

## **Advancement of Women in Biomedical Careers Workshop**

### **EXECUTIVE SUMMARY**

In 2007, in response to the National Academies Report, “Beyond Bias and Barriers, Fulfilling the Potential of Women in Academic Science and Engineering,” NIH established the NIH Working Group on Women in Biomedical Careers to assess successful strategies to recruit, retain, and advance women in faculty and leadership positions. Co-chaired by NIH Director Dr. Francis Collins and the Director of the Office of Research on Women’s Health, Dr. Janine Clayton, this working group issued a 2008 trans-NIH request for applications (RFA), “Research on Causal Factors and Interventions that Promote and Support the Careers of Women in Biomedical and Behavioral Science and Engineering”. The RFA supported the funding of 14 research grants that investigated a range of obstacles facing women at all stages of the scientific career pipeline, and assessed interventions that begin to address these obstacles.

With a growing body of evidence in hand, the NIH Working Group on Women in Biomedical Careers held a workshop on an Advancement of Women in Biomedical Careers on June 17, 2014 to identify workable strategies that may improve the retention and advancement of women faculty members. This group included deans and other high-level administrators at medical and graduate schools, and also included representatives from professional societies, government and industry.

Two major themes emerged:

- Expectations and motivations within an academic institution, as well as in biomedical research at large, combine to define a culture that shapes one’s outlook and reflects the support members receive from the institution.
- Successful interventions to change culture and thus promote women’s career advancement must be both integrated and institutionally individualized.

NIH is committed to promoting cooperation among government, academia and professional societies, and recognizes that the science career gender gap – and efforts to address it – must ultimately be led by the academic community.

## **Advancement of Women in Biomedical Careers Workshop**

### **National Institutes of Health (NIH) Campus**

**Bethesda, MD**

**June 17, 2014**

### **PRESENTATIONS**

#### **Welcome and Opening Remarks**

*Francis Collins, M.D., Ph.D., NIH Director*

Dr. Collins welcomed the group to NIH and acknowledged the significant progress that has been made to date as a result of the hard work of the NIH Working Group on Women in Biomedical Careers. The workshop discussion, toward ensuring the advancement and retention of women in biomedical careers, is critical to science, and it is no secret that diversity is the key to developing a stronger workforce.

Although the biomedical and behavioral sciences have a long way to go, the number of female students and Ph.D. recipients in science and engineering has been on the rise. Since 2012, women earned 46 percent of all doctorates in these fields. These increases, however, are not reflected in the number of female faculty in science, technology, engineering, and mathematics (STEM) areas, particularly at the higher ranks. This phenomenon has been named the “leaky pipeline.” The fact that this problem is not “solving itself” as increasing numbers of women receive graduate degrees is the rationale for a collective dedication among government, academia, and industry to addressing it.

Dr. Collins exhorted the group to take action toward working collaboratively:

- Academia must provide clear leadership in initiating cultural and structural changes to recruit, retain, and advance women into faculty and leadership positions.
- Professional societies can help by promoting equal treatment of women and men and demonstrating continued commitment to this issue.
- NIH must ensure that practices are in place to support the full participation of women, and that the agency does not reinforce a culture that fundamentally discriminates against women.

Recently, NIH has taken several steps toward enhancing the visibility of diversity broadly. One of these was by naming Dr. Hannah Valentine as the first NIH Chief Officer for Scientific Workforce Diversity. Dr. Valentine is charged with working closely with the NIH institutes and centers, the NIH grantee community, and community stakeholders to ensure engagement on the issue of diversifying the biomedical workforce at all levels. Now called the NIH Office of Equity, Diversity and Inclusion, NIH also reorganized the Office of Equal Opportunity and Diversity Management to create new initiatives for innovative ways to foster diversity and inclusion at NIH. Finally, NIH continues to support the work of the Working Group on Women and Biomedical Career that has convened this workshop.

Highlighting now as a “signal moment,” Dr. Collins urged workshop attendees to think hard about actions that will make an impact on advancing women’s careers and noted that NIH will assign high priority to this issue.

*Judith H. Greenberg, Ph.D., Acting Deputy Director, National Institute of General Medical Sciences, NIH*

Dr. Greenberg set the stage for the workshop by sharing the history that led to this workshop. In 2007, in response to the issuance of the National Academies Report, “Beyond Bias and Barriers, Fulfilling the Potential of Women in Academic Science and Engineering,” NIH established the NIH Working Group on Women in Biomedical Careers, co-chaired by Dr. Collins and the Director of the Office of Research on Women’s Health, Dr. Janine Clayton.

