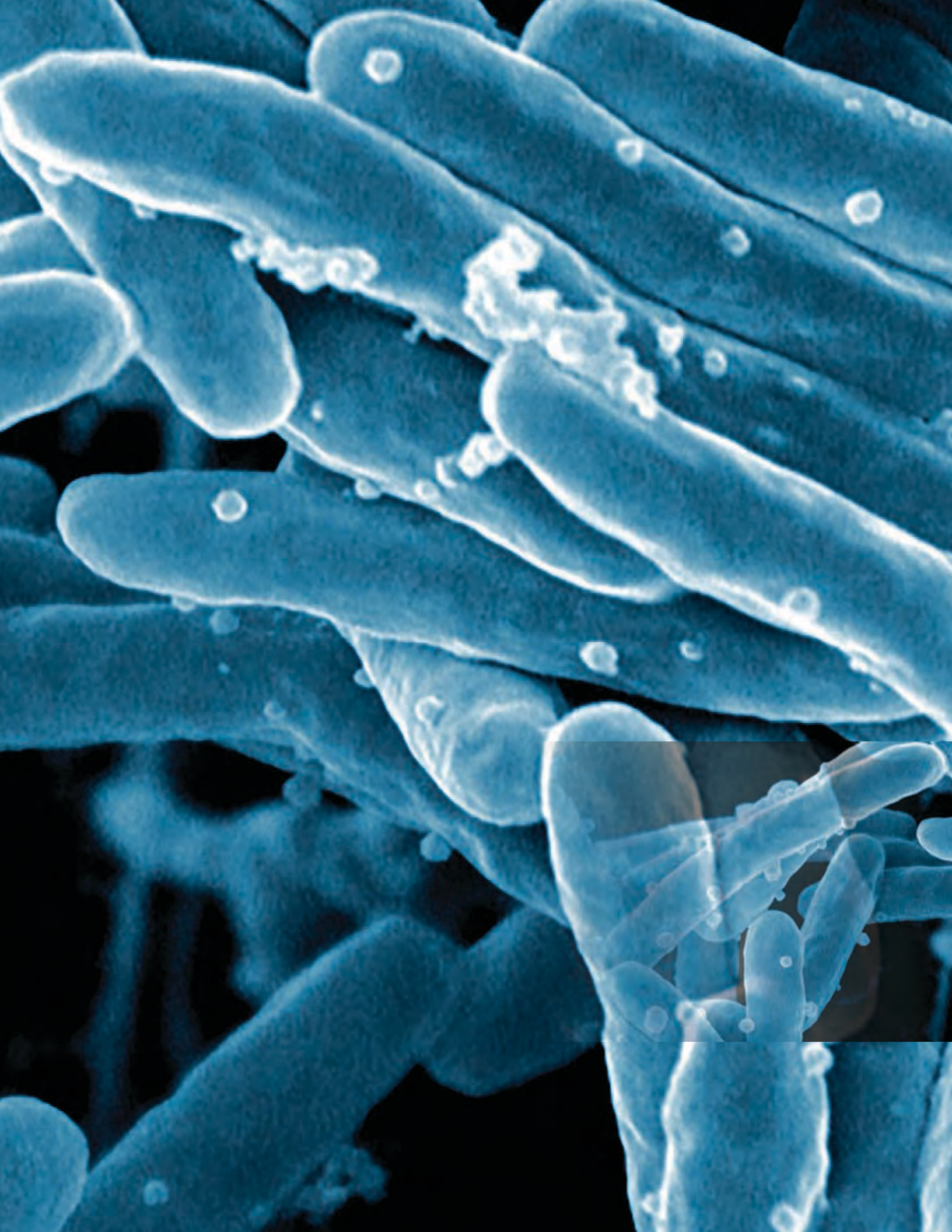
OPPORTUNITIES

Research and Training Programs for 2019-2020
NIAID Division of Intramural Research

NIAID

National Institute of Allergy and Infectious Diseases

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



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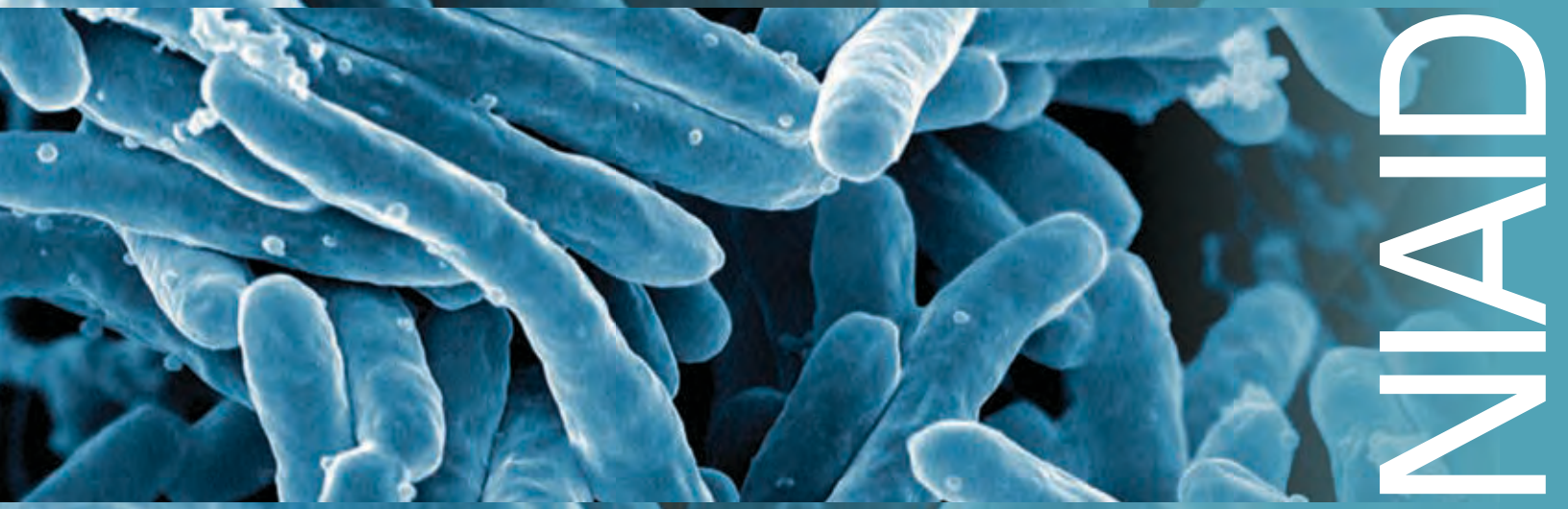

NIAID

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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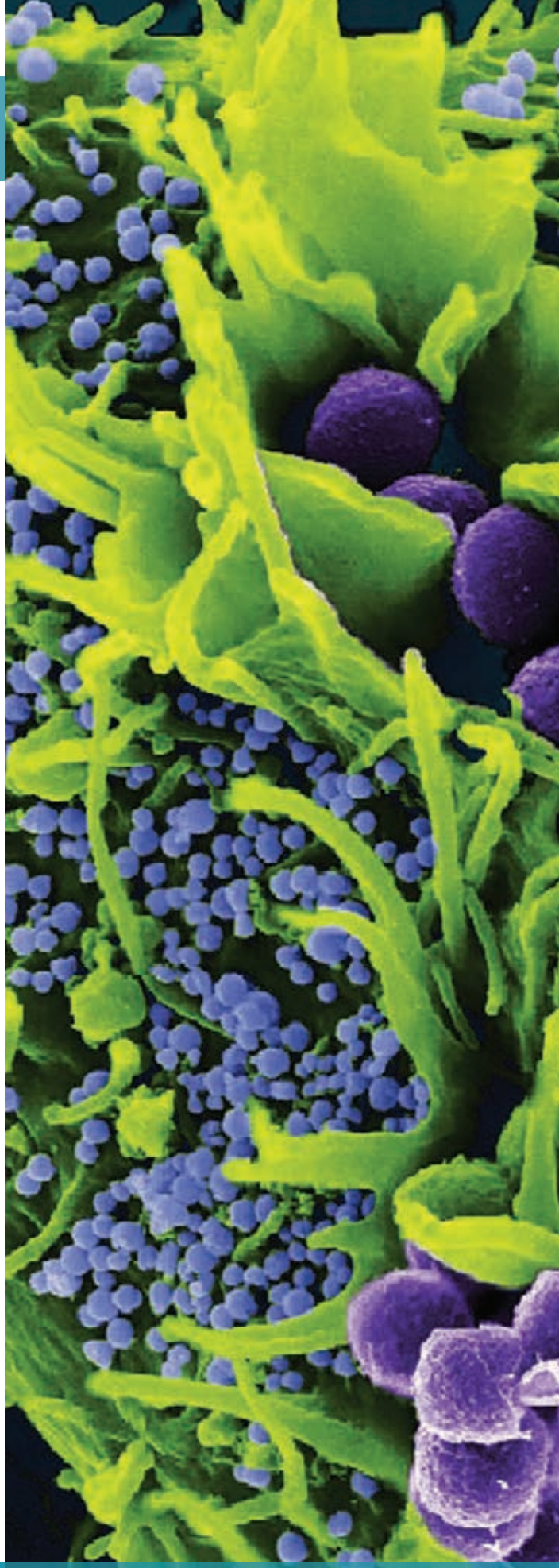
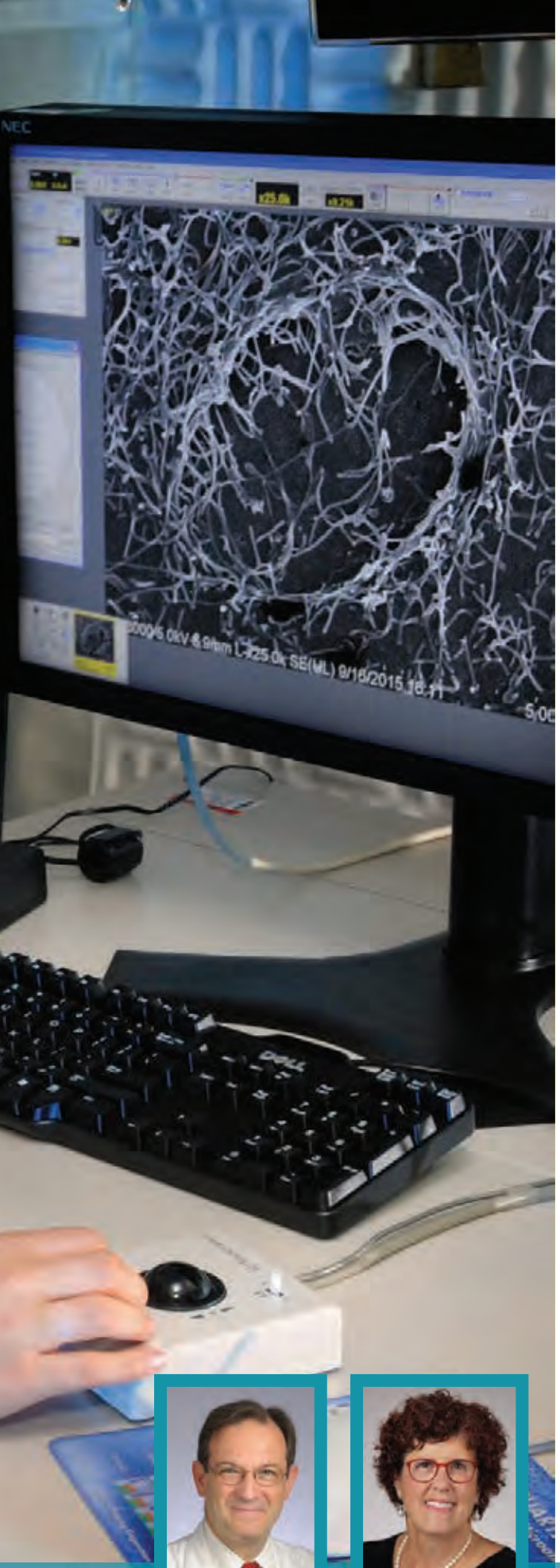


NIAID DIVISION OF INTRAMURAL RESEARCH
ORGANIZATIONAL CHART

OFFICE OF THE DIRECTOR, DIR

Comparative Medicine Branch	Laboratory of Allergic Diseases	Laboratory of Bacteriology	Laboratory of Clinical Immunology and Microbiology	Laboratory of Immunogenetics	Laboratory of Immune System Biology	Laboratory of Immunoregulation
Laboratory of Infectious Diseases	Laboratory of Malaria and Vector Research	Laboratory of Malaria Immunology and Vaccinology	Laboratory of Molecular Immunology	Laboratory of Molecular Microbiology	Laboratory of Parasitic Diseases	Laboratory of Persistent Viral Diseases
Laboratory of Viral Diseases	Laboratory of Virology	Research Technologies Branch	Rocky Mountain Veterinary Branch	Viral Immunology Section	Molecular HIV Host Interactions Section	
		Office of Operations and Management	Office of Scientific Management	Office of Training and Diversity		

INTRODUCTION TO NIAID



GREETINGS from the Division of Intramural Research (DIR) at the National Institute of Allergy and Infectious Diseases (NIAID).

For more than 60 years, our twin campuses in Bethesda, Maryland, and Hamilton, Montana, have been home to exceptional scientists conducting integrated basic and clinical research in immunology, allergy, and infectious diseases. DIR researchers continue to discover new pathogens, decipher new immune system functions, identify new mechanisms of allergy and immunological diseases, and develop new FDA-approved vaccines and therapies.

Technological advances in imaging, structural biology, systems biology, and the "-omics" help DIR pry into the innermost workings of the immune system and its pathogens and to search out their interactions. We are making game-changing discoveries that address our mission to develop and improve diagnostics, drugs, and vaccines.

Training is a central theme in DIR. We seek the best and brightest talent for our laboratories and clinical research programs, at all stages of their careers. Our programs range from summer internships for high school and college students to postbaccalaureate and postdoctoral training experiences and accredited medical fellowships in allergy/immunology and infectious diseases.

Our trainees work side-by-side with outstanding scientists and trainees from every part of the world. DIR investigators are leaders in their fields, recognized by extensive publications and prestigious awards. Our international programs offer chances to gain valuable field experience in malaria, tuberculosis, and tropical diseases. To do this, our research facilities include high-containment laboratories; advanced instrumentation; a robust animal program; and the NIH Clinical Center, the world's largest hospital devoted exclusively to clinical investigation.

We invest in our trainees' careers by providing mentored research experiences, skill-building workshops, grant-writing seminars, special interest groups, scientific lectures, and individual counseling. We seek to make you the best you can be at whatever you decide to be, whether in research, academia, industry, or regulation. In addition, we have staff, tenure-track, and tenured positions. Please take some time to learn more about DIR investigators and their laboratories. Don't hesitate to reach out to us directly or to any investigator as you go through the next days. This is where we work on the science and medicine of tomorrow, today.

L: **Steven M. Holland, M.D.,** *Director,* Division of Intramural Research, NIAID
R: **Karyl S. Barron, M.D.,** *Deputy Director,* Division of Intramural Research, NIAID

ABOUT DIR

WE BEGAN in 1887, as a one-person lab housed in the attic of the Staten Island Marine Hospital in New York. Now, the National Institutes of Health (NIH) encompasses 27 Institutes and Centers and a budget of more than $30 billion. The National Institute of Allergy and Infectious Diseases (NIAID) is one of the largest basic and clinical research Institutes at NIH.

The Division of Intramural Research (DIR) is a major component of NIAID. Our focus is on the patients who have infectious, immune, and allergic diseases and the basic science that promotes the development of new therapeutics, diagnostics, and vaccines.

In pursuit of these goals, DIR researchers do the following:

- Admit and treat patients with diseases under study, ranging from HIV to tuberculosis to rare immune deficiencies and allergic diseases
- Expand knowledge of immune-system components and functions
- Define mechanisms responsible for immunodeficiency, allergy, and autoimmunity
- Study the biology of infectious agents (viruses, bacteria, fungi, and parasites) and the host responses to them
- Develop novel strategies to prevent and treat immunologic, allergic, and infectious diseases

DIR scientists study all aspects of infectious diseases, including causative agents, vectors, and pathogenesis in humans and animals. Clinical research informs and responds to key lab discoveries, allowing for rapid translation into disease prevention, diagnosis, and treatment. DIR alone has more than 120 active clinical trials at the NIH Clinical Center, Bethesda, Maryland, as well as others at collaborating U.S. and international sites.

Unparalleled Opportunities

DIR is home to a vibrant research community of about 120 principal investigators who lead about 1,200 colleagues composed of scientists, physicians, trainee fellows, technical personnel, and students. DIR principal investigators are distinguished in their fields, as reflected in their preeminent publications, their numerous awards, and their election to prestigious societies, including the U.S. National Academies of Sciences and Medicine. Trainees, both pre- and postdoctoral physicians and scientists, constitute the largest staff group in DIR.

DIR is collegial, open, and collaborative. At the heart of the NIH campus is the NIH Clinical Center, a unique hospital devoted to performing clinical research while providing outstanding care. Our research facilities are within and adjacent to the hospital and provide access to state-of-the-art instrumentation in imaging, proteomics, genomics, structural biology, and cell analysis, as well as animal genetics. It is simply an ideal place to train and work.

World-Class Facilities and Research Support

Our laboratories conduct peer-reviewed research. Several of our branches focus on research technologies and animal care. Most DIR labs are located on the NIH campus in Bethesda, Maryland, and in nearby Rockville, Maryland. Our other Maryland facilities are located in Frederick, about 40 miles north of the main NIH campus. Our large research campus in Hamilton, Montana, is Rocky Mountain Laboratories (RML). RML has world-class programs in virology, emerging infections, and prion diseases. The Montana campus has state-of-the-art biosafety level (BSL)-2, BSL-3, and BSL-4 laboratory spaces.

DIR employees and trainees have access to these and other amenities:

- The NIH Clinical Center, the world's largest hospital devoted 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, CRISPR, and knockout mice
- An animal care program, which manages all aspects of research involving laboratory animals
- Computer networking and teleconferencing facilities, including satellite linkage to DIR-supported facilities at national and international sites

International Research

DIR is a leader in global research. Its International Centers for Excellence in Research (ICER) program is a model for the development of sustainable research programs in resource-limited countries that have high burdens of infectious diseases. We have partnerships with local scientists, academic centers, and hospitals in Peru, Mali, Uganda, South Africa, South Korea, Cambodia, Thailand, China, and India. We have global research capacity to train young scientists, develop laboratory and clinical infrastructure, and enhance information technology capabilities.

The ICER programs build on NIAID's long-standing malaria research collaboration with scientists around the world. For instance, Malian researchers collaborate with us on multiple projects, including mosquito vectors, malaria drug resistance, and candidate malaria vaccines; research on neglected tropical diseases such as filariasis and leishmaniasis; and, more recently, other vector-borne diseases, including relapsing fever, Lassa fever, and Crimean-Congo hemorrhagic fever virus. Scientists at the Mali ICER also were involved in the response to the Ebola virus disease cases that occurred in Mali.

In Uganda, we have a state-of-the-art field laboratory in the Rakai district, facilities at Makerere University in Kampala, and the Uganda Virus Research Institute in Entebbe. There we conduct basic and clinical research on HIV and other sexually transmitted infections, including studies on viral pathogenesis, transmission kinetics, treatment, and prevention. Researchers at the ICER site in India, located at the Tuberculosis Research Centre in Chennai, conduct collaborative studies on filariasis, as well as tuberculosis-filarial and HIV-filarial co-infections and the interaction between filarial infection and diabetes.

In addition to its ICER sites, DIR has collaborative research programs under way at several international sites, including the following:

- Brazzaville, Republic of the Congo—hemorrhagic fever viruses, including Ebola virus
- Cape Town, South Africa—tuberculosis and HIV-positive to HIV-positive organ donation research
- Phnom Penh and Pursat, Cambodia—malaria drug resistance and mosquito vector studies
- Zhengzhou, China—tuberculosis
- Yaounde and Buea, Cameroon—filariasis (lymphatic filariasis, onchocerciasis, and loiasis)

The Edge of Scientific Discovery

We remain 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, several chemokine receptors, and the cytokine interleukin 4. DIR scientists also developed vaccines for hepatitis A, hepatitis E, and rotavirus. We are currently conducting clinical studies of numerous vaccine candidates for malaria, dengue, and viral respiratory infections.

Our clinical research on the immune system has led to the discovery of numerous novel diseases known as immunodeficiencies and their underlying genetic and acquired causes. In addition, we are leading the development of gene therapies and bone marrow transplantation for these life-threatening diseases.

From the very start, DIR scientists have made important observations about the etiology, pathogenesis, and treatment of HIV/AIDS. This same expertise and strategy has been brought to bear on new and re-emerging diseases, such as Zika and Ebola virus infections.

Collaborative Research

Collaborative research is essential for scientists in different laboratories to move their research forward by sharing common questions, resources, and information. We encourage collaboration across laboratories and outside of NIAID and NIH. Programs and networks formed in DIR include the following:

- The International Collaborative Network for the Study of Human Helminth Co-Infections ensures that the necessary resources are available to inform policy related to helminth control.
- The Microbiome Program explores metaorganisms using microbiome sequencing facilities, bioinformatics support, and a gnotobiotic mouse facility.
- The Clinical Genomics Program provides human genomic analysis for basic and clinical immunology research.
- The Malaria Research Program studies malaria parasites in the mammalian host and the mosquito vectors that transmit them in the lab and in malaria endemic areas.
- The Program in Global Neglected Infectious Diseases promotes interactions among NIAID investigators on neglected tropical diseases (NTDs) and related infections.

DIR

TRAINING PROGRAMS

NIAID OFFERS research training experiences in our laboratories in Maryland and in Hamilton, Montana, through the DIR Office of Training and Diversity (OTD). Mentored research opportunities range from postdoctoral and clinical research fellowships to graduate partnership programs, postbaccalaureate traineeships, and summer internships.

As the focal point for NIAID training, OTD designs and conducts programs to enhance the learning environment for trainees at all levels. OTD staff emphasize mentoring and individual career counseling for fellows transitioning into the Institute as well as those who are moving to the next step in their career path.

NIAID research trainees participate in OTD's numerous career development activities, such as the annual fellows workshop, grant writing, career options seminars, skill-building workshops, interview practice sessions, detail opportunities, and more. OTD's orientation program gives incoming fellows support in navigating NIAID and NIH and introduces them to critical timelines for planning their time at NIAID and their next career step. The newest program, the Rocky-Beth Fellowship, is a competitive program that offers dual mentorship between NIAID's Montana and Maryland campuses. The program fosters collaborations among DIR labs, enhances research knowledge and skills, and broadens understanding of career opportunities.

OTD is committed to increasing diversity and inclusion among NIAID's workforce and in its training community through a variety of programs. An annual outreach program, Intramural NIAID Research Opportunities (INRO), seeks talented students from diverse backgrounds who are senior-level undergraduates or who have recently completed or are in their final year of a master's degree program. The OTD Sponsorship Program offers competitive research training stipends to trainees from populations underrepresented in the biomedical sciences and those dedicated to promoting diversity and inclusion, as defined by NIH's Interest in Diversity Notice. The program also provides individual mentorship, a professional development seminar series, and other events to support an inclusive NIAID research community.

Intramural NIAID Research Opportunities (INRO)

As a science or medical student from a diverse background, including those from populations underrepresented in biomedical research, you can join NIAID's research community for a two-day event in February to learn about the research training experience at the Institute, a leader in global health research. Find out what it is like to train as a researcher at a leading multi-disciplinary research facility and interview with prospective mentors. NIAID will pay expenses for travel, hotel accommodations, and daily stipend.

Applications are open each year from September 1 through November 22. Learn more about INRO by visiting https://www.niaid.nih.gov/about/inro.

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 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.

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 the 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. Eligible international scholars who are recent doctoral degree recipients can conduct postdoctoral research as visiting fellows.

Research Fellowship is for highly experienced postdoctoral scientists (generally more than five years of postdoctoral experience) who seek further research training and professional development.

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.

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 appointment allows you to use NIH facilities, equipment, and resources for your research and training; however, you cannot provide services to NIH.

Malaria Research Program Collaborative Research Fellowship

The Malaria Research Program Collaborative Research Fellowship will be awarded annually to a limited number of top applicants who aspire to improve our understanding of the biology, host-pathogen interactions, and transmission of malaria parasites. Applicants must have a Ph.D., M.D., or equivalent graduate degree awarded within five years of the fellowship start date.

HOW TO APPLY

INRO Program

www.niaid.nih.gov/about/inro
Applications are open from September 1 to November 22.

Postdoctoral Opportunities

Visit www.training.nih.gov/career_services/postdoc_jobs_nih, search "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 with whom you are interested in working:

- 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 email address.
- A copy of your curriculum vitae and bibliography. Representative publications are welcome.

Malaria Research Program Collaborative Research Fellowship

Applicants will submit a complete application consisting of the following:

- The MRP Collaborative Research Fellowship application, which includes curricular information and a description of the proposed research project
- Three letters of recommendation, including one from the current advisor

Promising candidates will be invited to interview with MRP investigators within two months of submitting their application. Interviews will be held at the NIH Twinbrook laboratories in Rockville, Maryland.

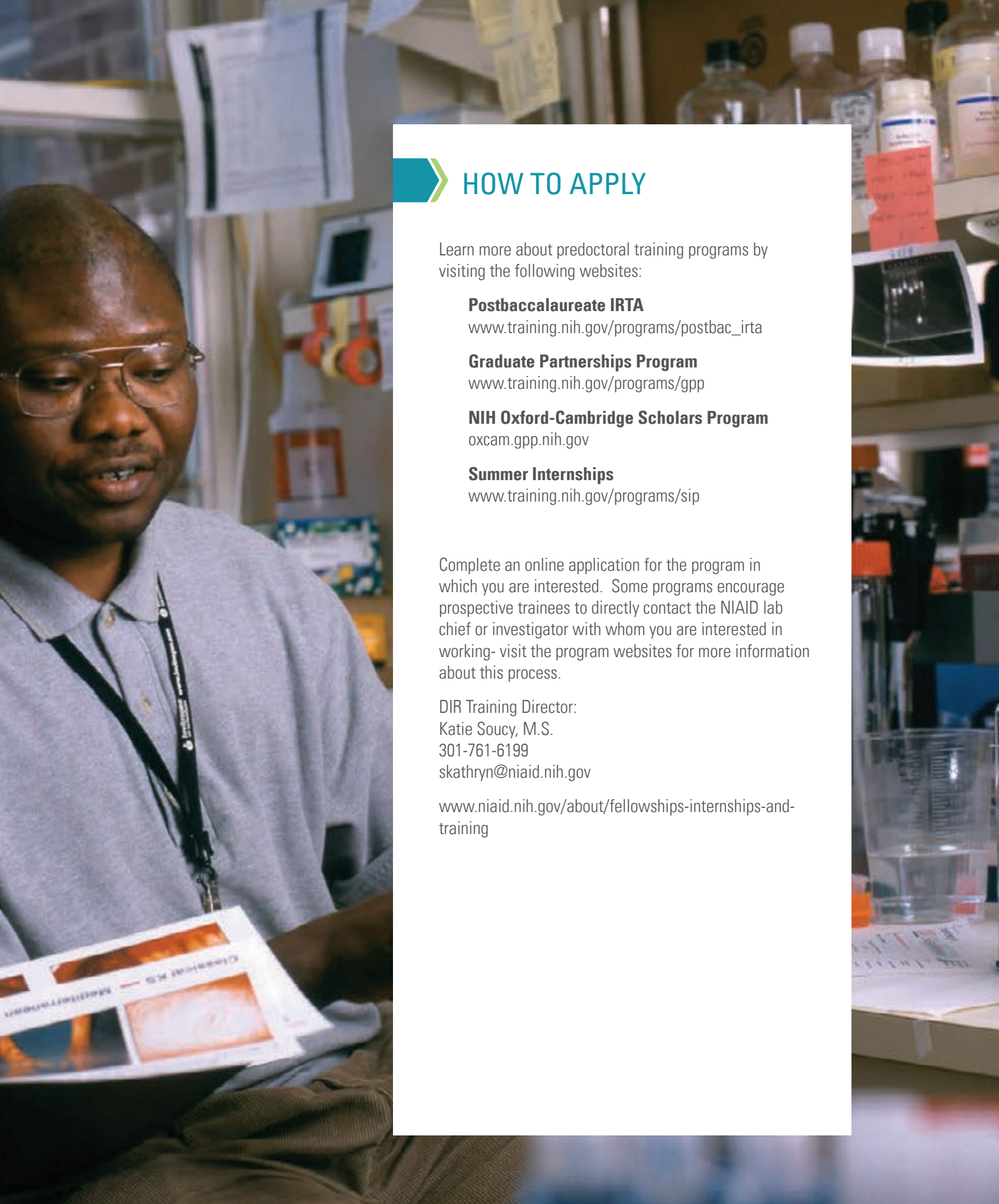
www.niaid.nih.gov/research/mrp-collaborative-fellowship

Predoctoral Training for Students

Postbaccalaureate Intramural Research Training Award (IRTA) enables you to postpone your application to graduate or medical school so you can get an introduction to biomedical research. To qualify, you must be a U.S. citizen, have graduated from a fully accredited U.S. college or university, and have held a bachelor's degree for less than three years or a master's degree for less than six months. During your NIAID training, you must intend to apply to graduate or medical school in biomedical research. You may also qualify if you've been accepted into a graduate, other doctoral, or medical school program and have written permission to delay entrance for up to one year.

Graduate Partnerships Program links NIH to national and international universities in the training of graduate students. It combines the academic environment of a university and the breadth and depth of research at NIH. This includes the NIH Oxford-Cambridge Scholars Program, an accelerated, international doctoral program in partnership with the Universities of Oxford and Cambridge in the United Kingdom. It is open to exceptional students in the field of biomedical research. Students admitted to the program typically design an innovative Ph.D. project, with co-mentorship by at least one NIH and one university principal investigator.

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 8-week (minimum) summer internships for high school, college, graduate, and medical students. An online application is available in early November. The application deadline is March 1.



HOW TO APPLY

Learn more about predoctoral training programs by visiting the following websites:

Postbaccalaureate IRTA
www.training.nih.gov/programs/postbac_irta

Graduate Partnerships Program
www.training.nih.gov/programs/gpp

NIH Oxford-Cambridge Scholars Program
oxcam.gpp.nih.gov

Summer Internships
www.training.nih.gov/programs/sip

Complete an online application for the program in which you are interested. Some programs encourage prospective trainees to directly contact the NIAID lab chief or investigator with whom you are interested in working- visit the program websites for more information about this process.

DIR Training Director:
Katie Soucy, M.S.
301-761-6199
skathryn@niaid.nih.gov

www.niaid.nih.gov/about/fellowships-internships-and-training

CLINICAL TRAINING OPPORTUNITIES

NIAID OFFERS three-year ACGME-approved fellowship programs in infectious diseases and in allergy and 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 training and two years of research. All trainees spend up to six months of the first year caring for patients in the NIAID inpatient ward at the NIH Clinical Center, where all NIAID patients participate in research protocols conducted by DIR investigators.

Patients enter the Clinical Center with various conditions, 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
- Hypereosinophilic syndromes and eosinophilic gastrointestinal disorders
- Allergic diseases, including atopic dermatitis, anaphylaxis, and mast cell disorders
- Parasitic diseases
- Mycoses
- Bacterial infections

During the remainder of clinical training, fellows join traditional consultation services and didactic rotations at NIH and other medical institutions in the surrounding area. Following clinical training, fellows conduct research in any one of the intramural laboratories at NIAID or in other NIH laboratories or programs.

HOW TO APPLY

Applicants to the allergy and immunology and infectious diseases training programs should follow the instructions in Electronic Residency Application Service (ERAS) at www.aamc.org/students/medstudents/eras. 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 12 months prior to entry in July. The application deadline in ERAS is September 15. 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 late August and early November.

www.niaid.nih.gov/about/allergy-and-immunology-training-program

Infectious Diseases Fellowship Program

Applications are accepted only via ERAS. The program participates in the National Resident Matching Program. Interviews are held from September to October prior to the fellowship match.

