



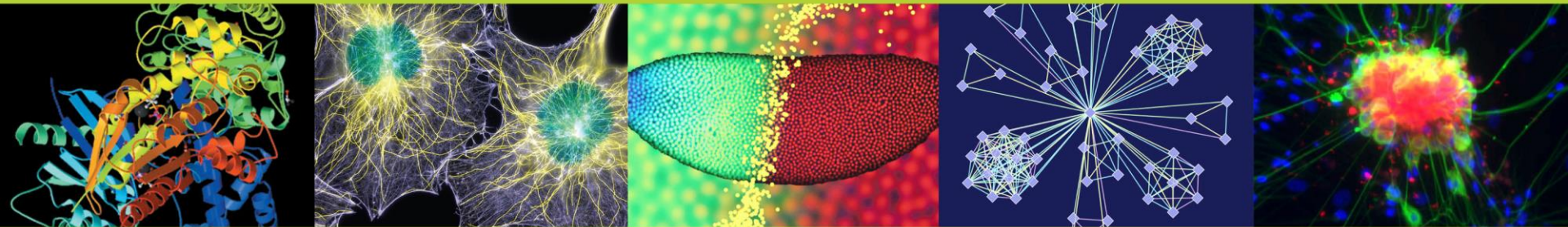
National Institute of  
General Medical Sciences



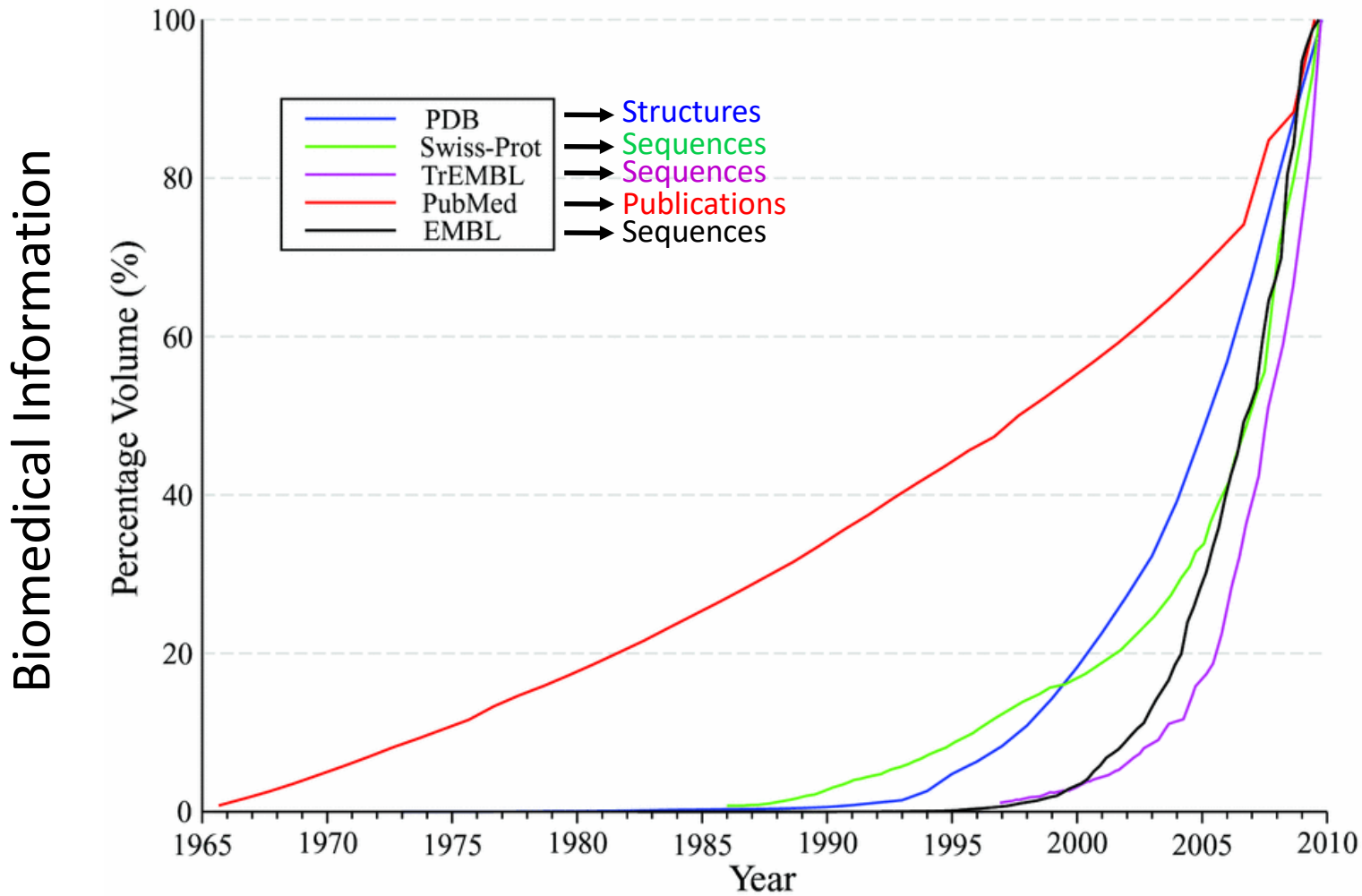
# Catalyzing the Modernization of Graduate Biomedical Education

