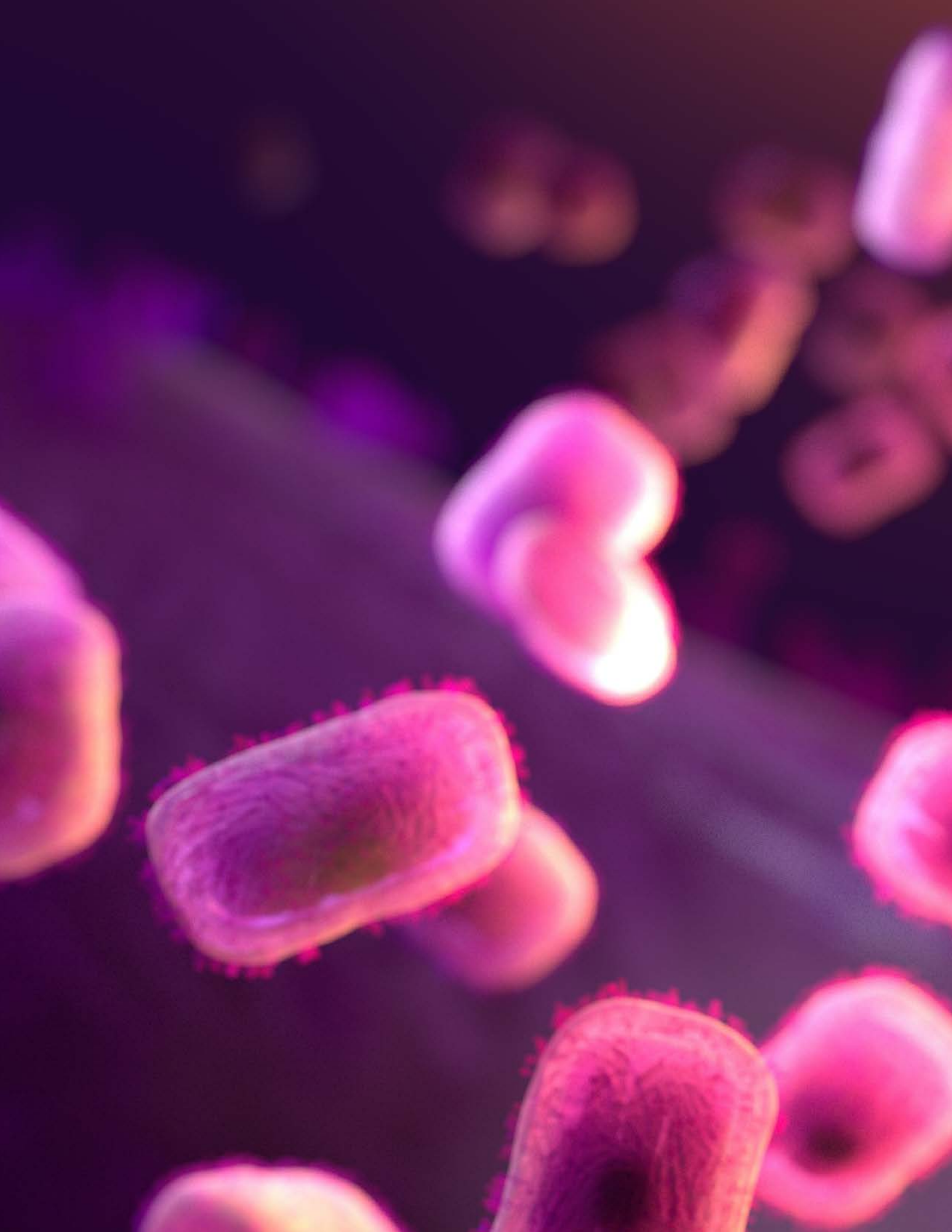
OPPORTUNITIES

Research and Training Programs for 2022-2023
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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CONTENTS

NIAID DIVISION OF INTRAMURAL RESEARCH
ORGANIZATIONAL CHART

OFFICE OF THE DIRECTOR, DIR

- Comparative Medicine Branch
- Research Technologies Branch
- Rocky Mountain Veterinary Branch
- Tuberculosis Imaging Program

- Office of Operations Management at RML
- Office of Scientific Management at RML
- Office of Research Training and Development

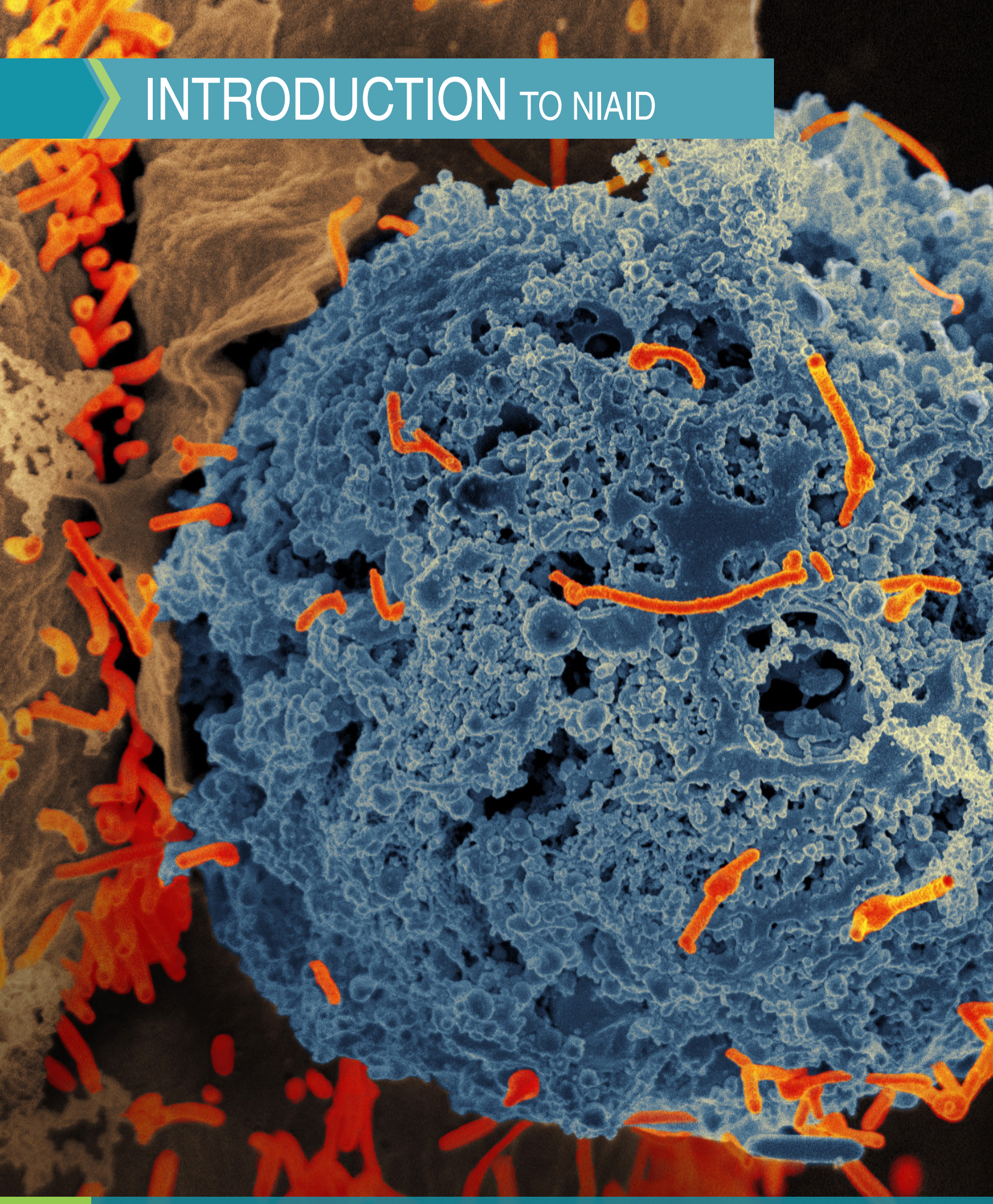
- Laboratory of Allergic Diseases
- Laboratory of Immune System Biology
- Laboratory of Malaria and Vector Research
- Laboratory of Parasitic Diseases

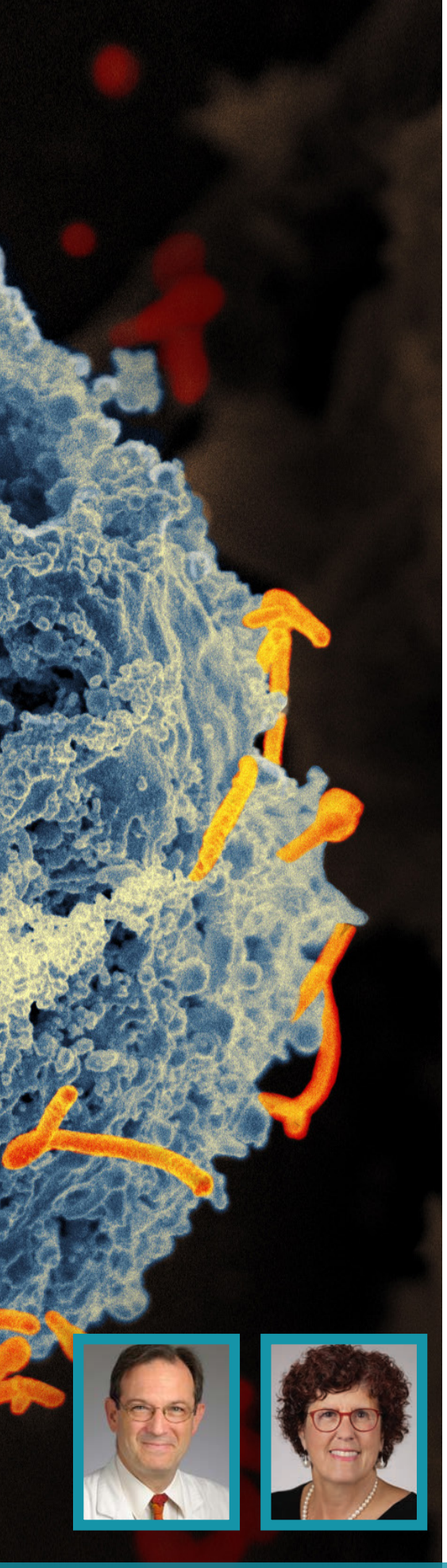
- Laboratory of Bacteriology
- Laboratory of Immunogenetics
- Laboratory of Malaria Immunology and Vaccinology
- Laboratory of Neurologic Infections and Immunology
- Molecular HIV Host Interactions Section

- Laboratory of Clinical Immunology and Microbiology
- Laboratory of Immunoregulation
- Laboratory of Molecular Immunology
- Laboratory of Viral Diseases

- Laboratory of Host Immunity and Microbiome
- Laboratory of Infectious Diseases
- Laboratory of Molecular Microbiology
- Laboratory of Virology

INTRODUCTION TO NIAID





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

For more than 65 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 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 to search out their interactions. We make game-changing discoveries as part of our mission to develop and improve diagnostics, drugs, therapies, 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, HIV, 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 $45 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 therapeutics, diagnostics, and vaccines that improve human health.

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 altered immune function (immunodeficiency, allergy, autoinflammation, and autoimmunity)
- Study the biology of infectious agents (viruses, bacteria, fungi, prions, 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 the causative agents and vectors and their pathogenesis in human and animal hosts. Clinical research is integral to the DIR mission, enabling key lab discoveries to be rapidly translated into methods to prevent, diagnose, or treat disease. DIR researchers currently conduct more than 180 clinical trials at the NIH Clinical Center on the Bethesda, Maryland, campus and at collaborating U.S. and international sites.

Unparalleled Opportunities

DIR is home to a vibrant research community of more than 130 principal investigators who lead research groups composed of scientists, physicians, fellows, technical personnel, nursing staff, and students. DIR 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, Engineering, 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. DIR also has a large research campus in Hamilton, Montana, known as the Rocky Mountain Laboratories (RML). RML has world-class programs in virology, emerging infections, and prion diseases and 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, 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 Mali, Liberia, Guinea, Uganda, the Republic of Congo, South Africa, 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 DIR scientists on multiple projects, including mosquito vectors, malaria drug resistance, malaria vaccines, and anti-malarial monoclonals; 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 Ebolavirus disease cases that occurred in Mali.

In Uganda, we have a state-of-the-art field laboratory in Kalisizo in southern Uganda, the Makerere University in Kampala, and the Uganda Virus Research Institute (UVRI) in Entebbe. NIAID scientists collaborate with local scientists on basic and clinical research on HIV and other sexually transmitted infections, including studies on viral pathogenesis, transmission kinetics, treatment, and prevention. In addition, the Laboratory of Virology, based at the NIAID Rocky Mountain Laboratories, is initiating a new collaboration on emerging pathogens together with colleagues at UVRI.

Researchers at the ICER site in Cambodia have pivoted the focus of research to dengue, disease discovery through metagenomics, and research on universal mosquito vaccination. The main laboratory is located just outside of Phnom Phenh, with clinical sites located in the Kampong Speu District.

Researchers at the ICER site in India, located at the National Institute for Research on Tuberculosis in Chennai, conduct collaborative studies on filariasis, including co-infection with tuberculosis, and the interaction between filarial infection and diabetes.

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

- Republic of the Congo—hemorrhagic fever viruses, including Ebolavirus
- South Africa—tuberculosis and HIV-positive to HIV-positive organ donation research
- China—tuberculosis
- Cameroon—filariasis (lymphatic filariasis, onchocerciasis, and loiasis)
- Ghana—Lassa, coronavirus infectious disease (COVID)-19
- Brazil—Dengue
- Philippines—COVID-19
- Jordan—Middle East respiratory syndrome-coronavirus (MERS-CoV)
- Thailand—anticytokine autoantibodies

The Edge of Scientific Discovery

We remain at the forefront of research on immunologic, allergic, and infectious diseases. DIR's pioneering work on the etiology, pathogenesis, and treatment of HIV/AIDS transformed the landscape of research on emerging infectious diseases. That expertise and strategy is brought to bear on other new and re-emerging diseases, such as SARS-CoV-2. DIR researchers spearheaded international collaboration to better understand immune system responses to COVID-19, the disease caused by SARS-CoV-2, including in people with immune deficits and children.

Recent advances build on a long history of discovery and innovation. DIR scientists discovered the bacterium that causes Lyme disease, 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.

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 our laboratories and outside of NIAID and NIH. Programs and networks formed in DIR include the following:

- The Center for Advanced Tissue Imaging, a joint effort with the NCI Center for Cancer Research, supports the application of evolving advanced imaging methods to multiplex, high-dimension tissue analysis.
- The Centralized Sequencing Program provides both human genome analysis and genetic counseling for every patient enrolled in NIAID clinical protocols. It addresses interrelated challenges in clinical care and DIR research including such issues as timely clinical diagnostics, data standards, and siloed datasets.
- Immune Response to COVID-19 is a large, international collaboration to unveil the innate and adaptive immune responses during acute COVID-19 infection and convalescence.
- 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 Microbiome Program explores metaorganisms using microbiome sequencing facilities, bioinformatics support, and a gnotobiotic mouse facility.
- The NIH Center for Human Immunology, Inflammation, and Autoimmunity (CHI) strives for an integrated and predictive understanding of human immunity and immune-microbiome behavior and function in health and disease. This is pursued through large scale human studies, scientific expertise, and technology applications not readily available in a single laboratory.
- The Program in Global Neglected Infectious Diseases promotes interactions among NIAID investigators on neglected tropical diseases (NTDs) and related infections.
- The Tuberculosis (TB) Imaging Program supports the NIAID DIR use of medical imaging including positron emission tomography (PET)/computed tomography (CT) and sophisticated, quantitative image analysis in preclinical models of TB and SARS-CoV-2. They also work closely with researchers in NIH intramural research programs to devise experiments for evaluating novel potential chemotherapeutics for TB or SARS-CoV-2 treatment, to evaluate potential vaccines for preventing clinical TB, and to support the expansion of investigations into basic immunology of *Mycobacterium tuberculosis* and SARS-CoV-2 infection.

DIR TRAINING PROGRAMS

NIAID OFFERS research training experiences in our laboratories in Maryland and in Hamilton, Montana, through the DIR Office of Research Training and Development (ORTD). 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, ORTD plans and conducts training initiatives and programs for Intramural Research Training Awardees (IRTAs) and visiting fellows (VFs). ORTD is the NIAID-specific training office, separate from the NIH Office of Intramural Training and Education (OITE), and provides individualized support and resources exclusively to NIAID fellows.

NIAID research trainees participate in ORTD-organized career development activities, such as the Annual Fellows Workshop, grant writing workshops, skill-building workshops, interview practice sessions, and more. ORTD'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 steps. 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.

ORTD 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 ORTD 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.

Postdoctoral Training

DIR has several options for those interested in postdoctoral laboratory research training. Postdoctoral fellows (postdocs) at NIAID engage in advanced research at the forefront of immunologic, allergic, and infectious diseases while gaining access to outstanding career and professional support. Postdocs conduct research in NIAID laboratories located in Maryland and Montana (Rocky Mountain Laboratories in Hamilton), providing a unique scientific research training environment in basic, translational, and clinical research. Upon completion, scientists progress to independent positions in academia, industry, government, and private organizations.

Eligibility varies, but all candidates must have a Ph.D., M.D., or other equivalent doctoral degree (earned within 5 years of fellowship start date). The two primary mechanisms for a postdoc fellowship are the IRTA and VF.

The first step in identifying a position is 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.

HOW TO APPLY

Submit an application through the NIAID Postdoc Application System**:** **postdoc.niaid.nih.gov**.

Visit **www.training.nih.gov/career_services/postdoc_jobs_nih**, search "NIAID," and apply for the program that interests you using the instructions provided on each individual posting.

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 dates 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.

Featured Postdoctoral Training Programs

www.niaid.nih.gov/about/postdoctoral-research-training

Predoctoral/Graduate School Training - Graduate Partnerships Program (GPP)

There are many ways for graduate school students and current graduate school applicants to conduct all or part of their thesis research in collaboration with NIH. The GPP has two avenues for forging an NIH collaboration: 1) Institutional partnerships, like the NIH Oxford-Cambridge Scholars Program, an accelerated, international doctoral program in partnership with the Universities of Oxford and Cambridge in the United Kingdom; 2) Individual partnerships/agreements, which allow students at any U.S. degree-granting institution to create a formal agreement with an NIH investigator to conduct a portion of their research in an NIH lab.

HOW TO APPLY

Application timelines and procedures vary based on institutional or individual agreement:

www.training.nih.gov/programs/gpp.

The NIH Oxford-Cambridge Scholars Program (NIH OxCam Program)

A highly individualized and accelerated doctoral training program for outstanding students committed to biomedical research careers. NIH OxCam students partner with two investigators—one at NIH and another at the University of Oxford or University of Cambridge in the United Kingdom—to perform a single, collaborative dissertation project.

HOW TO APPLY

Applications for the NIH OxCam Program are available online between August and December. Applicants must be a U.S. citizen or legal permanent resident and possess a bachelor's degree by the start of the program. Students selected for admission typically demonstrate a sincere passion for science through previous participation in summer, job-related, or undergraduate/post-baccalaureate research opportunities.

oxcam.gpp.nih.gov

Postbaccalaureate Intramural Research Training Award (IRTA)

Postbacs conduct research in NIAID laboratories located in Maryland and Montana (Rocky Mountain Laboratories in Hamilton), which provide unique scientific research training environments in basic, translational, and clinical research for recent college graduates who plan to apply to graduate or professional school (master's, Ph.D., M.D., or equivalent graduate degree). Postbacs spend one to two years performing full-time research under the guidance and direction of an NIAID principal investigator. Trainees have the opportunity to engage and network with experts in diverse scientific research fields while taking advantage of the extensive resources of NIH.

Eligible candidates must be a U.S. citizen or permanent resident, 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. Applicants may also qualify if accepted into a graduate, other doctoral, or medical school program and have written permission to delay entrance for up to one year.

HOW TO APPLY

Applications are accepted on a rolling basis and must be submitted to the OITE application portal: **www2.training.nih.gov/apps/publicforms/pbt/forms/login.aspx.**

For more information: **www.niaid.nih.gov/about/postbaccalaureate-research-training**

Intramural NIAID Research Opportunities (INRO)

Through INRO, ORTD sponsors postbac research trainees from U.S. populations underrepresented in the biomedical sciences and those dedicated to promoting diversity and inclusion, as defined by NIH's Interest in Diversity Notice: **grants.nih.gov/grants/guide/notice-files/NOT-OD-20-031.html.** Individuals from underrepresented populations and/or disadvantaged backgrounds are strongly encouraged to apply. Candidates must demonstrate a strong commitment to the promotion of diversity and inclusion in the biomedical sciences and be actively pursuing a postbac research training position in NIAID at the time of their INRO application.

If selected for INRO, finalists will have the opportunity to get to know the other finalists in their cohort and meet with prospective NIAID mentors during a two-day interview event in February, with the expectation that all finalists will join an NIAID laboratory and start their postbaccalaureate training in June of the participation year. The program also provides individual mentorship and other events to support an inclusive NIAID research community.

HOW TO APPLY

Applications open September 1 through November. Learn more about INRO by visiting **www.niaid.nih.gov/about/inro.**

NIH High School Summer Internship Program (HS-SIP)

Separate from the NIH SIP, current high school students may apply to the HS-SIP. This 8-week (minimum) program provides opportunities for high school students to conduct full-time research in an NIAID lab. HS-SIP is open to students who are high school juniors or seniors at the time of application and will be 17 years of age or older by June 15 of their internship year. Interns who will be 17 years of age on June 15 must live, at the time of application, within 40 miles of the NIH campus on which they will intern. This requirement does not apply to applicants who are 18 and older.

HOW TO APPLY

Applications are accepted from mid-November through February 1 and must be submitted to the OITE application portal:
www.training.nih.gov/programs/hs-sip

HS-SIP applicants are selected by central committees in the NIH Institutes and Centers (ICs). Care is taken to ensure that no high school summer intern works in the same IC as his/her parent or guardian. NIH investigators are no longer able to view high school applications or select their own high school interns. High school applicants should NOT contact NIH investigators directly.

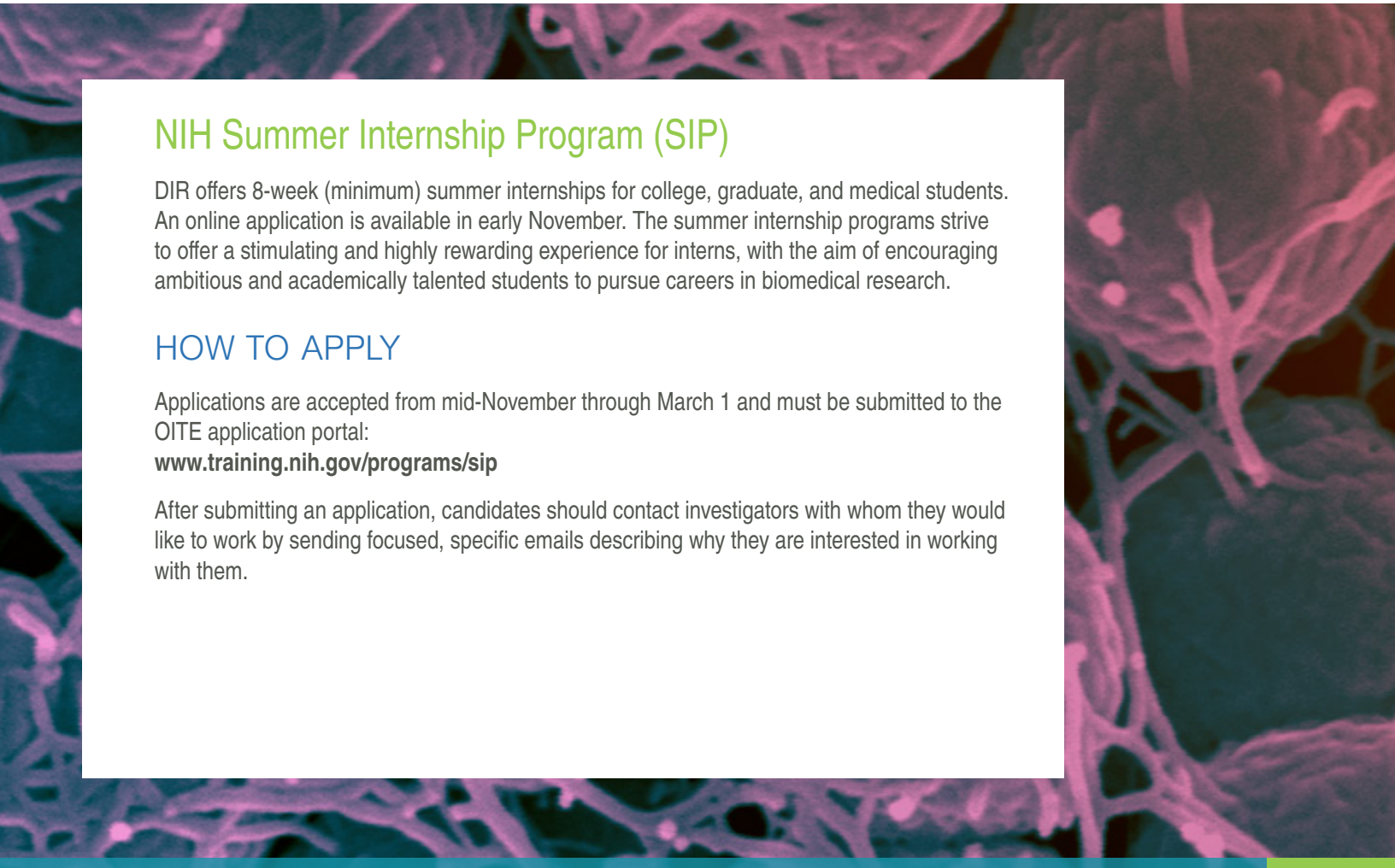
For more information on research training programs, contact the Office of Research Training & Development (ORTD)

NIAID Training Director: Katie Soucy, M.S.

NIAIDTraining@nih.gov

301-761-5673

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



NIH Summer Internship Program (SIP)

DIR offers 8-week (minimum) summer internships for college, graduate, and medical students. An online application is available in early November. The summer internship programs strive to offer a stimulating and highly rewarding experience for interns, with the aim of encouraging ambitious and academically talented students to pursue careers in biomedical research.

HOW TO APPLY

Applications are accepted from mid-November through March 1 and must be submitted to the OITE application portal:
www.training.nih.gov/programs/sip

After submitting an application, candidates should contact investigators with whom they would like to work by sending focused, specific emails describing why they are interested in working with them.

CLINICAL TRAINING OPPORTUNITIES

NIH IS HOME to the world's largest clinical research hospital—the NIH Clinical Center—offering unparalleled resources and opportunities to conduct clinical studies. There are multiple avenues for rising physicians to benefit from NIAID clinical resources and training – four featured programs are highlighted in this section and more information is available at **www.niaid.nih.gov/about/clinical-research-training.**

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. Positions in this program are fully funded for 4 years to ensure adequate time for the fellow to develop their basic or clinical research portfolio.

The program accepts applications from residents in internal medicine or pediatrics who have completed training in the United States or Canada.

Applications for the program are made through the Electronic Residency Application Service (ERAS), and the program participates in the National Residency 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 (CNMC), George Washington University (GWU), and Johns Hopkins Hospital.
- Participate in bi-weekly or monthly allergy continuity clinics during their second year of training in addition to a monthly primary immunodeficiency clinic.
- Provide allergy and immunology consultation at the NIH Clinical Center as well as during rotations at GWU and CNMC.
- Attend the core basic and clinical immunology conferences, case conferences, and journal clubs of the training program.
- Take American Board of Allergy and Immunology certification preparatory course.

HOW TO APPLY

Applicants to the Allergy and Immunology Training Program should follow the instructions in ERAS at **www.aamc.org/students/medstudents/eras.**

- A personal statement describing 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

Candidates should apply for the program 12 months prior to entry in July. The application deadline in ERAS is mid-September. Applicants must be on track to complete an Accreditation Council for Graduate Medical Education (ACGME)-approved residency in internal medicine and/or pediatrics at the time they enter the program. Interviews are held between September and October.

