprophylaxis
- Discovery of new viruses

Peter L. Collins, Ph.D.

Senior Investigator, Respiratory Viruses Section, LID

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Dr. Collins received a Ph.D. in 1981 from the University of Connecticut. He conducted postdoctoral research at the University of North Carolina. In 1984, he joined the Laboratory of Infectious Diseases, and he received tenure in 1990. He serves on the editorial boards of the *Journal of Virology, Virology,* and *Virus Research.*

Major Areas of Research

- Molecular biology, immunobiology, and pathogenesis of human RSV, human metapneumovirus (HMPV), and related respiratory viruses: Studies involve infections *in vitro* of epithelial cells, macrophages, and other cell types and *in vivo* infection of experimental animals to elucidate the viral replicative cycle, interactions between viral and host components, the host response to infection, and mechanisms of pathogenesis
- Sets of mutations that attenuate RSV and HMPV *in vivo*; reverse genetics to create live vaccine candidate viruses; pre-clinical and clinical vaccine development
- Live vaccines against HPIV types 1, 2, and 3 produced by reverse genetics and their use as vectors to make multivalent, live pediatric vaccines
- Vaccine vectors based on HPIVs and related avian viruses for use against highly pathogenic viruses like SARS coronavirus, avian influenza, and Ebola

Alexander G. Pletnev, Ph.D., D.Sci.

Senior Investigator, Respiratory Viruses Section, LID

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apletnev@niaid.nih.gov

Major Areas of Research

- Viral molecular biology
- Viral pathogenesis
- Development of live attenuated vaccines against disease caused by highly virulent, neurotropic viruses, such as tick-borne encephalitis viruses, West Nile virus, and St. Louis encephalitis virus

Dr. Pletnev received his Ph.D. in 1983 in chemistry from the Russian Academy of Sciences, studying RNA polymerases. Following postdoctoral research at the Novosibirsk Institute of Bioorganic Chemistry, he became chief of its Laboratory of Radiochemistry and Laboratory of Molecular Virology from 1984 to 1993 and became a professor in molecular biology in 1993. He joined the Laboratory of Infectious Diseases in 1993 and received tenure in 2005.

Kanta Subbarao, M.B.B.S., M.P.H.

Senior Investigator, Respiratory Viruses Section, LID

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Dr. Subbarao received her M.B.B.S. in 1982 from the Christian Medical College, Vellore, University of Madras, India, and completed a residency in pediatrics at Cardinal Glennon Memorial Hospital for Children at St. Louis University. She completed a fellowship in pediatric infectious diseases and earned her M.P.H. in epidemiology from the University of Oklahoma Health Sciences Center. After postdoctoral training in the Laboratory of Infectious Diseases (LID), she served on the faculty at McGill University, Montreal, Canada, and subsequently served as chief of the Molecular Genetics Section of the Influenza Branch at the CDC in Atlanta. Dr. Subbarao joined LID as a senior investigator in 2002.

Major Areas of Research

- Vaccines against pandemic strains of influenza
- Development of animal models and evaluation of vaccines against the SARS coronavirus

Jeffery Taubenberger, M.D., Ph.D.

Senior Investigator, Respiratory Viruses Section, LID

www.niaid.nih.gov/labs/aboutlabs/lid/respiratoryVirusesSection/Taubenberger.htm

taubenbergerj@niaid.nih.gov

Dr. Taubenberger received a B.S. in biology from George Mason University in 1982 and an M.D. in 1986 and a Ph.D. in 1987 from the Medical College of Virginia. He did his residency in pathology at the National Cancer Institute. He holds dual board certifications in anatomic pathology and molecular genetic pathology from the American Board of Pathology and the American Board of Medical Genetics. Prior to coming to NIAID in 2006, he served as chair of the department of molecular pathology at the Armed Forces Institute of Pathology in Washington, DC.

Major Areas of Research

- Modeling of influenza virus pathogenicity to understand viral and host contributions to disease for pandemic influenza strains like the 1918 influenza, potentially pandemic strains like H5N1, and annual epidemic influenza
- Genetic characterization of human influenza A viruses from the decade before and after 1918 to place the formation, development, and early evolution of the 1918 pandemic influenza virus in virologic context and to understand how novel pandemic strains develop
- Pathologic analysis of archival case material to determine the cause of death of victims of the 1918 influenza pandemic
- Genomic analyses to understand the ecobiology and evolution of influenza A viruses to predict the emergence of pandemic influenza viruses, facilitate vaccine strain selection in epidemic influenza, and augment current surveillance for human and animal influenza

Suzanne U. Emerson, Ph.D.

Chief, Molecular Hepatitis Section, LID

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semerson@niaid.nih.gov

Major Areas of Research

- Vaccines for hepatitis viruses
- Molecular biology of hepatitis C virus and hepatitis E virus

Dr. Emerson obtained her doctorate from the University of California-San Diego for the study of assembly of bacterial flagella. Following postdoctoral research at the University of Virginia Medical School, she joined the faculty of the department of microbiology, where she carried out molecular studies on vesicular stomatitis virus. She joined the Hepatitis Viruses Section in the Laboratory of Infectious Diseases in 1988 and, in 1998, became chief of the newly created Molecular Hepatitis Section.

Patrizia Farci, M.D.

Senior Investigator, Hepatitis Viruses Section/Molecular Hepatitis Section, LID

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pfarci@niaid.nih.gov

Major Areas of Research

- Pathogenesis of acute and chronic human liver disease
- Molecular mechanisms of liver fibrosis progression and regression
- Role of liver cirrhosis in the pathogenesis of hepatocellular carcinoma
- Role of neutralizing antibodies in the prevention and control of hepatitis C virus (HCV) infection
- Molecular mechanisms of resistance to antiviral therapy in HCV infection
- New hepatitis agents

Dr. Farci earned her M.D. at the University of Cagliari, Italy, and then became a board-certified specialist in infectious diseases and in gastroenterology at the same university. She was trained under the direction of Professor Sheila Sherlock at the department of medicine of the Royal Free Hospital School of Medicine in London where, in the mid-1980s, she started pioneering studies on antiviral therapy. In 1989, as a visiting scientist, she joined the laboratory of Dr. Robert H. Purcell at the Laboratory of Infectious Diseases (LID). In 1992, she became associate professor of medicine and, in 2000, full professor of medicine and director of the Liver Unit at the University of Cagliari. In 2000, she was awarded the honor of “Ufficiale of the Italian Republic” by the President of Italy. In 2007, she was appointed senior investigator in LID.

Ellie Ehrenfeld, Ph.D.

Chief, Picornavirus Replication Section, LID

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Dr. Ehrenfeld obtained her Ph.D. in biochemistry at the University of Florida. During postdoctoral work at the Albert Einstein College of Medicine, she began studies of molecular aspects of poliovirus replication in cultured human cells. She joined the faculty at Einstein and then continued her research and teaching career at the University of Utah School of Medicine and subsequently at the University of California-Irvine, where she also served as dean of the School of Biological Sciences. In 1997, Dr. Ehrenfeld came to NIH as director of the Center for Scientific Review and joined NIAID as chief of the Picornavirus Replication Section. Her research focuses on mechanisms of RNA replication and regulation of protein synthesis in poliovirus- and hepatitis A virus-infected cells. She has served on numerous editorial boards and consulted for several academic, government, and private sector agencies. She is the recipient of honors and awards for research and teaching in virology and molecular biology.

Major Areas of Research

- RNA replication
- RNA and protein structure/function
- Virus-host cell interactions

Albert Z. Kapikian, M.D.

Chief, Epidemiology Section, LID

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akapikian@nih.gov

Dr. Kapikian received his M.D. from Weill Medical College of Cornell University (formerly Cornell University Medical College) in 1956.

He is a member of the American Epidemiological Society, Infectious Diseases Society of America, and American Society for Virology.

Major Areas of Research

- Viral gastroenteritis
- Vaccine development
- Electron microscopy
- Epidemiology

John T. Patton, Ph.D.

Senior Investigator, Epidemiology Section, LID

www.niaid.nih.gov/labs/aboutlabs/lid/epidemiologySection/patton.htm

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Major Areas of Research

- RNA viruses
- Protein structure and function
- Viral genome packaging and replication
- Vaccine development

Dr. Patton received his Ph.D. in 1980 from Virginia Polytechnic Institute for his work on the molecular biology of the parvoviruses. Following postdoctoral research at the University of North Carolina Medical School-Chapel Hill, on the replication of vesicular stomatitis virus, he joined the faculty at the University of South Florida. In 1987, Dr. Patton moved to the University of Miami School of Medicine, where he remained until 1996, when he took a position in the Laboratory of Infectious Diseases.

Kim Y. Green, Ph.D.

Senior Investigator, Epidemiology Section, LID

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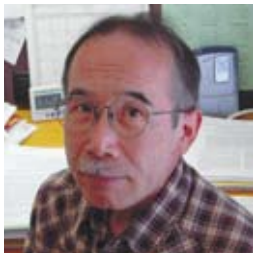
kgreen@niaid.nih.gov

Major Areas of Research

- Molecular epidemiology
- Animal models of norovirus disease
- Vaccines and antiviral inhibitors
- Basic replication mechanisms of noroviruses and other caliciviruses

Dr. Green earned a Ph.D. from the department of microbiology and immunology at the University of Tennessee Center for Health Sciences in Memphis. She joined the Laboratory of Infectious Diseases in 1986 and has focused on the study of viruses associated with gastroenteritis. In recent years, her research program has addressed the role of noroviruses in human disease, with an emphasis on the development of prevention and control strategies.



Yasutaka Hoshino, D.V.M.

Senior Investigator, Epidemiology Section, LID

www.niaid.nih.gov/labs/aboutlabs/lid/epidemiologySection/hoshino.htm

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Dr. Hoshino received his doctoral degree in veterinary medicine from Nihon University, Tokyo, studying virology. In 1979, Dr. Hoshino received his M.S. degree in veterinary virology from Cornell University School of Veterinary Medicine. Following post-doctoral research at Cornell on gastroenteritis viruses in cats, he came to the Laboratory of Infectious Diseases in 1981.

Major Areas of Research

- Isolation and serotypic characterization of human and animal rotaviruses
- Rotavirus vaccine development
- Genetic and molecular studies of rotavirus pathogenesis

Ching-Juh Lai, Ph.D.

Chief, Molecular Viral Biology Section, LID

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Dr. Lai received his Ph.D. from the University of Wisconsin-Madison, where he studied erythromycin-inducible resistance of *Staphylococcus aureus*. His subsequent research included physical and functional mapping of SV40 DNA using restriction enzymes and the genome organization and expression of influenza virus. He then initiated dengue virus (DENV) research at NIAID and invented strategies of chimeric and growth-restricted flaviviruses for development of vaccines against these viruses. His recent research focuses on antibody-mediated prevention of DENV and other flavivirus infections, antibody-dependent enhancement as a possible cause of dengue pathogenesis, and determinants responsible for infectivity and virulence in animal models.

Major Areas of Research

- Neutralizing antibodies as potential antivirals against DENV and other flavivirus infections in humans
- Antibody-dependent enhancement of DENV replication and strategies of prevention
- DENV determinants responsible for infectivity and virulence in animal models

Laboratory of Intracellular Parasites

Harlan D. Caldwell, Ph.D., Chief
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Sections and Units

Office of the Chief
Harlan D. Caldwell, Ph.D.

Chlamydial Pathogenesis Section
Harlan D. Caldwell, Ph.D.

Immunity to Pulmonary Pathogens Section
Catharine (Katy) Bosio, Ph.D.

Tularemia Pathogenesis Section
Jean Celli, Ph.D.

Host-Parasite Interactions Section
David W. (Ted) Hackstadt, Ph.D.

Coxiella Pathogenesis Section
Robert Heinzen, Ph.D.

Salmonella Host-Cell Interactions Section
Olivia Steele-Mortimer, Ph.D.

Research Activities

The Laboratory of Intracellular Parasites (LICP) investigates the biology, pathogenesis, and immunity of intracellular prokaryotic pathogens such as *Chlamydia trachomatis, Chlamydia pneumoniae, Francisella tularensis, Coxiella burnetii,* and *Salmonella typhimurium.* These agents are important causes of sexually transmitted infections, preventable blindness, and chronic heart disease and are also Category A and B bioterrorism agents. The long-term goal of the laboratory is the development of new and effective control strategies against intracellular bacterial parasitic infection.

Modern biological, molecular, and immunological tools are used to understand pathogen ligand-receptor interactions, pathogen vesicle maturation and trafficking, parasite manipulation of host cell signal transduction pathways, and host immune response to infection. Pathogen and host gene expression are being analyzed at the transcriptome and proteome levels, under experimental conditions that manifest both acute and persistent infection environments, to profile novel pathogen genes that function in the pathogenesis of infection. Animal models of infection are used to define immune effector mechanisms that function in adaptive immunity and to test promising vaccine candidates.

Harlan D. Caldwell, Ph.D.

