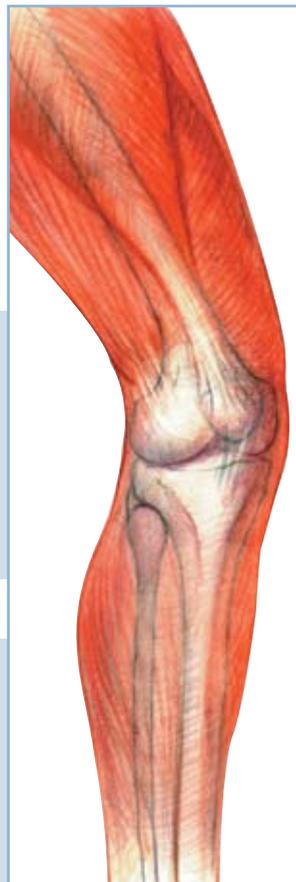
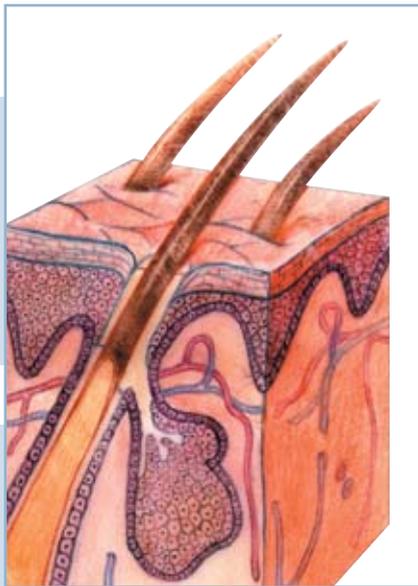


# NIAMS

NATIONAL INSTITUTE OF ARTHRITIS AND  
MUSCULOSKELETAL AND SKIN DISEASES



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NATIONAL INSTITUTES OF HEALTH



## From the Director STEPHEN I. KATZ, M.D., Ph.D.



Almost every household in America is affected in some way by diseases of bones, joints, muscles, and skin that are the mission areas of the NIAMS. These health conditions affect people of all racial and ethnic populations, ages, and economic strata. Many of the diseases within our mandate affect minorities and women disproportionately, and, in many cases, these populations also experience worse outcomes. We are committed to uncovering the bases of these racial, ethnic, and gender disparities and devising effective strategies to treat them.

Since our establishment 20 years ago, we have led the Nation's research and education efforts into these conditions by conducting and supporting clinical trials, establishing disease registries, forming partnerships with

public, private, patient-advocacy, and community organizations, establishing specialty research centers, training new scientists, and disseminating information targeted to researchers, healthcare professionals, patients, and consumers of different educational levels, cultures, and languages.

Internationally, we are proud to have joined healthcare agencies around the world in endorsing the Bone and Joint Decade (2002-2011), envisioned as a series of initiatives among physicians, health professionals, patients, healthcare agencies, and other organizations to raise awareness about musculoskeletal disorders, like osteoarthritis and promote research on these conditions.

To keep our research programs vibrant for the future, we must maintain an active pipeline of new investigators — particularly physician-scientists. We are especially committed to minority research training and to helping new investigators be successful, and we offer a number of programs to accomplish these goals. We are also proud of our innovative Health Partnership Program, and its local health research center in the Washington, DC-area community, and of the many local partners who have helped make it a success.

My staff and I are very excited about the research advances that have been realized to date and the future initiatives we have identified. We look forward to pursuing the scientific opportunities that medical research has uncovered. We believe that support of research in bones, muscles, joints, and skin will continue to result in scientific progress and improved health for the public. This is what motivates us and is the driving force for our Institute's administrative and funding decisions. Our research belongs ultimately to all of the American people, for whom we serve as stewards of their resources and their trust.

# NIAMS Research

For two decades, the NIAMS has been privileged to direct research against some of the world's most chronic, costly, common, and disabling conditions. We pursue not only basic and clinical research, but the all-important translational research that links the two.

Following are some of the major areas of NIAMS research and highlights of current research within these different areas.

## Arthritis and Other Rheumatic Diseases

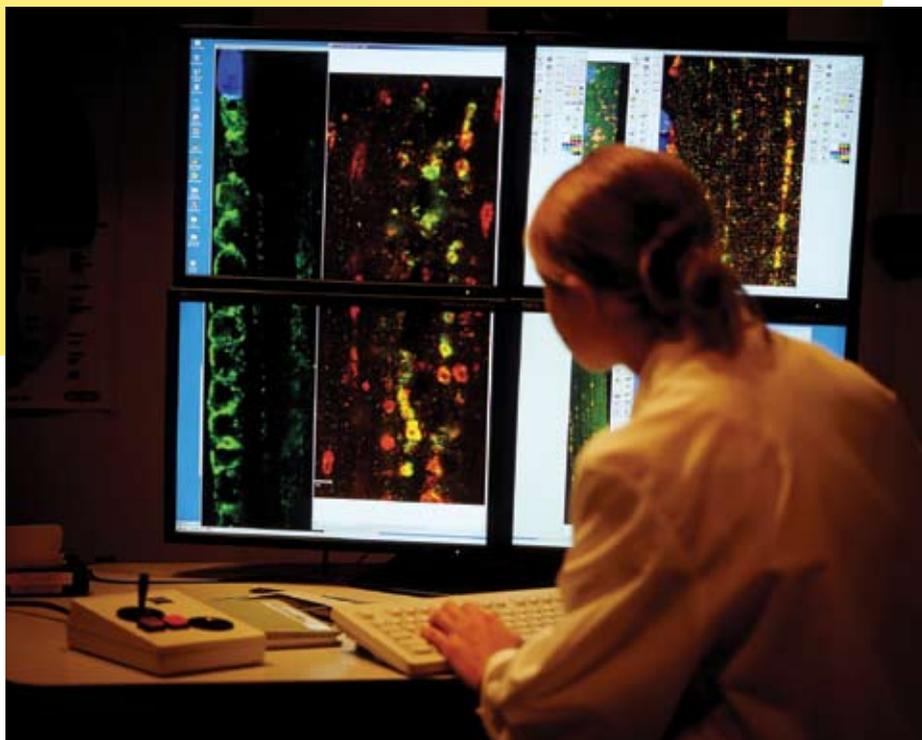
According to the Centers for Disease Control and Prevention, some 43 million Americans report that a doctor told them they have arthritis or other rheumatic disease. Another 23 million people have chronic joint symptoms but have not been diagnosed with arthritis. When compared to the general white population, forms of rheumatic diseases disproportionately affect certain minority communities. A higher proportion of African Americans report arthritis-attributable activity limitation, work limitations, and severe joint pain, and a higher proportion of Hispanics/Latinos report arthritis-attributable work limitations and severe joint pain.