**Alison Gammie**

Director, Division of Training, Workforce Development and Diversity  
National Institute of General Medical Sciences



# Science has changed dramatically in the past two decades – graduate education needs to keep up



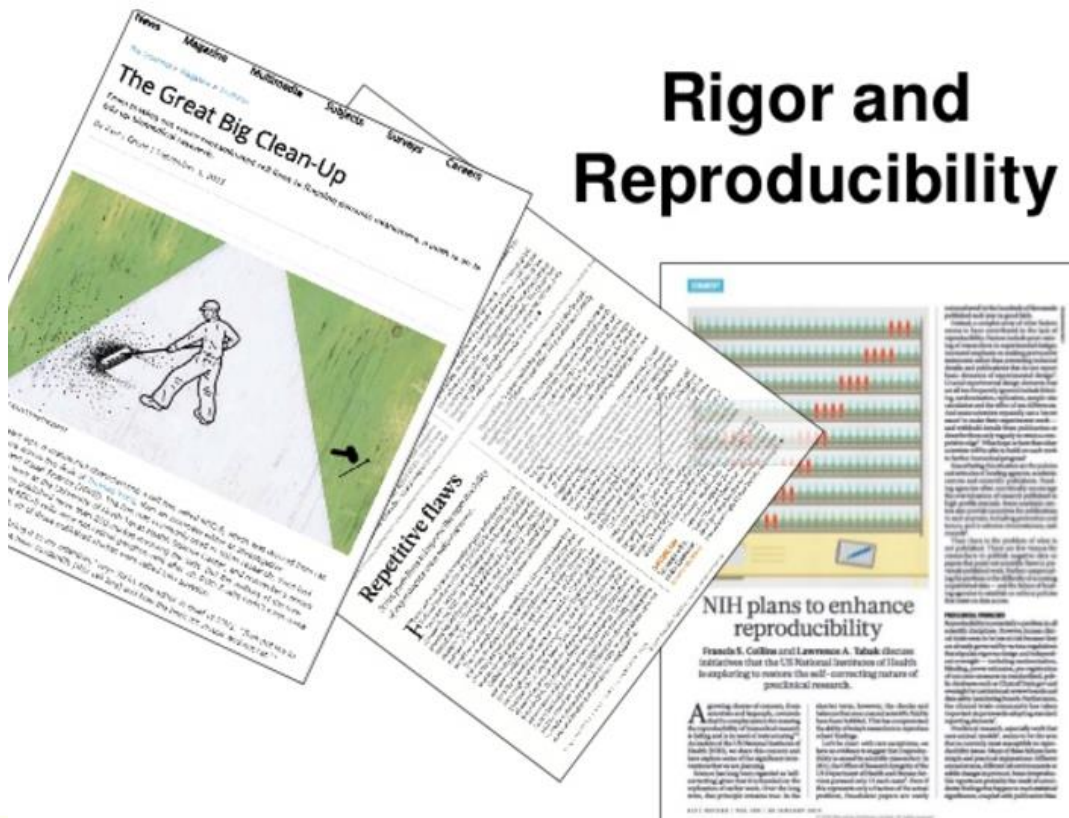
Biochem. J. (2009) 424: 317

# “Reproducibility” is a problem

## Science has lost its way, at a big cost to humanity

*Researchers are rewarded for splashy findings, not for double-checking accuracy. So many scientists looking for cures to diseases have been building on ideas that aren't even true.*