Chief, Laboratory of Intracellular Parasites
Chief, Chlamydial Pathogenesis Section, LICP

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Dr. Caldwell received his Ph.D. in pathobiology from the University of Washington in 1976. After completing a senior research fellowship in the department of medicine there, Dr. Caldwell joined the faculty of the University of California-San Francisco as an assistant professor of microbiology and immunology. In 1980, he was recruited to NIH as a tenure-track investigator in the NIAID Laboratory of Microbial Structure and Function. He became a tenured investigator in 1986 and chief of the Laboratory of Intracellular Parasites in 1990. He is a recipient of the NIH Director's Award, NIH Merit Award, and U.S. Public Health Service Superior Service Award. He was appointed to the NIH Senior Biomedical Research Service in 1997. Dr. Caldwell is a member of the editorial board of *Infection and Immunity* and a fellow of the American Academy of Microbiology. He is an internationally recognized leader in the fields of chlamydial pathogenesis and immunology.

Major Areas of Research

- Immunity to chlamydial infection
- Chlamydia vaccine design

Catharine (Katy) Bosio, Ph.D.

Chief, Immunity to Pulmonary Pathogens Section, LICP

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Dr. Bosio graduated from Washington State University cum laude with a B.Sc. in 1993. Following completion of her Ph.D. at Colorado State University in 1998, Dr. Bosio completed postdoctoral fellowships at the FDA Center for Biologics Evaluation and Research and at the U.S. Army Medical Research Institute for Infectious Diseases, studying innate immunity to *Mycobacterium tuberculosis, Francisella tularensis,* Marburg virus, and Ebola virus. Prior to joining NIAID's Rocky Mountain Laboratories (RML) in 2007, Dr. Bosio was an assistant professor at Colorado State University in the department of microbiology, immunology, and pathology. Dr. Bosio's laboratory at RML studies the host response to pulmonary pathogens, with special emphasis on virulent *F. tularensis* and dendritic cells, macrophages, and monocytes.

Major Areas of Research

- Innate immunity to *F. tularensis*
- Vaccine development for pneumonic tularemia
- Modulation of human cells by *F. tularensis*

Jean Celli, Ph.D.

Chief, Tularemia Pathogenesis Section, LICP

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jcelli@niaid.nih.gov

Major Areas of Research

- Study of the molecular mechanisms by which intracellular bacterial pathogens circumvent host defense mechanisms and survive and replicate within mammalian cells
- *Francisella tularensis* (the causative agent of tularemia) and *Brucella abortus* (the causative agent of brucellosis) as model pathogens
- Identification of the mechanisms that allow *Francisella* and *Brucella* to evade the degradative pathways and generate an intracellular replicative niche

Dr. Celli received his Ph.D. in microbiology from the Université Pierre et Marie Curie, Paris, France, in 1997. After completing postdoctoral training in 2001 in the laboratory of Dr. B. Brett Finlay at the University of British Columbia, Vancouver, Dr. Celli accepted a research scientist position from the Institut National de la Santé et de la Recherche Médicale to work at the Centre d'Immunologie de Marseille-Luminy. In 2004, he was recruited to NIAID as a tenure-track investigator in the Laboratory of Intracellular Parasites. He is a member of the American Society for Microbiology.

David W. (Ted) Hackstadt, Ph.D.

Chief, Host-Parasite Interactions Section, LICP

www.niaid.nih.gov/labs/aboutlabs/licp/hostParasiteInteractionsSection/

thackstadt@niaid.nih.gov

Major Areas of Research

- Chlamydia interactions with host cells
- Vesicle trafficking pathways
- Biology of rickettsia

Dr. Hackstadt received his Ph.D. from Washington State University. His postdoctoral work was in the Laboratory of Microbial Structure and Function at NIAID's Rocky Mountain Laboratories (RML). Dr. Hackstadt left RML for an associate professorship in the departments of pathology and microbiology at the University of Texas Medical School in Galveston. In 1990, he returned to the Laboratory of Intracellular Parasites at RML, where he was appointed chief of the Host-Parasite Interactions Section, awarded tenure in 1995, and appointed to the NIH Senior Biomedical Research Service in 2005. He serves as an associate editor of the journal *Traffic* and is on the editorial board of *Cellular Microbiology.* He is a past president of the American Society for Rickettsiology and was elected a fellow of the American Academy of Microbiology in 2005.

Robert A. Heinzen, Ph.D.

Chief, Coxiella Pathogenesis Section, LICP

www.niaid.nih.gov/labs/aboutlabs/licp/coxiellaPathogenesisSection/

rheinzen@niaid.nih.gov

Dr. Heinzen received his Ph.D. in microbiology from Washington State University in 1991. After completing an Intramural Research Training Award fellowship in the Laboratory of Intracellular Parasites (LICP) in 1996, Dr. Heinzen joined the faculty of the University of Wyoming as an assistant professor of molecular biology, where he was awarded tenure and promoted to associate professor in 2002. Dr. Heinzen was recruited to NIAID in 2003 as head of the new Coxiella Pathogenesis Section in LICP.

Major Areas of Research

- Host interactions
- Developmental biology
- Genomics and genetic systems

Olivia Steele-Mortimer, Ph.D.

Chief, Salmonella Host-Cell Interactions Section, LICP

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omortimer@niaid.nih.gov

Dr. Steele-Mortimer received her Ph.D. in cell biology from the European Molecular Biology Laboratory in 1994. She did her postdoctoral research at the University of British Columbia, Vancouver, and at Washington University, St. Louis. In 2001, she came to NIAID as a tenure-track investigator in the Laboratory of Intracellular Parasites and was awarded tenure in 2007. Dr. Steele-Mortimer is a member of the editorial board of *Traffic*.

Major Areas of Research

- Role of salmonella effector proteins in post-invasion events
- Biogenesis of the salmonella-containing vacuole
- Regulation of virulence genes

Laboratory of Malaria and Vector Research

Thomas E. Wellems, M.D., Ph.D., Chief

www.niaid.nih.gov/labs/aboutlabs/lmvr/

301-402-1274

Sections and Units

Office of the Chief
Thomas E. Wellems, M.D., Ph.D.

Malaria Genetics Section
Thomas E. Wellems, M.D., Ph.D.

Mosquito Immunity and Vector Competence Unit
Carolina V. Barillas-Mury, M.D., Ph.D.

Apicomplexan Molecular Physiology Section
Sanjay A. Desai, M.D., Ph.D.

International Studies of Malaria and Entomology Section
Robert W. Gwadz, Ph.D.

Malaria Immunology Section
Carole A. Long, Ph.D.

Regulation of Growth and Development Section
Thomas F. McCutchan, Ph.D.

Malaria Cell Biology Section
Louis H. Miller, M.D.

Vector Biology Section
José M.C. Ribeiro, M.D., Ph.D.

Malaria Functional Genomics Section
Xin-zhuan Su, Ph.D.

Vector Molecular Biology Unit
Jesus G. Valenzuela, Ph.D.

Research Activities

The Laboratory of Malaria and Vector Research (LMVR) is dedicated to studies of malaria and insect vectors of infectious diseases. Research groups in the laboratory maintain an array of on-campus and overseas activities investigating disease-transmitting insects and broad areas of malaria biology and pathogenesis. Basic discoveries from these investigations support searches for new treatments, diagnostic tools, and vaccines. The LMVR environment is highly collaborative and is organized to foster research teamwork by experts in various disciplines of the biological, physical, and medical sciences.

Thomas E. Wellems, M.D., Ph.D.

Chief, Laboratory of Malaria and Vector Research

Chief, Malaria Genetics Section, LMVR

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Dr. Wellems received his M.D. and Ph.D. from the University of Chicago. Following an internal medicine residency at the Hospital of the University of Pennsylvania, he joined NIAID's Division of Intramural Research. Dr. Wellems is a frequent lecturer, consultant, and reviewer. He is a member of the National Academy of Sciences and serves on a number of advisory committees for foundations and public-private partnerships.

Major Areas of Research

- Drug responses, immune evasion, and disease mechanisms in malaria
- Antimalarial drug resistance and determinants of clinical outcome after treatment
- Malaria protection conferred by human hemoglobinopathies and red cell polymorphisms
- Antigenic variation and immune evasion by malaria parasites
- Factors affecting *Plasmodium falciparum* virulence in humans and in animal models of malaria

Carolina V. Barillas-Mury, M.D., Ph.D.

Chief, Mosquito Immunity and Vector Competence Unit, LMVR

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cbarillas@niaid.nih.gov

Dr. Barillas-Mury received her B.S. in biology from the Universidad del Valle de Guatemala in 1981; her M.D. from the Universidad Francisco Marroquín de Guatemala in 1985; and her Ph.D. in biochemistry from the University of Arizona in 1992. From 1992 to 1993, she did postdoctoral training at the University of Arizona. She then went to Harvard University until 1994 and the European Molecular Lab until 1998. She was an assistant professor in the department of microbiology, immunology, and pathology at Colorado State University from 1998 to 2003 before she joined NIAID.

Major Areas of Research

- Mosquito midgut epithelial responses to *Plasmodium* infection
- Role of ROS in *Anopheles gambiae* refractoriness to malaria infection and mosquito fecundity
- Role of the STAT pathway in mosquito immune responses to *Plasmodium*
- Identification of mechanisms that allow African strains of *Plasmodium falciparum* to evade the mosquito's immune system

Sanjay A. Desai, M.D., Ph.D.

Chief, Apicomplexan Molecular Physiology Unit, LMVR

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sdesai@niaid.nih.gov

Dr. Desai received his M.D. and Ph.D. from Washington University, St. Louis. Following an internal medicine residency and infectious diseases fellowship at Duke University Medical Center, he joined NIAID's Division of Intramural Research. Dr. Desai is a frequent lecturer and reviewer.

Major Areas of Research

- Cellular and molecular biology of the malaria parasite, including studies of how the parasite acquires nutrients and other essential solutes from the human bloodstream
- Unusual ion channels that play a central role in trafficking solutes between serum and parasite compartments, one of which, the plasmodial surface anion channel (PSAC), is on the infected erythrocyte surface and is a validated target for development of new antimalarial drugs
- Identification of PSAC's gene(s) with molecular, genetic, and biochemical approaches
- Characterization of PSAC's unusual functional properties with the goal of understanding both structure and physiological role
- Identification of novel, high-affinity PSAC antagonists that may be starting points for the development of new antimalarial drugs

Robert W. Gwadz, Ph.D.

Chief, International Studies of Malaria and Entomology Section, LMVR

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rgwadz@niaid.nih.gov

Dr. Gwadz received his Ph.D. from the University of Notre Dame in 1970 for studies on the reproductive physiology of mosquitoes. He was a postdoctoral fellow in tropical public health at the Harvard University School of Public Health before joining NIH in 1972. He served as head of the Medical Entomology Program in the NIAID Laboratory of Parasitic Diseases until 1995. In the Laboratory of Malaria and Vector Research (LMVR), he is responsible for the development and operation of the Malaria Research and Training Center in Bamako, Mali, and the new LMVR malaria research program in Cambodia. In recognition of his work in establishing a program of cooperative research on vector-borne diseases in the Middle East, Dr. Gwadz was named an Honorary Fellow of the Hebrew University of Jerusalem, an Honorary Member of the Board of the Ain Shams University (Cairo) Center for Study of Tropical Diseases, and an Honorary Fellow of the Egyptian Society of Parasitologists. For his work in Mali, Dr. Gwadz was named a "Chevalier of the Nation of Mali" by the president of the republic.

Major Areas of Research

- Antimalarial drugs
- Malaria vaccines
- Vector biology and malaria transmission
- Training opportunities in Africa and Cambodia

Carole A. Long, Ph.D.
Chief, Malaria Immunology Section, LMVR

www.niaid.nih.gov/labs/aboutlabs/lmvr/MalariaImmunologySection/long.htm

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Dr. Long received her B.A. from Cornell University and her Ph.D. in microbiology and immunology from the University of Pennsylvania. She completed postdoctoral training at the University of Pennsylvania. She was a professor of microbiology and immunology at Drexel University School of Medicine in Philadelphia, teaching medical and graduate students and conducting research on malaria parasites. She joined the NIAID Malaria Vaccine Development Branch, where she was involved in preclinical and clinical immunologic studies of malaria vaccine candidates. In 2007, she relocated to the Laboratory of Malaria Vaccine Research. The goal of her section is to provide a detailed picture of innate and adaptive humoral and cellular immune responses to blood stages of malaria parasites and to apply these insights to new vaccine approaches to this disease.

Major Areas of Research

- Study of the interaction of malaria parasites with the immune system of the vertebrate host in children and adults in Mali, in other malaria-endemic areas of the world through collaborative interactions, and in mouse models
- Characterization of the quantitative and qualitative aspects of T lymphocytes in a longitudinal study of African children, correlation of these aspects with resistance to disease, and comparison of these T-cell responses to those found in rodent models
- Development of standardized assays to evaluate quantitative and functional aspects of antibodies to various blood-stage malaria parasite proteins in preclinical studies in animals and in children and adults living in malaria-endemic areas; these antibodies are being used in a proteomic approach to identify novel vaccine candidates
- Dissection of innate immune responses before and after malaria infection in mice and humans

Thomas F. McCutchan, Ph.D.
Chief, Regulation of Growth and Development Section, LMVR

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Major Areas of Research

- *Plasmodium* rRNA genes
- Development of auxotrophic lines of malaria parasites

Louis H. Miller, M.D.