Arthritis in its various forms costs the U.S. economy \$86.2 billion annually, but for the millions of Americans who have it, the greater cost of arthritis may be physical and emotional challenges, disability, and — in some cases — even death.

NIAMS supports research into the following relatively common rheumatic disorders, as well as into many less prevalent forms.

### Osteoarthritis

The most common form of arthritis, affecting an estimated 21 million Americans, osteoarthritis (OA) is characterized by the breakdown of cartilage that normally cushions the bones in joints. NIAMS-supported efforts in osteoarthritis range from a study demonstrating the effectiveness of acupuncture against knee OA to the large-scale Osteoarthritis Initiative and the Osteoarthritis Biomarkers Network. The Initiative is



a public-private partnership bringing together new resources and commitment to help find biomarkers for disease onset and progression; the Network involves institutions in the U.S. and Sweden that will facilitate the sharing of clinical, biological, and human resources to more rapidly and more effectively identify OA biomarkers.

### Rheumatoid Arthritis

Nearly 2.1 million Americans have rheumatoid arthritis (RA), a systemic disease characterized by an inflamed synovial membrane, causing pain, stiffness, swelling, and joint destruction. Recent highlights of NIAMS-supported RA research

have included the findings of a genetic variation in a specific protein that was found to increase the risk of disease twofold. It was also recognized that people with RA have a significantly increased risk of myocardial infarction, possibly related to persistent inflammation even prior to diagnosis. The latter study also showed that people with RA were less likely to have symptoms of angina, were more likely to receive coronary artery bypass surgery, had twice the risk of developing congestive heart failure, and had significantly higher risk of sudden cardiac death.

### Systemic Lupus Erythematosus

Systemic lupus erythematosus (SLE), an autoimmune disease that affects the joints, skin, blood, kidneys and other internal organs, affects hundreds of thousands of people. SLE is three times more common in women, and is more common and frequently more severe in certain minority communities. NIAMS-supported research is providing clues about the cause of lupus as well as effective treatments for this serious and potentially deadly disease.

One recent study provided support for a connection between the Epstein-Barr virus (EBV) — the cause of infectious mononucleosis — and the development of lupus. Working with the Department of Defense, NIAMS researchers identified individuals who developed lupus while on active duty. Then, by testing blood samples taken from them before lupus symptoms started, they could identify the first changes in the blood that signaled the early phase of disease. The study provides new insight into how lupus begins and has implications for treating or even preventing the disease through vaccinations against EBV or other mechanisms that could prevent or block the autoimmune response.

Other NIAMS-supported research has shown that contrary to previous suspicions, hormone replacement therapy is not associated with severe lupus flares in postmenopausal women with the disease and that the cancer medication rituximab may be an effective lupus treatment.

The NIAMS has also joined with representatives from academia, the Food and Drug Administration, the pharmaceutical industry, and patient advocacy groups to form the SLE Biomarkers Working Group. This group will identify and validate biomarkers that will be useful in diagnosing lupus and in developing, testing, and targeting treatments for it.

### Bone and Other Musculoskeletal Diseases

An estimated 10 million Americans — 80 percent of whom are women — have osteoporosis, a disease in which bones lose mass to the point where they are easily fractured and difficult to heal. Another 34 million are estimated to have low bone

mass, placing them at increased risk for this often debilitating disease. Because osteoporosis is typically painless, many people don't know they have the disease until they suffer a fracture. NIAMS-supported researchers are committed to developing a better understanding of the disease as well as better ways to diagnose and treat it.

One NIAMS-supported study showed that combination therapy with parathyroid hormone (PTH) to promote bone growth and alendronate to slow bone loss produced significant benefits if the two drugs were given sequentially. In a related study, different researchers found that PTH does not need to be given continuously throughout the year. In fact, cyclic treatment with PTH for 3 months followed by 3 months of alendronate alone was as effective at stimulating bone gain as the continuous use of PTH for 12 months.

NIAMS-supported scientists have also associated the gene for 15-lipoxygenase (ALOX15) with changes in bone mineral density in laboratory mice — a measure of susceptibility for osteoporosis — and found evidence that elevated blood levels of the amino acid homocysteine, long associated with increased risk of cardiovascular disease, may be related to the development of osteoporosis and related fractures.

To better define bone quality and ways to measure it, the NIAMS partnered with the American Society for Bone and Mineral Research to sponsor a May 2005 meeting to identify needs and future directions in bone quality research; highlight basic science, clinical, regulatory, and pharmaceutical perspectives; assess established and new methods for measuring bone quality; and discuss novel mechanisms to bring together research efforts on bone quality to move this research field forward.

### Muscle Diseases

One of the most active and productive areas within the Institute's research portfolio is in the muscular dystrophies: a group of genetic diseases characterized by progressive weakness and degeneration of the skeletal or voluntary muscles which control movement.

