Training at the NIAMS: Ensuring a Vibrant Future for Musculoskeletal Research

By Stephen I. Katz, MD, PhD

Although we can rightfully take pride in our contributions to biomedicine, the sobering mood of the times calls us to reexamine the future. Our most important asset—the thing that truly drives the research engine—is human capital: the scientists on whose experience, expertise, and creativity we rely. We are entering a time marked by a graying population, and some of our most experienced scientists may be considering life beyond active research. Will we have a workforce sufficient to carry on if they leave?

The National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), a part of the National Institutes of Health (NIH), has for many years focused on the long-term benefits of research training. The Institute has been committed to enhancing the “pipeline” of new scientists who will continue to increase the pace of scientific discovery. One goal of our training programs has been to ensure that no manpower deficit will slow research down.

The late management consultant Peter Drucker once said, “The best way to predict the future is to create it.”¹ The following are some of the ways in which NIAMS has embraced this philosophy and applied it to the present and future bone and joint research workforce.

New Investigators

NIAMS shares the NIH commitment to new investigators: those who have not

yet competed successfully for a substantial NIH independent research award. These scientists, given the opportunity, could contribute substantially to the research landscape with fresh ideas and technologies. NIH has long recognized their value and has in the past developed special programs to increase their numbers and reduce the age at which they first receive their independent grant funding. Recent increases have been encouraging. Indeed, NIH has pushed this priority even further and has announced a subcategory of new investigators: early-stage investigators, or individuals who are within ten years of either receiving their final research degree or completing their medical residency or clinical fellowship when they apply for a research grant. Their grant applications will be given special consideration during peer review and when funding decisions are made. The review will focus on the proposed approach rather than on the scientist's track record, and will require less preliminary data than that expected from an established researcher. For additional information about new and early-stage investigators, visit http://grants.nih.gov/grants/new_investigators/.

The enthusiasm at NIH for new investigators has prompted several new grant mechanisms for their support. The NIH Director's New Innovator Award (<http://nihroadmap.nih.gov/newinnovator/>) supports both promising new investigators and highly innovative

research. Many newly trained scientists have exceptionally innovative research ideas but not the preliminary data required to fare well in the traditional NIH peer-review system. This award requires no preliminary data, and no detailed annual budget is requested in the application. The procedure for evaluating applicants' qualifications is distinct from the traditional NIH peer review study-section process, and it emphasizes the individual's creativity, the innovativeness of the research approach, and the potential, if successful, to have a substantial impact on an important biomedical or behavioral research problem. For the purpose of the NIH Director's New Innovator Award, eligible applicants must be those who have not received an independent award and who are within ten years of completing a doctoral degree or of completing medical internship or residency.

A second new investigator award is the Pathway to Independence Award (http://grants.nih.gov/grants/new_investigators/index.htm), which offers very promising postdoctoral scientists an opportunity to receive both mentored and independent research support. Awardees participate in an initial one to two-year mentored phase that allows them to complete their supervised research work, have the results published, and search for an independent research position. A second, independent phase of three to four years allows awardees who secure an assistant

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professorship, or a like position, to establish their own research program and to convert this K99 award to an NIH Investigator-Initiated (R01) grant.

K Awards

Also called research career awards, the K Awards are designed for scientists whose careers are already underway. The Mentored Research Scientist Development Award (K01) provides research scientists with an additional period of sponsored research experience in an area new to the applicant or in an area that would greatly enhance the applicant's scientific career, while the Mentored Clinical Scientist Development Investigator Award (K08) is aimed at clinicians who need an intensive period of mentored research experience. Clinically trained professionals can also utilize the K23, or Mentored Patient-Oriented Research Career Development Award, to develop a focus on investigations involving patients. The Midcareer Investigator Award in Patient-Oriented Research (K24) supports protected time for clinicians to pursue patient-oriented research and to mentor beginning clinical scientists. Finally, the Mentored Quantitative Research Career Development Award (K25) makes supervised study and research possible for investigators whose quantitative scientific and engineering backgrounds are outside biology or medicine, but who have made a commitment to focus their research endeavors on biomedical research. To find out more about these opportunities, go to http://www.niams.nih.gov/Funding/Funding_Opportunities/activity_codes.asp and click on Research Career Awards (K).

Cosponsored Training Programs

NIAMS has partnered with the Orthopaedic Research and Education Foundation to fund National Research Service Award postdoctoral fellowships in epidemiology, clinical trials, and outcomes research in orthopaedic surgery. The fellowships support up to two years of advanced training to obtain

a Master of Public Health and/or Doctor of Philosophy degree in epidemiology, which will qualify fellows to pursue careers in these areas as they relate to musculoskeletal diseases. Through this initiative, the Institute aims to increase the number of clinically trained orthopaedic surgeons prepared to make advances in epidemiology, clinical trials, and health outcomes research. The fellowships should also enhance the visibility of these disciplines at U.S. academic health centers. For additional information, go to <http://grants.nih.gov/grants/guide/pa-files/PA-06-539.html>.

Loan Repayment Program

NIAMS participates in the NIH Loan Repayment Program, an initiative to attract health professionals to careers in clinical, pediatric, health disparities, and other areas of research. In exchange for a two or three-year commitment to a research career, NIH pays trainees up to \$35,000 per year toward the relief of their qualified student loan debt and makes payments equal to 39% of total loan repayments to the Internal Revenue Service on behalf of program participants to offset federal tax liabilities. The success rate for the Loan Repayment Program is quite favorable. It is currently directed toward clinical researchers and to basic and clinical researchers focusing on pediatric problems. For more information on the NIH Loan Repayment Program, visit <http://www.lrp.nih.gov/>.

Postdoctoral Trainee Success

In September 2007, an independent working group released an evaluation report on the effectiveness of the NIAMS K01 and K08 awards along with T32 (National Research Service Award Institutional Training Grants) and F32 (Postdoctoral Individual National Research Service Awards) funding mechanisms². (The latter two awards provide support at the beginning of a specialty training program.) A major outcome measure of

success was the ability of award recipients to later obtain R01 funding. The report showed that 83% of K01 recipients and 55% of K08 awardees went on to receive R01 funding. For the T32 and F32 awards, the numbers were 17% and 34%, respectively. The high rate of success of the K01 and K08 mechanisms, especially if one looks at success in terms of the percentage of recipients still involved in research, indicates a robust return rate for the Institute's investment in these programs.

Renewing the Cycle

As participants and stewards in the world of the biomedical sciences, our Institute is never far removed from the cycle of life: each new generation—from the most complex species to the least—must take on the challenges of its predecessor. At NIAMS, we take seriously our role not only in funding research but also in making sure that new generations of researchers are both available and well-prepared to carry on the exciting work of musculoskeletal science. With the help of our partners in the professional and lay communities, we have no doubt that we will continue to succeed.

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