Over the past 7 years, this working group has formed a number of subcommittees to address issues relevant to women at NIH and, to the extent that NIH has influence, in the extramural community. One subcommittee, the Committee on Research and Evidence to Promote Women in Scientific Careers, issued a trans-NIH Request for Applications (RFA) to support “Research on Causal Factors and Interventions that Promote and Support the Careers of Women in Biomedical and Behavioral Science and Engineering.” This RFA resulted in funding contributions for 14 grants in 2009, totaling almost \$17 million from 11 Institutes and Centers (ICs) and 4 offices in the NIH Office of the Director.

In November 2012, as the grants were coming to an end, NIH convened a workshop of the investigators to discuss the results of the research and consider future efforts to enhance outcomes of women in scientific careers.<sup>1</sup> The research addressed a range of obstacles facing women at all stages of the career pipeline and discussed interventions to begin to address these obstacles. In subsequent meetings, the subcommittee determined that the highest priority next step would be to assist deans and other high-level administrators at medical and graduate schools to identify and suggest workable strategies to improve the retention and advancement of women faculty members. A second workshop in June 2014, The Advancement of Women’s Careers in Biomedicine, also included representatives from government and industry, in addition to academia.

*Janine Clayton, M.D. NIH Associate Director for Research on Women’s Health/Director, NIH Office of Research on Women’s Health*

In her welcoming remarks, Dr. Clayton affirmed that the NIH Working Group on Women in Biomedical Careers has been hard at work, dividing labor among subcommittees to ensure that the many tasks to be accomplished get the full attention each deserves.

Issues related to enhancing careers for women are often similar to those of enhancing diversity in general; and work accomplished on behalf of addressing women’s career advancement should have broad impact for enriching the diversity of the scientific workforce. Since the November 2012 “Causal Factors” workshop, much data about the features and influence of bias, culture, and work-life balance has been gathered from NIH’s research investment in grants investigating factors and interventions that

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<sup>1</sup> [http://womeninscience.nih.gov/pdf/Causal\\_Factor\\_Summary.pdf](http://womeninscience.nih.gov/pdf/Causal_Factor_Summary.pdf)

affect women's representation and progress in science and medicine. The implications are that these issues can be quantitatively measured and addressed in a positive way.

Dr. Clayton urged workshop participants, who represent the leading edge of advancing the successful trajectories of women in science, medicine, and engineering, to share success strategies. What works at one institution may not always work at another, but anecdotal stories and data can help define the key elements of successful approaches.

### **A National Perspective: Strategies for Advancing Women in Biomedical Careers**

*Ann Bonham, Ph.D., Chief Scientific Officer, Association of American Medical Colleges (AAMC)*

Dr. Bonham addressed the group with an account of her own career journey, which highlights the importance of sponsorship in career advancement. Beginning as an assistant professor, she progressed, ultimately securing 20 years of NIH research funding. During this time, three influential males in her professional sphere promoted her to two important career positions in her academic setting: chief of the cardiology division and chair of the pharmacology department. At each post, Dr. Bonham used her position to increase the representation of women in those two academic units by 500 percent and 400 percent, respectively.

Dr. Bonham's story offers two hypotheses about strategies to enhance the representation of women in the higher echelons of academia:

1. Mentors, coaches, or sponsors, as well as a support team can facilitate the advancement of women into leadership positions.
2. Getting women into leadership positions can facilitate an increase in the numbers of women in the field and in future leadership positions.

The Association of American Medical Colleges (AAMC) has collected data on gender representation in U.S. medical schools for many years<sup>2</sup>, which reveals several striking disparities:

- Of roughly 3,000 department chairs in basic-science departments, only about 500 are women
- Only 16 percent of deans/interim deans are women.
- There are roughly five male full professors for every one female full professor in basic science departments, and women of color are very rare.
- Success rates for NIH funding are roughly equivalent for women and men, but in general men apply for more grants and receive more grants. Women are also less likely to re-apply for a grant if they are not funded the first time.

Several barriers keep women from advancing in scientific careers, including imperfect solutions to establish and maintain work-life integration; a "cool" climate/culture for females in science and medicine; and a persistent, yet hard-to-measure lack of confidence that appears to be pervasive among females in U.S. society. Various forms of bias, many unconscious, are likely to be key contributors to

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<sup>2</sup> [Women in U.S. Academic Medicine and Science: Statistics and Benchmarking Report 2011-2012](#)

flagging confidence among girls and women. In a 2014 study, Kaatz et al. found that gender stereotypes can place women in the “out-group” for many career-advancing opportunities,<sup>3</sup> arguing that policies alone will not achieve female/male equity in academic medicine, and that bias can be remedied through recognition and training.

