NIH Addresses the Science of Diversity: Focusing on Institutional Change

Hannah A. Valantine, MD
NIH Chief Officer for Scientific Workforce Diversity

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NIH Addresses the Science of Diversity

Presentation Outline

• Why diversity matters

• Keys to scientific workforce diversity

• Moving beyond individual-level diversity strategies

• Sustainability requires institutional-focused efforts
Why Diversity Matters
Capitalizing on the Opportunity

- Excellence, Creativity, Innovation
- Broadening Scope of Inquiry
  - Health Disparities
  - Sex/Gender
- Changing Demographics
- Global Research Preeminence
Capturing the Benefits of Diversity
Identity is a Proxy for Cognitive Diversity

*Underrepresented Populations in U.S. Biomedical, Clinical, Behavioral and Social Science Research
<table>
<thead>
<tr>
<th>Training</th>
<th>Early Career</th>
<th>Tenured Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associates</td>
<td>Women - Underrepresented: 20%</td>
<td>Women - Well-represented: 70%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 10%</td>
<td>Men - Well-represented: 90%</td>
</tr>
<tr>
<td>Bachelors</td>
<td>Women - Underrepresented: 40%</td>
<td>Women - Well-represented: 60%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 20%</td>
<td>Men - Well-represented: 50%</td>
</tr>
<tr>
<td>Masters</td>
<td>Women - Underrepresented: 50%</td>
<td>Women - Well-represented: 50%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 10%</td>
<td>Men - Well-represented: 40%</td>
</tr>
<tr>
<td>Doctoral</td>
<td>Women - Underrepresented: 50%</td>
<td>Women - Well-represented: 40%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 8%</td>
<td>Men - Well-represented: 30%</td>
</tr>
<tr>
<td>Lecturer/Instructor*</td>
<td>Women - Underrepresented: 5%</td>
<td>Women - Well-represented: 5%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 1%</td>
<td>Men - Well-represented: 1%</td>
</tr>
<tr>
<td>Assistant Professor*</td>
<td>Women - Underrepresented: 5%</td>
<td>Women - Well-represented: 5%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 1%</td>
<td>Men - Well-represented: 1%</td>
</tr>
<tr>
<td>Associate Professor*</td>
<td>Women - Underrepresented: 5%</td>
<td>Women - Well-represented: 5%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 1%</td>
<td>Men - Well-represented: 1%</td>
</tr>
<tr>
<td>Full Professor*</td>
<td>Women - Underrepresented: 5%</td>
<td>Women - Well-represented: 5%</td>
</tr>
<tr>
<td></td>
<td>Men - Underrepresented: 1%</td>
<td>Men - Well-represented: 1%</td>
</tr>
</tbody>
</table>
Gender Diversity Declines Along Career Path

<table>
<thead>
<tr>
<th>Level</th>
<th>Female</th>
<th>Male</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor</td>
<td>458</td>
<td>501</td>
<td>91.5%</td>
</tr>
<tr>
<td>Asst. Professor</td>
<td>2,437</td>
<td>3,475</td>
<td>41.5%</td>
</tr>
<tr>
<td>Assoc. Professor</td>
<td>1,492</td>
<td>2,891</td>
<td>51.8%</td>
</tr>
<tr>
<td>Professor</td>
<td>1,623</td>
<td>5,076</td>
<td>23.5%</td>
</tr>
<tr>
<td>Dept. Chair</td>
<td>141</td>
<td>546</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

Declining Representation of Women in Leadership: Basic Sciences (All Departments Combined)

AAMC, 2015 Faculty Roster Table 13; AAMC, The State of Women in Academic Medicine: The Pipeline and Pathways to Leadership, 2015-2016, Table 11
At the current rate, attaining gender parity will take a very long time (48 years nationwide).

Accountability – Disaggregate the data!
Without inclusion, diversity initiatives may not be enough

Focus on minority experiences in STEM, not just numbers
But numbers matter ...