Chief, Malaria Cell Biology Section, LMVR
Chief, Malaria Vaccine Development Branch

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Major Areas of Research

- Mechanism by which malaria parasites invade erythrocytes (including the study of parasite ligands and erythrocyte receptors)
- Mechanism of antigenic variation
- Molecular basis for cerebral malaria and rosetting
- Study of binding of parasitized erythrocytes in placenta

Dr. Miller received his B.S. from Haverford College, PA; his M.S. from Columbia University; and his M.D. from Washington University, St. Louis. He then served as a medical resident at Montifiore Hospital, NY, and as an intern and resident at Mount Sinai Hospital, NY.

He is a member of the Association of American Physicians, American Society of Clinical Investigation, American Society of Tropical Medicine and Hygiene, Royal Society of Tropical Medicine and Hygiene, National Academy of Sciences, and Institute of Medicine.

José M.C. Ribeiro, M.D., Ph.D.

Chief, Vector Biology Section, LMVR

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jribeiro@niaid.nih.gov

Dr. Ribeiro received his M.D. from the State University of Rio de Janeiro, Brazil, and his Ph.D. from the Biophysics Institute of the Federal University of Rio de Janeiro. He was an assistant and associate professor at the Harvard School of Public Health and professor in the department of entomology at the University of Arizona before joining NIAID in 1996. Dr. Ribeiro has served for many years in the Tropical Diseases Research Program of the World Health Organization and as editor and reviewer for several journals.

Major Areas of Research

- Role of vector saliva in blood feeding by arthropods, where a great diversity of pharmacologically active compounds and new targets for vaccination against vector-borne diseases have been uncovered
- Discovery and determination of mode of action of novel anti-clotting, anti-platelet, immunomodulatory, and vasodilatory agents
- Expression of novel proteins and peptides with known and unknown function
- Development of tools for transcriptome annotation

Xin-zhuan Su, Ph.D.

Chief, Malaria Functional Genomics Section, LMVR

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xsu@niaid.nih.gov

Dr. Su received his Ph.D. in parasitology from the University of Georgia in 1990 and joined the NIAID Laboratory of Parasitic Diseases in 1992. He became an investigator in the Laboratory of Malaria and Vector Research in 2001 and a senior investigator in 2006.

Major Areas of Research

- *Plasmodium* genetics
- Mechanisms of antimalarial drug resistance
- *Plasmodium* gene regulation and expression

Jesus G. Valenzuela, Ph.D.

Chief, Vector Molecular Biology Unit, LMVR

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jvalenzuela@niaid.nih.gov

Dr. Valenzuela received his Ph.D. in biochemistry from the University of Arizona in 1995. He joined the NIAID Laboratory of Parasitic Diseases in 1996, became a research fellow in 1999, and became an investigator in the Laboratory of Malaria and Vector Research in October 2002.

Major Areas of Research

- Transcriptomic approaches to characterize vector salivary and midgut proteins
- Impact of immune responses to sand fly salivary proteins in pathogen transmission
- Molecular interactions between sand fly gut proteins and *Leishmania* parasites

Laboratory of Molecular Immunology

Philip M. Murphy, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lmi/
301-402-9139

Sections and Units

Office of the Chief
Philip M. Murphy, M.D.

Molecular Signaling Section
Philip M. Murphy, M.D.

Inflammation Biology Section
Joshua Farber, M.D.

Mucosal Immunobiology Section
Brian Kelsall, M.D.

Research Activities

The Laboratory of Molecular Immunology (LMI) studies innate and adaptive immune system function in health and disease. Research is conducted in the following areas:

- Molecular and cellular mechanisms of leukocyte trafficking in both innate and adaptive immunity with a focus on chemokines and other chemoattractants and their G protein-coupled receptors
- Mimics of chemotactic factors and their receptors in infectious agents such as HIV, herpesviruses, and poxviruses
- Structure and function of the mucosal immune system in the gastrointestinal system
- Studies of reovirus and rotavirus infection in the gut and in models of inflammatory bowel disease
- Basic properties of neutrophils, naïve and memory T cells, and dendritic cells
- Chemokine receptor gene regulation
- Molecular pathogenesis of infectious and immunologic/inflammatory diseases, including HIV/AIDS, West Nile virus infection, listeria infection, *T. cruzi, T. gondii,* fungal infection, sepsis, atherosclerosis, psoriasis, and immunodeficiency, with the goal of identifying novel therapeutic targets and vaccine strategies
- Genetic risk factors for complex immune-mediated diseases
- Chemokines as inflammatory mediators in cancer
- Mechanisms of immunosuppression by HIV nef

Philip M. Murphy, M.D.

Chief, Laboratory of Molecular Immunology

Chief, Molecular Signaling Section, LMI

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Dr. Murphy obtained an A.B. from Princeton University in 1975 and an M.D. from Cornell University Medical College in 1981. He trained in internal medicine at New York University from 1981 to 1985, serving as chief resident from 1984 to 1985, and in infectious diseases at NIAID from 1985 to 1988. He began his research career as a medical staff fellow in the Bacterial Diseases Section of the NIAID Laboratory of Clinical Investigation in 1986 and was promoted to senior investigator with tenure in the Laboratory of Host Defenses (LHD) in 1992. In 1998, he was promoted to the Senior Biomedical Research Service and named chief of the LHD Molecular Signaling Section. In 2003, Dr. Murphy's research group was reorganized as part of the new Laboratory of Molecular Immunology, where he served first as acting chief from 2003 to 2006 and then as chief from 2006 to the present. Dr. Murphy's research interests include immunoregulation by chemokines and related chemoattractants.

Major Areas of Research

- Host defense and inflammation
- G protein-coupled chemoattractant receptors
- Genetic risk factors in infectious and immune-mediated diseases

Joshua M. Farber, M.D.

Chief, Inflammation Biology Section, LMI

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jfarber@mail.nih.gov

Dr. Farber obtained his M.D. from The Johns Hopkins University, did postdoctoral clinical training in internal medicine and infectious diseases at The Johns Hopkins University, and did research training there and at NIH. Dr. Farber joined the NIAID Laboratory of Clinical Investigation in 1993, became a senior investigator in 2000, and moved to the Laboratory of Molecular Immunology at its inception in 2004. His research focuses on the role of the chemokine system in T-cell biology. Chemokines and their receptors are proteins important for leukocyte trafficking and are therefore critical in immune responses and inflammation. Chemokine receptors are emerging as therapeutic targets in HIV and in a variety of immune-mediated diseases.

Major Areas of Research

- Chemokines and their receptors in human T-cell memory, host defense, inflammatory disease, and HIV/AIDS

Brian L. Kelsall, M.D.
Chief, Mucosal Immunobiology Section, LMI

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kelsall@nih.gov

Major Areas of Research

- Antigen presentation by mucosal dendritic cells and the regulation of mucosal immune responses
- Regulation of interleukin 12 production

Dr. Kelsall received his B.A. in human biology from Stanford University in 1982. In 1986, he earned his M.D. from Case Western Reserve University School of Medicine. He did postdoctoral training in internal medicine at The New York Hospital-Cornell Medical Center from 1986 to 1989 and in infectious diseases at the University of Virginia Medical Center from 1989 to 1992. In 1992, Dr. Kelsall came to NIH, completed fellowship training in mucosal immunology in 1996, and became a senior investigator in 2003.

Laboratory of Molecular Microbiology

Malcolm A. Martin, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lmm/
301-496-4012

Sections and Units

Office of the Chief
Malcolm A. Martin, M.D.

Viral Pathogenesis and Vaccine Section
Malcolm A. Martin, M.D.
Fadila Bouamr, Ph.D.
Jason Brenchley, Ph.D.
Vanessa M. Hirsch, D.V.M., D.Sc.
Bernard Lafont, Ph.D.

Molecular Virology Section
Kuan-Teh Jeang, M.D., Ph.D.

Viral Biology Section
Christine A. Kozak, Ph.D.

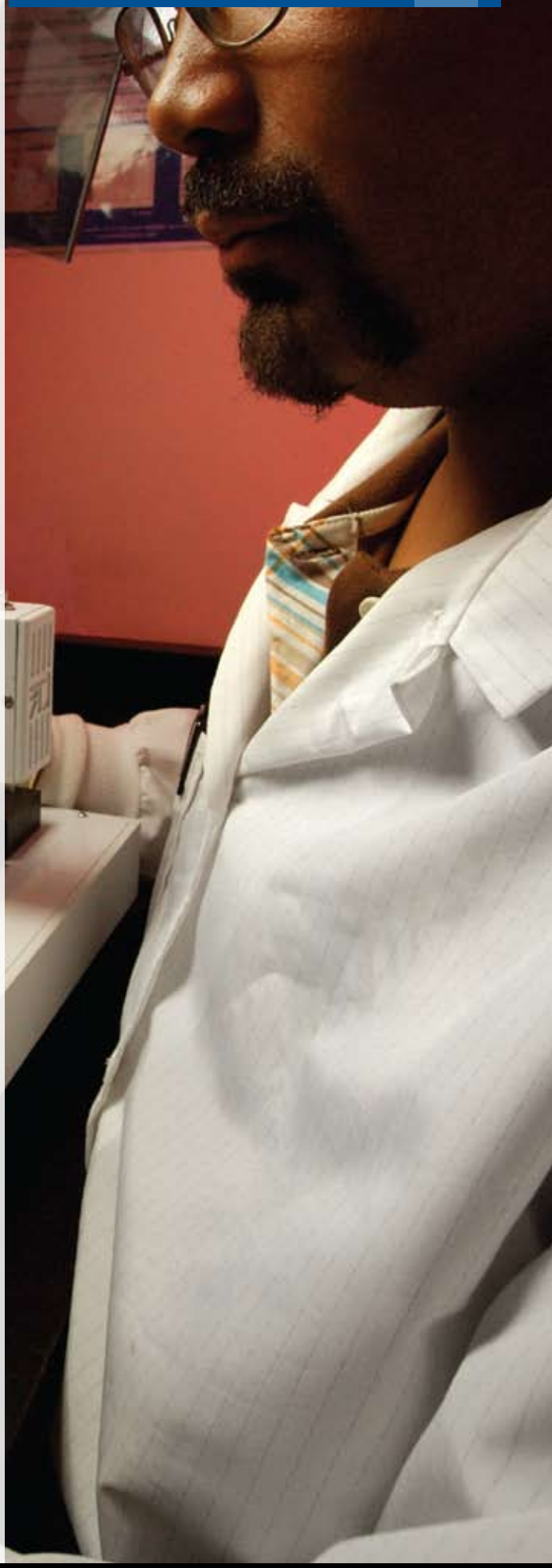
Viral Biochemistry Section
Klaus Strebel, Ph.D.

Research Activities

When it was established in 1981, the Laboratory of Molecular Microbiology (LMM) investigated the structure, function, and regulation of a diverse group of microorganisms, including RNA and DNA viruses, aerobic and anaerobic bacteria, and mycoplasma. Currently, the main focus of LMM scientists is murine leukemia virus and primate retroviruses (HIV, SIV, and human T-lymphotropic virus), with the principal area of research activity involving HIV-1. Fundamental investigations of viral gene regulation, protein structure and function, and particle assembly are integrated with studies of the determinants of immunologic protection against HIV and viral pathogenesis.

LMM's major areas of research are as follows:

- Studies of the synthesis, processing, and assembly of retroviral-encoded proteins into progeny virions
- Exploration of the structure and function relationship of retroviral accessory proteins synthesized during productive and chronic viral infections
- Understanding the regulation of retroviral gene activity and how viral-encoded proteins dysregulate normal cellular processes
- Development of animal models for investigations of viral pathogenesis, identification of potentially useful antiviral agents, and development of protective vaccines



Malcolm A. Martin, M.D.

Chief, Laboratory of Molecular Microbiology

Chief, Viral Pathogenesis and Vaccine Section, LMM

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mmartin@niaid.nih.gov

Major Areas of Research

- Studies of primate and murine retroviruses in cell culture and animal models
- HIV-1 vaccine studies
- HIV-1 pathogenesis experiments
- Retroviral molecular biology

Dr. Martin received an M.D. from Yale University School of Medicine in 1962 and, following two years of clinical training in internal medicine at the University of Rochester, joined NIH as a research associate. He initially investigated the replication and gene regulation of SV40 and polyomaviruses and subsequently studied endogenous murine and human retroviral sequences. Since 1984, his research program has focused on HIV. Dr. Martin was appointed chief of the Laboratory of Molecular Microbiology when it was established in 1981. He is a member of the National Academy of Sciences and recipient of numerous scientific awards.

Fadila Bouamr, Ph.D.