These differences exist in other professional domains as well. As noted by Jennifer Lawless of American University and Richard Fox of Loyola Marymount University, a gender gap in political ambition persists across generations and over time, indicating that a woman’s behavior affects career movement. When women do run for office, however, they are as likely to win their races as men. Might this translate to the science and medical arena? Are women less likely than men to demonstrate ambition even in the highest tiers of professional accomplishment or seek a leadership position, such as chair or dean?

Representation of women in science and medicine is the result of a system with many levers: Numerous factors that populate the national landscape inevitably affect female-male parity independently of any intentional activities to establish it. Some of these include increasing calls for data sharing and open science, changing health needs and health care, political and economic climates, and many other factors. For this reason, identifying and mediating individual triggers or influential levers is unlikely to impart systemic change. In a similar vein, ensuring female-male parity in science and medicine invites a team effort among many players: government, industry, and academia.

### **Achieving Gender Parity and Gender Equality in Academia: Intentionality, Institutional Cultures, Change Agents and Transformative Practices in the Trenches**

*Liza Cariaga-Lo, Ed.D., Associate Provost for Academic Development, Brown University*

When considering whether numbers of women in science and medicine are increasing over time, it is essential to disaggregate data. For example, as measured in the 2013-2014 academic year, 28 percent of Harvard University “ladder faculty” (i.e., tenured, tenure track, and non-tenure track faculty) members are female. This proportion is larger than in previous years, and there has been a 60 percent increase in women in senior positions. Yet, looking more closely, the number of women at the top varies dramatically by field, with the most female-male parity in education (46 percent women) and the least (13 percent women) in engineering.

A similar picture can be drawn from Brown University where, of the 736 regular faculty members in the 2013-2014 academic year, 34 percent are female, as are 25 percent of tenured faculty. By division, however, there is significant variation, with the greatest female-male parity in the humanities (48 percent women) and the least (17 percent women) in the physical sciences.

Institutional history and climate can exert a significant effect on the make-up of its faculty and workforce. For example, the Louise Lamphere vs. Brown University decision in 1977 has had a large impact on the number of women faculty at Brown. This class-action lawsuit was filed on behalf of

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<sup>3</sup> Kaatz A1, Carnes M. [Stuck in the Out-Group: Jennifer Can't Grow Up, Jane's Invisible, and Janet's Over the Hill](#). J Womens Health. 2014;23(6):481-4.

women faculty at Brown, who numbered only 25 by the mid-1970s, and alleged discrimination against women in the awarding of tenure. Legal action mandated timetables for hiring women faculty, and as a result, by the early 1990s, Brown had increased its number of tenured women faculty five-fold.

Dr. Cariaga-Lo noted that achieving gender parity is not equivalent to gender equality, but rather a step in that direction. She explained that a gender-equality lens can be applied at various levels of granularity: getting an education, finding opportunities through education, and achieving justice through education. Reaching true gender equality at all these levels requires structural and cultural change.

AAMC has tracked the representation of women in accredited U.S. medical schools for three decades using cross-institutional analyses as well as a nationwide view<sup>4</sup> and provides vital data on the reality that women remain far underrepresented at the top echelons of academic medicine. Having this solid baseline data enables benchmarking on a national scale but does not necessarily permit the evaluation of specific approaches to achieve female-male parity.

A body of literature speaks to the notion that female and male faculty members experience the culture of academic medicine, as defined by a range of factors, very differently. Culture is thus a key component of career “success,” and the differences in experiences are likely to affect advancement. Moreover, culture is experienced, not made. Efforts to achieve female-male parity will have to address cultural influences and may require behavior change if the culture is found to work against this parity.

Other concepts that have been explored at length in the workforce gender representation literature include gender schemas and the accumulation of advantage,<sup>5</sup> unconscious bias,<sup>6</sup> stereotype threat,<sup>7</sup> and micro/macro-aggressions.<sup>8</sup>

In conclusion, Dr. Cariaga-Lo offered these points of consideration for what institutions can do to increase gender equity:

- More widespread communication and awareness promote a sense of inclusion. People at all levels of higher education ranging from student to president should know how sex and gender influence evaluations and rewards.
- There is no such thing as a quick fix that will apply to every institution; efforts must be tailored to unique populations, and they must be monitored over time as educational environments are highly dynamic.
- Accountability is key, and failure to improve gender equity should promote the improvement of ineffective practices — not abandonment of practices altogether.
- Gender equity, and diversity in general, should be considered central topics to scholarship, worthy of study and discussion.