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Focus on minority experiences in STEM, not just numbers.
Gender diversity leads to better science

• Broader questions and research topics
• More rigorous science: gender-, sex-based analysis
• Higher quality: impact factor and citations

But... Critical mass is *Essential!*

• 15% and 30% must be women/URMs
### Keys to Scientific Workforce Diversity

<table>
<thead>
<tr>
<th>Diversity Science</th>
<th>Sociocultural Factors</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retention</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diversity Program Consortium**

Supported by the National Institutes of Health


**Diversity Outperforms Individual Ability**

- **Test:** Diverse vs. homogenous teams in solving hypothetical problems
- **Result:** Diverse teams of randomly selected participants outperformed homogenous teams of high-scoring/best individuals
- **Diversity enhances:**
  - Jury Decision Making*
  - Accurate stock trading predictions**
  - Publications in higher impact journals

Diverse Juries Make Better Decisions

Experimental study – randomly assigned
Racially homogenous jurors vs. Racially heterogeneous jurors

<table>
<thead>
<tr>
<th>Measure</th>
<th>All-White Group</th>
<th>Diverse Group*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliberation length, in minutes</td>
<td>38.49</td>
<td>50.67</td>
</tr>
<tr>
<td># of case facts discussed</td>
<td>25.93</td>
<td>30.48</td>
</tr>
<tr>
<td># of factual inaccuracies</td>
<td>7.28</td>
<td>4.14</td>
</tr>
<tr>
<td># of uncorrected inaccurate statements</td>
<td>2.49</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Wider range of information exchange; in diverse group – whites cited more facts; more discussion; fewer errors

Diversity Improves Quality of Science

- 2.57 million scientific papers between 1985-2008 (authors with U.S. addresses); 11 scientific fields
- Surnames of co-authors – ethnic diversity
- Controlled for # authors; population density etc.

Papers written by a diverse groups:
- Receive more citations
- Published in journals with higher impact factors

- Similar finding for gender diversity*


Keys to Scientific Workforce Diversity

Diversity Science

Recruitment Retention

Sociocultural Factors

Sustainability

NIH Diversity Program Consortium
*Building Evidence* - Awards made October 2014
Total: $250 million (5 years)

**BUILD: 10 sites/experiments**

**NRMN**
- California State University Long Beach
- California State University Northridge
- Morgan State University
- Portland State University
- San Francisco State University
- University of Alaska Fairbanks
- University of Detroit Mercy
- University of Maryland Baltimore County
- University of Texas El Paso
- Xavier University of Louisiana

**CEC**
- Boston College
  - Morehouse SM; U. Utah;
  - U. North Texas; U. Wisconsin

**NRMN**
- University of California Los Angeles

BUILD (2,400* students have participated to date)

*Data as of September 2017*
NIH Diversity Program Consortium

Building Evidence - Awards made October 2014
Total: $250 million (5 years)

BUILD: 10 sites/experiments

NRMN

CEC

BUILD Tested Interventions
• Stereotype threat
• Critical race theory
• Student entrepreneurship
• Living and learning communities

NRMN Activities
• Guided virtual mentorships
• MyNRMN tool
• Mentors: 2,066*
• Mentees: 3,844 *
• Grantwriting/coaching - mentees: 456 (July ‘17)

*Data as of September 2017
Race and Ethnicity of BUILD Participants

- White: 25%
- White & Latino: 4%
- Latino: 16%
- Black: 26%
- Asian/PI: 17%
- Native American/Alaska Native: 0.4%
- Other: 2%
- Two or More Ethnicities: 1%

Note: Based on first cohort of freshmen in 2015
Faculty Focused Interventions

Certain interventions contribute to increased self-efficacy, resulting in improvements in research-related success.

Interventions include:
- Rigorous pilot project funding process
- Protected time for research
- Grant writing workshops
- Grant writing coaches

BUILD

Surveys address self-efficacy

Hallmarks include: presentations at meetings, publications, external funding

NRMN Grant-Writing Training: Race/Ethnicity of Participants Submitting Grants

resulting in improvements in research-related success
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NRMN Grant-Writing Training:

Race/Ethnicity of Participants Submitting Grants

resulting in improvements in research-related success.
Keys to Scientific Workforce Diversity

Diversity Science

Sociocultural Factors

Stereotypes Bias

Recruitment Retention

Sustainability

Valantine and Collins. PNAS 2015: Oct 6;112:12240-2
Bias is Pervasive in Science and Beyond

“Black name applicants in our study received about 14 percent lower call-back rates than otherwise identical white applicants.”

Welcome to the world of sport. It's a world where men are "strong, big, real, great or fastest”

“… she became the third new mum to retain Olympic gold" … “asked how she cares for her skin and how training affects her hair.”