Julie Hoehl, Program Coordinator
Infectious Diseases Fellowship Program
10 Center Drive, Room 12C103, MSC 1899
Bethesda, MD 20892-1899
301-761-6720/301-480-0050 (fax)
jhoehl@nih.gov

Selection Process

Candidates are selected for interviews 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 candidates with the opportunity to explore the clinical setting and the research they might conduct.

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 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 inpatient and outpatient rotations at the NIH Clinical Center, Children's National Medical Center, George Washington University, Johns Hopkins Hospital, and the Institute for Asthma and Allergy 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 Fellowship Program

The Infectious Diseases Fellowship Program accepts applications from residents in internal medicine who have completed training in the United States or Canada.

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 fellowship to begin after two years of residency. Applicants accepted under the ABIM Research Pathway must spend four years in fellowship to be eligible for certification in both internal medicine and infectious diseases.

The first year of the training program is entirely clinical and comprises 11 months of rotations at NIH and five outside sites. Fellows also rotate on the NIAID Inpatient Ward and spend two to three weeks at a private practice infectious diseases clinic. Fellows receive training in hospital epidemiology and diagnostic microbiology.

Fellows are required to attend a weekly continuity clinic and participate in teaching conferences during the first two years of the training program. Fellows take the IDSA Infectious Diseases In-Training Examination during their first and second years and are eligible to take the Infectious Diseases Board Examination in their third year (fourth year for ABIM Research Pathway fellows).

NIAID Transition Program in Clinical Research

The NIAID Transition Program in Clinical Research provides opportunities for physicians to gain clinical and translational research experience in association with a DIR laboratory. NIAID conducts a national search to identify participants for this program. Participants are appointed as assistant clinical investigators. 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 at the NIH Clinical Center.

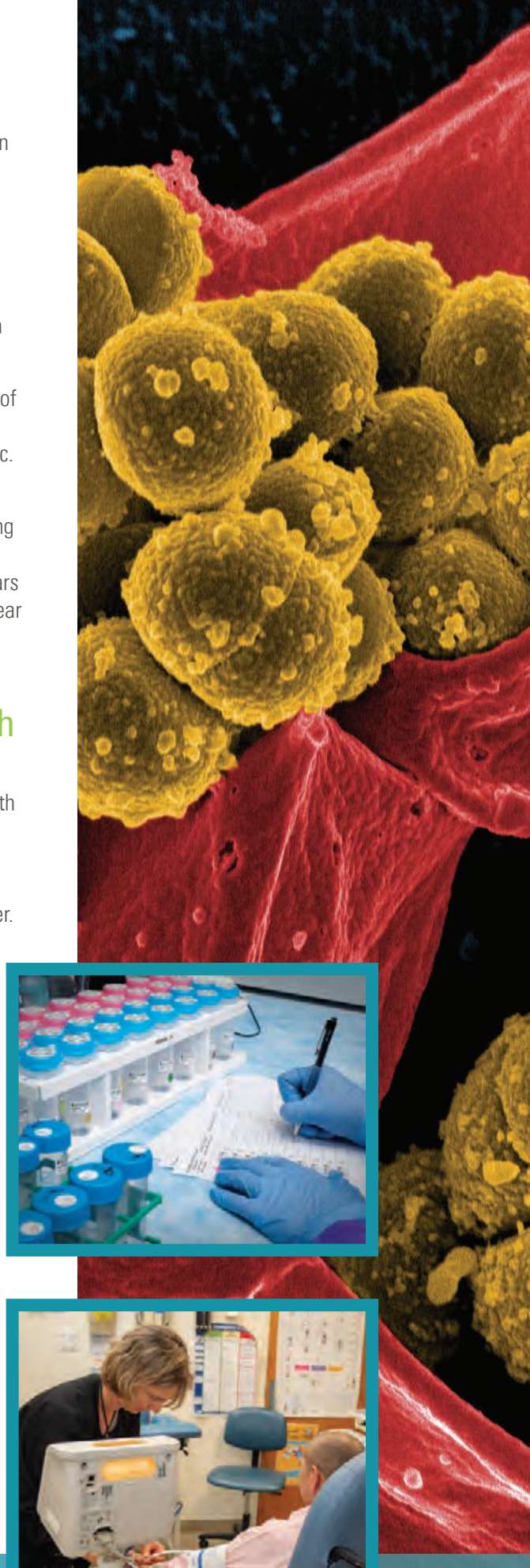
Candidates may choose the laboratory in which they will carry out their program, contingent upon approval from the lab chief and the DIR director. Appointments are for three to five years; accepted participants will be reviewed throughout their appointments by a committee composed of DIR senior investigators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

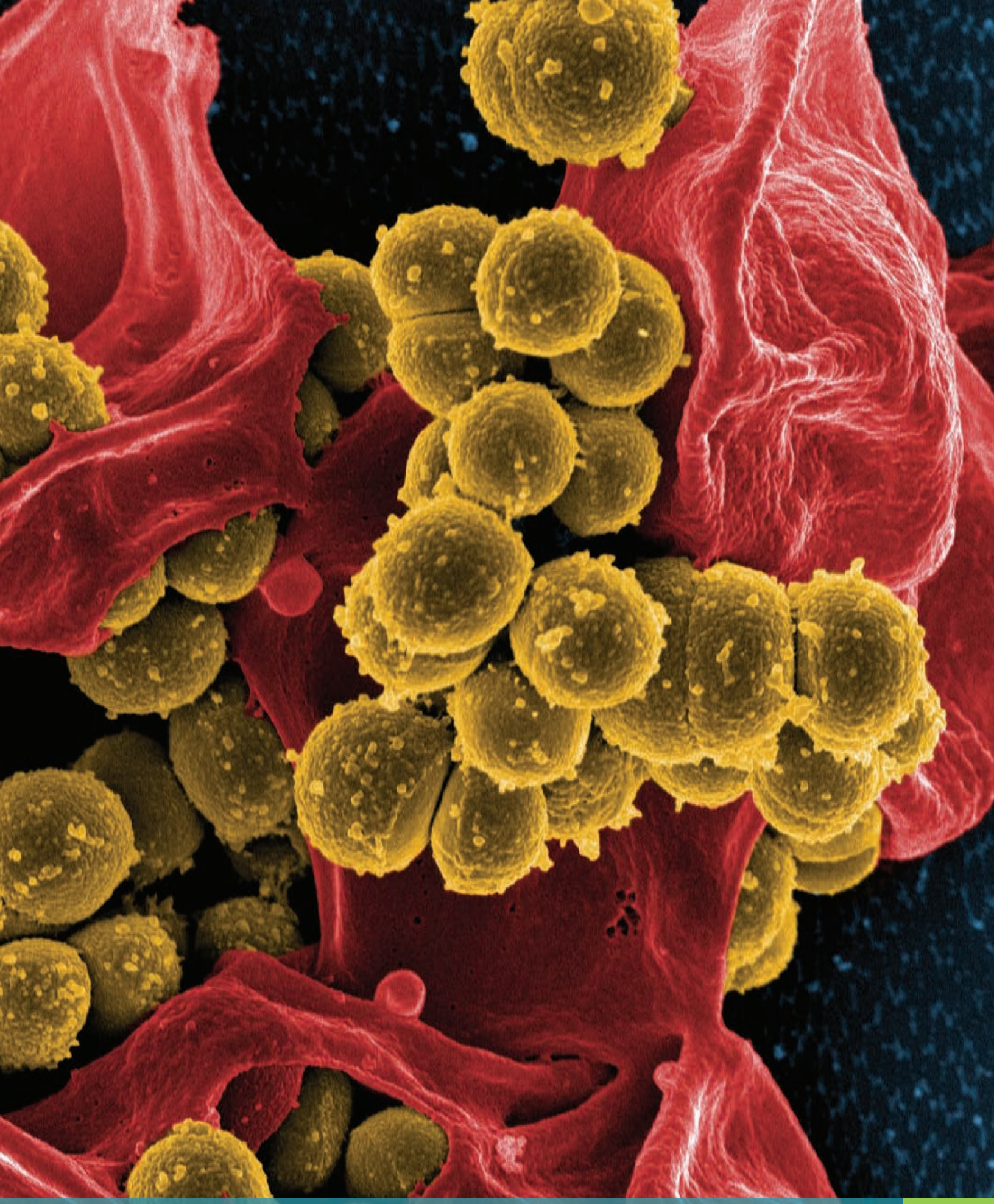
The application package must include a curriculum vitae/bibliography, three letters of reference sent directly from the referee to NIAID, a two-page research proposal, and a letter of support from the accepting NIAID lab chief. Submit application materials to the following email address:

NIAIDDIRSearch@niaid.nih.gov

For questions about the program, contact Karyl S. Barron, M.D., at 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/research/transition-program-clinical-research for more information.





LOAN REPAYMENT

Scientists employed by NIH, as well as fellows accepting an NIH full-time equivalent (FTE) appointment into the infectious diseases or allergy and immunology training program, are eligible to apply for student loan repayment. There are competitive and noncompetitive repayment programs.

General Research Intramural Loan Repayment Program

The NIH General Research Intramural Loan Repayment Program (General ILRP) was established to attract highly qualified professionals, particularly physicians, to conduct research at NIH. Unlike previously authorized programs 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 competitive ILRP may repay up to a maximum of $35,000 per year toward participants' outstanding eligible education loans. NIH also will make payments to cover the increased federal taxes incurred as a result of receiving program benefits, as loan repayments are considered income for tax purposes. In return, participants must sign a contract agreeing to conduct qualified research activities as NIH FTE employees for a minimum of three consecutive years.

Continuation contracts for additional years may be entered.

Quick Reference

NIH Loan Repayment Programs
866-849-4047
www.lrp.nih.gov
lrp@nih.gov

AIDS Research Intramural Loan Repayment Program

This loan repayment program was established to enable highly qualified physicians, nurses, and scientists to enter AIDS research. In exchange for loan repayment benefits, researchers with NIH FTE appointments must agree to participate in AIDS research for a minimum of two consecutive years. Continuation contracts for additional years may be entered.

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 health professionals from disadvantaged backgrounds to serve as clinical researchers. Eligibility requirements for the CR-LRP are the same as those for the other LRPs, 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. The income level considers family size and Bureau of the Census statistics, with annual adjustments for changes in the Consumer Price Index. HHS adjusts this level for use in all health professions programs and publishes this information periodically in the Federal Register. You must certify your disadvantaged background status by submitting at least one of the following documents:

- A written statement from your former school that you qualified for federal disadvantaged assistance during attendance
- Documentation that you received Health Professions Student Loans (HPSL) and Loans for Disadvantaged Students
- Documentation that you received scholarships from the U.S. Department of Health and Human Services (HHS) under the Scholarship for Individuals With Exceptional Financial Need

ACGME Fellows Loan Repayment Program

NIH offers student loan repayment benefits to qualified candidates who join one of its Accreditation Council for Graduate Medical Education (ACGME)-accredited residency or fellowship training programs through the General Research ILRP. The ACGME Loan Repayment Program (ACGME-LRP) can repay a maximum of $17,000 of eligible student loans for each year of the three-year fellowship program (maximum guarantee of $51,000). The program also covers the federal taxes on the loan amounts. Individuals who have been accepted to an ACGME program at NIH can receive these benefits upon completion of a short electronic application. These benefits are available to ACGME fellows non-competitively.

Fellows in non-ACGME subspecialty and residency training programs with an NIH FTE appointment can apply to the competitive General ILRP or the AIDS or Clinical ILRP.

General Requirements for Loan Repayment Programs

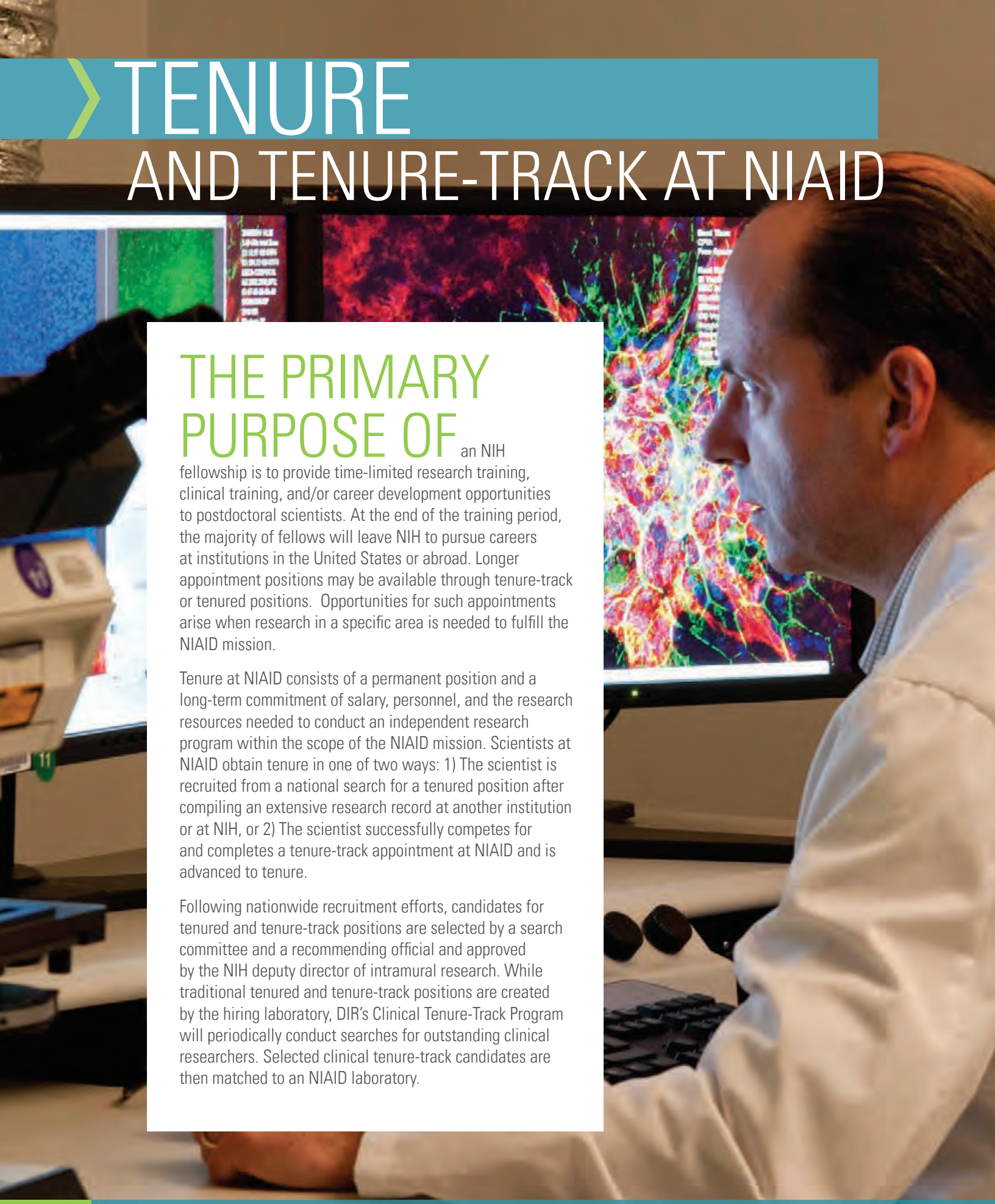
You must be a U.S. citizen, U.S. national, or permanent resident of the United States.

You must have a health professional doctoral degree (Ph.D., M.D., D.O., D.D.S., D.M.D., Pharm.D., or equivalent doctoral level degree) or a P.A., B.S.N., or A.D.N. degree from an accredited institution.

You must have qualifying educational debt in excess of 20 percent of your annual NIH base salary on the expected date of program eligibility.

You must have an NIH FTE appointment prior to submitting your application.

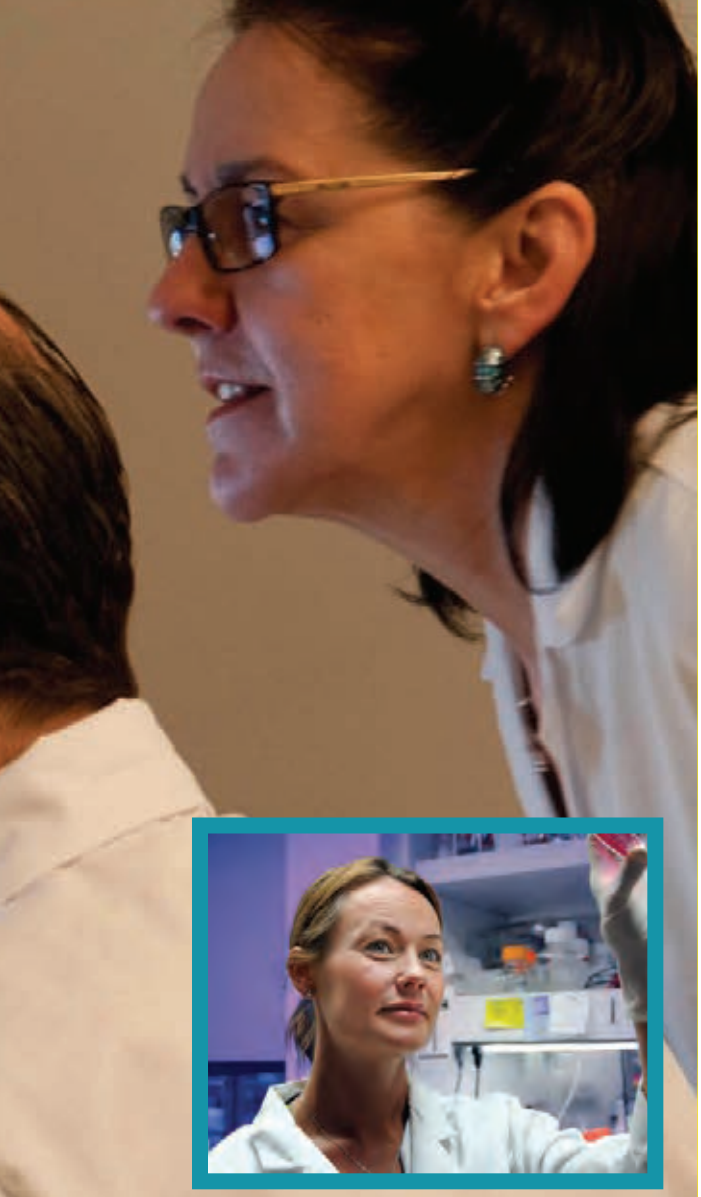
TENURE AND TENURE-TRACK AT NIAID



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. Longer appointment positions may be available through tenure-track or tenured positions. Opportunities for such appointments arise when research in a specific area is needed to fulfill the NIAID mission.

Tenure at NIAID 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 NIAID mission. Scientists at NIAID obtain tenure in one of two ways: 1) The scientist is recruited from a national search for a tenured position after compiling an extensive research record at another institution or at NIH, or 2) The scientist successfully competes for and completes a tenure-track appointment at NIAID and is advanced to tenure.

Following nationwide recruitment efforts, candidates for tenured and tenure-track positions are selected by a search committee and a recommending official and approved by the NIH deputy director of intramural research. While traditional tenured and tenure-track positions are created by the hiring laboratory, DIR's Clinical Tenure-Track Program will periodically conduct searches for outstanding clinical researchers. Selected clinical tenure-track candidates are then matched to an NIAID laboratory.

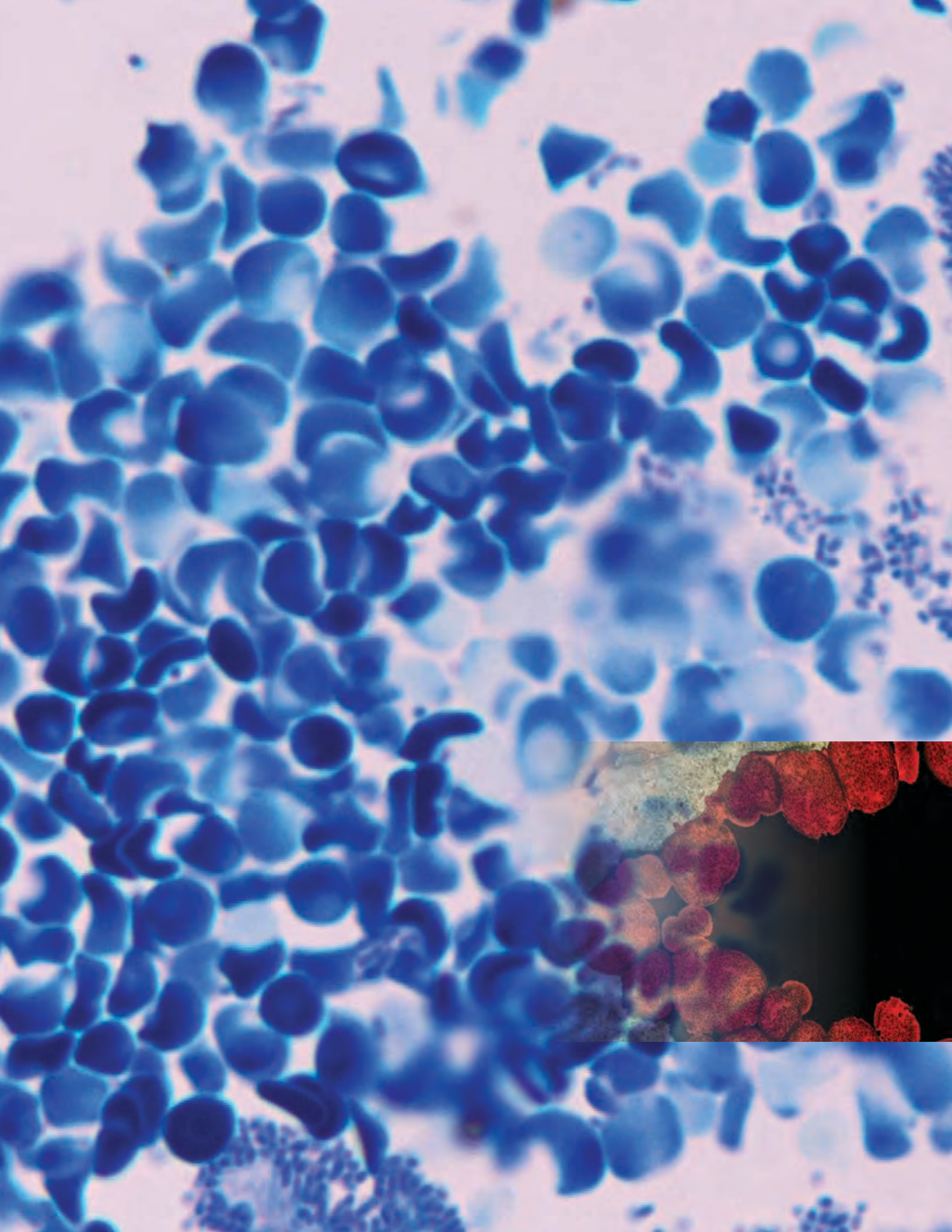


TENURE/NON-TENURE

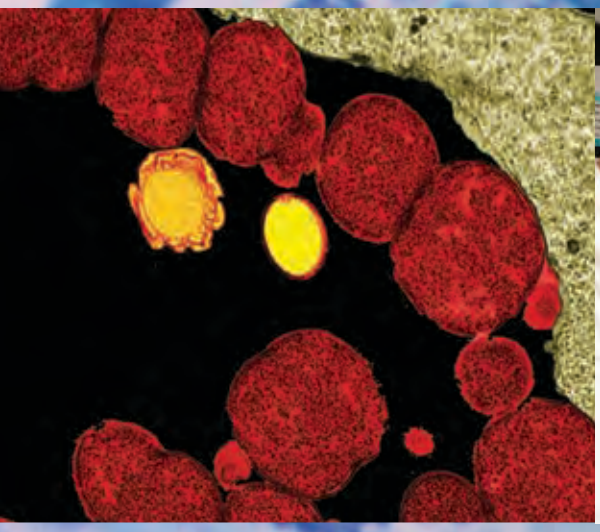
Tenure-track investigators in basic research are given seven years to establish themselves as independent scientists before being evaluated for tenure; clinical tenure-track candidates are given up to nine years. At the midpoint, the NIAID Board of Scientific Counselors (BSC) reviews the candidate's and the lab's performance and qualifications for tenure and decides whether the candidate should continue in tenure track or advance for an accelerated tenure decision. The BSC reviews the candidate's performance again at the completion of the tenure-track period and decides if the candidate should be recommended for tenure.

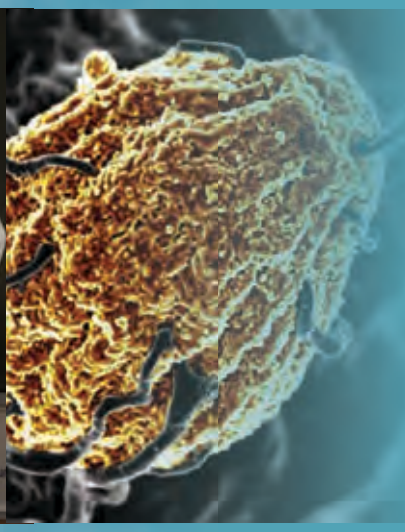
If a candidate is recommended for tenure by the BSC and the NIAID Promotion and Tenure Committee or by a search committee, and if the DIR director concurs, the request is forwarded for approval to the NIH Central Tenure Committee, which is chaired by the NIH deputy director for intramural research.

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 eight years, regardless of appointment mechanism, unless the postdoctoral trainee is approved for tenure track or a permanent appointment.

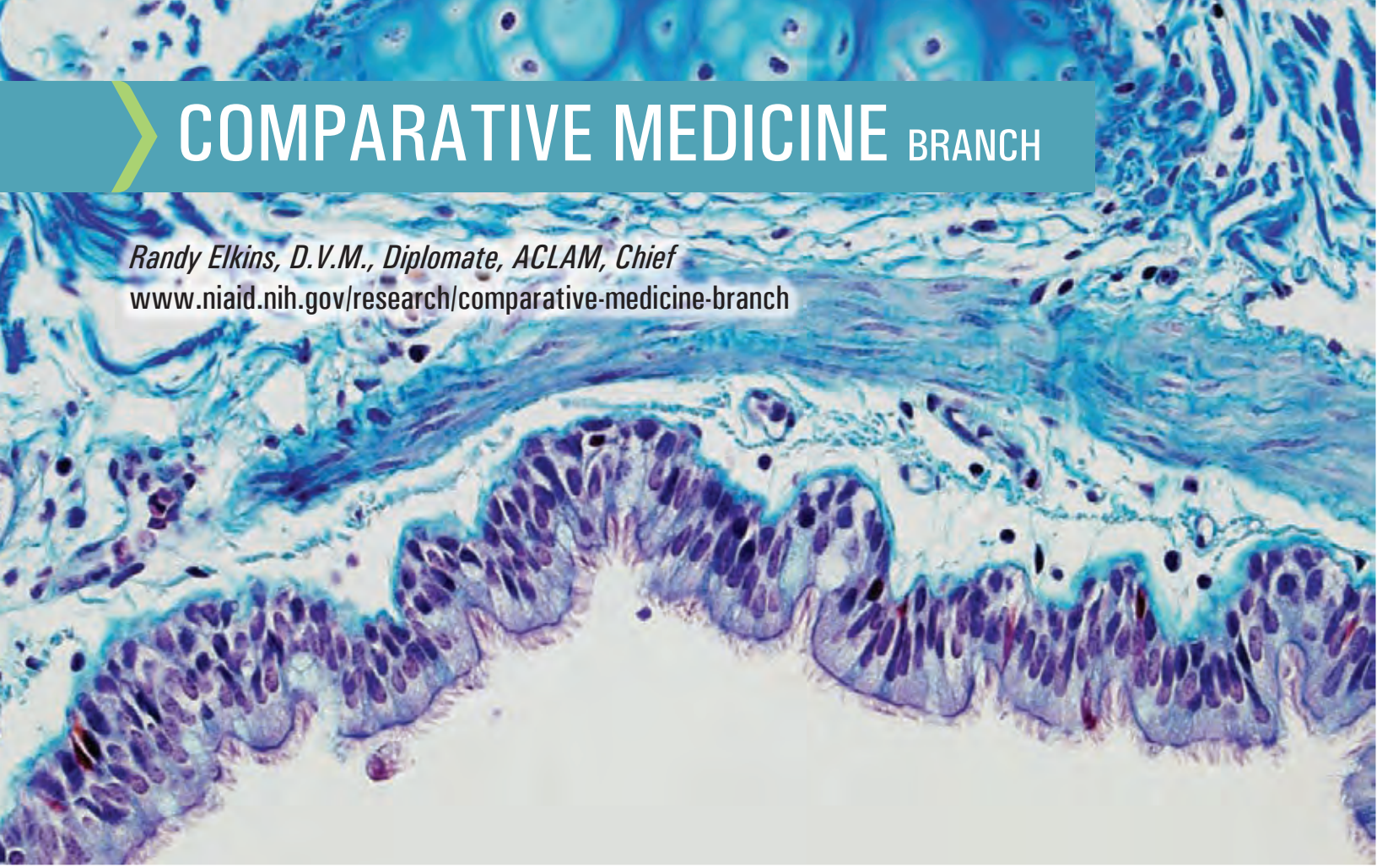


DIR BRANCHES





COMPARATIVE MEDICINE BRANCH



Randy Elkins, D.V.M., Diplomate, ACLAM, Chief
www.niaid.nih.gov/research/comparative-medicine-branch

USE OF ANIMALS in biomedical research is necessary to expand our ability to curtail infectious diseases, characterize new diseases, combat bioterrorism, and discover new ways to augment or harness the body's immune system. The mission of the Comparative Medicine Branch (CMB) is to provide the animals in our care with a comfortable, stable environment that eliminates research variables, to serve as a resource for Division of Intramural Research investigators, and to support research activities.

The CMB is composed of eight animal facilities and is responsible for animal care and research support of animal activities conducted by the various NIAID investigators. Animal use ranges from basic research support to pre-clinical trials. Species used include rodents, rabbits, ferrets, old world nonhuman primates, new world nonhuman primates, and chickens. CMB also has two animal biosafety level (ABSL)-3 facilities for conducting animal studies using infectious agents, including select agents that have the potential for aerosol transmission and require appropriate respiratory protection. CMB provides animal care and also provides research support activities.

CMB PROVIDES guidance to the Institute's intramural scientists using animals in research projects. This guidance includes

- Assisting with the development, annual review, and renewal of animal study proposals
- Developing standard operating procedures
- Purchasing animals
- Importing and exporting animals from and to locations all over the world
- Performing technical procedures on laboratory animals
- Diagnosing, treating, and controlling infectious agents
- Using NIH shared and central animal facilities
- Selecting and properly administering anesthetics and analgesics
- Tracking animal cage information through an interactive website

NIAID investigators maintain production colonies of more than 100 different strains of mice within government animal facilities. Many of these animals are unavailable anywhere else in the world or are available only after long delays.

INFECTIOUS DISEASE PATHOGENESIS SECTION

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

Chief, Comparative Medicine Branch
Chief, Infectious Disease Pathogenesis Section, CMB
Associate Director, Laboratory Animal Resources
Director, Animal Program, Division of Intramural Research
www.niaid.nih.gov/research/randy-elkins-dvm-diplomate-aclam
relkins@niaid.nih.gov

The Infectious Disease Pathogenesis Section provides pathology research support that has led to publications in highly respected, peer-reviewed journals; uses equipment that permits state-of-the-art pathology analytics; can process, analyze, and generate data to support NIAID investigators; and offers training and hands-on support to NIAID laboratories related to animal model education, study design, necropsy tissue collection methods and protocols, and micro-anatomical training/refresher training, in preparation for local and international scientific meetings.

AREAS OF SUPPORT

- Biostability of research models and issues related to animal welfare
- Adventitious infections and inherent disease conditions of laboratory animals
- Nonhuman primate-modeled infectious diseases and vaccine development support

BIOGRAPHY

Dr. Elkins obtained his D.V.M. from the University of Missouri College of Veterinary Medicine in 1974. He then 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, Ft. Detrick, Maryland. He joined the NIAID Division of Intramural Research (DIR), Laboratory of Infectious Diseases (LID), Immunodeficiency Viruses Section, as a senior staff laboratory animal veterinarian in 1992 and was promoted to head of the Experimental Primate Virology Section, LID, in 1997. Dr. Elkins was appointed DIR associate director for nonhuman primate research in 2000 and DIR associate director for laboratory animal resources and animal program director in December 2001. He became specialty board-certified by the American College of Laboratory Animal Medicine in 1996.