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<sup>4</sup> [Women in U.S. Academic Medicine and Science: Statistics and Benchmarking Report 2011-2012](#)

<sup>5</sup> <http://paid.uci.edu/chairs%20retreat%20files/ArrwhdMtrls2008/Z%20Gender%20Schemas%20Dr%20Valian.pdf>

<sup>6</sup> <http://banaji.socialpsychology.org/>

<sup>7</sup> <http://mrnas.pbworks.com/f/claude%20steele%20stereotype%20threat%201995.pdf>

<sup>8</sup> <http://www.tc.columbia.edu/academics/?facid=dw2020>

- Finally, routine is a powerful driver of behavior. If practices of fairness and equity are an institutional norm, there is little room for bias, unconscious or conscious, to surface.

### **What Successful Strategies Exist for the Advancement of Women? An Industry Perspective**

*Sue Siegel, M.Sc., CEO, GE Ventures, healthymagination, & Idea Works at GE Workshop Co-chair and Moderator*

Ms. Siegel compared and contrasted her experiences in the business world and the different cultures in the various organizations with which she has been involved throughout her career.

Venture capital (VC) has a poor showing when it comes to representation of women in high-ranking positions. Currently, only 4 percent of VC senior partners are women,<sup>9</sup> and only 4 women were listed on the most current Forbes Midas list of the 100 best venture capitalists.<sup>10</sup>

In corporations, women currently hold the top position at only 4.6 percent of Fortune 500 and Fortune 1000 companies, and women held only 14.6 percent of executive officer positions at those companies in 2013.<sup>11</sup> The percentage of board seats held by women in the 2020 Index companies has increased only slightly in recent years and is currently 16.6 percent.<sup>12</sup>

The healthcare industry has a poor record of female-male parity in top positions. Although 80 percent of the workforce in this sector is women, very few lead healthcare institutions such as hospitals, and no women lead any of the healthcare-focused companies on the Fortune 500.<sup>13</sup>

What about the larger picture of supply and demand? This year, 40 percent of Harvard's M.B.A. graduates were women.<sup>14</sup> And if women business owners in the United States formed a country, its gross domestic product would rank fifth globally.<sup>15</sup> However, it is still the case that globally only 3 to 4 percent of chief executive officers are women.<sup>16</sup>

Yet, despite the many real and profound challenges facing women in gaining senior leadership positions, progress is visible. For example:

- Nearly half (47 percent) of the projects that reach their funding goal on the crowdfunding site Indiegogo are female-led.<sup>17</sup>
- In the United States, nearly 60 percent of women work, and about 40 percent earn more than their husbands.<sup>18</sup>

9 <http://stvp.stanford.edu/blog/?p=7611>

10 <http://www.forbes.com/midas/list/#tab:women>

11 According to Catalyst, a nonprofit that tracks women in business. – WSJ article 3/7/2014

12 2020 Women on Boards Tracker, <http://www.2020wob.com/about/team>

13 <http://www.slideshare.net/RockHealth/xx-in-health-report-20130818-2100>

14 HBS MBAs: <http://www.hbs.edu/about/facts-and-figures/Pages/mba-statistics.aspx>

15 GDP: <http://www.fastcompany.com/3030144/bottom-line/gender-inequality-isnt-just-about-pay-why-female-entrepreneurs-need-greater-ace>

16 <http://www.businessinsider.com/study-women-are-better-leaders-2014-1>

17 <http://www.newsweek.com/2014/05/16/female-entrepreneurs-fight-their-piece-pie-250065.html>

- Women business owners employ 35 percent more people than all the Fortune 500 companies combined.<sup>19</sup>
- Data on executives shows women are often more effective leaders on several measures regarding leadership.<sup>20</sup>

GE has established a framework for promoting the value of women's leadership built around five concepts: leadership, engagement, education, culture, and collaboration.

*Leadership and Engagement.* Support from the top, through GE President Jeffrey Immelt, sets the tone for this framework to be effective. Ms. Siegel noted that representation of women in GE senior leadership includes approximately 30 percent at board level, approximately 30 percent at senior officer level, and approximately 20 percent on the senior executive board. He noted that these numbers outrank representation in most U.S. industries, which tend to be far less progressive in policies that promote female-male parity.

The GE Women's Network plays a key role in supporting the 100,000 women who work there. The network meets every two years, gathering women from all over the world. It is run by an executive team that represents a diverse group of women from each of GE's businesses and critical corporate functions. It is a worldwide organization of 160 hubs in nearly 50 countries, comprising thousands of active participants. Through the network, employees gain exposure to role models, get help in navigating career paths, and acquire skills-building tools. The network has programs that focus on developing commercial, engineering, and technology talent.