Recommendation letters for men:
Longer;
More references to CV, publications, patients, colleagues

Recommendation letters for women:
Shorter;
More “doubt raisers” (hedges, faint praise, and irrelevancies);
More references to personal life

“It’s amazing how much she’s accomplished.”
Bias is Pervasive in Science and Beyond

“Black name applicants in our study received about 14 percent lower call-back rates than otherwise identical white applicants.”

Rooted in Stereotypes and Begins Early

“... she became the third new mum to retain Olympic gold” ... “asked how she cares for her skin and how training affects her hair.”

Recommendation letters for men:
- Longer;
- More references to CV, publications, patients, colleagues

Recommendation letters for women:
- Shorter;
- More “doubt raisers” (hedges, faint praise, and irrelevancies);
- More references to personal life

“It’s amazing how much she’s accomplished.”
Study: “Who is a Scientist?”

Study: “Who is a Scientist?”

Women

Scientist

Teacher

Judged Career Likelihood

Masculine  Feminine

Masculine  Feminine
Study: “Who is a Scientist?”

Women

Judged Career Likelihood

Scientist

Masculine

Feminine

Men

Scientist

Masculine

Feminine

Teacher

Masculine

Feminine

Teacher

Masculine

Feminine
Study: “Who is a Scientist?”

Feminine women: Judged Less Likely to “be a Scientist”
Implicit Bias Intervention: Women in Scientific Leadership

• Hypothesis: a standardized, 20-minute educational intervention will educate faculty about implicit biases and help overcome them
• Measured pre- and post-IAT test and collected demographic data
Implicit Bias Intervention: Women in Scientific Leadership

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- Measured pre- and post-IAT test and collected demographic data.

Results of Intervention:
- Changed perception of implicit bias in males and females.
- Reduced implicit bias about leadership and men.

NIH Scientific Workforce Diversity

What are we doing to help?

Interventions at Individual Level

**Intramural**

- Recruitment Strategies and Tools: NIH SWD Interactive Toolkit
- Retention strategies: NIH Central Equity Committee
- Graduate Student Diversity

**Extramural**

- BUILD, NRMN, CEC
- Diversity Supplements
- Eliminate R01 funding disparities
  - Next Generation Scientist
  - Peer Review Bias Study
- Sustain and Scale
  - Hubs of Innovation
Expanding Diversity of NIH Candidate Pools: Junior Career Stage

Post-Doctoral and Assistant Professors

~ 693 total, top 1/3rd culled
4-10 years post-doctorate (most 4-7)
Authorship in top journals
10+ publications: 369
100+ citations: 490
200+ citations: 367

Race/Ethnicity

- White/Caucasian: 24%
- African-American/Black: 14%
- Hispanic/Latino: 25%
- Native American: 6%
- Asian: 1%
- Other: 1%

Gender

- Female: 44%
- Male: 56%
Expanding Diversity of NIH Candidate Pools: Senior Career Stage
Associate Professors and Full Professors

~ 706 total, top 1/2 culled
Authorship in top journals
100+ publications: 291
500+ citations: 586
2000+ citations: 414

Race/Ethnicity

- White/Caucasian: 55%
- African-American/Black: 7%
- Hispanic/Latino: 2%
- Native American: 1%
- Asian: 22%
- Other: 13%

Gender

- Female: 48%
- Male: 52%
NIH Scientific Workforce Diversity Toolkit

The U.S. scientific research enterprise - from basic laboratory research to clinical and translational research to policy - requires intellect, creativity, and diverse skill sets and viewpoints.

Diversity
... enhances excellence, creativity, and innovation
... broadens the scope of biomedical inquiry
... addresses health disparities
... ensures fairness in our highly diverse nation

- Recruitment search protocol
- Tips for reducing implicit bias
- Future Research Leaders Conference
Diversify the Talent Pool

Learn about how our recruitment tool can help you identify a wider range of candidates.
This recruitment search protocol can be used as one tool to diversify faculty in biomedicine. At NIH, we have used it numerous times to help scientific leadership in the NIH intramural research program identify highly qualified scientists (both senior and early-career) from diverse backgrounds. (For additional tips on identifying early-career scientists from diverse backgrounds, click here). Below, find step-by-step directions to conduct a systematic, unbiased talent search tailored to a particular discipline. Note: any information that is retrieved online such as Last Name, First Name, Degree, Race/Ethnicity, Focus/Interests, Email, and Phone Number are key examples of personally identifiable information (PII). Be aware of the sensitive nature of PII when storing, sending, and uploading protocol-related information.