Candidates are selected for interviews after a holistic review of their application as well as review of their clinical and/or research credentials and research interests. Interviews are designed to introduce potential trainees to the broad range of research possibilities at NIH in addition to showcasing the clinical experience. Interviews will be conducted virtually for the 2022–23 cycle.

Visit **www.niaid.nih.gov/about/allergy-and-immunology-training-program** for more information.

Infectious Diseases Fellowship Program

The Infectious Diseases Fellowship Program accepts applications from residents in either internal medicine or a combined medicine-pediatrics residency who have completed training in the United States or Canada.

Three years of residency training are required. Applicants who wish to pursue the American Board of Internal Medicine (ABIM) Research Pathway, and who have the approval of the director of their respective 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. Experiences in the first year include both inpatient and outpatient infectious diseases rotations. Fellows receive training in hospital epidemiology and diagnostic microbiology.

Fellows attend a weekly continuity clinic and participate in teaching conferences during the first two years of the training program. Fellows take the Infectious Diseases Society of America (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). Positions in this program are fully funded for 4 years to ensure adequate time for the fellow to develop their basic or clinical research portfolio.

HOW TO APPLY

Applicants to the Infectious Diseases Fellowship Program are only accepted through the Electronic Residency Application Service (ERAS) at **www.aamc.org/students/medstudents/eras.**

The program participates in the National Residency Matching Program. Interviews are held from September to October prior to the fellowship match.

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.

Transplant Infectious Disease Fellowship

This fellowship program is run jointly between NIH and Johns Hopkins University for a total of 13 months. This program is only for graduates of an ACGME infectious diseases fellowship who will be eligible to take the ABIM subspecialty examination in Infectious Diseases. Applications are taken directly through the Division of Intramural Research.

HOW TO APPLY

Applicants can submit their application packet, including letter of interest, three letters of reference, and curriculum vitae, to the Infectious Diseases Program Director. Admissions are on a rolling basis.

Visit **www.niaid.nih.gov/about/infectious-diseases-fellowship-program** for more information on either infectious disease program.

Program Coordinator
Infectious Diseases Fellowship Program
10 Center Drive, Room 12C103, MSC 1899
Bethesda, MD 20892-1899
301-761-6720/301-480-0050 (fax)

NIAID Transition Program in Clinical Research

The NIAID Transition Program in Clinical Research provides opportunities for physicians to gain mentored 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.

HOW TO APPLY

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 $50,000 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. The U.S. Department of Health and Human Services (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 HHS under the Scholarship for Individuals with Exceptional Financial Need

ACGME Fellows Loan Repayment Program

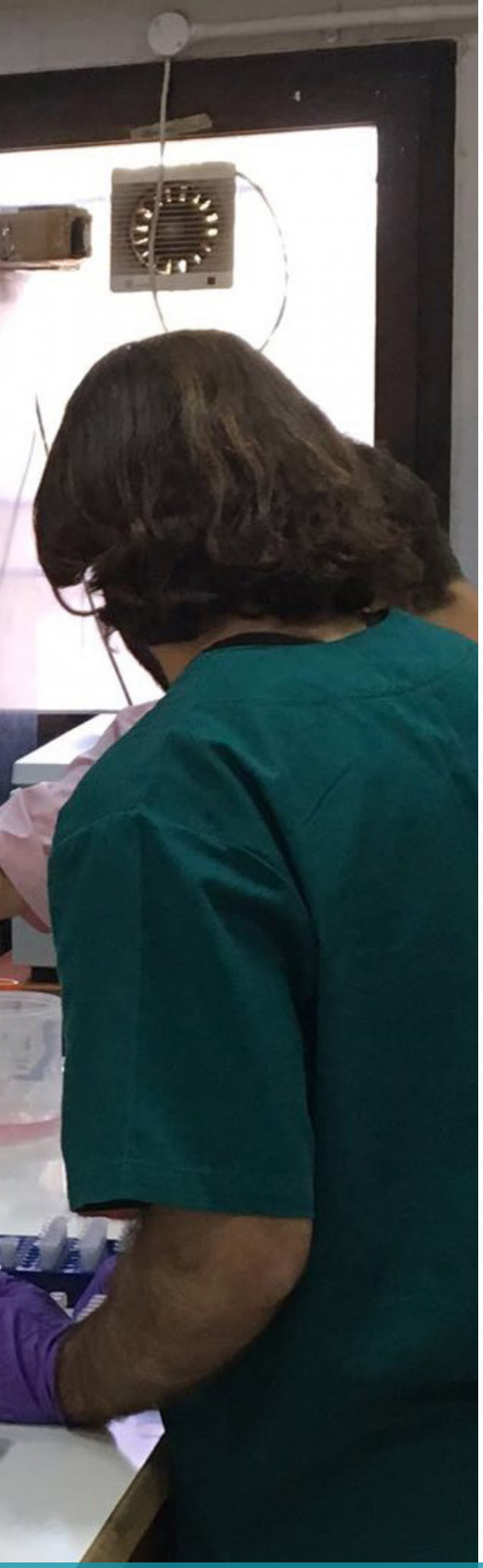
NIH offers student loan repayment benefits to qualified candidates who join one of its Accreditation Council for Graduate Medical Education (ACGME)-accredited residency or fellowship training programs through the General Research ILRP. The ACGME Loan Repayment Program (ACGME-LRP) can repay a maximum of $20,000 of eligible student loans for each year of the three-year fellowship program (maximum guarantee of $60,000). 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, the AIDS Research ILRP, or CR-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% 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



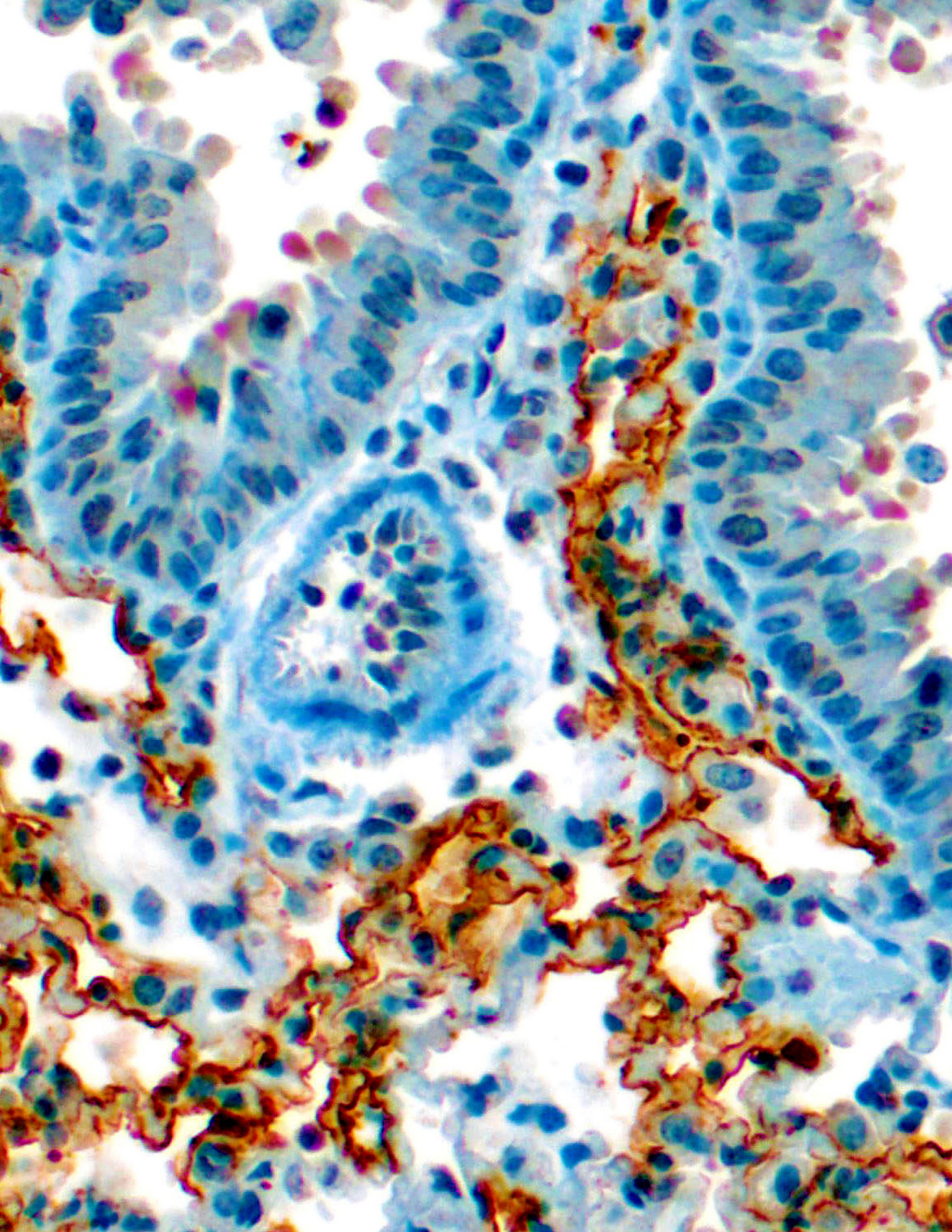
THE PRIMARY purpose of an NIH fellowship is to provide time-limited research training, clinical training, and/or career development opportunities to postdoctoral scientists. At the end of the training period, the majority of fellows will leave NIH to pursue careers at institutions in the United States 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.

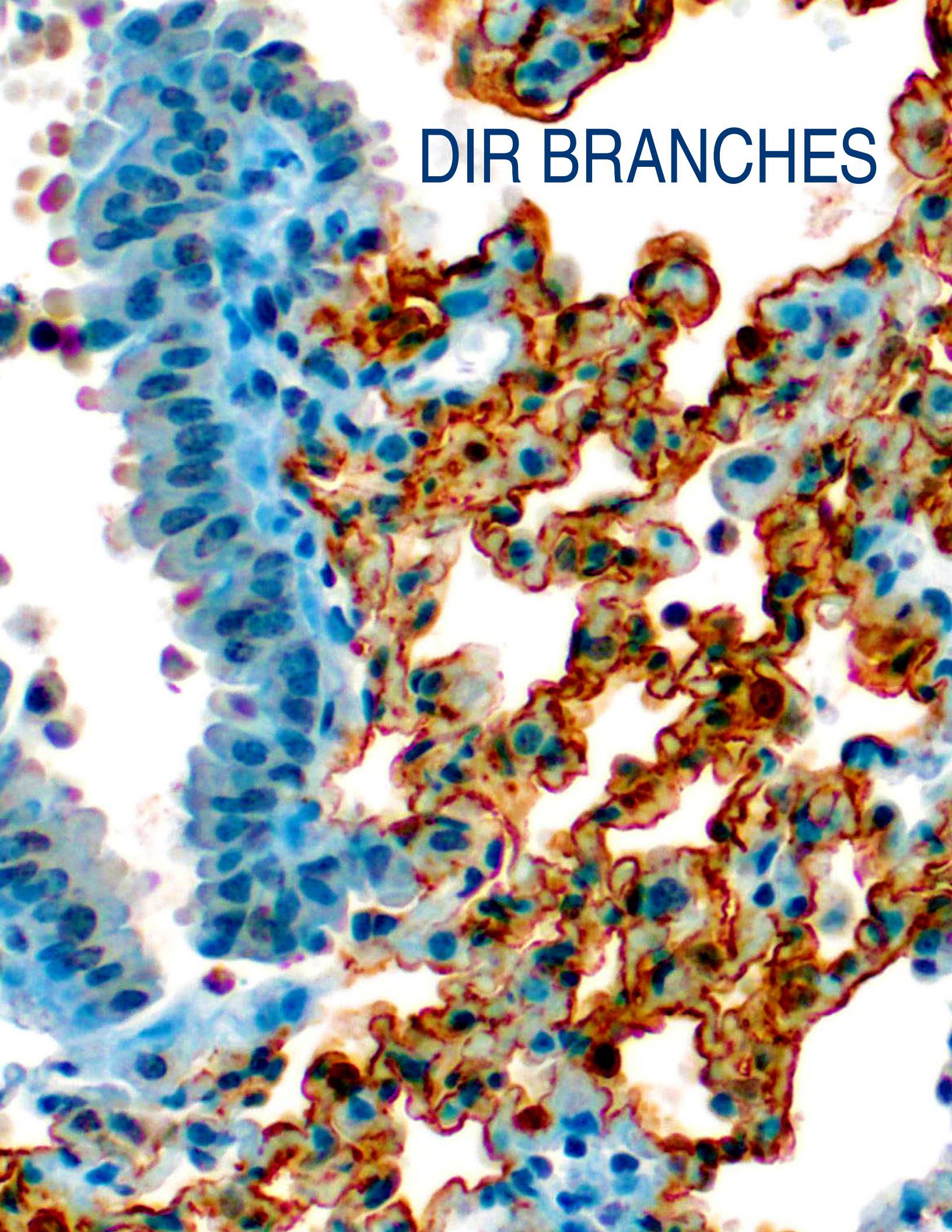
Tenure at NIAID consists of a permanent position and a long-term commitment of salary, personnel, and the research resources needed to conduct an independent research program within the scope of the NIAID mission. Scientists at NIAID obtain tenure in one of two ways: 1) The scientist is recruited from 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.

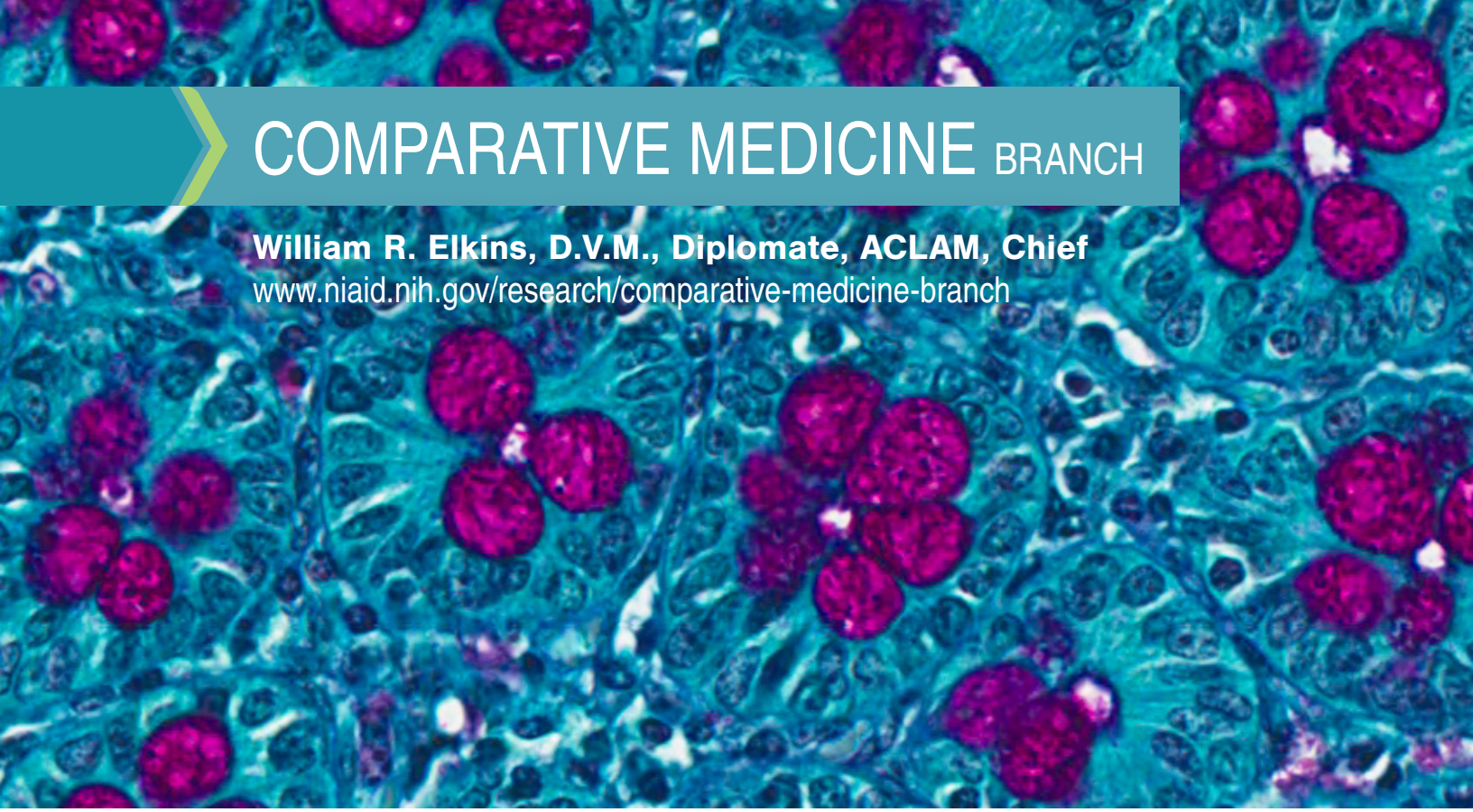
Following nationwide recruitment efforts, candidates for tenured and tenure-track positions are selected by a search committee and a recommending official and approved by the NIH Deputy Director for Intramural Research. While traditional tenured and tenure-track positions are created by the hiring laboratory, the NIH's Lasker Clinical Research Scholars Program conducts annual searches for outstanding clinical researchers. Selected clinical tenure-track candidates are then matched to an NIAID laboratory.

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 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.




DIR BRANCHES



COMPARATIVE MEDICINE BRANCH

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

USE OF ANIMALS in biomedical research is essential for the improvement of methods of prevention, diagnosis, and treatment across a wide spectrum of disease threats. Through the advancement of clinical and surgical procedures as well as the scientific understanding of complex and pathologic disease mechanisms, human lives are saved, and human suffering is lessened. The mission of the Comparative Medicine Branch (CMB) is to provide the animals in NIAID facilities with a comfortable, stable environment in accordance with federal laws and regulations that eliminates research variables; reduce pain and stress of all animals in care through high-quality husbandry practices and clinical care; and serve as a resource for DIR investigators. Therefore, CMB is intricately entwined in the NIAID mission.

CMB is composed of eight animal facilities and is responsible for animal care and research support of animal activities conducted by NIAID investigators. Animal use ranges from basic research support to preclinical 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 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
- Creating genetically modified transgenic animals and CRISPR-mediated gene-edited animal models
- Generating and culturing embryonic stem cells and induced pluripotent stem cells from different species
- 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.

MAJOR 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

WILLIAM R. ELKINS, D.V.M., DIPLOMATE, ACLAM

Chief, Comparative Medicine Branch
Associate Director, Laboratory Animal Resources
Director, Animal Program, Division of Intramural Research
www.niaid.nih.gov/research/william-r-elkins-dvm-diplomate-aclam
relkins@niaid.nih.gov

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

RICHARD HERBERT, D.V.M.

Chief, Experimental Primate Virology Unit, CMB
Associate Animal Program Director
www.niaid.nih.gov/research/richard-herbert-dvm
herbertr@mail.nih.gov

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, laparoscopy, endoscopy, digital radiography, and ultrasound for NIAID investigators requiring ante-mortem sample collection.

INFECTIOUS DISEASE PATHOGENESIS SECTION

DERRON A. ALVES, D.V.M., DIPLOMATE, ACVP

Chief, Infectious Disease Pathogenesis Section, CMB
www.niaid.nih.gov/research/derron-alves-dvm-diplomate-acvp
derron.alves@nih.gov

The Infectious Disease Pathogenesis Section (IDPS), using a collaborative and integrative One-Health approach, directly supports NIAID investigators, programs, and collaborators through the incorporation of pathology-based, animal model development and use, and institutional animal care and use committee-approved research to facilitate and improve diagnoses, treatments, preventions, and medical countermeasures of infectious diseases in humans. The IDPS conducts comprehensive postmortem examination (i.e., necropsy) and tissue collection training on laboratory animal species and provides complete microscopic tissue evaluation using a wide array of diagnostic, molecular, and special studies to support spontaneous and experimental disease pathogenesis research primarily involving significant and/or emerging public health threats. Equipped with and working alongside other core services, our board-certified veterinary pathologist(s) and highly specialized technical team is committed to providing concise and dependable results to collaborating researchers as well as publication-worthy summary findings (including photomicrographs) to advance the NIAID mission.

MOUSE GENETICS AND GENE MODIFICATION UNIT

JASPAL S. KHILLAN, PH.D.

Chief, Mouse Genetics and Gene Modification Section, CMB
www.niaid.nih.gov/research/jaspal-s-khillan-phd
jaspal.khillan@nih.gov

The Mouse Genetics and Gene Modification (MGGM) Section provides advice for design, services, and training in state-of-the-art technologies for ***in vivo*** functional genomics using embryos, embryonic stem cells, induced pluripotent stem cells and somatic cells. MGGM also provides services for cryopreservation of germplasm for long-term storage and rederivation of lines from in-house cryopreserved and imported embryos and sperm.

RESEARCH TECHNOLOGIES BRANCH

James M. Cherry, Ph.D., Chief
www.niaid.nih.gov/research/research-technologies-branch

THE RESEARCH

Technologies Branch (RTB) was established to provide researchers access to leading-edge technologies and specialized expertise through a tightly integrated, highly effective approach to study complex biological problems. Advances in optics, lasers, and computational biology have revolutionized well-established disciplines such as microscopy (light and electron), flow cytometry, genomics, and proteomics. These technologies require integration and more importantly highly trained specialized scientists to adapt these new technologies to the research needs of the Institute's diverse research agenda. RTB implements state-of-the-art research technologies and project-specific applications for the NIAID intramural research program in collaboration with current researchers along with a network of facilities located in Bethesda and Rockville, Maryland, as well as Hamilton, Montana. RTB sections and technological resources include biological imaging, protein chemistry, electron microscopy, structural biology, flow cytometry, visual and medical arts, genetics and genomics, and integrated data science. By developing a collaborative relationship with NIAID investigators, the RTB provides customized resources that meet the specific research needs of each NIAID investigator that uses resources throughout the branch as required by the scientific research scope.

MAJOR AREAS OF SUPPORT

- Biological Imaging
- Electron Microscopy
- Flow Cytometry
- Genomics Research
- Integrated Data Sciences
- Protein Chemistry
- Structural Biology
- Visual and Medical Arts

JAMES M. CHERRY, PH.D.

Associate Director, Research Technologies, DIR, NIAID
Chief, Research Technologies Branch
www.niaid.nih.gov/research/james-m-cherry-phd
jim.cherry@nih.gov

BIOGRAPHY

Dr. Jim Cherry obtained his Ph.D. from the Catholic University of America in molecular biology with a concentration in biomedical science. He earned an M.S. from Johns Hopkins University in molecular biology with a concentration in biotechnology. His Bachelor's degree is from Shepherd University with a major in biology and minor in chemistry.

MAJOR AREAS OF RESEARCH

- Monitors new developments in the biotechnology industry
- Translates new technology applications into useful applications for biomedical research
- Develops project-specific applications using state-of-the-art technologies
- Technology Transfer and consultation
- Offers formal and informal training, support, and troubleshooting
- Evaluates new technologies applications
- Established a new bioinformatics application that fully support investigators' computational scientific needs

INTEGRATED DATA SCIENCES

JACK COLLINS, PH.D.

Director, Integrated Data Sciences Section
www.niaid.nih.gov/research/research-technologies-branch-integrated-data-sciences
collinja@mail.nih.gov

The Integrated Data Sciences Section (IDSS) provides scientific consultation, training and workshops, computational and data science support and collaborates on technology development projects. IDSS works with RTB technologies to develop a fully integrated resource for NIAID investigators that includes experimental design support through final data analysis and manuscript preparation. IDSS pipelines and software are available for use by NIAID investigators and staff along with focused workshops and training.

MAJOR AREAS OF SUPPORT

- Genomics
- Proteomics
- Biostatistics
- Structural biology
- Image analysis and visualization (including 3D models and reconstructions)
- Machine learning and artificial intelligence
- Molecular modeling and simulation

BIOLOGICAL IMAGING

OWEN M. SCHWARTZ, PH.D.

Chief, Biological Imaging Section, RTB
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oschwartz@mail.nih.gov

The Biological Imaging Section (BIS) offers a wide range of advanced equipment for microscopic examination of samples. In addition to instrumentation, the facility offers advice on experimental design, instrument configuration, and optimal image collection. Information and assistance in post-collection data analysis such as quantification, colocalization, counting of objects, rates of movement, particle tracking, surface reconstruction, and segmentation, also are provided.

MAJOR AREAS OF SUPPORT

- Confocal microscopy
- Intravital imaging
- Fluorescence lifetime imaging
- Post-collection image quantification and deconvolution
- Scientific poster printing

ELECTRON MICROSCOPY

ELIZABETH FISCHER, M.A.

Chief, RML Microscopy Unit, RTB
www.niaid.nih.gov/research/research-technologies-branch-electron-microscopy
efischer@niaid.nih.gov

The Microscopy Unit provides expertise in both light and electron microscopy-related techniques and technologies to support the structural imaging needs of DIR scientists both in Maryland and at RML. The facility provides sample preparation, imaging, and analysis ranging from basic structural studies and immune localization of selected antigens to high resolution and three-dimensional analyses for a wide array of specimens. Recent addition of a focused ion beam scanning electron microscope (FIB-SEM), light microscopes (LM), and digital spatial profiling system, as well as expansion of the cryo-EM technologies both at the Bethesda and RML campuses, provide greater access for DIR scientists to advanced imaging and spatial profiling technologies.

MAJOR AREAS OF SUPPORT

- Light microscopy-related techniques
- Electron microscopy-related techniques
- Digital spatial profiling
- 3D tomography

FLOW CYTOMETRY

IYADH DOUAGI, PH.D.

Chief, Flow Cytometry Section, RTB
www.niaid.nih.gov/research/research-technologies-branch-flow-cytometry
iyadh.douagi@nih.gov

The Research Technologies Branch (RTB) offers NIAID researchers at the National Institutes of Health (NIH) campus in Bethesda, Maryland and at the Rocky Mountain Laboratories (RML) in Hamilton, Montana access to a variety of flow cytometry collaborative technologies to support their research.

MAJOR AREAS OF SUPPORT

- Cell analysis and cell sorting including RG2, RG3 & RG4 agents
- Single cell sorting and cloning
- Ultra-deep immunophenotyping (30+ parameters)
- Spectral flow cytometry
- Imaging flow cytometry
- Custom antibodies services
- Consultation & training

GENOMICS RESEARCH

CRAIG MARTENS, PH.D.

Chief, Genomics Research Section, RTB
www.niaid.nih.gov/research/research-technologies-branch-genomics-research
martensc@mail.nih.gov

Located at Rocky Mountain Laboratories (RML) in Hamilton, Montana and the NIH main campus in Bethesda, Maryland, the Research Technologies Branch (RTB) Genomics Research Section (GRS) enables intramural NIAID investigators to use state-of-the-art applications in gene expression and sequencing technologies in their research programs. Our staff provides expertise, instrumentation, and data analysis and interpretation.

MAJOR AREAS OF SUPPORT

- Next-generation DNA/RNA sequencing
- Single cell RNA processing and analysis
- Spatial genomics
- Long read DNA sequencing
- High-throughput TaqMan (RT-qPCR) analysis
- Primary bioinformatics

PROTEIN CHEMISTRY

L. RENEE OLANO, PH.D.

Chief, Protein Chemistry Section, RTB
www.niaid.nih.gov/research/research-technologies-branch-protein-chemistry
olanol@mail.nih.gov

The Research Technologies Branch (RTB) Protein Chemistry Section (PCS) enables intramural NIAID investigators to use state-of-the-art applications in mass spectrometry, assay development and protein characterization.

MAJOR AREAS OF SUPPORT

- Analytical mass spectrometry (MS)
- Protein identification, separation, and kinetics
- Assay development
- Proteomics
- Edman (N-terminal) protein sequencing
- Biotyping microbial identification
- Biomolecular assembly characterization
- Bioinformatics

STRUCTURAL BIOLOGY

DAVID GARBOCZI, PH.D.

Chief, Structural Biology Section, RTB
www.niaid.nih.gov/research/research-technologies-branch-structural-biology
dgarboczi@niaid.nih.gov

The Structural Biology Section (SBS) provides specialized techniques and scientific expertise that enables DIR scientists to obtain biophysical and structural data for macromolecules. While closely collaborating with DIR researchers, the SBS provides consulting/training, produces pure proteins, performs biophysical analyses, and determines structures of proteins and other macromolecules that are central to the infectious disease and immunology research programs of DIR.