*Education.* The development of world-class talent in STEM is critical to America's global leadership with women in STEM jobs earning 33 percent more than those in non-STEM occupations and experiencing a smaller wage gap relative to men.<sup>21</sup> One of the programs which ~~that~~ has grown out of the GE Women's Network is the GE Girls program. It started in 2011 when the Women's Network reached out to GE Aviation and the Massachusetts Institute of Technology and asked them to develop a STEM curriculum for the program. During their week-long engagement, girls attending the program experience a hands-on curriculum focused on medical technologies, physiology, and biomedical engineering.

*Culture.* GE has defined a set of growth values to promote women's leadership and career advancement. The key components are external focus, inclusiveness, expertise, imagination and courage, and clear thinking.

*Collaboration.* GE recognizes the multifaceted nature of female-male parity in senior leadership. The company works with national and local community organizations to help women all over the world; in particular, in some places such as Saudi Arabia where women have a very low participation in the workforce.

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<sup>18</sup> <http://www.bls.gov/cps/demographics.htm>

<sup>19</sup> [http://nawbo.org/content\\_9226.cfm](http://nawbo.org/content_9226.cfm)

<sup>20</sup> <http://www.businessinsider.com/study-women-are-better-leaders-2014-1>

<sup>21</sup> [http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem\\_factsheet\\_2013\\_07232013.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_factsheet_2013_07232013.pdf)

## COMMENTS FROM SELECTED ORGANIZATION REPRESENTATIVES

*Madeleine Jacobs, B.S. (American Chemical Society, ACS)*

ACS employs many strategies to advance women's careers in chemistry. The Women Chemists Committee, established in 1927, aims to attract, develop, promote, and advocate for women in the chemical sciences in order to positively impact society and the profession. The committee has four goals:

- Increase participation and retention of women in the chemical sciences and related disciplines.
- Take an advocacy position within ACS on issues of importance to women in the chemical sciences.
- Provide leadership for career development opportunities for women in the chemical sciences and related disciplines.
- Promote and recognize the professional accomplishments of women in the chemical sciences and related disciplines.

This committee also employs task forces to examine issues that disproportionately impact women. Sample issues include advocacy for the needs and rights of non-tenure track faculty and award recognition. In 2012, ACS instituted a Women Chemists of Color Program whose mission is to empower women chemists of color to maximize their opportunities in the chemical profession while cultivating an environment that fully engages these members.

Despite its programs and efforts, female representation in chemistry, especially at the top ranks, has changed little. ACS recently reached out to its membership for additional suggestions.

*Shirley Malcom, Ph.D. (American Association for the Advancement of Science, AAAS)*

Over the years, AAAS has mainstreamed women's issues in its programs and practices. Since the 1970s, AAAS has been dedicated to improving representation in the scientific workforce for a range of groups with traditionally low involvement, including women, minorities, and people with disabilities. AAAS also considers the unique needs of people who are doubly disadvantaged by belonging to more than one of these groups: women of color, for example.

*Sandra K. Masur, Ph.D. (American Society for Cell Biology, ASCB)*

The Women in Cell Biology committee began in the early 1970s as a group of women cell biologists who began to take note of the under-representation of women in academia in general and cell biology in particular. This committee provides year-round career support and advice to women by offering a speaker referral service to help program organizers identify women speakers, and this group also produces monthly columns for the ASCB Newsletter. Two collections of columns, "Career Advice for Life Scientists I and II," have been published.

*Yvette Seger, Ph.D. (Federation of American Societies for Experimental Biology (FASEB))*

FASEB develops many resources for advancing women's careers in biomedicine. Examples include a speed-mentoring network, field-specific conferences for women members, a committee on the status of women in science, and recognition awards for women.

*Jane Silverthorne, Ph.D. (National Science Foundation, NSF)*

NSF uses a range of methods and practices to support women's careers in science. The agency actively recruits women for review-panel positions, and employs a rigorous, data-driven, benchmarked approach to achieving a diverse staff. They work diligently to dispel the myth that diversity weakens science.

*Lydia Villa-Komaroff, Ph.D. (National Academy of Engineering, NAE)*

NAE is a component of the U.S. National Academies, with member-based election of new members. Various committees support the advancement of women in science and engineering, including through workshops on bias, work-family life, and other topics.

## II. THEMATIC SUMMARY OF PRESENTATIONS AND DISCUSSIONS

*Workshop Co-chairs and Moderators: Wiley Souba, M.D., Sc.D., M.B.A., Geisel School of Medicine, Dartmouth; Sue Siegel, M.Sc., CEO, GE Ventures, healthymagination, & Idea Works at GE*

Workshop attendees focused discussion around the following questions, which are summarized in two themes of key points below.