Tenure-Track Investigator, Viral Pathogenesis and Vaccine Section, LMM

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Major Areas of Research

- Host factors involved in retroviral budding
- Comparative studies of the structure of HTLV-I and HIV-1 capsids

Dr. Bouamr received her Ph.D. from Victor Segalen Bordeaux University, France, in 1997. She performed her postdoctoral research with Dr. Carol Carter at State University of New York-Stony Brook and with Dr. Steve Goff at Columbia University. She joined the Laboratory of Molecular Microbiology in December 2004.

Jason Brenchley, Ph.D.

Tenure-Track Investigator, Viral Pathogenesis and Vaccine Section, LMM

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Dr. Brenchley received a master's degree from Idaho State University in 1999 and then received a Ph.D. from the University of Texas Southwestern Medical Center at Dallas in 2003. He joined NIH as a research fellow, studying immunopathogenesis and mucosal immunology in HIV-infected individuals. Since 2008, he has been an investigator in the Laboratory of Molecular Microbiology.

Major Areas of Research

- Immunopathogenesis in different non-human primate models of HIV
- Microbial translocation and immune activation
- Mucosal immunology and mechanisms of microbial translocation

Vanessa M. Hirsch, D.V.M., D.Sc.

Senior Investigator, Viral Pathogenesis and Vaccine Section, LMM

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Dr. Hirsch received her D.V.M. from the University of Saskatchewan, Canada, in 1977 and did a residency in pathology there, becoming board-certified by the American College of Veterinary Pathologists in 1984. She earned her D.Sc. from the Harvard School of Public Health in 1988. She was a research assistant professor at Georgetown University until 1992, when she joined the NIAID Laboratory of Infectious Diseases, transferring to the Laboratory of Molecular Microbiology in 1999.

Major Areas of Research

- AIDS pathogenesis
- Evolution and origins of primate lentiviruses
- HIV vaccine development

Bernard Lafont, Ph.D.

Tenure-Track Investigator, Viral Pathogenesis and Vaccine Section, LMM

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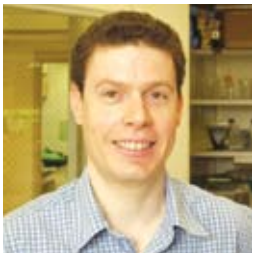

Major Areas of Research

- Immunogenetics of non-human primates, with a major interest for species used to study HIV pathogenesis
- Characterization of antiviral cellular responses in primates
- Impact of MHC genetic background on antigen presentation, immunodominance, and disease progression in primates infected with lentiviruses

Dr. Lafont received his Ph.D. in virology from the University of Strasbourg, France, in 1999. He conducted his research at the French Institute for Medical Research, where he studied SIV and recombinant SIV-HIV pathogenesis in macaques. He then joined the Laboratory of Molecular Microbiology as a Fogarty Visiting Fellow in 2000 and was awarded a tenure-track investigator position in February 2008.

Kuan-Teh Jeang, M.D., Ph.D.

Chief, Molecular Virology Section, LMM

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kjeang@niaid.nih.gov

Major Areas of Research

- HIV-1 transcription
- HTLV-1 transcription and transformation
- Cell cycle checkpoints
- Molecular antivirals

Dr. Jeang received his M.D. and Ph.D. from The Johns Hopkins University School of Medicine in 1984. He performed his postdoctoral studies with the late Dr. George Khoury at the National Cancer Institute and joined the Laboratory of Molecular Microbiology in 1987.

Christine A. Kozak, Ph.D.

Chief, Viral Biology Section, LMM

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Dr. Kozak received her Ph.D. in biology from Yale University in 1977, after her B.A. from Emmanuel College in 1971. After a postdoctoral fellowship at NIAID under Dr. Wallace Rowe, she joined the Laboratory of Molecular Microbiology (LMM) in 1984. In 1992, Dr. Kozak became chief of the Viral Biology Section in LMM. She is a member of several editorial boards, has served on the Committee on Standardized Nomenclature for Mice, was chair of the Mouse Chromosome 5 Committee for 10 years, and has authored more than 300 research publications dealing with mouse retroviruses and mouse genetics.

Major Areas of Research

- Genetics of resistance to mouse retroviruses
- Naturally occurring mouse retroviruses
- Mouse genomics

Klaus Strebel, Ph.D.

Chief, Viral Biochemistry Section, LMM

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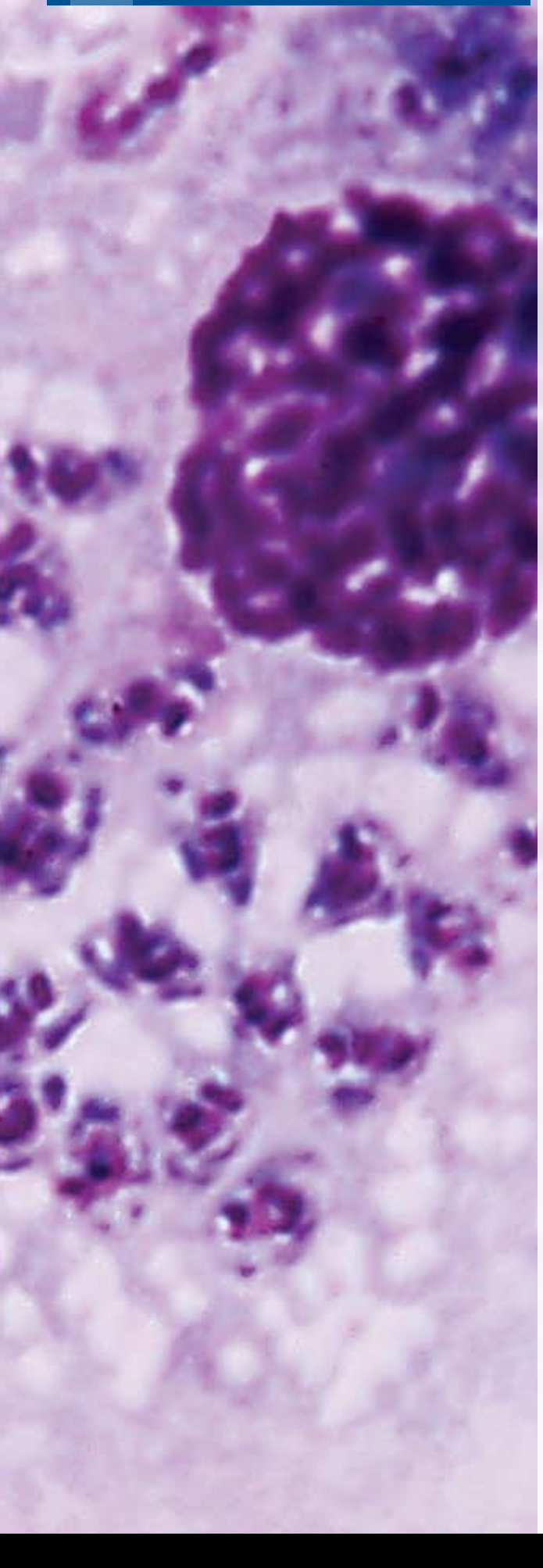
kstrebel@niaid.nih.gov

Dr. Strebel received his Ph.D. in microbiology in 1985 from the University of Heidelberg, Germany. After postdoctoral research in Germany, he joined the Laboratory of Molecular Microbiology (LMM) in 1986 as a postdoctoral fellow. He was awarded tenure in 1998 and, since 2000, has been head of the Viral Biochemistry Section within LMM.

Major Areas of Research

- Biological and biochemical functions of HIV accessory proteins
- Characterization of cellular factors involved in Vif and Vpu function
- Characterization of innate immune defense mechanisms



Laboratory of Parasitic Diseases

Alan Sher, Ph.D., Chief
Thomas B. Nutman, M.D., Deputy Chief
www.niaid.nih.gov/labs/aboutlabs/lpd/
301-496-3535

Sections and Units

Office of the Chief
Alan Sher, Ph.D.
Thomas B. Nutman, M.D.

Immunobiology Section
Alan Sher, Ph.D.

Helminth Immunology Section
Thomas B. Nutman, M.D.

Mucosal Immunology Unit
Yasmine Belkaid, Ph.D.

Cell Biology Section
Dennis M. Dwyer, Ph.D.

Molecular Parasitology Unit
Michael E. Grigg, Ph.D.

Gastrointestinal Parasites Section
Theodore E. Nash, M.D.

Intracellular Parasite Biology Section
David L. Sacks, Ph.D.

Immunopathogenesis Section
Thomas A. Wynn, Ph.D.

Research Activities

The Laboratory of Parasitic Diseases (LPD) conducts basic and applied research on the prevention, control, and treatment of a variety of parasitic and bacterial diseases of global importance. The work of the group is largely directed toward the identification of immunological and molecular targets for disease intervention. The pathogens studied include parasitic protozoa *(Leishmania, Toxoplasma, Giardia, Plasmodium, Trypanosoma cruzi, Cryptosporidium, Entamoeba)* and helminths *(Filariae, Schistosoma, Strongyloides, Taenia),* as well as non-parasitic agents (e.g., mycobacteria). Much of this work is directed at uncovering basic aspects of the host-pathogen interaction in both humans and experimental animal models, as well as in invertebrate vectors that transmit medically important parasites.

LPD also includes a clinical group that conducts patient-centered research at the NIH Clinical Center, as well as international field studies in India, Latin America, and Africa. A new focus is on food- and water-borne protozoa that represent possible bioterrorism threats.

Alan Sher, Ph.D.

Chief, Laboratory of Parasitic Diseases

Chief, Immunobiology Section, LPD

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asher@niaid.nih.gov

Dr. Sher earned his A.B. from Oberlin College and his Ph.D. in cell biology from the University of California-San Diego. He was a postdoctoral fellow at the National Institute for Medical Research, London, prior to becoming a research associate at the Peter Bent Brigham Hospital, Boston. He then became an assistant professor in the department of pathology at Harvard Medical School and Brigham and Women's Hospital. He joined the Laboratory of Parasitic Diseases in 1980 and was appointed its chief in 1993.

Major Areas of Research

- Initiation and regulation of T-lymphocyte responses to intracellular parasitic and bacterial pathogens
- Effector mechanisms of host resistance to parasitic and bacterial infections
- Role of interleukin (IL)-12 in host resistance and disease
- Innate recognition of pathogens by dendritic cells
- Role of IL-10 in regulation of infection-induced immunopathology
- Interactions between HIV and parasitic and mycobacterial infections
- Role of p47GTPases in regulation of host resistance

Thomas B. Nutman, M.D.

Deputy Chief, Laboratory of Parasitic Diseases

Chief, Helminth Immunology Section, LPD

www.niaid.nih.gov/labs/aboutlabs/lpd/helminthImmunologySection/

tnutman@niaid.nih.gov

Dr. Nutman received his A.B. from Brown University and his M.D. from the University of Cincinnati College of Medicine. He did an internal medicine residency at New York University (Bellevue) and postdoctoral training in the Laboratory of Parasitic Diseases (LPD). He has been a tenured investigator in NIAID since 1989. He became the deputy chief of LPD in 2003.

Major Areas of Research

- Regulation of the host immune response to parasitic helminth infection (primarily filariasis, loiasis, and onchocerciasis)
- Mechanisms of eosinophil activation and eosinophilia
- Control of immediate hypersensitivity reactions
- Influence of helminth infection on expression of non-parasitic infections, atopy, and asthma

Yasmine Belkaid, Ph.D.

Chief, Mucosal Immunology Unit, LPD

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ybelkaid@niaid.nih.gov

Major Areas of Research

- Immunologic mechanisms induced by parasites to promote survival within their hosts
- Development of new intervention strategies
- *Leishmania major*
- *Cryptosporidium* and *Microsporidium* and *Toxoplasma spp*

Dr. Yasmine Belkaid obtained her Ph.D. in 1996 from the Pasteur Institute in France on innate responses to *Leishmania* infection. Following a postdoctoral fellowship at NIAID on immune regulation during *Leishmania* infection, she joined the Children's Hospital Research Foundation in Cincinnati as an assistant professor in 2002. In 2005, she joined the Laboratory of Parasitic Diseases as a tenure-track investigator.

Dennis M. Dwyer, Ph.D.

Chief, Cell Biology Section, LPD

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ddwyer@niaid.nih.gov

Major Areas of Research

- Cell biology: secretory and endocytic trafficking
- Biochemistry and physiology of surface membrane and secreted enzymes
- Molecular biology: gene structure/function and expression

Dr. Dwyer received his Ph.D. from the University of Massachusetts at Amherst for studies concerning the biochemistry and cell biology of several pathogenic protozoa. Following two years of postdoctoral research at The Rockefeller University and four years as an assistant professor at that institution, he joined the Laboratory of Parasitic Diseases in 1976 as a senior investigator. Concurrently, he has been an adjunct professor on the graduate faculties of The Rockefeller University, Cornell Medical College, and his alma mater. His research group focuses on the basic cell and molecular biology of *Leishmania*, an important protozoan pathogen of humans worldwide. He serves on several journal editorial boards and on various national and international grant-review panels.