EXPERIMENTAL PRIMATE VIROLOGY UNIT

The Experimental Primate Virology Unit provides research support to NIAID investigators using a variety of nonhuman primate—both old world and new world—species in infectious disease studies, such as simian immunodeficiency virus, influenza, dengue, and respiratory syncytial virus. The section provides comprehensive research support from initial review and protocol development to conclusion of the study. They also collect research data including blood, lymph nodes, cerebral spinal fluid, bronchoalveolar lavages, and necropsy/post-mortem samples and provide services for surgical procedures, endoscopy, digital radiography, and ultrasound for NIAID investigators requiring ante-mortem sample collection.

MOUSE GENETICS AND GENE MODIFICATION UNIT

The Mouse Genetics and Gene Modification (MGGM) Unit provides *in vivo* gene modification and gene editing services using state-of-the-art technologies such as CRISPR/cas9 for functional genomics to NIAID scientists; provides services for sperm cryopreservation, embryo cryopreservation, and rederivation of mouse lines for NIAID laboratories; provides gene targeting in embryonic stem (ES) cells to create gene knockout and gene knock in animal models; and generates new ES cell lines from gene-targeted animals.

RESEARCH TECHNOLOGIES BRANCH

Robert J. Hohman, Ph.D., Chief

www.niaid.nih.gov/research/research-technologies-branch

The Research Technologies Branch (RTB) allows investigators in the Division of Intramural Research access to state-of-the-art research technologies. During the past 30 years, the advent of the biotechnology industry and the development of new scientific disciplines have resulted in an explosion of new technologies. In addition, advances in optics, lasers, and computer technology have revolutionized well-established disciplines such as microscopy (both light and electron), flow cytometry, and genomics. These technologies require very expensive instrumentation and, even more important, highly trained and specialized scientists to adapt these new technologies to the research needs of the Institute's diverse research agenda. The branch develops cutting-edge research technologies and project-specific applications for the NIAID intramural research program through a network of facilities located in Bethesda and Rockville, Maryland, as well as Hamilton, Montana. Scientists in RTB also provide expert training and consultation in experimental design, laboratory protocols, and analysis of results. Through different areas of expertise, RTB provides a variety of sections that investigators and trainees can access.

MAJOR AREAS OF SUPPORT

- Develop project-specific applications using state-of-the-art technologies.
- Provide technology consultation.
- Offer formal and informal training, support, and troubleshooting.
- Evaluate new technology and applications.
- Support investigators' bioinformatics needs.

AREAS OF EXPERTISE

- Light microscopy (confocal, multiphoton, colocalization, TIRF, FRET, high-resolution 3D imaging, laser microcapture, correlative techniques, and post-collection imaging processing)
- Electron microscopy (high-resolution scanning and transmission, cryoimmobilization/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 identification, protein separation, and assay development)
- Genomics (Agilent Sure-print custom spotted, Illumina BeadChip, and Affymetrix microarrays; microarray design; Illumina and Roche next-generation DNA sequencing; and Q-PCR)
- Bioinformatics and biostatistics (experiment design, data management, statistical analysis, exploratory analysis, data mining, and database integration)

PROTEIN CHEMISTRY SECTION

Robert J. Hohman, Ph.D.

Chief, Protein Chemistry Section
Chief, Research Technologies Branch
www.niaid.nih.gov/research/robert-j-hohman-phd
rhohman@niaid.nih.gov

The Protein Chemistry Section offers the use of cutting edge applications in mass spectrometry, bioinformatics, peptide synthesis and analysis, and protein sequencing in their research programs.

MAJOR AREAS OF SUPPORT

- Edman (N-terminal) protein sequencing
- Peptide synthesis
- Analytical mass spectrometry (MS)
- Protein identification
- Protein separation
- Assay development
- Proteomics
- Bioinformatics

BIOGRAPHY

Dr. Hohman received his Ph.D. in microbiology from NIH and the University of Maryland in 1982. After a three-year postdoctoral position in the laboratory of biochemistry at the Pasteur Institute in Paris, he returned to NIH for a second postdoctoral appointment. In 1992, he joined Oncor Inc., a biotechnology company that specialized in DNA diagnostics, and became the vice president of research and development. In 2000, he was recruited back to NIH to become the DIR associate director for research technologies and chief of the Research Technologies Branch.

BIOLOGICAL IMAGING SECTION

Owen M. Schwartz, Ph.D.

Chief, Biological Imaging Section, RTB
www.niaid.nih.gov/research/owen-m-schwartz-phd
oschwartz@mail.nih.gov

The Biological Imaging Section offers state-of-the art microscopy in their research programs. The section provides expertise, instruction, and instrumentation, as well as assistance in experiment design and in the collection and analysis of images of living and fixed material.

MAJOR AREAS OF SUPPORT

- Confocal microscopy
- Fluorescence microscopy
- Video microscopy
- Post-collection quantification and deconvolution

ELECTRON MICROSCOPY UNIT

Elizabeth Fischer, M.A.

Chief, RML Microscopy Unit, RTB
www.niaid.nih.gov/research/beth-fischer-ma
efischer@niaid.nih.gov

The Electron Microscopy (EM) Unit, located in Rocky Mountain Laboratories (RML), provides sample preparation and analysis ranging from basic to high-resolution structural studies to immuno-localization of selected antigens for a wide array of specimens. A variety of methods, protocols, and equipment are employed to accommodate different preparative and imaging needs. Real-time viewing of samples by video image-sharing is also available to NIAID users, enabling scientists at distant locations the ability to view samples simultaneously with microscopy staff.

MAJOR AREAS OF SUPPORT

- 3D tomography and high-resolution transmission electron microscopy (TEM)
- Confocal microscopy
- Correlative light and electron microscopy (CLEM)
- Cryo-electron microscopy
- Immuno-electron microscopy
- Microwave-assisted freeze substitution
- Scanning electron microscopy (SEM)
- TEM

FLOW CYTOMETRY SECTION

Tom Moyer

Acting Chief, Flow Cytometry Section, RTB
www.niaid.nih.gov/research/tom-moyer
tmoyer@niaid.nih.gov

The Flow Cytometry Section specializes in state-of-the-art flow cytometric analysis and sorting technologies. The section provides expertise, instrumentation, and analysis. In addition, the staff is accessible for consultation in the design of experiments and in interpretation of high-quality data.

MAJOR AREAS OF SUPPORT

- Flow cytometric analysis (up to 13-color sorting, up to 14-color analysis, BSL-3 sorting and analysis, multispectral imaging cytometry, and multiplex bead array assays)
- Sorting technologies

GENOMIC TECHNOLOGIES SECTION

Timothy G. Myers, Ph.D.

Chief, Genomic Technologies Section, RTB
www.niaid.nih.gov/research/timothy-g-myers-phd
tgmyers@mail.nih.gov

The Genomic Technologies Section provides microarray and next-generation sequencing technology. They also provide statistical and bioinformatics data analysis support.

MAJOR AREAS OF SUPPORT

- Genome-wide assays of mRNA, micro-RNA, and DNA copy (Copy Number Variation (CNV), Comparative Genomic Hybridization (CGH))
- Detection of DNA aberrations, DNA methylation, Epigenetics
- Human disease biomarker discovery
- Statistical analysis of microarray and high-throughput screening data
- Bioinformatics, database mining, pathway and network analysis
- Data management and analysis pipelines, "reproducible data analysis" protocols
- Experiment design for microarray and other massively parallel assays

RML FLOW CYTOMETRY UNIT

Aaron Carmody, M.S.

Chief, RML Flow Cytometry Unit, RTB
www.niaid.nih.gov/research/aaron-carmody-ms
acarmody@mail.nih.gov

The RML Flow Cytometry Unit offers flow cytometric analysis and sorting technologies in their research programs. The unit provides expertise, experiment design, data analysis, and data interpretation involving cell sorting or multi-parameter experiments. Staff is accessible for consultation in design and running of experiments and in interpretation of data.

MAJOR AREAS OF SUPPORT

- Flow cytometric analysis
- Sorting technologies

RML GENOMICS UNIT

Craig Martens, Ph.D.

Chief, RML Genomics Unit, RTB
www.niaid.nih.gov/research/craig-martens-phd
martensc@niaid.nih.gov

Located in the Rocky Mountain Laboratories (RML), RML Genomics Unit enables the use of state-of-the-art applications in microarray and sequencing technologies in their research programs. As well, staff provide expertise, instrumentation, and analysis and interpretation of data.

MAJOR AREAS OF SUPPORT

- High-throughput Capillary/Sanger DNA sequencing
- Affymetrix microarray technologies
- Next-generation DNA/RNA sequencing
- High-throughput TaqMan (Q-RtPCR) analysis
- Human and pathogen genotyping
- Advanced bioinformatics and biostatistics (experiment design, data management, statistical analysis, exploratory analysis, data mining, and database integration) for all of the above

STRUCTURAL BIOLOGY UNIT

David N. Garboczi, Ph.D.

Chief, Structural Biology Unit, RTB
www.niaid.nih.gov/research/david-n-garboczi-phd
dgarboczi@niaid.nih.gov

The Structural Biology Unit facilitates use of state-of-the-art applications in X-ray crystallography. They provide expertise, instruction, and instrumentation in X-ray crystallography of macromolecules. Staff is available to assist in producing the highly purified macromolecules required for growing crystals, in acquiring X-ray data from the crystals, and in using the X-ray data to determine three-dimensional crystal structures.

MAJOR AREAS OF SUPPORT

- Production of large amounts of highly purified, correctly folded macromolecules
- Preparation of diffraction-quality crystals
- Determination of structures by X-ray crystallography and other macromolecules

VISUAL AND MEDICAL ARTS UNIT

Anita Mora

Team Lead, Visual and Medical Arts Unit, RTB
www.niaid.nih.gov/research/anita-mora
amora@niaid.nih.gov

The Visual and Medical Arts Unit (VMA) at Rocky Mountain Laboratories enables investigators to communicate complex phenomena to both the scientific community and the general public. The VMA operates in all venues of modern communication, including YouTube, Facebook, Twitter, Pinterest, and Flickr to ensure scientific achievements reach the widest possible audience. The unit uses a state-of-the-art comprehensive suite of illustration, design, photography, 3D animation, and video technology.

MAJOR AREAS OF SUPPORT

- Scientific illustration
- Photography
- 3D animation
- Video technology

ROCKY MOUNTAIN VETERINARY BRANCH

RESEARCH SUPPORT ACTIVITIES

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

MAJOR AREAS OF SUPPORT

- Biosafety level-4 pathogen animal models and molecular reagents
- Testing novel vaccine candidates for ABSL-4 select agents
- Clinical care and animal model development
- Developing standard operating procedures for high-containment animal research environments
- Full pathological services for infectious disease animal models
- Novel histopathology techniques for laboratory animal models
- Training programs for laboratory animal procedures and biosafety in animal facilities
- Imaging techniques in the high-containment animal research environment

VETERINARY PATHOLOGY SECTION

Dana Scott, D.V.M.

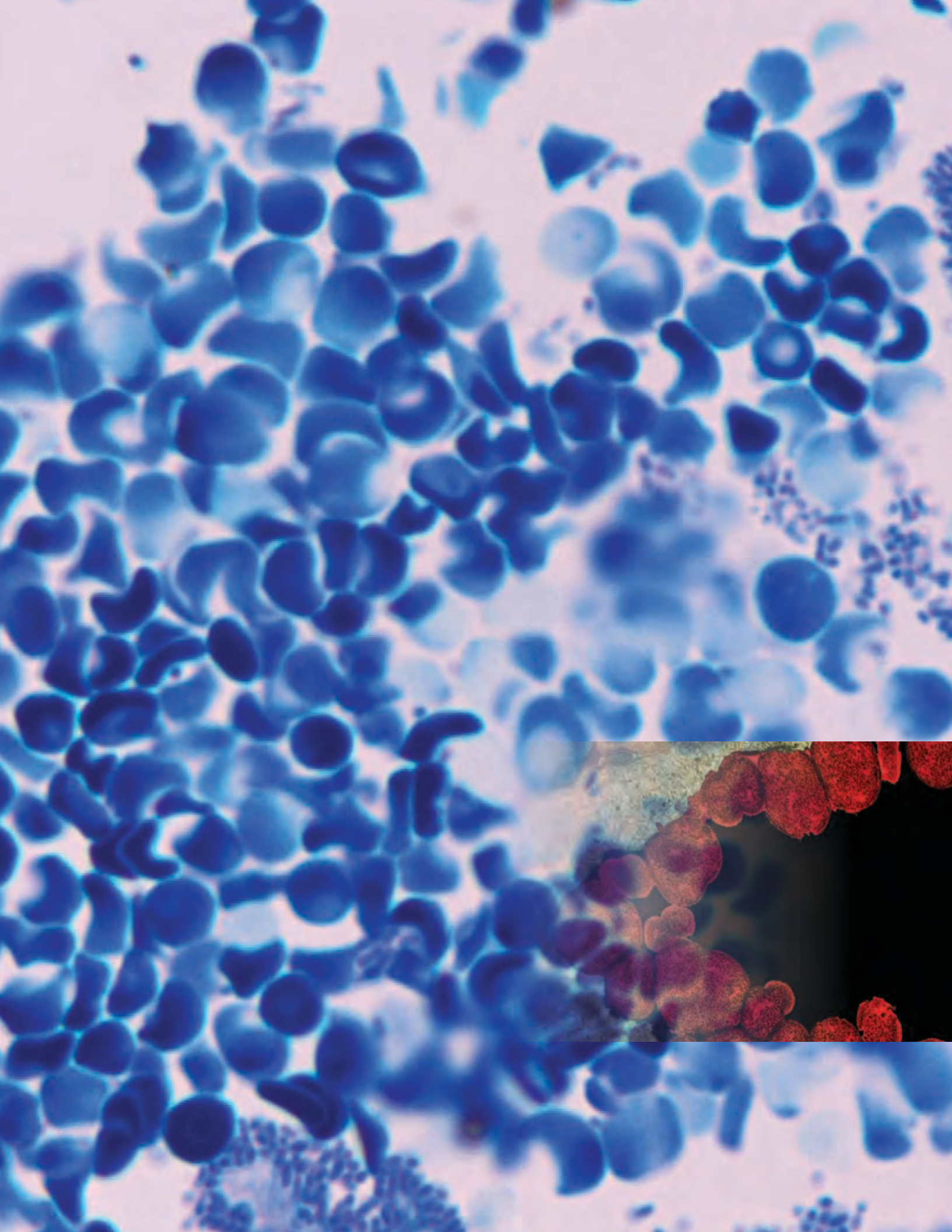
Chief, Rocky Mountain Veterinary Branch
Chief, Veterinary Pathology Section, RMVB
dscott@niaid.nih.gov

BIOGRAPHY

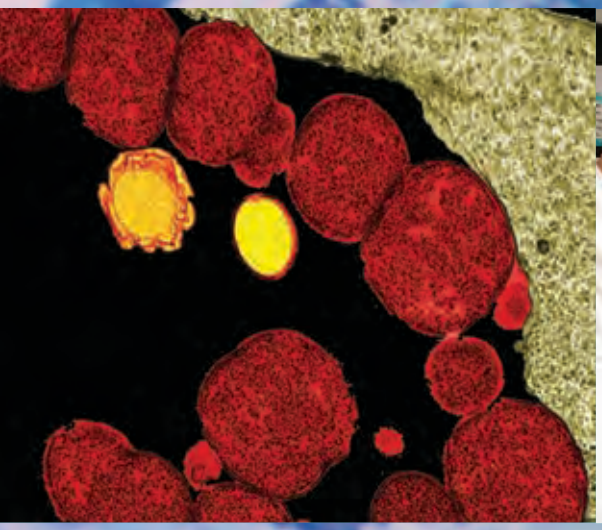
Dr. Scott earned his D.V.M. from Washington State University in 1987. He served for 22 years in the U.S. Army Veterinary Corps. During that time he completed his residency at the Armed Forces Institute of Pathology and became a diplomate of the College of Veterinary Pathologists in 1997. He earned a master's degree in national resource strategy at the National Defense University in 2006. He joined the Rocky Mountain Veterinary Branch (RMVB) in 2011 and currently serves as its chief.

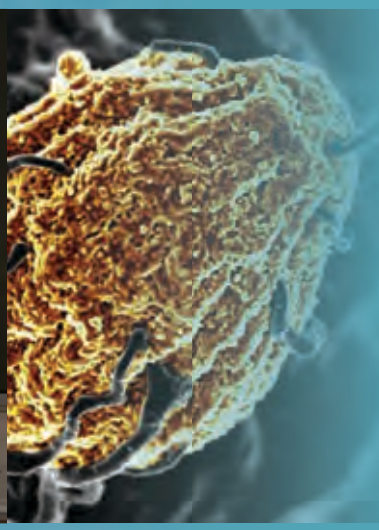
MAJOR AREAS OF RESEARCH

- Imaging
- Surgical modeling



DIR LABORATORIES & INDEPENDENT SECTIONS





LABORATORY OF ALLERGIC DISEASES

Joshua Milner, M.D., Chief
www.niaid.nih.gov/research/lab-allergic-diseases

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 basic and translational research aimed at elucidating events in mast cell-dependent, IgE-mediated allergic inflammatory reactions, including anaphylaxis, eosinophilic gastrointestinal diseases, and systemic mast cell disorders. Studies are focused on the role of mast cells, basophils, eosinophils, T lymphocytes, and their cytokines in these disorders.

MAJOR AREAS OF RESEARCH

- Study the growth, differentiation, and activation of mast cells, basophils, and eosinophils
- Elucidate signal transduction pathways in inflammation
- Understand the biological manifestations of effector-cell activation in tissues
- Perform clinical/translational research directed at understanding the pathogenesis of allergic inflammation
- Find novel immunomodulatory and anti-inflammatory approaches to the treatment of allergic and immunologic disorders

SECTIONS AND UNITS

Food Allergy Research Unit
Pamela A. Guerrerio, M.D., Ph.D.

Genetics and Pathogenesis of Allergy Section
Joshua D. Milner, M.D.

Inflammation Immunobiology Section
Helene F. Rosenberg, M.D., Ph.D.

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

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

Translational Allergic Immunopathology Unit
Jonathan Lyons, M.D.

JOSHUA D. MILNER, M.D.

Chief, Laboratory of Allergic Diseases
Chief, Genetics and Pathogenesis of Allergy Section, LAD
www.niaid.nih.gov/research/joshua-d-milner-md
jdmilner@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Investigation of defects in T-cell receptor signaling and repertoires
- Clinical and pathophysiologic analysis of patients with known genetic diseases associated with atopy
- Search for novel genetic diseases associated with atopy

BIOGRAPHY

Joshua Milner graduated with an S.B. in biology from the Massachusetts Institute of Technology (MIT) in 1995 and an M.D. with distinction in immunology from the Albert Einstein College of Medicine in 2000. He finished his residency in pediatrics at the Childrens National Medical Center in Washington, DC, in 2003. He was the recipient of the Pediatric Scientist Development Program Fellowship and did his fellowship in allergy and immunology at NIAID. He completed a postdoctoral fellowship with Dr. William Paul, examining issues of mouse T-cell receptor repertoires before beginning as a clinical tenure-track investigator in LAD. He was named chief of LAD in 2017.

KIRK M. DRUEY, M.D.

Chief, Molecular Signal Transduction Section, LAD
www.niaid.nih.gov/research/kirk-m-druey-md
kdruey@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Signaling mechanisms of G protein-coupled receptors (GPCRs)
- Role of airway smooth muscle abnormalities in asthma
- The Systemic Capillary Leak Syndrome

BIOGRAPHY

Dr. Druey obtained his M.D. from Rush Medical College in Chicago, Illinois. 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 become chief of the Molecular Signal Transduction Section.

PAMELA A. GUERRERIO, M.D., PH.D.

Chief, Food Allergy Research Unit, LAD
www.niaid.nih.gov/research/pamela-guerrerio-md-phd
pamela.guerrerio@nih.gov

MAJOR AREAS OF RESEARCH

- Identification of genetic disorders associated with the development of food allergy and related conditions
- Investigation of the key cellular and biochemical pathways critical in the development of tolerance to food antigens using human and murine models
- Development of novel therapies for food allergy

BIOGRAPHY

Dr. Guerrerio graduated with a B.S. degree in biology from the University of Iowa and entered the Medical Scientist Training Program at The Johns Hopkins University, where she completed medical school and a Ph.D. in human genetics. She also did her residency in pediatrics and fellowship in allergy and immunology at Johns Hopkins. She subsequently joined the faculty at Johns Hopkins and was the recipient of the 2011 ARTrust Faculty Development Award from the American Academy of Asthma, Allergy, and Immunology. In 2014, Dr. Guerrerio was appointed chief of the Food Allergy Research Unit.

JONATHAN LYONS, M.D.

Chief, Translational Allergic Immunopathology Unit, LAD
www.niaid.nih.gov/research/jonathan-lyons-md
lyonsjj@mail.nih.gov

MAJOR AREAS OF RESEARCH

- To investigate the consequences of altered glycosylation in atopy and allergic inflammation
- To study the structural variation, altered expression, and function of the glycoprotein tryptase, a mediator released by mast cells and involved in allergic reactions
- To develop novel targeted therapeutic approaches for individuals with severe allergy and mast cell-associated disorders

BIOGRAPHY

Jonathan Lyons graduated with a B.A. in chemistry from Pomona College in 2003 and received an M.D. from the University of Southern California in 2007. Dr. Lyons completed residency training in internal medicine at the University of California, San Diego, in 2010, remaining an additional year as a chief medical resident. He concluded his formal medical training in 2014 at NIAID as a clinical fellow in allergy and immunology. Following completion of a fellowship, he was selected for the NIAID Transition Program in Clinical Research and is currently an assistant clinical investigator in the Laboratory of Allergic Diseases. Dr. Lyons is board certified in internal medicine and allergy/immunology, a member of the Clinical Immunology Society, and a member of the American Academy of Allergy, Asthma & Immunology, where he serves on the Genetics, Molecular Biology, and Epidemiology Committee.

DEAN D. METCALFE, M.D.

Chief, Mast Cell Biology Section, LAD
www.niaid.nih.gov/research/dean-d-metcalfe-md
dmetcalfe@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Identification of mutations and polymorphisms in human disease that affect the mast cell compartment
- Characterization of key signaling pathways in human mast cells that control mast cell responses
- Application of this information to the diagnosis and treatment of anaphylaxis and other allergic and immunologic diseases

BIOGRAPHY

Dr. Metcalfe received his M.D. at the University of Tennessee and an M.S. in microbiology at 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. In 1995, he was appointed as the first chief of the newly created Laboratory of Allergic Diseases at NIAID. He is a past president of the American Academy of Allergy, Asthma, and Immunology and a past chair of the American Board of Allergy and Immunology. Dr. Metcalfe is a fellow of the American Academy of Allergy, Asthma, and Immunology and a member of the Association of American Physicians, *Collegium Internationale Allergologicum*, and American Clinical and Climatological Association.

HELENE F. ROSENBERG, M.D, PH.D.

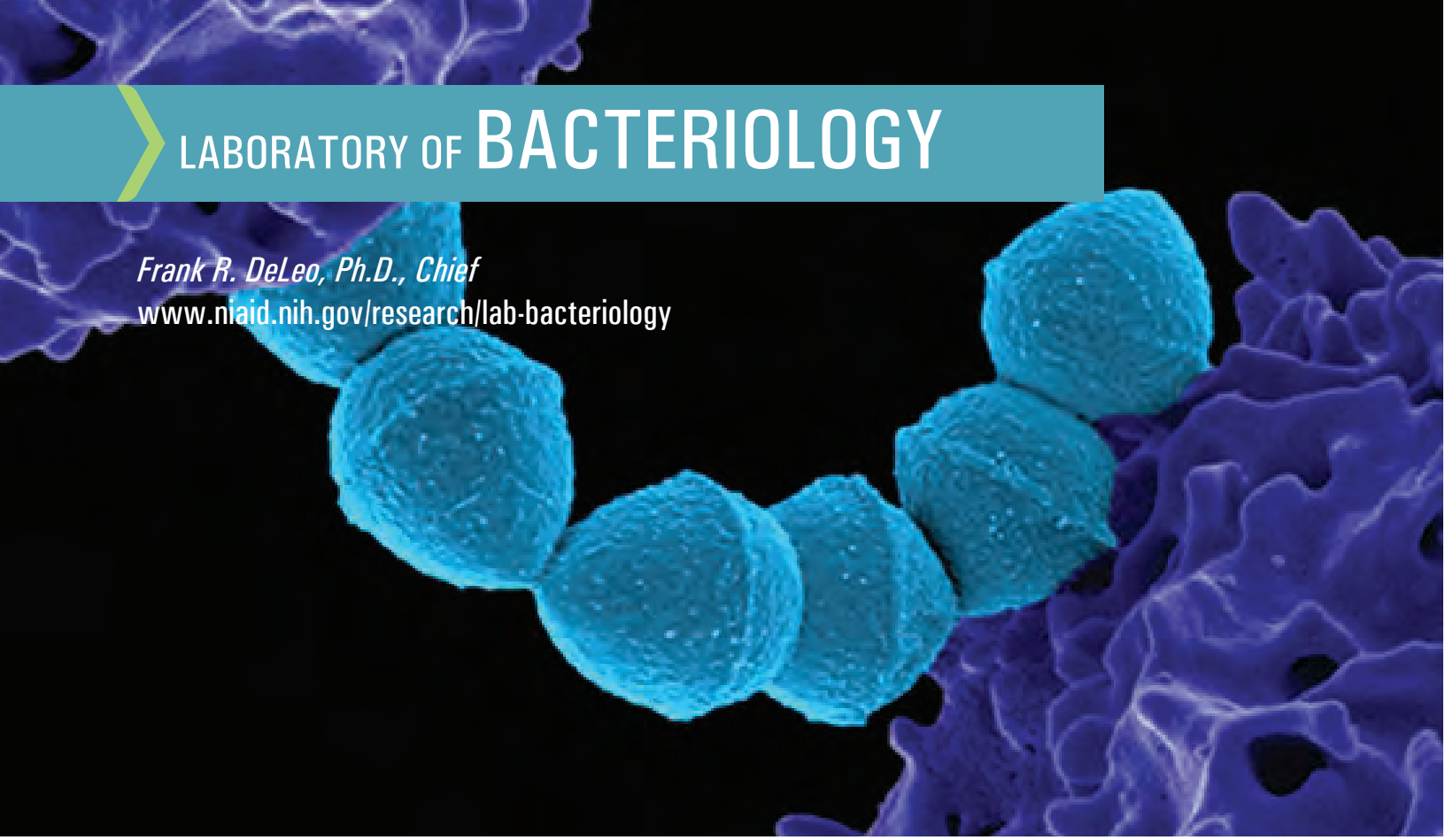
Chief, Inflammation Immunobiology Section, LAD
www.niaid.nih.gov/research/helene-f-rosenberg-md-phd
hrosenberg@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Respiratory viruses, inflammation, and immunomodulatory therapies
- Eosinophils and their role in innate immune responses
- Diversity and biology of RNase A family ribonucleases

BIOGRAPHY

Dr. Rosenberg was awarded both M.D. and Ph.D. degrees from the Medical Scientist Training Program at The Rockefeller University/Cornell University Medical College (1984, 1985). Following postdoctoral research at Harvard University, she joined NIH in 1991, was granted tenure in 1998, and became a section chief in 2002.



LABORATORY OF BACTERIOLOGY

Frank R. DeLeo, Ph.D., Chief

www.niaid.nih.gov/research/lab-bacteriology

MAJOR AREAS OF RESEARCH

The Laboratory of Bacteriology (LB) studies bacteria that cause important human infections, including *Chlamydia, Coxiella, Francisella, Rickettsia*, and *Salmonella*. In addition, LB conducts research with pathogens listed as serious or urgent threats in the National Action Plan for Combating Antibiotic-Resistant Bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA) and carbapenem-resistant *Klebsiella pneumoniae*. The ultimate goal of our research is to identify novel or improved strategies to control bacterial diseases, including development of diagnostics, vaccines, and therapeutics. LB maintains a flexible laboratory and theoretical infrastructure to permit analysis of bacterial pathogens of special interest.

SECTIONS AND UNITS

***Coxiella* Pathogenesis Section**
Robert A. Heinzen, Ph.D.

Gene Regulation Section
Frank Gherardini, Ph.D.

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

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

Molecular Genetics Section
Patricia Rosa, Ph.D.

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

Pathogen Molecular Genetics Section
Michael Otto, Ph.D.

Plague Section
B. Joseph Hinnebusch, Ph.D.

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

FRANK R. DELEO, PH.D.

Chief, Laboratory of Bacteriology
Chief, Pathogen-Host Cell Biology Section, LB
www.niaid.nih.gov/research/frank-r-deleo-phd
fdeleo@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Neutrophil biology and function
- Evasion of innate immunity by bacterial pathogens
- Host interactions with antibiotic-resistant bacteria

BIOGRAPHY

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 diseases in the department of medicine at the University of Iowa (1996 – 2000). Dr. DeLeo joined the staff at the NIAID Rocky Mountain Laboratories in 2000 and served previously as acting chief of the Laboratory of Human Bacterial Pathogenesis (2007 – 13). He was appointed to the NIH Senior Biomedical Research Service in 2011 and is chief of the Laboratory of Bacteriology.

OLIVIA STEELE-MORTIMER, PH.D.

Deputy Chief, Laboratory of Bacteriology
Chief, Salmonella*-Host Cell Interactions Section, LB*
www.niaid.nih.gov/research/olivia-steele-mortimer-phd
omortimer@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Host-cell proteins involved in invasion
- Biogenesis of the *Salmonella*-containing vacuole

BIOGRAPHY

Dr. Steele-Mortimer received her Ph.D. in cell biology from the European Molecular Biology Laboratory in 1994. From 1995 to 1999, she did postdoctoral research on *Salmonella*-host cell interactions in the laboratory of B. Brett Finlay at the University of British Columbia in Vancouver, followed by one year at Washington University, St. Louis, with Phillip D. Stahl. She came to NIH in 2001 and became a tenured senior investigator in 2007. Dr. Steele-Mortimer is an associate editor of *Microbial Pathogenesis* and is a member of the editorial board of *Traffic*.

CATHARINE (KATY) BOSIO, PH.D.

Chief, Immunity to Pulmonary Pathogens Section, LB
www.niaid.nih.gov/research/catharine-katy-bosio-phd
bosioc@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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 Food and Drug Administration Center for Biologics Evaluation and Research and at the U.S. Army Medical Research Institute for Infectious Diseases, studying innate immunity to *Mycobacterium tuberculosis, F. tularensis*, Marburg virus, and Ebola virus. Prior to joining NIAID in 2007, Dr. Bosio was an assistant professor at Colorado State University in the department of microbiology, immunology, and pathology. Dr. Bosio's laboratory studies the host response to pulmonary pathogens, with special emphasis on virulent *F. tularensis* and dendritic cells, macrophages, and monocytes.

FRANK GHERARDINI, PH.D.

Chief, Gene Regulation Section, LB
www.niaid.nih.gov/research/frank-gherardini-phd
frank.gherardini@nih.gov

MAJOR AREAS OF RESEARCH

- Physiology, biochemistry, gene regulation, and pathogenesis of *Borrelia burgdorferi* and *Borrelia hermsii*

BIOGRAPHY

Dr. Gherardini received his doctorate in 1987 from the University of Illinois, studying enzymes involved in the utilization of galactomannans by *Bacteroides ovatus*. From 1991 to 2001, he was a tenured professor in the department of microbiology at the University of Georgia. In 2001, Dr. Gherardini joined the Rocky Mountain Laboratories, where he is chief of the Gene Regulation Section and a senior investigator in the Laboratory of Zoonotic Pathogens.

DAVID W. (TED) HACKSTADT, PH.D.