In 2003, the NIAMS teamed with the National Institute of Neurological Disorders and Stroke (NINDS), the National Institute of Child Health and Human Development (NICHD), and the Muscular Dystrophy Association to fund the Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Centers. The first three centers were established that year, and in 2005 three more centers were added. The Centers' work includes basic and clinical studies of disease mechanisms and investigations of gene and stem cell therapies and molecular and pharmacological treatments.

Recent NIAMS-supported research in the muscular dystro-

phies includes the finding that injecting a fragment of the protein heregulin improves the structure and function of muscles in mice that develop a disease similar to Duchenne muscular dystrophy. Other scientists have found a way to isolate muscle-derived stem cells from young mice and culture them in the laboratory.

## Skin Diseases

Skin diseases significantly compromise daily life for millions of Americans, both physically and psychologically. Researchers supported by the NIAMS have made great progress in our understanding of basic skin biology as well as understanding the bases for some skin diseases.

A particular area of focus in the NIAMS portfolio is the role genes play in skin diseases. Some scientists, for example, have identified two genes on chromosome 17 which are associated with psoriasis, and others have found two new regions on chromosomes 8 and 15 linked to alopecia areata in a mouse

model of the disease. Several years ago, researchers identified a genetic mutation responsible for pseudo-xanthoma elasticum, a connective tissue disease that involves the elastic tissue in the skin, eyes, and cardiovascular system. Now, NIAMS-supported researchers have applied those findings to create a mouse model of the disease.

Keloids, an abnormal form of scarring, disproportionately affect people of color. Investigators studying the physiologic basis for keloid formation have determined that a blood vessel growth factor is likely associated with keloid formation. And in vitiligo — an autoimmune disease in which white patches develop on the skin because of lost pigment production — a new NIAMS-supported study demonstrates not only an association between this disorder and autoimmune diseases like lupus and autoimmune thyroid disease, but also links between a certain form of vitiligo and a number of other autoimmune diseases, including RA, psoriasis, and adult-onset, insulin-dependent diabetes mellitus.

# Research in Special Populations

## Women, Minorities, and Children

**M**any of the diseases within the mission of NIAMS affect women more than men. For example, RA affects 2.5 times as many women as men; osteoporosis affects 4 times as many women as men; and lupus affects 8 to 10 times as many women as men.

Many of the diseases are more common — or in some cases, more severe — in minorities. Lupus, for example, is three times more common in African American women than in Caucasian women. It is also more common among women of Hispanic/Latina, Asian, and American Indian descent. African American and Hispanic/Latina women tend to develop symptoms at an earlier age than other women. African Americans also have more severe organ problems, especially with their kidneys. Other diseases, such as vitiligo, are more psychologically distressing in people of color.

All research into these diseases has the potential to be of great benefit to women and minorities, but some research is specifically targeted to these groups. For example, the Safety of Estrogen in Lupus Erythematosus National Assessment (SELENA) trial looks at the uniquely female issues of oral contraceptives and postmenopausal hormone therapy in women with lupus. The LUpus in MInority Populations: NAture vs. Nurture (LUMINA) study was designed to understand why minorities are affected more frequently and more severely by lupus.

The NIAMS also supports research in children, for whom arthritis and other rheumatic diseases can significantly compromise the ability to enjoy an active life. NIAMS-supported researchers have launched a state-of-the-art genomics project, the goal of which is to take full advantage of the tremendous progress that has been realized in genetics and genomics, and to uncover gene expression patterns (groups of genes that are “turned on” or “turned off”) that contribute to the development of pediatric arthritis. The NIAMS and a chapter of the Arthritis Foundation and the Schmidlapp Trust are supporting this study of children newly diagnosed with a variety of pediatric diseases such as juvenile rheumatoid arthritis, juvenile ankylosing spondylitis (or spinal arthritis), and other related immune disorders. Identifying the gene expression patterns for different types of arthritis in children will help to improve diagnosis as well as to predict the severity of disease for affected children.

In other pediatric studies supported by the NIAMS, the promise of genetic studies was underscored by the identification of a gene variant that increases susceptibility to juvenile arthritis. The NIAMS and the Arthritis Research Campaign funded researchers from around the world who worked collaboratively in collecting DNA samples from children with juvenile rheumatoid arthritis and their parents. Research findings suggest that there may be distinct genetic profiles for the disease that result in differences in age of onset as well as disease severity.

# The NIAMS and Health Disparities

In addition to supporting research into diseases that disproportionately affect women and minorities, the NIAMS is committed to research to uncover the bases of these gender, racial, and ethnic disparities and devising effective strategies to treat or prevent them.

One NIAMS-supported study, for example, identified barriers that keep people with lupus or RA who are economically disadvantaged or from diverse ethnic backgrounds from complying with their prescribed medical treatments. The main barriers uncovered were fear of side effects; the belief that medications are not working; medication costs; problems with the health system environment, such as navigating the requirements for Medicaid; and the lack of continuity in seeing the same doctor. Other barriers identified included lack of transportation, a shortage of translators for Hispanic patients, difficulty scheduling medical appointments if employment was sporadic or unpredictable, and illness severity that made it difficult to keep appointments. Studies like this provide information on sensitivity to different populations and are important as we continue to address the issues of health disparities — to identify the many complex factors that make some populations more vulnerable to diseases within our mission areas.

Other NIAMS-supported studies looked at death rates from lupus in ethnic minorities with low education levels and the lower rate of total knee replacements and higher rate of postoperative complications in African Americans.

The NIAMS also supports and/or collaborates with other NIH institutes on the following training and research initiatives designed to promote research by minorities and in minority institutions.