Michael E. Grigg, Ph.D.

Chief, Molecular Parasitology Unit, LPD

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Dr. Grigg earned his B.Sc. in 1989 from the University of British Columbia, followed by his Ph.D. and D.I.C. in 1994 from the Imperial College of Science, Technology, and Medicine, London. From 1994 to 1997, Dr. Grigg was a Howard Hughes Medical Institute senior fellow at the University of Washington, until he earned a position as a postdoctoral scholar at Stanford University. In 2002, he became an assistant professor at the University of British Columbia. He became a tenure-track investigator at NIAID in 2006.

Major Areas of Research

- Investigation of *Toxoplasma* outbreaks associated with unusually severe clinical disease to assess the contribution of sexual meiosis in the evolution of new strains
- Functional genomic, genetic, and bioinformatic approaches to identify and characterize discrete virulence factors that contribute to disease pathogenesis
- Bioimaging the host-pathogen interaction *in vivo* using real-time molecular imaging and *in situ* within anatomically intact host tissues to visualize host immune cells responding to parasite-infected targets
- Gene expression, structural, and immunological analyses of parasite cell-surface antigens that regulate host immunity and contribute to parasite infectivity

Theodore E. Nash, M.D.

Chief, Gastrointestinal Parasites Section, LPD

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tnash@niaid.nih.gov

Dr. Nash received his M.D. from the University of Miami in 1968 and completed his internship and residency at Duke University. In 1970, he was appointed a fellow in the NIAID Laboratory of Clinical Investigation and, in 1973, became a staff fellow in the Laboratory of Parasitic Diseases (LPD). After an infectious disease fellowship at the Beth Israel-Children's Hospital in Boston and a fellowship in biological chemistry at Harvard University, he returned to LPD as a senior scientist in 1976. He currently heads the Gastrointestinal Parasites Section.

Major Areas of Research

- Treatment of neurocysticercosis
- Natural history, disease association, morbidity, prevention, and treatment of perilesional edema episodes associated with calcific cysticercosis
- Development of model cestodes infection to determine best treatments for neurocysticercosis
- Immune response associated with treatment and measures to ameliorate acute inflammatory responses
- Antigenic variation in *Giardia*, cellular biology, and differences among *Giardia* groups/isolates

David L. Sacks, Ph.D.

Chief, Intracellular Parasite Biology Section, LPD

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dsacks@niaid.nih.gov

Major Areas of Research

- Study of parasite and sand fly molecules controlling the development of transmissible infections in the vector
- Development of vaccines against leishmaniasis and their evaluation using infected sand fly challenge
- Mechanisms of acquired resistance and those controlling persistent infection
- Mechanisms underlying pathogenesis and immunosuppression in human visceral leishmaniasis and development of immune-based therapies

Dr. Sacks obtained his Ph.D. from Harvard University for studies on immune responses to chlamydial infections. Following a postdoctoral fellowship at the National Institute for Medical Research in London (Mill Hill) studying immune suppression in African trypanosomiasis, he joined the Laboratory of Parasitic Diseases in 1980. He became a senior investigator in 1986.

Thomas A. Wynn, Ph.D.

Chief, Immunopathogenesis Section, LPD

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twynn@niaid.nih.gov

Major Areas of Research

- Pathogenesis of schistosomiasis-induced liver fibrosis
- Basic mechanisms of inflammation and fibrosis in rodents and humans
- Asthma
- Pulmonary fibrosis

Dr. Wynn obtained his Ph.D. from the University of Wisconsin-Madison Medical School in the department of microbiology and immunology. He is a member of the American Association of Immunologists and the American Society of Tropical Medicine and Hygiene. Dr. Wynn is the recipient of the Oswaldo Cruz Medal and the NIH Certificate of Merit. He joined the Laboratory of Parasitic Diseases in 1991.

Laboratory of Persistent Viral Diseases

Bruce W. Chesebro, M.D., Chief

www.niaid.nih.gov/labs/aboutlabs/lpvd/

406-363-9354

Sections and Units

Office of the Chief
Bruce W. Chesebro, M.D.

TSE/Prion and Retroviral Pathogenesis Section
Bruce W. Chesebro, M.D.

TSE/Prion Cell Biology Section
Gerald S. Baron, Ph.D.

TSE/Prion Biochemistry Section
Byron Caughey, Ph.D.

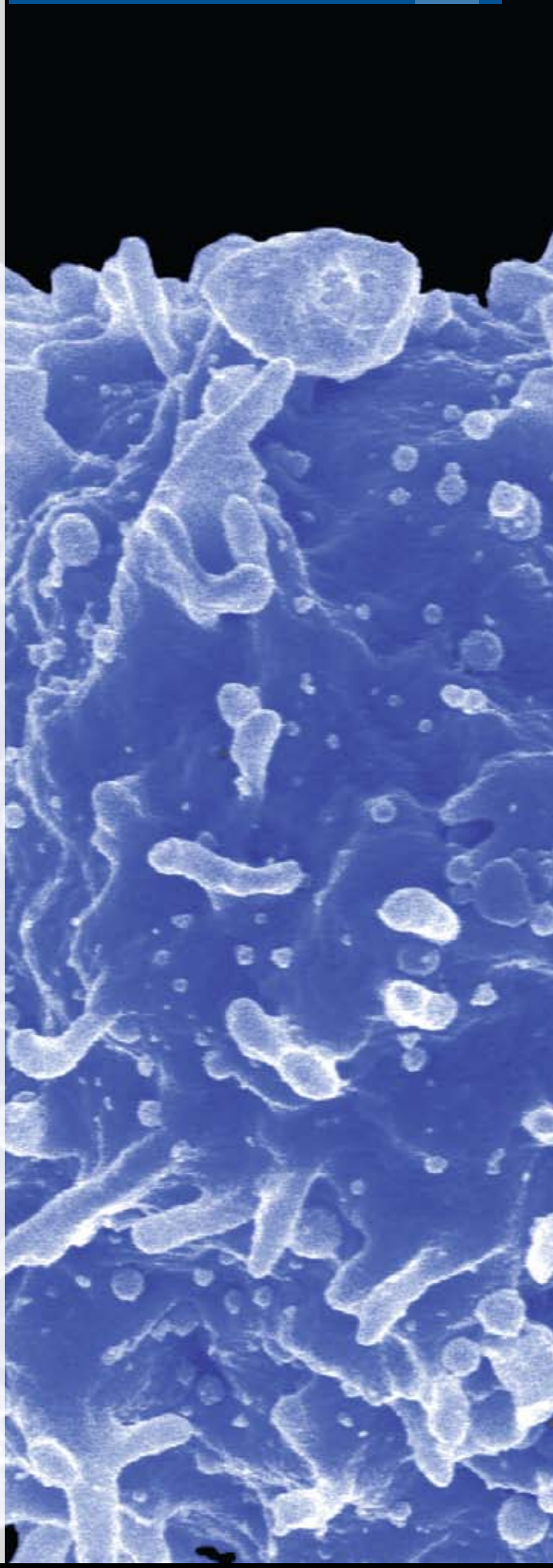
Retroviral Molecular Biology Section
Leonard H. Evans, Ph.D.

Retroviral Immunology Section
Kim J. Hasenkrug, Ph.D.

Retroviral Neuroimmunology Section
Karin Peterson, Ph.D.

Retroviral Neuropathogenesis Section
John L. Portis, M.D.

TSE/Prion Molecular Biology Section
Suzette A. Priola, Ph.D.



Research Activities

The Laboratory of Persistent Viral Diseases (LPVD) studies persistent active, latent viral, and prion disease infections. Investigators place particular emphasis on persistent infections of the nervous system and of the hemopoietic and lymphoid systems. The laboratory is also studying the roles of persistent infection in the development of retrovirus-induced immunosuppression. Models being examined include prion diseases of various species and murine and human retroviruses.

The major research goals of the laboratory are to understand basic pathogenic mechanisms induced by these infections, to study immune or other defense mechanisms used by infected individuals against infections, and to develop drug therapies capable of reducing or eliminating such infections.

Bruce W. Chesebro, M.D.

Chief, Laboratory of Persistent Viral Diseases

Chief, TSE/Prion and Retroviral Pathogenesis Section, LPVD

www.niaid.nih.gov/labs/aboutlabs/lpvd/TSEPrionRetroviralPathogenesisSection/

bchesebro@nih.gov

Major Areas of Research

- Transmissible spongiform encephalopathies (TSEs), or prion diseases
- Retroviral brain diseases

Dr. Chesebro received his M.D. from Harvard Medical School in 1968. He completed postdoctoral studies at the Karolinska Institute, Sweden, in 1967; at Stanford University from 1968 to 1970; and at the National Institute of Arthritis and Metabolic Diseases from 1970 to 1972. He came to NIAID's Rocky Mountain Laboratories in 1972 and became the chief of the Laboratory of Persistent Viral Diseases in 1979.

Gerald S. Baron, Ph.D.

Chief, TSE/Prion Cell Biology Section, LPVD

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gbaron@niaid.nih.gov

Major Areas of Research

- TSEs or prion diseases
- Determining mechanisms of infection, intra- and intercellular transport of TSE agents, and neurodegeneration
- Defining the nature of the TSE agent

Dr. Baron received his Ph.D. in biochemistry in 1998 from the University of Victoria, Canada, studying genes required for intramacrophage growth of the facultative intracellular bacterium *Francisella tularensis*. He conducted his postdoctoral research on prions and TSEs in the laboratory of Dr. Byron Caughey at NIAID's Rocky Mountain Laboratories. In 2005, he established an independent laboratory as a tenure-track investigator.

Byron Caughey, Ph.D.

Chief, TSE/Prion Biochemistry Section, LPVD

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bcaughey@nih.gov

Dr. Caughey received his Ph.D. in biochemistry from the University of Wisconsin-Madison in 1985 and completed postdoctoral studies in pharmacology at Duke University Medical Center from 1985 to 1986. He has conducted TSE/prion research in the Laboratory of Persistent Viral Diseases since 1986. He became a tenured senior investigator in 1994.

Major Area of Research

- TSEs (prion diseases)
- Prion structure, amplification and detection, and disease prevention and therapeutics
- Prion protein functions and protein cell biology
- Protein-folding diseases

Leonard H. Evans, Ph.D.

Chief, Retroviral Molecular Biology Section, LPVD

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levans@niaid.nih.gov

Dr. Evans received his Ph.D. in biochemistry in 1977 at the Oregon Health Sciences University in Portland. He did postdoctoral studies on the genetic structure of retroviruses in the department of molecular and cellular biology at the University of California-Berkeley from 1977 until 1980. In 1980, he joined NIAID's Rocky Mountain Laboratories, where he is currently a senior investigator in the Laboratory of Persistent Viral Diseases.

Major Areas of Research

- Mixed retrovirus infections
- Interactions of exogenous retroviruses with their endogenous counterparts
- Genetic alterations of retroviruses and their role in disease
- Retroviral vectors for gene delivery

Kim J. Hasenkrug, Ph.D.

Chief, Retroviral Immunology Section, LPVD

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khasenkrug@nih.gov

Major Areas of Research

- Mechanisms of vaccine protection against retroviral infection
- Chronic retroviral infections: immunological control, regulatory T cells, immunomodulation, and therapeutics
- Mechanisms of genetic resistance to retroviral disease

Dr. Hasenkrug received his Ph.D. in cell biology from the Albert Einstein College of Medicine in 1991 and conducted his postdoctoral research in the laboratory of Dr. Bruce Chesebro at NIAID's Rocky Mountain Laboratories. In 1998, he established an independent laboratory to study retroviral immunology and mechanisms of vaccine protection. A special focus of his work has been the study of chronic viral infections and the development of therapeutics to cure them. Dr. Hasenkrug serves as an affiliated associate professor at Montana State University and as a scientific advisor for the International AIDS Vaccine Initiative. He also serves on the editorial boards of *Virology* and the *Journal of Virology.*

Karin Peterson, Ph.D.

Chief, Neuroimmunology Section, LPVD

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Major Areas of Research

- Impact of the innate immune response on viral pathogenesis in the central nervous system
- Response of glial cells following virus infection or toll-like receptor stimulation
- Interaction between toll-like receptors in regulating glial cell activation to virus infection
- Experimental procedures such as real-time PCR, *in situ* hybridization, immunohistochemistry, multiplex bead arrays, and use of knockout mice to study the contribution of specific genes to neuroinflammatory responses

Dr. Peterson earned her B.S. in 1992 from the University of Wisconsin-River Falls and her Ph.D. in 1998 from the University of Missouri-Columbia. From 1998 to 2003, she did a postdoctoral fellowship in the Laboratory of Persistent Viral Diseases (LPVD). She then served as assistant professor in the department of pathobiological sciences in the School of Veterinary Medicine at Louisiana State University. She returned to LPVD as a tenure-track investigator in July 2008.

John L. Portis, M.D.

