NIGMS: Supporting the Training and Education of the Next Generation of Biomedical Scientists

Jon Lorsch
Some Ongoing Priorities for NIGMS

• Expansion of the Maximizing Investigators’ Research Award (MIRA) Program
  o New FOA for established PIs: PAR-17-094.
    • Anyone with an NIGMS R01, R37, DP2 or SC1 award can apply to convert to a MIRA when their current grant is up for renewal.
    • 5 years; renewable; more flexibility to follow new ideas and directions; increased stability; one NIGMS research grant per PI.
  o New FOA for Early Stage Investigators: PAR-17-190.
  o Separate review panels and criteria for established and early-stage investigators.

• New Technology Development Pipeline
  o Exploratory/proof of concept grants (R21): PAR-17-046.
    • No preliminary data allowed!
  o Focused technology R&D grants (R01): PAR-17-045.
  o Revised Biomedical Technology Research Resource (P41) FOA: PAR-17-316.

• New Team Science FOA coming soon!
  o Designed to support investigator-initiated research that must be done in organized teams and which needs a dedicated funding stream for the whole team.
  o Will replace NIGMS P01s and centers grants (except IDeA, AIDS, P41s and P30s).
Biomedical Graduate Education: Calls for Revolution

Rethinking graduate education

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If available evidence suggests that over 50% of new PhDs in science in the United States will not have careers in academic research, yet graduate training in science has followed the same basic format for almost 100 years, heavily focused on producing academic researchers. Given that so many students will not just that community, this system is failing to meet the needs of the majority of its students. Many academic, governmental, and professional leaders and organizations have lamented this discrepancy and have suggested various curricular adjustments, but most of these have been minor changes in graduate course offerings. It is time for the scientific and educational communities to take a more fundamental look at how graduate education is structured and consider, given the current environment, whether a major reconfiguration of the entire system is needed.

Some relatively new government programs and curricular innovations are positive steps that are likely to glide students greater access to training. For example, the Strengthening the Biomedical Research Workforce Program from the U.S. National Institutes of Health supports innovative approaches to help biomedical graduate training better reflect the range of career options that students might pursue. Institutional structures are also working on the problem. As one example, the Massachusetts Institute of Technology offers a Global Entrepreneurship Minor to help students learn innovation-driven entrepreneurship through hands-on learning experiences with successful entrepreneurs. However, these efforts are limited in scope and primarily take the form of adding offerings to an already overcrowded curriculum. What is needed is a fundamental system analysis and reconfiguration that results in graduate training programs that are better designed to meet the diverse career needs of today’s students. One of the last exam-level systems was in 1985, when the U.S. National Academies’ Committee on Science, Engineering, and Public Policy published a report calling for a rethinking of graduate education to reflect the evolution of careers in science and the dependent fields. Some experiments and small demonstrations but not much real program, merit in terms of the scale of analysis open and include an action plan for making the recommended changes.

Fix the PhD

No longer a guaranteed ticket to an academic career, the PhD system needs a serious rethink.

WORLD VIEW
Reform the PhD system or close it down

MUST DOCTORAL PROGRAMMES
CONFORM TO A MODEL DEFINED IN THE MIDDLE AGES.

“Substantial changes in graduate education are recommended—not because the previous approaches were wrong—but because the technological leaders of this century must have skills crafted to meet its demands.”

ADVANCING GRADUATE EDUCATION IN THE CHEMICAL SCIENCES

Summary Report of an ACS Presidential Commission

Submitted to ACS President Bassam Z. Shashashivi on December 3, 2012

Future Of Bioscience Graduate And Postdoctoral Training Conference, Part 2

NIH National Institute of General Medical Sciences
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**Developing a highly skilled, creative and diverse biomedical research workforce**
NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES (NIGMS)

Science Education Partnership Awards (SEPA).-SEPA fosters important connections between biomedical researchers and K-12 teachers and their students. These connections establish an education pipeline to careers in biomedical sciences, which is one of the most important areas of workforce development in the U.S. economy. The agreement expects SEPA to receive not less than $18,541,000, the fiscal year 2016 level, and transfers SEPA funding to NIGMS following NIH’s transfer of the program earlier this year.
Purpose:
• Increase the numbers of urban, rural and minority students considering research and medical careers

Partnerships:
• Scientists and clinicians partnering with educators, community organizations and science centers

Goals:
• Career opportunities for minority and underserved students
• Teacher professional development
• Student and teacher laboratory internships
• Mobile laboratories bring science to rural communities
• Public health literacy
Science Club Summer Camp