1. What are the obstacles to the advancement of women?
2. What successful strategies exist for the advancement of women?
3. What new approaches could be implemented?
4. How can successful strategies be exported to the biomedical community?

Advancing women's careers in biomedicine is a shared goal among government, academia, and industry with a range of potential interventions that await evaluation and implementation. Research to date has uncovered several modifiable factors that may go a long way toward enhancing representation of not only women, but of other underrepresented groups, in science and medicine. Many of these factors have been identified and characterized in the psychological, sociological, and behavioral sciences literature. These include unconscious bias and stereotype threat. Another key notion, which is emerging from the field, is that career advancement — especially at the top echelons — is affected heavily by cultural norms and standards. Institutional “buy-in” is important. Change can be facilitated by senior leadership that sets an appropriate tone and works to alleviate feelings of isolation - that there is a “guest”/“member” divide between minority and majority groups.

**Theme 1: Expectations and motivations within an academic institution, as well as in biomedicine at large, combine and mix to define a culture that shapes one's outlook and the support members receive from the institution.**

Workplace culture in academic institutions is not uniform across biomedicine. The culture of an institution has weight, and women choose institutions where they are most comfortable. Research has shown that culture can be modified, and a range of incentives can be effective in making positive changes. Less than half of U.S. institutions have a dedicated position for faculty development; neglecting this critical aspect of organizational culture may perpetuate not only career dissatisfaction but also career stagnation. Institutional goodwill goes a long way, and it does not have to be expensive.

Positive and negative consequences affect behavior.

- Institutions should consider positive support that improves the recruitment, retention and advancement of women through a range of means, such as:
  - Additional funding for training;
  - Gaining an additional hire when a department hires a qualified woman;
  - Offering an incentive to faculty who recruit women that result in a successful hire.
- Although generally less effective than positive incentives, institutions might consider imposing penalties in response to failure to improve the recruitment, retention, and advancement of women through a range of means including denial of institutional accreditation or funding.

A variety of factors contribute to workplace behavior and expectations. For example, starting salaries may be too low for women faculty to get help needed at home and at work. This problem may be exacerbated by differences in negotiating skills between men and women that lead to inadvertent inequalities in salary. On the one hand, women can be taught negotiating skills, and on the other hand, institutions should examine their salary structure to eliminate gender inequalities.

Sex and gender differences affect decision-making and productivity. One of the biggest stressors after acquiring a faculty position is obtaining a grant, and this situation can be intensified for women by the coincident “ticking” of the biological clock. The tenure clock also presents pressure during this time period. Practical limitations dictated by behavior/preference can also have an impact on performance and advancement: in many cases, women are less likely to move geographically for a job because of family constraints. In addition, female academic scientists are more likely to be in dual-career marriages, and are also more likely to be married to another academic scientist.<sup>22</sup> The “two-body” problem in academic science also likely contributes to women’s differential career trajectories in science. Institutions that recognize, work with, and provide support for these areas may be likely to recruit and retain more women faculty.

Confidence is another key contributor to women’s expectations, activities, and career advancement. Stereotype threat, the experience of anxiety in a situation that has the potential to confirm a negative stereotype about an individual’s social or professional group, has been shown to significantly impede the performance and advancement of under-represented groups. Importantly, stereotype threat cannot

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<sup>22</sup> Mason, Wolfinger, and Goulden 2013 *Do Babies Matter: Gender and Family in the Ivory Tower*. Rutgers University Press. See also Fox, Mary Frank. “Gender, Family Characteristics, and Publication Productivity Among Scientists.” *Social Studies of Science* 35 (February 2005): 131-150.

be corrected by the actions of any one entity, an academic institution, NIH, or other organization. Consider the following information cited by workshop participants:

- Stereotype threat influences women’s job decisions. In experiments simulating working environments, women applied for higher positions only when they felt 100 percent qualified, whereas men applied when they were 50 percent qualified.
- Stereotype threat influences performance. Women scored higher on tests when they were told to answer all the questions, even if they did not think they knew the answers/topic area well enough, as opposed to not being encouraged in advance to answer all the questions.
- Stereotype threat influences self-perception. Fifty percent of women report feelings of self-confidence, whereas 70 percent of men do.
- Stereotype threat influences aspirations. When offered an academic chair position, women are more likely than men to say “I’m not ready.”

**Theme 2: Successful interventions to change culture and thus promote women’s career advancement must be both cross-cutting and institutionally individualized.**

In any organization, single solutions for complex, systemic problems are rarely effective, calling for the need for integrated strategies. It may be helpful to look outside the world of science for potential interventional strategies.