Chief, Retroviral Neuropathogenesis Section, LPVD

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Dr. Portis received his M.D. in 1971 from the University of California-Los Angeles School of Medicine, where he also completed his residency training in pathology. He joined NIAID's Rocky Mountain Laboratories in 1976 and is a senior investigator in the Laboratory of Persistent Viral Diseases. His research interests focus on the virus-host interactions driving the neuropathologies induced by retroviral infection of the central nervous system. He is a faculty affiliate at the University of Montana and has participated in its graduate program.

Major Areas of Research

- Mechanisms of murine neuronal injury following retroviral infection
- Cellular stress responses linked to neurodegenerative diseases

Suzette A. Priola, Ph.D.

Chief, TSE/Prion Molecular Biology Section, LPVD

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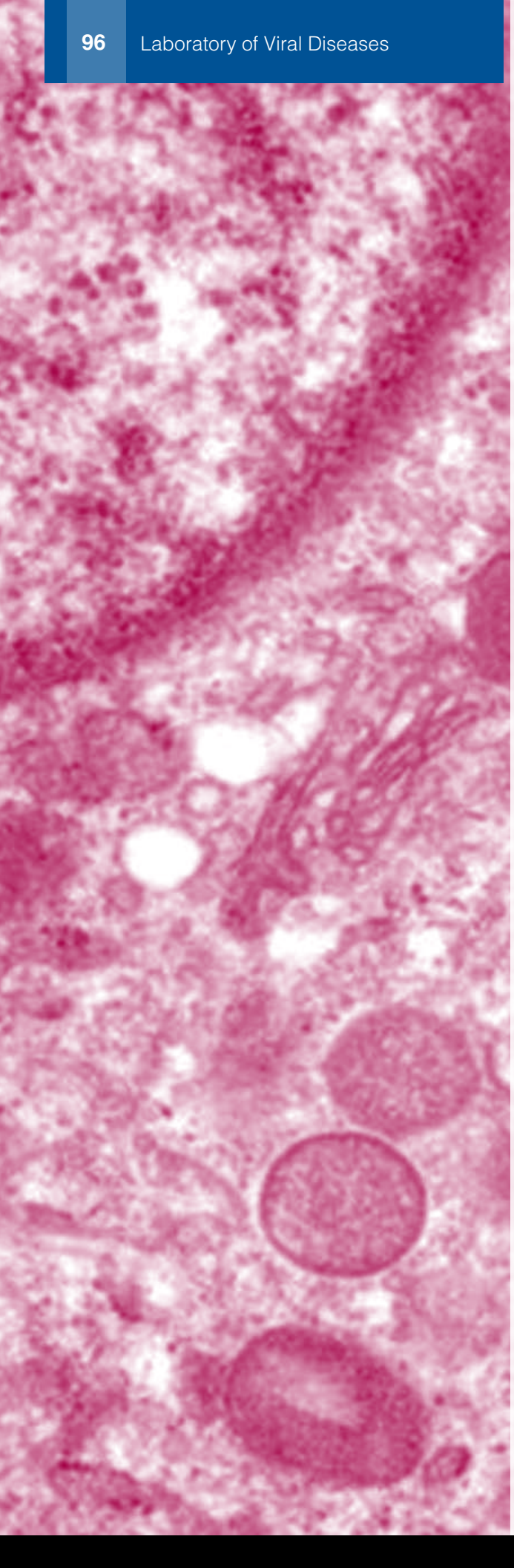
spriola@nih.gov

Dr. Priola received her Ph.D. in microbiology and immunology in 1990 from the University of California-Los Angeles. In 1991, she joined NIAID's Rocky Mountain Laboratories, where she is now a senior investigator. She is currently chief of the TSE/Prion Molecular Biology Section and serves on the editorial boards of both the *Journal of Biological Chemistry* and *Virology*.

Major Areas of Research

- TSEs
- Molecular mechanisms of neurodegenerative diseases



Laboratory of Viral Diseases

Bernard Moss, M.D., Ph.D., Chief
www.niaid.nih.gov/labs/aboutlabs/lvd/
301-496-9869

Sections and Units

Office of the Chief
Bernard Moss, M.D., Ph.D.

Genetic Engineering Section
Bernard Moss, M.D., Ph.D.

DNA Tumor Virus Section
Alison McBride, Ph.D.

Viral Immunology Section
Jack R. Bennink, Ph.D.

Molecular Structure Section
Edward A. Berger, Ph.D.

Molecular Genetics Section
Thomas M. Kristie, Ph.D.

Viral Pathogenesis Section
Ted C. Pierson, Ph.D.

Cellular Biology Section
Jonathan W. Yewdell, M.D., Ph.D.

Research Activities

The Laboratory of Viral Diseases (LVD) investigates the molecular biology of viruses, the interactions of viruses with host cells, the pathogenesis of viral diseases, and host defense mechanisms. The studies are designed to increase fundamental knowledge, as well as to facilitate the development of new approaches to the prevention and treatment of disease. Current topics of basic research include viral entry into cells, regulation of gene expression, mechanisms of DNA replication, assembly and transport of viral proteins and particles, actions of viral growth factors and immune defense molecules, determinants of viral virulence, and viral targets of humoral and cellular immunity.

Applied areas of research include development of recombinant expression vectors, candidate vaccines, and antiviral agents. These studies involve a wide range of DNA and RNA viruses including HIV, poxviruses, herpesviruses, papillomaviruses, influenza, West Nile, and dengue.

The laboratory is well equipped with an electron microscope, confocal microscopes, a small-animal imaging system, FACS machines, DNA sequencers, PCR machines, Biacore apparati, ultracentrifuges, and other standard items. The members of the laboratory are interactive and hold weekly seminars in which current research is presented and discussed.

Bernard Moss, M.D., Ph.D.

Chief, Laboratory of Viral Diseases

Chief, Genetic Engineering Section, LVD

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bmoss@nih.gov

Dr. Moss received his M.D. from the New York University School of Medicine; interned at the Children's Hospital Medical Center, Boston; and then earned a Ph.D. in biochemistry from the Massachusetts Institute of Technology. He has received numerous awards and prizes, including the Dickson Prize for Medical Research, the Invitrogen Eukaryotic Expression Award, the ICN International Prize in Virology, the Taylor International Prize in Medicine, and the Bristol-Myers Squibb Award for Distinguished Achievement in Infectious Disease Research. He has been elected to the National Academy of Sciences and to the American Academy of Microbiology. He is a fellow of the American Association for the Advancement of Science and a past president of the American Society for Virology.

Dr. Moss is currently an editor of *Virology* and a member of the editorial boards of the *Journal of Virology, AIDS Research and Human Retroviruses, Current Opinion in Biotechnology, Advances in Virus Research,* and *The NIH Catalyst*. He is an adjunct professor at George Washington University and the University of Maryland.

Major Areas of Research

- Replication of poxviruses
- Viral immune defense proteins
- Recombinant vaccines

Alison McBride, Ph.D.

Chief, DNA Tumor Virus Section, LVD

www.niaid.nih.gov/labs/aboutlabs/lvd/dnaTumorVirusSection/

alison_mcbride@nih.gov

Dr. McBride received a B.Sc. in molecular biology from the University of Glasgow, Scotland, in 1981. In 1986, she received a Ph.D. in biochemistry from the Imperial Cancer Research Fund and Imperial College, University of London, where she studied Epstein-Barr virus. Dr. McBride was a postdoctoral fellow and research associate at the National Cancer Institute before joining the Laboratory of Viral Diseases in 1994. She became a senior investigator and chief of the DNA Tumor Virus Section in 2000.

Major Areas of Research

- Papillomaviruses
- DNA replication and viral genome partitioning
- Keratinocyte biology

Jack R. Bennink, Ph.D.

Chief, Viral Immunology Section, LVD

www.niaid.nih.gov/labs/aboutlabs/lvd/cellBiologyAndViralImmunologySection/

jbennink@niaid.nih.gov

Major Areas of Research

- Discovery and definition of basic cellular processes involved in the generation of MHC class I peptide ligands
- Study of the underlying *in vivo* cellular events that lead to presentation of viral antigens to CD8+ T cells and the regulation of antiviral CD8+ T-cell responses

Dr. Bennink obtained his Ph.D. from the University of Pennsylvania for the study of the specificity of virus immune effector T cells. He spent two years as a member of the Basel Institute for Immunology, followed by five years as assistant and associate professor at the Wistar Institute of Anatomy and Biology, before coming to the Laboratory of Viral Diseases in 1987. His research focuses on antigen processing and presentation to class I restricted antiviral T cells.

Edward A. Berger, Ph.D.

Chief, Molecular Structure Section, LVD

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edward_berger@nih.gov

Major Areas of Research

- Mechanisms of viral Env glycoprotein-receptor interactions (HIV, herpesviruses, flaviviruses, etc.)
- Novel treatment and prevention strategies based on viral Env glycoprotein-receptor interactions

Dr. Berger earned his B.S. in chemistry from City College of the City University of New York in 1968. He received his Ph.D. in biochemistry and molecular biology in 1973 from Cornell University. He went on to do a postdoctoral fellowship in the department of genetics, biochemistry, and neurobiology at Stanford University School of Medicine from 1973 to 1976 and another fellowship in the department of cellular and developmental immunology at Scripps Clinic and Research Foundation, La Jolla, CA, from 1976 to 1977. He was a staff scientist with the Cell Biology Group at the Worcester Foundation for Experimental Biology, Shrewsbury, MA, from 1977 to 1987. He joined the Laboratory of Viral Diseases in 1987 and became chief of the Molecular Structure Section in 1995.

Thomas M. Kristie, Ph.D.

Chief, Molecular Genetics Section, LVD

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tkristie@niaid.nih.gov

Dr. Kristie received his B.S. in biology from Fairfield University in 1981. He received his Ph.D. from the Committee on Virology at the University of Chicago for his work with Dr. Bernard Roizman on the regulation of herpes simplex virus gene expression. As a postdoctoral fellow with Dr. Philip Sharp at the Center for Cancer Research, Massachusetts Institute of Technology, Dr. Kristie focused on the interaction of components involved in the formation of transcriptional enhancer complexes. Dr. Kristie joined the Laboratory of Viral Diseases in 1993.

Major Areas of Research

- Herpes simplex virus gene expression
- Transcriptional coactivators in herpesvirus lytic and latency reactivation
- Mechanisms involved in RNAP II-mediated gene transcription

Ted C. Pierson, Ph.D.

Chief, Viral Pathogenesis Section, LVD

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piersontc@niaid.nih.gov

Dr. Pierson received his Ph.D. from The Johns Hopkins School of Medicine in 2001. While training in the laboratory of Dr. Robert F. Siliciano, Dr. Pierson investigated the molecular biology of the pre-integration state of HIV-1 latency and the contribution of this relatively labile reservoir toward the persistence of HIV-1 in the face of aggressive antiretroviral therapy. After completing these studies, Dr. Pierson took a postdoctoral fellowship in the laboratory of Dr. Robert W. Doms in the department of microbiology at the University of Pennsylvania. While training there, Dr. Pierson initiated a new research program to study the cell biology of the envelope proteins of flaviviruses, with a focus on West Nile virus and dengue viruses. In 2004, this research program was awarded a grant from the Pediatric Dengue Vaccine Initiative to support studies of the neutralizing antibody response of individuals infected with dengue. In 2005, Dr. Pierson was recruited to initiate the Viral Pathogenesis Section of the Laboratory of Viral Diseases.

Major Areas of Research

- Identification of the interactions between the envelope glycoproteins of flaviviruses and host cells that are required to promote virus entry
- Definition in quantitative and mechanistic terms of the factors that govern the potency of neutralizing antibodies and define the risk of antibody-mediated enhancement of infection

Jonathan W. Yewdell, M.D., Ph.D.
Chief, Cellular Biology Section, LVD

www.niaid.nih.gov/labs/aboutlabs/lvd/cellBiologyAndViralImmunologySection/

jyewdell@niaid.nih.gov

Major Areas of Research

- Generation of MHC class I peptide ligands from endogenous and exogenous antigens
- Immunodominance in antiviral B- and T-cell responses
- Vital imaging of adaptive and innate antiviral immune responses using multiphoton microscopy
- Antigenic variation in influenza A virus hemagglutinin
- Function of the influenza A virus accessory protein PB1-F2

Dr. Yewdell received an A.B. in biochemistry from Princeton University in 1975, writing his undergraduate thesis with Dr. Arnold Levine on immune recognition of virus-transformed cells. He received an M.D. and a Ph.D. in immunology from the University of Pennsylvania in 1981, working with Dr. Walter Gerhard on the generation and characterization of antiviral monoclonal antibodies. As a postdoctoral fellow, he worked with Dr. David Lane at the Imperial College, London, studying the newly discovered p53 protein. From 1983 to 1987, he was assistant professor at the Wistar Institute in Philadelphia. In 1987, Dr. Yewdell joined the Laboratory of Viral Diseases and in 1993 was asked to lead the Cellular Biology Section.