Chief, Host-Parasite Interactions Section, LB
www.niaid.nih.gov/research/david-w-ted-hackstadt-phd
thackstadt@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- *Chlamydia* interactions with host cells
- Vesicle trafficking pathways
- Biology of *Rickettsia*

BIOGRAPHY

Dr. Hackstadt received his Ph.D. from Washington State University. His postdoctoral work was in the NIAID Laboratory of Microbial Structure and Function. Dr. Hackstadt then assumed an associate professorship in the departments of pathology and microbiology at the University of Texas Medical School in Galveston. In 1990, he returned to NIAID, 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 currently serves on the editorial boards of *Traffic, Cellular Microbiology*, and *Infection and Immunity*. 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, LB*
www.niaid.nih.gov/research/robert-heinzen-phd
rheinzen@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Genomics and genetic systems
- Developmental biology
- Host interactions

BIOGRAPHY

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 at NIAID in 1996, Dr. Heinzen joined the faculty of the molecular biology department at the University of Wyoming, where he was awarded tenure in 2002. Dr. Heinzen was recruited to NIH in 2003 as head of the new *Coxiella* Pathogenesis Section, where he was awarded tenure in 2010 and promoted to senior investigator. Dr. Heinzen has served on the executive council for the American Society for Rickettsiology. In 2011, Dr. Heinzen was elected fellow of the American Academy of Microbiology in recognition of his studies on *Coxiella* and *Rickettsia* pathogenesis.

B. JOSEPH HINNEBUSCH, PH.D.

Chief, Plague Section, LB
www.niaid.nih.gov/research/b-joseph-hinnebusch-phd
jhinnebusch@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Interactions between the bacterium *Yersinia pestis* and 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

BIOGRAPHY

Dr. Hinnebusch received his Ph.D. in microbiology in 1991 from the University of Texas Health Science Center at San Antonio, studying the molecular structure and replication of linear plasmids of *Borrelia burgdorferi,* the bacterial agent of Lyme disease. He joined 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 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.

MICHAEL OTTO, PH.D.

Chief, Pathogen Molecular Genetics Section, LB
www.niaid.nih.gov/research/michael-otto-phd
motto@niaid.nih.gov

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- and hospital-associated methicillin-resistant *Staphylococcus aureus* (MRSA): virulence determinants and epidemiology
- Gene regulatory processes during pathogen-host interaction

BIOGRAPHY

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. In 2008, he became a tenured senior investigator and moved his laboratory to the NIH Bethesda main campus (Building 33). In 2015, his section became part of the new Laboratory of Bacteriology.

PATRICIA ROSA, PH.D.

Chief, Molecular Genetics Section, LB
www.niaid.nih.gov/research/patricia-rosa-phd
prosa@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Development of a genetic system for *Borrelia burgdorferi*, the spiral-shaped bacterium that causes Lyme disease
- Analysis of the structure and function of the plasmid component of the highly segmented *B. burgdorferi* genome
- Determination of the roles of specific plasmids, genes, and proteins during the natural infectious cycle of *B. burgdorferi*
- Cultivation and genetic manipulation of free-living and pathogenic *Leptospira*

BIOGRAPHY

Dr. Rosa received her doctorate in 1980 from the Institute of Molecular Biology at the University of Oregon. In 1988, following research fellowships at Washington University School of Medicine in St. Louis and at the Research Institute of Scripps Clinic, Dr. Rosa joined Rocky Mountain Laboratories. She became a tenured investigator in 2000. Dr. Rosa is a fellow of the American Academy of Microbiology and an internationally recognized leader in the field of bacterial molecular genetics.

LABORATORY OF CLINICAL IMMUNOLOGY AND

Luigi Daniele Notarangelo, M.D., Chief
www.niaid.nih.gov/research//lab-clinical-immunology-and-microbiology

The Laboratory of Clinical Immunology and Microbiology (LCIM) conducts clinical and basic science, and epidemiologic research into human immunologic, inflammatory, and infectious diseases.

Primary immunodeficiencies (PIDs) that arise from a variety of mutations in genes involved in the immune system are a major focus area of the laboratory. To develop a comprehensive understanding of the natural history and pathogenesis of PIDs, the LCIM integrates clinical studies with laboratory investigations at molecular-, cellular-, and systems-level scales.

Clinical and basic science aspects of bacterial, fungal, and viral microbiology and pathogenesis are another major concentration of LCIM investigators. Vaccine development and drug discovery efforts have led to several international clinical trials that aim to lessen the global impact of microbial diseases and prevent or minimize the emergence of drug-resistant microbes.

Training of physicians and scientists is central to the LCIM mission. The NIAID Infectious Disease Fellowship Training Program, the NIAID Primary Immune Deficiency Clinic, and the NIH Clinical Center Infectious Disease Consultation Service are integral components of the LCIM and facilitate the reciprocal education of basic scientists and clinical fellows alike.

MAJOR AREAS OF RESEARCH

- Discovery of the gene mutations causing primary immune deficiencies and autoimmune disorders
- Bacterial pathogenesis (e.g., Mycobacterium, Borrelia, Chlamydia, Granulibacter)
- Fungal pathogenesis (e.g., Cryptococcus, Candida, Aspergillus)
- Viral pathogenesis (e.g., Herpes simplex and zoster, Vaccinia, Zika, Epstein-Barr)
- Development and testing of novel antimicrobial drugs, gene therapy, stem cell transplant, cytokines, monoclonal antibodies, and other therapeutics to modify or correct immune function, prevent infection, and reduce inflammation

SECTIONS AND UNITS

Antibacterial Host Defense Unit
Robert S. Munford, M.D.

Bacterial Pathogenesis and Antimicrobial Resistance Unit
John P. Dekker, M.D., Ph.D.

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

Clinical Pathophysiology Section
John I. Gallin, M.D.

Fungal Pathogenesis Section
Michail S. Lionakis, M.D., Sc.D.

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

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

Immune Deficiency Genetics Section
Luigi Daniele Notarangelo, M.D.

Immunopathogenesis Section
Steven M. Holland, M.D.

Inflammation and Innate Immunity Unit
Katrin D. Mayer-Barber, Dr. Rer. Nat.

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

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

Mucosal Immunity Section
Warren Strober, M.D.

Neuroimmunolgical Diseases Section
Bibi Bielekova, M.D.

Translational Autoinflammatory Disease Studies Unit
Raphaela T. Goldbach-Mansky, M.D., M.H.S.

Translational Mycology Section
Peter Williamson, M.D., Ph.D.

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

Viral Immunity and Pathogenesis Unit
Heather Hickman, Ph.D.

MICROBIOLOGY

LUIGI DANIELE NOTARANGELO, M.D.

Chief, Laboratory of Clinical Immunology and Microbiology
Chief, Immune Deficiency Genetics Section
www.niaid.nih.gov/research/luigi-d-notarangelo-md
luigi.notarangelo2@nih.gov

MAJOR AREAS OF RESEARCH

- Defining the molecular and cellular bases of novel forms of human primary immune deficiency
- Understanding the mechanisms underpinning manifestations of immune dysregulation in patients with RAG deficiency and other forms of combined immune deficiency
- Developing novel approaches to correct primary immune deficiency gene defects

BIOGRAPHY

Luigi D. Notarangelo received his M.D. from the University of Pavia, Italy. After completing training in pediatrics, subspecialty training in allergy/immunology, and human genetics at the University of Pavia and a postdoctoral internship with David Nelson, M.D., at the Metabolism Branch, National Cancer Institute, he was appointed associate professor and subsequently full professor of pediatrics at the University of Brescia, Italy, where he chaired the department of pediatrics between 2000 and 2006. In November 2006, he joined the division of immunology at Boston Children's Hospital, Harvard Medical School, as professor of pediatrics. In October 2016, he joined the Laboratory of Host Defenses.

CLIFTON E. BARRY III, PH.D.

Chief, Tuberculosis Research Section, LCIM
www.niaid.nih.gov/research/clifton-e-barry-iii-phd
cbarry@mail.nih.gov

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
- Advanced diagnostic solutions for TB

BIOGRAPHY

Dr. Barry received his Ph.D. in organic and bio-organic chemistry in 1989 from Cornell University. He joined NIAID following postdoctoral research at The Johns Hopkins University. In 1998, he was tenured as chief of the Tuberculosis Research Section. Dr. Barry is a member of several editorial boards, has authored more than 120 research publications in tuberculosis, and is the most cited researcher in the field, according to ScienceWatch.com.

JOHN E. BENNETT, M.D.

Senior Investigator, LCIM
www.niaid.nih.gov/research/john-e-bennett-md
jbennett@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Cryptococcosis in previously normal patients
- Idiopathic CD4 lymphocytopenia
- Clinical trials of antifungal agents

BIOGRAPHY

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 seven editions of *Principles and Practice of Infectious Diseases;* and consultant to the Centers for Disease Control and Prevention, American College of Physicians-American Society of Internal Medicine, U.S. Public Health Association, Food and Drug Administration, and U.S. Department of Defense.

BIBI BIELEKOVA, M.D.

Chief, Neuroimmunological Diseases Section, LCIM
www.niaid.nih.gov/research/bibi-bielekova-md
bielekovab@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Development of combinatorial biomarkers for reliable measurement of pathophysiological processes (e.g., inflammation, neurodegeneration) in patients with immune-mediated diseases of the central nervous system, especially multiple sclerosis (MS)
- Validation of MS disease mechanisms and therapeutic targets within the context of interventional clinical trials and longitudinal follow-up of patients on FDA-approved disease-modifying treatments
- Identification of biomarker signatures that can predict a drug's efficacy on clinical outcomes and development of algorithms that optimize therapeutic selections

BIOGRAPHY

Dr. Bielekova received an M.D. in 1993 from Comenius University in Bratislava, Slovakia. After a medical internship at SUNY Downstate Medical Center in Brooklyn and a neurology residency at Boston University, she did a 3-year postdoctoral research fellowship at the NINDS Neuroimmunology Branch (NIB). She remained at NIB for an additional 5 years as a staff physician, focusing on development of novel therapies for MS. In 2005, she became associate professor of neurology with tenure and director of the Waddell Center for MS at University of Cincinnati. In 2008, she moved back to NINDS as an investigator. In 2018, Dr. Bielekova transferred as a senior investigator to NIAID.

HARLAN D. CALDWELL, PH.D.

Chief, Chlamydial Diseases Section, LCIM
www.niaid.nih.gov/research/harlan-d-caldwell-phd
hcaldwell@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Pathogenesis of chlamydial infection
- Immunity to chlamydial infection
- Chlamydia vaccine development

BIOGRAPHY

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 at the University of Washington in 1978, 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 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 PHS 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.

JOHN P. DEKKER, M.D., PH.D.

Chief, Bacterial Pathogenesis and Antimicrobial Resistance Unit, LCIM
Director, Genomics Section, Microbiology Service, Dept Lab Medicine, NIH Clinical Center
www.niaid.nih.gov/research/john-p-dekker-md-phd-fcap
john.dekker@nih.gov

MAJOR AREAS OF RESEARCH

- Genomics of antimicrobial resistance
- Adaptive evolution of bacterial infections in the context of acute or chronic infection
- Pathogenesis of bacterial infections in patients with primary immunodeficiencies
- Development of novel approaches for rapid antimicrobial resistance diagnostics

BIOGRAPHY

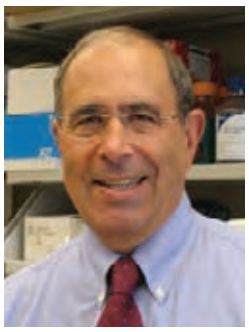
Dr. Dekker received his M.D. from Harvard Medical School and Ph.D. from Harvard University in ion channel biophysics through the NIH Medical Scientist Training Program. He is board-certified in Clinical Pathology and Medical Microbiology. Since 2013, he has been a Senior Staff member at the NIH Clinical Center. In 2018, Dr. Dekker was named as a Lasker Clinical Research Scholar and recruited to NIAID, where he established the Bacterial Pathogenesis and Antimicrobial Resistance Unit. Dr. Dekker serves on the Clinical Center Hospital Infection Control Committee and the NIAID Infectious Disease Fellowship Committee. He is a member of the editorial board for Journal of Clinical Microbiology. In 2016, Dr. Dekker received the Beckman-Coulter Young Investigator award from the American Society for Microbiology, and he received an NIH Clinical Center CEO Award in 2017.

JOHN I. GALLIN, M.D., M.A.C.P.

Chief Scientific Officer, Clinical Center, NIH
Chief, Clinical Pathophysiology Section, LCIM
www.niaid.nih.gov/research/john-i-gallin-md-macp
jgallin@cc.nih.gov

MAJOR AREAS OF RESEARCH

- Inflammation
- Phagocyte dysfunction



BIOGRAPHY

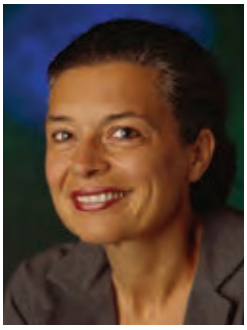
Dr. Gallin received his medical training at Cornell University Medical College in New York City followed by residency in internal medicine at Bellevue Hospital. In 1971, he first came to NIH as a clinical associate in Sheldon Wolff's Laboratory of Clinical Investigation. In 1974 he served as senior chief resident in medicine at Bellevue Hospital before returning to NIH in 1976 as a senior investigator. Dr. Gallin served as the director of the NIAID Intramural Research Program (1985–1994), the chief of the Laboratory of Host Defenses (1991–2003), and the director of the NIH Clinical Center (1994–2017). Currently, Dr. Gallin is the chief scientific officer of the NIH Clinical Center and the NIH associate director for clinical research. Among his honors are membership in the National Academy of Medicine and a master of the American College of Physicians.

RAPHAELA T. GOLDBACH-MANSKY, M.D., M.H.S.

Chief, Translational Autoinflammatory Disease Studies Unit, LCIM
www.niaid.nih.gov/research/raphaela-t-goldbach-mansky-md-mhs
goldbacr@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Study pathogenesis and immune-dysregulatory mechanisms of interleukin-1-mediated autoinflammatory diseases including NOMID, DIRA, and the IL-1/IL-18-mediated disease NLRC4-MAS
- Study pathogenesis and immune-dysregulatory mechanisms of Type I interferon-mediated autoinflammatory diseases including CANDLE and SAVI
- Identify molecular and genetic causes (using next-generation sequencing methods) of as-yet-undifferentiated autoinflammatory diseases
- Find drug targets for better treatment approaches
- Implement pilot treatment studies with targeted therapeutics



BIOGRAPHY

Dr. Goldbach-Mansky received her medical degree from the University Witten-Herdecke, Germany, in 1990. She completed her rheumatology fellowship training at NIAMS in 1999 and served as a staff clinician at NIAMS through 2008. She leads the NIAID autoinflammatory disease clinic and has built a translational research program focusing on clinical and translational studies in children with early-onset autoinflammatory diseases. Together with Dr. Daniel Kastner (NHGRI) she founded the Translational Autoinflammatory Research Initiative (TARI) at NIH to improve research in patients with rare autoinflammatory diseases.

HEATHER HICKMAN, PH.D.

Chief, Viral Immunity and Pathogenesis Unit, LCIM
www.niaid.nih.gov/research/heather-hickman-phd
hhickman@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Anatomy of antiviral immune responses in infected peripheral tissue
- Impact of lymph node anatomy on priming antiviral T- and B-cells
- Role of chemotactic factors in antiviral T-cell effector function
- Viral pathogenesis and immune clearance of infected tissues

BIOGRAPHY

Dr. Heather Hickman received her Ph.D. (Microbiology and Immunology) from the University of Oklahoma Health Sciences Center in 2003. While training in the lab of Dr. William Hildebrand, she investigated the presentation of viral ligands by major histocompatibility class I molecules. In 2004, she joined the Laboratory of Viral Diseases (LVD) (NIAID), first as a postdoctoral fellow with Dr. Jonathan Yewdell and later as a senior associate scientist. In the LVD, Dr. Hickman developed a research program aimed at better defining the mechanisms of adaptive immunity to viral infections using a number of different viruses as models (such as vaccinia, Zika, and influenza). Dr. Hickman became an Earl-Stadtman tenure-track investigator in the Viral Immunity and Pathogenesis Unit in 2017.

STEVEN M. HOLLAND, M.D.

Chief, Division of Intramural Research
Chief, Immunopathogenesis Section, LCIM
www.niaid.nih.gov/research/steven-m-holland-md
sholland@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Immune defects of phagocytes: GATA2 deficiency (MonoMAC), nontuberculous mycobacterial infections, chronic granulomatous disease, hyper IgE (Job's) syndrome, leukocyte adhesion deficiency
- Cytokines and their receptors in the pathogenesis and therapy of infections
- Susceptibility to disseminated mycobacterial infections, such as GATA2, autoantibodies to interferon gamma, and defects in the interferon gamma/IL-12 pathway
- Mechanisms of mycobacterial pathogenesis, bacterial pathogenesis (e.g., *Burkholderia*), *Coccidioides immits* pathogenesis, and airway dysfunction leading to mycobacterial and fungal infection

BIOGRAPHY

Dr. Holland received his M.D. from The Johns Hopkins University School of Medicine in 1983. He came to NIH in 1989 as a National Research Council fellow in the Laboratory of Molecular Microbiology, working on transcriptional regulation of HIV. In 1991, Dr. Holland joined the Laboratory of Host Defenses, shifting his research to the host side, with a focus on phagocyte defects and their associated infections. He was chief of LCID from 2004 to 2016 and was selected as DIR director in 2016.

KYUNG (JUNE) KWON-CHUNG, PH.D.

Chief, Molecular Microbiology Section, LCIM
www.niaid.nih.gov/research/kj-kwon-chung-phd
jkchung@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Virulence determinants of *Cryptococcus neoformans* and *Aspergillus fumigatus*
- Mechanism by which *neoformans* invades the brain
- Mechanism by which cryptococci adapt to the brain environment and produce fulminating disease
- The mechanism of cryptococcal adaptive resistance to azole drugs and flucytosine
- Pathobiological differences between *neoformans* and *gattii*
- Host factors that predispose patients to invasive aspergillosis

BIOGRAPHY

Dr. Kwon-Chung received her B.S. and M.S. in biology from Ewha Womans University in Seoul, South Korea, prior to receiving a Fulbright Scholarship to pursue her doctoral work in the bacteriology department at the University of Wisconsin, Madison. After receiving her Ph.D., she joined the Medical Mycology Section of the NIAID Laboratory of Microbiology as a visiting fellow. She became a senior investigator in the NIAID Laboratory of Clinical Investigation in 1973 and has been the chief of the Molecular Microbiology Section, Laboratory of Clinical Infectious Diseases, since 1995.

THOMAS L. LETO, PH.D.

Chief, Molecular Defenses Section, LCIM
www.niaid.nih.gov/research/thomas-l-leto-phd
tleto@niaid.nih.gov

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, adaptive immunity and cellular signaling)

BIOGRAPHY

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.

MICHAIL S. LIONAKIS, M.D., SC.D.

Chief, Fungal Pathogenesis Section, LCIM
www.niaid.nih.gov/research/michail-s-lionakis-md-scd
lionakism@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Host defense against invasive candidiasis and mucosal and systemic fungal challenge
- Genetic susceptibility to infection in mice and patients with candidiasis
- Organ-specific immunity in invasive candidiasis
- Immunological mechanisms of susceptibility: systemic fungal infections in patients with CARD9 deficiency, chronic mucocutaneous candidiasis (CMC) in patients with APECED syndrome
- Pathogenesis of antibiotic-induced vaginal candidiasis
- Novel genetic defects in patients with inherited susceptibility to Candida, Aspergillus, and other mold infections

BIOGRAPHY

Dr. Lionakis obtained his M.D. and Sc.D. from the University of Crete in Greece. After completing his clinical training in internal medicine at Baylor College of Medicine and infectious diseases at NIAID, Dr. Lionakis joined the Laboratory of Molecular Immunology (LMI) in 2008. In 2012, Dr. Lionakis was recruited as a tenure-track investigator in the NIAID intramural research program and established the Fungal Pathogenesis Unit within the Laboratory of Clinical Infectious Diseases.

HARRY L. MALECH, M.D.

Chief, Genetic Immunotherapy Section, LCIM
www.niaid.nih.gov/research/harry-l-malech-md
hmalech@nih.gov

MAJOR AREAS OF RESEARCH

- Clinical trials and basic research of gene therapy
- Allogeneic transplantation using hematopoietic stem cell grafts
- Chronic granulomatous disease
- X-linked severe combined immune deficiency
- Leukocyte adhesion deficiency
- WHIM syndrome
- Acute and chronic graft versus host disease
- Biology of engraftment of hematopoietic stem cells and the role of the CXCR4 chemokine receptor
- Primary immune deficiencies
- Induced pluripotent stem cells to model human immune deficiencies to develop of novel treatments

BIOGRAPHY

Dr. Malech received his medical degree from Yale University in New Haven, Connecticut, in 1972. He completed clinical residency training at the University of Pennsylvania in Philadelphia, followed by basic research postdoctoral fellowship training at NIH in Bethesda, Maryland. After then completing clinical fellowship training in infectious diseases at Yale University, he remained at Yale as assistant and then associate professor until 1986. In 1986, he returned to NIH as a senior investigator in NIAID. He is currently chief of the Laboratory of Host Defenses (LHD). Dr. Malech's research and clinical program within LHD is the Genetic Immunotherapy Section.

KATRIN D. MAYER-BARBER, DR. RER. NAT.

Chief, Inflammation and Innate Immunity Unit, LCIM
www.niaid.nih.gov/research/katrin-d-mayer-barber-dr-rer-nat-phd
mayerk@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Cellular mechanisms of inflammation *in vivo*
- Inflammatory cytokine and lipid mediator networks in host resistance
- Role of innate effector cells in host resistance to tuberculosis
- Role of inflammation in host-directed therapies and vaccine-adjuvant design

BIOGRAPHY

Dr. Mayer-Barber received her diploma in biology from the University of Würzburg, Germany, in 2002. She obtained her doctoral degree (Doctor rerum naturalium: Dr. rer. nat.) in 2006 from the University of Würzburg, Germany and joined NIAID in 2007 as a postdoctoral fellow in the Laboratory of Parasitic Diseases. Dr. Mayer-Barber was awarded the Earl Stadtman Tenure-Track Investigator position in the NIAID Laboratory of Clinical Infectious Diseases in 2015.

ROBERT S. MUNFORD, M.D.

Chief, Antibacterial Host Defense Section, LCIM
www.niaid.nih.gov/research/robert-s-munford-md
munfordrs@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- To understand the basis for the prolonged immunosuppression that develops when animals that cannot inactivate lipopolysaccharides (LPS) are exposed to LPS or to Gram-negative bacteria that make LPS
- To understand how human cells regulate the production of acyloxyacyl hydrolase (AOAH), the LPS-inactivating enzyme
- To look for associations between AOAH deficiency and human diseases
- To define AOAH's role in metabolizing oxidized phospholipids and endocannabinoids *in vivo*

BIOGRAPHY

Dr. Munford received his B.A. in history from Vanderbilt University and an M.A. in animal physiology from Oxford University before attending Harvard Medical School. After training in internal medicine at Parkland Memorial Hospital, Dallas, Texas, he served as an Epidemic Intelligence Service officer at the Centers for Disease Control and Prevention, did postdoctoral research at the Rockefeller University, and completed an infectious disease fellowship at the Massachusetts General Hospital. He worked for many years as a physician-scientist at the University of Texas Southwestern Medical School in Dallas before moving to NIH in 2009. His interest in bacterial lipopolysaccharides began when he investigated an outbreak of meningococcal disease in São Paulo, Brazil, in 1972.

WARREN STROBER, M.D.

Chief, Mucosal Immunity Section, LCIM
www.niaid.nih.gov/research/warren-strober-md
warren.strober@nih.gov

MAJOR AREAS OF RESEARCH

- Basic studies of mucosal immunity and inflammation and inflammatory bowel disease 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 inflammatory cytokines
- Studies of innate immunity in the mucosal immune system

BIOGRAPHY

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 a leader in the study of mucosal antibody responses, oral tolerance, and gastroenterological diseases caused by immunologic abnormalities. His discoveries concerning the mucosal immune system have formed the basis of our knowledge of IgA B-cell development and the mechanisms of mucosal inflammation.

HELEN SU, M.D., PH.D.

Chief, Human Immunological Diseases Section, LCIM
www.niaid.nih.gov/research/helen-su-md-phd
hsu@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Defining the molecular mechanisms of new inherited human immunological diseases
- Understanding DOCK8 function in health and human disease

BIOGRAPHY

Helen Su received M.D. and Ph.D. degrees 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 Michael Lenardo, M.D., in the Laboratory of Immunology, she joined the Laboratory of Host Defenses in 2007 as a tenure-track clinical investigator.

PETER WILLIAMSON, M.D., PH.D.

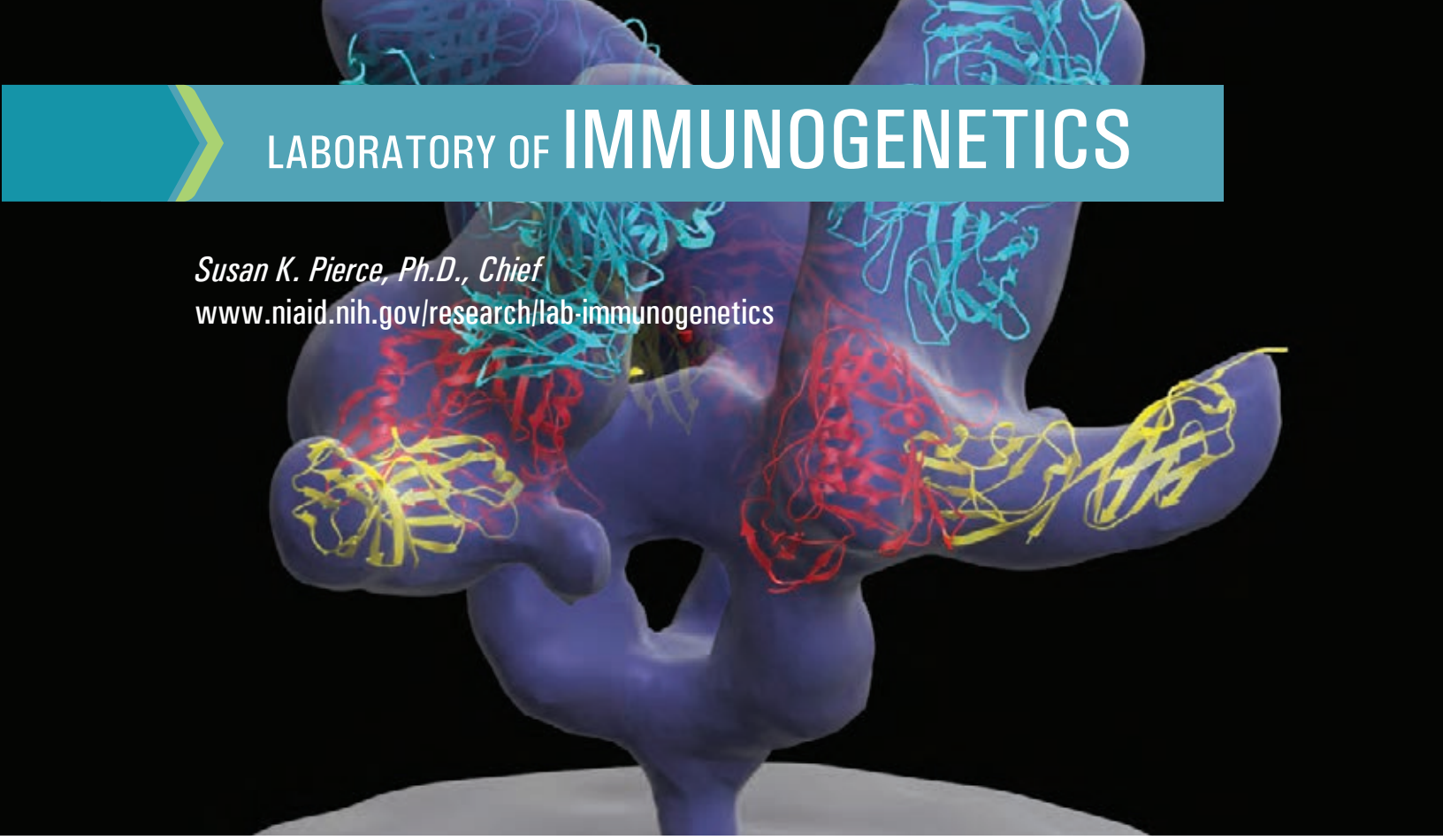
Chief, Translational Mycology Unit, LCIM
www.niaid.nih.gov/research/peter-williamson-md-phd
williamsonpr@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Specialized signal motifs in trafficking of virulence factors to the fungal cell wall
- Exploitation of copper by cryptococcal strains to produce meningitis
- Regulation of autophagy by *Cryptococcus*
- TOR-dependent regulation of autophagic-associated phagocytosis in macrophages
- Genetic susceptibility to infection by *Cryptococccus* in non-HIV-related infections
- Genetic susceptibility to bloodstream infections by *Candida albicans*
- High-dimensional transcriptional profiling of primary immune deficiencies and autoimmune diseases
- International Studies: Early clinical and genetic markers of cryptococcal disease in AIDS patients and markers of immune reconstitution syndrome (Africa and India)

BIOGRAPHY

Dr. Williamson received his M.D./Ph.D. from Boston University in 1987 and completed a residency in internal medicine at Georgetown University before coming to NIH for a fellowship in infectious diseases. In 1995, after serving a short stint as chief medical officer, Lalmba Sudan, Dr. Williamson joined the faculty at the University of Illinois at Chicago as an assistant professor of medicine in the section of infectious diseases. After progressing to the rank of professor of medicine, pathology, microbiology, and immunology, Dr. Williamson then returned to NIH to head the Translational Mycology Unit in the Laboratory of Clinical Infectious Diseases.



LABORATORY OF IMMUNOGENETICS

Susan K. Pierce, Ph.D., Chief
www.niaid.nih.gov/research/lab-immunogenetics

The research in the Laboratory of Immunogenetics (LIG) focuses on the cellular and molecular mechanisms that underlie the signaling functions of immune cell receptors. This work encompasses a wide spectrum of experimental approaches from the structural determination of immune receptors to live-cell image analysis of the behavior of chemotactic receptors.

LIG members are highly interactive, creating a unique environment in which structural biology, molecular biology, and cell biology are interfaced. Interactions within LIG are facilitated by weekly work-in-progress presentations detailing recent advances and future directions of LIG fellows and students.

MAJOR AREAS OF RESEARCH

- Structure and function of the natural killer (NK) cell inhibitory and activating receptors
- Molecular mechanisms underlying the functions of the FcgammaRIIB receptor
- Signal transduction pathway in chemotaxis mediated by G protein-coupled receptors
- Function of the B-cell antigen receptor in initiating signaling cascades and transporting antigen for processing with the MHC class II molecules
- Structures of components of important pathogens and the cellular receptors with which they interact

SECTIONS AND UNITS

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

Chemotaxis Signal Section
Tian Jin, Ph.D.

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

Malaria Infection Biology and Immunity Unit
Peter D. Crompton, M.D., M.P.H.

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

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

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

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

SUSAN K. PIERCE, PH.D.

Chief, Laboratory of Immunogenetics
Chief, Lymphocyte Activation Section, LIG
www.niaid.nih.gov/research/susan-k-pierce-phd
spierce@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Regulation of the antigen-driven initiation of B cell-receptor signaling
- Generation and maintenance of immunological memory in malaria

BIOGRAPHY

Dr. Pierce became chief of the NIAID Laboratory of Immunogenetics in 1999. Prior to joining NIAID, she was a member of the faculty at Northwestern University, where she held the Cook Chair in the Biological Sciences. She earned her Ph.D. in immunology from the University of Pennsylvania in 1976.

SILVIA BOLLAND, PH.D.

Chief, Autoimmunity and Functional Genomics Section, LIG
www.niaid.nih.gov/research/silvia-bolland-phd
sbolland@niaid.nih.gov

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 Fc gamma RIIB and the phosphoinositol 5-phosphatase (SHIP)

BIOGRAPHY

Dr. Bolland received her Ph.D. in molecular biology from the University of Cantabria, Spain, and received postdoctoral training at Harvard and Rockefeller University. She joined the NIAID 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.