MAJOR AREAS OF SUPPORT

- Protein expression expertise
- Light scattering and isothermal titration calorimetry
- Bio-layer interferometry
- X-ray crystallography
- Training

VISUAL AND MEDICAL ARTS

ANITA MORA

Team Lead, Visual and Medical Arts Unit, RTB
www.niaid.nih.gov/research/research-technologies-branch-visual-and-medical-arts
amora@niaid.nih.gov

The Visual and Medical Arts Unit (VMA) at Rocky Mountain Laboratories enables investigators to communicate biomedical research to both the scientific community and the general public. VMA creates clear and captivating visualizations that are scientifically accurate and that effectively communicate to a broad audience.

MAJOR AREAS OF SUPPORT

- Biomedical communication
- Medical and scientific illustration
- Animation
- Photography
- Scientific media

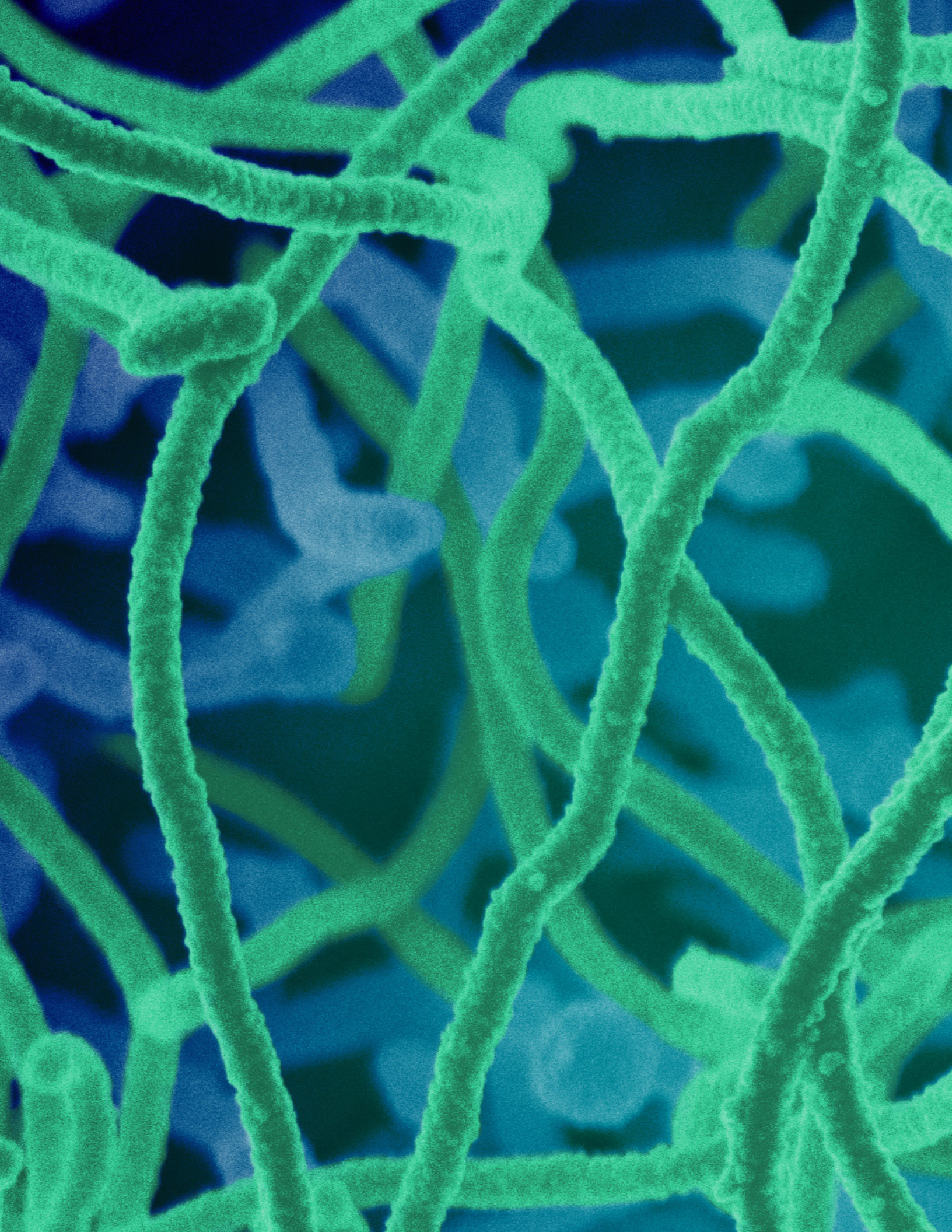
ROCKY MOUNTAIN VETERINARY BRANCH

Patrick W. Hanley, D.V.M., Diplomate, ACLAM, Acting Chief
patrick.hanley@nih.gov

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 and therapeutic development; increasing the efficiency and safety of animal research in animal biosafety level (ABSL)-2 to -4 laboratories; and evaluating new caging systems for high-containment research. Within the Rocky Mountain Veterinary Branch, there are two main support groups (Biocontainment Support Services and Veterinary Pathology Section).

MAJOR AREAS OF SUPPORT

- ABSL-2 to -4 pathogen animal models and molecular reagents
- Testing novel vaccine candidates for ABSL-3 and ABSL-4 select agents
- Clinical veterinary 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



DIR LABORATORIES & INDEPENDENT SECTIONS

LABORATORY OF ALLERGIC DISEASES

Pamela A. Guerrerio, M.D., Ph.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 understanding the genetics and pathology underlying the immune dysfunction associated with allergic inflammation.

RESEARCH OBJECTIVES

- Investigate the genetics associated with atopy
- 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
- Identify novel immunomodulatory and anti-inflammatory approaches to the treatment of allergic and immunologic disorders

SECTIONS AND UNITS

Allergy and Immunology Fellowship Training Program
Paneez Khoury, M.D., M.H.Sc., FAAAAI, Director

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

Lung and Vascular Inflammation Section
Kirk Druey, M.D.

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

Translational Allergic Immunopathology Unit
Jonathan J. Lyons, M.D.

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

Chief, Laboratory of Allergic Diseases
Chief, Food Allergy Research Section, 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
- Development of novel therapies for food allergy
- Investigation of the cellular, immunologic, and biochemical pathways critical in the development of tolerance to food antigens using human and murine models

BIOGRAPHY

Dr. Guerrerio graduated with a B.S. degree in biology from the University of Iowa and entered the Medical Scientist Training Program at 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 Hospital. Dr. Guerrerio joined NIAID in 2014 and is currently a senior investigator, chief of the Laboratory of Allergic Diseases, and chief of the Food Allergy Research Section. Dr. Guerrerio has received a number of awards for her research, including the ARTrust Faculty Development Award from the American Academy of Asthma, Allergy & Immunology and the Presidential Early Career Award for Scientists and Engineers (PECASE).

KIRK DRUEY, M.D.

Chief, Lung and Vascular Inflammation Section, LAD
www.niaid.nih.gov/research/kirk-m-druey-md
kdruey@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Clarkson disease (monoclonal gammopathy-associated systemic capillary leak syndrome)
- Fungal-associated asthma
- Signal mechanisms of G protein-coupled receptors

BIOGRAPHY

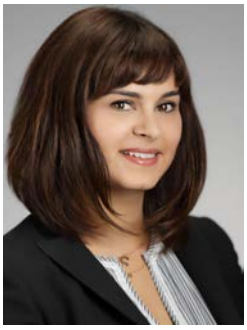
Dr. Druey obtained his M.D. from Rush Medical College in Chicago, Illinois. In 1992, following a residency in internal medicine at The New York Hospital/Cornell Medical Center, Dr. Druey became a postdoctoral fellow in the NIAID Laboratory of Immunoregulation. He joined the Laboratory of Allergic Diseases in 1997 to become chief of the Molecular Signal Transduction Section. In 2020, the section was renamed the Lung and Vascular Inflammation Section.

PANEEZ KHOURY, M.D., M.H.SC., FAAAAI

Director, Allergy & Immunology Fellowship Training Program, LAD
Chief, Eosinophil Clinical Research Unit, Human Eosinophil Section, LPD
www.niaid.nih.gov/research/paneez-khoury-md-mhsc
paneez.khoury@nih.gov

MAJOR AREAS OF RESEARCH

- Clinical trials and studies in eosinophilic disorders
- Patient-centered clinical research in eosinophilic disorders
- Disparities education and education methods in allergy & immunology



BIOGRAPHY

Paneez Khoury, M.D., is a senior clinician. She joined the Human Eosinophil Section in 2012, where she is head of the Eosinophil Clinical Research Unit. She received her M.D. from University of Illinois College of Medicine in Chicago, followed by an internal medicine residency at Ohio State University and a fellowship in allergy and clinical immunology at NIH. She also holds a Master of Health Sciences from Duke University, is board certified in internal medicine and allergy/immunology and is a fellow of the American Academy of Allergy, Asthma, and Immunology (AAAAI). She sits on the graduate medical education committee, including the policy subcommittee, and is a member of the staff clinician council.

JONATHAN J. 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

- Characterize inherited or acquired genetic variants leading to severe allergic inflammation and reactions in order to dissect their pathogenesis
- Define immunogenetic and metabolic mechanisms regulating myeloid cell proliferation and reactivity in allergic diseases
- Develop novel targeted therapeutic approaches for individuals with severe allergic inflammation and reactivity

BIOGRAPHY

Dr. Lyons graduated with a B.A. in chemistry from Pomona College in 2003 and an M.D. from the University of Southern California in 2007. He completed residency training in internal medicine at the University of California, San Diego. In 2014, he came to NIAID as a clinical fellow in allergy and immunology. He was selected for the NIAID Transition Program in Clinical Research and served as an assistant clinical investigator until 2018. Since then, Dr. Lyons has served as chief of the Translational Allergic Immunopathology Unit. His many awards include the AAAAI Foundation / The Mastocytosis Society Research Award in Mastocytosis and/or Mast Cell Activation Syndrome (2015), NIAID Merit Award (2016, -17, -20), Lasker Scholar (2018), the Young Physician-Scientist Award from the American Society for Clinical Investigation (2020), and the Innovation in Research Award by The Mast Cell Disease Society (2021).

DEAN D. METCALFE, M.D., M.S.

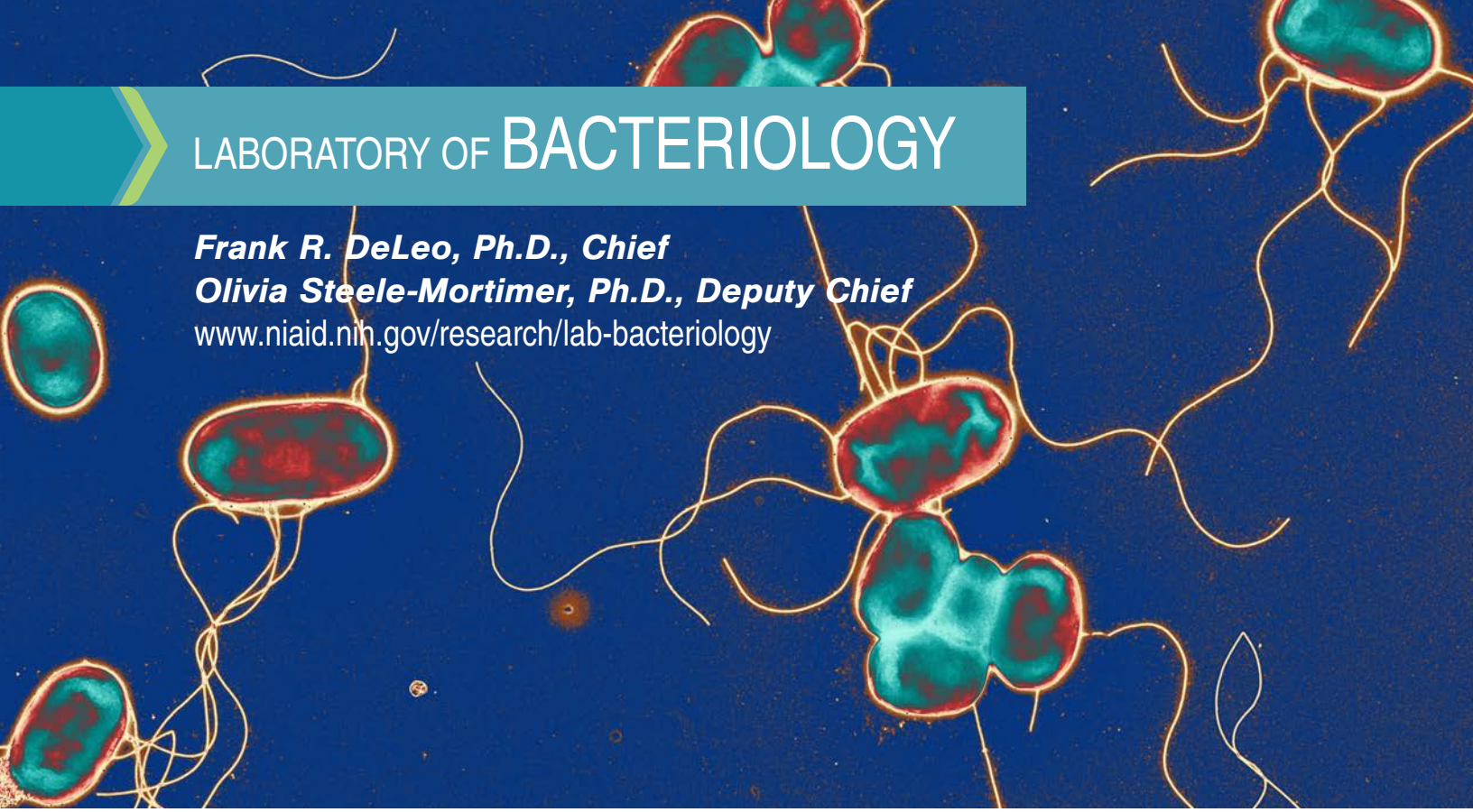
Chief, Mast Cell Biology Section, LAD
www.niaid.nih.gov/research/dean-d-metcalfe-md
dmetcalfe@niaid.nih.gov

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 allergic and immunologic diseases and clonal mast cell disorders

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 (LAD) at NIAID, a position he continued for 22 years until stepping down in 2017. 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.



LABORATORY OF BACTERIOLOGY

Frank R. DeLeo, Ph.D., Chief
Olivia Steele-Mortimer, Ph.D., Deputy 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 intracellular and arthropod-borne bacterial pathogens. In addition, LB conducts research with antibiotic-resistant bacteria listed as serious or urgent threats in the National Action Plan for Combating Antibiotic-Resistant Bacteria. 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 infrastructure to permit analysis of emerging bacterial pathogens and/or those of special interest.

SECTIONS AND UNITS

Bacterial Physiology and Metabolism Unit
Ashley Groshong, Ph.D.

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

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

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

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

Pathogen Molecular Genetics Section
Michael Otto, Ph.D.

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

Tick-Pathogen Transmission Unit
Lucas Tirloni, Ph.D.

Vector-Pathogen-Host Interaction Unit
Tais B. Saito, D.V.M, M.S., Ph.D.

FRANK R. DELEO, PH.D.

Chief, Laboratory of Bacteriology
Chief, Pathogen-Host Cell Biology Section, LB
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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 as a tenure-track investigator. He served previously as acting chief (2007 – 2013) and chief (2013 – 2015) of the Laboratory of Human Bacterial Pathogenesis. Dr. DeLeo was appointed to the NIH Senior Biomedical Research Service (2011 – 2017) and elected as an American Academy of Microbiology Fellow in 2017. He is currently chief of the Laboratory of Bacteriology. He serves on the editorial boards of ***Infection and Immunity*** and ***Journal of Innate Immunity***.

OLIVIA STEELE-MORTIMER, PH.D.

Deputy Chief, Laboratory of Bacteriology
Chief, Salmonella*-Host Cell Interactions Section, LB*
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MAJOR AREAS OF RESEARCH

- Interaction of *Salmonella typhimurium* with epithelial cells
- *Salmonella typhimurium* and the blood brain barrier
- Developing attenuated *S. typhimurium* for cancer treatment

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 the National Institutes of Health in 2001 and became a tenured senior investigator in 2007.

CATHARINE (KATY) BOSIO, PH.D.

Chief, Immunity to Pulmonary Pathogens Section, LB
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MAJOR AREAS OF RESEARCH

- Innate and adaptive immune responses in the lung
- Immunity to *Francisella tularensis, Bordetella pertussis*, SARS-CoV-2
- Immunometabolism

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, monocytes, and how metabolic flux plays a role in lung diseases.

ASHLEY GROSHONG, PH.D.

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MAJOR AREAS OF RESEARCH

- Nutritional uptake of *Borrelia burgdorferi* within the mammalian host and tick vector environments
- Nutrients available to the spirochete during the enzootic cycle
- Modulation of gene expression in response to changes in the host and/or vector environments

BIOGRAPHY

Dr. Groshong received a B.S. in biology and a B.A. in chemistry and English at the University of Arkansas at Little Rock. She began studying *Borrelia burgdorferi* and its virulence determinants during her Ph.D. in microbiology and immunology at the University of Arkansas for Medical Sciences. She completed a postdoctoral fellowship at the University of Connecticut Health Center where she studied *B. burgdorferi* gene regulation throughout the enzootic cycle and continued on as an instructor of basic science, where she began developing her studies on amino acid acquisition by the spirochete.

DAVID (TED) HACKSTADT, PH.D.

Chief, Host-Parasite Interactions Section, LB
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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 National Institutes of Health 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 HEINZEN, PH.D.

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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 the National Institutes of Health (NIH) 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.

CARRIE MAE LONG, PH.D.

Independent Research Scholar, Coxiella *Pathogenesis Section, LB*
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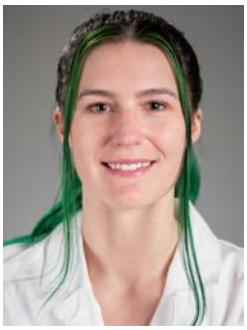
MAJOR AREAS OF RESEARCH

- *Coxiella burnetii*, the causative agent of Q fever
- Identification of host and bacterial factors involved in *C. burnetii* virulence
- Development of a safe and effective Q fever vaccine
- Characterization of post-vaccination hypersensitivity responses



BIOGRAPHY

Dr. Long graduated ***summa cum laude*** from Gardner-Webb University with a B.S. in 2011. She received her Ph.D. in immunology and microbial pathogenesis from West Virginia University in 2016. Here, she studied the role of regulatory T cells and microRNAs in chemical allergy at the National Institute for Occupational Safety and Health (CDC). After earning her doctorate, Dr. Long moved to Hamilton, Montana, to join Dr. Robert Heinzen's group at the National Institutes of Health to work as an Intramural Research Training Award postdoctoral fellow. During this time, Dr. Long worked in the biosafety level 3 laboratory researching the causative agent of Q fever, ***Coxiella burnetii***. She investigated both bacterial and host factors required for virulence and refined guinea pig models for infection, vaccination, and post-vaccination hypersensitivity. In 2019, Dr. Long received an Independent Research Scholar Award from NIH, allowing her to form an autonomous research group to continue her work on ***Coxiella burnetii.***

MICHAEL OTTO, PH.D.

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MAJOR AREAS OF RESEARCH

- Staphylococcal infection and colonization
- Bacterial interactions with the host and the host microbiota
- Antibiotic resistance in *Staphylococcus aureus* (MRSA)
- Biofilm development and infection

BIOGRAPHY

Dr. Otto received his M.S. in biochemistry in 1993 from the University of Tübingen, 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. Dr. Otto serves on several editorial advisory boards and is a section editor (Gram-positive bacteria) at *PLoS Pathogens*.

TAIS B. SAITO, D.V.M, M.S., PH.D.

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MAJOR AREAS OF RESEARCH

- Host immune components in establishment of vector-borne infection and disease pathogenesis
- Role of epidermal/dermal cells in vector transmission-associated inflammation
- Dynamics of cutaneous immunoregulation during tick attachment and pathogen transmission
- Identification of tick and bacterial factors associated with establishment of infection and bacterial persistence

BIOGRAPHY

Dr. Saito received a D.V.M. from the State University of Londrina, Parana, Brazil, where she also completed a residency in clinical practice and small animal surgery and a Master of Science. Dr. Saito earned her Ph.D. in veterinary medicine and infectious diseases at the State University of Sao Paulo, Brazil. In 2009, she moved to the United States to conduct postdoctoral research at the University of Texas Medical Branch at Galveston (UTMB), where she later served as instructor and as a research assistant professor. Dr. Saito was recruited to the NIAID in 2020 as a tenure-track investigator. She serves as a review editor for *Frontiers in Cellular and Infection Microbiology* and as ad hoc reviewer for numerous journals in her field. She is an advocate for diversity in the biomedical sciences.

LUCAS TIRLONI, PH.D.

Chief, Tick-Pathogen Transmission Unit, LB
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MAJOR AREAS OF RESEARCH

- Study the tick feeding site to get insights into tick-host-pathogen interaction at molecular and cellular level
- Study how ticks evade and exploit host keratinocytes and its relevance to tick feeding and *Borrelia burgdorferi* transmission
- Study the importance of tick saliva for blood feeding and pathogen transmission
- Use and development of *in vitro* and *in vivo* systems to study the interactions among tick-host-pathogen

BIOGRAPHY

Dr. Tirloni was born and raised in Brazil. He received his Ph.D. in cellular and molecular biology in 2015 from the Federal University of Rio Grande do Sul, Brazil. He received his postdoctoral training at Federal University of Rio Grande do Sul (2015 – 2016), Texas A&M University (2016 – 2018), and NIAID (2018 – 2020). In 2020, Dr. Tirloni became a tenure-track investigator in the Laboratory of Bacteriology.

LABORATORY OF

CLINICAL IMMUNOLOGY AND MICROBIOLOGY

Luigi D. Notarangelo, M.D., Chief
Michail S. Lionakis, M.D, Sc.D., Co-Deputy Chief
Harry L. Malech, M.D., Co-Deputy Chief

www.niaid.nih.gov/research/lab-clinical-immunology-and-microbiology

THE LABORATORY of Clinical Immunology and Microbiology (LCIM) conducts clinical and basic science, as well as 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, LCIM integrates clinical studies with laboratory investigations at molecular-, cellular-, and systems-level scales. Through exploiting knowledge gained in the clinic and in the laboratory, LCIM aims to develop novel diagnostic methods and therapeutic approaches to manage and, ideally, cure patients of PIDs and infectious diseases.

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 LCIM and facilitate the reciprocal education of basic scientists and clinical fellows alike.

SECTIONS AND UNITS

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

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

Clinical Patient Services Unit
Christa S. Zerbe, M.D., M.S.

Epidemiology and Data Management Unit
Emily Ricotta, Ph.D., M.Sc.

Epidemiology and Population Studies Unit
D. Rebecca Prevots, Ph.D.

Epithelial Therapeutics Unit
Ian A. Myles, M.D., M.P.H.

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

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

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

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

Immunopathogenesis Section
Steven Holland, M.D.

Infectious Disease Fellowship Program
Christa S. Zerbe, M.D., M.S.

Inflammation and Innate Immunity Unit
Katrin D. Mayer-Barber, Dr. rer. nat. (Ph.D.)

Molecular Defenses Section
Thomas Leto, Ph.D.

Molecular Microbiology Section
K.J. Kwon-Chung, Ph.D.

Mucosal Immunity Section
Warren Strober, M.D.

Neuroimmunological Diseases Section
Bibi Bielekova, M.D.

NeuroImmunopathogenesis Unit
Farinaz Safavi, M.D., Ph.D.

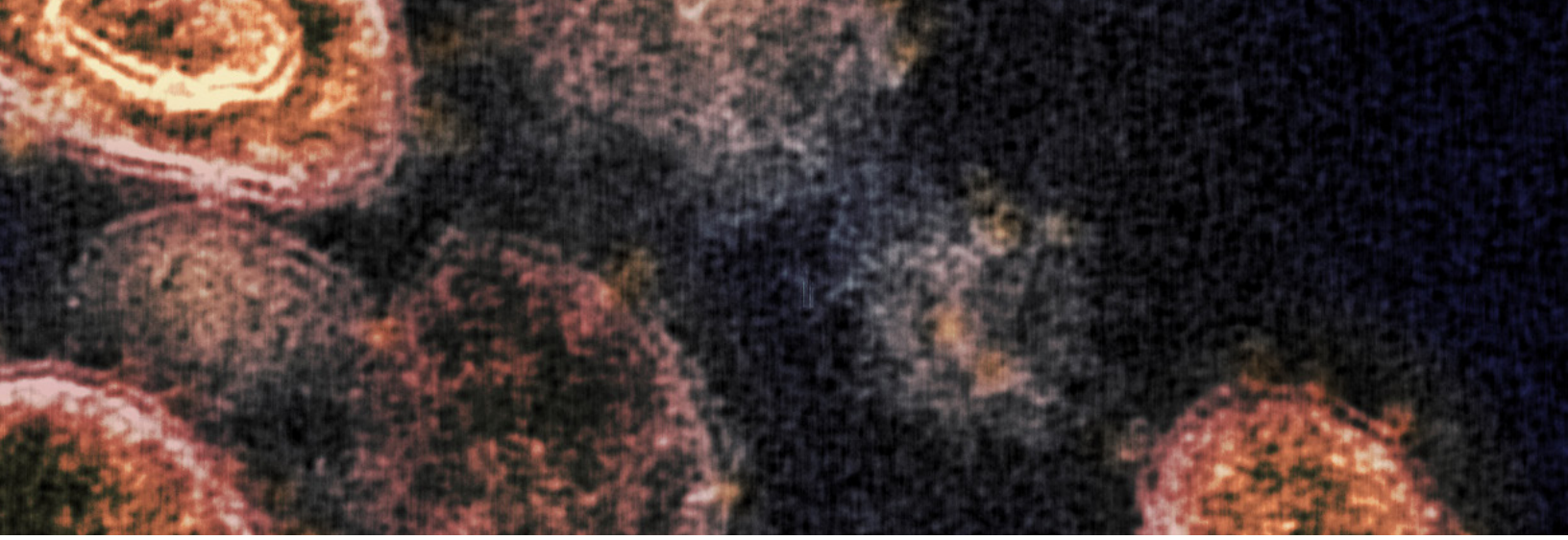
Primary Immune Deficiency Clinic
Alexandra F. Freeman, M.D.

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 Barry III, Ph.D.

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



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

LUIGI D. NOTARANGELO, M.D.

Chief, Laboratory of Clinical Immunology and Microbiology
Chief, Immune Deficiency Genetics Diseases Section, LCIM
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MAJOR AREAS OF RESEARCH

- Molecular and cellular bases of novel forms of human inborn errors of immunity
- Mechanisms of immune dysregulation in patients with RAG deficiency
- Cellular and transcriptional diversity of thymic stromal and hematopoietic cells in health and disease
- Analysis of the inflammatory response in patients with COVID-19 and MIS-C

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 came to NIAID. In 2017, he was named chief of the Laboratory of Clinical Immunology and Microbiology.

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

Co-Deputy Chief, Laboratory of Clinical Immunology and Microbiology
Chief, Fungal Pathogenesis Section, LCIM
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MAJOR AREAS OF RESEARCH

- Role of immune cells in antifungal host defense against mucosal and systemic fungal challenge
- Immunological mechanisms of susceptibility in patients with CARD9 deficiency and APECED syndrome
- 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. In 2002, he worked as a research fellow at the University of Texas MD Anderson Cancer Center under the mentorship of Dimitrios Kontoyiannis. 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 2010, he was recruited as an assistant clinical investigator in the NIAID Transition Program in Clinical Research and established the Clinical Mycology Unit within LMI. 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. He received tenure in 2017 and now heads the Fungal Pathogenesis Section within the Laboratory of Clinical Immunology and Microbiology.

HARRY L. MALECH, M.D.

