TRANSLATING SCIENCE TO BETTER HEALTH:
THE POWER OF DIVERSITY AND MULTICULTURAL ENGAGEMENT

OPENING CEREMONY
Translational Science and the Power of Diversity

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Translational Science and the Power of Diversity: Increasing Participation in Biomedical Research: The View from NIH

- Why diversity matters
- The NIH workforce
- New NIH workforce initiatives
- Some advice to trainees: Top Ten things I have learned

Why Diversity Matters

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Why Diversity Matters

To ensure that we continue to attract the brightest minds to biomedical research, NIH is committed to increasing the diversity of its workforce.

Possible Impediments to Participation in Clinical Trials

- Distrust of the medical/scientific community; distrust of research
- Failure of researchers to recruit underrepresented groups actively
- Lack of knowledge about/lack of access to clinical trials
- Language and cultural barriers
- Small numbers of minority medical professionals in specific areas of research
Participants in National Cancer Institute Cooperative Group Breast, Colorectal, Lung, or Prostate Cancer Therapeutic Trials, 1996-2002

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Trial Participants (N)</th>
<th>Proportion of Males (%)</th>
<th>Proportion of Blacks (%)</th>
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<tr>
<td>Overall</td>
<td>61,686</td>
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<tr>
<td>Black</td>
<td>31,686</td>
<td>55.3</td>
<td>53.7</td>
</tr>
<tr>
<td>White</td>
<td>30,000</td>
<td>55.3</td>
<td>53.7</td>
</tr>
</tbody>
</table>

From Participation in Cancer Clinical Trials: Race-, Sex-, and Age-Based Disparities. JAMA. 2004;291(22):2720-2726.

Value of Diversity in Clinical Research

- BiDil example: first drug approved by the FDA marketed for a single racial-ethnic group for the treatment of congestive heart failure

- Would not have been possible without diversity in the Vasodilator-Heart Failure Trials

Vasodilator-Heart Failure Trial

Differential survival in black (left graph) and white (right graph) patients: demonstrated benefit of hydralazine-isosorbide dinitrate therapy in black patients

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1980 & 2010

Reform the PhD system or close it down

Scientific American

Does the U.S. Produce Too Many Scientists?
ACD Working Group on the Future Biomedical Research Workforce

- Shirley Tilghman, Ph.D., co-chair
  Princeton University
- Sally Rockey, Ph.D., co-chair
  NIH
- Sandra Deges, Ph.D.
  University of Cincinnati
- Laura Force, M.D.
  Weill Cornell Medical Center
- Donna Githier, Ph.D.
  University of Kansas
- Arthur Gutierrez-Hartmann, M.D.
  University of Colorado Denver
- Freeman Hrabowski, Ph.D.
  Univ of Maryland, Baltimore County
- James Jackson, Ph.D.
  University of Michigan, Ann Arbor
- Leemor Joshua-Tor, Ph.D.
  Cold Spring Harbor Laboratory
- Richard Lifton, M.D., Ph.D.
  Yale School of Medicine
- Garry Neil, M.D.
  Johnson & Johnson
- Naomi Rosenberg, Ph.D.
  Tufts University
- Bruce A. Weinberg, Ph.D.
  The Ohio State University
- Keith Yamamoto, Ph.D.
  Univ of California, San Francisco

Biomedical Research Workforce Working Group: Findings

- Increasingly difficult to launch traditional, independent academic research career:
  – Rising number of Ph.D.s
  – Number of established researchers staying longer in field
- Long training time, relatively low early-career salaries make biomedical research careers less attractive than other professions
- Training programs offer little preparation for careers outside academia—despite decreasing likelihood of finding an academic position

Snapshot of the Biomedical Research Workforce

Notations:
- **~** medium confidence in accuracy of the data
- **≈** low confidence in accuracy of the data

- **Postdoctoral Training**
  - ~8% of graduates leave the US
  - ~30% of graduates skip a postdoc
  - ~70% of graduates do a postdoc

- **Graduate Education & Training**
  - 2009 Total: 83,000
  - Time to Degree: ~5.5-7 years
  - 2009 Graduates: 9,000

- **Post-Training Workforce**
  - ~1,900 to ~3,900 in 2009

- **Industrial Research**
  - ~43% (~23% tenured)

- **Academic Research or Teaching**
  - ~6%

- **Government Research**
  - ~18%

- **Science Related Non-Research**
  - ~13%

- **Non-Science Related**
  - ~2%

- **Unemployed**
  - (~128,000 Biomedical US-trained PhDs)
Biomedical Research Workforce Working Group: Recommendations

- Graduate Students: diversify, shorten training
- Postdoctoral Researchers: shorten pathway to independent career; increase support for training; improve pay, benefits
- Information Analysts: improve tracking of career outcomes, workforce analysis
- Physician Scientists: conduct further study
- Staff Scientists: promote their value, stature
- Salary Support: gradually reduce % of funds from NIH
- Diversity: strengthen coordination, evaluation of programs