PETER D. CROMPTON, M.D., M.P.H.

Chief, Malaria Infection Biology and Immunity Unit, LIG
www.niaid.nih.gov/research/peter-d-crompton-md-mph
pcrompton@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mechanisms of naturally acquired immunity to malaria
- Antibody responses to *Plasmodium falciparum* infection
- B- and T-cell biology of *P. falciparum* infection
- Regulation of *P. falciparum*-induced inflammation
- Systems immunology of human malaria

BIOGRAPHY

Dr. Crompton received his M.D. and M.P.H. from The Johns Hopkins Schools of Medicine and Public Health in 2000. He then completed a residency in internal medicine at Massachusetts General Hospital/Harvard University in Boston before going on to a fellowship in infectious diseases at NIAID in 2004. After a year of clinical training at NIAID, he earned a diploma in tropical medicine and hygiene at the London School of Hygiene and Tropical Medicine before joining the Laboratory of Immunogenetics in 2005 to pursue his research interest in the human immune response to malaria. In 2010, he became a tenure-track investigator and chief of the Malaria Infection Biology and Immunity Unit. Dr. Crompton is certified in internal medicine and infectious disease by the American Board of Internal Medicine.

TIAN JIN, PH.D.

Chief, Chemotaxis Signal Section, LIG
www.niaid.nih.gov/research/tian-jin-phd
tjin@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mechanisms underlying the G protein-coupled receptor (GPCR)-mediated chemotaxis in *Dictyostelium discoideum*
- Mechanisms involved in chemotaxis of immune and cancer cells

BIOGRAPHY

Dr. Jin received his B.S. in biology from the Peking University, China, in 1984 and his Ph.D. from the department of biochemistry at the Robert Wood Johnson Medical School at Rutgers-UMDNJ in 1994. From 1994 to 2000, he was a postdoctoral fellow in the department of biological chemistry at Johns Hopkins University School of Medicine. Dr. Jin was appointed instructor in the department of cell biology and anatomy at The Johns Hopkins University School of Medicine in 2001. In July 2001, he joined the Laboratory of Immunogenetics as a tenure-track investigator. In 2009, he became senior investigator at NIAID.

VICTOR V. LOBANENKOV, PH.D.

Chief, Molecular Pathology Section, LIG
www.niaid.nih.gov/research/victor-v-lobanenkov-phd
vlobanenkov@niaid.nih.gov

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

BIOGRAPHY

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, which later became part of the Laboratory of Immunogenetics.

ERIC O. LONG, PH.D.

Chief, Molecular and Cellular Immunology Section, LIG
www.niaid.nih.gov/research/eric-o-long-ph-d
elong@nih.gov

MAJOR AREAS OF RESEARCH

- Innate lymphocyte function in malaria
- Proteomics and imaging as tools to investigate signaling networks
- Regulation of lymphocyte activation by inhibitory receptors
- Zinc-induced receptor polymerization in signaling

BIOGRAPHY

Dr. Long has a biochemistry degree from the ETH Zürich, Switzerland, spent a year as a postbac at the MRC Department of Molecular Genetics, University of Edinburgh, and obtained a Ph.D. in biology from the University of Geneva, Switzerland. After postdoctoral research at the department of embryology, Carnegie Institution, Baltimore, and at the National Cancer Institute, NIH, he returned to Geneva as a faculty member in the department of microbiology at the medical school. There, he began to apply molecular approaches to study MHC class II molecules and processing pathways for antigen presentation to CD4 T cells. He then joined the Laboratory of Immunogenetics, NIAID, where he became a senior investigator and chief of the Molecular and Cellular Immunology Section in 1988. In the mid-1990s, his main interest turned to the regulation of natural killer-cell activation, when his team identified molecular clones for the inhibitory killer cell Ig-like receptors (KIR) and the signaling basis for inhibition.

POLLY MATZINGER, PH.D.

Chief, T-Cell Tolerance and Memory Section, LIG
www.niaid.nih.gov/research/polly-matzinger-phd
pcm@helix.nih.gov

MAJOR AREAS OF RESEARCH

- Danger model of immunity
- Tissue-based class control
- Immune tolerance and activation

BIOGRAPHY

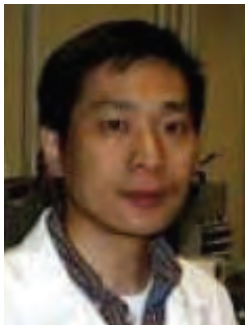
Polly Matzinger has worked as a bartender, carpenter, jazz musician, playboy bunny, and dog trainer. She is currently chief of the ghost lab and the section on T-Cell Tolerance and Memory. She worried for years that the dominant model of immunity does not explain a wealth of accumulated data and suggested an alternative, the Danger model, which suggests that the immune system is far less concerned with things that are foreign than with those that do damage. This model, whose two major tenets were conceived in a bath and on a field while herding sheep, has very few assumptions and yet explains most of what the immune system seems to do right, as well as most of what it appears to do wrong, covering such areas as transplantation, autoimmunity, and the immunobiology of tumors. The model has been the subject of a BBC "horizon" film and was featured in three other films about immunity, as well as countless articles in both the scientific and the lay press. In 2013, her section was assigned to the Laboratory of Immunogenetics.

PETER D. SUN, PH.D.

Chief, Structural Immunology Section, LIG
www.niaid.nih.gov/research/peter-d-sun-phd
psun@niaid.nih.gov

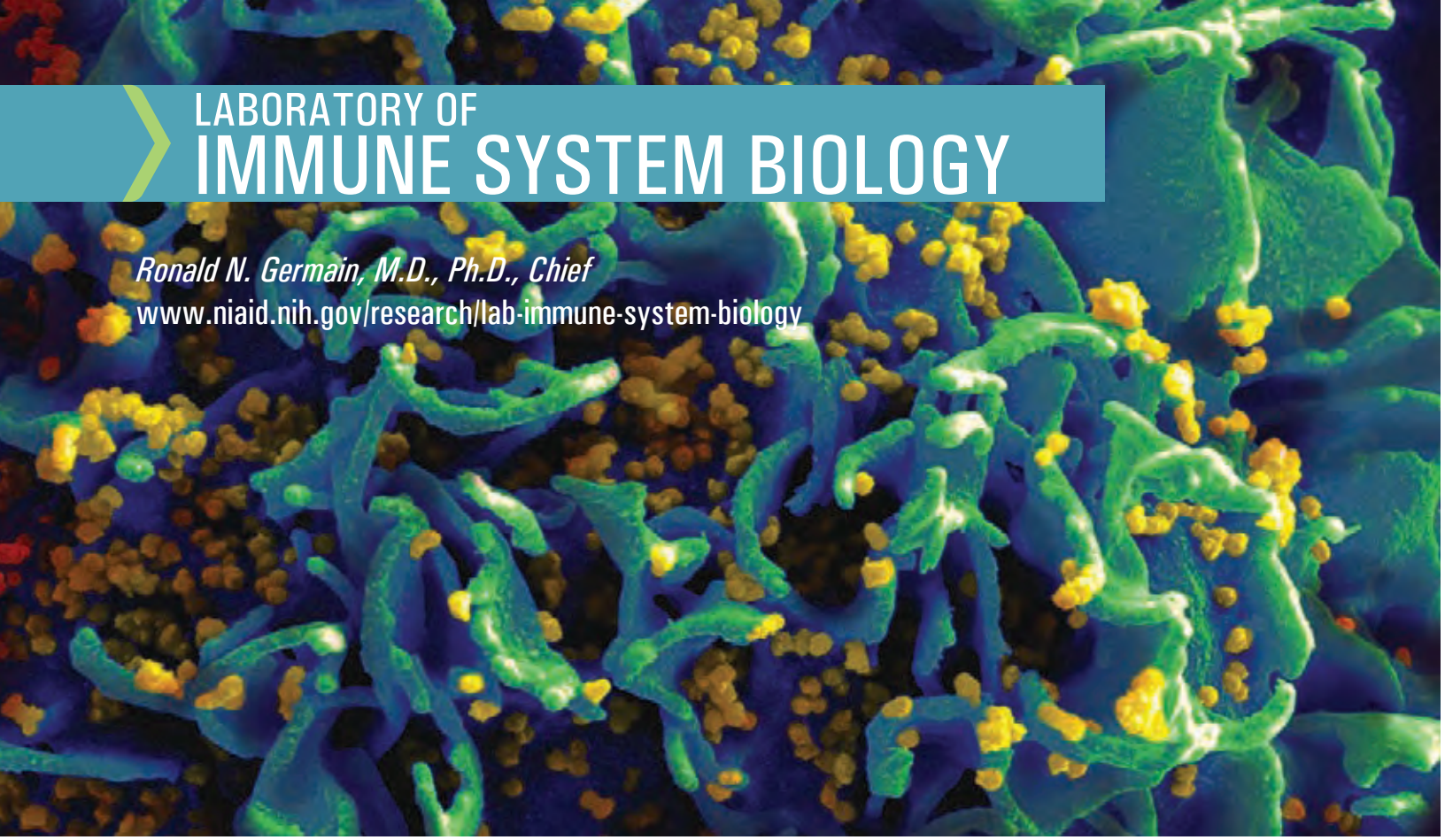
MAJOR AREAS OF RESEARCH

- Structural immunology
- Structure and function of NK-cell receptors
- Structural mechanisms of HIV and host interactions



BIOGRAPHY

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 a human transforming growth factor, TGF-beta 2. He joined NIAID in 1994.



LABORATORY OF IMMUNE SYSTEM BIOLOGY

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

www.niaid.nih.gov/research/lab-immune-system-biology

The major research activities of Laboratory of Immune System Biology scientists concern the basic genetics, molecular biology, cell biology, and cellular immunology of the immune system. How dysregulation of the immune system results in autoimmune and lymphoproliferative diseases and what strategies might be valuable for vaccine development are important topics of interest.

MAJOR AREAS OF RESEARCH

- miRNA regulation of immune-cell function
- T-cell development, differentiation, and plasticity
- Transcriptional regulation of lymphocyte differentiation
- Regulation of primary and secondary immune responses
- Cytokine biology, transcriptional networks, and signaling mechanisms
- Programmed cell death and autophagy
- Biology of regulatory T cells and control of autoimmunity
- Role of T regulatory cells in chronic infection
- Induction of T-cell tolerance and treatment of autoimmunity
- Lymphocyte dynamics
- Structure and function of viral immunoevasins
- Detection and analysis of genetically determined defects in human lymphocyte homeostasis

SECTIONS AND UNITS

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

Cell Signaling and Immunity Section
Pamela Schwartzberg, M.D., Ph.D.

Computational Biology Section
Martin Meier-Schellersheim, Ph.D.

Functional Cellular Networks Section
Aleksandra Nita-Lazar, Ph.D.

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

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

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

Molecular and Cellular Immunoregulation Section
Jinfang (Jeff) Zhu, Ph.D.

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

Mucosal Immunology Section
Yasmine Belkaid, Ph.D.

Signaling Systems Section
Iain Fraser, Ph.D.

Systems Genomics and Bioinformatics Unit
John Tsang, Ph.D.

RONALD N. GERMAIN, M.D., PH.D.

Chief, Laboratory of Immune System Biology
Chief, Lymphocyte Biology Section, LISB
www.niaid.nih.gov/research/ronald-n-germain-md-phd
rgermain@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Intravital imaging, analysis, and modeling of immune cell dynamics and *in vivo* activity
- Control of cell migration and cell-cell interactions by structural and chemical cues
- Multiplex imaging of cell phenotype, signaling, and function in complex tissues
- Systems-level analysis of immune cell signaling and responses to infection
- Human immune analysis using systems biology methods

BIOGRAPHY

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. In 1994, Dr. Germain was named deputy chief of LI. In 2006, he became director of the NIAID Program in Systems Immunology and Infectious Disease Modeling, which became the Laboratory of Systems Biology in 2011 and for which he serves as chief of the laboratory. He is also acting chief of LI and associate director of the Trans-NIH Center for Human Immunology, Inflammation, and Autoimmunity (CHI).

IAIN D.C. FRASER, PH.D.

Chief, Signaling Systems Section, LISB
www.niaid.nih.gov/research/iain-dc-fraser-phd
fraseri@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Analysis of the signaling pathway interactions in immune cells that define context-specific responses to pathogens
- Profiling and modeling of the cellular response to complex stimuli
- Application of RNAi screening 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 behavior and function

BIOGRAPHY

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, Oregon, 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 in 2008 as leader of the Program in Systems Immunology and Infectious Disease Modeling (PSIIM) Molecular and Cell Biology Team, which became the LSB Signaling Systems Unit in 2011.

MICHAEL J. LENARDO, M.D.

Chief, Molecular Development of the Immune System Section, LISB
www.niaid.nih.gov/research/michael-j-lenardo-md
lenardo@nih.gov

MAJOR AREAS OF RESEARCH

- Genetic diseases of immune homeostasis and autoimmunity
- Non-apoptotic mechanisms of cell death
- Development of novel immunodiagnostics and immunotherapeutics
- Physiology of Mg2+ as a second messenger in signal transduction

BIOGRAPHY

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. He was one of the founders of the NIH Oxford-Cambridge Scholars program for doctoral training and the NIH M.D./Ph.D. partnership program.

DAVID H. MARGULIES, M.D., PH.D.

Chief, Molecular Biology Section, LISB
www.niaid.nih.gov/research/david-margulies-md-phd
dmargulies@niaid.nih.gov

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
- Immune hypersensitivity reactions related to MHC-I molecules
- Natural killer (NK)-cell receptors, cell surface molecules of effector cells of the innate immune system that mediate recognition of tumor- and virus-infected cells via the level and composition of MHC-I molecules on the NK-cell target
- T-cell receptors, which by clonal expression confer antigen and MHC specificity for the activation of T cells

BIOGRAPHY

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. In 1987, he became a senior investigator and, since 1989, has been chief of the Molecular Biology Section. Since 2008, he has been a member of the Senior Biomedical Research Service.

MARTIN MEIER-SCHELLERSHEIM, PH.D.

Chief, Computational Biology Section, LISB
www.niaid.nih.gov/research/martin-meier-schellersheim-phd
mms@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Computational modeling and simulation of intra- and intercellular signaling processes
- Development of interfaces between proteomic databases and computational modeling tools
- Development of tools for analyzing and simulating reaction-diffusion processes at the level of single-particle dynamics
- Contributing to the development of a systems biology markup language (SBML) standard for describing multi-component, multi-state molecular complexes and their roles for biochemical reaction networks

BIOGRAPHY

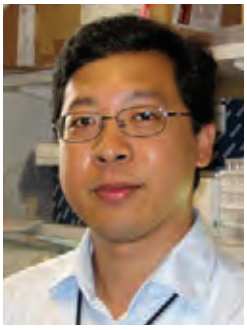
Dr. Meier-Schellersheim obtained a master's degree in physics in 1997 and a Ph.D. in 2001 from the University of Hamburg, Germany. His research focuses on building a bridge between experimental and computational cell biology through the development and application of modeling tools that combine accessible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

STEFAN A. MULJO, PH.D.

Chief, Integrative Immunobiology Section, LISB
www.niaid.nih.gov/research/stefan-muljo-phd
stefan.muljo@nih.gov

MAJOR AREAS OF RESEARCH

- Non-coding RNAs: characterization under physiological and pathological conditions, regulation of production, mechanisms of action, 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



BIOGRAPHY

Dr. Muljo 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 was recruited to the Laboratory of Immunology in 2008 as a tenure-track investigator. In 2016, he was promoted to tenured senior investigator and is head of the Integrative Immunobiology Section. He is a faculty member of the NIH-Penn graduate partnership program, as well as others.

ALEKSANDRA NITA-LAZAR, PH.D.

Chief, Functional Cellular Networks Section, LISB
www.niaid.nih.gov/research/aleksandra-nita-lazar-phd
nitalazarau@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Protein modifications involved in cell signaling
- Absolute quantification of molecular representation and interaction

BIOGRAPHY

Dr. Nita-Lazar received her Ph.D. in biochemistry in 2003 from the University of Basel for studies performed at the Friedrich Miescher Institute for Biomedical Research, where she analyzed protein glycosylation using mass spectrometry methods. After postdoctoral training at Stony Brook University and Massachusetts Institute of Technology, where she continued to investigate post-translational protein modifications and their influence on cell signaling, she joined the Program in Systems Immunology and Infectious Disease Research, now the Laboratory of Systems Biology, in April 2009.

PAMELA L. SCHWARTZBERG, M.D., PH.D.

Chief, Cell Signaling and Immunity Section, LISB
www.niaid.nih.gov/research/pamela-l-schwartzberg-md-phd
pams@nih.gov

MAJOR AREAS OF RESEARCH

- Signal transduction in T lymphocytes
- Genetic, cellular, biochemical, and genomic analyses of T-cell function in the context of immunization, cancer, and responses to infectious diseases
- Studies of lymphocytes from patients and models of genetic primary immunodeficiencies

BIOGRAPHY

Dr. Schwartzberg received her B.A. from Princeton University and her M.D. and Ph.D. from the Columbia College of Physicians and Surgeons, Columbia University. After an internship at Boston Children's Hospital, Dr. Schwartzberg did a fellowship at the National Cancer Institute. Dr. Schwartzberg started her own laboratory at the National Human Genome Research Institute at the end of 1997 and was promoted to senior investigator with tenure in 2003. In 2018, she moved to NIAID. Dr. Schwartzberg is an adjunct faculty member at University of Pennsylvania and George Washington University School of Biomedical Sciences and has received several NIH awards for mentoring. She is the recipient of a Searle Scholar's Award and the American Association of Immunologists BD-Pharmingen Biosciences Award for Early Career Scientists and has been elected to the American Society for Clinical Investigation (ASCI) and the Association of American Physicians (AAP).

ETHAN M. SHEVACH, M.D.

Chief, Cellular Immunology Section, LISB
www.niaid.nih.gov/research/ethan-m-shevach-md
eshevach@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Immune regulation in the pathogenesis and treatment of organ-specific autoimmune disease

BIOGRAPHY

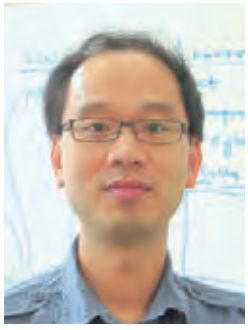
Dr. Shevach received his M.D. from Boston University in 1967. Following clinical training, he joined the Laboratory of Immunology as a senior staff fellow in 1972, was appointed a senior investigator in 1973, and became a section chief in 1987. Dr. Shevach served as editor-in-chief of the *Journal of 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.

JOHN TSANG, PH.D.

Chief, Systems Genomics and Bioinformatics Unit, LISB
Director, Computational Systems Biology, Trans-NIH Center for Human Immunology (CHI)
www.niaid.nih.gov/research/john-tsang-phd
tsangjs@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Systems immunology
- Integrative genomics: computational approaches to integrate diverse data types to obtain novel biological insights; biological circuit reconstruction
- Single-cell genomics; the function and consequence of phenotypic heterogeneity and stochastic gene expression in immune cells



BIOGRAPHY

Dr. Tsang received his Ph.D. in biophysics from Harvard University and B.A.Sc. and M.Math. in computer engineering and computer science, respectively, from the University of Waterloo in Canada. After graduating from Waterloo in 2000, he helped pioneer high-throughput computational and experimental methods to annotate the then-freshly sequenced human genome using custom DNA microarrays at Rosetta Inpharmatics and then led a bioinformatics group at Caprion Proteomics. His doctoral research was conducted in Alexander van Oudenaarden's laboratory at MIT. After earning his Ph.D. in 2008, he returned to Rosetta Inpharmatics (then a division within Merck Research Laboratories). He is also jointly appointed as director of computational systems biology at the Trans-NIH Center for Human Immunology (CHI).

JINFANG (JEFF) ZHU, PH.D.

Chief, Molecular and Cellular Immunoregulation Section, LISB
www.niaid.nih.gov/research/jinfang-zhu-phd
jfzhu@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Diversity and plasticity of T helper (Th) subsets
- Development and functions of innate lymphoid cell (ILC) subsets
- Transcriptional regulation of lineage-specific genes

BIOGRAPHY

Dr. Zhu received his bachelor's degree summa cum laude from the department of biology, NanKai University, Tianjin, China, and his Ph.D. in biochemistry and molecular biology from the Shanghai Institute of Biochemistry (now known as Shanghai Institute of Biochemistry and Cell Biology), Chinese Academy of Sciences. He joined the Laboratory of Immunology first as a visiting fellow and then as a staff scientist studying CD4 T-cell differentiation. He was appointed as an Earl Stadtman investigator in LI in 2011 and received tenure in 2017.

YASMINE BELKAID, PH.D.

Chief, Mucosal Immunology Section, LISB
www.niaid.nih.gov/research/yasmine-belkaid-phd
ybelkaid@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Role of the microbiota in immunity to infection
- Role of dietary metabolites in promoting immune regulation and immune responses to pathogens
- Tissue-specific regulatory responses to infection
- Leishmania major, Toxoplasma gondii, Cryptosporidium and Microsporidium spp

BIOGRAPHY

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. Since 2008, she has worked as an adjunct professor at the University of Pennsylvania.

LABORATORY OF IMMUNOREGULATION

Anthony S. Fauci, M.D., Chief

www.niaid.nih.gov/research/lab-immunoregulation

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. Our investigation of host factors involved in the evolution of HIV disease indicates that HIV pathogenesis is a multifactorial and multiphasic process. Particularly important aspects of this process that are under intense investigation include

- Regulation of HIV replication by endogenous cytokines and chemokines
- Regulation of expression of HIV coreceptors
- HIV envelope-mediated intracellular signaling events responsible for immune dysfunction
- The role of a latent, inducible reservoir of HIV-infected cells in the pathogenesis of HIV disease and its implication for antiretroviral therapy
- Contribution of HIV-infected T cells, B cells, dendritic cells, monocyte/macrophages, and multipotent progenitor cells to disease pathogenesis
- The role of immunomodulation in immune reconstitution during antiretroviral therapy for HIV infection

LIR researchers conduct clinical trials to determine the safety and efficacy of drugs for the treatment of HIV infection and its complication and the development of methods for immunologic reconstitution in HIV-infected individuals. Their studies of the epidemiology and pathogenesis of HIV infection and other sexually transmitted diseases are both domestic and international.

MAJOR AREAS OF RESEARCH

- Cellular and molecular mechanisms of HIV immunopathogenesis
- Regulation of the human immune system, particularly the cellular and molecular mechanisms of activation, proliferation, and differentiation of human T and B cells
- Cellular gene expression during activation of human T and B cells
- Pathogenesis and treatment of immune-mediated diseases, particularly vasculitic syndromes

SECTIONS AND UNITS

B-Cell Immunology Unit
Susan Moir, Ph.D.

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

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

Clinical Research Section
Richard Davey, M.D.

HIV Immunovirology Unit
Tae-Wook Chun, Ph.D.

HIV Pathogenesis Section
Irini Sereti, M.D.

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

Immunopathogenesis Section
Anthony S. Fauci, M.D.

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

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

ANTHONY S. FAUCI, M.D.

Director, NIAID
Chief, Laboratory of Immunoregulation
Chief, Immunopathogenesis Section, LIR
www.niaid.nih.gov/research/anthony-s-fauci-md
afauci@niaid.nih.gov

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
- Therapeutic strategies for management of hepatitis C/HIV co-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

BIOGRAPHY

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. 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.

TAE-WOOK CHUN, PH.D.

Chief, HIV Immunovirology Unit, LIR
www.niaid.nih.gov/research/tae-wook-chun-phd
twchun@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Persistence of viral reservoirs in HIV-infected individuals receiving antiretroviral therapy
- Viral dynamics and immunologic control of HIV replication in infected individuals
- Development of therapeutic strategies aimed at achieving sustained virologic control in HIV-infected individuals in the absence of antiretroviral therapy

BIOGRAPHY

Dr. Chun received his Ph.D. from the biochemistry, cellular, and molecular biology graduate program from The Johns Hopkins University School of Medicine, where he discovered and characterized latently infected, resting CD4+ T cells in HIV-infected individuals. He began his postdoctoral work in the Laboratory of Immunoregulation at NIAID as a research fellow in 1997. Subsequently, Dr. Chun was appointed to the position of staff scientist in 2001. Dr. Chun was selected as one of the Earl Stadtman Investigators and received a tenure-track investigator position in LIR in June 2016.

MARK CONNORS, M.D.

Chief, HIV-Specific Immunity Section, LIR
www.niaid.nih.gov/research/mark-connors-md
mconnors@nih.gov

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

BIOGRAPHY

Dr. Connors received his M.D. from Temple University and was trained in pediatrics at Tufts 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 DAVEY, M.D.

Deputy Clinical Director, NIAID
Chief, Clinical Research Section, LIR
www.niaid.nih.gov/research/lab-immunoregulation
rdavey@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Treatments for HIV infection and the consequences of those treatments
- Studies of immune function, immunodeficiency, and pathogenesis of HIV disease
- Studies of the natural history, pathogenesis, and treatment of influenza infection and other emerging infectious diseases

BIOGRAPHY

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.

JOHN H. KEHRL, M.D.

Chief, B-Cell Molecular Immunology Section, LIR
www.niaid.nih.gov/research/john-h-kehrl-md
jkehrl@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Kehrl graduated from Wayne State Medical School, completed his medical residency in internal medicine at Yale New Haven Hospital, and held fellowships in both infectious diseases and allergy-immunology in the Laboratory of Immunoregulation. Dr. Kehrl is currently a tenured senior investigator and a member of the research officers group in the Commissioned Corps of the U.S. Public Health Service. Dr. Kehrl was appointed chief of the LIR B-Cell Molecular Immunology Section in 1993. Under his supervision, his laboratory has gained international recognition for its studies of human and murine B lymphocytes and the function and regulation of heterotrimeric G-protein signaling in lymphocytes and other cell types.

H. CLIFFORD LANE, M.D.

Clinical Director, NIAID
Chief, Clinical and Molecular Retrovirology Section, LIR
www.niaid.nih.gov/research/h-clifford-lane-md
clane@mail.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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 2006, NIAID Deputy Director for Clinical Research and Special Projects. He is currently on the editorial boards of the *Journal of Acquired Immune Deficiency Syndromes* and *The American Journal of Medicine*.

PAOLO LUSSO, M.D., PH.D.

Chief, Viral Pathogenesis Section, LIR
www.niaid.nih.gov/research/paolo-lusso-md-phd
plusso@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Viral receptors and coreceptors
- Structure-function relationships in the HIV-1 envelope
- Molecular basis of HIV-1 immune evasion
- Novel approaches to the development of HIV-1 vaccines
- Role of chemokines and other endogenous factors in HIV-1 disease

BIOGRAPHY

Dr. Lusso received his M.D., *magna cum laude,* from the University of Turin and his Ph.D. from the Ministry of Scientific and Technologic Research, Rome, Italy. He is a board-certified specialist in internal medicine and in infectious diseases. He came to NIH for the first time in 1986 to work in the Laboratory of Tumor Cell Biology under Dr. Robert C. Gallo at the National Cancer Institute. He returned to Italy in 1994, where he created the Laboratory of Human Virology at the San Raffaele Scientific Institute in Milan and became associate professor of infectious diseases at the University of Cagliari. In 2006, he again joined NIH, where he became chief of the Viral Pathogenesis Section in the Laboratory of Immunoregulation. He is an executive editor of *Current HIV Research* and a member of the editorial board of several other journals. He is an elected member of the European Molecular Biology Organization (EMBO).

SUSAN L. MOIR, PH.D.

Chief, B-Cell Immunology Unit, LIR
www.niaid.nih.gov/research/susan-moir-phd
smoir@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Contribution of B cells to HIV pathogenesis
- Characterization of virus-specific B-cell responses in HIV-infected individuals
- Pathogenesis of B cells in immune-mediated diseases, particularly primary immune deficiencies

BIOGRAPHY

Dr. Moir received her Ph.D. in immunology and microbiology from the University Laval, Quebec City, Quebec, Canada, in 1996. Her Ph.D. studies were supported by a scholarship from the National Health Research and Development Program of Canada. In 1996, Dr. Moir came to the NIAID Laboratory of Immunoregulation (LIR) as a visiting fellow. Dr. Moir was appointed to the position of staff scientist in 2006, with honorific title of associate scientist in 2010. In 2009, NIH launched a new recruiting program named for the late Earl Stadtman, an NIH biochemist who mentored several Nobel laureates. Dr. Moir was selected as one of the 2014 – 2015 Earl Stadtman Investigators and received a tenure-track investigator position in LIR in August 2015.

THOMAS C. QUINN, M.D., M.SC.

Chief, International HIV/STD Section, LIR
www.niaid.nih.gov/research/thomas-quinn-md
tquinn@jhmi.edu

MAJOR AREAS OF RESEARCH

- Definition of epidemiologic 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
- Evaluations of interventions to control blinding trachoma due to *Chlamydia trachomatis* in sub-Saharan Africa

BIOGRAPHY

Dr. Quinn obtained his M.D. from Northwestern University. He was a research associate in infectious diseases in the NIAID 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 University, where he became a professor of medicine in 1991. Dr. Quinn is a member of the National Academy of Medicine and the National Academy of Sciences and is a fellow of the American Association for the Advancement of Science.

IRINI SERETI, M.D.

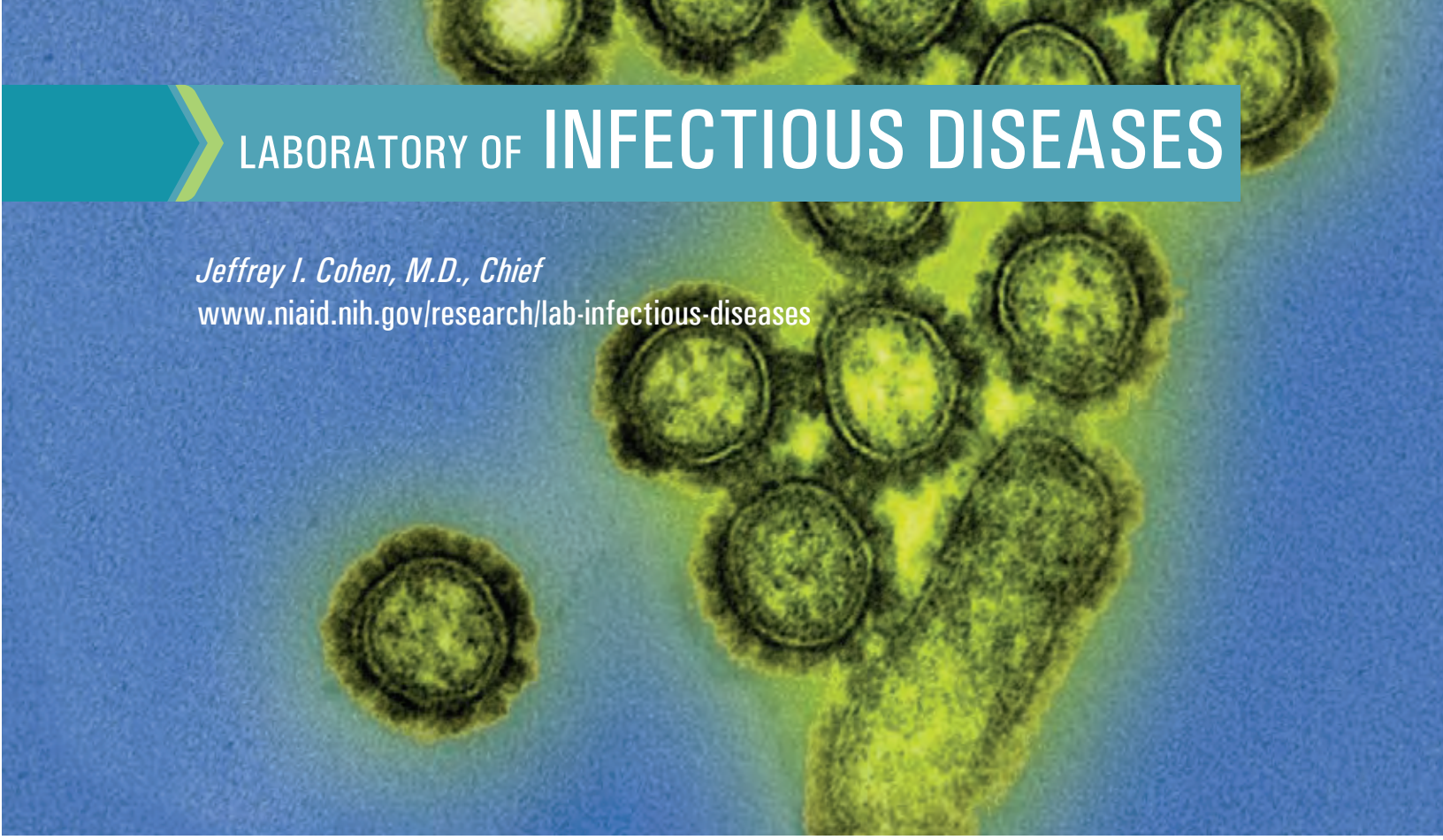
Chief, HIV Pathogenesis Section, LIR
www.niaid.nih.gov/research/irini-sereti-md
isereti@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Pathogenesis of HIV infection emphasizing mechanisms of immune reconstitution inflammatory syndrome in advanced HIV infection and of serious non-AIDS events in treated HIV-infected patients
- Pathogenesis of idiopathic CD4 lymphocytopenia (ICL)
- Immune-based therapeutic strategies of HIV infection and ICL

BIOGRAPHY

Dr. Sereti received her M.D. from the University of Athens, Greece, in 1991. She did research for one year in Dr. Greg Spear's laboratory at Rush Presbyterian Hospital in Chicago and then completed an internship, residency, and chief residency in medicine at Northwestern University. In 1997, Dr. Sereti came to NIH as a clinical associate in the Laboratory of Immunoregulation. She became a staff clinician in 2003. She was appointed to a clinical tenure-track position in 2009.