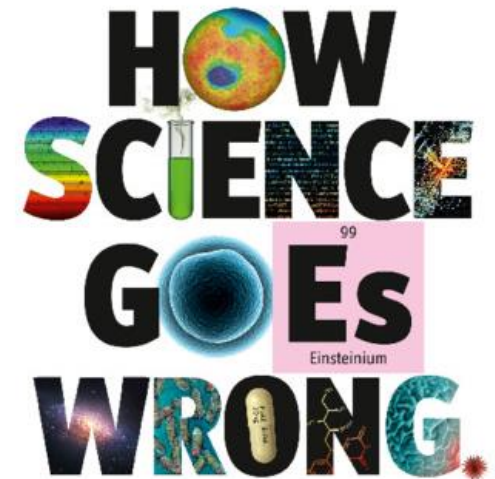
October 27, 2013 | Michael Hiltzik



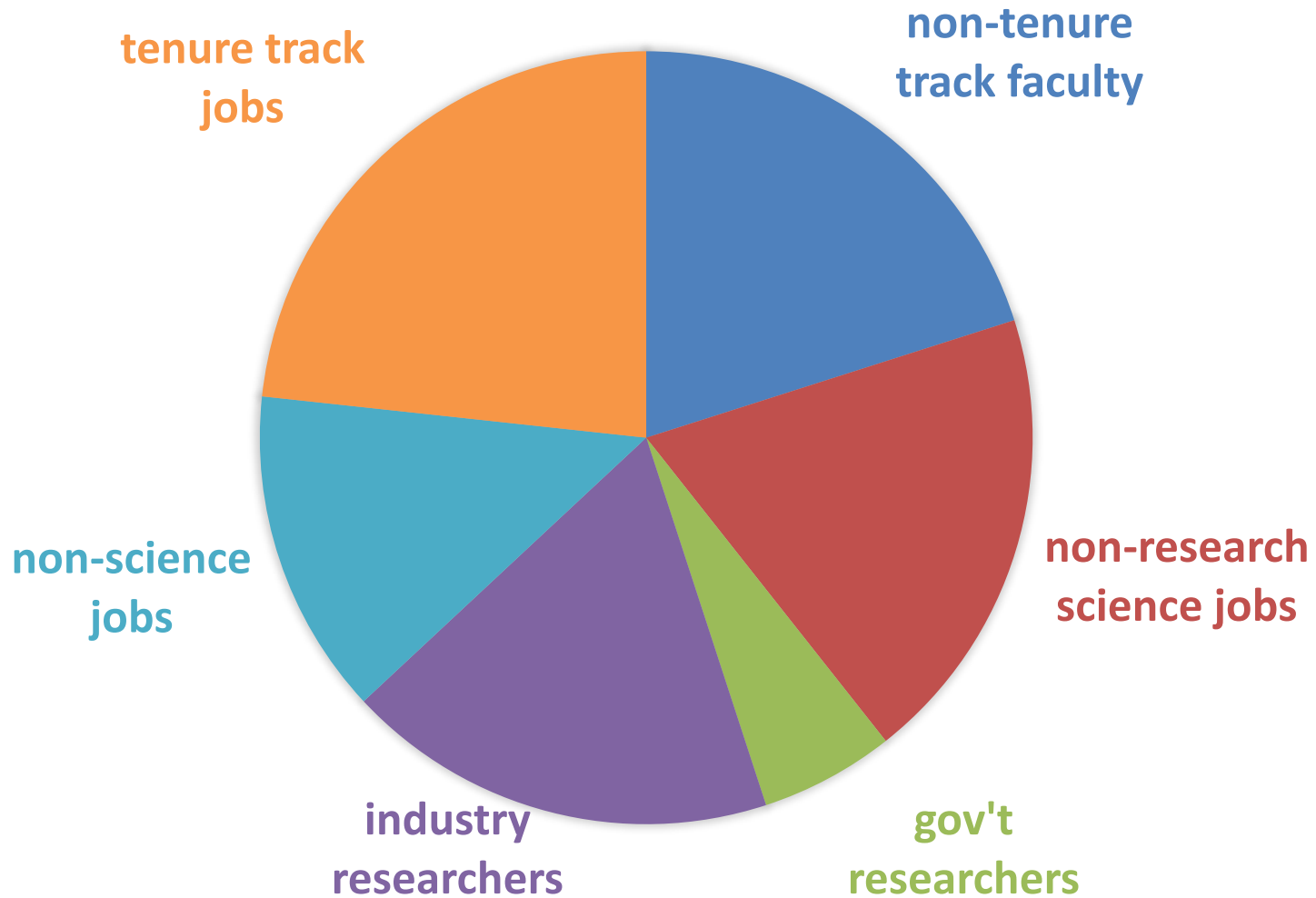
## Rigor and Reproducibility

The Economist  
OCTOBER 19TH-27TH 2013  
Economist.com