Co-Deputy Chief, Laboratory of Clinical Immunology and Microbiology
Chief, Genetic Immunotherapy Section, LCIM
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hmalech@nih.gov

MAJOR AREAS OF RESEARCH

- Clinical trials and basic research of gene therapy
- Chronic granulomatous disease
- X-linked and other forms of severe combined immune deficiency
- Acute and chronic graft versus host disease

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 the National Institutes of Health (NIH) in Bethesda, Maryland. After 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 Genetic Immunotherapy Section (GIS) and co-deputy chief of the Laboratory of Clinical Immunology and Microbiology.

MICHAEL ABERS, M.D.

Assistant Clinical Investigator, LCIM
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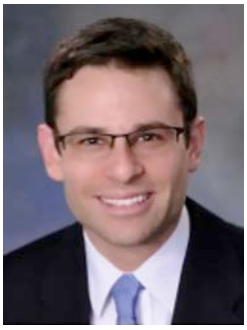
MAJOR AREAS OF RESEARCH

- Gaining an understanding of immunopathogenesis of invasive fungal infections using clinically relevant mouse models and patient cohorts



BIOGRAPHY

Dr. Abers obtained his B.A. in biological sciences with a concentration in biochemistry from Northwestern University and his M.D. from Baylor College of Medicine. He then completed internal medicine residency at Massachusetts General Hospital. After his first year of clinical fellowship in infectious diseases at Harvard Medical School, he transferred to NIH to join the Fungal Pathogenesis Section for his research fellowship. He is now an assistant clinical investigator.

CLIFTON BARRY III, PH.D.

Chief, Tuberculosis Research Section, LCIM
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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 TB patients

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 Johns Hopkins University. In 1998, he was tenured as chief of the Tuberculosis Research Section (TBRS). Dr. Barry is a member of several editorial boards, has authored more than 300 research publications in tuberculosis, and is the most cited researcher in the field, according to ScienceWatch.com.

BIBI BIELEKOVA, M.D.

Chief, Neuroimmunological Diseases Section, LCIM
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MAJOR AREAS OF RESEARCH

- Combinatorial biomarkers that reliably measure pathophysiological processes in patients with multiple sclerosis (MS)
- MS disease mechanisms and therapeutic targets with interventional clinical trials
- Biomarker signatures to predict a drug's efficacy and algorithms that optimize therapeutic selections using cerebrospinal fluid (CSF) biomarker profiles

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. Her laboratory is studying mechanisms of immunoregulation and immune-mediated CNS tissue injury in MS and other neuroimmunological diseases with a long-term goal of developing effective therapies. In addition, Dr. Bielekova is a principal investigator on several innovative protocols including adaptively designed Phase I/II clinical trials.

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

Chief, Bacterial Pathogenesis and Antimicrobial Resistance Unit, LCIM
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MAJOR AREAS OF RESEARCH

- How antimicrobial resistance emerges in the natural context of human infection
- Genomic sequencing of evolutionary pathways of resistance to antimicrobial drug classes
- Gram-negative bacterial infections in patients with primary immune deficiency diseases
- Biochemical studies of bacterial metabolic adaptations that occur during infection

BIOGRAPHY

Dr. Dekker received his M.D. and Ph.D. from Harvard through the NIH Medical Scientist Training Program. He completed pathology residency and fellowship training in medical microbiology at Massachusetts General Hospital and 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 a Lasker Clinical Research Scholar and established the Bacterial Pathogenesis and Antimicrobial Resistance Unit within LCIM. In addition, he continues to oversee the Genomics Section within the Microbiology Service. 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. In 2020, he was recognized with the Young Physician-Scientist Award by the American Society for Clinical Investigation.

ALEXANDRA F. FREEMAN, M.D.

Senior Clinician, LCIM
Director, Primary Immune Deficiency Clinic
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MAJOR AREAS OF RESEARCH

- Hyper IgE syndromes
- Diagnosis and treatment of inborn errors of immunity
- Susceptibility to mycobacteria

BIOGRAPHY

Dr. Freeman is a pediatric infectious diseases physician who focuses on the diagnosis and management of primary immunodeficiencies. Dr. Freeman received her medical training at Georgetown University Medical School, completed her pediatric residency training at Yale New Haven Children's Hospital, and did her pediatric infectious diseases fellowship at Northwestern's program in Chicago. She then joined NIH as an attending physician, briefly focusing on pediatric HIV and then changing her focus to primary immunodeficiency. She is recognized worldwide as an expert in the management of patients with hyper IgE due to her large cohorts at NIAID. She also directs the Primary Immune Deficiency Clinic at NIAID, where she educates the allergy/immunology fellows in the diagnosis and management of individuals with complex primary immunodeficiencies. Dr. Freeman has over 200 peer-reviewed journal articles, has multiple book chapters and reviews, and has been a speaker in many national and international conferences on the topic of primary immunodeficiencies.

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

NIH Associate Director for Clinical Research
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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 was the senior chief resident in medicine at Bellevue Hospital before returning to NIH in 1976 as a senior investigator. Dr. Gallin served as director of the NIAID Intramural Research Program (1985 – 1994), chief of the Laboratory of Host Defenses (1991 – 2003), and 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 (formally the Institute of Medicine) of the National Academy of Sciences and master of the American College of Physicians.

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

Chief, Translational Autoinflammatory Disease Studies Unit, LCIM
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MAJOR AREAS OF RESEARCH

- Pathogenesis and immune-dysregulatory mechanisms of interleukin (IL)-1-mediated autoinflammatory diseases including NOMID, DIRA, and the IL-1/IL-18-mediated disease NLRC4-MAS
- Pathogenesis and immune-dysregulatory mechanisms of Type I interferon (IFN)-mediated autoinflammatory diseases including CANDLE and SAVI
- Molecular and genetic causes (using next-generation sequencing methods) of yet-undifferentiated autoinflammatory diseases

BIOGRAPHY

Dr. Raphaela Goldbach-Mansky received her medical degree from the University Witten-Herdecke, Germany, in 1990 and completed a combined residency in internal medicine and pediatrics at Case Western Reserve University, Metro Health Medical Center. She completed her rheumatology fellowship training at NIAMS in 1999 and served as a staff clinician at NIAMS through 2008. Dr. Goldbach-Mansky is chief of the NIAID Translational Autoinflammatory Disease Studies (TADS) Unit. 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.

PORTIA GOUGH, PH.D.

Independent Research Fellow, LCIM
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MAJOR AREAS OF RESEARCH

- Host-microbe interactions in the context of commensalism
- Mechanisms of interaction between the commensal bacteria, *Roseomonas mucosa*, and human skin in terms of immune regulation through interaction with TLR5

BIOGRAPHY

Dr. Gough received her Ph.D. in microbiology in 2017 from the University of Chicago and was a postdoctoral fellow in the Epithelial Therapeutics Unit of the Laboratory of Clinical Immunology and Microbiology. She is now an independent research fellow.

HEATHER HICKMAN, PH.D.

Chief, Viral Immunity and Pathogenesis Unit, LCIM
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hhickman@nih.gov

MAJOR AREAS OF RESEARCH

- Biology of tissue-resident lymphocytes at initial sites of viral infection
- Role of the lymph node in shaping antiviral immunity
- T cell-mediated clearance of established viral infections
- Viruses studied: poxviruses, influenza, Zika, chikungunya, SARS-CoV-2

BIOGRAPHY

Dr. Heather Hickman received her Ph.D. in microbiology and immunology from the University of Oklahoma, where she investigated the presentation of virus-derived peptides by major histocompatibility (MHC) class I molecules. Dr. Hickman first joined NIH as a postdoctoral fellow in the Laboratory of Viral Diseases, NIAID, to study antiviral immunity under the mentorship of Dr. Jonathan Yewdell. Later, Dr. Hickman became an Earl-Stadtman tenure-track investigator in the Laboratory of Clinical Immunology and Microbiology, forming the Viral Immunity and Pathogenesis Unit. Dr. Hickman's research focuses on better defining the mechanisms underlying adaptive immunity to viral infections.

STEVEN HOLLAND, M.D.

Director, Division of Intramural Research
Chief, Immunopathogenesis Section, LCIM
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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
- Interferon gamma/IL-12 pathway
- Mechanisms of mycobacterial pathogenesis, bacterial pathogenesis (e.g., *Burkholderia*), *Coccidioides immitis* 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, where he stayed as a resident in internal medicine, assistant chief of service in medicine, and fellow in infectious diseases. He came to NIH in 1989 as a National Research Council fellow in the 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. His work centered on the pathogenesis and management of chronic granulomatous disease, as well as other congenital immune defects affecting phagocytes, including those predisposing to mycobacterial diseases. He was chief of the NIAID Laboratory of Clinical and Infectious Diseases from 2004 to 2016 and was selected as DIR director in 2016.

K.J. KWON-CHUNG, PH.D.

Chief, Molecular Microbiology Section, LCIM
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MAJOR AREAS OF RESEARCH

- Virulence determinants of *Cryptococcus neoformans* and *C. gattii*
- Mechanism by which *Cryptococcus neoformans* invades the brain
- Pathobiological differences between *Cryptococcus neoformans* and *C. gattii*
- Identification of 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 department of bacteriology at the University of Wisconsin, Madison. After receiving her Ph.D. in 1965, she joined the Medical Mycology Section of the NIAID Laboratory of Microbiology in 1966 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 in LCIM since 1995. She received an Honorary Doctoral Degree in Science from University of Wisconsin in 2009 and the Lifetime Achievement Award from the American Society for Microbiology in 2017.

THOMAS LETO, PH.D.

Chief, Molecular Defenses Section, LCIM
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MAJOR AREAS OF RESEARCH

- NOX/DUOX family NADPH oxidases, structure, and function
- Roles of reactive oxygen and NOX enzymes in health and disease (host defense, inflammation, cellular signaling, innate and adaptive immunity)
- Roles of NOX enzymes in tumor microenvironment signaling, cancer progression, and survival
- NOX-based innate immune mechanisms in phagocytic cells and in respiratory and gastrointestinal tracts

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.

KATRIN D. MAYER-BARBER, DR. RER. NAT. (PH.D.)

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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 (TB)
- 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. In 2003 she came to the United States for her Ph.D. thesis work in the laboratory of Dr. Markus Mohrs at the Trudeau Institute in Saranac Lake, New York. She obtained her doctoral degree in 2006 from the University of Würzburg, Germany, and joined NIAID in 2007 as a postdoctoral fellow in the Laboratory of Parasitic Diseases. There she studied pulmonary innate effector cells, such as inflammatory monocytes and dendritic cells, and delineated the role of inflammatory mediators including IL-1, type I interferons, and prostaglandins in host resistance to TB. Dr. Mayer-Barber was awarded the Earl Stadtman Tenure-Track Investigator position in the NIAID Laboratory of Clinical and Infectious Diseases (now LCIM) in 2015.

ROBERT MUNFORD, M.D.

Chief, Antibacterial Host Defense Section
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MAJOR AREAS OF RESEARCH

- Prolonged immunosuppression when animals that cannot inactivate lipopolysaccharides (LPS) are exposed to LPS or to Gram-negative bacteria that make LPS
- How human cells regulate the production of acyloxyacyl hydrolase (AOAH), the LPS-inactivating enzyme
- Associations between AOAH deficiency and human diseases

BIOGRAPHY

Dr. Munford received his B.A. in history from Vanderbilt University and 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 Rockefeller University, and completed an infectious disease fellowship at 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. His lab's major research goal has been to understand how animals inactivate these highly stimulatory molecules.

IAN A. MYLES, M.D., M.P.H

Chief, Epithelial Therapeutics Unit, LCIM
Chief Medical Research Officer, U.S. Public Health Service Commissioned Corps
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MAJOR AREAS OF RESEARCH

- Therapeutic effects of microbiome manipulation in the treatment of eczema (atopic dermatitis)
- Role of the microbiome during the normal processes of tissue repair and wound healing
- Mechanisms of susceptibility to epithelial infections with *Staphylococcus aureus*
- Dietary influences on immune development
- Role of environmental exposures in creating dysbiosis

BIOGRAPHY

Dr. Myles graduated with a B.S. in biology from Colorado State University in 2001 and an M.D. from the University of Colorado in 2005. He completed an internal medicine residency at The Ohio State University prior to beginning fellowship training in allergy and clinical immunology at NIH. In 2011, Dr. Myles became a commissioned officer in the United States Public Health Service (USPHS) Commissioned Corps. Lieutenant Commander (LCDR) Myles has supported several USPHS missions, including the Ebola virus vaccine trial in West Africa. In 2013, he was awarded a position as an assistant clinical investigator in the NIAID Transition Program in Clinical Research. Dr. Myles received his M.P.H. from George Washington University in 2016. In 2018, Dr. Myles became the head of the newly formed Epithelial Therapeutics Unit. He is currently a Lasker Clinical Research Scholar.

D. REBECCA PREVOTS, PH.D., M.P.H.

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MAJOR AREAS OF RESEARCH

- Nontuberculous mycobacteria and bronchiectasis
- COVID studies on transmission, vaccine response, seroprevalence
- Malaria natural history studies vaccine evaluation
- Spatio-temporal mapping and ecology of infectious diseases

BIOGRAPHY

Dr. Prevots began her public health research career at the New York City Department of Health in 1985, working as a public health advisor in the AIDS surveillance and epidemiology unit. From there she went to the University of Michigan, where she earned her M.P.H. in 1988 and her Ph.D. in epidemiology in 1991. Upon completing her Ph.D., she joined the Epidemic Intelligence Service at the Centers for Disease Control and Prevention (CDC). Dr. Prevots joined NIAID in 2003 to build an epidemiology research group and enhance epidemiologic capacity within NIAID. In 2007 she became head of the newly created Epidemiology and Population Studies Unit within the intramural program at NIAID. She has led fundamental studies to establish the burden of nontuberculous mycobacterial disease in the United States and to identify clinical and environmental risk factors for disease susceptibility and progression.

EMILY E. RICOTTA, PH.D., M.SC.

Chief, Epidemiology and Data Management Unit, LCIM
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MAJOR AREAS OF RESEARCH

- Infectious disease epidemiology: COVID-19, invasive fungal infections, antimicrobial resistance, Ebola, malaria
- Data management and science: Non-randomized study design, data collection and standardization, epidemiologic and statistical analysis, data visualization

BIOGRAPHY

Dr. Emily Ricotta received her Ph.D. in epidemiology in 2018 from the Swiss Tropical and Public Health Institute at the University of Basel, where her research focused on how human behavior impacts the uptake and use of malaria prevention methods, specifically bed nets. Her M.Sc. in molecular microbiology and immunology was awarded in 2012 by the Johns Hopkins Bloomberg School of Public Health for her work on household-level risk factors for malaria transmission. Dr. Ricotta has over 15 years of research experience in epidemiology and molecular microbiology working with a variety of human pathogens and has participated in global public health program monitoring and evaluation, policy development, and scientific advocacy. In addition to research, she teaches epidemiology, biostatistics, and clinical research methods to graduate students at George Washington University. In March 2019, she was selected to become an Emerging Leader in Biosecurity Initiative Fellow by the Johns Hopkins Center for Health Security.

FARINAZ SAFAVI, M.D., PH.D.

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MAJOR AREAS OF RESEARCH

- Neurological manifestations of primary and acquired immunodeficiency
- Role of immune-related gene defects in neurons and glial cell function
- Effect of host immune defects on central nervous system immune compartment
- Role of inborn errors of immunity (IEIs) in patients with atypical neuroinflammatory, neuroinfectious, and neurodegenerative diseases

BIOGRAPHY

Dr. Safavi received her M.D. from Tehran University of Medical Sciences followed by a Ph.D. in neural and behavioral science from State University of New York, Health Science Center at Brooklyn. After graduation, she joined the department of neurology at Thomas Jefferson University as a research fellow. She then completed her neurology residency training at Icahn School of Medicine at Mount Sinai and finished her clinical training by a clinical fellowship in neuroimmunology and neuroinfectious diseases at NINDS. She was selected for the NIAID Transition Program in Clinical Research to establish a basic and clinical research program on the role of genetic and acquired host immune defects in the nervous system.

WARREN STROBER, M.D.

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MAJOR AREAS OF RESEARCH

- Basic studies of mucosal immunity, mucosal inflammation, and inflammatory bowel disease such as ulcerative colitis and Crohn's disease
- Studies of the immunobiology of inflammatory cytokines
- Studies of immunodeficiency such as common variable immunodeficiency and hyper-IgM syndrome
- 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. Dr. Strober has provided leadership to the scientific community as chair of the American Board of Allergy and Immunology and as president of the Society for Mucosal Immunity.

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

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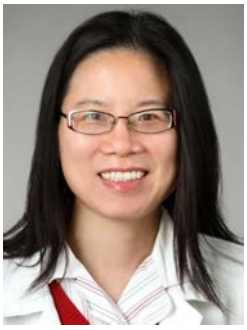
MAJOR AREAS OF RESEARCH

- Defining the molecular mechanisms of new inherited human immunological diseases
- Understanding DOCK8 function in health and human disease
- Elucidating innate immunoregulatory mechanisms for control of respiratory virus infections in humans



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 and was tenured in 2016. She has received the Society for Pediatric Research E. Mead Johnson Award and the Gale and Ira Drukier Prize in Children's Health Research. She was elected member of the American Society for Clinical Investigation and the Association of American Physicians.

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

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MAJOR AREAS OF RESEARCH

- Pathophysiology and treatment of neuroinflammatory syndromes in refractory fungal infections
- Genetic susceptibility to infections by *Cryptococcus*
- Role of RNA biology in susceptibility to human fungal disease
- Granulocyte-monocyte colony stimulating factor (GMCSF) signaling in fungal susceptibility

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, Lamba 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 where he currently heads the Translational Mycology Section in the Laboratory of Clinical Immunology and Microbiology.

CHRISTA S. ZERBE, M.D., M.S.

Director, Infectious Disease Fellowship Program
Medical Director, Clinical Patient Services Unit, LCIM
Senior Staff Clinician
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MAJOR AREAS OF RESEARCH

- Chronic granulomatous disease (CGD) and the inflammatory and infectious complications
- Carriers of X-linked CGD
- Anti-cytokine autoantibody diseases
- Disseminated non-tuberculous mycobacterial infections

BIOGRAPHY

An alumnus of The University of Pittsburgh School of Medicine, Dr. Zerbe completed her internal medicine residency at the University of Maryland Hospital before transitioning into the ABIM Research Pathway for Infectious Disease Fellowship at NIH. Dr. Zerbe serves as principal investigator on numerous protocols within NIAID. She is the director of the infectious disease training program at NIH and recently began overseeing the joint NIH-Johns Hopkins Hospital Transplant Oncology Infectious Disease training program.

LABORATORY OF HOST IMMUNITY AND MICROBIOME

Yasmine Belkaid, Ph.D., Chief

www.niaid.nih.gov/research/lab-host-immunity-and-microbiome-lhim

THE VISION

of the Laboratory of Host Immunity and Microbiome (LHIM), led by Dr. Yasmine Belkaid, is to comprehensively examine the factors controlling immunity and inflammation, whether they are host intrinsic (e.g., tissue-specific or the consequence of tissue-tissue communication) or extrinsic (e.g., involving the microbiota, nutrition, or infection). One major goal of the laboratory is to assess the consequences of environmental stress, such as infection, nutrition, and pollution, on host immunity and predisposition to inflammatory disorders in the context of fetal development, early life, and in adults. The laboratory also seeks to explore novel microbiota-mediated and immunotherapeutic approaches to combat the increasing threat of antimicrobial resistance. The laboratory is built upon strong clinical-basic research foundations and partnership with the NIH Clinical Center and the NIAID Microbiome Program.

LHIM has been specifically organized to maximize the capacity of its investigators to conduct cutting-edge research. It is home to the NIAID Microbiome Program, which supports microbiome-related research through gnotobiotic, microbiology, and genomic core services. To help foster a rich local intellectual and technological environment, LHIM has also developed a close partnership with the adjacent Laboratory of Immune System Biology, including shared resources for single-cell analysis, proteomics, genomics, and advanced imaging. A major emphasis of LHIM is to promote collaborations between the laboratories within NIAID, as well as with the larger NIH (including the larger NIH immunology community), and extramural scientific communities. LHIM also has a strong emphasis on mentorship and on fostering increased diversity in the next generation of scientific leaders.

MAJOR AREAS OF RESEARCH

LHIM utilizes transdisciplinary approaches in the exploration of host-microbe, tissue-tissue, and host-environment interactions. Areas of research focus include the following:

- Immunology (e.g., human immunology, immunometabolism, nutritional immunology)
- Microbiology (e.g., microbial ecology, antimicrobial resistance)
- Chemistry (e.g., microbiota-derived natural products)
- Neuroscience (e.g., gut/brain axis)
- Genomics

In these latter cases, the lab has a particular interest in how such studies would enhance our understanding of host immunity.

SECTIONS AND UNITS

Clinical Microbiome Unit
Suchitra Hourigan, M.D

Metaorganism Immunity Section
Yasmine Belkaid, Ph.D.

Molecular Mycology and Immunity Unit
Eric Van Dang, Ph.D.

Neuro-Immune Crosstalk Unit
Hao Jin, Ph.D.

YASMINE BELKAID, PH.D.

Chief, Laboratory of Host Immunity and Microbiome
Chief, Metaorganism Immunity Section, LHIM
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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.

ERIC VAN DANG, PH.D.

Chief, Molecular Mycology and Immunity Unit, LHIM
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MAJOR AREAS OF RESEARCH

- Innate immune detection of fungal pathogens
- Fungal crosstalk with mammalian hosts
- Mechanisms of fungal persistence/ colonization at barrier tissues
- Cellular mechanisms of antifungal immune response *in vivo*

BIOGRAPHY

Dr. Dang received his undergraduate degree in public health studies from Johns Hopkins University in 2010, where he studied T-cell differentiation in the lab of Dr. Drew Pardoll. After college, he spent a year in London working in Dr. Anne O'Garra's lab at the National Institute for Medical Research in Mill Hill. After a brief stint in medical school, he performed his graduate thesis work at the University of California, San Francisco, in the laboratory of Dr. Jason Cyster. There, he studied the role of oxysterols and cholesterol metabolism in regulating macrophage inflammatory responses. After receiving his Ph.D. in 2018, Dr. Dang joined the laboratory of Dr. Hiten Madhani at UCSF for his postdoctoral work. There, he used forward genetic approaches to study mechanisms of immune system manipulation by the fungal pathogen *Cryptococcus neoformans*. Dr. Dang was hired as a tenure-track investigator in LHIM in 2022.

SUCHITRA HOURIGAN, M.D.

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MAJOR AREAS OF RESEARCH

- Clinical microbiome interventions to mitigate chronic inflammatory diseases
- Early life microbiome therapies to improve future health
- Advanced exploration of microbiome and host physiology interactions in humans

BIOGRAPHY

Dr. Suchitra (Suchi) Hourigan was born in the United Kingdom and received her medical degree from the University of Oxford. She is a board-certified physician in pediatrics and pediatric gastroenterology, having completed her pediatric residency and pediatric gastroenterology fellowship training at the Johns Hopkins Hospital in Baltimore, MD. Prior to coming to NIH, Dr. Hourigan held faculty positions at the Johns Hopkins School of Medicine and the University of Virginia and served as vice chair of research at Inova Children's Hospital, Virginia. She joined NIAID in 2021 as a Lasker Clinical Research Scholar and an NIH Distinguished Scholar.

HAO JIN, PH.D.

Chief, Neuro-Immune Crosstalk Unit, LHIM
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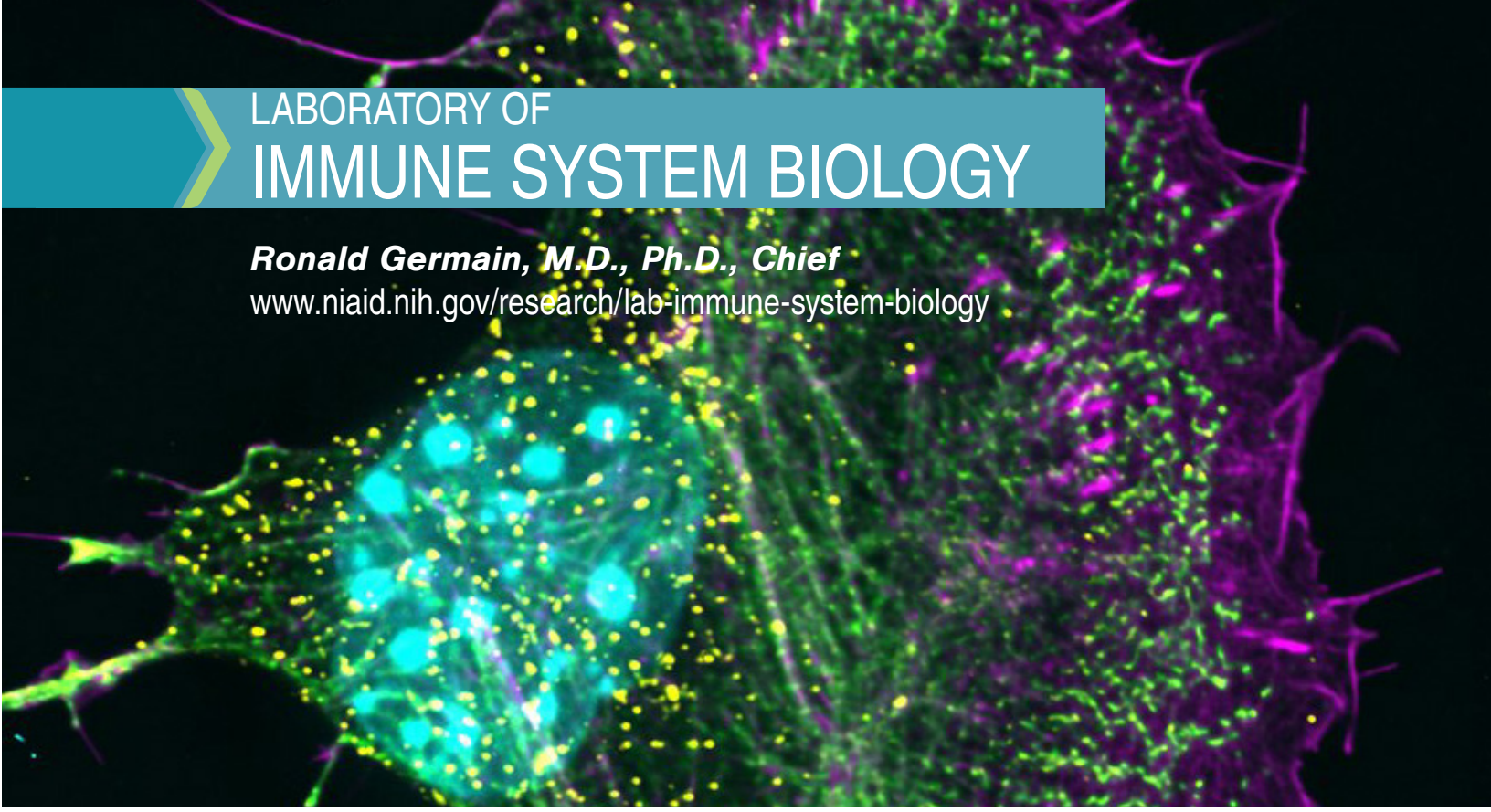
MAJOR AREAS OF RESEARCH

- Role of body-brain axis in the control of innate immune response
- Representation and regulation of distinct types of immune responses by the brain
- Modulation of immune responses by sensory experience and internal states

BIOGRAPHY

Dr. Jin received his Bachelor of Science degree from Shanghai Jiao Tong University. He completed his Ph.D. at the National University of Singapore on the developmental biology of blood stem and immune cells. He was then trained as a postdoc in Columbia University where he switched to study the neurobiology of mammalian taste. In 2022, he began his new position as a tenure-track investigator in the Laboratory of Host Immunity and Microbiology (LHIM) at the National Institute of Allergy and Infectious Diseases (NIAID). His research at LHIM intersects neuroscience with immunology, exploring the new frontier of the regulation of immune responses by the nervous system with an integrative multimodal approach combining contemporary neurobiology and immunobiology tools and techniques.