LABORATORY OF INFECTIOUS DISEASES

Jeffrey I. Cohen, M.D., Chief
www.niaid.nih.gov/research/lab-infectious-diseases

Established in 1942, the Laboratory of Infectious Diseases (LID) has a long history of vaccine development and identification of new agents of viral diseases. LID is noted for undertaking high-risk, high-reward programs that require extraordinary time and resource commitments, such as programs to develop vaccines for viral hepatitis, severe childhood respiratory diseases, and viral gastroenteritis.

Clinical studies complement LID's major areas of research, including testing candidate vaccines in clinical trials, a human challenge study with influenza to study pathogenesis and immune correlates for protection against the virus, and studies of severe virus infections in persons without known immune deficiency.

MAJOR AREAS OF RESEARCH

- Vaccines for respiratory viruses, gastrointestinal viruses, hepatitis C, flaviviruses, and herpesviruses
- Pathogenesis of and host immune response to viral infections
- Microarray analysis of liver biopsies and central nervous system tissue to study host responses to viral hepatitis and neurotropic flaviviruses, respectively
- New antiviral agents
- Monoclonal antibodies to emerging and select agents
- Structure and function of viral glycoproteins
- Pandemic, seasonal, and animal influenza
- Evolution of norovirus, rotavirus, and influenza
- Immunodeficiencies associated with severe herpesvirus infections
- Paramyxovirus vectors
- Virus discovery

SECTIONS AND UNITS

Caliciviruses Section
Kim Y. Green, Ph.D.

Hepatic Pathogenesis Section
Patrizia Farci, M.D.

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

Neurotropic Flaviviruses Section
Alexander G. Pletnev, Ph.D.

RNA Viruses Section
Peter L. Collins, Ph.D.

Structural Informatics Unit
Audray K. Harris, Ph.D.

Structural Virology Section
Joseph Marcotrigiano, Ph.D.

Viral Pathogenesis and Evolution Section
Jeffery K. Taubenberger, M.D., Ph.D.

JEFFREY I. COHEN, M.D.

Chief, Laboratory of Infectious Diseases
Chief, Medical Virology Section, LID
www.niaid.nih.gov/research/jeffrey-i-cohen-md-laboratory-infectious-diseases
jcohen@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Pathogenesis of human virus infections *in vitro* and *in vivo*
- Identification of cellular proteins that interact with herpesviruses
- Development of vaccines against human herpesviruses
- Identification of cellular mutations in patients with severe herpesvirus infections

BIOGRAPHY

Dr. Cohen received his M.D. from The Johns Hopkins University and was a 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 and an instructor in medicine at Harvard University. He returned to NIH, where he was the chief of the Medical Virology Section in the Laboratory of Clinical Infectious Diseases until 2010. In June 2010, Dr. Cohen became chief of the Laboratory of Infectious Diseases.

PETER L. COLLINS, PH.D.

Chief, RNA Viruses Section, LID
www.niaid.nih.gov/research/peter-l-collins-phd
pcollins@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Studies in molecular biology, immunobiology, and pathogenesis of the human respiratory pathogens RSV, HPIV 1, 2, and 3, and HMPV
- Development of novel attenuating mutations introduced by reverse genetics into RSV, HPIV1, 2, and 3, and HMPV to produce live, attenuated "designer" vaccine candidates
- Evaluation of candidate live vaccines in clinical studies and wild type viruses in adult volunteers
- Studies with wild type and "designer" mutants of pneumonia virus of mice.
- Development of vaccine vectors based on HPIV and avian paramyxoviruses for use against highly pathogenic emerging viruses like SARS coronavirus, avian influenza, and Ebola viruses

BIOGRAPHY

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

PATRIZIA FARCI, M.D.

Chief, Hepatic Pathogenesis Section, LID
www.niaid.nih.gov/research/patrizia-farci-md
pfarci@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Pathogenesis of acute and chronic viral hepatitis
- 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

BIOGRAPHY

Dr. Farci earned her M.D. at the University of Cagliari Medical School, Italy, and then became a board-certified specialist in infectious diseases and gastroenterology at the same university. She was trained at the department of gastroenterology of the Molinette Hospital in Torino under Dr. Mario Rizzetto and at the department of medicine of the Royal Free Hospital School of Medicine in London under Professor Sheila Sherlock. In 1989, she joined the Laboratory of Infectious Diseases (LID) as a visiting scientist. In 1992, she became associate and, in 2000, full professor of medicine and director of the liver unit and of the postgraduate school of gastroenterology at the University of Cagliari. In 2007, she returned to LID, where in 2010 she became chief of the Hepatic Pathogenesis Section.

KIM Y. GREEN, PH.D.

Chief, Caliciviruses Section, LID
www.niaid.nih.gov/research/kim-y-green-phd
kgreen@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Green earned her Ph.D. from the University of Tennessee Center for Health Sciences in Memphis in the department of microbiology and immunology. 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.

AUDRAY K. HARRIS, PH.D.

Chief, Structural Informatics Unit, LID
www.niaid.nih.gov/research/audray-k-harris-phd
harrisau@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Structure-function of viral glycoproteins
- Epitope mapping and structure-supported design of immunogens
- Molecular architecture and assembly of viruses
- Predictive structural correlations to virus pathogenesis and immune escape
- Coherent integration of structural, computational, and biological information

BIOGRAPHY

Dr. Harris received his Ph.D. in 2002 from the University of Alabama at Birmingham. Following postdoctoral training at the National Institute of Arthritis and Musculoskeletal and Skin Diseases, he joined the National Cancer Institute as a research fellow. In 2012, Dr. Harris was selected as an Earl Stadtman Investigator and in 2013 joined the Laboratory of Infectious Diseases.

JOSEPH MARCOTRIGIANO, PH.D.

Chief, Structural Virology Section, LID
www.niaid.nih.gov/research/joseph-marcotrigiano-phd
joseph.marcotrigiano@nih.gov

MAJOR AREAS OF RESEARCH

- Explore the mechanism of entry and replication of RNA viruses
- Understand how the cell distinguishes self from non-self
- Characterize the immune response to RNA virus infection
- Contribute to the development of novel therapies to combat infection and spread of RNA viruses
- Develop novel methods for the recombinant production of challenging proteins in mammalian cells

BIOGRAPHY

Dr. Marcotrigiano pursued graduate studies at Rockefeller University in the laboratory of Dr. Stephen K. Burley. After receiving a Ph.D., he became a Merck Fellow of the Life Sciences Research Foundation at the Center for the Study of Hepatitis C under the direction of Dr. Charles Rice. In 2007, he began an independent tenure-track position at the Center for Advanced Biotechnology and Medicine at Rutgers University and was awarded tenure in July 2013. In September 2016, he was selected as a Howard Hughes Medical Institute Faculty Scholar. Dr. Marcotrigiano became chief of the Structural Virology Section in the Laboratory of Infectious Diseases in January 2017.

ALEXANDER G. PLETNEV, PH.D., D.SCI.

Chief, Neurotropic Flaviviruses Section, LID
www.niaid.nih.gov/research/alexander-g-pletnev-phd-dsci
apletnev@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Study of pathogenesis of flavivirus infection in the central nervous system
- Development of novel approaches to restrict flavivirus neurotropism
- Generation of attenuated vaccine candidates against disease caused by highly virulent neurotropic flaviviruses and evaluation of their safety, immunogenicity, and protective efficacy in animal models in preclinical studies, as well as assessment of safety for environment
- Evaluation of safety and immunogenicity of live attenuated vaccine candidates in human clinical trials

BIOGRAPHY

Dr. Pletnev earned 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 served as chief of the laboratory of radiochemistry and the laboratory of molecular virology from 1984 to 1993 and became a professor in molecular biology in 1993. In 1990, he received his doctorate of sciences degree in biochemistry and molecular biology from the Russian Academy of Sciences. He joined the Laboratory of Infectious Diseases in 1993 as a visiting scientist and became a senior investigator in 2005.

JEFFERY K. TAUBENBERGER, M.D., PH.D.

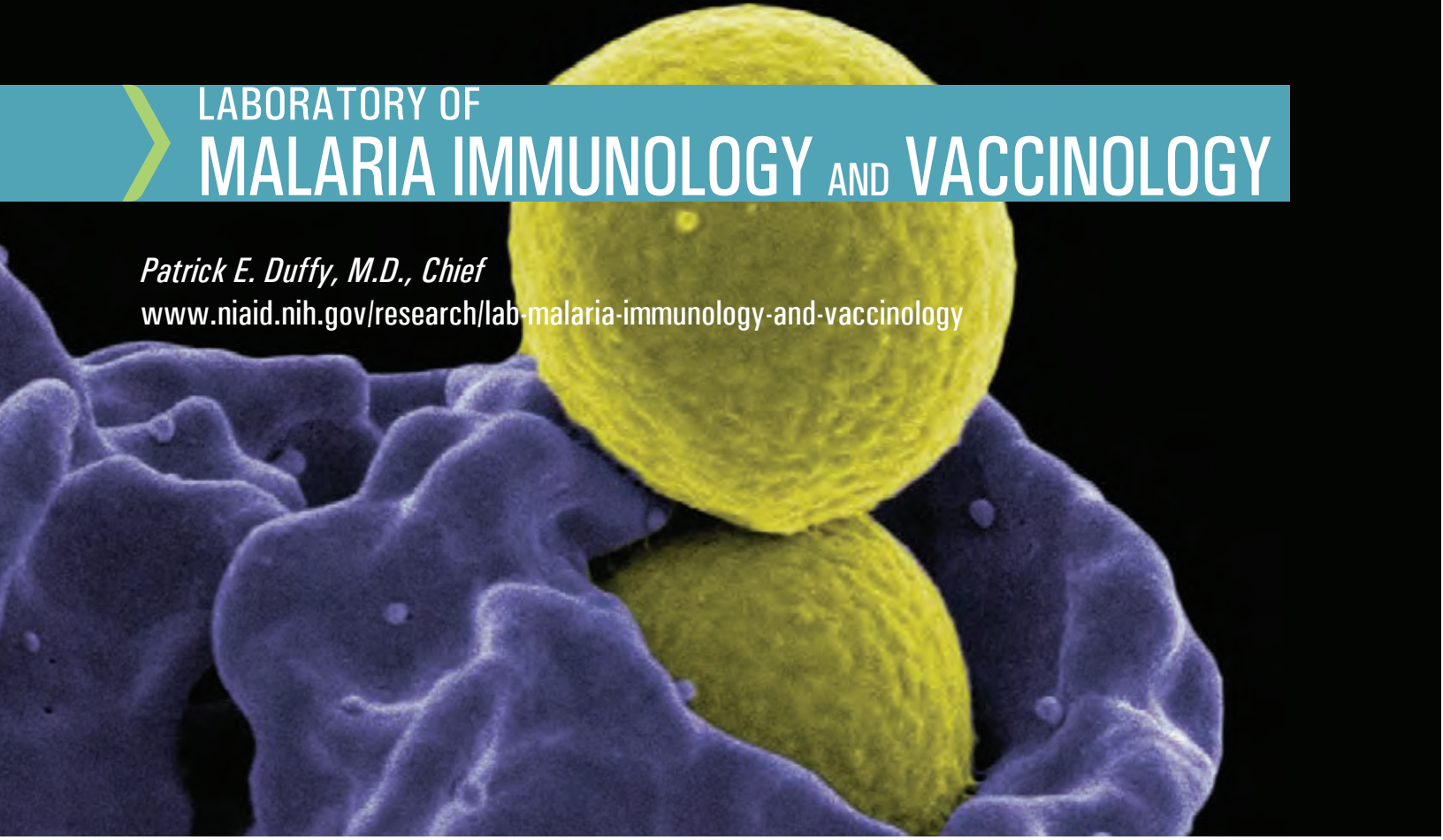
Chief, Viral Pathogenesis and Evolution Section, LID
www.niaid.nih.gov/research/jeffery-k-taubenberger-md-phd
taubenbergerj@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Influenza pathogenesis
- Animal models of influenza infection
- Influenza virus genomics and evolution
- Viral surveillance
- Archaevirology
- Influenza diagnostics
- Clinical influenza research

BIOGRAPHY

Dr. Taubenberger received a B.S. in biology from George Mason University in 1982. He earned his medical degree in 1986 and his Ph.D. in 1987, both from the Medical College of Virginia. He completed a residency in pathology at the National Cancer Institute and holds dual board certifications in anatomic pathology and in 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, a position he had held since 1994.



LABORATORY OF MALARIA IMMUNOLOGY AND VACCINOLOGY

Patrick E. Duffy, M.D., Chief

www.niaid.nih.gov/research/lab-malaria-immunology-and-vaccinology

The Laboratory of Malaria Immunology and Vaccinology (LMIV) was commissioned in 2009 to conduct basic and applied research relevant to malaria immunology and vaccine development, to pursue novel vaccine concepts, to produce prototype malaria vaccines, and to conduct early-phase clinical trials of promising vaccine candidates. Our overarching goal is to develop malaria vaccines that will reduce severe disease and death among African children and pregnant women and will eliminate malaria from low-transmission areas of the world.

LMIV has an organizational structure that encompasses both basic discovery and product development within a small, integrated team. Discovery sections within LMIV conduct basic research on malaria pathogenesis and immunology, with an emphasis on studies in humans who are naturally or experimentally infected with malaria parasites. In parallel, the Vaccine Development Unit—which was launched in 2001 as the Malaria Vaccine Development Unit and then became the Malaria Vaccine Development Branch before taking its current shape—operates 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 allows multiple vaccine candidates to move from concept to clinical trials efficiently and rapidly. Together, the discovery sections and production unit form a research and testing enterprise that can rapidly translate ideas into proof-of-concept trials and then capture basic information about human immunity and responses to infection during human clinical trials.

MAJOR AREAS OF RESEARCH

- Enhance our basic understanding of malaria pathogenesis and immunity in humans
- Develop strategies for anti-infection, anti-disease, and transmission-blocking vaccines
- Produce and formulate antigens suitable for human testing
- Develop assays and perform animal trials that define the potential for protection
- Conduct clinical trials to test vaccines in the United States and in malaria-endemic areas
- Establish scientific collaborations and obtain outside funding to accelerate the program

SECTIONS AND UNITS

Host-Pathogen Interactions and Structural Vaccinology Section
Niraj Harish Tolia, Ph.D.

Molecular Pathogenesis and Biomarkers Section
Michal Fried, Ph.D.

Pathogenesis and Immunity Section
Patrick Duffy, M.D.

Vaccine Development Unit
Patrick Duffy, M.D.

PATRICK E. DUFFY, M.D.

Chief, Laboratory of Malaria Immunology and Vaccinology
Chief, Pathogenesis and Immunity Section, LMIV
www.niaid.nih.gov/research/patrick-e-duffy-md-pathogenesis-and-immunity

Chief, Vaccine Development Unit, LMIV
www.niaid.nih.gov/research/patrick-e-duffy-md-vaccine-development-unit
duffype@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Process development of vaccine candidates for commercial viability, including molecular biology, fermenation/ purification, conjugation, formulation, and quality control
- Pre-clinical evaluation of vaccine candidates
- Clinical trials, both U.S. and international
- Immunologic assay development
- Pregnancy malaria: surface antigens and mechanisms of disease
- Liver stage malaria: antigen discovery and models of immunity
- Severe malaria in children: epidemiology and pathogenesis

BIOGRAPHY

Before joining NIAID in November 2009, he served as malaria program director at Seattle Biomedical Research Institute and affiliate professor of global health at the University of Washington. He leads the Pregnancy Malaria Initiative to develop a malaria vaccine for pregnant women, a Grand Challenges in Global Health consortium project to understand immunity to severe malaria in African children, and a consortium of laboratories identifying novel vaccine targets against liver-stage malaria parasites. He established the Malaria Clinical Trials Center in Seattle and for several years led the SBRI-Tanzania Malaria Research Training Program for young African scientists. He received his medical degree from Duke University, his internal medicine training at Walter Reed, and his postdoctoral training in molecular vaccine development at NIH.

MICHAL FRIED, PH.D.

Chief, Molecular Pathogenesis and Biomarkers Section, LMIV
www.niaid.nih.gov/research/michal-fried-phd
friedm@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Correlates of immunity: parasite adhesion phenotypes, parasite antigens, and antigen-specific antibodies
- Disease biomarkers: pathways analysis of host response and disease comparison
- Identifying targets of pre-erythrocytic immunity

BIOGRAPHY

Dr. Fried earned her Ph.D. in molecular parasitology at Hebrew University (Israel) and M.Sc. in biochemistry at Ben-Gurion University (Israel). She made groundbreaking work on the molecular basis of placental malaria and described the model of protective immunity that is the basis of the current effort to develop a pregnancy malaria vaccine. The model of pregnancy malaria is currently expanded to studies of severe malaria in children carried out in longitudinal studies in Africa.

NIRAJ HARISH TOLIA, PH.D.

Chief, Host-Pathogen Interactions and Structural Vaccinology Section, LMIV
www.niaid.nih.gov/research/niraj-harish-tolia-phd
niraj.tolia@nih.gov

MAJOR AREAS OF RESEARCH

- Host-pathogen interactions: structure, function and mechanism
- Mechanisms of protective antibody neutralization
- Structural vaccinology for malaria

BIOGRAPHY

Niraj Harish Tolia received his B.Sc. from Imperial College and his Ph.D. from the Watson School of Biological Sciences as a Leslie Quick Jr. Fellow. In May 2018, Dr. Tolia became chief of the Host-Pathogen Interactions and Structural Vaccinology Section in the Laboratory of Malaria Immunology and Vaccinology. He is a tenured senior investigator in the Division of Intramural Research, NIAID. Dr. Tolia was born and raised in Nairobi, Kenya. He is a third generation Kenyan of Indian descent. His first interaction with malaria arose when he contracted the disease as a child. This spurred an interest in infectious disease of global importance.

LABORATORY OF MALARIA AND VECTOR RESEARCH

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

www.niaid.nih.gov/research/lab-malaria-and-vector-research

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 drug 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.

MAJOR AREAS OF RESEARCH

- Malaria biology and pathogenesis
- Insect vectors of infectious diseases
- New drug treatments, diagnostic tools, and vaccines

SECTIONS AND UNITS

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

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

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

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

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

Molecular Entomology Unit
Eric Calvo, Ph.D.

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

Molecular Parasitology and Entomology Unit
Joel Vega-Rodriguez, Ph.D.

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

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

THOMAS E. WELLEMS, M.D., PH.D.

Chief, Laboratory of Malaria and Vector Research
Chief, Malaria Genetics Section, LMVR
www.niaid.nih.gov/research/thomas-e-wellems-md-phd
twellems@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Antimalarial drug responses and factors that affect clinical outcome after treatment
- Malaria protection conferred by human hemoglobinopathies and red cell polymorphisms
- Antigenic variation by *Plasmodium falciparum* parasites
- Molecular mechanisms of malaria parasite infectivity and pathogenesis

BIOGRAPHY

Dr. Wellems received his M.D. and Ph.D. from the University of Chicago. He completed his internal medicine residency at the Hospital of the University of Pennsylvania, and in 1984 he joined the Division of Intramural Research. He has directed the Malaria Genetics Section since 1991 and has served as chief of the Laboratory of Malaria and Vector Research since 2002. Dr. Wellems is a member of the U.S. National Academy of Sciences and the National Academy of Medicine, is a past president of the American Society of Tropical Medicine and Hygiene, and serves on a number of advisory committees for foundations and public-private partnerships, including the Medicines for Malaria Venture.

CAROLINA V. BARILLAS-MURY, M.D., PH.D.

Chief, Mosquito Immunity and Vector Competence Section, LMVR
www.niaid.nih.gov/research/carolina-v-barillas-mury-md-phd
cbarillas@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Interactions between *Plasmodium* parasites, the gut microbiota, and mosquito midgut epithelial cells
- Immune pathways that mediate antiplasmodial responses
- Hemocyte differentiation and immune memory in mosquitoes
- *Plasmodium* evasion of the mosquito immune system

BIOGRAPHY

Dr. Barillas received her B.S. in biology from the Universidad del Valle de Guatemala in 1981, her M.D. from 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 in 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. She joined the Laboratory of Malaria and Vector Research in 2003 and became a senior investigator in 2010.

ERIC CALVO, PH.D.

Chief, Molecular Entomology Unit, LMVR
www.niaid.nih.gov/research/eric-calvo-phd
ecalvo@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Role of arthropod saliva in vector-borne disease transmission
- Functional salivary transcriptomics and proteomics
- Gene-editing approaches (based on the CRISPR/Cas9 system) to characterize gene function
- Discovery of new salivary functions in blood feeding arthropods

BIOGRAPHY

Dr. Calvo was born and raised in Havana, Cuba. He received his B.Sc. in biochemistry from the University of Havana, Cuba, and his Ph.D. from the Institute of Biomedical Sciences, University of Sao Paulo, Brazil. He did postdoctoral work at the University of California, Irvine, and at NIAID. Dr. Calvo became a staff scientist first at the FDA and then at NIAID, where he is now an Earl Stadtman tenure-track investigator and NIH Distinguished Scholar. The primary aim of his research is to enrich the functional annotation of disease vectors' salivary proteins and provide a better understanding of their biologic function and potential involvement in pathogen transmission. His goal is to develop new control strategies to reduce or eliminate vector-borne diseases. He has also served as guest editor and reviewer for several scientific journals and international funding agencies.

SANJAY A. DESAI, M.D., PH.D.

Chief, Apicomplexan Molecular Physiology Section, LMVR
www.niaid.nih.gov/research/sanjay-desai-md-phd
sdesai@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Cellular and molecular biology of the malaria parasite
- Unusual parasite ion channels, e.g., the plasmodial surface anion channel (PSAC), required for parasite survival within human erythrocytes
- 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

BIOGRAPHY

Dr. Desai received his M.D. and Ph.D. from Washington University in St. Louis. Following an internal medicine residency and infectious diseases fellowship at Duke University Medical Center, he joined the Division of Intramural Research. His work focuses on the molecular and cellular biology of malaria parasites.

CAROLE A. LONG, PH.D.

Chief, Malaria Immunology Section, LMVR
Director, PATH Malaria Vaccine Initiative Standard Membrane Feeding Assay-Reference Center
Director, USAID Growth Inhibition Assay–Reference Center
www.niaid.nih.gov/research/carole-long-phd
calong@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Immunity to malaria in those living in malaria-endemic areas
- Transmission of malaria in the field
- New malaria vaccine candidates, focusing on the erythrocytic and sexual stages of malaria infection
- *In vitro* parasite growth inhibition assay and a membrane feeding assay

BIOGRAPHY

Dr. Long received her Ph.D. in microbiology and immunology from the University of Pennsylvania and also did postdoctoral training there. Before joining NIAID in 1999, Dr. Long was a professor of microbiology and immunology at Hahnemann University School of Medicine (now Drexel University) in Philadelphia. She has served as president of the American Society for Tropical Medicine and Hygiene and chair of the Tropical Medicine and Parasitology Study Section. Her lab's work focuses on immune responses to malaria parasites, particularly in those living in malaria-endemic areas, and also on identification and evaluation of possible candidate antigens for malaria vaccines.

LOUIS H. MILLER, M.D.

Chief, Malaria Cell Biology Section, LMVR
www.niaid.nih.gov/research/louis-h-miller-md
lmiller@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Miller received his B.S. from Haverford College in Pennsylvania; his M.S. from Columbia University; and his M.D. from Washington University in St. Louis. He then served as a medical resident at Montifiore Hospital, New York, and as an intern and resident at Mount Sinai Hospital. 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 the National Academy of Medicine. In 2011, he received the Walter Reed Medal for distinguished accomplishment in the field of tropical medicine from the American Society of Tropical Medicine and Hygiene.

JOSÉ M.C. RIBEIRO, M.D., PH.D.

Chief, Vector Biology Section, LMVR
www.niaid.nih.gov/research/jose-mc-ribeiro-md-phd
jribeiro@niaid.nih.gov

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
- Development of tools for transcriptome annotation
- 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

BIOGRAPHY

Dr. Ribeiro received his M.D. from the State University of Rio de Janeiro and a 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 at the department of entomology in the University of Arizona before joining NIAID in 1996. His work focuses on the 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. 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.

XIN-ZHUAN SU, PH.D.

Chief, Malaria Functional Genomics Section, LMVR
www.niaid.nih.gov/research/xin-zhuan-su-phd
xsu@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- *Plasmodium* genetics and genomics
- Host-parasite interaction and molecular signaling
- Antimalarial drug development and mechanisms of drug resistance

BIOGRAPHY

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

JESUS G. VALENZUELA, PH.D.

Chief, Vector Molecular Biology Section, LMVR
www.niaid.nih.gov/research/jesus-g-valenzuela-phd
jvalenzuela@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Functional transcriptomic approaches to characterizing vector salivary proteins
- Development of natural models of vector-transmitted cutaneous and visceral leishmaniases to study the impact of immune responses to sand fly salivary proteins in parasite transmission, early events of pathogenesis post-bite, and adaptive immunity to naturally acquired disease
- Studies of human cellular immune responses to sand fly salivary proteins in volunteers and individuals living in leishmaniasis-endemic areas
- Development of biomarkers for vector exposure using immunogenic salivary proteins

BIOGRAPHY

Dr. Valenzuela received his Ph.D. in biochemistry from the University of Arizona in 1995. He joined the Laboratory of Parasitic Diseases in 1996, became a research fellow in 1999, and became a tenure-track investigator in the Laboratory of Malaria and Vector Research in October 2002. Dr. Valenzuela became a senior investigator in October 2009.

JOEL VEGA-RODRIGUEZ, PH.D.

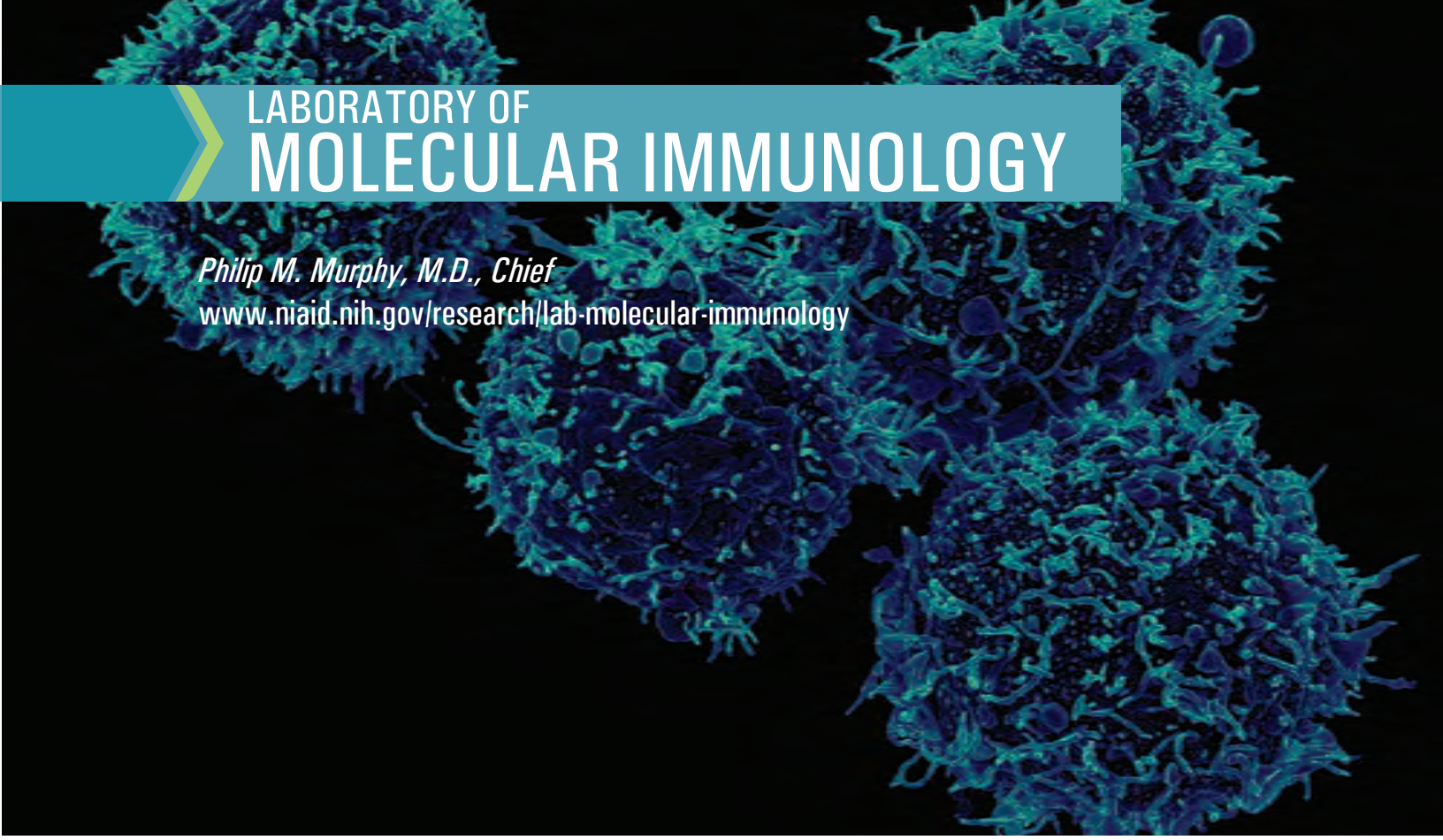
Chief, Molecular Parasitology and Entomology Unit, LMVR
www.niaid.nih.gov/research/joel-vega-rodriguez-phd
joel.vega-rodriguez@nih.gov

MAJOR AREAS OF RESEARCH

- Host-parasite-vector interactions required for sporozoite transmission
- Parasite interaction with the human fibrinolytic system and its role during parasite infection of the mosquito and the mammalian host
- Molecular mechanisms of Plasmodium sexual reproduction in the mosquito midgut

BIOGRAPHY

Dr. Joel Vega-Rodriguez received his Ph.D. in molecular biology in 2008 at the Rio Piedras Campus of the University of Puerto Rico in San Juan. In 2009 he joined the laboratory of Dr. Marcelo Jacobs-Lorena at the Johns Hopkins Malaria Research Institute, where he did his postdoctoral training and later became a research associate. In 2018, Dr. Vega-Rodriguez became a Stadtman tenure-track investigator in the Laboratory of Malaria and Vector Research.