Implicit, or unconscious, bias likely plays an influential role in stalling the advancement of women in science and medicine. As data accumulates about the prevalence of unconscious bias in science and medicine, there is need for a nationwide awareness campaign about what it is and what can be done to change it.

Implicit bias regarding gender and science arises from unconscious associations most people hold that more easily relate men with the scientific domain. Implicit bias affects most people – and men and women similarly - and can be measured through the administration of the implicit-association test (IAT), a social psychology tool designed to detect the strength of a person’s automatic association between mental representations of objects in memory. Several workshop attendees noted that simply taking the test appears to have an impact on behavior, and they recommended that academic leaders receive training about unconscious bias.

Faculty development programs, including but not limited to bias remediation, must to be tailored to institutional characteristics, taking into account the strengths and limitations of the existing program. It may also be useful to consider the semantics at play. Rather than calling these programs “training,” one strategy is to consider interventions as “research” and collect data along the way. People are tired of yet another training module.

*Example —The Stanford University School of Medicine recently tested an intervention to enhance faculty career flexibility. Stanford reframed and integrated a set of different policies to combine career counseling and practical help that can resolve work-work and work-personal conflicts. They instituted a “banking” system to share hours and tasks that assigns “credits” that can be*

*traded with others. For basic scientists, in which leaving completely from work responsibilities is impractical and may incur career risk or damage, the system employs ways to find help an individual with more generic tasks that s/he is not uniquely qualified to do. The program tailors an individual's career as priorities change over time. To date, Stanford has piloted this approach with six departments and preliminary results suggest increased satisfaction and other positive metrics of short-term success. Integration was essential in the design and success of this program, which stemmed from a collaboration of the Stanford diversity office and the design school at Stanford that helped to derive creative solutions to a complex problem, using film clips to ideate scenarios, then prompt actions.*

Managing a career effectively is made easier by “choosing what you’re good at and focusing on it” instead of trying to be the best at everything. Individuals should feel confident about customizing job descriptions and duties to the outcomes they want to achieve and the skills and talents they bring to the table. For women, career progression may better resemble a web than a ladder. Career trajectories should be considered in a broader sense. For example, there is evidence that older female physicians remain active at work longer than older male physicians. Shifting career trajectories in biomedical research would require significant re-framing of the standard measures of success, such as independent funding, tenure, and other currently defined advancement metrics.

Methods and strategies to promote career advancement of women can and should be combined to reveal new ways of thinking about the issue. Importantly, although policies need to be tailored to people, they also must resonate with institutional characteristics and culture. The business and scientific worlds are very different, but accountability applies to both landscapes, and the establishment and enforcement of accountability standards are critical.

### **NEXT STEPS**

There is a notable difference between passive dissemination and systemic implementation of policies, and leadership tone and “ownership” of the issue is an essential component of any integrated set of solutions, even those with pieces that extend beyond institutional responsibility. Importantly, all stakeholders working in this arena, including academic faculty and leadership, professional societies, and government, should recognize that individuals often belong to many groups. Women, and especially women of color, often get over-recruited for career-related services and activities that highlight their status as an under-represented group. Sometimes referred to as the “Unicorn Law” as a reflection on tokenism, these seemingly harmless requests for representation can lead these scientists prone to burnout and diminished career success. While NIH can convene experts, and it has funded research on identifying problems and developing/testing solutions, ultimately this problem must be owned and managed by the academic community. NIH eagerly awaits cooperation and collaboration among its stakeholders to analyze research to date, share success strategies, and promote next steps, such as:

- Employing pilot testing of measuring/modifying implicit bias among senior leadership within a small group of academic institutions.

- Identifying and communicating models that show there is more than one way to achieve career success in biomedicine, e.g., working part-time.
- Including both women and men in any programs aiming to optimize faculty development and progression for women.
- Developing and sharing opportunities for outreach and implementation of gender-equity ideas and approaches at deans meetings at AAMC and similar gatherings.
- Creating a centralized resource that includes a baseline survey, unconscious-bias training information, and an implicit-association test (IAT) tool.

### **Concluding Remarks**

Dr. Greenberg and Dr. Clayton thanked the group for their time and thoughtful contributions.