- Collaborative Arthritis and Musculoskeletal and Skin Diseases Sciences Award (CAMSSA) — Established in 1999, the CAMSSA program is designed to encourage collaborative investigations among scientists at institutions with substantial minority enrollment with grantees from research-intensive institutions who have grant support to conduct research in arthritis or musculoskeletal or skin diseases. The CAMSSA program is designed to develop and expand scientific opportunities among the participating institutions. The CAMSSA will support an investigator-initiated research project in which the applicant and a collaborating scientist will work in a clearly defined area of mutual interest. Each of the participating

institutions must provide the appropriate facilities and resources for the applicant and collaborating investigators to accomplish the goals of the proposed research program. Applicants may request up to 5 years of support for a CAMSSA.

- Clinical Research Education and Career Development Grant (CRECD) — CRECD awards are intended to support the develop-



ment and implementation in minority institutions of curriculum-dependent programs to train selected doctoral and postdoctoral candidates in clinical research leading to a Master of Science in Clinical Research or Master of Public Health in a clinically

# GRANTEE SPOTLIGHT

## Graciela Alarcón, M.D., M.P.H.

Jane Knight Lowe Professor of  
Medicine in Rheumatology  
University of Alabama at Birmingham

relevant area. A successful program will result in an accredited master's degree program and will produce well-trained and independent clinical researchers who can lead translational and clinical research projects. New or first-time applicants can apply for up to 5 years of support with no more than \$500,000 in direct costs per year. CRECD is a joint program of eight institutes, including NIAMS, within the National Institutes of Health.

- Diversity Supplement Awards — The goal of this award, established in 1989, is to create a diversified workforce by increasing the number of minority scientists participating in biomedical research and health-related sciences and to expand research opportunities for minority scientists. NIH-funded investigators may apply for administrative supplements to existing grants for the support and recruitment of underrepresented minority students (from the high-school level up) and investigators.

- Predoctoral Fellowship Awards for Minority Students — The Predoctoral Fellowship Awards for Minority Students offered by NIAMS provide predoctoral support of research leading to the Ph.D. or equivalent research degree for individuals to extend their potential for a career in research in arthritis, muscle, bone, musculoskeletal and/or skin diseases. Applicants can apply for up to 5 years of support.

- Extramural Associates Research Development Award (EARDA) Grants — The EARDA award is designed to promote entry and participation of individuals from underrepresented minority and women's institutions into biomedical and behavioral research. Under the auspices of the Extramural Associates program — which was established in the NIH Office of Extramural Research in 1978 — the NIH selects scientific faculty or academic science administrators and, on a competitive basis, those who have applied for the EARDA based on the type of institution represented and the technical merit score of the competing application. The EARDA offers two options for support: the Sponsored Research Infrastructure Program (SRIP), a 5-month program primarily designed for master's and professional degree-granting institutions, and the Faculty Research Enhancement Support Program (FRESP), a 10-week program designed specifically for institutions that award degrees no higher than the baccalaureate, and that are expected to have little or no research activity.

Dr. Graciela Alarcón's current work is focused on prevention and outcomes research dedicated to the study of risk factors accounting for poor disease outcomes among patients with different rheumatic disorders,

particularly lupus.

One of her most interesting current studies—funded in part by NIAMS—is the 12-year-old LUMINA (LUPus in MINority Populations—NATURE vs. Nurture) program.



In this multicenter study, her team of researchers look at how ethnicity influences lupus risk and outcomes. The study involves 600 African American, Hispanic, and Caucasian people older than 18 with lupus. Though anyone can develop lupus, it occurs predominantly in women in their reproductive years. “We went into the study knowing that lupus affects minority groups more seriously and more frequently,” says Dr. Alarcón. “Because most of the studies in the U.S. up until then had focused on African American populations, our study also included Hispanic populations, both in Texas and in Puerto Rico.”

What Dr. Alarcón and her team found was that Hispanic Texans and African Americans had very different responses to the disease than Caucasians and Puerto Ricans. “The disease starts at a younger age and more abruptly in the African Americans and the Hispanics from Texas,” she says. “These groups also have more kidney disease and experience higher death rates.”

A unique aspect of the study is its research into environmental and socioeconomic factors related to the development of lupus. “It’s not clear yet whether the differences we’ve noted are due to differences in the socioeconomic profile of the patients or to genetic differences,” says Dr. Alarcón. “One thing we do know is that poverty has been consistently found to be a factor affecting survival. We haven’t been able to sort out exactly which factor is most important because they’re all interrelated, but it’s part of our ongoing work.”

# A Look at The Health Partnership

As part of its efforts to address the health disparities that exist among minority groups for arthritis and other rheumatic diseases, the NIAMS established The Health Partnership Program (HPP) in February, 2000. The HPP is a community-based medical research program operating as a collaborative effort between NIAMS and Washington, DC-area community leaders and representatives. The program aims to enhance our understanding of disparities in rheumatic disease and their causes, and to provide direction for improving the health status and health outcomes of the minority communities affected. It has been focused on rheumatic diseases such as arthritis and lupus in the African American and Hispanic/Latino communities in the metropolitan Washington, DC, area.

“We met with members of the community in Washington, DC, and together we identified priorities in five areas,” says Barbara Mittleman, M.D., Director of Public/Private Partnerships in the Office of Science Policy at NIH and principal investigator for the parent health disparities study run at the NIAMS Community Health Center (CHC), a facility in the heart of a multicultural community in Washington, DC. The CHC provides a platform for HPP’s research, education, and training activities. One of the main priority areas identified was health education, she says. “People need to know the meaning and implications of their symptoms in order to make smart decisions about when to seek evaluation and treatment. If the assumption is that everyone gets arthritis when they get old and that nothing can be done about this, then there is no motivation to seek care. In fact, a lot can be done to help people with arthritis and rheumatic diseases, and early diagnosis and treatment make a big difference.”