Laboratory of Virology

Heinz Feldmann, M.D., Ph.D., Chief
www.niaid.nih.gov/labs/aboutlabs/LV/
406-375-7410

Sections and Units

Office of the Chief
Heinz Feldmann, M.D., Ph.D.

Disease Modeling and Transmission Section
Heinz Feldmann, M.D., Ph.D.

Tickborne Flavivirus Pathogenesis Section
Marshall E. Bloom, M.D.

Research Activities

The Laboratory of Virology (LV) conducts innovative scientific research on viral agents requiring high or maximum biocontainment, BSL-2 to BSL-4. These agents include filoviruses, bunyaviruses, arenaviruses, and flaviviruses. Research studies focus on vector/reservoir transmission, viral ecology, pathogenesis, pathophysiology, and host immune response of these viral pathogens.

LV scientists broadly study viral pathogens that cause hemorrhagic fevers, encephalitis, and certain respiratory diseases. This work employs investigations in cell culture and animal models—including nonhuman primates, reservoir species, and arthropod hosts—to elucidate viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions. In particular, LV scientists do the following:

- Study pathogenesis and pathophysiology of high-containment viral pathogens by using molecular technologies, including reverse genetics
- Study immune responses to infection and vaccination of high-containment viral pathogens and develop new vaccine candidates
- Study vector/reservoir transmission of high-containment viral pathogens by using appropriate animal models
- Use *in vitro* and *in vivo* systems to study the interactions between viral pathogens or viral components and host cells and to develop new antiviral strategies
- Study the epidemiology and ecology of high-containment pathogens using newly developed rapid, sensitive, and specific diagnostic test systems, including those that can be applied under field conditions

Heinz Feldmann, M.D., Ph.D.

Chief, Laboratory of Virology

Chief, Disease Modeling and Transmission Section, LV

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feldmannh@niaid.nih.gov

Major Areas of Research

- Filoviruses, arenaviruses, bunyaviruses, and flaviviruses
- Vector/reservoir transmission, pathogenesis, pathophysiology, host immune response, and virus biology
- Diagnostics, therapeutics, and vaccines

Dr. Feldmann earned his M.Sc. in 1981, his M.D. in 1987, and his Ph.D. in virology in 1988—all from Justus-Liebig University, Germany. He worked as a research fellow at the Institute of Virology, Philipps University of Marburg, Germany, and at the CDC in Atlanta. He held positions as assistant and associate professor at the Philipps University until 1999 and, since 2000, at the University of Manitoba in Winnipeg, Canada. In 1999, he became chief of the Special Pathogens Program in the National Microbiology Laboratory of the Public Health Agency of Canada. Dr. Feldmann came to NIAID as chief of the newly formed Laboratory of Virology in August 2008. Dr. Feldmann is the recipient of numerous awards and serves as the editor for *Archives of Virology* and on the editorial boards of several virology and infectious disease journals. He is an expert on high- and maximum-containment viral pathogens and serves as a consultant in that field for the World Health Organization.

Marshall E. Bloom, M.D.

Associate Director, RML

Chief, Tickborne Flavivirus Pathogenesis Section, LV

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mbloom@niaid.nih.gov

Major Areas of Research

- Interactions between tickborne encephalitis viruses and innate immune responses, including interferon and apoptosis signaling pathways
- Viral determinants of neurovirulence and neuroinvasiveness
- Viral determinants of effective vertical (through the tick life stages) and horizontal (from tick to mammalian host) transmission

Dr. Bloom received his M.D. in 1971 from Washington University School of Medicine in St. Louis and joined NIAID's Rocky Mountain Laboratories (RML) in 1972 as a research associate. From 1975 to 1977, he was a postdoctoral fellow in the NIAID Laboratory of the Biology of Viruses in Bethesda, MD. He returned to RML as a tenured investigator in 1977 and was a charter member of the Laboratory of Persistent Viral Diseases. He is a world expert in the molecular biology and pathogenesis of parvoviruses and has spent much of his career studying Aleutian mink disease parvovirus. In 2004, Dr. Bloom's research group changed its focus to the pathogenesis of tickborne flaviviruses and, in 2008, joined the newly formed Laboratory of Virology. Dr. Bloom is also the associate director for RML in NIAID's Division of Intramural Research, a position he has held since 2002. He serves on the editorial board of *Virology.*

Laboratory of Zoonotic Pathogens

Tom G. Schwan, Ph.D., Chief
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Sections and Units

Office of the Chief
Tom G. Schwan, Ph.D.

Medical Entomology Section
Tom G. Schwan, Ph.D.

Gene Regulation Section
Frank Gherardini, Ph.D.

Plague Section
B. Joseph Hinnebusch, Ph.D.

Molecular Genetics Section
Patricia Rosa, Ph.D.

Research Activities

Scientists in the Laboratory of Zoonotic Pathogens (LZP) study diseases that are communicable from animals to humans. Specifically, LZP scientists do the following:

- Conduct research to delineate the molecular basis of interaction between pathogens and their arthropod vectors
- Define and identify pathogen and vector molecules that contribute to successful completion of pathogen transmission
- Conduct research to examine differential gene regulation of pathogens during their transmission cycle in vertebrate hosts and arthropod vectors
- Search for antigens to improve serological tests for the laboratory confirmation of zoonotic pathogens
- Maintain research expertise in tick and flea biology as needed for their involvement in pathogen maintenance and transmission

Tom G. Schwan, Ph.D.

Chief, Laboratory of Zoonotic Pathogens

Chief, Medical Entomology Section, LZP

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Major Areas of Research

- Adaptations of *Borrelia* spirochetes in ticks
- Genetic diversity of Lyme disease and relapsing fever spirochetes
- Development of better serological tests for human spirochetal infection
- Genomic studies of relapsing fever spirochetes
- Elucidation of geographic areas at risk for relapsing fever

Dr. Schwan received his Ph.D. in 1983 in parasitology from the University of California-Berkeley, studying the ecology of fleas and plague in Lake Nakuru National Park, Kenya. From 1983 to 1986, he was a postdoctoral fellow at the Yale Arbovirus Research Unit, Yale University School of Medicine, studying tickborne viruses. He joined NIAID's Rocky Mountain Laboratories in 1986. He served on the editorial board of the *Journal of Clinical Microbiology* for nine years and is on the editorial boards of *Vector Borne and Zoonotic Diseases* and *Emerging Infectious Diseases*.

Frank Gherardini, Ph.D.

Chief, Gene Regulation Section, LZP

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Major Areas of Research

- Physiology, biochemistry, gene regulation, and pathogenesis of *Borrelia burgdorferi*
- *Treponema pallidum*
- *Burkholderia mallei*
- Identification of genes required for intracellular survival of *Burkholderia pseudomallei*

Dr. Gherardini received his doctorate in 1987 from the University of Illinois, studying enzymes involved in the use of galactomannans by *Bacteroides ovatus.* From 1991 to 2001, he was on the faculty in the department of microbiology at the University of Georgia. In 2001, Dr. Gherardini joined NIAID's Rocky Mountain Laboratories, where he is currently a senior investigator in the Laboratory of Zoonotic Pathogens.

B. Joseph Hinnebusch, Ph.D.

Chief, Plague Section, LZP

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Dr. Hinnebusch received his Ph.D. in microbiology in 1991 from the University of Texas Health Science Center-San Antonio, studying the molecular structure and replication of linear plasmids of *Borrelia burgdorferi*, the arthropod-borne bacterial agent of Lyme disease. He joined NIAID's Rocky Mountain Laboratories as a postdoctoral fellow in 1992, where he developed model systems to study the transmission of *Yersinia pestis*, the bacterial agent of bubonic and pneumonic plague. He advanced to a tenure-track investigator position in 2001 and is now a senior investigator and chief of the Plague Section in the Laboratory of Zoonotic Pathogens. From 2002 to 2006, he was the recipient of a New Scholar Award in Global Infectious Diseases from the Ellison Medical Foundation.

Major Areas of Research

- Interactions of *Y. pestis* with its rat flea vector *Xenopsylla cheopis* that lead to transmission
- Mechanisms of *Y. pestis* pathogenicity and immune evasion
- Aspects of the flea-bacteria-host transmission interface that influence nascent infection and immunity
- Characterization of a protective immune response to plague; new plague vaccines and diagnostics

Patricia A. Rosa, Ph.D.

Chief, Molecular Genetics Section, LZP

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Dr. Rosa received her doctorate in 1980 from the Institute of Molecular Biology at the University of Oregon. Following research fellowships at Washington University School of Medicine in St. Louis, and at the Research Institute of Scripps Clinic in La Jolla, CA, Dr. Rosa joined NIAID's Rocky Mountain Laboratories in 1988. She became a tenured investigator in 2000 and joined the newly formed Laboratory of Zoonotic Pathogens in 2005. Dr. Rosa is a fellow in the American Academy of Microbiology and an internationally recognized leader in the field of bacterial molecular genetics.

Major Areas of Research

- Development of basic genetic tools to manipulate borrelial genes of interest
- Study of the structure and function of the segmented genome of the Lyme disease spirochete
- Determination of how the Lyme disease spirochete infects and is transmitted between its tick vector and mammalian host

Malaria Vaccine Development Branch

Louis H. Miller, M.D., Chief
www.niaid.nih.gov/labs/aboutlabs/mvdb/
301-435-3405

Sections and Units

Office of the Chief
Louis H. Miller, M.D.

Research Activities

The Malaria Vaccine Development Branch (MVDB) was commissioned in 2001 to research, develop, and produce prototype malaria vaccines and to conduct early-phase clinical trials of promising vaccine candidates. The overarching goal is to develop malaria vaccines that will reduce severe disease and death among African children and eliminate malaria from low-transmission areas of the world.

MVDB has an organizational structure and vaccine development strategy that allows it to operate more like a small biotech firm than a typical research laboratory. Specialists in each step of the development process, from antigen selection to clinical trials, contribute their expertise as the candidate moves along the development pathway. This process allows multiple vaccine candidates to move from concept to clinical trials efficiently and rapidly. Objectives of the branch are as follows:

- Develop strategies for asexual blood-stage, transmission-blocking, and pre-erythrocytic-stage vaccines
- Produce and formulate antigens
- Develop assays and animal trials that define the potential for protection
- Establish clinical trials to test vaccines in the United States and in the developing world
- Establish scientific collaborations and outside funding to accelerate the program

Louis H. Miller, M.D.

Chief, Malaria Vaccine Development Branch

Chief, Malaria Cell Biology Section,
Laboratory of Malaria and Vector Research

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Dr. Miller received his B.S. from Haverford College, PA; his M.S. from Columbia University; and his M.D. from Washington University, St. Louis. He then served as a medical resident at Montifiore Hospital, NY, and as an intern and resident at Mount Sinai Hospital, NY.

He is a member of the Association of American Physicians, American Society of Clinical Investigation, American Society of Tropical Medicine and Hygiene, Royal Society of Tropical Medicine and Hygiene, National Academy of Sciences, and Institute of Medicine.

Major Areas of Research

- Mechanism by which malaria parasites invade erythrocytes, including the study of parasite ligands and erythrocyte receptors
- Mechanism of antigenic variation
- Molecular basis for cerebral malaria and rosetting
- Study of binding of parasitized erythrocytes in placenta

Program in Systems Immunology and Infectious Disease Modeling

Ronald N. Germain, M.D., Ph.D., Director

www.niaid.nih.gov/labs/aboutlabs/psiim/

301-496-1904

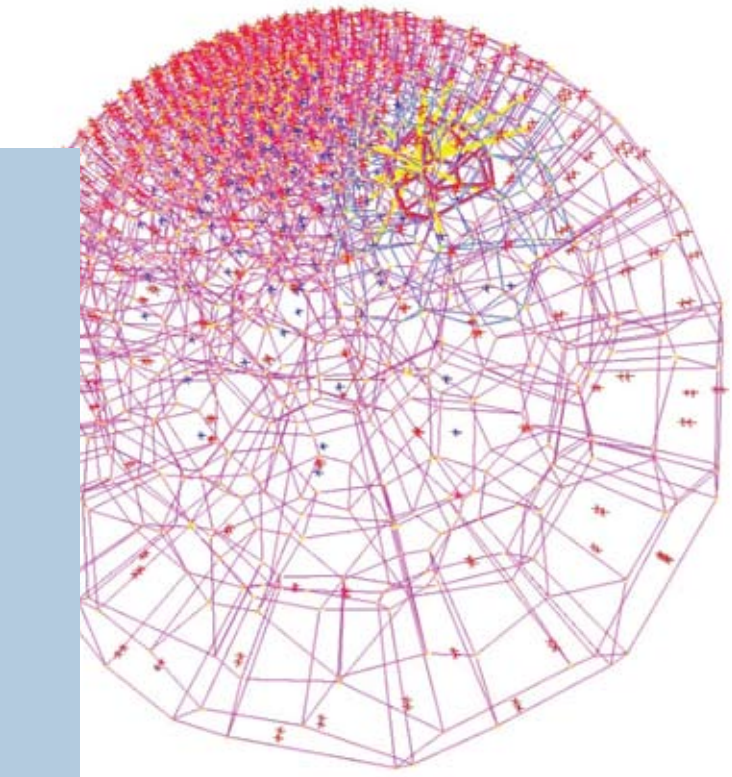
Program Teams

Office of the Director
Ronald N. Germain, M.D., Ph.D.