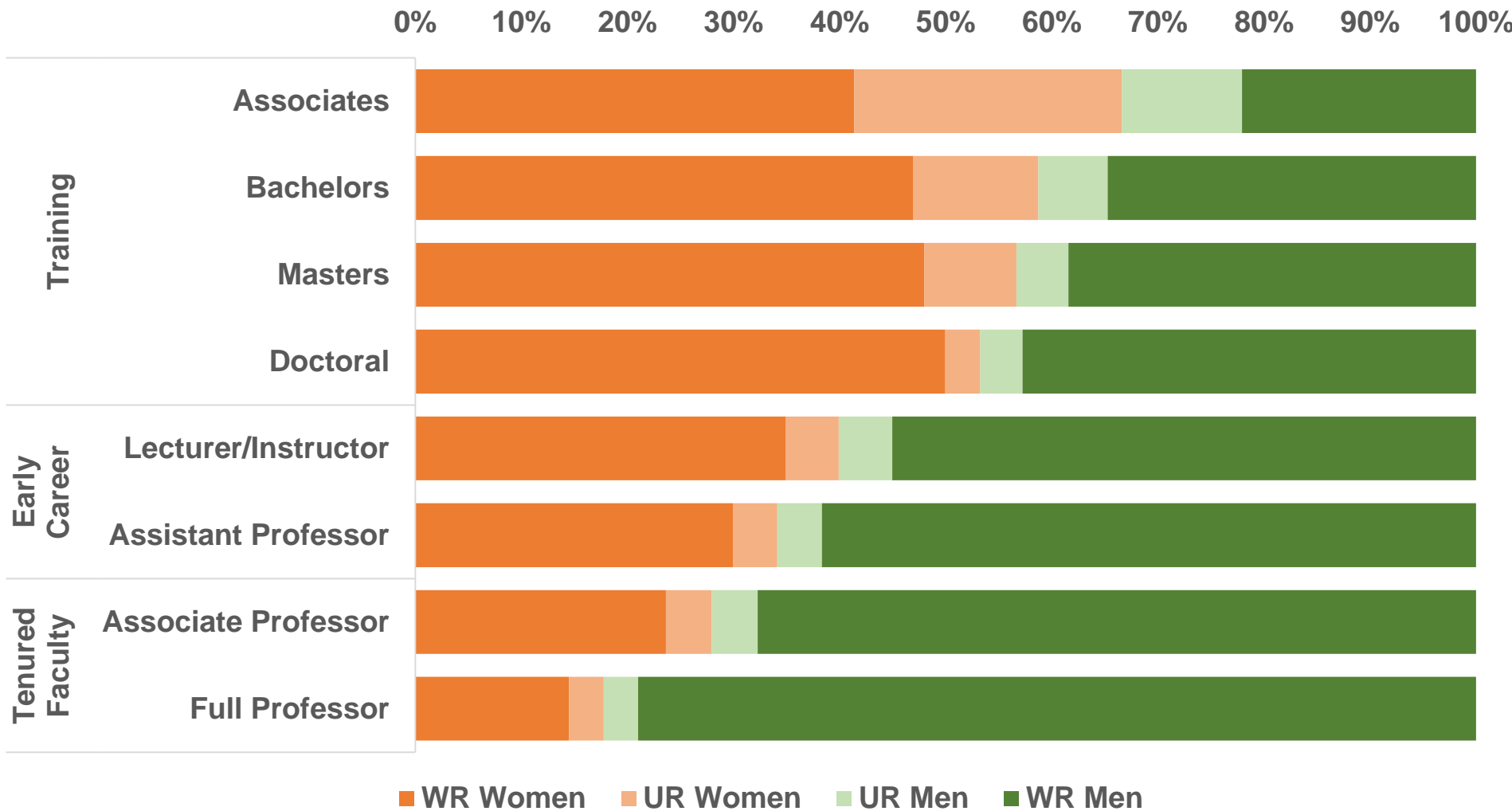
- Washington's lawyer surplus
- How to do a nuclear deal with Iran
- Investment tips from Nobel economists
- Junk bonds are back
- The meaning of Sachin Tendulkar