LABORATORY OF IMMUNE SYSTEM BIOLOGY

Ronald 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 (LISB) are focused on the basic genetics, molecular biology, and cell biology of the immune system, as well as on human disease informed by these more basic studies. How dysregulation of the immune system results in immunodeficiencies, autoimmunity, inflammation, allergy, chronic infections, and lymphoproliferative diseases and what strategies might be valuable for therapeutics or vaccine development related to these conditions as well as cancer are important topics of interest, as is the behavior of the meta-organism (the combination of the host and the commensal microbiota).

MAJOR AREAS OF RESEARCH

- Quantitative systems-level studies of humans and of animal models
- Development, differentiation, plasticity of immune cells
- Transcriptional and post-transcriptional regulation of lymphocyte differentiation and function
- Regulation of primary and secondary immune responses
- Programmed cell death and autophagy
- Biology of regulatory T cells and their role in autoimmunity and chronic infection
- Induction of T cell tolerance and treatment of autoimmunity

SECTIONS AND UNITS

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

Cellular Immunology Section
Ethan Shevach, M.D.

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

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

Integrative Immunobiology Section
Stefan Muljo, Ph.D.

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

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

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

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

Signaling Systems Section
Iain Fraser, Ph.D.

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

Chief, Laboratory of Immune System Biology
Chief, Lymphocyte Biology Section, LISB
Director, Center for Advanced Tissue Imaging (CAT-I)
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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

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. In 1982, he was named a senior investigator in the Laboratory of Immunology at NIAID, becoming chief of the Lymphocyte Biology Section in 1987. He has held a number of leadership roles and since 2018 has been chief of the Laboratory of Immune System Biology. He was elected as an associate (foreign) member of EMBO (2008), the National Academy of Medicine (2013), and National Academy of Science (2016); received the Meritorious Career Award from the American Association of Immunologists (2015); chosen as NIAID outstanding mentor (2016); and designated an NIH distinguished investigator. He has trained more than 70 postdoctoral fellows, many of whom hold senior academic and administrative positions at leading universities and medical schools.

IAIN FRASER, PH.D.

Chief, Signaling Systems Section, LISB
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MAJOR AREAS OF RESEARCH

- Development and application of genome-scale genetic screening to comprehensively define pattern recognition receptor (PRR) response pathways
- Delineating mechanisms of innate immune signaling and transcriptional control
- Characterizing combined PRR pathway activation in host-pathogen interactions

BIOGRAPHY

Dr. Fraser received his B.S. in biochemistry from Heriot-Watt University, Edinburgh, Scotland, and his Ph.D. in biochemistry from Imperial College, University of London. He was a Wellcome Trust International postdoctoral fellow at the Vollum Institute in Portland, Oregon. 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 PSIIM Molecular and Cell Biology Team and became chief of the Signaling Systems Unit within the Laboratory of Systems Biology (LSB) in 2011. In 2017 he was appointed as a tenured senior investigator and chief of the Signaling Systems Section.

JOSHUA R. LACSINA, M.D., PH.D.

Assistant Clinical Investigator, LISB
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MAJOR AREAS OF RESEARCH

- Human immunity to *Leishmania* infection
- Systems immunology of human skin: single cell multiomics and multiplex spatial profiling
- Global health: human systems immunology at international field sites
- *Leishmania* vaccine development

BIOGRAPHY

Dr. Lacsina received his A.B. in biochemical sciences from Harvard University and his M.D. and Ph.D. in pathology through the Duke University Medical Scientist Training Program. He completed his residency training in internal medicine at the University of Washington (UW). From 2015 to 2016 he served as the UW Global Health Chief Resident at Naivasha Sub-County Hospital in Kenya. He completed his clinical fellowship training in infectious diseases at NIAID and conducted his fellowship research with Dr. Jesus Valenzuela (Laboratory of Malaria & Vector Research) on human skin immunity to the bites of arthropod vectors of infection. In 2021, Dr. Lacsina was appointed as an assistant clinical investigator in LISB through the NIAID Transition Program in Clinical Research. Dr. Lacsina is certified in internal medicine and infectious disease by the American Board of Internal Medicine.

MICHAEL LENARDO, M.D.

Chief, Molecular Development of the Immune System Section, LISB
Co-Director, NIAID Clinical Genomics Program
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MAJOR AREAS OF RESEARCH

- Genetic diseases of immune homeostasis and autoimmunity
- Non-apoptotic mechanisms of cell death
- Development of novel immunodiagnostics and immunotherapeutics

BIOGRAPHY

Dr. Lenardo received a B.A. in natural sciences from Johns Hopkins University and his M.D. from Washington University in St. Louis. He performed clinical work in internal medicine and research at the University of Iowa. He received postdoctoral training at the Whitehead Institute for Biomedical Research at the Massachusetts Institute of Technology under the mentorship of Nobel laureates David Baltimore and Philip Sharp. He established an independent research unit at NIAID in 1989 and became a senior investigator and section chief in 1994. He has founded or co-founded several joint research programs including the NIH-Oxford-Cambridge Biomedical Research Scholars, the NIH-University of Pennsylvania Immunology Program, the NIH-Marshall Scholars, the NIH-Rhodes Scholars, the National M.D./Ph.D. partnership program, and the NIH-Institut Pasteur Infectious Disease and Immunology Program.

KALPANA MANTHIRAM, M.D.

Assistant Clinical Investigator, LISB
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MAJOR AREAS OF RESEARCH

- Genetics of periodic fever, aphthous stomatitis, pharyngitis, adenitis (PFAPA) syndrome, and other Behçet's Spectrum Disorders
- Immunology of pediatric tonsil disorders
- Immune responses to infections in oropharyngeal lymphoid tissue
- Clinical and immunologic features of trisomy 8 associated autoinflammatory disease (TRIAD)

BIOGRAPHY

Dr. Kalpana Manthiram obtained her M.D. at University of Texas Southwestern Medical School in Dallas, Texas, and completed her internship and residency in pediatrics at the Boston combined residency program at Boston Children's Hospital and Boston Medical Center. She went on to do her pediatric infectious diseases fellowship at Vanderbilt University Medical Center, where she worked with Dr. Kathryn Edwards to study PFAPA syndrome, the most common periodic fever syndrome in children. She obtained her Master of Science in clinical investigation at Vanderbilt. Following her clinical fellowship, she was a postdoctoral researcher in Dr. Daniel Kastner's laboratory in NHGRI for 5 years, where she began studying the genetics of PFAPA syndrome. In 2020, she joined NIAID as an assistant clinical investigator in the Laboratory of Immune System Biology. Her mentor is Dr. Pamela Schwartzberg.

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

Chief, Molecular Biology Section, LISB
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MAJOR AREAS OF RESEARCH

- Molecular and cellular basis of cellular recognition in the immune response
- Mechanism of peptide loading in the antigen presentation pathway
- MHC class I and class II molecules, whose function is to present antigens to T lymphocytes
- Structure and recognition sites of antibodies to SARS-CoV-2

BIOGRAPHY

Dr. Margulies received an A.B. from Columbia University in 1971. In 1977 and 1978, he earned his Ph.D. and M.D. degrees from the Albert Einstein College of Medicine, and from 1978 to 1980 he served as a resident in internal medicine at Columbia/Presbyterian Medical Center. From 1980 to 1983, he worked as a research associate in the Laboratory of Molecular Genetics at the National Institute of Child Health and Human Development. From 1983 to 1987, he was an investigator in the Laboratory of Immunology. In 1987, he became a senior investigator and, since 1989, has been chief of the Molecular Biology Section. He has served on many review panels and NIH committees.

MARTIN MEIER-SCHELLERSHEIM, PH.D.

Chief, Computational Systems Biology Section, LISB
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MAJOR AREAS OF RESEARCH

- Quantitative experimental analysis and computational modeling to explore intra- and intercellular signaling processes and cellular behavior
- *In vitro* reconstruction and computational models of extracellular matrices to investigate how cellular morphology and migration behavior is determined by the extracellular environment
- Development of tools for analyzing and simulating reaction-diffusion processes at the level of single-particle dynamics

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 MULJO, PH.D.

Chief, Integrative Immunobiology Section, LISB
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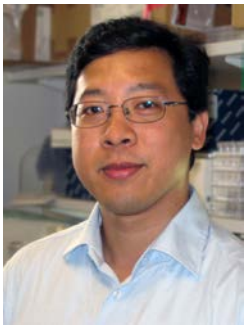
MAJOR AREAS OF RESEARCH

- RNA-binding proteins and regulatory non-coding RNAs
- Gene expression programs and their regulation in hematopoietic stem cells and during cellular differentiation
- Targeting microRNAs for modulating or enhancing immune responses
- Post-transcriptional regulation of human endogenous retroviruses (HERVs)



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 (LI) in 2008 as a tenure-track investigator. In 2016, he was promoted to tenured senior investigator and is head of the Integrative Immunobiology Section, which is now part of the Laboratory of Immune System Biology (LISB). He is a faculty member of the NIH-Penn and NIH-OxCam graduate partnership programs, as well as others.

ALEKSANDRA NITA-LAZAR, PH.D.

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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 Immune System Biology, in April 2009.

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

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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

Pamela L. 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. She moved to NIAID in 2018. Dr. Schwartzberg is an adjunct faculty member at the University of Pennsylvania and the George Washington University School of Biomedical Sciences and has received several NIH awards for mentoring. She has served on numerous mentoring, reviewing, and editorial boards; 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 SHEVACH, M.D.

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MAJOR AREAS OF RESEARCH

- Role of natural killer cells, antigen presenting cells, and Tregs in immune system homeostasis in both steady-state and disease
- Mechanisms of Treg-mediated suppression
- Elucidating the function of two members of the Ikaros gene transcription factor (TF) family, Helios and Eos
- Role of type I interferons (IFNs) in Treg function
- Collaborating with industry in studying hTregs biology

BIOGRAPHY

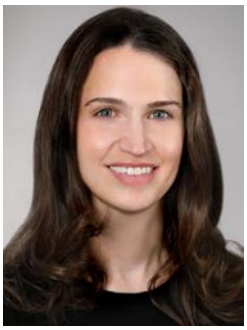
Dr. Shevach received his M.D. from Boston University in 1967. Following clinical training, he joined the Laboratory of Immunology as a senior staff fellow in 1972, was appointed a senior investigator in 1973, and became a section chief in 1987. Dr. Shevach served as editor-in-chief of the *Journal of Immunology* from 1987 to 1992 and editor-in-chief of *Cellular Immunology* from 1996 to 2007. Dr. Shevach is the author of more than 450 papers.

RACHEL SPARKS, M.D., M.P.H.

Assistant Clinical Investigator, LISB
rachel.sparks@nih.gov

MAJOR AREAS OF RESEARCH

- Multiomic approaches to investigate human immune dysregulation and immunodeficiency
- Systems immunology data to design targeted drug therapy trials
- Vaccine response variation in different immunological backgrounds



BIOGRAPHY

Dr. Sparks earned her M.D. from University of Washington., where she also completed her residency in internal medicine. She was then awarded a fellowship in allergy and immunology at NIAID, where she conducted her clinical fellowship research with Dr. John Tsang in LISB. She was appointed as an assistant clinical investigator in 2019 and is board certified in internal medicine and allergy and immunology.

JINFANG (JEFF) ZHU, PH.D.

Chief, Molecular and Cellular Immunoregulation Section, LISB
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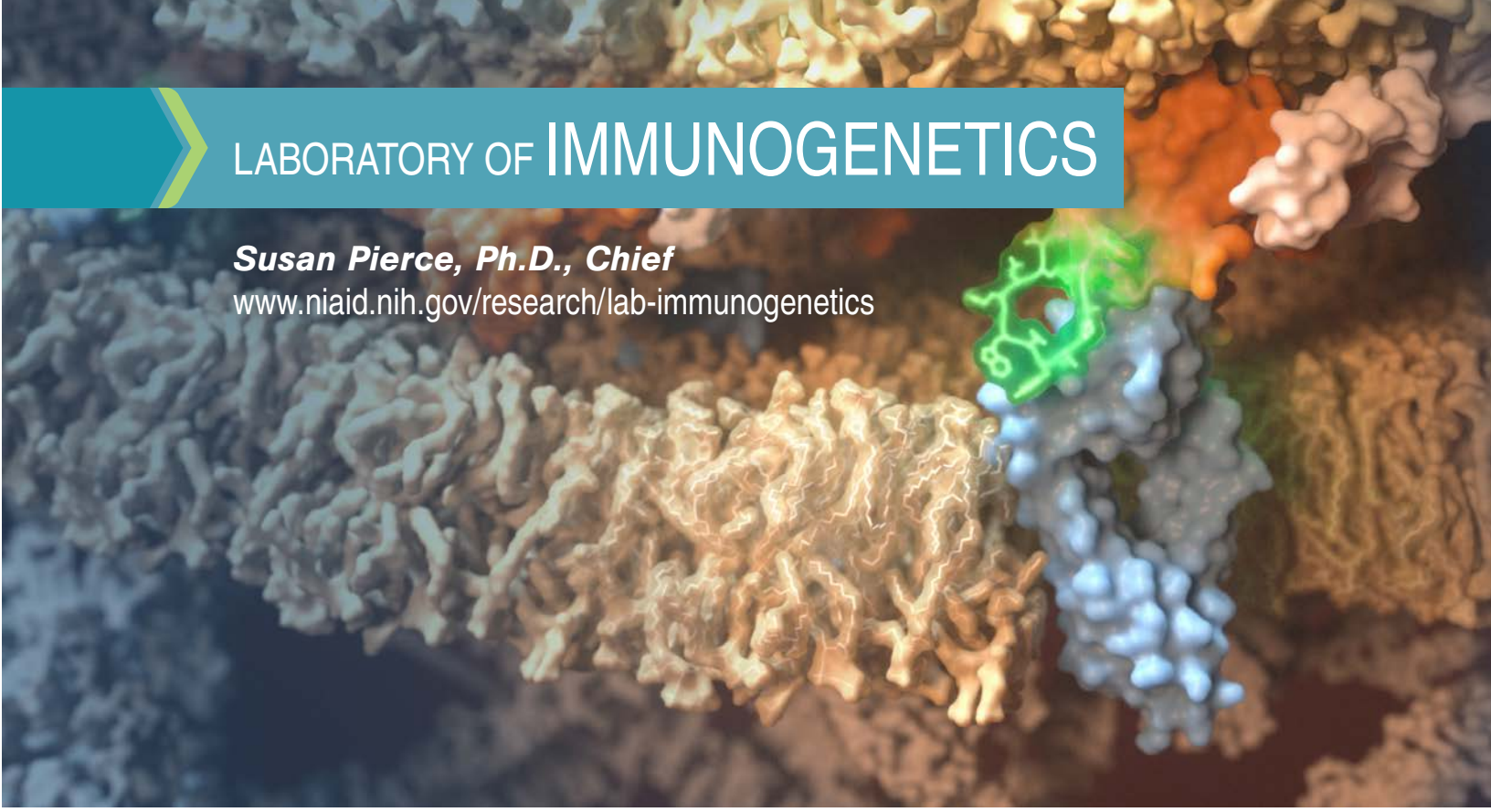
MAJOR AREAS OF RESEARCH

- 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 (later known as Shanghai Institute of Biochemistry and Cell Biology), Chinese Academy of Sciences. He joined the Laboratory of Immunology (LI) first as a visiting fellow and then as a staff scientist studying CD4 T-cell differentiation. He was appointed an Earl Stadtman investigator in LI in 2011 and received tenure in 2017. He is interested in investigating heterogeneity and plasticity of immune cells and their functions during normal and pathological immune responses at cellular and molecular levels. His focus is on induction and functions of transcription factor complexes during development, lineage commitment, and maintenance of immune cells, particularly CD4 Th cells and ILCs.



LABORATORY OF IMMUNOGENETICS

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

THE RESEARCH

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, 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 Fc gamma RIIB 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

Antibody Biology Unit
Joshua Tan, Ph.D.

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

Chemotaxis Signal Section
Tian Jin, Ph.D.

Lymphocyte Activation Section
Susan Pierce, Ph.D.

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

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

Molecular Pathology Section
Victor Lobanenkov, Ph.D.

Structural Immunology Section
Peter Sun, Ph.D.

SUSAN PIERCE, PH.D.

Chief, Laboratory of Immunogenetics
Chief, Lymphocyte Activation Section, LIG
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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
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MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

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

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MAJOR AREAS OF RESEARCH

- Mechanisms of naturally acquired immunity to malaria
- Antibody responses to *P. falciparum* infection
- B- and T-cell biology of *P. falciparum* infection
- Regulation of *P. falciparum*-induced inflammation
- Systems immunology of human malaria
- Clinical trials of monoclonal antibodies against 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 & Tropical Medicine before joining the Laboratory of Immunogenetics in 2005 to pursue his research interest in malaria immunology. In 2016, he became a senior investigator and chief of the Malaria Infection Biology and Immunity Section. 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
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tjin@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mechanisms underlying the 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 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 a senior investigator at NIAID.

VICTOR LOBANENKOV, PH.D.

Chief, Molecular Pathology Section, LIG
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MAJOR AREAS OF RESEARCH

- Three distinct classes of CTCF & BORIS (also known as CTCFL) binding in epigenetic regulation of the genome
- 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 (MPS) in the Laboratory of Immunopathology, which became part of the Laboratory of Immunogenetics in 2012.

ERIC LONG, PH.D.

Chief, Molecular and Cellular Immunology Section, LIG
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MAJOR AREAS OF RESEARCH

- Innate lymphocyte function in malaria
- Fighting cancer with natural killer (NK) cells: how to break tumor cell resistance
- Regulation of NK cells by activating and inhibitory receptors

BIOGRAPHY

Dr. Long has a biochemistry degree from the ETH Zürich and a Ph.D. in molecular biology from the University of Geneva, Switzerland. After postdoctoral research at the Carnegie Institution for Science and the National Cancer Institute, NIH, he returned to Geneva as a faculty member in the Department of Microbiology. There, he applied molecular approaches to isolate the first cDNA clones for MHC class II molecules. In 1983, he joined the Laboratory of Immunogenetics at NIAID and became senior investigator and head of the Molecular and Cellular Immunology Section in 1988. In the mid-90's, his main interest turned to the regulation of NK cell function, after his team identified molecular clones for a family of NK cell inhibitory receptors called KIR that engage MHC class I molecules on healthy cells to prevent killing by NK cells. The discovery of the signaling basis for inhibition by these receptors was selected as a "Pillar of Immunology" by the Journal of Immunology.

PETER SUN, PH.D.

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MAJOR AREAS OF RESEARCH

- HIV pathogenesis and infection-induced viral release
- Structural biology of T-cell receptors
- Inhibition of coronavirus release
- Mitigation of COVID-19 pathogenesis

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.

JOSHUA TAN, PH.D.

Chief, Antibody Biology Unit, LIG
www.niaid.nih.gov/research/joshua-tan-phd
joshuahoongyu.tan@nih.gov

MAJOR AREAS OF RESEARCH

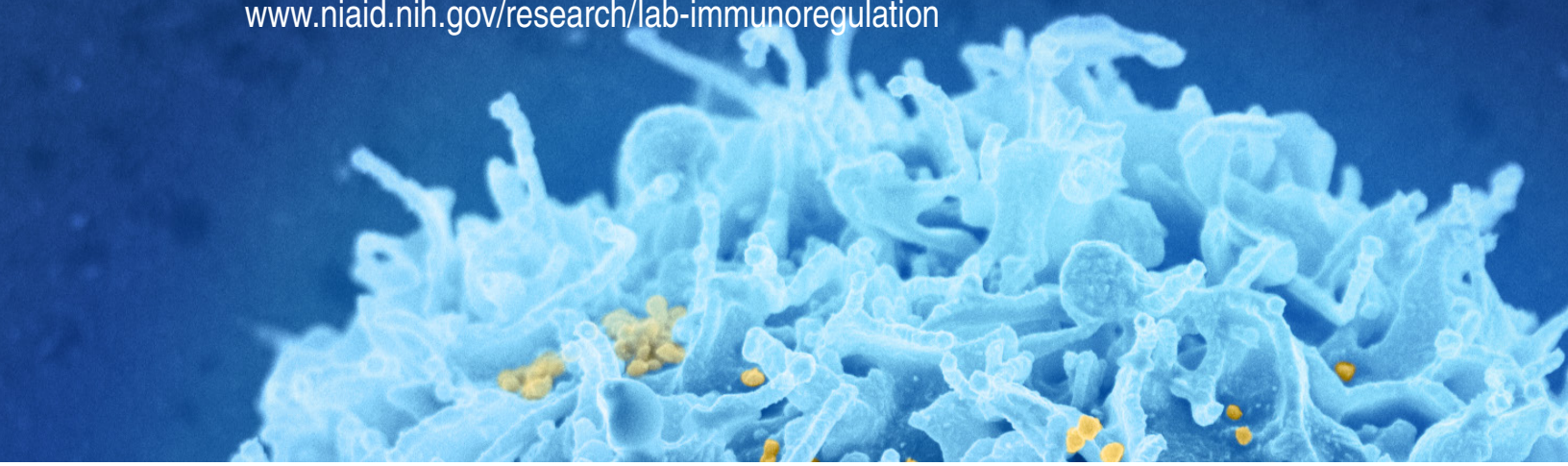
- Characterization of human monoclonal antibodies to infectious pathogens
- Biology of antibody response to *Plasmodium falciparum*, SARS-CoV-2, and *Mycobacterium tuberculosis*

BIOGRAPHY

Joshua Tan, Ph.D., is a Stadtman tenure-track investigator and an NIH Distinguished Scholar. He received his Ph.D. from the University of Oxford, England. Prior to joining the NIH, he was awarded the Pfizer Research Prize for his malaria work and the Sir Henry Wellcome Postdoctoral Fellowship to investigate human monoclonal antibodies that target the malaria-causing parasite *P. falciparum.*

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
- 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 Section
Susan Moir, Ph.D.

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

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

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

HIV Immunovirology Section
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., M.Sc.

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

ANTHONY S. FAUCI, M.D.

Director, NIAID
Chief, Laboratory of Immunoregulation
Chief, Immunopathogenesis Section, LIR
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MAJOR AREAS OF RESEARCH

- Roles of latently infected, resting CD4+ T cells, B cells, and innate immunity in the pathogenesis and treatment of HIV disease
- Role of HIV envelope signaling in viral replication and immune dysfunction
- 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. Dr. Fauci has been a key advisor to seven Presidents and their administrations on global HIV/AIDS issues, and on initiatives to bolster medical and public health preparedness against emerging infectious disease threats such as pandemic influenza and COVID-19. Dr. Fauci announced he will depart in December 2022 after 54 years at NIAID.

TAE-WOOK CHUN, PH.D.

Chief, HIV Immunovirology Section, LIR
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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 was the first to discover latently infected, resting CD4+ T cells in HIV-infected individuals. In 1997, he was recruited by Dr. Anthony Fauci in the Laboratory of Immunoregulation at NIAID to pursue his studies on HIV persistence in infected individuals receiving antiretroviral therapy as a postdoctoral research fellow. In 2001, Dr. Chun was appointed to the position of staff scientist and, in 2016, became a tenure-track investigator after being selected from the Trans-NIH Earl Stadtman Tenure-Track Program. Dr. Chun received full tenure in 2020.

MARK CONNORS, M.D.

Chief, HIV-Specific Immunity Section, LIR
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MAJOR AREAS OF RESEARCH

- Cellular immune response to HIV
- Mechanisms of immunologic control of HIV in rare patients termed long-term nonprogressors or elite controllers
- Mechanisms of broad cross-neutralization of HIV
- Basic immunology of the response to vaccination

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 T. DAVEY, JR., M.D.

NIAID Deputy Clinical Director
Chief, Clinical Research Section, LIR
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rdavey@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- HIV
- Influenza
- Ebola
- Emerging infectious diseases of public health importance

BIOGRAPHY

Dr. Davey received his M.D. from the Columbia University College of Physicians and Surgeons in 1980. He completed his internship and internal medicine residency at Boston University Hospital in 1983. He came to NIH as a fellow in NIAID's infectious diseases training program and received board certification in infectious diseases in 1986. He joined the Laboratory of Immunoregulation in 1987 as an attending physician in the NIAID/CCMD HIV Research clinic. In addition, he is deputy clinical director within NIAID and also serves as the medical director of the Special Clinical Studies Unit at the Clinical Center.

JOHN KEHRL, M.D.

Chief, B-Cell Molecular Immunology Section, LIR
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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
Deputy Director for Clinical Research and Special Projects, NIAID
Director, Division of Clinical Research, NIAID
Chief, Clinical and Molecular Retrovirology Section, LIR
www.niaid.nih.gov/research/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
- Emerging infectious diseases (COVID-19; Ebola)

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. 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, became NIAID Deputy Director for Clinical Research and Special Projects and Director of the Division of Clinical Research.

ANDREA LISCO, M.D., PH.D.

Assistant Clinical Investigator, LIR
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MAJOR AREAS OF RESEARCH

- Immunological, genetic, and virological determinants of the susceptibility to severe human papillomavirus (HPV)-related diseases
- Viral pathogenesis in skin and mucosal surfaces of patients with primary and acquired immunodeficiencies
- Immune-based therapeutic strategies of severe HPV-related diseases

BIOGRAPHY

Dr. Lisco earned his medical degree at University of Bari, Italy. He pursued his research interests in viral immunology and pathogenesis of oncogenic viruses during his Ph.D. at the University of Padua, Italy, and postdoctoral fellowship at NIH. He then underwent his internal medicine residency training at Case Western University Hospitals Cleveland Medical Center and returned to NIH to complete his fellowship training in infectious disease at NIAID. Since 2018, Dr. Lisco has been an assistant clinical investigator at NIAID.

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

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MAJOR AREAS OF RESEARCH

- Novel approaches (including mRNA) to the development of an HIV-1 vaccine
- Structure-function relationships in the HIV-1 envelope
- Structure-based design of improved therapeutic monoclonal antibodies
- Molecular basis of HIV-1 immune evasion
- Role of chemokines and other endogenous immune modulators in HIV-1 disease

BIOGRAPHY

Dr. Lusso received his M.D. from the University of Turin, Italy, 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 joined NIH for the first time in 1986 to work with Dr. Robert C. Gallo in the Laboratory of Tumor Cell Biology, 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 Cagliari University Medical School. In 2006, he re-joined NIH to become 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 or the European Molecular Biology Organization (EMBO) and a Fellow of the American Academy of Microbiology (AAM).

SUSAN MOIR, PH.D.

Chief, B-Cell Immunology Section, LIR
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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
- Characterization of B-cell responses to emerging pathogens

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. In 2020, Dr. Moir became a tenured senior investigator and chief of the B-Cell Immunology Section in LIR.

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

Chief, International HIV/STD Section, LIR
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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
- Study of the serologic responses to SARS-CoV-2 and other coronaviruses
- Quantification of the latent HIV reservoir in virally suppressed Ugandan men and women

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. He returned to NIAID and later became chief of the Section on International HIV/STI Research. In 2006, he was appointed as associate director for international research in the Division of Intramural Research. 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, and in 2006 became director of the Center for Global Health. Dr. Quinn is a member of the National Academy of Medicine in the National Academies of Science and is a fellow of the American Association for the Advancement of Science and the Association of American Physicians.

STEVEN J. REYNOLDS, M.D., M.P.H.

Senior Clinician, International HIV/STD Section, LIR
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MAJOR AREAS OF RESEARCH

- Treatment monitoring strategies to optimize HIV care in resource-limited settings
- Herpes virus co-infections among HIV-positive individuals and their role in immune activation
- Epidemiology of transmitted and acquired HIV drug resistance in Uganda and South Africa
- Implementation of combination HIV prevention strategies to reduce HIV incidence in Uganda

BIOGRAPHY

Dr. Reynolds obtained his M.D. from McGill University in 1994 and went on to receive specialty certification in internal medicine, medical microbiology, and infectious diseases. He completed his M.P.H. in 2002 at Johns Hopkins University while working on an HIV prevention collaboration in Pune, India. He is a senior clinician at NIAID and an associate professor of medicine and epidemiology at Johns Hopkins University. He has worked on collaborative research with colleagues in Uganda since 2003, where he oversees clinical and laboratory research activities for the NIAID International Centers for Excellence in Research (ICER) program. In addition to providing scientific direction to the ICER program in Uganda, he continues to provide HIV care and treatment at both Rakai Health Sciences Program and at the Infectious Diseases Institute in Kampala.