Another priority was clinical care. “There are a lot of people who live in the Washington, DC, area who don’t have very much insurance or don’t have any health insurance at all,” says Dr. Mittleman. “Access to arthritis specialists for those underinsured and uninsured patients is very hard to come by, so arthritis goes undiagnosed and untreated. Clinical care in the context of learning about disease is therefore a big issue that we were committed to and that is consistent with our agency’s mandate.”

“One of the big things that struck me is how much of an underserved need there is,” says Michael Ward, M.D., NIAMS researcher and chair of the Health Partnership Program



Community partners celebrate with Dr. Stephen Katz and Dr. Deborah Parham-Hobson of the Health Resources and Services Administration (HRSA).

Committee. “If you take a look at arthritis in general, there are some diseases where we are not very effective with our current interventions, particularly early interventions. But rheumatoid arthritis (RA) is a totally different animal, and there is very good evidence that treatment with immunosuppressive or immunomodulatory disease-modifying medications helps improve long-term outcomes in people with RA. There are also good data to say that physicians other than rheumatologists really don’t use these kinds of things, primarily because they are not familiar with them. So one of the things that impressed me is how little exposure these patients have had to these known effective medications.”

The NIAMS CHC, which opened in July, 2001, provides the community with access to specialized care—including these disease-modifying agents that have proven effective for RA—and—scientifically based health information. At the same time, it provides NIAMS researchers with access to patients most affected by rheumatic diseases. All patients at the CHC are enrolled in the Natural History Study of Rheumatic Diseases in Minorities, which is designed to gather information on incidence, prevalence, severity, and outcomes of disease.

In addition to the priorities of health education and clinical care, the HPP concentrates on these other three priority areas:

- Health disparities research, which aims to increase scientific information about the disproportionate burden of disease among affected racial and ethnic groups
- Recruitment to research careers, which seeks to increase the number of underrepresented researchers, physicians, and allied health professionals
- Community relations, which aims to increase involvement of people from minority communities in the medical research process.

# NIAMS PROFILES

**Gregory Dennis, M.D.**  
Director, Clinical Care and Training  
Office of the Clinical Director



**When did you know you wanted to go into medicine and research?**

**Dr. Dennis:** I actually had no clue that I wanted to go into medicine until I was in undergraduate school. I had been selected to participate in this undergraduate research program that allowed six students to have that opportunity. One day, my biology professor walked up to me and asked me why I had not asked him for a letter of recommendation for medical school. My answer was “Well, because I had not thought about going to medical school; I had only thought about going to graduate school and doing research.” He just said, “Well, maybe you ought to think about it.” So I went through all of the application steps, and the next thing I knew I was in medical school.

**Did you do the Army program to go to medical school?**

**Dr. Dennis:** That’s right. When I went to medical school, I decided to apply for a financial health profession scholarship, which paid my way through medical school. As a consequence, I had to serve on active duty to pay back that time. My satisfaction with what I was being allowed to do while on active duty made me decide to stay on active duty for 21 years. I retired in 2001. At that time, I was the Chief of Rheumatology at Walter Reed and Director of the fellowship training program, and then was recruited to come to NIH to continue doing some of the same things that I had been doing.

**You do a lot of lupus research now. Was that something that you identified as an area of interest early on?**

**Dr. Dennis:** Yes, As a matter of fact, when I was a resident in internal medicine, the first research that I embarked upon was

in lupus. One of the things that makes lupus a particularly fascinating area to pursue in terms of research is the multisystem involvement that the patient may have; it can involve pretty much any organ in the body, and it can be a very complex disease to understand from a clinical standpoint.

**What does your typical day look like at this point?**

**Dr. Dennis:** I direct our rheumatology fellowship training program, which is designed to train individuals to become investigators in biomedical research. I also oversee the clinical care that is underway within the NIAMS Community Health Center, the outreach clinic in Washington, DC. So I would say that most of my time now is spent doing either administrative work related to those particular areas or teaching individuals how to become expert rheumatologists and mentoring them into becoming investigators in biomedical research.

**What is your role within the Health Partnership Program and what excites you about the program?**

**Dr. Dennis:** I oversee the Community Health Center in Washington, DC, and the fellows in rheumatology are the ones who are the primary providers for the patients seen in that particular setting. So many of the patients who come to us don't have access to subspecialty care, and we can play a tremendous role in just simply providing expert evaluations of rheumatic disease. We can further try to ensure that they are taking medications that are the least harmful to them while improving their disease outcome. In addition, it's allowing us to establish communication with physicians or other providers in the community that was not previously there. By doing that, the providers are more likely to refer patients who may not have the opportunity to participate in clinical trials at the National Institutes of Health, and they may be more likely to refer patients to us here in the Clinical Center. So it not only potentially impacts those patients being referred to us, but also has some spillover effects into other services here at the National Institutes of Health.

**How do you feel your clinical training has enhanced your research?**

**Dr. Dennis:** I think it's extremely important that one becomes an excellent clinician in order to be an excellent clinical investigator, because if you don't understand clinical disease, it is going to be hard to ask the right questions to begin to study in the laboratory or in clinical research.

**What are some of the things that you are most proud of in your career thus far?**

**Dr. Dennis:** One of the things that I am particularly proud of is that throughout my career, I have been able to maintain relatively close contact with patients. As a result of that, I feel that my understanding of patients and their problems is as important now as it ever was. I'm also very proud that earlier in my career as a fellow I spent a lot of time in the laboratory,



which opened up an entirely new understanding, a new dimension to understanding immune disease and how it might relate to clinical medicine. Another thing that I am extremely proud of is having had the opportunity to mentor many individuals in their own careers in biomedical research. It's very gratifying to be able to participate and help shape a young individual's career and to see them become successful.

**What do you have as your own career goals for the next 5 or 10 years?**

**Dr. Dennis:** I would like to continue playing a leadership role in helping to eliminate health disparities, in helping to better understand and treat rheumatic diseases, and to continue participating in defining the future of rheumatology. In addition, I plan to continue serving as a mentor throughout my career to any individuals interested in careers in clinical medicine as well as biomedical research.