# The career landscape has changed



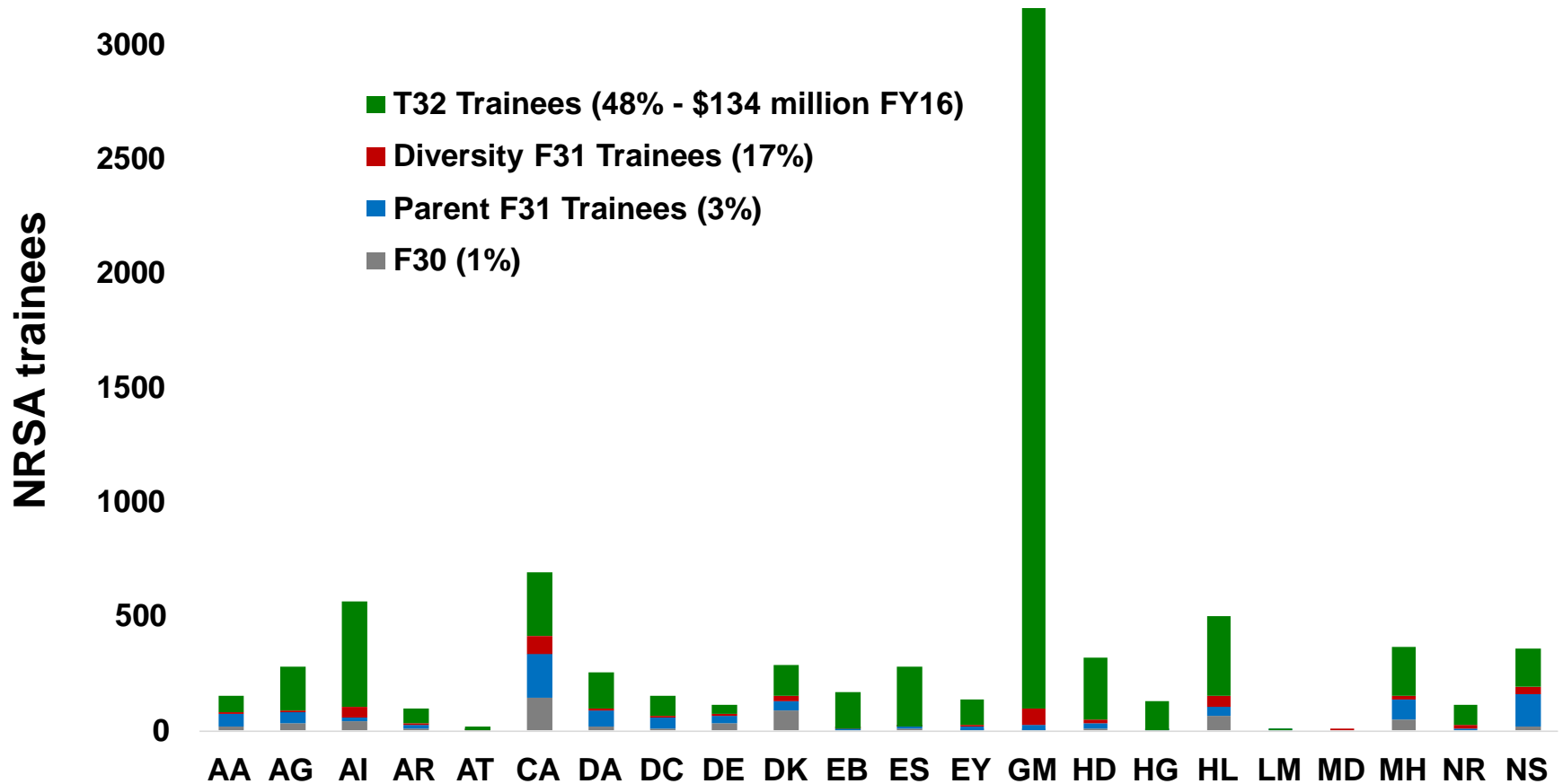
# Underrepresented minorities and women are leaving the biomedical academic pathway



