

National Leadership Workshop on Mentoring Women in Biomedical Careers

MEETING PROCEEDINGS

Office of Research on Women's Health, National Institutes of Health
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES



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RESEARCH ON
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and Human Services

This report was compiled by Jennifer Reineke Pohlhaus, Ph.D., Marsha S. Love, M.A., Joyce Rudick, Janine Austin Clayton, M.D., and Vivian W. Pinn, M.D., for the National Institutes of Health Working Group on Women in Biomedical Careers and the Office of Research on Women's Health.

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We acknowledge the special efforts of Workshop Co-chairs, Dr. Mary Clutter and Dr. M.R.C. Greenwood, in assisting with developing the agenda and confirming speakers, as well as continuously making themselves available to provide advice and input at a moment's notice.

In addition, we thank all of the Speakers, Panelists, and Concurrent Workshop Chairs and Co-chairs who made this workshop a reality, especially those who changed their schedules to participate.

We are pleased to have the collaboration of the Committee on Women in Science, Engineering, and Medicine (CWSEM), a standing committee of the National Research Council (NRC) that serves as an institutional focal point in support of complementary activities across the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, with a mandate to increase the participation of women in science, engineering, and medicine. CWSEM believes in collaboration among professional societies and organizations as a key element in developing effective programs and practices to encourage the retention and success of women in scientific, engineering, and biomedical fields, and that creating opportunities for young women professionals to establish mentoring relationships is essential to sustaining women in these disciplines and helping them advance into leadership positions. We hope that this collaborative support will continue through other cooperative efforts to positively impact scientists and engineers and their careers.

Finally, we are grateful for the hundreds of women and men who traveled to Bethesda, Maryland to attend the workshop, and those who participated via Webcast, for continuing to focus on the important issues of recruitment, retention, reentry, and advancement of women in biomedical research careers.



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Foreword

The United States has long depended on a talented and advanced workforce in scientific and professionally related fields to sustain our national economy, national security, health security, and environment. Critical science policy documents, beginning with Vannevar Bush's *Science, the Endless Frontier*, have stressed that for the continued success of our Nation, we must nourish our science-based talent and grow our cohorts to meet advanced technology and population demands. For many decades, we filled our science- and health-related professional ranks with mostly white males drawn from our rapidly improving and growing research universities. While there was considerable evidence that women were capable in scientific fields, there was scant representation in most fields, with the exception of the fields of nursing, dental hygiene, and elementary science teaching.

With the advent of the women's movement, agencies, universities, and many other sectors began to question why there were so few women in these fields. In 1992, one of the first meetings on the status of women in science and health careers was convened by the newly established National Institutes of Health (NIH) Office of Research on Women's Health. The public hearing and workshop on Recruitment, Retention, Reentry, and Advancement of Women in Biomedical Careers, summarized in *Women in Biomedical Careers: Dynamics of Change, Strategies for the 21st Century*, was an important milestone for women in science, giving credibility to the emerging discussion on the importance of improving the representation of women in health and other sciences.

For much of the ensuing 16 years, many efforts were directed toward inspiring women to enter fields of sciences and to redress the discriminatory climate that many women believed existed. These efforts have met with much success in several fields and lesser, but still hopeful, success for women gaining access in other scientific fields. For example, during the past 40 years, there has been steady growth in the number of women entering biomedical careers. At present, that includes about 50 percent of M.D.s and Ph.D.s in health science-related fields.

Nonetheless, in spite of increased access, there has not been a corresponding increase in women in leadership positions, as stressed in the recent report by the National Academies, *Beyond Bias and Barriers, Fulfilling the Potential of Women in Academic Science and Engineering*. Indeed, recently there have been disturbing signs of women dropping out. In addition, the rate of entry for males is, at best, constant, and too dependent on international talent. This has now led to the interesting change that efforts to recruit and keep women in science careers is no longer a matter of fairness, access, and redress, but has become essential to the Nation's long-term security and success. These observations have suggested that continuing efforts to improve our national talent pool must include not only inspiring female students and ensuring access to advanced programs but also ensuring advancement, development, and successfully sustained leadership.

The National Academies report, *Beyond Bias and Barriers, Fulfilling the Potential of Women in Academic Science and Engineering* challenged Universities, Professional societies, Federal Agencies and Congress to take action to address these issues.

NIH, in its role as the leading agency supporting medical research, accepted the challenge, and is to be commended for its action and foresight. Dr. Elias Zerhouni, NIH Director, established the NIH Working Group on Women in Biomedical Careers and asked Dr. Vivian Pinn to be Co-chair. Eleven subcommittees were created to address the following issues: Best practices to sustain career success, Extramural funding mechanisms and policies, Efficacy of programs to reduce gender bias; Examination of Title IX enforcement; Mentoring programs; Recruitment, retention, reentry, and advancement of women at NIH; and Integration of women into bioengineering fields.