# NIAMS PROFILES

**Maria I. Morasso, Ph.D.**  
Principal Investigator  
Developmental Skin Biology Unit,  
Office of the Scientific Director



## When did you first know you were interested in science?

**Dr. Morasso:** I was born in the U.S., but I lived all of my adult life and trained in Venezuela. In high school I was very interested in biology and chemistry, and for a thesis, I got to go into a lab and do an experiment. It was very simple, but I was completely enchanted by the experience, and it made me realize I wanted to go into biology. I did what is the U.S. equivalent of my master's and Ph.D. work in Venezuela, with 1 year in the U.S. as part of the training (kind of like an international rotation) and then finally came to U.S. as a postdoctoral fellow.

## What was your area of research interest?

**Dr. Morasso:** I did my graduate work in cancer-related diseases; specifically, melanoma. I then came to work as a postdoctoral fellow at the National Institute of Child Health and Human Development on the transcriptional regulation during early development. After this, I started my position as a tenure-track investigator at NIAMS.

## You have a lot of undergrads and graduate students come through your lab. Is that satisfying for you?

**Dr. Morasso:** Oh, I love it! The students bring real excitement to the lab. To them, everything is so "cool" and "awesome." Their enthusiasm and thirst for knowledge is an inspiration. We keep in touch, and it is very satisfying to see them pursue a medical career and/or a career in research.

## What does a typical workday look like for you?

**Dr. Morasso:** Right now, I have more of an administrative load, but I try to minimize that. My choice has been to make time so that I work on my own project in the lab doing experiments. That is a choice you have to make. I also enjoy sitting down with people to discuss experiments and troubleshoot things that are not working.

## Are you just as excited to come to work today as you were when you started?

**Dr. Morasso:** I am always really excited! We have many resources available to us at NIH, and with the rapid growth of technology, things are much easier now than they were 10 years ago. Plus, it has been a positive and productive journey — if someone would have told me that I would have my own lab and projects and be able to train people, in such a relatively short amount of time, I wouldn't have believed it. It's a very stimulating time to be in science.

## If you had one piece of advice to give our readers who are considering adding a research component to their medical career, what would you say to them?

**Dr. Morasso:** I tell my students that science is beautiful. I try to explain to my friends who are not scientists the great satisfaction you get from being able to ask how things work. You do a lot of repetitive work to be able to get to a point where you get an answer, but when you get it, it's one of the best feelings in the world.

For students who are torn between being a clinician or a researcher, I tell them that these options are not exclusive; you can be both if you want to. You just have to decide what is good for you and what you really like to do. If they think they have an interest in research, obtaining the experience of working in a lab is crucial, even if it's only for a short time.

# NIAMS PROFILES

**Juan Rivera, Ph.D.**  
Chief, Molecular Inflammation Section Director,  
Office of Science and Technology



### When did you know that you wanted to go into science and research?

**Dr. Rivera:** Science was not something I ever really thought of; my parents were not very highly educated individuals. But my first interest in science developed because of an excellent chemistry teacher I had in high school. In fact, I didn't do that well at the very beginning, but I grew to love the discipline, and I developed an aptitude for it. I think that shows how important it is to have a good teacher.

It was at the University of Maryland where I became very interested in immunology, and in my second year of college, I started working at the NIH through the Stay-in-School program, a program for people from disadvantaged backgrounds. That was a big help to me, and, in fact, I've been at the NIH ever since.

### What was it about immunology that really sparked your interest and passion?

**Dr. Rivera:** I really became intrigued that it is such a fundamental mechanism or a "key" to the basics of everyday life. In microbiology, I had heard about all of these "bad bugs," but in immunology, I learned why we can survive. It is also a very complex discipline because there is a little bit of every biomedical discipline involved in immunology. Some might consider it a specialized discipline, but it has rather a broad perspective on life biology as a whole.

### What have your primary research interests been?

**Dr. Rivera:** I've worked on a particular area of immunology that has to do with the role of a particular family of receptors — Fc receptors — and how these receptors function in inflammation and disease. The emphasis is on identification of molecular targets to intervene in allergic and autoimmune diseases. We're also learning that this whole family of receptors is involved in a large number of diseases, and so what one learns in one model system may be important in terms of understanding how they may function in other diseases.

### What is your typical workday like?

**Dr. Rivera:** Well, at the moment I wear two hats in our Institute, which means I spend probably about 60 to 70 percent of my time on office responsibilities and the rest of the time on my science responsibilities. I head up the Molecular Inflammation Section, which is my "research hat." I determine the direction of the science we conduct and make decisions as to what are the priorities. I also discuss the science and problems encountered with lab members and provide overall guidance. I am also actively involved in manuscript preparation for reporting the findings of our work. The second hat I wear is Director of the Office of Science and Technology in our Institute. This office oversees all of the core technology facilities that are within our Institute, such as light imaging, flow cytometry, bioinformatics, and others. My office makes sure that those facilities are effective in their mission and that they provide cutting-edge technologies to the investigators within the Institute. That's my major administrative hat.

I think it is inevitable that as you reach a particular level in your career, you have to make a decision whether you are going to step outside of the research laboratory, walk away from the bench, or whether one stays focused on the research and/or working at the bench. For the moment I chose to walk away from the bench but I am still active in research, which allows me to have a broader impact on the science being done at our Institute.



*Dr. Rivera (center) with his research team*

**What are some of the things that you are the most proud of in your career at NIAMS?**

**Dr. Rivera:** I think it would be the cumulative effect of the discoveries we have made over the years; I can't say that there is just a single one that I am most proud of. But if I were to pick a recent one, I would say probably the fact that we discovered that Fc receptors work in a very different way than what people had initially thought, and that finding has really changed the paradigm and put us on a very different path in thinking about how these receptors function. The implications are important for medicine as it changes our approach in thinking about treatment for diseases in which these receptors may play a role. I would also say that another aspect of my science career that I am very proud of is that the people who have come through my lab have received good training, and all the individuals who have come through my lab are still in science. I feel very good about that.