IRINI SERETI, M.D., M.H.S.

Chief, HIV Pathogenesis Section, LIR
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MAJOR AREAS OF RESEARCH

- HIV pathogenesis and related CD4 lymphopenia and inflammation
- Immune reconstitution inflammatory syndrome
- Idiopathic CD4 lymphopenia (ICL)
- Immune-based therapies in HIV and ICL
- COVID-19 pathogenesis

BIOGRAPHY

Dr. Sereti received her medical degree at the National Kapodistrian University of Athens in Greece and did her internal medicine residency and chief residency at Northwestern University in Chicago. She completed an M.H.S. from Duke University and her infectious diseases fellowship at NIAID. She stayed at NIAID as clinical investigator, receiving tenure in 2015. She is a physician scientist who has conducted multiple clinical trials and has published more than 200 peer reviewed papers. Dr. Sereti is a 2022 – 2023 Executive Leadership in Academic Medicine (ELAM) fellow and is one of the upcoming associate editors of the *Journal of Infectious Diseases* on her personal time. She is also a member of the executive committee of the NIH-Oxford-Cambridge Scholars program. She is passionate about translational research with excellence in patient care, mentorship, and promotion of women in biomedical sciences. She speaks English, Greek, Spanish and a touch of French.

LABORATORY OF INFECTIOUS DISEASES

Jeffrey I. Cohen, M.D., Chief
Jeffery Taubenberger, M.D., Ph.D., Deputy 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, viral gastroenteritis, flaviviruses, and herpesviruses.

Clinical studies complement LID's major areas of research, including testing candidate vaccines in clinical trials, human challenge studies with influenza and respiratory syncytial virus to study pathogenesis and immune correlates for protection against these viruses, 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
- Pandemic, seasonal, and animal influenza
- Evolution of norovirus, rotavirus, and influenza
- Immunodeficiencies associated with severe herpesvirus infections

SECTIONS AND UNITS

Caliciviruses Section
Kim Green, Ph.D.

Hepatic Pathogenesis Section
Patrizia Farci, M.D.

LID Clinical Studies Unit
Matthew J. Memoli, M.D., M.S.

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

RNA Viruses Section
Ursula Buchholz, Ph.D.

Structural Informatics Unit
Audray Harris, Ph.D.

Structural Virology Section
Joseph Marcotrigiano, Ph.D.

Translational Immunobiology Unit
Mattia Bonsignori, M.D., M.S.

Viral Epidemiology and Immunity Unit
Leah C. Katzelnick, Ph.D., M.P.H.

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

JEFFREY I. COHEN, M.D.

Chief, Laboratory of Infectious Diseases
Chief, Medical Virology Section, LID
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jcohen@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Development of vaccines against human herpesviruses
- Development of monoclonal antibodies and other therapeutics against herpesviruses
- Identification of cellular mutations and immune defects in patients with severe herpesvirus infections
- Analysis of SARS-CoV-2-specific antibody responses

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.

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

Deputy Chief, Laboratory of Infectious Diseases
Chief, Viral Pathogenesis and Evolution Section, LID
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MAJOR AREAS OF RESEARCH

- Influenza virus and coronavirus pathogenesis
- Animal models of influenza and coronavirus infection
- Influenza virus and coronavirus genomics and evolution
- Development of broadly protective "universal" influenza and coronavirus vaccines

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 held since 1994. Dr. Taubenberger's research interests include influenza virus and coronavirus biology, evolution, pathophysiology, clinical research, and influenza and coronavirus vaccine development.

MATTIA BONSIGNORI, M.D., M.S.

Chief, Translational Immunobiology Unit, LID
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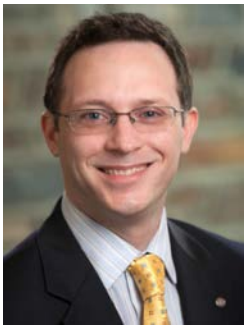
MAJOR AREAS OF RESEARCH

- Genetic and functional antibody evolution
- B cell responses after infection and upon vaccination
- Immunogen selection, design, and vaccine development
- Pathogens: HIV-1, flaviviruses, influenza virus, herpesviruses, betacoronaviruses, emerging pathogens



BIOGRAPHY

Dr. Bonsignori received his M.D. and M.S. in clinical microbiology and virology from the University of Insubria Medical School in Varese, Italy. He conducted postdoctoral research in the Department of Immunology at St. Jude Children's Research Hospital in Memphis, Tennessee, before being appointed research associate at the Duke Human Vaccine Institute, Duke University School of Medicine in Durham, North Carolina, where his activity focused primarily on HIV vaccine development. In 2009, he established the Laboratory of B-cell Repertoire Analysis and attained the position of associate professor of medicine. Dr. Bonsignori studied B cell and antibody responses in the field of HIV research, and later applied some of the technologies and workflows he developed to study B cell responses to *P. falciparum* and Zika virus. He supported the Duke University student COVID-19 surveillance program by establishing a high-throughput workflow that screened up to 20,000 samples per week. Dr. Bonsignori joined the Laboratory of Infectious Diseases in March 2021.

URSULA BUCHHOLZ, PH.D.

Chief, RNA Viruses Section, LID
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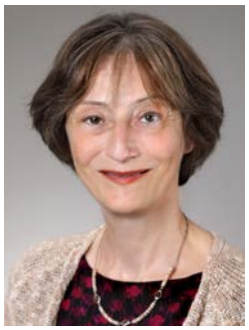
ubuchholz@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Respiratory syncytial virus (RSV), human parainfluenza virus (HPIV) serotypes 1, 2, and 3, and human metapneumovirus (HMPV)
- Live, attenuated RSV, HPIV3, and HMPV vaccine candidates
- Vaccine vectors based on HPIV and avian paramyxoviruses for use against highly pathogenic emerging viruses including severe acute respiratory syndrome-coronavirus-2, avian influenza, and Ebola viruses



BIOGRAPHY

Dr. Buchholz received her Ph.D. in 1994 from the Free University of Berlin, Germany. She conducted postdoctoral studies at the Federal Research Center of Virus Diseases of Animals in Tuebingen, Germany, and became a tenured scientist at the Federal Research Center in 2000. In 2002, she joined Dr. Peter L. Collins' section in the Laboratory of Infectious Diseases, and she became the chief of the RNA Viruses Section in 2020.

PATRIZIA FARCI, M.D.

Chief, Hepatic Pathogenesis Section, LID
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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 Dr. Robert H. Purcell in the Laboratory of Infectious Diseases (LID) as a visiting scientist. In 1992, she became associate professor of medicine 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 GREEN, PH.D.

Chief, Caliciviruses Section, LID
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MAJOR AREAS OF RESEARCH

- Molecular epidemiology and evolution of noroviruses
- Model systems for evaluating norovirus vaccines and therapeutics
- Translational research to prevent and treat norovirus disease

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 HARRIS, PH.D.

Chief, Structural Informatics Unit, LID
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harrisau@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Molecular architecture and assembly of viruses
- Structure-function and epitope mapping of viral glycoproteins
- Characterization and structural studies of vaccine immunogens and particles

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.

LEAH C. KATZELNICK, PH.D., M.P.H.

Chief, Viral Epidemiology and Immunity Unit, LID
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MAJOR AREAS OF RESEARCH

- Immunologically complex emerging and re-emerging viral diseases, including dengue and Zika
- Host immunologic correlates of enduring protection and disease
- Antigenic and genetic viral evolution
- Virus transmission dynamics

BIOGRAPHY

Dr. Leah Katzelnick pursued a Ph.D. studying antigenic variation among dengue viruses at the University of Cambridge and NIH as an NIH-Oxford-Cambridge Scholar and Gates Cambridge Scholar. After receiving her Ph.D. in 2016, she conducted her postdoctoral work at the University of California, Berkeley, and University of Florida on determinants of dengue and Zika disease, spending a year in Ecuador and Nicaragua to work closely with research teams conducting longitudinal cohort studies. In September of 2020, Leah became an Earl Stadtman tenure-track investigator and NIH Distinguished Scholar in the Laboratory of Infectious Diseases in NIAID. She is chief of the Viral Epidemiology and Immunity Unit.

JOSEPH MARCOTRIGIANO, PH.D.

Chief, Structural Virology Section, LID
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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. Joseph Marcotrigiano completed graduate studies at Rockefeller University in the laboratory of Dr. Stephen K. Burley, determining the first structures of proteins involved in eukaryotic translation initiation. After earning his Ph.D., Dr. Marcotrigiano 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. As a postdoctoral fellow, he determined the structures of hepatitis C virus nonstructural protein (NS) 5A and NS2. 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.

MATTHEW J. MEMOLI, M.D., M.S.

Director, Clinical Studies Unit, LID
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MAJOR AREAS OF RESEARCH

- Human influenza pathogenesis
- Influenza transmission and correlates of protection
- Influenza and other viral human challenge models
- Respiratory viruses

BIOGRAPHY

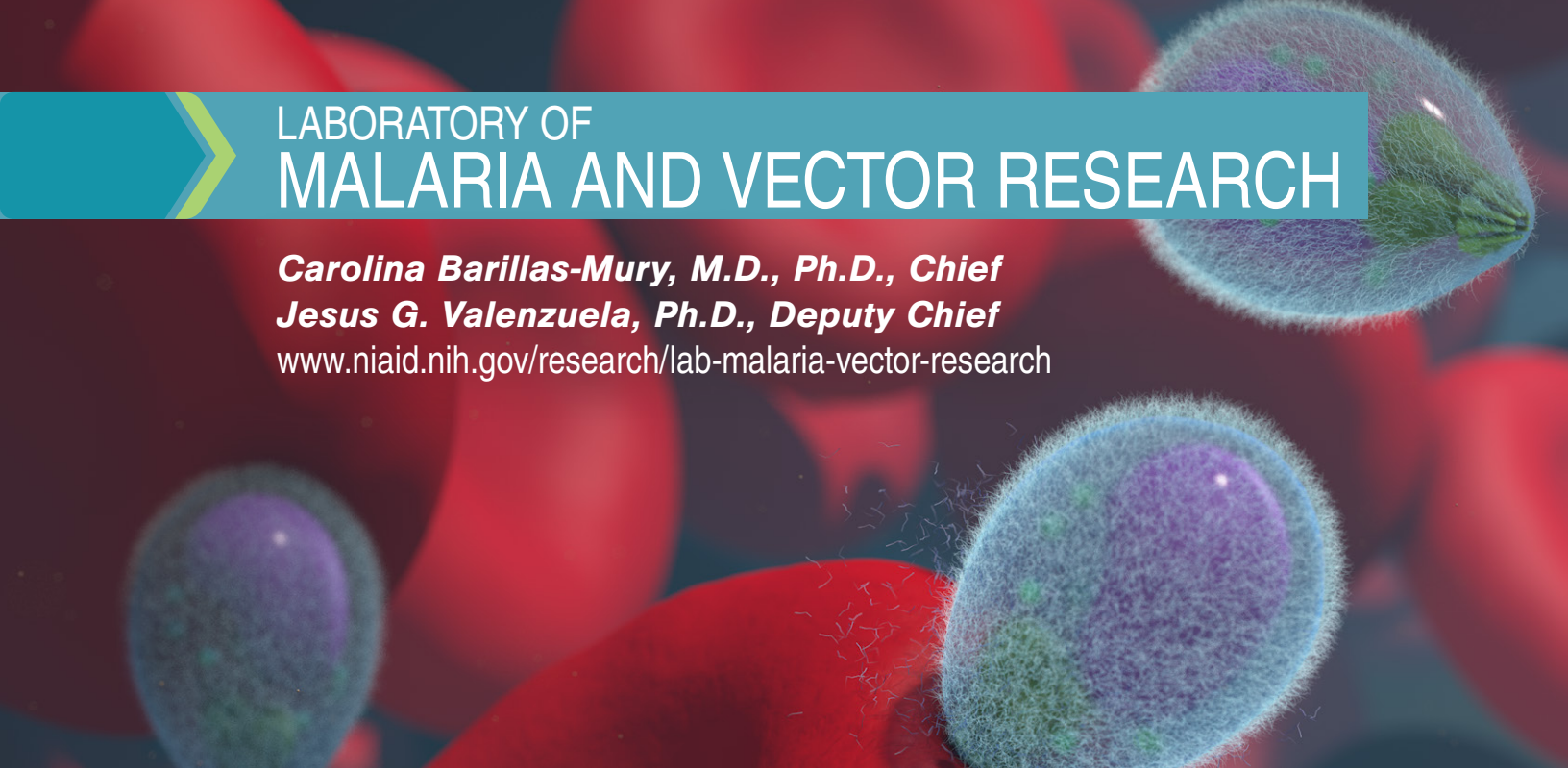
Dr. Memoli is a graduate of the College of William and Mary, and he received his master's degree in microbiology from Thomas Jefferson University in Philadelphia, PA. He then received his M.D. from St. George's University School of Medicine. He completed a residency in internal medicine at the Washington Hospital Center Georgetown University Internal Medicine Program in Washington, DC. After completing an infectious disease fellowship in NIAID, Dr. Memoli developed a clinical/translational research program to study influenza and other respiratory viruses in the Laboratory of Infectious Diseases. He now serves as chief of the LID Clinical Studies Unit.

JENNIFER WEBSTER-CYRIAQUE, D.D.S., PH.D.

Deputy Director, National Institute of Dental and Craniofacial Research
Adjunct investigator, LID
Jennifer.webster-cyriaque@nih.gov

BIOGRAPHY

Dr. Jennifer Webster-Cyriaque is the deputy director of National Institute of Dental and Craniofacial Research and an adjunct investigator in LIR. An accomplished clinician, researcher, and leader, she had previously served as a faculty member at the University of North Carolina (UNC) schools of dentistry and medicine for more than two decades. In addition to her research, Dr. Webster-Cyriaque has held leadership roles as the chair/vice chair of the Oral HIV/AIDS Research Alliance, as research director at the National Dental Association Foundation, as director of postdoctoral CTSA training, along with multiple roles within the American Association for Dental, Oral, and Craniofacial Research and the International Association for Dental Research. Since 2004, she has led the UNC Malawi project and provided assistance in founding Malawi's first dental school in 2019. Dr. Webster-Cyriaque earned her PhD in microbiology/immunology from the University of North Carolina-Chapel Hill in 1998, her DDS from SUNY Buffalo in 1992, and her BA in biology and interdisciplinary social science from SUNY Buffalo in 1988.



LABORATORY OF MALARIA AND VECTOR RESEARCH

Carolina Barillas-Mury, M.D., Ph.D., Chief
Jesus G. Valenzuela, Ph.D., Deputy Chief
www.niaid.nih.gov/research/lab-malaria-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 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 Long, Ph.D.

Molecular Entomology Unit
Eric Calvo, Ph.D.

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

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

NIAID International Center of Excellence in Research Cambodia
Jessica E. Manning, M.D., M.Sc.

Physiology Unit
Hans C. Ackerman, M.D., D.Phil., M.Sc.

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

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

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

Chief, Laboratory of Malaria and Vector Research
Chief, Mosquito Immunity and Vector Competence Section, LMVR
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cbarillas@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Mosquito immune responses that limit *Plasmodium* infection
- *Plasmodium* evasion of the mosquito immune system
- Hemocyte differentiation and immune memory in mosquitoes
- Mosquito antiviral immunity and susceptibility to dengue infection

BIOGRAPHY

Dr. Barillas received her B.S. in biology from Universidad del Valle de Guatemala, her M.D. from Universidad Francisco Marroquin de Guatemala, and her Ph.D. from the University of Arizona. She did her postdoctoral training in Prof. Fotis Kafatos' laboratory at Harvard University and at the European Molecular Biology Laboratory in Germany. She was an assistant professor at Colorado State University and joined NIH in 2003. She became senior investigator in 2010 and NIH Distinguished Investigator in 2016. Dr. Barillas-Mury received the 2010 Bailey K. Ashford Medal from the American Society of Tropical Medicine and Hygiene and the 2013 Sanofi/Pasteur Award in Tropical and Neglected Diseases and was elected a member of the National Academy of Sciences in 2014 and of the National Academy of Medicine in 2021.

JESUS G. VALENZUELA, PH.D.

Deputy Chief, Laboratory of Malaria and Vector Research
Chief, Vector Molecular Biology Section, LMVR
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jvalenzuela@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Impact of vector arthropod bites and vector-derived factors on innate and adaptive host skin immune responses
- Determinants of successful parasite infection and transmission in *Leishmania*-infected sand flies
- Translational research on vectors of disease with emphasis in sand flies, ticks, and mosquitoes

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. In 2019, Dr. Valenzuela became deputy chief of the Laboratory of Malaria and Vector Research.

HANS C. ACKERMAN, M.D., D.PHIL., M.SC.

Chief, Physiology Unit, LMVR
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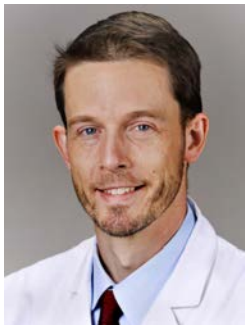
MAJOR AREAS OF RESEARCH

- Mechanisms by which globins regulate nitric oxide signaling between endothelial cells and vascular smooth muscle cells in human arteries
- The impact of genetic variation in globin genes on vascular function and vascular disease risk
- Nitric oxide metabolism and endothelial function in malaria and sickle cell disease



BIOGRAPHY

Dr. Ackerman received his D.Phil. from the University of Oxford where he studied variation in cytokines genes with Dominic Kwiatkowski. He earned a medical degree from Harvard Medical School and completed an internship and residency in internal medicine at Massachusetts General Hospital. In 2007, he came to the NIH Clinical Center as a clinical fellow and went on to become board certified in internal medicine and critical care medicine. In 2011, he received the NIAID Transition Program in Clinical Research Award to study the metabolic determinants of nitric oxide signaling and endothelial dysfunction in severe malaria. He began his tenure-track work on endothelial globins in the NHLBI Sickle Cell Branch in 2014. He moved to the NIAID Laboratory of Malaria and Vector Research in 2017 to expand his clinical research program at the NIH Clinical Center and to engage with NIAID's International Centers for Excellence in Research.

ERIC CALVO, PH.D.

Chief, Molecular Entomology Unit, LMVR
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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 DESAI, M.D., PH.D.

Chief, Apicomplexan Molecular Physiology Section, LMVR
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sdesai@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Cellular and molecular biology of the malaria parasite
- Identification and characterization of parasite-specific ion channels required for pathogen survival in humans and their mosquito vectors
- Molecular, structural, and biochemical studies of the plasmodial surface anion channel (PSAC) at the host membrane of infected erythrocytes
- Discovery and development of transport inhibitors as future 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 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
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calong@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Acquisition of immunity to malaria in those living in malaria-endemic areas
- Growth inhibition and standard membrane feeding assay for antibodies to *P. falciparum* erythrocytic and sexual stages
- Process of transmission of malaria in the field
- Malaria vaccine candidates focusing on the erythrocytic and sexual stages of malaria infection

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.

JESSICA E. MANNING, M.D., M.SC.

Assistant Clinical Investigator, LMVR
Science Attaché, U.S. Embassy Phnom Penh and NIAID ICER Cambodia
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MAJOR AREAS OF RESEARCH

- Clinical and field epidemiology of dengue, Zika, malaria, and other diseases carried by mosquitos and other arthropod vectors in tropical, endemic areas
- Characterization of host immune response to mosquito saliva
- Application of metagenomic next generation sequencing in patients with fever to identify known and emerging pathogens and to better understand disease transmission

BIOGRAPHY

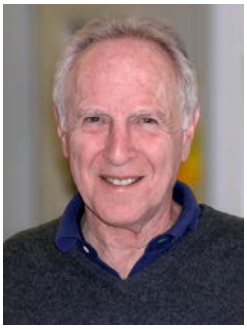
Dr. Manning earned her medical degree from Emory University School of Medicine and her Master of Science in epidemiology from Harvard School of Public Health. She completed the Doris and Howard Hiatt Residency in Global Health Equity and Internal Medicine at Brigham and Women's Hospital while a clinical fellow at Harvard Medical School. In 2015, she became an infectious diseases fellow at the NIH Clinical Center. She moved to NIAID's Laboratory of Malaria and Vector Research in Cambodia in 2017. In 2019, she was awarded a place in the NIAID Transition Program in Clinical Research. She is currently an assistant clinical investigator residing full-time in Cambodia where she leads the NIAID International Center of Excellence in Research (ICER) Cambodia.

LOUIS 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 Institute 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 RIBEIRO, M.D., PH.D.

Chief, Vector Biology Section, LMVR
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jribeiro@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Role of vector saliva in blood feeding by arthropods
- Discovery and determination of mode of action of novel anti-clotting, anti-platelet, immunomodulatory, and vasodilatory agents
- Expression of novel proteins and peptides with known and unknown function
- Development of tools for transcriptome annotation

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
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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.

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 *Plasmodium* 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.

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

Chief, Malaria Genetics Section, LMVR
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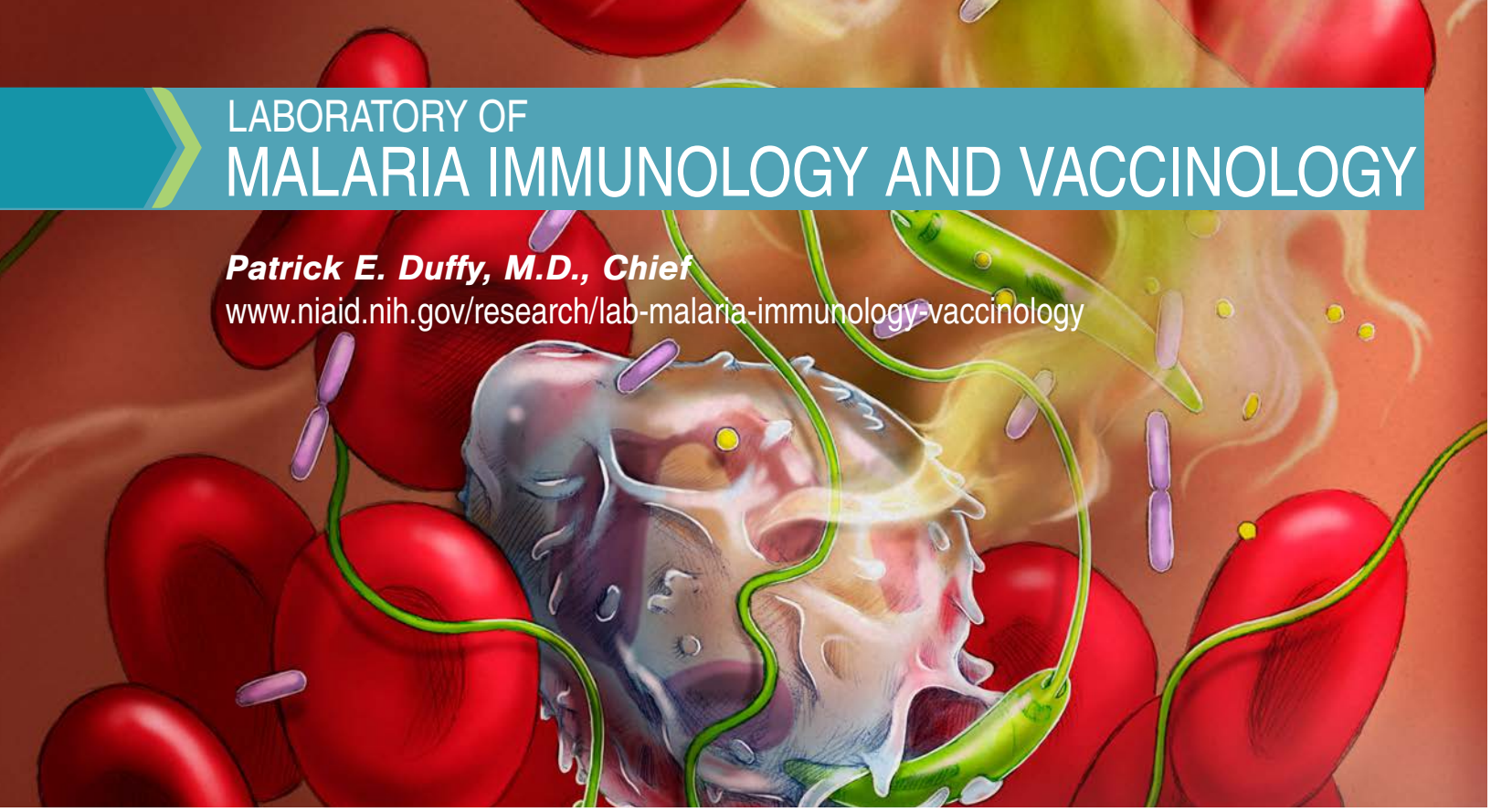
twellems@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Antimalarial drug responses and factors that affect clinical outcome after treatment
- Malaria parasite genetics and molecular biology of pathogenesis

BIOGRAPHY

Dr. Wellems received his M.D. and Ph.D. from the University of Chicago and completed his residency in internal medicine at the Hospital of the University of Pennsylvania. In 1984, he joined the NIAID Division of Intramural Research where he studies the drug responses and disease biology of *Plasmodium falciparum* and *Plasmodium vivax*. Dr. Wellems holds elected memberships in the National Academy of Sciences, the National Academy of Medicine, and the American Academy of Arts and Sciences. He is a past president of the American Society of Tropical Medicine and Hygiene, and he has served on numerous advisory committees for foundations and public-private partnerships, including the Medicines for Malaria Venture.



LABORATORY OF MALARIA IMMUNOLOGY AND VACCINOLOGY

Patrick E. Duffy, M.D., Chief
www.niaid.nih.gov/research/lab-malaria-immunology-vaccinology

LMIV WAS commissioned in 2009 to conduct basic and applied research relevant to malaria immunology and vaccine development, pursue novel vaccine concepts, produce prototype malaria vaccines, and 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 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 emphasis on studies in humans who are naturally or experimentally infected with malaria parasites. In parallel, the Vaccine Development Unit operates more like a small biotech firm than a typical research laboratory. Specialists in each step of the development process, from antigen selection, vaccine process development and manufacture, and preclinical animal modeling to clinical trials and assays of the immune response, contribute their expertise as the candidate moves along the development pathway. This allows multiple vaccine candidates to advance from concept to clinical trials efficiently and rapidly. Together, the Discovery sections and Vaccine Development Unit form a research and testing enterprise that can rapidly translate ideas into proof-of-concept trials and capture data about human immunity and responses to infection, which then inform new and improved strategies.

MAJOR AREAS OF RESEARCH

- Develop strategies for anti-infection, anti-disease, and transmission-blocking vaccines
- Conduct large longitudinal cohort studies to describe malaria epidemiology, especially in pregnant women and young children
- Enhance our basic understanding of malaria pathogenesis and host-parasite interactions in humans
- Develop assays and animal models and perform preclinical trials that define the potential for protection
- Produce, formulate antigens for human testing
- Execute clinical trials to test vaccines

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 E. Duffy, M.D.

Vaccine Development Unit
Patrick E. 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
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duffype@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Novel malaria vaccine concepts
- Pregnancy malaria: pathogenesis and vaccines
- Liver stage malaria: mechanisms and targets of protective immunity
- Severe malaria in children: epidemiology and pathogenesis

BIOGRAPHY

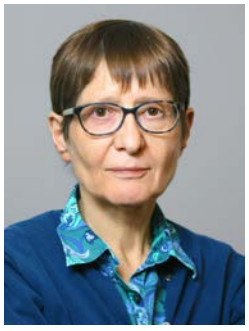
Dr. Duffy completed medical school at Duke University, internal medicine training at Walter Reed Army Medical Center, and postdoctoral research training in molecular vaccine development at NIAID. He now leads research teams that focus on malaria pathogenesis, immunity, and vaccine development. He has extensive experience leading human observational and interventional studies of malaria, as well as mentorship of young scientists in the United States and Africa. As chief of the Laboratory of Malaria Immunology and Vaccinology (LMIV), he is responsible for the intramural NIAID program to develop and test malaria vaccines in clinical trials. He previously served as malaria program director at Seattle Biomedical Research Institute (now part of Seattle Children's Research Institute) and as affiliate professor of pathobiology and of global health at the University of Washington.