In order to ensure that talented women are successful and to safeguard our Nation's role in science for the future, we must be clear that aiding and abetting this effort is everyone's responsibility in the national interest. Clearly, a multipronged approach is needed to make progress. The workshop title, *National Leadership Workshop on Mentoring Women in Biomedical*

Careers: "Mentoring is Everybody's Business," reflects this priority. Topics discussed at the workshop included: models of successful mentoring, challenges for developing and sustaining leadership, training of mentors and mentees, determining gaps in mentoring programs, insights from social science research, evaluating mentoring, mentoring in clinical departments, and mentoring minority women.

The charge to the workshop was to develop innovative strategies to promote the sustained advancement of women in biomedical careers. Questions that were considered included: What is mentoring? Does it change over time? Is it a one-on-one endeavor or can it be a group activity? Is it active or passive? Can it be mandated? Should funding depend on positive action? What metrics can be used for evaluation? Is there a culture problem? Can it be fixed? Is it necessary to reform higher education? What follows are the materials from this highly successful workshop.

Drs. Pinn and Zerhouni are to be congratulated for taking the first critical step in responding to the challenge of the National Academies committee.

As the Co-chairs of the Planning Committee for this workshop, we wish to thank the extraordinary number of women and men who graciously accepted the invitation to participate as speakers, workshop organizers, and discussants. We have rarely met a more devoted, energetic, or talented group of scientists. We also want to thank those hundreds who came to and participated in this workshop. The response was gratifying and indicated the strong belief that there was still much work to be done. We were honored to be asked to Co-chair this important meeting and we look forward to additional efforts on the part of NIH and other agencies.

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Executive Summary

INTRODUCTION

In early 2007, Elias A. Zerhouni, M.D., Director, National Institutes of Health (NIH), appointed the *NIH Working Group on Women in Biomedical Careers* to consider the recommendations from the National Academies report, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, give attention to the NIH intramural community and the concerns of intramural women scientists; consider the broader context of girls and women in science; and provide special attention to issues of barriers, minority women scientists, and mentoring.

The National Academies report concluded that eliminating gender bias in academia would require an immediate overarching reform, including decisive action by university administrators, professional societies, Federal funding agencies, foundations, Government agencies, and Congress. Through the Working Group, NIH aims to develop innovative strategies and tangible solutions to promote the advancement of women both within the NIH intramural community and throughout the extramural research community.

In November 2007, the NIH Working Group, through the Office of Research on Women's Health (ORWH) convened the *National Leadership Workshop on Mentoring Women in Biomedical Careers*. More than 500 registrants from Government, academia, industry, and other organizations attended the workshop. The workshop resulted in a variety of themes, recommendations, and best practices on mentoring, which are included in this report.

BACKGROUND

Recruitment of women into biomedical careers has changed significantly during the last three decades. In 1972, the U.S. Congress passed Title IX of the Education Amendment Act, which banned sexual discrimination in education programs receiving Federal funding. Consider that prior to this act:

- » Fewer than 1 in 5 faculty members were female.
- » Approximately 3 percent of college presidents were female.
- » Only 1 percent of those obtaining master's degrees in science/engineering were female.
- » Only 2 percent of the population who obtained master's degrees in math were female.
- » Only 40 percent of undergraduates were females.
- » Only 1 in 100 dental students were female
- » Less than 10 percent of medical students were female.

Since then, there has been significant improvement in various areas to increase gender representation. Studies now show that:

- » Approximately 50 percent of medical students are female.
- » Nearly 40 percent of dental students are female.
- » More than 50 percent of veterinarian students are female.
- » More women than men are being awarded baccalaureate degrees in science and engineering.
- » More than 50 percent of the doctoral degrees in biological, psychological, and social sciences are being awarded to women.
- » Doctoral degrees in earth, atmospheric, and ocean sciences awarded to women have risen from fewer than 30 percent to more than 45 percent in one decade.

Although women today comprise an increasing proportion of science and engineering majors, the representation of women in leadership positions in academic institutions, scientific and professional societies, and honorary organizations is low relative to the number of women qualified to hold these positions, according to the *Beyond Bias and Barriers* report.

This underrepresentation in leadership positions is reflected in current data from the Association of American Medical Colleges (AAMC), which show there are few women holding senior positions as chairs and deans in certain departments of medicine, such as orthopedics.

According to the National Academies report, it is not the lack of talent but rather the unintentional biases and outmoded institutional structures that are hindering the access and advancement of women.

Research and practice have shown that mentoring can provide supporting and encouraging opportunities for retention and sustained advancement of women in the sciences. Mentoring has also been shown to help develop and sustain leadership for women in biomedical careers.

MENTORING OVERVIEW

Mentoring is a relationship and learning process that results in many outcomes for mentees, mentors, and organizations as well as for society and the world.

Two decades ago, it was common for mentors to choose their mentees. Generally, mentees were similar to the mentors in gender, ethnicity, or cultural background. Today the reverse is also true—mentees choose their mentors.

Because mentoring programs are different than naturally occurring mentoring relationships, they are usually more structured than individual, naturally occurring mentoring relationships.