UR, underrepresented: Hispanic, African American/Black, Native American

WR, well represented: White, Asian

# NIGMS is committed to supporting predoctoral training



Data: FY15 QVR/FTK Predoctoral T32, Parent F31 (PA-11-111, 14-147), Diversity F31 (PA-11-112, 14-148); Kenny Gibbs



# NIGMS supports ~300 T32 Predoctoral Programs at ~150 Institutions



# Gathering Information

## Catalyzing the Modernization of Graduate Education



Posted by Dr. Shiva Singh, Dr. Alison Gammie and Dr. Jon Lorsch on November 30, 2015

[Post a Comment](#) | [View Comments \(9\)](#) ↓

A major overhaul of how we educate graduate students in biomedical research is long overdue.





# Educator-Initiated Innovations

- Training modules to enhance data reproducibility (R25)

## NIH Rigor and Reproducibility Training Modules

[Introduction to the Modules \[PDF, 110KB\]](#)



### Module 1: Lack of Transparency

In order to reproduce someone else's findings adequately, the experimental methods, rationale and other pertinent information must be accessible and understandable. This module highlights the need to include all relevant details in publications to ensure that other studies are able to build upon the research appropriately and accurately.

[Lack of Transparency Discussion Material \[PDF, 97.2KB\]](#)

- Administrative supplements T32 predoctoral grants
  - Rigor & Reproducibility (26)
  - Career development (16)
  - Graduate Education - Skills (10)

## NIGMS Symposium on Catalyzing the Modernization of Graduate Education

### Meeting Date(s):

Monday, April 11, 2016

### Location:

Natcher Conference Center (Rooms E1/E2)  
Bethesda , Maryland  
United States

### Registration Date(s):

Tuesday, February 16, 2016 to Monday, April 4, 2016

### Sponsored by:

● National Institute of General Medical Sciences

- **150 participants from across the country**
- **30+ posters**
- **>500 views on webcast (304 live)**

# Launching a New Predoctoral T32 FOA (MSTP to come)

- **Consulted**

- ✓ **NIGMS Leadership**
- ✓ **Community**
- ✓ **Program Directors**
- ✓ **Review**
- ✓ **Council**

Request for Information (RFI): Strategies for  
Modernizing Biomedical Graduate Education

Notice Number: NOT-GM-16-109

- **RFI & Feedback loop post**

**Give Input on Strategies for Modernizing Biomedical Graduate  
Education**



Posted by [Dr. Shiva Singh](#) on June 9, 2016

[Post a Comment](#) | [No Comments ↓](#)

# Responses

- **90 unique, codable responses (most anonymous)**
  - Submitted through webpage, *Feedback Loop*, modernPhD mailbox, direct email

- **Institutions**



HARVARD  
UNIVERSITY



- **Individuals**



VANDERBILT  
UNIVERSITY

Duke  
UNIVERSITY



JOHNS HOPKINS  
UNIVERSITY

- **Society/advocacy groups**



# NEW NIGMS-specific funding announcement

- Emphasize trainee development.
- Focus on skills development, rigor and reproducibility, diversity and inclusion, and responsible conduct.
- Address conflicts in the incentive structure of the research enterprise.
- Encourage the use of evidence-based, innovative educational practices.
- Require the collection and dissemination of data on the success/failure of educational interventions.
- Emphasize improvements in career preparation (broadly defined) and dissemination of career outcomes on publicly available sites.
- Align the review criteria with the training objectives and program plan.