LABORATORY OF MOLECULAR IMMUNOLOGY

Philip M. Murphy, M.D., Chief
www.niaid.nih.gov/research/lab-molecular-immunology

The Laboratory of Molecular Immunology (LMI) conducts basic, translational, and clinical studies related to innate and adaptive immune system function in health and disease. LMI scientists have made major contributions to our understanding of immunoregulation by chemokines and their G protein-coupled receptors, HIV pathogenesis, the NFkB family of transcription factors, mucosal immunology in the gut, reovirus and rotavirus infection in the gut, and mouse models of inflammatory bowel disease. They explore the basic properties of neutrophils, macrophages, naïve and memory T cells, and dendritic cells, as well as genetic risk factors for complex immune-mediated diseases.

In LMI, current studies focus on the molecular pathogenesis of infectious and immunologic/inflammatory diseases, including West Nile virus infection, *Listeria* infection, *Trypanosoma cruzi, Toxoplasma gondii,* fungal infection, sepsis, atherosclerosis, psoriasis, inflammatory bowel disease, primary immunodeficiency disease, and cancer, working toward the goal of identifying novel therapeutic targets and strategies.

MAJOR AREAS OF RESEARCH

- Structure and function of the mucosal immune system in the gastrointestinal system
- Basic properties of neutrophils, naïve and memory T cells, macrophages, and dendritic cells
- Genetic and epigenetic regulation of chemokine receptor expression
- Chemokines as mediators in antimicrobial host defense, inflammation, and cancer
- Primary immunodeficiency disease

SECTIONS AND UNITS

Immune Activation Section
Ulrich Siebenlist, Ph.D.

Inflammation Biology Section
Joshua M. Farber, M.D.

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

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

PHILIP M. MURPHY, M.D.

Chief, Laboratory of Molecular Immunology
Chief, Molecular Signaling Section, LMI
www.niaid.nih.gov/research/philip-m-murphy-md
pmurphy@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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.

JOSHUA M. FARBER, M.D.

Chief, Inflammation Biology Section, LMI
www.niaid.nih.gov/research/joshua-m-farber-md
jfarber@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Chemokines and their receptors in health and disease

BIOGRAPHY

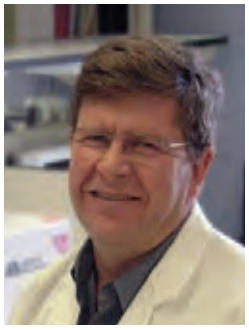
Dr. Farber obtained his M.D. from The Johns Hopkins University, where he did additional clinical training in internal medicine and infectious diseases. Dr. Farber's postdoctoral training in bench research was both at NIH and at Johns Hopkins. Dr. Farber joined the NIAID Laboratory of Clinical Investigation in 1993, became a senior investigator in 2000, and moved to the Laboratory of Molecular Immunology at its inception in 2004.

BRIAN L. KELSALL, M.D.

Chief, Mucosal Immunobiology Section, LMI
www.niaid.nih.gov/research/brian-l-kelsall-md
bkelsall@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Antigen presentation by mucosal dendritic cells and the regulation of mucosal immune responses
- Regulation of interleukin (IL)-12 production
- Innate and adaptive immunity to intestinal viral infection
- Genetic susceptibility to intestinal inflammation in mouse models of inflammatory bowel disease



BIOGRAPHY

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.

ULRICH SIEBENLIST, PH.D.

Chief, Immune Activation Section, LMI
www.niaid.nih.gov/research/ulrich-siebenlist-phd
usiebenlist@niaid.nih.gov

MAJOR AREAS OF RESEARCH

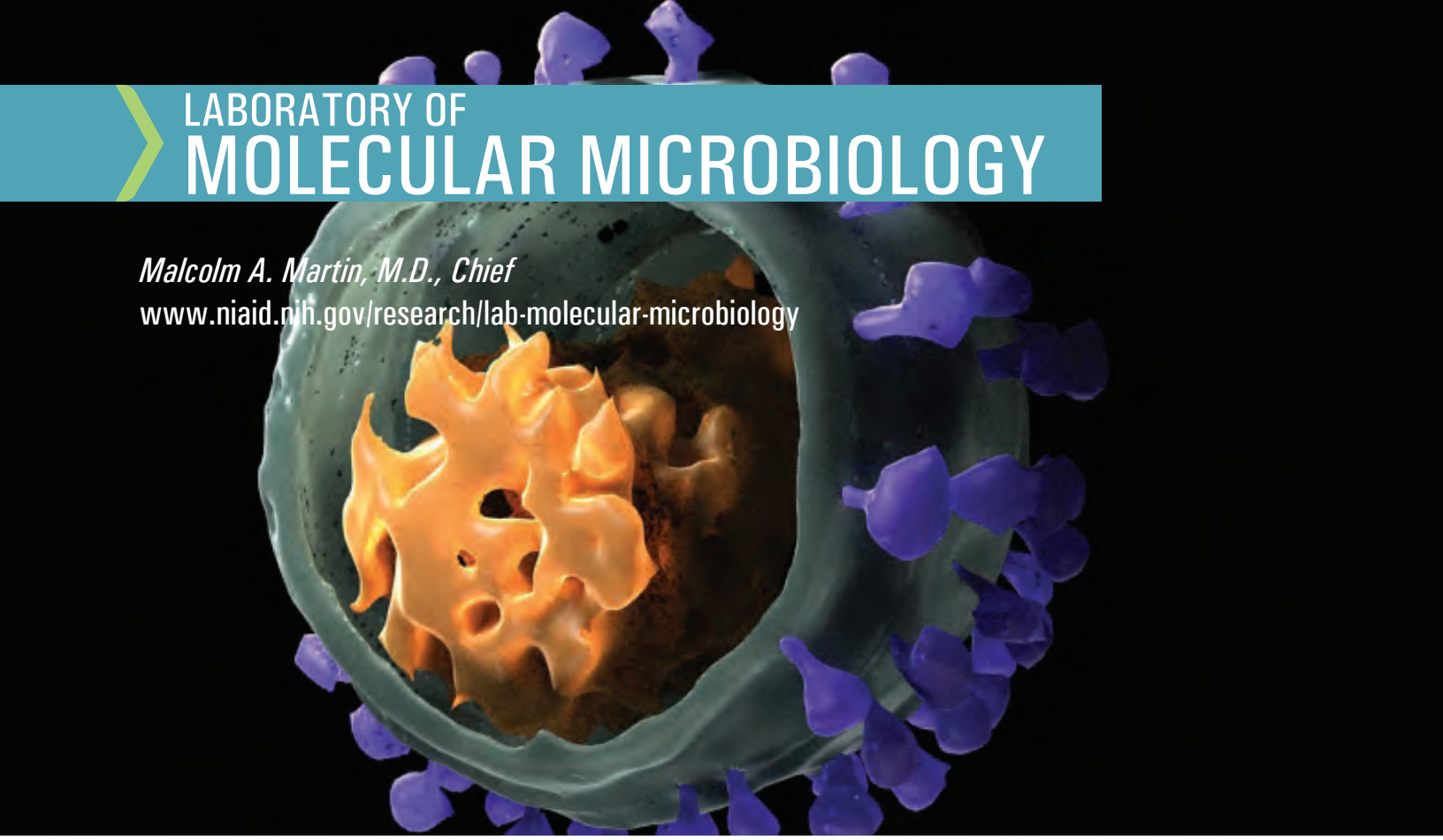
- Elucidation of the normal functions of NF-kappa B transcription factors and their regulators in the context of host defense against pathogens and in immune tolerance
- Dysregulated functions of NF-kappa B transcription factors in diseases, such as inflammation-induced cancers and the break in immune tolerance leading to autoimmunity
- Identification of factors/regulators that may serve as potential targets for therapeutic intervention in specific diseases
- Functions of the various members of the IL-17 cytokine family in host defenses, including Th17- and Th2-mediated responses
- Functions and mechanisms of action of IL-17 cytokines in specific inflammatory and autoimmune diseases, including asthma, allergy, rheumatoid arthritis, and lupus
- Molecular dissection of the signaling pathways engaged by IL-17 cytokines and development of potential therapeutic reagents to block specific signaling paths in disease

BIOGRAPHY

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 NIAID Laboratory of Immunoregulation. He is now chief of the Immune Activation Section in the Laboratory of Molecular Immunology.

LABORATORY OF MOLECULAR MICROBIOLOGY



Malcolm A. Martin, M.D., Chief
www.niaid.nih.gov/research/lab-molecular-microbiology

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 mycoplasmas. Currently, the main focus of LMM scientists is murine (e.g., murine leukemia virus) and primate retroviruses (e.g., HIV, immune immunodeficiency virus, 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.

MAJOR AREAS OF RESEARCH

- 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, the identification of potentially useful antiviral agents, and the development of protective vaccines

SECTIONS AND UNITS

Nonhuman Primate Virology Section
Vanessa M. Hirsch. D.V.M., D.Sc.

Viral Biochemistry Section
Klaus Strebel, Ph.D.

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

Viral Pathogenesis and Vaccine Section
Malcolm A. Martin, M.D.

MALCOLM A. MARTIN, M.D.

Chief, Laboratory of Molecular Microbiology
Chief, Viral Pathogenesis and Vaccine Section, LMM
www.niaid.nih.gov/research/malcolm-martin-md
mmartin@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Studies of primate and murine retroviral biology and genetics in cell culture systems and animal models
- Assessment of the SIV and SIV/HIV chimeric virus (SHIV) acute infections in macaque monkeys
- Development of R5-tropic SHIVs as challenge viruses in vaccine experiments
- Use of R5-tropic SHIVs to investigate the development of cross-reacting anti-HIV-1 neutralizing antibodies in virus-infected and vaccinated nonhuman primate models of HIV/AIDS

BIOGRAPHY

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 the recipient of numerous scientific awards.

VANESSA M. HIRSCH, D.V.M., D.SC.

Chief, Nonhuman Primate Virology Section, LMM
www.niaid.nih.gov/research/vanessa-m-hirsch-dvm-dsc
vhirsch@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Hirsch received her D.V.M. from the University of Saskatchewan in Canada in 1977 and did a residency in pathology at the University of Saskatchewan, becoming board certified by the American College of Veterinary Pathologists in 1984. She earned her D.Sc. from Harvard School of Public Health, Boston, 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 and becoming tenured in 2002.

CHRISTINE A. KOZAK, PH.D.

Chief, Viral Biology Section, LMM
www.niaid.nih.gov/research/christine-kozak-phd
ckozak@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Kozak received her Ph.D. in biology from Yale University in 1977. 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 an associate editor for several journals, 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 400 research publications dealing with mouse retroviruses and mouse genetics.

KLAUS STREBEL, PH.D.

Chief, Viral Biochemistry Section, LMM
www.niaid.nih.gov/research/klaus-strebel-phd
kstrebel@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Biological and biochemical functions of HIV and SIV accessory proteins Vif, Vpu, Vpr, and Vpx
- Characterization of cellular factors controlled by Vif, Vpu, Vpr, and Vpx
- Characterization of innate immune defense mechanisms

BIOGRAPHY

Dr. Strebel received his Ph.D. in microbiology in 1985 from the University of Heidelberg, Germany. After postdoctoral research in Germany on foot-and-mouth disease protein processing and maturation, he joined the Laboratory of Molecular Microbiology (LMM) in 1986 as a postdoctoral fellow to work on molecular mechanisms of HIV-1 replication. He was awarded tenure in 1998 and, since 2000, has been chief of the Viral Biochemistry Section within LMM.

LABORATORY OF PARASITIC DISEASES

Thomas Nutman, M.D., Chief
Alan Sher, Ph.D., Deputy Chief
www.niaid.nih.gov/research/lab-parasitic-diseases

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*, and *Entamoeba*) and helminths (*Filariae*, *Schistosoma*, *Strongyloides*, and *Taenia*), as well as non-parasitic agents (e.g., mycobacteria).

LPD 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. Four new programs focus on genetic determinants of virulence in apicomplexan protozoa, the function of the eosinophil in human infectious and inflammatory disease processes, the role of commensal microbiota in immune regulation and homeostasis, and T-cell regulation in mycobacterial and fungal opportunistic infections.

MAJOR AREAS OF RESEARCH

- Uncovering basic aspects of the host-pathogen interaction in humans and experimental animal models, as well as in invertebrate vectors that transmit medically important parasites
- Regulatory environment induced in chronic parasitic and bacterial infection
- Identification of determinants of host resistance and pathology, with a focus on barrier sites

SECTIONS AND UNITS

Clinical Parasitology Section
Theodore Nash, M.D.
Thomas B. Nutman, M.D.

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

Human Eosinophil Section
Amy D. Klion, M.D.

Immunobiology Section
Alan Sher, Ph.D.

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

Microbial Pathogenesis Section
Stephen H. Leppla, Ph.D.

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

T-Lymphocyte Biology Unit
Daniel L. Barber, Ph.D.

THOMAS B. NUTMAN, M.D.

Chief, Laboratory of Parasitic Diseases
Chief, Clinical Parasitology Section, LPD
Chief, Helminth Immunology Section, LPD
www.niaid.nih.gov/research/thomas-b-nutman-md
tnutman@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Regulation of the host immune response to parasitic helminth infection
- Influence of helminth infection on expression of non-parasitic infections, atopy, and asthma
- Molecular characterization of tissue-invasive helminth parasites
- Mechanisms of eosinophil activation and eosinophilia
- Control of immediate hypersensitivity reactions
- Clinical definition and pathogenesis underlying parasitic diseases
- New therapeutic interventions and methods of diagnosis in parasitic infections
- Clinical definition and pathogenesis underlying parasitic diseases

BIOGRAPHY

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 and postdoctoral training in the Laboratory of Parasitic Diseases (LPD). He is board certified in internal medicine and allergy and immunology. He also holds a diploma/certificate in tropical medicine and travelers' health. He has been at NIH in LPD since 1982. In addition, he is the director of the NIAID International Center for Excellence in Research (ICER) located in Chennai, India, as well as director of the filariasis unit at the NIAID ICER in Mali.

ALAN SHER, PH.D.

Deputy Chief, Laboratory of Parasitic Diseases
Chief, Immunobiology Section, LPD
www.niaid.nih.gov/research/alan-sher-phd
asher@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mechanisms of host resistance and immune regulation in parasitic and mycobacterial infection
- Role of innate pathogen recognition in the initiation of adaptive immunity and in CD4+ T-cell subset effector choice
- Regulatory pathways limiting pathogen-induced Th1 immunopathology
- Immunotherapeutic approaches to the treatment of infectious disease

BIOGRAPHY

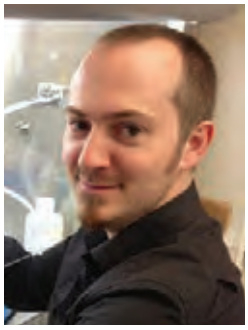
Dr. Sher received his Ph.D. from the University of California, San Diego, and did his postdoctoral training in the Division of Parasitology at the National Institute for Medical Research in Mill Hill, London. In 1980, after several years as a research associate and then assistant professor in the department of pathology at Harvard Medical School, he joined NIAID as a section chief in the Laboratory of Parasitic Diseases. Sher became chief of LPD in 2003 and was promoted to NIH Distinguished Investigator in 2011.

DANIEL L. BARBER, PH.D.

Chief, T-Lymphocyte Biology Unit, LPD
www.niaid.nih.gov/research/daniel-l-barber-phd
barberd@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Immunoregulation during infection with *Mycobacterium tuberculosis* and opportunistic fungal pathogens
- Mechanisms of mycobacteria-associated immune reconstitution inflammatory syndrome (IRIS)
- Role of the PD-1 pathway in the regulation of T-cell responses



BIOGRAPHY

Dr. Barber obtained his B.S from Rider University and his Ph.D from Emory University in the department of microbiology and immunology. In 2006, he joined the Laboratory of Parasitic Diseases as a postdoctoral fellow in the Immunobiology Section. In 2012, Dr. Barber was awarded a position as an Earl Stadtman Tenure-Track Investigator in the Laboratory of Parasitic Diseases.

MICHAEL E. GRIGG, PH.D.

Chief, Molecular Parasitology Section, LPD
www.niaid.nih.gov/research/michael-e-grigg-phd
griggm@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Virulence shifts in protozoan parasites: biology and genetics
- Forward/reverse genetics and functional genomic screens that identify protozoan virulence factors
- Immunoparasitology and mechanisms of host resistance against protozoan parasites
- Parasite gene families that modulate host immunity, infectivity, and parasite pathogenesis

BIOGRAPHY

Dr. Grigg earned his B.Sc. in 1989 from the University of British Columbia. He obtained his Ph.D. and D.I.C. in 1994 from the Imperial College of Science, Technology, and Medicine, University of London. From 1994 to 1997, Dr. Grigg was a Howard Hughes Medical Institute senior fellow at the University of Washington. From 1997 to 2001, he trained as a postdoctoral scholar in molecular parasitology at Stanford University. In 2002, he was appointed at the assistant professor level in medicine, microbiology, and immunology at the University of British Columbia. In 2006, he joined the Laboratory of Parasitic Disease as a tenure-track investigator. In 2013, he was appointed senior investigator at NIH. He is also an adjunct professor at the University of British Columbia and Oklahoma State University.

AMY D. KLION, M.D.

Chief, Human Eosinophil Section, LPD
www.niaid.nih.gov/research/amy-d-klion-md
aklion@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Identification and characterization of new subtypes of hypereosinophilic syndromes (HES)
- Elucidation of the role of the eosinophil in pathogenesis of eosinophilic disorders
- Assessment of the safety and efficacy of chemotherapeutic agents targeting eosinophils (or their precursors)
- Prevention of post-treatment reactions in loiasis, a filarial infection associated with dramatic eosinophilia following anthelminthic therapy

BIOGRAPHY

Dr. Klion earned her B.A. from Princeton University and her M.D. from New York University School of Medicine. After completing a residency in internal medicine at The Johns Hopkins University, she was a postdoctoral fellow in the Laboratory of Parasitic Diseases from 1989 to 1991. She completed her fellowship in infectious diseases at the University of Iowa Hospitals and Clinics in Iowa City, Iowa, where she was appointed an assistant professor in the division of infectious diseases prior to returning to the Laboratory of Parasitic Diseases in 1997 as a staff clinician. She became a tenure-track clinical investigator in the Laboratory of Parasitic Diseases in 2009 and a senior clinical investigator in 2014.

STEPHEN H. LEPPLA, PH.D.

Chief, Microbial Pathogenesis Section, LPD
www.niaid.nih.gov/research/stephen-h-leppla-phd
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

BIOGRAPHY

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, Maryland. He moved to NIH in 1989 and to NIAID in 2003.

THEODORE E. NASH, M.D.

Principal Investigator, Clinical Parasitology Section, LPD
www.niaid.nih.gov/research/theodore-e-nash-md
tnash@niaid.nih.gov

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

BIOGRAPHY

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 is currently a principal investigator in the Clinical Parasitology Section.

DAVID L. SACKS, PH.D.

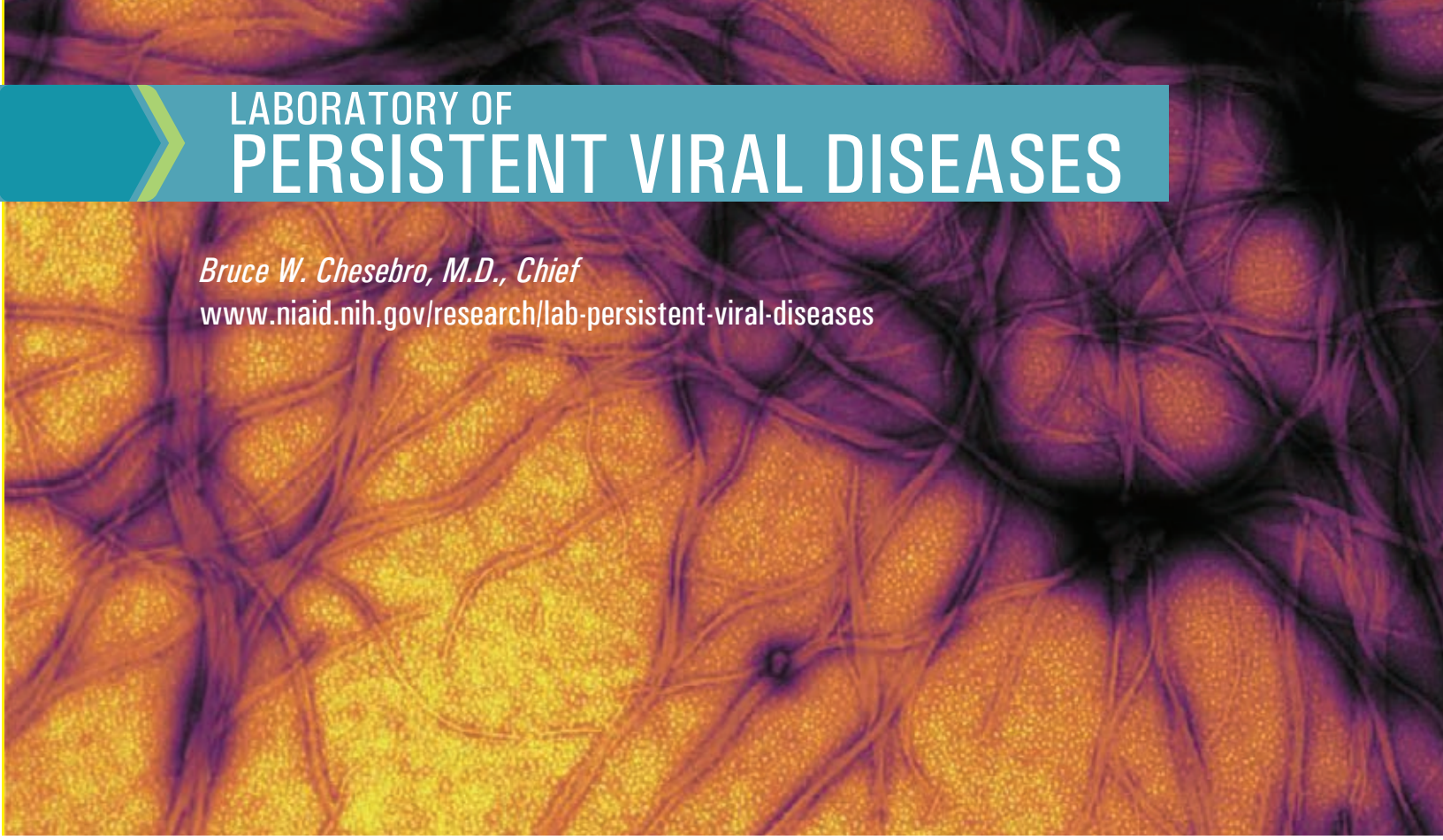
Chief, Intracellular Parasite Biology Section, LPD
www.niaid.nih.gov/research/david-l-sacks-phd
dsacks@niaid.nih.gov

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 in cutaneous leishmaniasis and those controlling persistent infection
- Mechanisms underlying pathogenesis and immunosuppression in human visceral leishmaniasis and development of host-directed therapies
- Study of sexual reproductive strategies in Leishmania and the development of forward genetic approaches to identify virulence genes

BIOGRAPHY

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.



LABORATORY OF PERSISTENT VIRAL DISEASES

Bruce W. Chesebro, M.D., Chief

www.niaid.nih.gov/research/lab-persistent-viral-diseases

The Laboratory of Persistent Viral Diseases (LPVD) studies persistent active or latent viral or prion disease infections. Investigators place particular emphasis on persistent infections of the nervous system and of the hematopoietic 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.

MAJOR AREAS OF RESEARCH

- 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.

SECTIONS AND UNITS

Neuroimmunology Unit
Karin Peterson, Ph.D.

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

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

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

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

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

BRUCE W. CHESEBRO, M.D.

Chief, Laboratory of Persistent Viral Diseases
Chief, TSE/Prion and Retroviral Pathogenesis Section, LPVD
www.niaid.nih.gov/research/bruce-w-chesebro-md
bchesebro@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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 in 1972 and became chief of the Laboratory of Persistent Viral Diseases in 1979. He was elected as a fellow in the American Academy of Microbiology in 2011.

BYRON CAUGHEY, PH.D.

Chief, TSE/Prion Biochemistry Section, LPVD
www.niaid.nih.gov/research/byron-caughey-phd
bcaughey@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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. Dr. Caughey is also an editor for the Journal of Virology and a fellow of the American Academy of Microbiology.

LEONARD H. EVANS, PH.D.

Chief, Retroviral Molecular Biology Section, LPVD
www.niaid.nih.gov/research/leonard-h-evans-phd
levans@niaid.nih.gov

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

BIOGRAPHY

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 at Berkeley from 1977 until 1980. In 1980, he joined the Rocky Mountain Laboratories, where he is currently a senior investigator in the Laboratory of Persistent Viral Diseases.

KIM J. HASENKRUG, PH.D.

Chief, Retroviral Immunology Section, LPVD
www.niaid.nih.gov/research/kim-j-hasenkrug-phd
khasenkrug@niaid.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

BIOGRAPHY

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 the 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 establishment and maintenance of chronic infections and virus escape. Dr. Hasenkrug serves as an affiliated associate professor at Montana State University and the University of Montana and as a scientific advisor for the International AIDS Vaccine Initiative.

KARIN E. PETERSON, PH.D.

Chief, Neuroimmunology Unit, LPVD
www.niaid.nih.gov/research/karin-e-peterson-phd
petersonka@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Examine interactions between the immune and nervous systems in regulating viral pathogenesis in the central nervous system (CNS)
- Examine the influence of the immune response on La Crosse virus-induced neurological disease
- Examine the Influence of the immune response on retrovirus-induced neurological disease
- Determine the mechanisms of SARM1-mediated neuronal cell death
- Identify potential therapeutic pathways to limit virus-mediated damage in the CNS

BIOGRAPHY

Karin Peterson received her Ph.D. in microbiology and immunology in 1998 from the University of Missouri Medical School, where she studied autoimmunity and the activation of self-reactive T cells. She then went to Rocky Mountain Laboratories (RML) in 1998 as a postdoctoral fellow in the Laboratory of Persistent Viral Diseases and applied her skills in immunology toward understanding the mechanisms that control the immune response to retrovirus infection. During this time, she became interested in the immune responses to virus infections in the CNS. In 2004, Dr. Peterson accepted a position as an assistant professor at Louisiana State University School of Veterinary Medicine, where she furthered her studies on viral pathogenesis in the CNS and also taught classes in immunology and virology. In 2008, she returned to RML as a tenure-track investigator to study the innate immune responses in the CNS and their role in viral pathogenesis.

SUZETTE A. PRIOLA, PH.D.

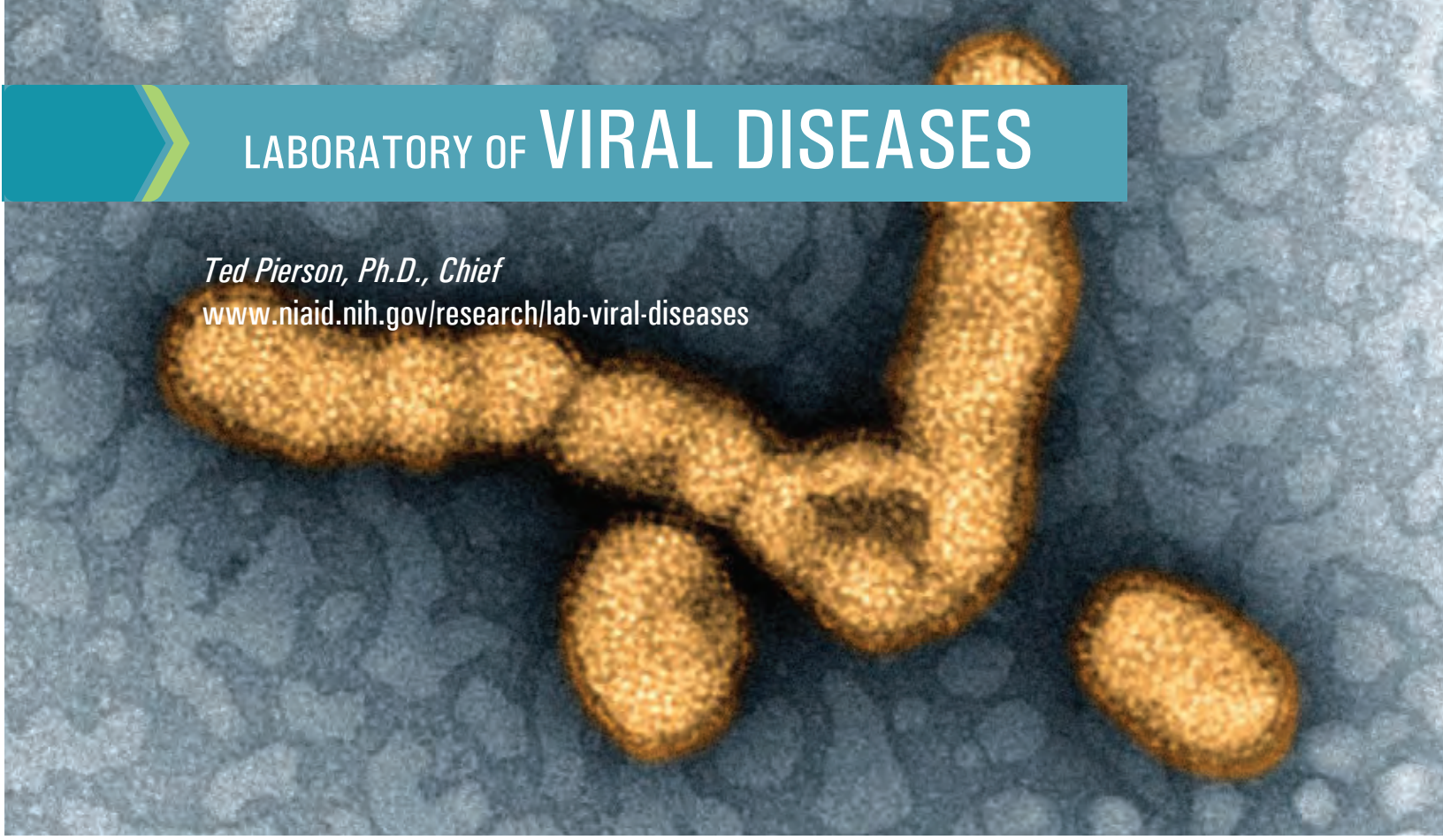
Chief, TSE/Prion Molecular Biology Section, LPVD
www.niaid.nih.gov/research/suzette-priola-phd
spriola@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Prion diseases
- Molecular mechanisms of neurodegenerative diseases

BIOGRAPHY

Dr. Priola received her Ph.D. in microbiology and immunology in 1990 from the University of California, Los Angeles. In 1991, she joined the Rocky Mountain Laboratories, where she is now a senior investigator. She is a former chair of the FDA TSE Advisory Committee and is currently chief of the TSE/Prion Molecular Biology Section. She currently serves on the editorial board of the journal *Virology*.



LABORATORY OF VIRAL DISEASES

Ted Pierson, Ph.D., Chief
www.niaid.nih.gov/research/lab-viral-diseases

The Laboratory of Viral Diseases carries out investigations on 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. The laboratory is well equipped with an electron microscope, confocal microscopes, FACS machines, DNA sequencers, PCR machines, ultracentrifuges, and other standard items. The members of the laboratory are interactive and hold weekly seminars in which current research is presented and discussed.

MAJOR AREAS OF RESEARCH

- 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
- Viral targets of humoral and cellular immunity
- Development of recombinant expression vectors, candidate vaccines, and antiviral agents
- Wide range of DNA and RNA viruses including HIV, poxviruses, herpesviruses, papillomaviruses, influenza virus, and flaviviruses

SECTIONS AND UNITS

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

DNA Tumor Virus Section
Alison McBride, Ph.D.

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

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

Barrier Immunity Section
Jason M. Brenchley, Ph.D.

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

TED C. PIERSON, PH.D.

Chief, Laboratory of Viral Diseases
Chief, Viral Pathogenesis Section, LVD
www.niaid.nih.gov/research/ted-c-pierson-phd
piersontc@mail.nih.gov

MAJOR AREAS OF RESEARCH

- The multiple roles of the envelope glycoproteins during the flavivirus lifecycle
- Mechanisms of antibody-mediated neutralization of viruses
- Humoral immunity to flavivirus infection

BIOGRAPHY

Dr. Pierson received his Ph.D. from The Johns Hopkins University 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 2005, Dr. Pierson was recruited to initiate the Viral Pathogenesis Section of the Laboratory of Viral Diseases and to continue his work on flaviviruses.

