News from the National Institute of General Medical Sciences (NIGMS)[1]

PART I: WHAT IS THE SCOPE OF INSTITUTIONAL TRAINING PROGRAMS (T32s) SUPPORTED BY THE NIGMS? WHERE IS MORE INFORMATION AVAILABLE?

NIGMS supports multidisciplinary training in biomedical research under the National Research Service Awards (NRSA) Act. This is the first part of a two part series on training programs, and is an overview of what the NIGMS presently supports. More information about what the peer reviewers consider when evaluating training grant applications (e.g. program director, faculty, applicant pool, didactic training, training record, etc.) will be provided in a future column. Descriptions of the extramural training programs and instructions for applicants are found in the document "NIGMS GUIDELINES FOR NATIONAL RESEARCH SERVICE AWARDS", which can be accessed from the NIGMS home page.

In general, it is NIGMS' goal in its predoctoral programs to provide trainees with broad access to research opportunities across disciplinary and departmental lines, while maintaining high standards of depth and creativity. Cooperative involvement of faculty members from several departments or doctoral degree programs is one essential aspect of this multidisciplinary emphasis. Another is breadth in research training instruction, with regard to both the curriculum and laboratory rotations. NIGMS now offers a new option for the construction of grant applications for predoctoral training support that combines two or more of the seven Ph.D. support areas. Additionally, the institute participates in the jointly-sponsored NIH Predoctoral Training Program in the Neurosciences. NIGMS also provides support for a small number of postdoctoral research training grants in the more clinically related areas of research training; training should focus on advanced and specialized areas of research and offer appropriate opportunities to study problems of clinical relevance.

Descriptions of the NIGMS predoctoral and postdoctoral institutional research training programs (T32s) in the biomedical sciences are summarized below.

Predoctoral Support Areas

1. Cellular, Biochemical and Molecular Sciences

Training programs should be of a cross-disciplinary nature and involve in-depth study of biological problems at the level of the cellular and molecular sciences. The research training offered should encompass related disciplines, such as biochemistry, biophysics, chemistry, cell biology, developmental biology, genetics, immunology, microbiology, molecular biology, molecular medicine, neurobiology, and pathology. These research opportunities should be available in the represented disciplines with faculty mentors from interacting departments and/or interdisciplinary Ph.D. programs.

2. Genetics

Training programs in genetics should emphasize broad training in the principles and mechanisms of genetics and related sciences. Training in a variety of areas such as classical genetics, molecular genetics, population and behavioral genetics, and developmental genetics should be included. Programs may also include training and research opportunities in related disciplines such as biochemistry, cell biology, and statistics. These programs are generally expected to include faculty members in other disciplines, in addition to genetics.

3. Pharmacological Sciences

Training programs in this area should be multidisciplinary and should emphasize exposure to the broadly-based field of pharmacological sciences. Individuals should receive training that will enable them to conduct research on the biological phenomena and related chemical and molecular processes involved in the actions of therapeutic drugs and their metabolites. Thesis research opportunities should be available with faculty members in a variety of disciplines, such as biochemistry, physiology, molecular biology, cell biology, chemistry, medicinal chemistry, toxicology, as well as pharmacology. Students trained in this program should be able to contribute to the design and evaluation of therapeutic strategies based upon the competence they have acquired through specialized training in the pharmacological sciences.

4. Systems and Integrative Biology

Training in this area should be directed toward building broad research competence required to investigate integrative, regulatory, and developmental processes of higher organisms and their functional components. The training program should bring together varied resources, approaches, and thesis research opportunities with faculty mentors of such disciplines/departments as physiology, biomedical engineering, and the neuro- and behavioral sciences, as well as biochemistry and cell and developmental biology. Graduates of the program should be well-versed in quantitative approaches to biology.

5. Molecular Biophysics

Multidisciplinary programs in this area are intended to provide training which focuses on the application of physics, mathematics, and chemistry to problems of biological structure, primarily at the atomic level. These programs should bring together faculty members from departments such as chemistry, physics, and engineering with an interest in biologically related research with those faculty in biological science departments whose orientation is to the application of physical methods and concepts to biological systems.

[1] Future topics for this column: new program announcements, the current funding picture, and your suggestions.

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6. Biotechnology

Training programs in this area should be multidisciplinary and focus on the applications of engineering, physics, chemistry, mathematics, and biology to areas of basic biomedical research related to biotechnology. The programs should provide training that bridges the life sciences with the other sciences, and should involve the participation of faculty members from several departments/schools whose research emphases are on the areas mentioned above. Active participation by faculty members in engineering is particularly encouraged, as well as mechanisms to expose students to the biotechnology industry.

7. Chemistry—Biology Interface

Training programs in this area should provide significant biological training to students receiving in-depth training in synthetic/mechanistic chemistry and provide significant training in synthetic/mechanistic chemistry to students being trained in depth in the biological sciences. It is expected that these programs will consist of faculty drawn from departments of chemistry, medicinal chemistry, and/or pharmaceutical chemistry and faculty from the biological disciplines, such as biochemistry, cellular biology, cell biology, immunology. Students trained at the chemistry-biology interface should be well-grounded in a core discipline and sufficiently well-trained in complementary fields to allow them to work effectively in a multidisciplinary team.