NIH Plans Regarding the Biomedical Research Workforce – Highlights

- Establish a grant program seeking innovative approaches to complement traditional research training in biomedical sciences at institutions that receive NIH funds.
- Encourage all NIH grantees that support graduate students for doctoral degrees and/or postdoctoral researchers to have IDPs for these individuals
- Increase initial postdoctoral researcher stipend
- Increase awards that encourage independence: K99/R00 and Early Independence Awards
- Develop a simple and comprehensive tracking system for trainees
- Full implementation plans will be available on acd.od.nih.gov
New Investigators, New Ideas

Research Career = Tenured Professor

Health Care Delivery
Investment
Elementary & High School Teaching
Intellectual Property
Writing
Policy
Sales
Industry-based Research
Science Administration

Alternate Scientific Careers
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Diversity of the NIH-Funded Research Workforce

- Hispanic or Latino (of any race)
- American Indian and Alaska Native
- Asian
- Black or African American
- Native Hawaiian and other Pacific Islander
- Other, unknown, not reported and more than one race

2010 US Census Bureau Report

Sources: US Census Report 2010; IMPACII; AAMC

Greater Diversity in Research Workforce is Needed

Weaving a Richer Tapestry in Biomedical Science

Advisory Committee to the Director Working Group on Diversity in the Biomedical Research Workforce:

- Reed Tuckson, M.D., co-chair
  UnitedHealth Group
- John Ruffin, Ph.D., co-chair
  NIH
- Lawrence Tabak, D.D.S., Ph.D., co-chair
  NIH
- Ann Bonham, Ph.D.
  AAMC
- Jordan Cohen, M.D.
  AAMC
- José Flores, M.D., Ph.D.
  Harvard Medical School
- Gary Gibbons, M.D.
  NIH
- Renee Jenkins, M.D.
  Howard University
- Tujuan Portsun, Ph.D.
  Lehigh University
- Wayne Riley, M.D., M.P.H., M.B.A., MACP
  Meharry Medical College
- Samuel S. Ferguson, M.D.
  Columbia University Medical Center
- Dana Yusuf Takagi, M.D.
  University of California, Santa Cruz
- Maria Teresa Veloz, Ph.D.
  University of Arizona
- M. Roy Wilson, M.D., M.S.
  NIH
- Keith Yamamoto, Ph.D.
  University of California, San Francisco
- Clyde Yang, M.D., M.S., FACC, FAHA, MACP
  Northwestern University
Working Group Recommendations: A Comprehensive Strategy

- Pipeline
- Mentoring
- Infrastructure
- Peer Review

A Dramatic Cultural Shift is Required

We need an integrated solution that maximizes the likelihood for success; this includes direct support for students; support for faculty mentors; and support to the Institution.

A Dramatic Cultural Shift is Required

We must acknowledge that we do not have all the answers – we need to identify best practices from programs around the country and then attempt to merge them into a coherent, scalable approach.
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Goals

The two main goals of this initiative are:
1. To increase the diversity of the NIH-funded workforce because we have compelling evidence that this will help us accomplish our mission
2. To ensure that all applicants are treated fairly in the peer review system

The Challenges We Must Solve

- No one set of initiatives will diversify the NIH-funded workforce overnight – this will take time
- There is tremendous mistrust in many of the communities that we must engage with and we must work hard to gain their trust
- Any effort will require the collaboration and cooperation of extramural partners
- Diversifying the NIH-funded workforce and ensuring the fairness of the peer review system are collective responsibilities across the NIH because we will all benefit
### Form ACD Working Group on Diversity

- Standing working group of the Advisory Committee to the Director
  - Charge: providing regular advice to the ACD and NIH Director on effective strategies to increase the representation of individuals from diverse backgrounds underrepresented nationally in biomedical research and to reduce disparities in research awards from applicants from backgrounds underrepresented nationally in biomedical research

### Implementation Strategies

Four interrelated approaches will be implemented:

- The NIH Building Infrastructure Leading to Diversity (BUILD) Program
- The National Research Mentoring Network (NRMN)
- Ensuring Fairness in Peer Review
- Increased Engagement by all NIH Leadership
Building Infrastructure Leading to Diversity (BUILD) Program

- Student Support:
  - Rigorous mentored research experience for 2 summers (in college) and up to 2 years (post-graduation)
  - Tuition scholarships for up to 2 years as undergraduate
  - Possibility of loan repayment in graduate school
  - ~150 new students per year / ~600 students in the program per year
- Based, in part, on the success of the NIH IRP Undergraduate Scholarship Program and, in part, on the “Race to the Biomedical Top” program suggested by Dr. Wilson of the White House Initiative on HBCUs

BUILD Program (cont.)