**What do you think is the key to successful mentoring?**

**Dr. Rivera:** I think it's important to realize that mentoring is a life-long experience. I have been a protégé all of my life and I continue to be mentored. I continue to seek career and professional advice from my more senior colleagues who have had the experiences I have yet to encounter. In particular, I view my relationship with my branch chief as one of mentor/protégé. I regularly seek his opinion on various career and research matters. However, I also have developed a cadre of mentors outside of NIH who serve to provide counsel on career or research matters when a broader perspective may be important. Over the years I have found this to be invaluable towards career

advancement and recognition in the scientific community. One of the most important lessons I have learned about the mentor/protégé experience is that it is a two-way relationship. It is imperative that the protégé be an active participant, act on the advice, seize the opportunities provided, and demonstrate career maturation. This provides a powerful incentive to the mentor since he/she is able to see the contributions to the mentoring experience being brought to fruition. Having served on both sides of this equation, I can attest to the legacy of a successful mentor/protégé relationship. It serves to amplify the pool of successful future scientists who themselves will likely develop successful mentor/protégé relationships because they feel indebted to those who

have mentored them.

**Why do you think it's important to have minority investigators working in this field?**

**Dr. Rivera:** I'd say that having minority investigators helps to create an acceptance in the community about the research being done. As a role model in that community, if you are voicing an opinion about a medical condition, it's more likely to be accepted because they see that you have come from essentially the same background as they have. The other important issue is that so many of the diseases we study impact the minority communities. So I think that whether you're doing an epidemiological study or public health access services or basic research, any research is enhanced if the individuals doing that research are from that community and are involved in the health care of that community.

**What do you think M.D.s can bring to the research table?**

**Dr. Rivera:** The physician-scientist has the unique ability to translate the research being done at the bench to the bedside care of patients. Translational research is really a key to better public health, and this research relies heavily on the clinical perspective of the physician-scientist. As a Ph.D., I can collaborate with physicians in the clinic, but I cannot myself bring something into the clinic and say, this is what we're going to do in terms of treating these patients. Only the physician-scientist can do that. The clear benefit is that treatment of a disease can be expedited by individuals who have a clear understanding of the science, the disease, and clinical strategies for treatment.

# NIAMS PROFILES

**Susana Serrate-Sztejn, M.D., Ph.D.**  
Chief, Rheumatic Diseases Branch

## Did you always know you wanted to go into research?

**Dr. Serrate-Sztejn:** I realized in my second year of medical school in Buenos Aires that I wanted to go into research. I developed a real curiosity about working in the lab, so I became a research assistant. I quickly realized that I liked asking questions that could help explain disease and that I would pursue a research career. By getting exposure to one lab, I got an idea of what science at-large could do. I came to the U.S. on a Fogarty Fellowship with NIH. I've been extremely lucky to have had continuous involvement with NIH ever since.

I've also been very fortunate to have good mentors, people who cared, who were interested in my career goals, and who gave me advice all along the way.

## Has your career in research matched up to your initial expectations?

**Dr. Serrate-Sztejn:** Yes! It is both thrilling and satisfying to be a part of the team trying to answer research questions. It's difficult, intensive work, especially the work needed to get funding. But it's also a very rewarding career in so many ways. Research is something that is not easily matched by any other career.

## What is your current field of study?

**Dr. Serrate-Sztejn:** I've been involved with autoimmune diseases for over a decade, but I realized that I could make a greater contribution by doing science administration than I could in the lab. It was a better fit for my skills. Responsibilities for science administration include managing grant portfolios and working with grantees to support and encourage scientific advances.

## Of the work that's taking place in your Branch, what are you most excited about right now?

**Dr. Serrate-Sztejn:** We are at the brink of a lot of exciting science. We now have a better understanding of the genetics of



rheumatoid arthritis (RA), including the role of inflammation in cells lining the joints, and how these inflammatory processes contribute to joint destruction. We've also worked on the identification of biological markers that can predict rapid progression of RA, allowing physicians to develop treatment strategies based on the likely course of disease in affected patients. I think we're going to see many more new therapies in the next 10 years.

## Why do you think it's important to have minorities participating in research?

**Dr. Serrate-Sztejn:** We need a research workforce that represents the health needs and the talent of the population at large. Just as I had a curiosity and was able to pursue my dreams, I think it is important for minority students to realize that their talents are valuable and they can make a contribution. Science doesn't belong to any one group; it belongs to all of us.

# NIAMS student PROFILES

**Carolina Montaña, B.S.**  
Neuroscience and Molecular Biology  
Brigham Young University  
Applying to M.D./Ph.D. Programs

## What originally got you interested in science and research?

**Ms. Montaña:** I knew I was going to grow up to be a scientist ever since I was 8 years old. I told my parents I would dissect rats and discover the cause of diseases. Unfortunately, in my native country of Colombia, there is little money available for biomedical research and few opportunities to pursue a career in science outside of medicine. I began my medical education in Colombia after finishing high school, which is the usual pathway for a medical degree in many countries outside of the U.S. This experience exposed me to a vast wealth of knowledge and opened my eyes to the reality that even though books could describe signs and symptoms, they couldn't tell me what really caused disease, which is what got me interested in medicine in the first place. Unfortunately, due to the civil war that affects my country, my family had to leave the country. Quitting medical school after 3 years of training and starting from scratch in the U.S. was very difficult for me, but here I had the opportunity to explore my interest in research and join labs at my undergraduate institution, at the Mayo Clinic, and at NIH. After moving to the U.S. and continuing the pursuit of my degree through college, I am now applying to M.D./Ph.D. programs.