# Program Objective Change

The Objective of the Institutional Research Training Grant Program is to:

- **OLD:** develop and/or enhance research training opportunities for individuals interested in careers in biomedical, behavioral and clinical research that are relevant to the NIH mission. The training program should provide.... (a set of experiences)
- **NEW:** develop a diverse pool of responsible, well-trained, rigorous scientists who have ..... (a set of skills, described in the next slides)

# Proposed *Trainee Focused Objectives:* Technical/Operational Skills

- Broad understanding across biomedical disciplines, and the skills to independently acquire the knowledge needed to advance their chosen field
- The ability to think critically, independently and to identify important biomedical research questions and approaches that push forward the boundaries of their area of study





# Proposed *Trainee* Focused Objectives: Technical/Operational Skills

- A strong foundation in rigorous research design, experimental methods, quantitative literacy & reasoning skills, data analysis & interpretation
- Experience initiating, conducting, interpreting, and presenting rigorous and reproducible biomedical research with increasing self-direction



# Proposed *Trainee Focused Objectives:* Professional Skills

- The ability to work effectively in teams with colleagues from diverse cultural and disciplinary backgrounds, and to promote an inclusive and supportive scientific research environment
- The skills and opportunities to communicate scientific research methodology and findings to a wide variety of audiences (e.g., discipline-specific, across disciplines, and the public)
- The knowledge, professional skills and experiences required to identify and transition into productive careers in the biomedical research workforce



# Review Criteria: Overall Impact

**Overall Impact:** Reviewers will provide an overall impact score to reflect their assessment of the likelihood that the proposed training program...

## OLD

...will prepare individuals for successful, productive scientific research careers and thereby exert a sustained influence on the research field(s) involved.

## NEW

...through courses, structured training activities, and mentored research experiences will produce well-trained, responsible, rigorous and diverse scientists with the technical, operational, and professional skills necessary to transition into productive biomedical research careers.

# Review Criteria -Training Program and Environment

## Questions focused on:

### OLD

- Research Environment
- Training Program Plan
- Institutional Commitment  
Sufficient
- Distinct from other funded programs

### NEW – additional questions concerning

- Mission, Objectives, and Overall Training Plan
  - Should state measurable, obtainable objectives
- Institutional and Departmental Commitment
- Enhancements to the Training Environment
  - Evidence-based approaches to teaching, mentoring and inclusion
- Mentor Selection Process and Mentor Training
- Career Development
- Program Evaluation Plan Aligned with Objectives

# Review Criteria: Principal Investigator

- **OLD**

- Expertise, leadership and time commitment
- Somewhat discouraging of multiple PI's

- **NEW**

- Expertise, leadership, *record of rigorous research*, time commitment, *trained in mentoring, diversity and inclusion*
- Encourage multiple PI's with complementary expertise in training

# Review Criteria: Preceptors/Mentors

## OLD

- Focused on numbers, funding, and scientific expertise

## NEW

- Numbers, funding and expertise
- Bandwidth and commitment *to training*
- Must provide research opportunities and teach: experimental design, rigor & reproducibility
- Trained mentors
- Commitment to diversity and a supportive research environment
- Actively promote career development

# Review Criteria: Trainees

## OLD

- Mostly whether there are sufficient numbers of “well-qualified” students
- Must have an appointment plan

## NEW

- Encourages recruiting and appointing trainees from diverse backgrounds (broadly defined) with the **potential** to become outstanding scientists (e.g., a holistic review process when accepting and appointing students)
- Emphasizes a retention plan with oversight throughout the entire time in graduate training



# Review Criteria: Training Record

## OLD

- Completion
- Research accomplishments: (e.g., “high-impact” publications, awards, careers in research, leadership positions)
- Evaluations

## NEW

- Completion and time to degree (well- vs under-represented similar)
- Demonstrate rigorous research activity that advanced scientific knowledge and/or technologies (e.g., peer-reviewed papers, presentations at scientific meetings, etc.)
- Career development and tracking
- Recruitment of students from underrepresented groups
- Evaluation, outcomes, and dissemination; responsive improvements
- Recruitment plans for diversifying the faculty

# Timeline

- **NIH Guide publication:** September 2017 (estimated)
- **Application receipt:** May 2018
- **Initial review:** Oct/Nov 2018
- **NAGMS Council review:** January 2019
- **Earliest award date:** July 2019

# Questions? Comments?