Immunology Team
Ronald N. Germain, M.D., Ph.D.

Molecular and Cell Biology
Iain Fraser, Ph.D.

Computational Biology
Martin Meier-Schellersheim, Ph.D.



Research Activities

Modern technology now allows the analysis of immune responses and host-pathogen interactions at a global level, across scales ranging from intracellular signaling networks to individual cell behavior to the functioning of a tissue, an organ, and the whole organism. The challenge is not only to collect the large amounts of data such methods permit, but also to organize the information in a manner that enhances our understanding of how the immune system operates or how pathogens affect their hosts.

To do this, it is necessary to develop detailed quantitative models that can be used to predict the behavior of a complex biological system, whose properties help explain the mechanistic basis for physiological and pathological responses to infection or vaccination and can be used to design new therapies or vaccines.

Achieving this goal requires an interdisciplinary effort, and the Program in Systems Immunology and Infectious Disease Modeling (PSIIM) is designed to address this challenge. PSIIM is an integrated group of scientists and support staff, rather than a collection of independent laboratories. Within PSIIM are teams with expertise in computational biology, bioinformatics, proteomics, cell biology, immunology, and infectious diseases. Teams have access to the latest technology for gene expression profiling, high-content screening of RNAi libraries for the discovery of pathway components, high-throughput proteomic and genomic analysis, imaging tools, and an extensive computer infrastructure. They will have access to BSL-3 facilities for working with infectious agents of high priority for human health.

Although PSIIM has been established within NIAID, it is expected to play a major role in fostering the growth of systems biology efforts across NIH, through its development of new software tools for complex systems modeling and high-throughput screening. PSIIM team members are expected to become involved in an extensive web of formal and informal interactions with other intramural NIH scientists and with extramural groups in the United States and abroad that have a common interest in a systems approach to biology.

Ronald N. Germain, M.D., Ph.D.

Director, Program in Systems Immunology and Infectious Disease Modeling

Deputy Chief, Laboratory of Immunology

Chief, Lymphocyte Biology Section, LI

www.niaid.nih.gov/labs/aboutlabs/psiim/

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Dr. Germain received his Sc.B. and Sc.M. from Brown University in 1970 and his M.D. and Ph.D. from Harvard Medical School and Harvard University in 1976. From 1976 to 1982, he served as an instructor, assistant professor, and associate professor of pathology at Harvard Medical School. From 1982 to 1987, he worked as a senior investigator in the NIAID Laboratory of Immunology (LI). In 1987, he was appointed chief of the Lymphocyte Biology Section in LI. Since 1994, Dr. Germain has also served as deputy chief of LI. In 2006, he became director of the Program in Systems Immunology and Infectious Disease Modeling.

Major Areas of Research

- Modeling of T-cell antigen discrimination
- Transcriptional analysis and modeling of host-pathogen interactions, especially influenza infection
- High-throughput RNAi analysis and modeling of toll-like receptor and nod-like receptor signaling pathways
- Integrated multimodal analysis and multiscale modeling of CD4+ T-cell effector differentiation

Iain Fraser, Ph.D.

Team Leader, Cell and Molecular Biology Team, PSIIM

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Dr. Fraser received his B.S. in biochemistry from Heriot-Watt University, Edinburgh, Scotland, in 1990 and his Ph.D. in biochemistry from Imperial College, University of London, in 1995. He was a Wellcome Trust International postdoctoral fellow at the Vollum Institute in Portland, OR, from 1996 to 1999. He joined the Alliance for Cellular Signaling (AfCS) research consortium in 2000 as lead scientist of the molecular biology group at the California Institute of Technology and became co-director of the AfCS Molecular Biology Laboratory in 2005. He joined NIAID as leader of the PSIIM Molecular and Cell Biology Team in 2008.

Major Areas of Research

- Application of RNAi technology to the identification of signaling network components in immune cells
- Design and implementation of high-throughput and high-content assays to facilitate computational modeling of immune cell function
- Analysis and modeling of signaling pathway interactions in complex systems

Martin Meier-Schellersheim, Ph.D.

Team Leader, Computational Biology Team, PSIIM

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Dr. Meier-Schellersheim obtained a master's degree in physics in 1997 and a Ph.D. in 2001 from the University of Hamburg, Germany. His research focuses on building a bridge between experimental and computational cell biology through the development and application of modeling tools that combine accessible graphical interfaces with the capability to perform spatially and temporally highly resolved simulations, even for models of complex cellular signaling processes.

Major Areas of Research

- Computational modeling and simulation of intra- and intercellular signaling processes
- Exploration of how intra-cellular reaction-diffusion processes determine cellular communication and behavior by using a combination of agent-based techniques and discretized partial differential equations
- Investigation of T-cell proliferation, differentiation, and death to identify mechanisms of T-cell homeostasis and the reasons for its failure after HIV/SIV infection by using sets of coupled, ordinary differential equations and agent-based approaches
- Development of interfaces between proteomic databases and computational modeling tools

Research Technologies Branch

Robert Hohman, Ph.D., Chief
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Sections and Units

Office of the Chief
Robert Hohman, Ph.D.

Research and Support Activities

The Research Technologies Branch (RTB) develops and provides state-of-the-art research technologies to NIAID's intramural research program through a network of 10 sections and units located in Bethesda and Rockville, MD, and in Hamilton, MT. RTB scientists also provide training and consulting on all aspects of the technology, including experimental design, laboratory protocols, and analysis of results.

Areas of RTB expertise are as follows:

- Light microscopy (confocal, multiphoton, colocalization, TIRF, FRET, high-resolution 3-D imaging, laser microcapture, and post-collection imaging processing)
- Electron microscopy (high-resolution scanning and transmission, cryo-immobilization/viewing, and immunolocalization of selected antigens)
- Flow cytometry (up to 13-color sorting, up to 14-color analysis, BSL-3 sorting and analysis, multispectral imaging cytometry, and multiplex bead array assays)
- Custom antibodies (hybridoma expansion, purification, and labeling)
- Protein chemistry (peptide synthesis, protein sequencing, mass spectrometry, protein ID, protein separation, and assay development)
- Genomics (spotted and Affymetrix microarrays, microarray design, high-throughput DNA sequencing, and Q-PCR)
- Bioinformatics and biostatistics (experiment design, data management, statistical analysis, exploratory analysis, data mining, and database integration)

Robert Hohman, Ph.D.
Associate Director, Research Technologies, DIR
Chief, Research Technologies Branch
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Major Areas of Research

- Technology development
- Biochemistry

Dr. Hohman received his Ph.D. in microbiology/biochemistry in 1981 from the University of Maryland and NIH and then was a postdoctoral fellow at the Pasteur Institute. In 1984, he returned to NIH as a staff fellow and, in 1991, became director of biochemistry and then vice president of research and development at Oncor Inc. In 2000, he joined NIAID's Division of Intramural Research as associate director for research technologies and chief of the Research Technologies Branch.

Rocky Mountain Veterinary Branch

Michael J. Parnell, D.V.M., Ph.D., Chief
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Sections and Units

Office of the Chief
Michael J. Parnell, D.V.M., Ph.D.

Research and Support Activities

The major research and support activities of the Rocky Mountain Veterinary Branch staff include basic immunology, molecular biology, and pathogenesis of bacterial, viral, and prion disease in laboratory animal models; developing new animal models of emerging infectious diseases and vaccine development; increasing the efficiency and safety of animal biosafety level (ABSL)-4 research; and evaluating new caging systems for high-containment research. Current activities include the following:

- Hantavirus animal models and molecular reagents
- Standard operating procedure development for the ABSL-4 laboratory
- Novel histopathology techniques for laboratory animal infectious disease models
- Training programs for laboratory animal procedures and biosafety in animal facilities
- Imaging techniques in the high-containment animal research environment

Michael J. Parnell, D.V.M., Ph.D.
Chief, Rocky Mountain Veterinary Branch
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Major Areas of Research

- High-containment infectious disease research: ABSL-3 and ABSL-4
- Vaccine development
- Increasing efficiency and safety in ABSL-4 laboratories

Dr. Parnell obtained his undergraduate degree from the University of Montana, his D.V.M. from Colorado State University, and his Ph.D. in pharmacology/toxicology from Washington State University. His interests include laboratory animal medicine/surgery and the development of new animal models for infectious disease research.

Acronyms

BSC: Board of Scientific Counselors

CBS: Cytokine Biology Section

CMB: Comparative Medicine Branch

CR-LRP: Clinical Research Loan Repayment Program

DIR: NIAID Division of Intramural Research

ERAS: Electronic Residency Application System

EVPS: Emerging Viral Pathogens Section

INRO: Intramural NIAID Research Opportunities Program

IRTA: Intramural Research Training Award

LAD: Laboratory of Allergic Diseases

LBD: Laboratory of Bacterial Diseases

LCID: Laboratory of Clinical Infectious Diseases

LCMI: Laboratory of Cellular and Molecular Immunology

LHBP: Laboratory of Human Bacterial Pathogenesis

LHD: Laboratory of Host Defenses

LI: Laboratory of Immunology

LICP: Laboratory of Intracellular Parasites

LID: Laboratory of Infectious Diseases

LIG: Laboratory of Immunogenetics

LIP: Laboratory of Immunopathology

LIR: Laboratory of Immunoregulation

LMI: Laboratory of Molecular Immunology

LMM: Laboratory of Molecular Microbiology

LMVR: Laboratory of Malaria and Vector Research

LPD: Laboratory of Parasitic Diseases

LPVD: Laboratory of Persistent Viral Diseases

LRP: General Loan Repayment Program

LV: Laboratory of Virology

LVD: Laboratory of Viral Diseases

LZP: Laboratory of Zoonotic Pathogens

MVDB: Malaria Vaccine Development Branch

NIH: National Institutes of Health

OTD: Office of Training and Diversity

PSIIM: Program in Systems Immunology and Infectious Disease Modeling

RTB: Research Technologies Branch

VP: Visiting Program

Index

C

D

E

F

G

H

I

J

K

L

M

Photo Credits

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Cover (Bottom, second image from right): HIV-1 budding from cultured lymphocyte; CDC Public Health Image Library, ID #10000

P. ii Microbiologist demonstrates "candling" an embryonated chicken egg; CDC Public Health Image Library, ID #10759

P. 14 Microbiologist counts viral plaques; CDC Public Health Image Library, ID #10728

P. 22 Ebola virus; NIAID

P. 24 Human mast cell; NIAID

P. 27 *Bacillus anthracis* spores; CDC Public Health Image Library, ID #10123

P. 29 HIV-1 budding from cultured lymphocyte; CDC Public Health Image Library, ID #10000

P. 32 *Mycobacterium tuberculosis*; CDC Public Health Image Library, ID #9997

P. 37 NBT-stained, PMA-stimulated neutrophils from peripheral blood of CGD patient after gene therapy; NIAID

P. 42 Methicillin-resistant *Staphylococcus aureus*; NIAID

P. 44 Researcher observes the use of a luminometer to measure HIV infection; CDC Public Health Image Library, ID #10022

P. 48 Enlarged lymphocyte; CDC Public Health Image Library, ID #6080

P. 53 Procalcitonin; NIAID

P. 55 HIV interacting with T lymphocytes; Getty Images

P. 60 Influenza virion; CDC Public Health Image Library, ID #10073

P. 68 *Coxiella burnetii*; NIAID

P. 72 *Anopheles gambiae* taking a blood meal; NIAID

P. 78 Macrophage containing a number of phagocytized red blood cells; CDC Public Health Image Library, ID #10613

P. 81 Biologist sets up a liquid-handling robot to perform PCR analysis for HSV-2; CDC Public Health Image Library, ID #10029

P. 86 *Trypanosoma cruzi* during leishmanial stage of development; CDC Public Health Image Library, ID #598

P. 91 T cell; NIAID

P. 96 Infected cell showing immature and mature forms of vaccinia virus; NIAID

P. 101 Dendritic cells infected with the Langat virus; NIAID

P. 103 *Argas monolakensis* (soft ticks); NIAID

P. 106 *Anopheles minimus*; CDC Public Health Image Library, ID #7949

P. 108 Top: 3D cell model subdivided into discrete elements. Bottom: 3D cell model used to perform spatial simulations of reaction-diffusion processes; NIAID

P. 111 *Coxiella burnetii*; NIAID

P. 113 Deer mouse; CDC Public Health Image Library, ID #8360

P. 118 Lab technician makes notations on a Petri plate growing *Fusarium* fungal colonies; CDC Public Health Image Library, ID #8962

P. 120 A nurse administers an intramuscular vaccination; CDC Public Health Image Library, ID #9401

P. 123 Microbiologist manipulates a flask of cells; CDC Public Health Image Library, ID #10727

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National Institutes of Health

National Institute of Allergy
and Infectious Diseases