## APPENDIX I: AGENDA

Building 31, C-Wing, Conference Room 6, Bethesda

Tuesday, June 17, 2014

7:30 – 8:00

### **Registration**

8:00 – 8:30

### **Welcome and Opening Remarks**

Francis Collins, M.D., Ph.D., Director, National Institutes of Health

Judith H. Greenberg, Ph.D., Acting Deputy Director, National Institute of General Medical Sciences, NIH

Janine Clayton, M.D. Associate Director for Research on Women's Health,  
Director for Office of Research on Women's Health, NIH

### **Introductions around the table**

8:30 – 9:45

### **Speakers**

Ann Bonham, PhD, Chief Scientific Officer, Association of American Medical Colleges

*A National Perspective: Strategies for Advancing Women in Biomedical Careers*

Liza Cariaga-Lo, Ed.D., Associate Provost for Academic Development, Brown University

*Achieving Gender Parity and Gender Equality in Academia: Intentionality, Institutional Cultures, Change Agents and Transformative Practices in the Trenches*

9:45 – 10:00

### **BREAK**

10:00 – 11:00

### **Moderated Discussion**

*What Are the Obstacles to the Advancement of Women?*

Wiley Souba, M.D., Sc.D., M.B.A., Geisel School of Medicine, Dartmouth  
Workshop Co-chair and Moderator

11:00 – 12:00

### **Moderated Discussion**

*What Successful Strategies Exist for the Advancement of Women?*

Sue Siegel, M.Sc., CEO, GE Ventures, healthymagination, & Idea Works at GE  
Workshop Co-chair and Moderator

12:00 – 1:30

**LUNCH – Networking Opportunity**

1:30 – 2:30

**Moderated Discussion**

*What New Approaches Could Be Implemented?*

Wiley Souba, M.D., Sc.D., M.B.A., Geisel School of Medicine, Dartmouth  
Workshop Co-chair and Moderator

2:30 – 3:15

**Comments from Selected Organization Representatives** (5 minutes each)

Moderator: Janine Clayton, M.D., Associate Director for Research on Women's  
Health, Director for Office of Research on Women's Health, NIH

Madeleine Jacobs, B.S. - American Chemical Society

Shirley Malcom, Ph.D. - American Association for the Advancement of Science

Sandra K. Masur, Ph.D. - American Society for Cell Biology

Yvette Seger, Ph.D. - Federation of American Societies for Experimental Biology

Jane Silverthorne, Ph.D. – National Science Foundation

Lydia Villa-Komaroff, Ph.D. - National Academy of Engineering

3:15 – 3:30

**BREAK**

3:30 – 4:30

**Moderated Discussion**

*How Can Successful Strategies Be Exported to the Biomedical Community?*

Sue Siegel, M.Sc., CEO, GE Ventures, healthymagination, & Idea Works at GE  
Workshop Co-chair and Moderator

4:30 – 4:40

**Closing Remarks**

Judith H. Greenberg, Ph.D., Acting Deputy Director, National Institute of General  
Medical Sciences, NIH

Janine Clayton, M.D. Associate Director for Research on Women's Health,  
Director for Office of Research on Women's Health, NIH

4:40

**Adjourn**

## APPENDIX II: ROSTER

Sue Siegel, M.Sc., Co-chair/Moderator  
GE Ventures, healthymagination, & Idea Works  
at GE

Wiley Souba, M.D., Sc.D., M.B.A., Co-  
chair/Moderator  
Geisel School of Medicine, Dartmouth

Peter S. Amenta, M.D., Ph.D.  
UMDNJ-Robert Wood Johnson Medical School

Karen Antman, M.D.  
Boston University

Judith Appleton, Ph.D.  
Cornell University

Regina Benjamin, M.D., M.B.A.  
Xavier University

Ann Bonham, Ph.D.  
Association of American Medical Colleges

Liza Cariaga-Lo, Ed.D.  
Brown University

Janine Clayton, M.D.  
National Institutes of Health

Janice Clements, Ph.D.  
Johns Hopkins University

Francis Collins, M.D., Ph.D.  
National Institutes of Health

Michael Gottesman, M.D.  
National Institutes of Health

Judith H. Greenberg, Ph.D.  
National Institutes of Health

Sandra Harris-Hooker, Ph.D.  
Morehouse School of Medicine

Misty Heggeness, Ph.D.  
National Institutes of Health  
Madeleine Jacobs, B.S.  
American Chemical Society

Shirley Malcom, Ph.D.  
American Association for the Advancement of  
Science

Sandra K. Masur, Ph.D.  
American Society for Cell Biology

Frederick Ognibene, M.D., F.C.C.M., F.A.C.P.  
National Institutes of Health

Sally Rockey, Ph.D.  
National Institutes of Health

Yvette Seger, Ph.D.  
Federation of American Societies for  
Experimental Biology

Jane Silverthorne, Ph.D.  
National Science Foundation

Hannah Valantine, M.D.  
National Institutes of Health

Lydia Villa-Komaroff, Ph.D.  
National Academy of Engineering