PAR-14-228

- RCT
- Case Comparison
- Logic Model
- Independent Evaluator
- Advisory Committee

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

https://nihsepa.org
Programs in the NIGMS Center for Research Capacity Building (CRCB)

Fred Taylor
Director, CRCB
Goals and Opportunities for SEPA

• Increase connections and synergies with other NIGMS programs
  - IDeA Program: INBREs, COBREs, CTRs
  - NARCH, SCORE
  - Undergraduate diversity programs
  - Graduate training grants
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• Leverage NIGMS communications and outreach programs for SEPA and vice-versa
Science Education and the NIGMS Office of Communications and Public Liaison

Findings Magazine
HTML | PDF | Companion poster | Multimedia
Showcases diverse scientists who do cutting-edge research and lead interesting lives. Each issue also contains brief research highlights, a puzzle or other activity and online extras.

Inside the Cell
E-PUB | HTML | PDF | Companion poster
Makes cell biology come alive through vivid descriptions and stunning images.

Cell Day 2016
“Cell”erate the Cell in a Chat with NIGMS Scientists
Thursday, November 3, 2016, 10:00 a.m.-3:00 p.m. EDT

As part of its commitment to encouraging future generations of scientists, NIGMS hosted an interactive web chat about the cell and careers in research for middle and high school students. Transcript is now available.

For more information about Cell Day, please see our FAQs page or send an e-mail to nigmsedlab@nih.gov.

https://publications.nigms.nih.gov/order/pubs_gateway.html
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  o Graduate training grants

• Leverage NIGMS communications and outreach programs for SEPA and vice-versa

• Broaden distribution of SEPAs: A SEPA in every state!
Teaching to Learn: Health Sciences and Technology Academy in West Virginia

HSTA Scholars Are . . .

- 80% rural
- 32% African American
- 73% female
- 73% first-generation college attendees
- 63% financially disadvantaged

SEPA – INBRE Pipeline
HSTA outcomes:
• 2,049 students have graduated from HSTA 1998-2014
• 99% of those students went to college
• 90% of HSTA students graduate with a four-year degree or better
HSTA Students vs. WV & Nation


HSTA graduates receive tuition waivers from the state of West Virginia to attend any state-supported college or university.
Programs in the NIGMS Center for Research Capacity Building (CRCB)

Fred Taylor
Director, CRCB
The IDeA Program Supports Research and Research Capacity Building in 23 States and Puerto Rico
Why have an IDeA program?

• Enhance the biomedical research enterprise in states that have historically received little NIH funding

• Improve outcomes for state-specific disease burdens

• Increase economic activity in the biotechnology sector in IDeA states
Why have an IDeA program?

Ensure that cutting-edge biomedical research is conducted in every state in the Nation

- Diversity of past and present experiences enhances the strength of the scientific enterprise
- Tap into the country’s entire talent pool, not just the students who happen to live in certain states
INBRE Program

Build a statewide multi-disciplinary research network

Provide support to undergraduate students, serve as “pipeline” to health research

Increase research support to faculty, postdoctoral fellows and students

Enhance science and technology knowledge of the state's workforce.
Participant Outcomes
Oklahoma INBRE

- Current Undergraduate
  - M.D./D.O.: 55
  - Graduate School: 51
  - Unknown: 12

- B.S./B.A. in STEM
  - Non-science related job: 4
  - Non-biomedical STEM degree: 16
  - Associate Degrees and Biotech Certificate: 14

- Health-Related Professions (PharmD, PT, DVM, DDS...)
  - 73

- Compared to matched control group:
  - 350% increase in students going to graduate school
  - 67% increase in students going to medical school

Grant #: P20GM103447 (Oklahoma INBRE)
PI: Darrin Akins, Ph.D.
INBRE Program Coordinator: Dawn Hammon
“Daily I see myself achieving and conducting scientific research I never in my wildest dreams thought possible.”

“...I don’t think I would have continued my education had it not been for this program...Currently I am in my second year as a graduate student and am in the middle of submitting my first fellowship.”

“I had never thought about research as a career prior to being an INBRE student. This fall I will attend graduate school, working towards a PhD in biochemistry, and I give credit for INBRE for first showing me the possibility of this career path.”
DPC Coordination and Evaluation Center: A Model for Supporting Outcomes Evaluation for NIGMS TWD Programs?
Questions or Comments?