## Talk a little bit about the work you've done with NIAMS and how you feel it has helped in your training progression.

**Ms. Montaña:** I joined Dr. Rafael Casellas' laboratory in the NIAMS, which investigates how the mammalian genome responds to damage. Besides learning different techniques, I have learned to critically read the literature and sharpen my presentation skills. After being in this lab, I feel better prepared to start doctoral training.

## Why do you think the NIH is a good place to go for training?



**Ms. Montaña:** There are several reasons why NIH is a good place to train. First of all, with the vast number of scientists working, it is very likely to find a mentor who can match your research interests. Scientists are around all the time, and it is not hard to exchange ideas with the leaders in their fields. It is a rich, multicultural environment with many opportunities for training. Seminars are offered on a daily basis, and graduate-level and biotechnology classes are available every semester. Laboratories have enough funding to push the frontiers of science and carry out risky experiments. Moreover, I have been able to receive advice about career development through workshops and one-on-one interactions with medical doctors and scientists who have followed paths that I want to pursue.

## What are your own personal goals for your career?

**Ms. Montaña:** I want to enroll in an M.D./Ph.D. program and become a principal investigator in a lab that focuses on disease-oriented research. I would also like to be a mentor for future Hispanic scientists and help reduce health disparities in my community.

# NIAMS student PROFILES

**Kendan Jones, B.S.**  
Cellular, Molecular, and  
Developmental Biology,  
University of Washington, Seattle



#### **At what point are you in your training?**

**Mr. Jones:** I am currently participating in the NIH Academy program. The program focuses on providing postbachelor training opportunities at the NIH for recent graduates while also educating them in topics concerning health disparities. I plan on applying to medical school in June.

#### **What originally got you interested in science and research?**

**Mr. Jones:** My father is an engineer and my mother is a nurse-midwife, so I was raised in an environment where I was exposed to science fairly early. However, while I always had a keen interest in the natural world and how things work, the spark was really cultivated in high school by my first biology teacher, Mark Wangerin. In these classes, I was exposed to topics that really excited me such as cell biology, evolution, and genetics. I excelled in the classes and continued to cultivate my interest by taking the A.P. biology course as well as job shadowing a microbiology professor at the local community college.

#### **Talk a little bit about the work you've done with NIAMS and how you feel it has helped in your training progression.**

**Mr. Jones:** My work so far has been in the Cartilage Biology and Orthopedics Branch, headed by Rocky S. Tuan, Ph.D., where I have been working to better understand how chondrogenic differentiation is regulated in adult mesenchymal stem cells by glucocorticoids as well as how it is modulated by glucosamine. My work is contributing to my development as an effective researcher by providing me with a long-term opportunity to take part in a project. This will allow me to fully participate in its stepwise progression and therefore experience it more fully.

#### **Why do you think the NIH is a good place to go for training?**

**Mr. Jones:** To me, the most exciting part of working at the NIH is the opportunity to interact with experienced scientists from a multitude of diverse backgrounds. Additionally, working in the country's premier biological research institution provides a more complete view of all the aspects that contribute to biomedical advancement.

#### **What are your own personal goals for your career?**

**Mr. Jones:** My goal is to devote my career to issues of global public health and infectious disease. I am planning to pursue a dual M.D./Ph.D. degree and to apply my training to public policy as well as public health research. In the meantime, I plan to educate myself as much as possible on topics concerning disparities in health care both in the United States as well as worldwide.

# How to get involved with NIAMS

The NIAMS actively seeks interested candidates who want to learn about the latest advances in basic and clinical research at an early stage in their careers. Students in high school, college, graduate school, or professional school can spend a summer or work part time through the academic year at the NIAMS. College graduates who plan to pursue an advanced degree but want some research experience can work full time for up to 2 years prior to their enrollment in a postdoctoral program.

Our intramural researchers pursue projects in biomed-

ical research ranging from fundamental analyses of protein structure and function (e.g., by high-energy irradiation, x-ray diffraction, electron microscopy, genetics, and biomedical approaches) to research on treatment, etiology, and pathogenesis of a variety of bone, joint, muscle, and skin diseases. Students may take part in research projects, learn a variety of laboratory techniques, and, in many cases, be responsible for carrying out experiments. Students also attend seminars, journal clubs, data sessions, and safety and other training courses available to the intramural scientific community.

## Types of Programs Offered at NIAMS

- NIAMS Intramural Research Program Scientific Summer Program - The deadline for submitting applications for the summer is March 1 annually. The online application for next year will become available in mid-November.
- Postbaccalaureate Intramural Research Training Award - For recent college graduates who plan to apply to graduate or professional school or who want a year-round laboratory training experience.
- Graduate Partnerships Program - For college graduates seeking doctoral training through the NIH University Ph.D. training partnership (duration of 3-5 years).
- Predoctoral or Interim Intramural Research Training Award - For graduate or medical students who desire an interim or year-off research experience.
- Predoctoral Visiting Fellow Program - Opportunities for foreign graduate students in doctoral programs to participate in research at the NIH.
- NIH Academy - For recent college graduates who have an interest in health disparities.
- Technical Intramural Research Training Award - For individuals with a bachelor's or master's degree who aspire to careers as research support professionals.
- NIH Undergraduate Scholarship Program - Competitive scholarships for exceptional students from disadvantaged backgrounds.
- HACU - Internships through the Hispanic Association of Colleges and Universities.
- NAFEO - Internships through the National Association for Equal Opportunity in Higher Education.
- WINS - Washington Internships for Native Students.



# NIAMS

NATIONAL INSTITUTE OF ARTHRITIS AND  
MUSCULOSKELETAL AND SKIN DISEASES



For more information on how you can get involved in NIAMS programs, contact:

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