JASON M. BRENCHLEY, PH.D.

Chief, Barrier Immunity Section, LVD
www.niaid.nih.gov/research/jason-m-brenchley-phd
jbrenchl@mail.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Brenchley received a master's degree from Idaho State University in 1999 and 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 at NIAID and has been a senior investigator since 2013.

THOMAS M. KRISTIE, PH.D.

Chief, Molecular Genetics Section, LVD
www.niaid.nih.gov/research/thomas-m-kristie-phd
tkristie@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Herpes simplex virus gene expression
- Transcriptional coactivators in herpesvirus lytic and latency reaction
- Chromatin control of herpesvirus lytic and latency-reaction cycles
- Mechanisms involved in RNAP II-mediated gene transcription

BIOGRAPHY

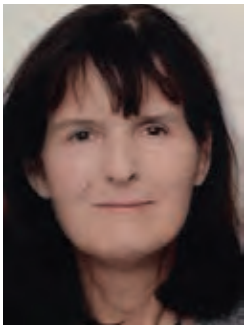
Dr. Kristie received his Ph.D. from the Committee on Virology at the University of Chicago for his work with Dr. Bernard Roizman on the regulation of herpes simplex virus gene expression. As a postdoctoral fellow with Dr. Philip Sharp at the Center for Cancer Research, Massachusetts Institute of Technology, Dr. Kristie focused on the interaction of components involved in the formation of transcriptional enhancer complexes. Dr. Kristie joined the NIAID Laboratory of Viral Diseases in 1993, became a senior investigator in 2000, and became chief of the Molecular Genetics Section in 2001.

ALISON MCBRIDE, PH.D.

Chief, DNA Tumor Virus Section, LVD
www.niaid.nih.gov/research/alison-mcbride-phd
amcbride@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Characterization of the mechanisms of viral genome establishment in keratinocytes
- Characterization of the mechanisms by which papillomavirus genomes are maintained and partitioned in dividing cells
- Determination of the role of the host DNA damage response and repair pathways in viral DNA replication
- Development of therapeutics to intervene in viral genome tethering
- Development of efficient methods to conditionally immortalize primary keratinocytes



BIOGRAPHY

Dr. McBride received a B.Sc. (with honors) in molecular biology from the University of Glasgow, Scotland, and a Ph.D. in biochemistry from the Imperial Cancer Research Fund and Imperial College, London, studying Epstein-Barr virus. She began working on human and other papillomaviruses as a postdoctoral fellow in the National Cancer Institute and joined NIAID in 1994. She became a senior investigator in the Laboratory of Viral Diseases in 2000.

BERNARD MOSS, M.D., PH.D.

Chief, Genetic Engineering Section, LVD
www.niaid.nih.gov/research/bernard-moss-md-phd
bmoss@niaid.nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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 became interested in viruses after joining NIH and is well known for studies on the cap structure of mRNAs, regulation of gene expression, replication cycle of poxviruses, virus defense molecules, and development and application of virus vectors.

Dr. Moss has received numerous awards and prizes. He was elected to the National Academy of Sciences, American Academy of Microbiology, Fellow of the American Association for the Advancement of Science, and 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.

JONATHAN WILSON YEWDELL, M.D., PH.D.

Chief, Cellular Biology Section, LVD
www.niaid.nih.gov/research/jonathan-wilson-yewdell-md-phd
jyewdell@nih.gov

MAJOR AREAS OF RESEARCH

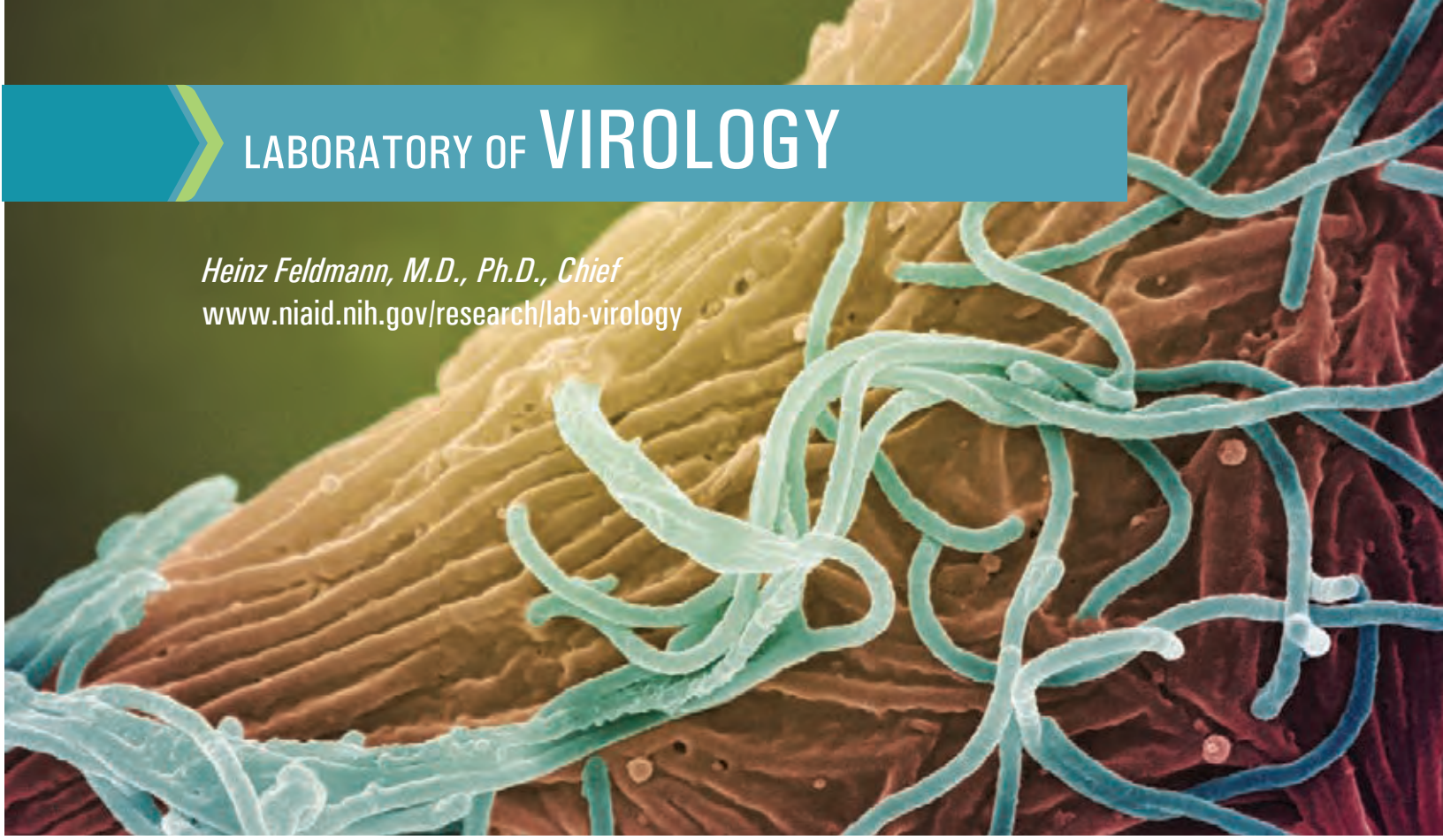
- Generation of MHC class I peptide ligands from defective ribosomal products (DRiPs) and other endogenous antigens
- Cell biology of specialized and non-canonical protein translation
- Defining mechanisms of influenza A virus evolution and antigenic variation in viral glycoproteins
- Understanding immunodominance in B-cell and antibody responses to influenza A virus
- Real-time imaging of virus-host interactions using multiphoton microscopy

BIOGRAPHY

Dr. Yewdell received an A.B. in biochemistry *magna cum laude* from Princeton University in 1975, working with Dr. Arnold Levine for his undergraduate thesis 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 using monoclonal antibodies to understand influenza A virus hemagglutinin antigenicity and function. As a postdoctoral fellow, he worked with Dr. David Lane at the Imperial College in London, studying the newly discovered p53 protein. From 1983 to 1987, he was an assistant professor at the Wistar Institute in Philadelphia. In 1987, Dr. Yewdell joined the LVD and in 1993 was appointed to lead its Cellular Biology Section.

LABORATORY OF VIROLOGY

Heinz Feldmann, M.D., Ph.D., Chief
www.niaid.nih.gov/research/lab-virology



The Laboratory of Virology (LV) conducts innovative scientific research on viral agents requiring high or maximum containment (biosafety level-2 to biosafety level-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. A significant goal is to develop diagnostics, vaccines, and therapeutics against these agents.

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

MAJOR AREAS OF RESEARCH

- Study pathogenesis and pathophysiology of high-containment viral pathogens 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 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 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.

SECTIONS AND UNITS

Biology of Vector-Borne Viruses Section
Marshall E. Bloom, M.D.

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

Innate Immunity and Pathogenesis Unit
Sonja M. Best, Ph.D.

Virus Ecology Unit
Vincent Munster, Ph.D.

HEINZ FELDMANN, M.D., PH.D.

Chief, Laboratory of Virology
Chief, Disease Modeling and Transmission Section, LV
www.niaid.nih.gov/research/heinz-feldmann-md-phd
feldmannh@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Disease modeling using rodent and nonhuman primate models
- Emergency vaccines using different replication-competent and replication-deficient viral vector platforms
- Antivirals and therapeutics
- Virus transmission in reservoir and host species

BIOGRAPHY

Heinz Feldmann graduated from medical school in 1987 (M.D.) and received his Ph.D. in 1988, both from the University of Marburg, Germany. His postdoctoral research was conducted in the field of virology (filoviruses and hantaviruses) at the Institute of Virology, University of Marburg, Germany, and the special pathogens branch at the Centers for Disease Control and Prevention in Atlanta, where he held a fellowship from the National Research Council. Following his postdoctoral training, he was as an assistant and associate professor with the Institute of Virology at the University of Marburg, Germany. During this time he was trained as an infectious disease specialist with a focus on laboratory diagnostics. From 1999 to 2008, Dr. Feldmann held the position of chief of the special pathogens program of the National Microbiology Laboratory, Public Health Agency of Canada. Since 2008, he has been the chief of Laboratory of Virology and the chief scientist at the RML BSL-4 laboratories.

SONJA M. BEST, PH.D.

Chief, Innate Immunity and Pathogenesis Unit, LV
www.niaid.nih.gov/research/sonja-m-best-phd
sbest@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mechanisms utilized by pathogenic viruses to modulate host innate immunity
- The role of novel interferon-stimulated genes in host resistance to virus infection
- The importance of dendritic cell function to anti-viral innate and adaptive immune responses

BIOGRAPHY

Dr. Best received her Ph.D. in biochemistry and molecular biology from the Australian National University, where she studied the pathogenesis of myxoma virus, a poxvirus. She conducted her postdoctoral research at Rocky Mountain Laboratories (RML) on the complex role of apoptosis in the replication of parvoviruses. She stayed at RML as a research fellow and then a staff scientist to investigate virus-host interactions involved in flavivirus pathogenesis. It was during this time that she developed her interests in innate immunity and the molecular mechanisms utilized by flaviviruses to evade these critical host responses. In 2009, Dr. Best established an independent laboratory as a tenure-track investigator to expand her studies on interactions between pathogenic viruses and the host immune response. In 2011, Dr. Best was awarded a Presidential Early Career Award for Scientists and Engineers for her work on flavivirus suppression of innate immune responses.

MARSHALL E. BLOOM, M.D.

Associate Director for Science Management, Rocky Mountain Laboratories
Chief, Biology of Vector-Borne Viruses Section, LV
www.niaid.nih.gov/research/marshall-e-bloom-md
mbloom@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Structural biology of tick-borne flaviviruses in vertebrate and arthropod systems
- Biology and molecular pathogenesis of acute and persistent tickborne flavivirus infections
- Viral and host determinants of effective vertical (through the tick life stages) and horizontal (from tick to mammalian host) transmission

BIOGRAPHY

Dr. Bloom received his M.D. in 1971 from Washington University School of Medicine in St. Louis, MI, and then joined the Rocky Mountain Laboratories (RML) of NIAID in 1972 as a research associate. From 1975 to 1977, he was a postdoctoral fellow in the NIAID Laboratory of the Biology of Viruses on the NIH campus 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 is considered an authority in biocontainment. In 2004, Dr. Bloom's research group changed its focus to the pathogenesis of tickborne flaviviruses. In 2008, Dr. Bloom was named associate director for science management for RML in NIAID's Division of Intramural Research.

VINCENT J. MUNSTER, PH.D.

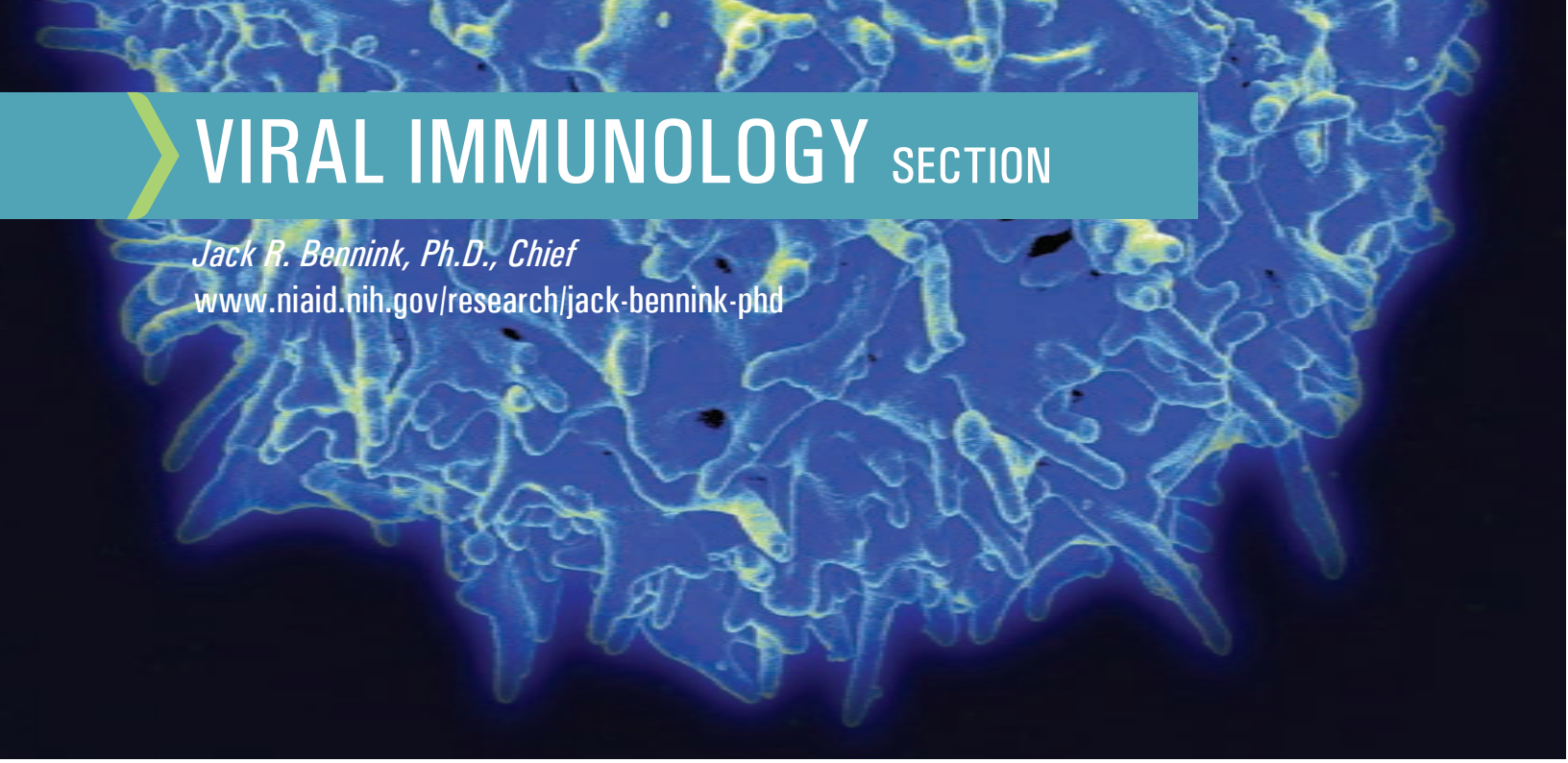
Chief, Virus Ecology Unit, LV
www.niaid.nih.gov/research/vincent-j-munster-phd
munstervj@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Natural reservoirs of emerging viruses and elucidation of the underlying biotic and abiotic drivers of zoonotic and cross-species transmission events
- Evolutionary dynamics of emerging viruses in the context of virus-host ecology
- Modeling zoonotic and cross-species transmission of emerging viruses and the efficacy of outbreak intervention strategies

BIOGRAPHY

Dr. Vincent Munster received his Ph.D. in virology from Erasmus University, Rotterdam, the Netherlands, in 2006. He continued his training at the Erasmus Medical Center from 2006 to 2009, where he worked within the Center for Research on Influenza Pathogenesis and Surveillance (CRIPS) focusing on pathogenicity and human-to-human transmission of influenza A viruses. Dr. Munster joined the Laboratory of Virology as a visiting fellow in 2009 to study the ecology of emerging viruses to include filoviruses and henipaviruses. In 2013, Dr. Munster established the Virus Ecology Unit as an independent tenure-track investigator. Dr. Munster was awarded the European Scientific Working Group on Influenza (ESWI) Best Body of Work Award for Young Scientists in 2011 and the MERCK-IAAC young investigator award in 2014.



VIRAL IMMUNOLOGY SECTION

Jack R. Bennink, Ph.D., Chief
www.niaid.nih.gov/research/jack-bennink-phd

Virus infections within the human population impose a significant annual burden in morbidity, mortality, and economic loss. The immune system and viruses have evolved and continue to evolve in response to each other. The mission of the Viral Immunology Section is focused on extending our basic understanding of the interaction between the immune system and viruses.

JACK BENNINK, PH.D.

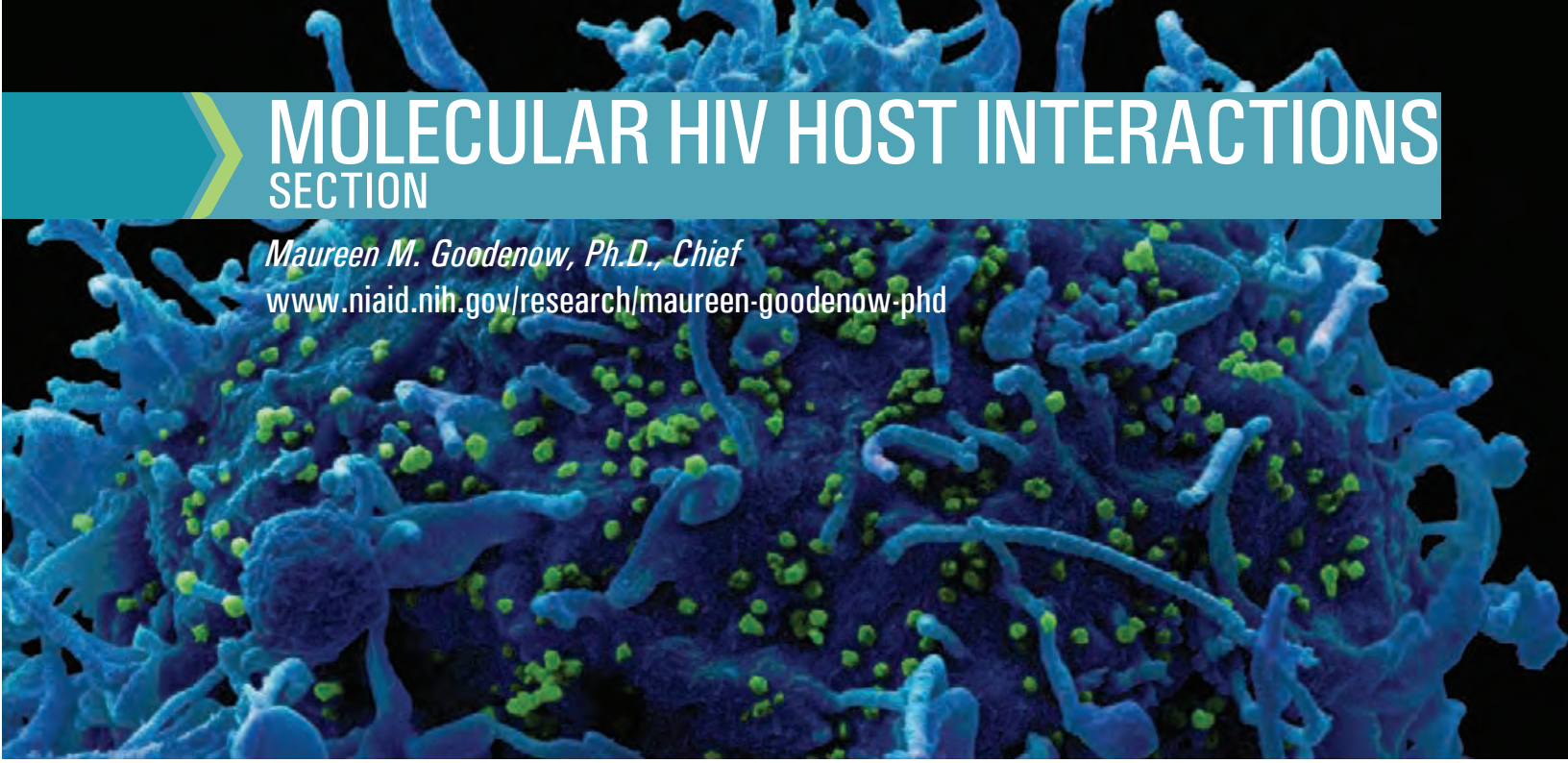
Chief, Viral Immunology Section
www.niaid.nih.gov/research/jack-bennink-phd
jbennink@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Interaction between host immunity and viruses
- Biology and evolution of viruses with a primary emphasis on influenza virus evolution under immune (vaccination), partially immune, and non-immune selection pressures *in vitro* and *in vivo*
- Innate and adaptive immunity with a focus on repertoire and the function of antiviral CD8+ T cells and B cells and their contribution to virus clearance and evolution
- Cellular processing and presentation of viral antigens to major histocompatibility complex class I-restricted CD8+ T cells

BIOGRAPHY

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 NIAID in 1987. His research focuses on influenza virus and antiviral immunity.



MOLECULAR HIV HOST INTERACTIONS SECTION

Maureen M. Goodenow, Ph.D., Chief
www.niaid.nih.gov/research/maureen-goodenow-phd

MAUREEN M. GOODENOW, PH.D.

Chief, Molecular HIV Host Interactions Section
Director, NIH Office of AIDS Research
www.niaid.nih.gov/research/maureen-goodenow-phd
maureen.goodenow@nih.gov

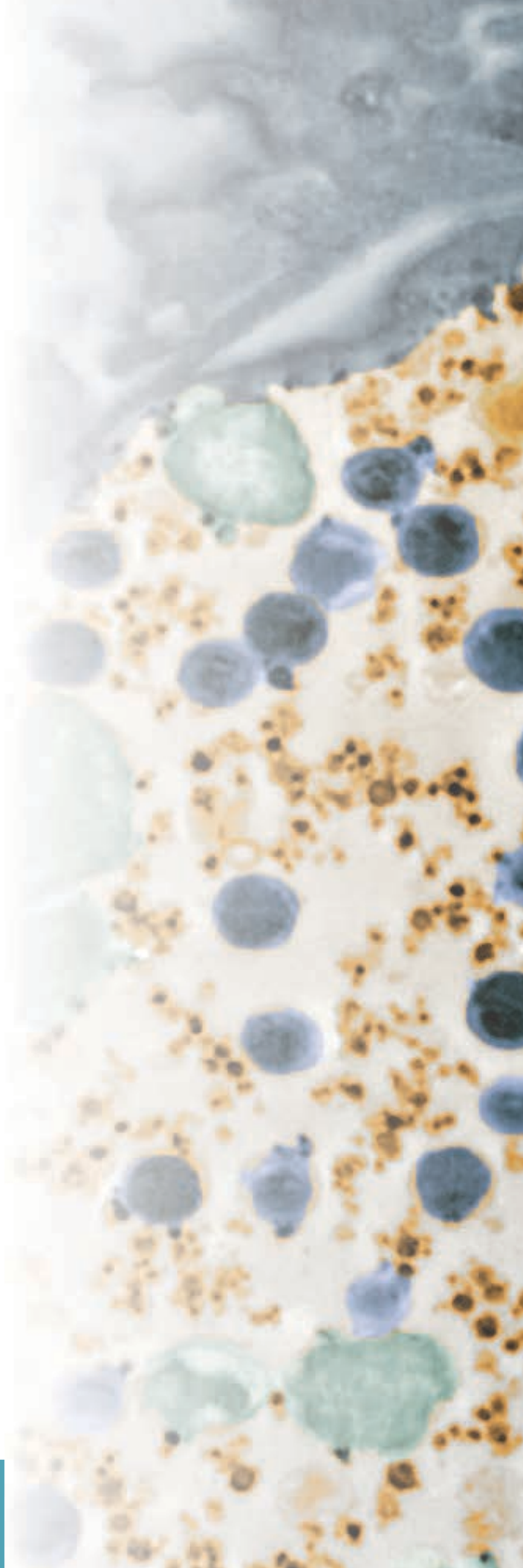
MAJOR AREAS OF RESEARCH

- Interactions between HIV-1 and host, in particular children, adolescents, and young adults, at the molecular level

BIOGRAPHY

Dr. Goodenow received her undergraduate degree in biology from Fordham University and her Ph.D. in molecular genetics from the Albert Einstein College of Medicine. She has served as the acting director of the Office for Research and Science in the U.S. Department of State, Office of the U.S. Global AIDS Coordinator, and Office of Global Health Diplomacy. Dr. Goodenow was the 2012 recipient of the prestigious Jefferson Science Fellowship at the State Department, where she served as senior science advisor in the Office of Economic Policy's Bureau of East Asian and Pacific Affairs.

Dr. Goodenow was appointed associate director for AIDS Research at NIH and director of the NIH Office of AIDS Research in 2016. She also is chief of the Molecular HIV Host Interactions Section. She has trained more than 50 doctoral and postdoctoral fellows, has published more than 100 articles and book chapters, and serves as a reviewer for more than 10 journals.



ACRONYMS

BSC:	Board of Scientific Counselors
CDC:	Centers for Disease Control and Prevention
CHI:	Trans-NIH Center for Human Immunology
CMB:	Comparative Medicine Branch
CR-LRP:	Clinical Research Loan Repayment Program
DIR:	NIAID Division of Intramural Research
ERAS:	Electronic Residency Application System
INRO:	Intramural NIAID Research Opportunities Program
IRTA:	Intramural Research Training Award
LAD:	Laboratory of Allergic Diseases
LB:	Laboartory of Bacteriology
LCIM:	Laboratory of Clinical Immunology and Microbiology
LID:	Laboratory of Infectious Diseases
LIG:	Laboratory of Immunogenetics
LIR:	Laboratory of Immunoregulation
LISB:	Laboratory of Immune System Biology
LMI:	Laboratory of Molecular Immunology
LMIV:	Laboratory of Malaria and Immunology and Vaccinology
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
NIAID:	National Institute of Allergy and Infectious Diseases
NIH:	National Institutes of Health
OTD:	Office of Training and Diversity
RML:	Rocky Mountain Laboratories
RMVB:	Rocky Mountain Veterinary Branch
RTB:	Research Technologies Branch
VP:	Visiting Program

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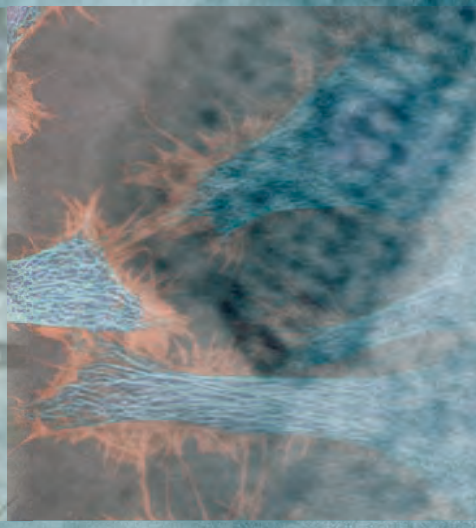

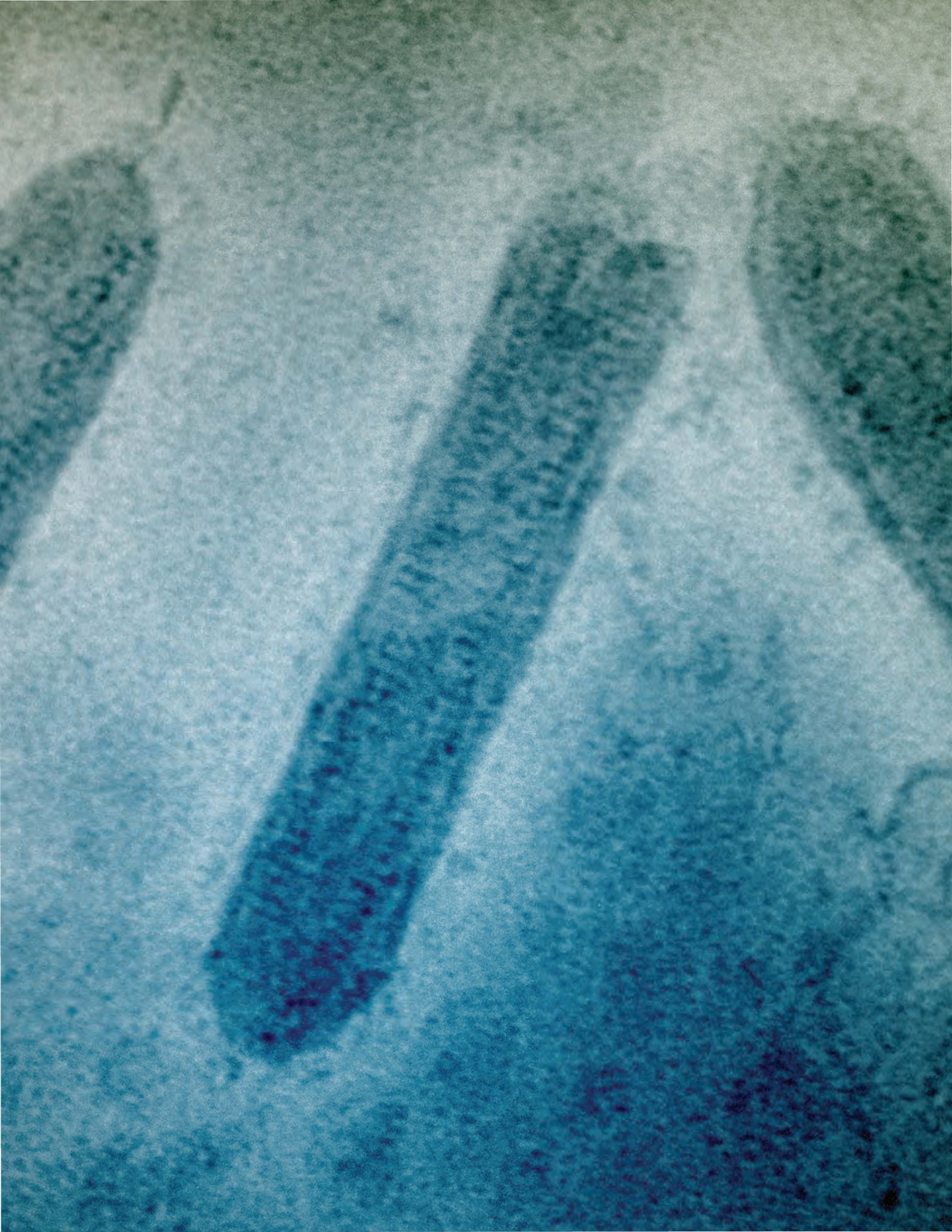

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