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

- Biomarkers of malaria disease and immunity during pregnancy
- Malarial anemia pathways
- Targets of protective immunity in young children



BIOGRAPHY

Dr. Fried earned her Ph.D. in molecular parasitology at Hebrew University (Israel) and M.Sc. in biochemistry at Ben-Gurion University (Israel). Her groundbreaking work elucidated the molecular basis of placental malaria and described the model of protective immunity that is the basis of current pregnancy malaria vaccine development. This 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.

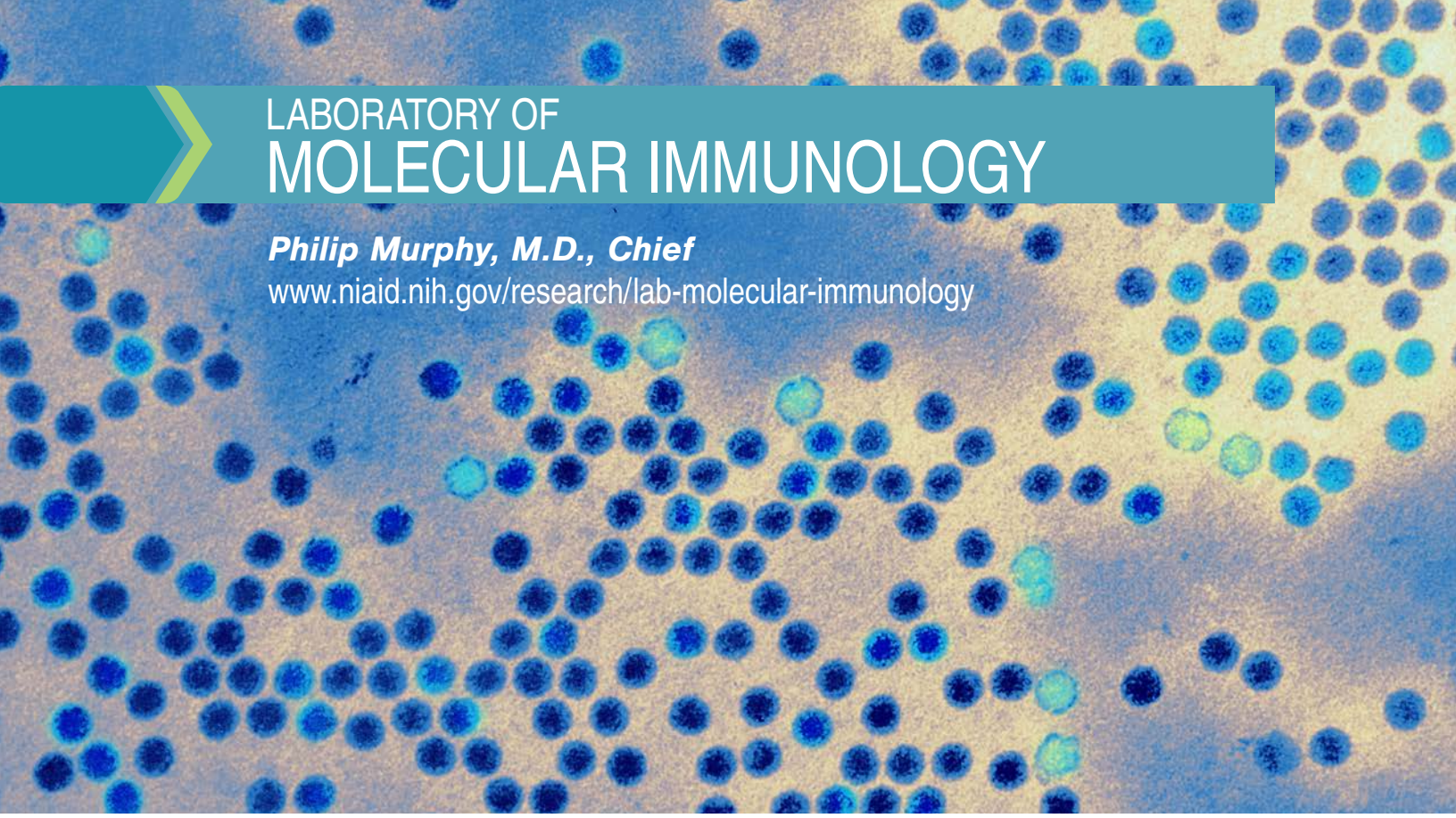
Chief, Host-Pathogen Interactions and Structural Vaccinology Section, LMIV
www.niaid.nih.gov/research/niraj-harish-tolia-phd
niraj.tolia@nih.gov

MAJOR AREAS OF RESEARCH

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

BIOGRAPHY

Dr. Tolia became chief of the Host-Pathogen Interactions and Structural Vaccinology Section in the Laboratory of Malaria Immunology and Vaccinology in May 2018. He is a tenured senior investigator. He received his B.Sc. from Imperial College and his Ph.D. from the Cold Spring Harbor Laboratory School of Biological Sciences as a Leslie Quick Jr. Fellow. Dr. Tolia began his independent career as an assistant professor of molecular microbiology and an assistant professor of biochemistry and molecular biophysics at Washington University School of Medicine in November 2007. He was the recipient of an Investigator in the Pathogenesis of Infectious Disease Award from the Burroughs Wellcome Fund, and his research was supported by grants from NIH, the Edward Mallinckrodt, Jr. Foundation, the American Heart Association, the W.M. Keck Foundation, and the Children's Discovery Institute.



LABORATORY OF MOLECULAR IMMUNOLOGY

Philip 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

Inflammation Biology Section
Joshua Farber, M.D.

Molecular Signaling Section
Philip Murphy, M.D.

Mucosal Immunobiology Section
Brian Kelsall, M.D.

PHILIP MURPHY, M.D.

Chief, Laboratory of Molecular Immunology
Chief, Molecular Signaling Section, LMI
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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 FARBER, M.D.

Chief, Inflammation Biology Section, LMI
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jfarber@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Chemokines and their receptors in human T-cell trafficking and differentiation, autoimmune/inflammatory disease, and cancer.

BIOGRAPHY

Dr. Farber obtained his M.D. from Johns Hopkins University, where he did additional clinical training in internal medicine and infectious diseases. Dr. Farber's postdoctoral research training was both at NIH (Laboratory of Biochemistry, NHLBI) and Johns Hopkins (Department of Molecular Biology and Genetics). 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 KELSALL, M.D.

Chief, Mucosal Immunobiology Section, LMI
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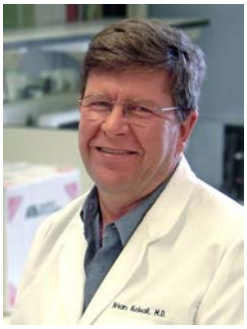
bkelsall@niaid.nih.gov

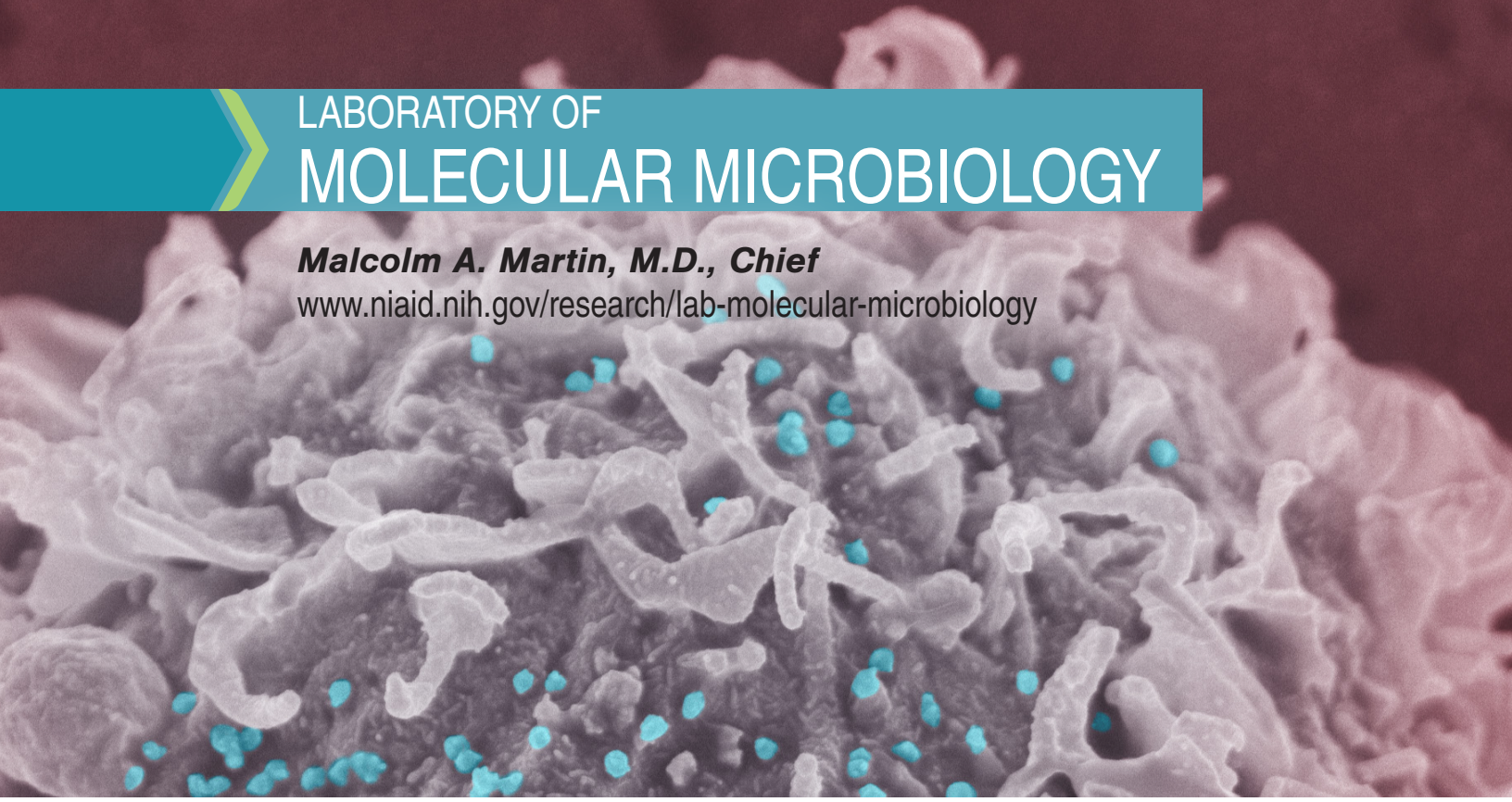
MAJOR AREAS OF RESEARCH

- Antigen presentation by mucosal dendritic cells (DCs) 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. Dr. Kelsall came to the National Institutes of Health in 1992, completed fellowship training in mucosal immunology in 1996, and became a senior investigator in 2003. His research focuses on the regulation of immune responses in the intestine, in particular the role that unique intestinal dendritic cell and macrophage populations play in the induction of immunity to intestinal viral pathogens and mucosal vaccines and in the pathogenesis of inflammatory bowel disease.



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, simmune 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.

SECTIONS AND UNITS

Viral Biochemistry Section
Klaus Strebel, Ph.D.

Viral Biology Section
Christine Kozak, Ph.D.

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

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

MALCOLM A. MARTIN, M.D.

Chief, Laboratory of Molecular Microbiology
Chief, Viral Pathogenesis and Vaccine Section, LMM
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mmartin@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Investigates the contribution of individual HIV-1 and SIV genes inducing immunodeficiency in SHIV-infected rhesus macaques
- Studies the use of broadly acting anti-HIV-1 neutralizing antibodies (bNAbs) to treat SHIV-infected rhesus macaques
- Assesses the role of bNAbs in preventing SHIV acquisition of NHPs by pre-exposure immunoprophylaxis
- Develops vaccine regimens targeting inferred germline B-cell precursors of anti-HIV bNAbs

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.

CHRISTINE 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 retroviruses
- Naturally occurring retroviruses
- Endogenous retroviruses

BIOGRAPHY

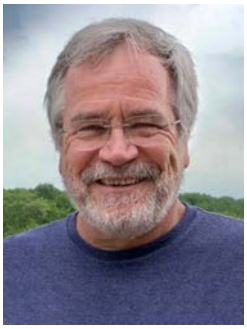
Dr. Kozak received her Ph.D. in biology from Yale University in 1977. After a postdoctoral fellowship at NIAID under Dr. Wallace Rowe, she joined the Laboratory of Molecular Microbiology (LMM) in 1984. In 1992, Dr. Kozak became chief of the Viral Biology Section in LMM. She has served as associate editor or editorial board member for several journals and has authored more than 400 research publications dealing with retroviruses and mouse genetics/genomics.

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 virus-host interactions
- 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 virus 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
Elodie Ghedin, Ph.D., Co-Deputy Chief
Amy Klion, M.D., Co-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.

SECTIONS AND UNITS

Eosinophil Clinical Research Unit
Paneez Khoury, M.D., M.H.Sc., FAAAAI

Helminth Immunology Section
Thomas Nutman, M.D.

Human Eosinophil Section
Amy Klion, M.D.

Intracellular Parasite Biology Section
David Sacks, Ph.D.

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

Molecular Parasitology Section
Michael Grigg, Ph.D.

Systems Genomics Section
Elodie Ghedin, Ph.D.

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

Type 2 Immunity Section
P'ng Loke, Ph.D.

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

THOMAS NUTMAN, M.D.

Chief, Laboratory of Parasitic Diseases
Chief, Helminth Immunology Section, LPD
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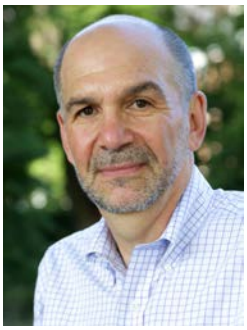
tnutman@mail.nih.gov

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
- Type 2-associated responses and their control in parasitic helminth infections and related disorders



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 (Bellevue) 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, where he is currently LPD's chief, as well as chief of the Helminth Immunology Section. 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. He is on numerous advisory committees and editorial boards and holds patents related to parasite diagnosis and vaccine development.

ELODIE GHEDIN, PH.D.

Co-Deputy Chief, Laboratory of Parasitic Diseases
Chief, Systems Genomics Section, LPD
www.niaid.nih.gov/research/elodie-ghedin-phd
elodie.ghedin@nih.gov

MAJOR AREAS OF RESEARCH

- Respiratory virus transmission and evolution
- Microbial interactions in respiratory infections (influenza, COVID-19, tuberculosis)
- Host-parasite interactions in filarial worm infections

BIOGRAPHY

Dr. Elodie Ghedin obtained her Ph.D. from McGill University's Institute of Parasitology in Montreal, Canada. In 2000, following a postdoctoral fellowship at NIAID, she joined The Institute for Genomic Research (now the J. Craig Venter Institute). In 2006 she joined the University of Pittsburgh School of Medicine where she was part of the department of computational and systems biology and the center for vaccine research. In 2014 she moved to New York University where she was a professor of biology in the college of arts and sciences and a professor of epidemiology in the school of global public health. From 2017 to 2019, she served as director of NYU's Center for Genomics and Systems Biology. In May 2020, Dr. Ghedin joined NIAID's Laboratory of Parasitic Diseases as a senior investigator. She also holds an affiliated position with New York University.

AMY KLION, M.D.

Co-Deputy Chief, Laboratory of Parasitic Diseases
Chief, Human Eosinophil Section, LPD
www.niaid.nih.gov/research/amy-klion-md
aklion@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Identification and characterization of new subtypes of hypereosinophilic syndromes (HES)
- 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
- Elucidation of the role of the eosinophil in pathogenesis of eosinophilic disorders

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 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.

DANIEL L. BARBER, PH.D.

Chief, T-Lymphocyte Biology Section, LPD
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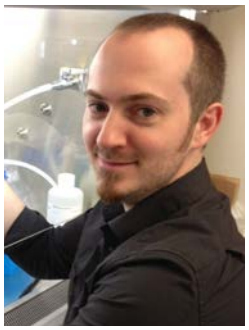
barberd@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- T cell responses to *Mycobacterium tuberculosis* infection in mice and non-human primates.
- Immune responses to SARS-CoV-2 infection in non-human primates



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 2012, Dr. Barber was awarded a position as an Earl Stadtman Tenure-Track Investigator in the Laboratory of Parasitic Diseases, and he was tenured and promoted to Senior Investigator in 2019.

MICHAEL GRIGG, PH.D.

Chief, Molecular Parasitology Section
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

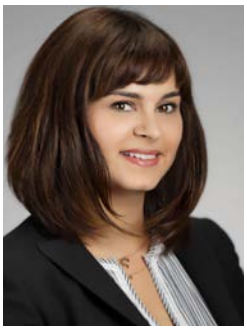
Dr. Grigg earned his B.Sc. in 1989 from the University of British Columbia. He obtained his Ph.D. and D.I.C. in 1994 from the Imperial College of Science, Technology, and Medicine, University of London. From 1994 to 1997, Dr. Grigg was a Howard Hughes Medical Institute senior fellow at the University 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 Diseases 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.

PANEEZ KHOURY, M.D., M.H.SC., FAAAAI

Chief, Eosinophil Clinical Research Unit, Human Eosinophil Section, LPD
Director, Allergy & Immunology Fellowship Training Program, LAD
www.niaid.nih.gov/research/paneez-khoury-md-mhsc
paneez.khoury@nih.gov

MAJOR AREAS OF RESEARCH

- Characterization and treatment of eosinophilic disorders
- Eosinophil responses to glucocorticoids
- Clinical trials and studies in eosinophilic disorders
- Patient-centered clinical research in eosinophilic disorders
- Disparities education and education methods in allergy & immunology



BIOGRAPHY

Paneez Khoury, M.D. is a senior clinician in NIAID. She joined the Human Eosinophil Section in 2012 where she is head of the Eosinophil Clinical Research Unit. She received her M.D. from University of Illinois College of Medicine in Chicago, followed by an internal medicine residency at the Ohio State University and a fellowship in allergy and clinical immunology at NIH. She also holds a Master of Health Sciences from Duke University, is board certified in internal medicine and allergy/immunology and is a fellow of the American Academy of Allergy, Asthma, and Immunology (AAAAI). At NIH, she serves as chair of the scientific review committee of the Laboratory of Parasitic Diseases. She sits on the graduate medical education committee, including the policy subcommittee, and is a member of the staff clinician council.

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 roles of toxins in bacterial pathogenesis
- Bacterial gene regulation, interactions of bacteria and toxins with animal cells and tissues, effects of toxins on host physiology, 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 the National Institutes of Health in 1989 and to NIAID in 2003.

P'NG LOKE, PH.D.

Chief, Type 2 Immunity Section, LPD
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png.loke@nih.gov

MAJOR AREAS OF RESEARCH

- Type 2 cytokine (IL-4 and IL-13)-activated macrophages during helminth infections
- Genetic and environmental contributions toward immune variation between individuals
- Helminth infections, inflammatory bowel diseases, metabolic syndrome, atherosclerosis, chronic inflammation
- Role of microbiota during helminth infections

BIOGRAPHY

Dr. P'ng Loke completed his Ph.D. research at the University of Edinburgh on IL-4-activated macrophages responding to ***Brugia malayi*** filarial parasites in 2001. He then did postdoctoral research on costimulatory molecules at University of California-Berkeley and studied macrophage responses to different parasites at University of California-San Francisco. In 2009, he joined New York University School of Medicine as an assistant professor and was a tenured associate professor before he joined the Laboratory of Parasitic Diseases as a senior investigator in 2020.

DAVID 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

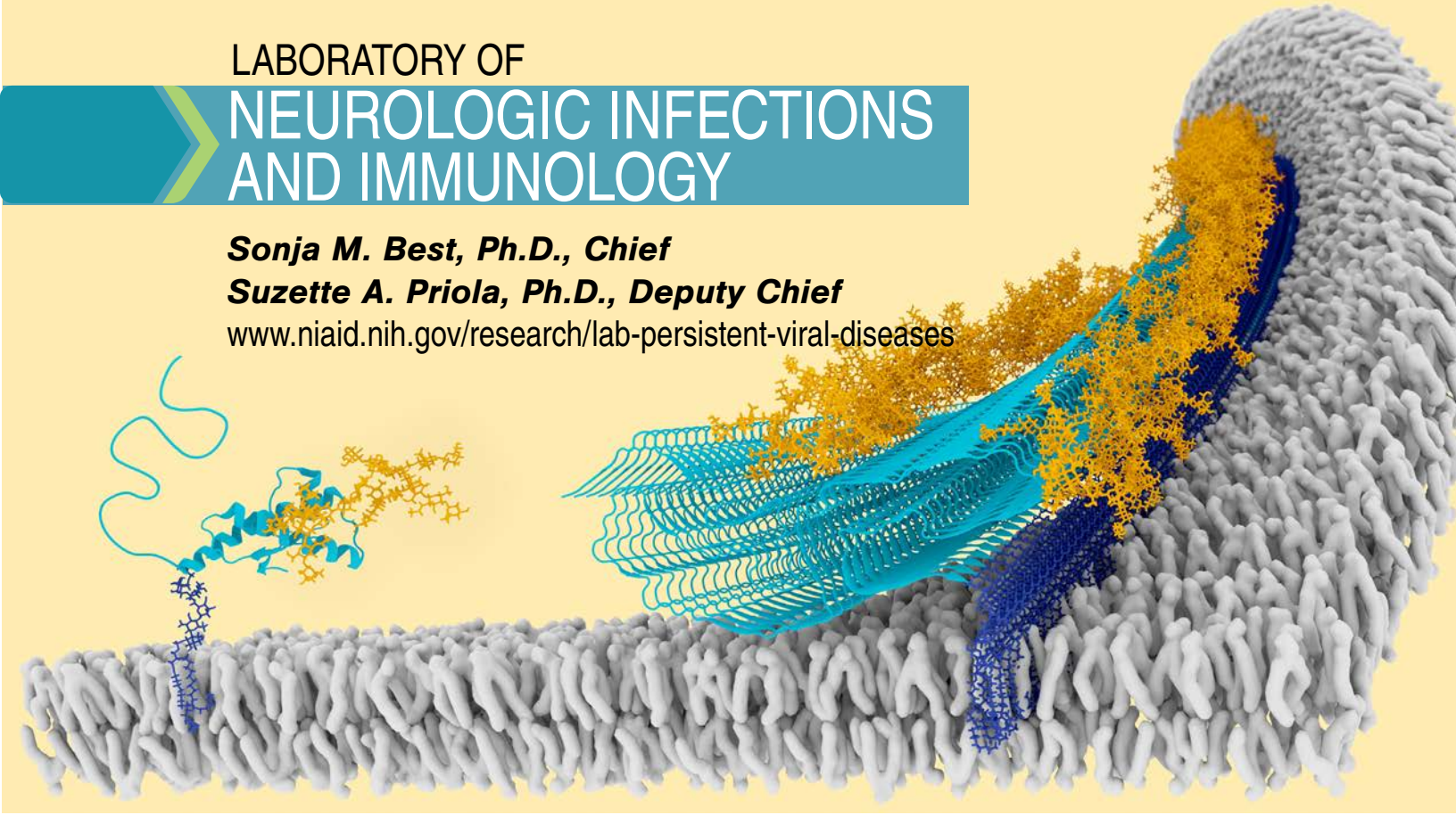
- Parasite and sand fly molecules controlling transmissible infections in the vector
- Vaccines against leishmaniasis
- Acquired resistance in cutaneous leishmaniasis
- Pathogenesis and immunosuppression in human visceral leishmaniasis
- Sexual reproductive strategies in *Leishmania*

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 NEUROLOGIC INFECTIONS AND IMMUNOLOGY

Sonja M. Best, Ph.D., Chief
Suzette A. Priola, Ph.D., Deputy Chief
www.niaid.nih.gov/research/lab-persistent-viral-diseases



THE LABORATORY of Neurologic Infections and Immunology, (formerly Persistent Viral Diseases) 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, murine and human retroviruses.

MAJOR AREAS OF RESEARCH

- Understand basic pathogenic mechanisms induced by these infections
- Study immune or other defense mechanisms used by infected individuals against infections
- Develop drug therapies capable of reducing or eliminating such infections

SECTIONS AND UNITS

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

Neuroimmunology Section
Karin E. Peterson, Ph.D.

Prion Cell Biology Unit
Cathryn L. Haigh, Ph.D.

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

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

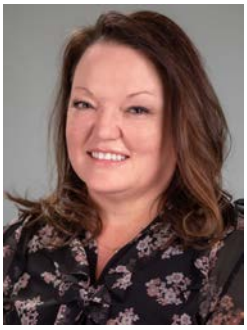
TSE/Prion and Retroviral Pathogenesis Section
Bruce W. Chesebro, M.D.

SONJA M. BEST, PH.D.

Chief, Laboratory of Neurologic Infections and Immunology
Chief, Innate Immunity and Pathogenesis Section, LNII
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
- Role of novel interferon-stimulated genes (ISGs) in host resistance to virus infection
- Importance of dendritic cell (DC) function to antiviral 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 used 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.

SUZETTE A. PRIOLA, PH.D.

Deputy Chief, Laboratory of Neurologic Infections and Immunology
Chief, TSE/Prion Molecular Biology Section, LNII
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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 deputy chief of the Laboratory of Persistent Viral Diseases and chief of the TSE/Prion Molecular Biology Section.

BYRON CAUGHEY, PH.D.

Chief, TSE/Prion Biochemistry Section, LNII
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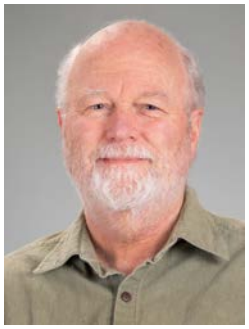
MAJOR AREAS OF RESEARCH

- Prion diseases
- Alzheimer's disease and other tauopathies
- Parkinson's disease and other synucleinopathies
- Prion structural biology and biochemistry
- Prion cell biology
- Diagnostic tests for pathological protein aggregates
- Prion disease therapeutics



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 research on prions and other proteinopathies in the Laboratory of Persistent Viral Diseases since 1986. He became a tenured senior investigator in 1994. Dr. Caughey is a fellow of the American Academy of Microbiology.

BRUCE W. CHESEBRO, M.D.

Chief, TSE/Prion and Retroviral Pathogenesis Section, LNII
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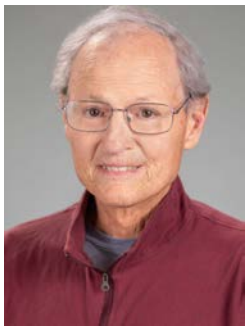
bchesebro@niaid.nih.gov

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.

CATHRYN L. HAIGH, PH.D.

Chief, Prion Cell Biology Unit, LNII
www.niaid.nih.gov/research/cathryn-l-haigh-phd
cathryn.haigh@nih.gov

MAJOR AREAS OF RESEARCH

- Prion diseases
- Prion redox biology
- Prion protein processing and function
- Cerebral organoid models of prion infection and disease

BIOGRAPHY

Dr. Haigh received her Ph.D. in biochemistry from the University of Bath (UK). Her thesis focused on the cellular function of the prion protein and genetic control of its expression. In July 2006, she relocated to The University of Melbourne (Australia) as a senior research officer in the department of pathology to continue her research into prion diseases. She subsequently held the positions of honorary research fellow at the Mental Health Research Institute of Victoria (Australia), senior research fellow in the department of medicine at the University of Melbourne, and senior scientist for the Australian National CJD Registry. She additionally managed the prion containment facility within the Melbourne Brain Centre. In 2017, Dr. Haigh was recruited to NIAID and established the Prion Cell Biology Unit, of which she is currently the chief.

KARIN E. PETERSON, PH.D.

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

MAJOR AREAS OF RESEARCH

- Interaction of immune and nervous systems
- Neuropathogenesis of orthobunyaviruses, including La Crosse virus and Jamestown Canyon virus
- Neuropathogenesis of Zika virus
- Mechanisms of virus-induced neuronal damage
- Immune responses in the central nervous system

BIOGRAPHY

Karin Peterson received her Ph.D. in microbiology and immunology in 1998 from the University of Missouri Medical School. 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 central nervous system (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. 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. She was tenured in 2016 and became a senior investigator and chief of the Neuroimmunology Section.