8. Medical Scientist Training Program

Interdisciplinary programs in this training area should provide the integrated medical and graduate research training required for investigation relevant to diseases in man. The combination of Ph.D. and M.D. studies should be coordinated and should enhance both degrees. These programs should assure highly selected trainees a choice of a wide range of pertinent graduate programs in the biological, chemical, and physical sciences combined with training in medicine leading to the combined M.D.-Ph.D. degree. Programs are encouraged to provide a breadth of doctoral research training opportunities for MSTP trainees consistent with individual institutional strengths. In addition to the above disciplines, support of trainees in other disciplines such as computer sciences, social and behavioral sciences, economics, epidemiology, public health, bioengineering, biostatistics, and bioethics is appropriate. The proposed program should be flexible and adaptable in providing each trainee with the appropriate background in the sciences relevant to medicine and be rigorous enough to enable the individual to function independently in both basic research and clinical investigations.

Postdoctoral Support Areas

1. Medical Genetics

Training programs should provide advanced and specialized research training in the principles of genetics with the goal of understanding human genetic disorders. Trainees, who will normally hold the M.D. degree, should be drawn from diverse backgrounds and should be offered opportunities for conducting research with faculty who represent a variety of approaches to genetics ranging from molecular genetics to human population genetics. Programs should provide rigorous training in basic or applied research, with an emphasis on human or medical genetic problems. For holders of the M.D. or other professional degrees, the program should provide training and research opportunities in areas of basic genetics. This training should build on, and complement, the trainee's clinical background. For holders of the Ph.D. degree, the research and training should be specifically designed to foster a career in human and medical genetics.

2. Clinical Pharmacology

Individuals in these training programs should receive experience in the methodology and in the conduct of basic and clinical research to qualify them to investigate the effects and mechanisms of drug actions in humans. Trainees, most of whom would have the M.D. degree, will be expected to spend at least two years in the training program and should have the opportunity to acquire fundamental scientific knowledge and research techniques in areas such as basic pharmacology, biochemistry, physiology, molecular medicine and gene therapy, biostatistics, and other biomedical subdisciplines. For trainees with an M.D. or other professional degree, this experience should emphasize rigorous research training and complement their clinical backgrounds. For trainees with a Ph.D. degree, the research and training should be specifically designed to promote a career in clinical pharmacology.

3. Trauma and Burn

Multidisciplinary research training should be offered to postdoctoral trainees seeking to improve the understanding of the body's systemic responses to major injury and to foster the more rapid application of this knowledge to the treatment of trauma and burn-injured victims. The supervisory staff should include trauma surgeons and/or burn specialists as well as basic scientists. Trainees, most of whom would hold the M.D. degree, will be expected to spend at least two years in the training program and to apply such basic disciplines as biochemistry, physiology, immunology, microbiology, cell biology, molecular biology, biomedical engineering, or behavioral sciences to the study of trauma.

4. Anesthesiology

Training programs should offer training support to individuals with the M.D. degree who seek a better understanding of the fundamental mechanisms of anesthetic action. Trainees will be expected to spend at least two years in such basic science departments as pharmacology, physiology, or biochemistry to enable them to study the effects of anesthetic agents on the body at the level of the organ system as well as at the molecular and cellular level.

All training grant applications should present detailed plans of the training program organization, criteria for trainee recruitment and selection, and mechanisms for evaluation of the quality and success of the training effort. Recruitment of trainees with a variety of undergraduate science backgrounds (or doctoral degree experiences for postdoctoral programs) is encouraged. Information should be provided on the qualifications of the proposed faculty participants, including their experience as trainers and their current research programs and support.

Applicants must also describe their program plans and efforts to recruit individuals from underrepresented minority groups as well as their success in recruitment, retention, and graduation of these individuals and must describe program plans to provide instruction in the responsible conduct of scientific research. NIGMS training grant awards do not provide support for mixed predoctoral and postdoctoral research training. In general, only one award in each of the areas listed will be made to an institution.

For general information about these institutional NRSA programs, contact:

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Additionally, NIGMS accepts individual NRSA postdoctoral fellowship (F32) applications from individuals who seek advanced biomedical research training. Predoctoral fellowship awards (F31) for Underrepresented Minority Students and for Students with Disabilities are also available. The Minority Access to Research Careers (MARC) Program supports several research training programs; its goals are to increase the number and capabilities of scientists from underrepresented minorities who are engaged in biomedical research. These training programs are intended to strengthen science curricula and student research opportunities at institutions with substantial minority enrollment in order to prepare minority students for research careers. Further information can be found at the following world wide web sites:

NIGMS—Funding Opportunities, Program Announcements, Training and Fellowships http://www.nih.gov/nigms/funding/pa/

NIH Office of Extramural Research—National Research Service Award Research Training Programs http://www.nih.gov/grants/training/policydocs.htm

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