- Faculty Support:
  - Salary offset and infrastructure support for key faculty responsible for undergraduate research training
  - Resources for highly effective mentors to train new mentors
  - Support for “Innovation Space” to enable organizations to develop novel approaches to increase diversity of the student pool that enters the PhD training pathway
BUILD Program (cont.)

- **Primary Site Eligibility:**
  - < $7.5M of NIH research project grant funding (RPG) annually and,
  - at least 25% of undergraduate students receiving Pell Grants.

BUILD Program (cont.)

- **Consortium:**
  - Primary site encouraged to partner with pipeline-partner institutions and research-partner institutions (including NIH intramural program) to complement strengths and participate in Nation-wide BUILD consortium
  - Primary site may also partner with a "Co-Primary" Institution that does not have an undergraduate program and,
    - meets the RPG inclusion criteria for undergraduate schools and,
    - have an award-eligible pool of doctoral-level applicants, 25% of whom are former Pell recipients.

Implementation Strategies

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National Research Mentoring Network

• Grantee will engage and assemble multiple people and/or organizations into a single, Nation-wide consortium
• Goals
  – Connect students, postdoctoral fellows, and faculty to experienced mentors both in person and virtual
  – Develop standards for good mentorship
  – Provide training to individuals interested in learning how to become better mentors

National Research Mentoring Network

• Goals (cont.)
  – Provide or arrange for relevant workshops and training opportunities in grantsmanship (grant writing; mock study sections, feedback on grant applications) and career "survival" strategies
  – Link with BUILD consortium primary institutions and all student participants
  – Network students, postdoctoral fellows, and faculty to the larger biomedical research community

BUILD and NRMN Coordinating and Evaluation Center

• Will create and maintain a database that can be fully interrogated of all mentors (i.e. those from BUILD institutions as well as those participating in the NRMN) and mentees that will include:
  – personal and organizational demographics
  – productivity measures
  – outcome measures for individuals and institutions
• Will have connections with the BMW tracking
• Will perform analyses requested by NIH and Consortium members in priority order as determined by an Independent Data Access Committee
• Will be responsible for integrating and coordinating all trans-consortium activities
• Will conduct an annual meeting of the Consortium as a means to facilitate the sharing of science and best practices with all participants
Why a National Consortium is Important

• Networking has become an increasingly important element in the ability of modern science to "work together."
• Additional analysis of Biosketch data by Dr. Ginther and her colleagues has shown that Black applicants have significantly fewer publications, citations, and co-authors.
• Linking trainees and investigators from groups that have been historically underrepresented in science to majority investigators should be facilitated by the BUILD/NRMN Consortium.

Anticipated Support for BUILD/NRMN Consortium – A Common Fund Program

• We plan to issue planning grants in FY2013 and conduct regional technical workshops to aid applicant organizations that may wish to apply for these programs.
• Subject to fund availability and a sufficient number of highly meritorious applications, we plan to support ~10 primary site institutions with an ultimate steady state of ~600 UG5 in all program phases; 1 NRMN; and, 1 coordinating and evaluation center.
• We estimate the average yearly support over the initial life of the program to be ~$50M/year.
• We would welcome partnerships with other funding sources to expand the program.

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Ensuring Fairness in Peer Review

- NIH has a core responsibility to ensure that all applicants are treated fairly in the peer review system.
  - Form expert, ad-hoc, subcommittee of ACD Working Group on Diversity to examine multiple hypotheses, including the role of unconscious bias, related to disparities in research awards
  - Implement implicit bias and diversity awareness training for both SROs and members of review panels
  - Pilot anonymizing of applications by removing identification of applicant and/or the applicant organization

Implementation Strategies

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Increased Engagement by all NIH Leadership

- Create an NIH Steering Committee Working Group on Diversity, thus making diversity a core consideration of NIH governance
- Recruit a Chief Diversity Officer, who will:
  - coordinate NIH initiatives designed to enhance diversity of NIH-funded research workforce
  - oversee a rigorous prospective evaluation of existing NIH programs designed to enhance diversity of the NIH-funded extramural and intramural research workforce
  - be a practicing scientist that will work collaboratively across the NIH to increase the diversity of Intramural Investigators
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Top Ten Things* I Have Learned

10. Use experiments of Nature to guide your research questions
9. Over-report failure; under-report success
8. Know what good is and aim for it
7. Do not be afraid to fail
6. Do not be seduced by “cartoon biology”
5. Mentorship is a team effort – it is about enabling not restraining
4. Humor can be effective tool, as long as the “joke is on you”
3. You do not have to be the smartest person in the room to succeed, just make sure you are always in a room with smart people
2. Hard work makes up for lack of brilliance
1. Be a mensch** – offer help without any expectation of “return”

* with apologies to David Letterman
** a good person

NIH

Turning Discovery into Health

Lawrence.Tabak@nih.gov

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Panel Discussion / Q&A

Thank you for participating!