LABORATORY OF VIRAL DISEASES

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

RESEARCH programs in the Laboratory of Viral Diseases (LVD) explore fundamental aspects of cell and molecular biology, viral pathogenesis, and viral immunology within the context of a diverse group of medically important viruses that includes human/simian immunodeficiency viruses, poxviruses, herpesviruses, papillomaviruses, coronaviruses, influenza viruses, alphaviruses, and flaviviruses. The goals of these research programs are to create knowledge that increases a basic biological understanding of these pathogens and their interactions with their hosts and to generate new strategies for preventing and treating viral diseases.

The LVD is a highly collaborative environment focused on both scientific discovery and the mentoring of young scientists. LVD seminar series provide opportunities for trainees to present and discuss their science with the entire LVD, to meet prominent virologists, and to gain professional insight from scientists with “beyond the bench” careers.

SECTIONS AND UNITS

Arbovirus Vaccine Research Section
Stephen Whitehead, Ph.D.

Barrier Immunity Section
Jason Brenchley, Ph.D.

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

DNA Tumor Virus Section
Alison McBride, Ph.D.

Emerging Virus Immunity Unit
Julie M. Fox, Ph.D.

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

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

Quantitative Virology and Evolution Unit
Patrick T. Dolan, Ph.D.

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

MAJOR AREAS OF RESEARCH

- Viral entry into cells
- Regulation of viral and host gene expression
- Mechanisms of viral DNA replication
- Biogenesis of viral proteins and particles
- Actions of viral growth factors and immune defense molecules
- Determinants of viral virulence and pathogenicity
- Generation of MHC class I peptides
- Specificity and function of antiviral antibodies
- Development of recombinant expression vectors, candidate vaccines, and antiviral agents
- Wide range of DNA and RNA viruses
- Wide range of expertise, including molecular biology, cell biology, cellular immunology, humoral immunology, carcinogenesis, recombinant viruses, vaccines, viral pathogenesis, and the microbiome

THEODORE C. PIERSON, PH.D.

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

MAJOR AREAS OF RESEARCH

- Flavivirus assembly and entry
- Humoral immunity to arbovirus infections
- Arbovirus vaccine design and evaluation

BIOGRAPHY

Dr. Pierson received his Ph.D. from The Johns Hopkins University School of Medicine in 2001. Dr. Pierson trained as a postdoctoral fellow and research associate with Dr. Robert W. Doms at the University of Pennsylvania, where he developed interests in the virology and immunology of arboviruses. In 2005, Dr. Pierson was recruited to the Laboratory of Viral Diseases (LVD) to initiate an independent research program focused on flavivirus biology. His laboratory, the Viral Pathogenesis Section, explores fundamental and translational questions related to the structure of flaviviruses, their interactions with cells and host factors, and humoral immunity. These perspectives guide the development of vaccines and studies of the mechanisms and correlates of immune protection. In 2018, Dr. Pierson assumed the responsibility of chief of the LVD. Dr. Pierson is an American Academy of Microbiology Fellow and recipient of the NIH Director's Ruth L. Kirschstein Mentoring Award.

JASON 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 and has been a senior investigator since 2013.

PATRICK T. DOLAN, PH.D.

Chief, Quantitative Virology and Evolution Unit, LVD
www.niaid.nih.gov/research/patrick-t-dolan-phd
patrick.dolan@nih.gov

MAJOR AREAS OF RESEARCH

- Virus-host dynamics at single-cell resolution
- Virus evolution within and across hosts
- Systems biology of virus infection
- RNA viruses: Picornaviridae, Flaviviridae, and others

BIOGRAPHY

Patrick T. Dolan, Ph.D., is an experimental virologist and computational biologist whose work focuses primarily on the evolution and host-virus interactions of positive-sense RNA viruses. Patrick earned his B.S. degree in microbiology and molecular genetics from Michigan State University and his Ph.D. in biological sciences in 2014 from Purdue University. Patrick then pursued postdoctoral studies at Stanford University and University of California, San Francisco, in the laboratories of professors Raul Andino and Judith Frydman, where he developed methods to understand the evolutionary dynamics of enteroviruses and flaviviruses in alternative host environments. In the fall of 2021, Patrick began as unit chief of the Quantitative Virology and Evolution Unit at NIAID in Bethesda, MD, where he will continue to study the forces that shape the long- and short-term evolution of RNA virus populations.

JULIE M. FOX, PH.D.

Chief, Emerging Virus Immunity Unit, LVD
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julie.fox@nih.gov

MAJOR AREAS OF RESEARCH

- Immunity and pathogenesis of alphaviruses
- Antibody-based immunity and contributions of antibody effector functions
- Mechanisms of cross-immunity between alphaviruses
- Mouse models of viral infection
- Cross-talk between innate and adaptive immunity

BIOGRAPHY

Dr. Fox received her Ph.D. in infectious diseases from the University of Georgia in 2013 working on host immunity to influenza virus. She completed her postdoctoral training in arbovirus immunity at Washington University in St. Louis School of Medicine in the division of infectious diseases in 2020. Dr. Fox joined the Laboratory of Viral Diseases in 2020.

THOMAS M. KRISTIE, PH.D.

Chief, Molecular Genetics Section, LVD
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tkristie@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- Herpes simplex virus gene expression
- The role of transcriptional coactivators in regulation of herpesvirus lytic infection and reactivation from latency
- Chromatin control of herpesvirus lytic and latency-reaction cycles

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 immediate early 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

- Mechanisms by which extrachromosomal human papillomavirus (HPV) genomes are established, partitioned, and amplified during persistent infection
- Role of host intrinsic immunity and DNA damage response and repair pathways in HPV DNA replication
- Analysis of the mechanism and consequences of viral genome integration in HPV-associated cancers
- Keratinocyte biology: reprogramming keratinocytes by rho kinase inhibition
- PaVE: The PapillomaVirus Episteme, a bioinformatics resource

BIOGRAPHY

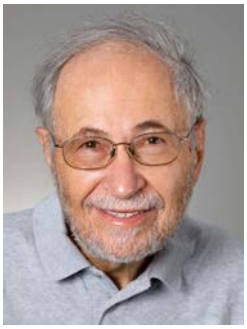
Dr. McBride received a B.Sc. (Hons) in molecular biology from the University of Glasgow, Scotland, and a Ph.D. in biochemistry from the Imperial Cancer Research Fund and Imperial College, England, studying Epstein-Barr virus. She began working on human and other papillomaviruses as a postdoctoral fellow in the National Cancer Institute and joined NIAID in 1994. She became a senior investigator in the Laboratory of Viral Diseases in 2000, and a section chief in 2001. Dr. McBride is also adjunct faculty, a member of the virology graduate program at the University of Maryland. She is a fellow, American Academy of Microbiology; section editor, *PLOS Pathogens*; and editor, *Virology*.

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
- Viral immune defense proteins
- Recombinant vaccines



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. 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 on the editorial boards of the *Proceedings of the National Academy of Sciences*, the *Journal of Virology*, and the *NIH Catalyst*. He is an adjunct professor at the University of Maryland.

STEPHEN WHITEHEAD, PH.D.

Chief, Arbovirus Vaccine Research Section
swhitehead@niaid.nih.gov

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 and other endogenous antigens
- Defining mechanisms of influenza and coronavirus evolution and antigenic variation in viral glycoproteins
- Understanding immunodominance in B-cell and antibody responses to influenza A virus
- Identifying and characterizing novel viral proteins
- Cell biology of specialized and non-canonical protein translation

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 Sir 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 Laboratory of Viral Diseases 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 to elucidate the viral pathogenesis, immune responses, molecular evolution, cellular and molecular biology, and vector-host interactions.

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.

Immunobiology and Molecular Virology Unit
Andrea Marzi, Ph.D.

Innate Virus Ecology Section
Vincent Munster, Ph.D.

Molecular Pathogenesis Unit
Emmie de Wit, Ph.D.

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.

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

Chief, Laboratory of Virology
Chief, Disease Modeling and Transmission Section, LV
Chief Scientist of the RML BSL4 Laboratories
www.niaid.nih.gov/research/heinz-feldmann-md-phd
feldmannh@mail.nih.gov

MAJOR AREAS OF RESEARCH

- Disease modeling using a variety of animal species including rodents, livestock, and nonhuman primates
- Virus transmission in reservoir and host species
- Emergency vaccines using different replication-competent and replication-deficient viral vector platforms, as well as replicating RNA approaches
- Antivirals and therapeutics

BIOGRAPHY

Heinz Feldmann graduated from medical school in 1987 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 in Marburg and the Centers for Disease Control and Prevention in Atlanta, a National Research Council fellowship. Following his postdoctoral training, he was an assistant and associate professor at the Institute of Virology in Marburg. From 1999 to 2008, he held the position of chief, special pathogens program of the National Microbiology Laboratory, Public Health Agency of Canada. Since 2008, he has been chief of the Laboratory of Virology and chief scientist of the biosafety level (BSL)-4 laboratories at the Rocky Mountain Laboratories, NIAID, NIH. Heinz Feldmann is a laboratory expert on high-containment pathogens and serves as a consultant on emerging viruses for the World Health Organization. He has field experience and expertise in outbreak management.

MARSHALL E. BLOOM, M.D.

Chief, Biology of Vector-Borne Viruses Section, LV
Associate Director for Science Management, Rocky Mountain Laboratories
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mbloom@niaid.nih.gov

MAJOR AREAS OF RESEARCH

- 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, MO, and 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 2002, Dr. Bloom was appointed associate director for RML. In 2008, Dr. Bloom was named associate director for science management for RML in the NIAID Division of Intramural Research. He has also served as acting chief of the NIAID Laboratory of Virology and Laboratory of Human Bacterial Pathogenesis.

EMMIE DE WIT, PH.D.

Chief, Molecular Pathogenesis Unit, LV
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MAJOR AREAS OF RESEARCH

- Pathogenesis of emerging viruses that cause severe respiratory disease
- Develop *in vitro* and *in vivo* model systems to integrate analyses of pathogen, single cell, and host to identify common pathways involved in disease progression
- Use our knowledge of the pathogenesis of respiratory tract infections to aid development of effective, broad-acting therapeutics

BIOGRAPHY

Dr. de Wit received her Ph.D. in virology from Erasmus University Rotterdam, the Netherlands. Dr. de Wit then moved to the Laboratory of Virology. In 2014 to 2015, Dr. de Wit spent 4 months in a field lab in Monrovia, Liberia, in charge of patient diagnostics for several Ebola treatment units in the area, to help contain the devastating Ebola epidemic in Liberia. In 2019, Dr. de Wit became chief of the Molecular Pathogenesis Unit. When SARS-CoV-2 emerged in late 2019, Dr. de Wit focused her research on SARS-CoV-2, developing animal models and using those for testing of medical countermeasures and gaining a better understanding of SARS-CoV-2 pathogenesis. Among other accomplishments, the data generated in Dr. de Wit's lab contributed to the licensing of remdesivir as an antiviral treatment for COVID-19 patients.

ANDREA MARZI, PH.D.

Chief, Immunobiology and Molecular Virology Unit, LV
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MAJOR AREAS OF RESEARCH

- Identification of viral and host factors driving pathogenicity
- Analysis of immune responses to vaccination and challenge to identify important components of protection
- Development of prophylactic and therapeutic strategies against emerging viruses

BIOGRAPHY

Dr. Marzi received her Ph.D. in virology from the Friedrich-Alexander University Erlangen-Nurnberg, Germany. After a short first postdoc in Winnipeg, Canada, at the National Microbiology Laboratory-Public Health Agency of Canada, Dr. Marzi moved to the NIAID Rocky Mountain Laboratories and continued her biosafety level-4 work on vaccine development for highly pathogenic viruses using primarily the vesicular stomatitis virus (VSV) platform. In 2019, Dr. Marzi was selected as a tenure-track investigator in the NIAID Laboratory of Virology and as an NIH Distinguished Scholar. The German Society of Virology recognized Dr. Marzi with the prestigious Löffler-Frosch Preis (Award) for her research on filoviruses and vaccine development in 2019.

VINCENT MUNSTER, PH.D.

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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. 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. Dr. Munster joined NIAID's Laboratory of Virology as a visiting fellow in 2009. In 2013, Dr. Munster established the Innate Virus Ecology Section as an independent tenure-track investigator. The mission of the Innate Virus Ecology Section is to elucidate the ecology of emerging viruses and drivers of zoonotic and cross-species transmission. The Innate Virus Ecology Section uses a combined field and experimental research approach and conducts research at the state-of-the-art high- and maximum-containment facilities of the Rocky Mountain Laboratories, as well as at field study sites in Africa (the Republic of the Congo, Mali), the Caribbean (Trinidad and Tobago), and the Middle East (Jordan).

MOLECULAR HIV HOST INTERACTIONS SECTION

Maureen M. Goodenow, Ph.D., Chief
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MAUREEN M. GOODENOW, PH.D.

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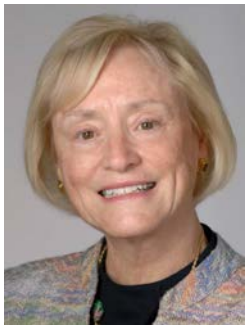
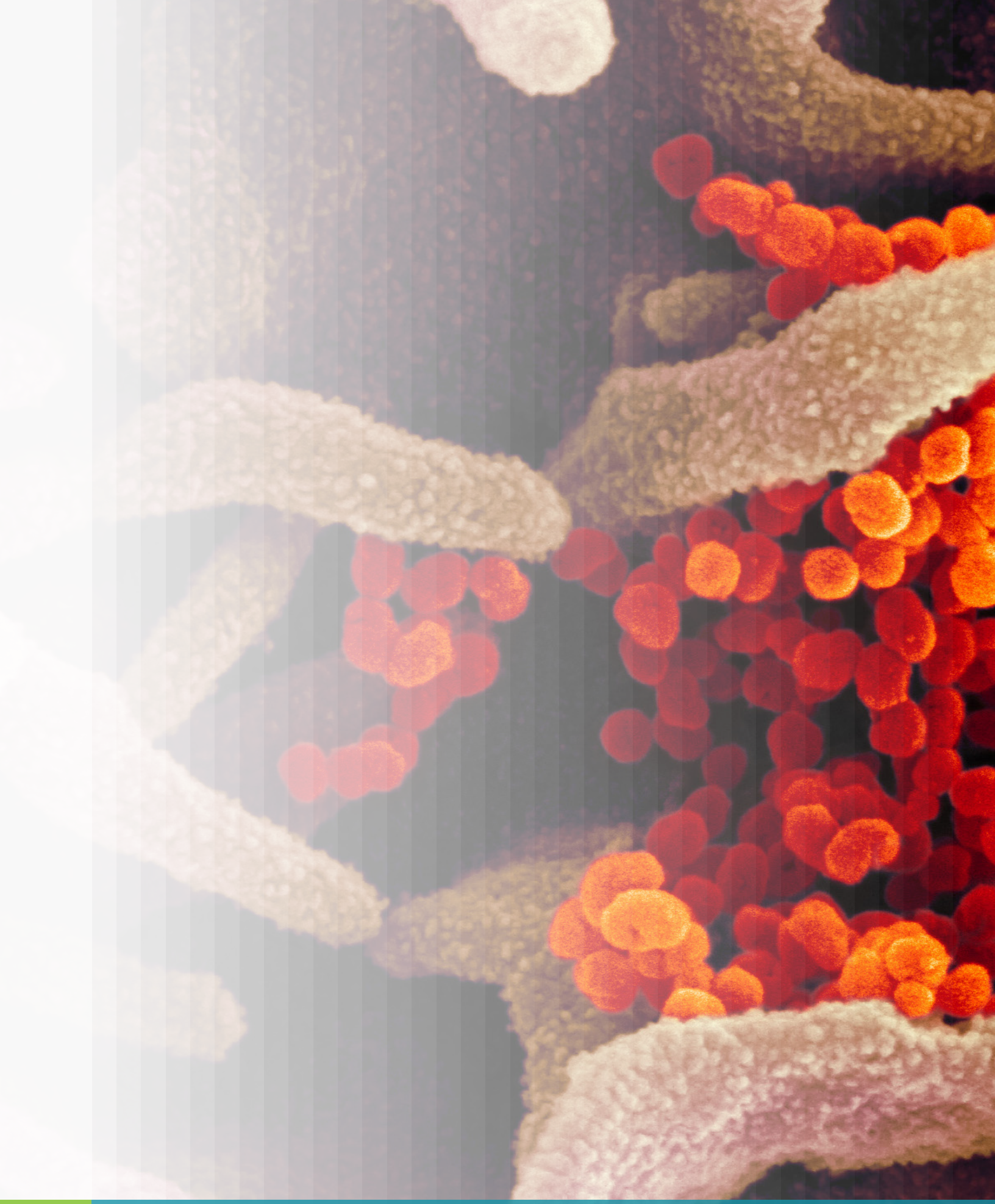
MAJOR AREAS OF RESEARCH

- Effect of recreational substance use on gene expression and biological pathways in youth with HIV on antiretroviral therapy
- Transcriptome bioprofiles in HIV-exposed but -uninfected children
- HIV-1 cell tropism, latency, reservoir, reactivation, and evolution of the HIV-1 genome over the course of infection



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. After a postdoctoral fellowship at the Sloan Kettering Institute, Dr. Goodenow was a visiting scientist at the Pasteur Institute in Paris. 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 HIV/AIDS research at NIH and director of the NIH Office of AIDS Research in 2016, coordinating the HIV/AIDS research agenda across NIH. She also is chief of the Molecular HIV Host Interactions Section in NIAID.



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
LHIM:	Laboratory of Host Immunity and Microbiome
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
LNII:	Laboratory of Neurologic Infections and Immunity
LPD:	Laboratory of Parasitic 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

INDEX

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

V

W

Y

Z

PHOTO CREDITS

Front Cover Illustration of an extracellular monkeypox virion binding to glycosaminoglycans on a human host cell. Credit: *NIAID*. **Left:** Post-baccalaureate fellow in the NIAID Laboratory of Malaria and Vector Research uses a dissecting microscope to perform morphological identification of preserved mosquito specimens. Credit: *NIAID*. **Right:** NIAID scientists confer in the laboratory about HIV gene regulation. Credit: *NIAID*.

Inside Cover Computer generated illustration of extracellular monkeypox virions. Credit: *NIAID*.

p. 1 Colorized scanning electron micrograph of H5N1 Influenza. Credit: *NIAID.*

p. 2 Colorized Scanning electron micrograph of Ebola virus budding from the surface of a Vero cell. Credit: *NIAID*.

p. 4 Fluorescent image of small intestine following Helicobacter pylori worm infection. Credit: *NIAID*

p. 5 NIAID scientist working in a Vaccine Research Center laboratory. Credit: *NIAID*

p. 8 Leah Gober, part of the 2018-2019 National Institutes of Health (NIH) Medical Research Scholars Program (MRSP) from Mercer University School of Medicine, looking through a light microscope at tissue slides. Credit: *NIH*

p. 9 Tylisha Gourdine, Intramural NIAID Research Opportunities (INRO) postbac in the Laboratory of Virology, Rocky Mountain Laboratories (RML). Credit: *NIAID*

p. 10 NIAID researcher reaching for cell cultures in a CO2 incubator. Credit: *NIAID*

p. 13 Colorized scanning electron micrograph of phenotypic variants of Neisseria gonorrhoeae bacteria. Credit: *NIAID*

p. 14 Participants in the NIH Medical Research Scholars Program (MRSP) conduct research in the Clinical Center. Credit: *Clinical Center, NIH*

p. 18 Colorized scanning electron micrograph of heat-killed Mycobacterium tuberculosis on peripheral blood mononuclear cells. Credit: *NIAID*

p. 20 NIAID scientist Neeltje van Doremalen, in yellow, trains Jordanian health care workers on classic diagnostic procedures for MERS-CoV. Credit: *NIAID*

p. 22 Immunohistochemical evaluation for SARS-CoV-2 N-protein in the lung of a mock-treated, humanized ACE-2 mouse by Kerry L. Hilligan, Fellow, NIAID Laboratory of Parasitic Diseases. Captured by Chad Clancy, NIAID RMVB. Credit: *NIAID*

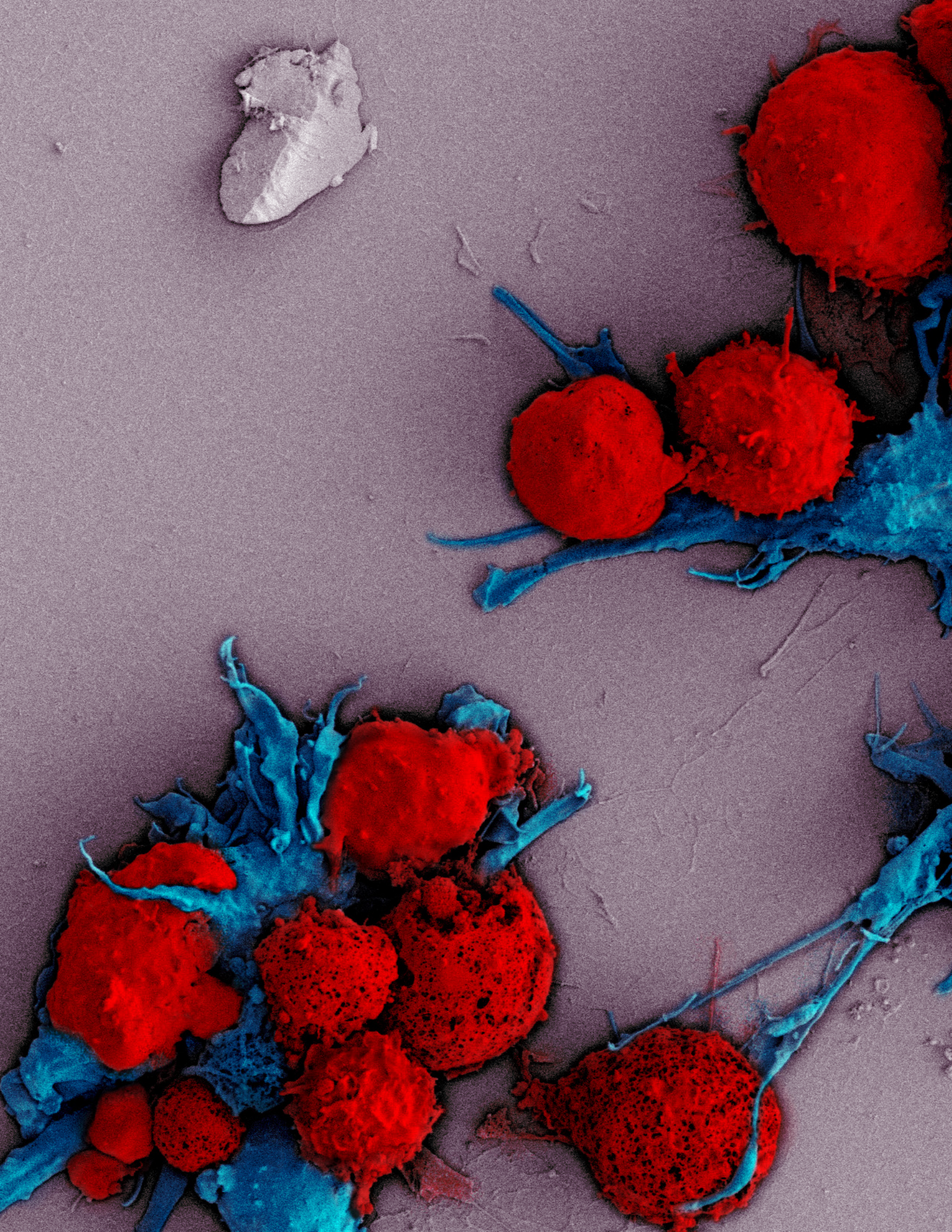
p. 24 Periodic Acid-Schiff (PAS) stains of goblet cells (magenta) of the intestinal epithelium. Captured by trainee Tina Thomas, NIAID RMVB. Credit: *NIAID*

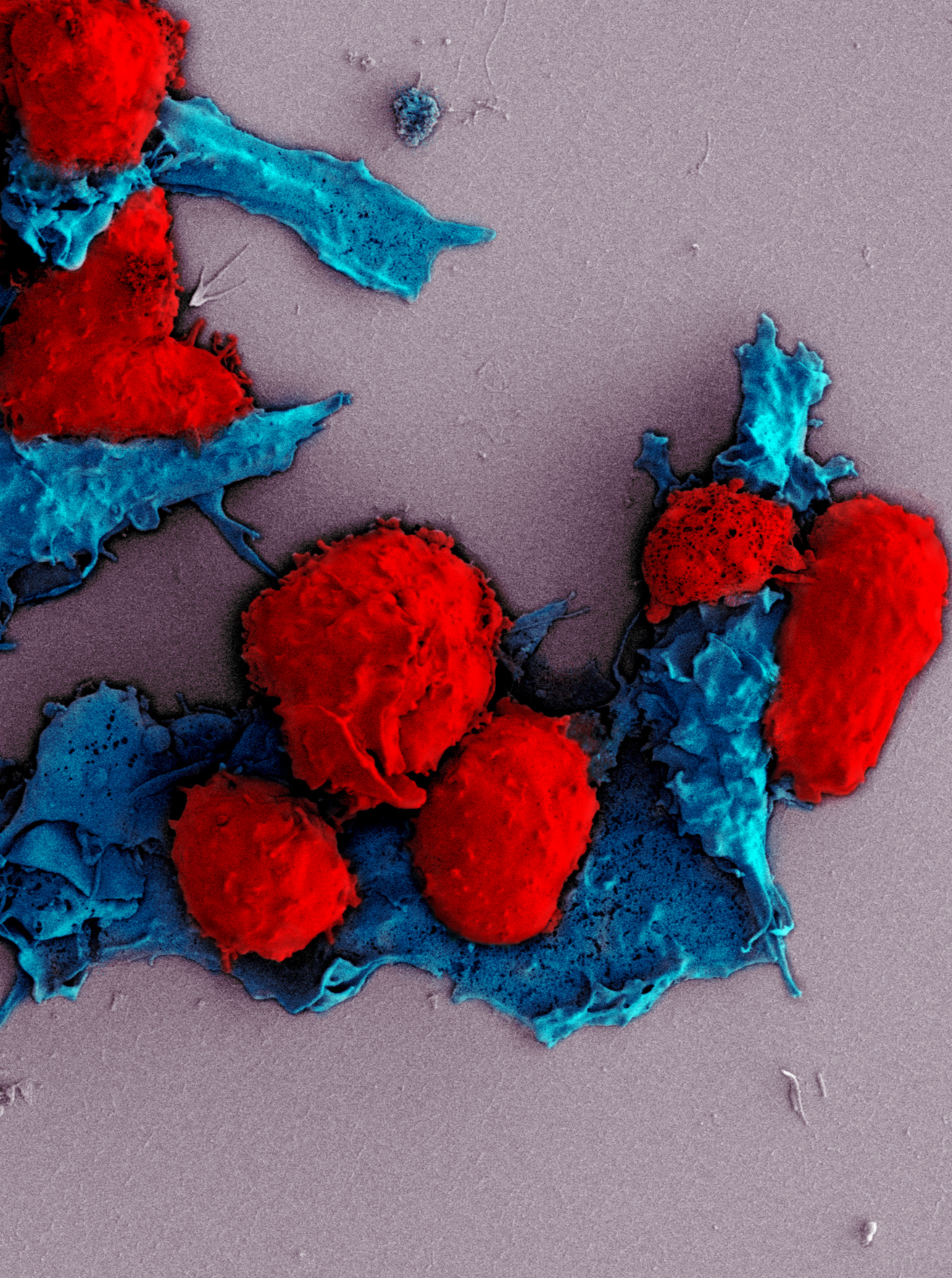
p. 71 Illustration of the binding of Hepatitis C E2 protein to CD81, with E2 CD81-binding loop (green). Credit: *NIAID*

p. 84 Illustration of nanoparticle vaccine delivery for Epstein-Barr Virus (EBV) elicits antibodies that neutralize EBV in B cells. Credit: *NIAID*

p. 91 Illustration of malaria merozoite invading a human RBC cell. Credit: *NIAID*

p. 98 Illustration of the innate immune response to Leishmania promastigotes. Credit: *NIAID*





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