**STEP 1:** Generate dataset of top scientists in field of interest

**STEP 2:** Organize dataset by contact, professional, and demographic information

**STEP 3:** Vet candidates in the dataset using quantitative and qualitative measures
Web of Science (WOS) Method

1. Using Web of Science, start by entering your keywords into the search bar under Basic Search. For this example, our keywords are “computational genomics” and “cancer genomics,” and we will be searching for U.S.-funded scientists.

2. Use both keywords in combination to broaden the search (add another field).

3. Add "computational genomics" and select "Topic" in the top box. Change "AND" to "OR" and type in "cancer genomics." Click on Search.

4. Next, click “Analyze Results.”
13. The results will provide a list of the top 100 (or 250) authors, as below.

<table>
<thead>
<tr>
<th>Field: Authors</th>
<th>Record Count</th>
<th>% of 1428</th>
<th>Bar Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>KHOURY MJ</td>
<td>14</td>
<td>0.980 %</td>
<td>I</td>
</tr>
<tr>
<td>GARRAWAY LA</td>
<td>11</td>
<td>0.770 %</td>
<td>I</td>
</tr>
<tr>
<td>MARDIS ER</td>
<td>9</td>
<td>0.630 %</td>
<td>I</td>
</tr>
<tr>
<td>WANG Y</td>
<td>9</td>
<td>0.630 %</td>
<td>I</td>
</tr>
<tr>
<td>BALADANDAYUTHAPANI V</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
<tr>
<td>BEROUKHIM R</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
<tr>
<td>BULT CJ</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
<tr>
<td>DOLAN ME</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
<tr>
<td>GETZ G</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
<tr>
<td>KIM J</td>
<td>8</td>
<td>0.560 %</td>
<td>I</td>
</tr>
</tbody>
</table>

14. View records and further characterize authors using your desired search engine(s). Check the box by a name to look further.

<table>
<thead>
<tr>
<th>Field: Authors</th>
<th>Record Count</th>
<th>% of 1496</th>
<th>Bar Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>KHOURY MJ</td>
<td>14</td>
<td>0.936 %</td>
<td>I</td>
</tr>
<tr>
<td>GARRAWAY LA</td>
<td>11</td>
<td>0.735 %</td>
<td>I</td>
</tr>
<tr>
<td>BALADANDAYUTHAPANI V</td>
<td>0</td>
<td>0.632 %</td>
<td>I</td>
</tr>
</tbody>
</table>

15. Click View Records. This will generate a list of the author’s publications and analyze as desired, in addition to further characterizing the authors on your list with other search methods. Proceed to STEP 3.
Conduct an Unbiased Talent Search

Learn about implicit bias and find tips on how to reduce it
How to Reduce Implicit Bias

We have developed an evidence-based educational tool to reduce implicit bias. It is a face-to-face workshop led by behavioral scientists - not an online tutorial. The session first presents empirical evidence and interactive demos to show how implicit bias affects all of us as we make judgements and decisions. The session then provides evidence-based strategies to reduce the impact of bias in hiring and performance evaluations.  

Unconscious Bias in Medicine Online CME Course (Stanford)

NIH SWD implicit bias presentation

Breaking the Bias Habit® (WISELI)

Contact us for more information: SWDToolkit@od.nih.gov
Outreach and Networking

Learn about our Future Research Leaders Conference
FUTURE RESEARCH LEADERS CONFERENCE
MEET. LEARN. CONNECT.

NIH Future Research Leaders Conference (FRLC)
Mentoring Relationships

Institutional endorsement of mentoring relationships promotes inclusion and belonging
Optimizing Mentoring Relationships

Effective mentoring is relational, not hierarchical. Advisors convey disciplinary knowledge and information about career development. Role models inspire through example. And sponsors connect mentees to “power” through award nominations and membership in professional networks. The end goal of an effective mentoring relationship is a strong working alliance built from trust and communication.

What Does Good Mentoring Look Like?

Effective mentoring relationships address both career advancement and psychosocial issues. This can involve individual peers, group cohorts, and mentoring “mosaics” - communities that bring together individuals of different ranks, ages, genders, races, and ethnicities with a range of skills and experiences.

Mentoring mosaics are equally effective for women, men, and scientists from underrepresented groups.

Sponsorship Matters for Diverse Scientists

Good mentorship is important for productivity and career satisfaction, but sponsorship drives career advancement. Unlike mentors who advise and guide mentees, sponsors advocate intentionally. Sponsors use their positions of authority to help others get ahead. This is especially relevant for scientists from underrepresented groups, since research links connectedness with promotion in academia.


Keys to Scientific Workforce Diversity

Diversity Science

Sociocultural Factors

Recruitment Retention

Sustainability Institutional Accountability

Valantine and Collins. PNAS 2015: Oct 6;112:12240-2
Race/Ethnicity and NIH Funding: Trainees (1996-2015)

1,274 URG PhDs (~9% total pool)
1,747 URG PhDs (~10% total pool)

1996-2005: 1,091 URM PhDs (9% total)
2006-2015: 1,723 URM PhDs (11% total)

NSF Survey of Earned Doctorates 1996-2015. Fields included: Biological Sciences (53%), Medical Chemistry (19.2%), Sciences (7.5%), Other Life Sciences (5.2%), Psychology (14.7%).

58% increase
URM Assistant Professors: Lags Behind Growth in Ph.D. Recipients

Population Growth Relative to 1980

Gibbs, K. D., et al. (2016). Decoupling the minority PhD talent pool and assistant professor hiring in the medical school basic science departments in the US.
Addressing Racial R01 Funding Gap
New Data

- AA/B applicants less likely to get R01 grants (Ginther et al., 2011)
  - Controlled for education/training; employer characteristics; NIH experience; research productivity

- New NIH analysis with more recent data (FY2011-2015)
  - Relative gap slightly lower than in 2000-2006
  - Multifactorial, disparity at each stage in the process
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  - Multifactorial, disparity at each stage in the process

Smaller Pool (1.5%)

- Fewer Submissions and Resubmissions
  - (3X Funding Improvement on Resubmission)

- Lower Score

- Topic Choice
  - Community/Population vs. Basic/Mechanistic

Cumulative gap
AA/B scientists funded at half the rate of WH scientists
Intervention Targets

Submissions
- Institution
- Topic

Review
- Less discussed
- Score
- Fewer re-submissions
- Topic

Funding
- IC Council review
- Paylines, select pay
- Topic

Mentoring/coaching pilot to enhance submission and re-submission
- Information on re-submission outreach
- Anonymized application review study

IC select pay analysis
- Topic further analyses
- Health disparities
- Minority health

Spring 2018
Underway
**Eliminate Transition Gaps:** Enhance Faculty Diversity

- **Postdoc -> faculty/other research careers**
  - Needed: Program linkages across career stages

- **Draw evidence from existing programs**
  - Integrated approaches
  - Sociocultural factors

**Goal:** Eliminate transition barriers > achieve sustainable transformation in scientific workforce diversity
NIH Hubs of Innovation and Research in Scientific Workforce Diversity: Model

Data-driven; evidence based; interdisciplinary engine

Partnerships

Research

Evaluation

Mentoring

Training

Communicate/Disseminate

Academia

Industry/Business

Community

Public-Private

STEM Jobs

Tech      Pharma      Biotech      Small Businesses      Federal Agencies      Social Scientists
Biomedical Scientists      Community Colleges      Community Organizations      Business Schools
Minority-Serving Institutions      Research-Intensive Institutions      Academic Medical Centers
Institutional Transformation and Culture Change

Programs are necessary but not sufficient:

Promote Transparency and Accountability

Link to Institutional Values and Reward Systems

• Systematic review and transparency of hiring and promotion procedures, policies
• Transparency: collect and publicize aggregate diversity metrics
• Provide tools to Divisions, Departments for enhancing recruitment and retention
• Evaluation of impact
Institutional Leadership: Promotes Diversity and Inclusion

Three Pillars of Culture

Climate
Work-Life
Equity
Institutional Leadership: Promotes Diversity and Inclusion

Candidates are not faculty … until they are hired!
Science of Diversity

Diversity Leads to Innovation

LEARN MORE

diversity.nih.gov
Great minds think differently ... 

@NIH_COSWD