Beyond one-on-one relationships, mentoring can also occur in a group setting. Research on mentoring during the last decade shows the notion of having one mentor to guide a person throughout a career is not usually found in practice. Instead, people often have a network of mentors or have multiple mentors, both simultaneously and sequentially.

Current insight from research and practice has determined best practices that make mentoring relationships more effective. Research and practice have also identified specific elements that can be critical for mentoring programs.

Successful mentoring programs such as MentorNet, Mentoring in Medicine, ELAM, ADVANCE, BIRCWH, and WOWS serve as models for the development of future programs. (Each of these programs is presented in further detail in the Boxes 1-6.)

During the workshop, participants convened in small groups and offered recommendations on six specific mentoring areas:

- » Mentee and mentor training
- » Mentoring in clinical departments
- » Mentoring minority women in biomedical research
- » Determining gaps in mentoring programs and developing novel models for successful mentoring
- » Insight into mentoring in biomedical careers from social science research
- » Models for evaluating mentoring

These recommendations are described following a description of the workshop's main themes.

1

Model of a Successful Mentoring Program: MentorNet (www.mentornet.net)

MentorNet was founded in 1997 as an e-mentoring program. Using e-mail allows MentorNet program participants to transcend constraints of geography and time. Communicating electronically also removes some of the most obvious markers of status difference, including those rooted in gender and hierarchy.

MentorNet pairs community college, undergraduate and graduate students, postdoctoral scholars, and untenured faculty with experienced professionals in their fields for e-mail-based mentoring relationships lasting 8 months. MentorNet also offers online training, interactive online case studies, and coaching.

Those in the MentorNet community can take advantage of:

- One-on-one e-mentoring program
- The MentorNet E-Forums: Web-based discussion groups for anyone interested in topics such as work/life balance, job searching, and graduate studies
- Resources for and about mentoring, diversity, and careers
- A résumé database for students seeking jobs or internships

During the last 10 years, MentorNet has matched more than 20,600 pairs of mentors and mentees. The online MentorNet community currently consists of about 21,000 individuals. During the last academic year, MentorNet included mentors from more than 1,000 different employers.

2

Model of a Successful Mentoring Program: ELAM Program (www.drexelmed.edu/ELAM/)

The Executive Leadership in Academic Medicine (ELAM) Program is the Nation's only program that focuses on preparing senior women faculty at schools of medicine, dentistry, and public health to move into positions of institutional leadership where they can effect positive change.

Candidates must be at associate professor rank or higher and demonstrate significant administrative responsibilities and potential for advancement to top levels of academic administration. The program operates on the principle that mentoring is needed throughout one's career.

ELAM offers an intensive, 1-year program of leadership training that includes coaching, networking, and mentoring opportunities. ELAM offers a group mentoring model by involving multiple mentors. Peer networking mentoring (where women in the ELAM community are helping other women) is also supported.

To date, nearly 525 fellows have participated in the program; approximately 48 fellows are chosen every year. The effectiveness of ELAM's distinctive approach to leadership preparation is broadly recognized within the academic health community, with nearly 90 percent of U.S. medical schools and 50 percent of U.S. dental schools represented among the program's graduates.

ELAM graduates come from more than 100 academic health centers and include 21 current or former deans, 90 department chairs, 30 center or institute directors, and 70 senior dean's staff throughout the United States, Canada, and Puerto Rico.

3

Model of a Successful Mentoring Program— Georgia Tech ADVANCE Program (<http://www.advance.gatech.edu/>)

The goal of the National Science Foundation's ADVANCE Program is to develop systemic approaches to increase the representation and advancement of women in academic science and engineering careers. The program's focus is to advance women on an academic tenure track to positions in senior and leadership areas in the university. More than 30 institutions in the United States have participated in the ADVANCE Program and almost all of the programs contained a mentorship aspects.

At the Georgia Institute of Technology, the ADVANCE Awareness of Decisions In Evaluating Promotion and Tenure (ADEPT) program provides case studies and various forms of reference materials relevant to promotion and tenure evaluations.

Program components include:

- Speed mentoring, based on the idea of “speed dating,” which connects faculty applying for tenure with individuals who have been (but are not currently) on tenure and promotion committees. Through this activity, faculty are given feedback on their CVs, and accomplishments. The activity aims to identify gaps and strengthen the tenure case of faculty.
- A 2-day leadership retreat with women faculty and senior institutional leaders that allows faculty access to senior leadership.
- A formal tenure and promotion training process aimed at removing subtle gender, racial and other biases.
- A network of term professors through which participants are paired with senior women faculty with a solid research track record. This works much like an “endowed chair,” and mentors are supported with \$60,000 per year to keep their research going and provide for the substantial time needed in mentoring.

4

Model of a Successful Mentoring Program: The UC–Davis BIRCWH Program (www.ucdmc.ucdavis.edu/bircwh)

The Building Interdisciplinary Research Careers in Women's Health (BIRCWH) program at the University of California–Davis focuses on effective mentoring to provide interdisciplinary research and training. The NIH-supported program aims to create an environment that nurtures non-traditional interdisciplinary collaborations in focused and interactive research areas that are essential to improving the health of women.

At UC–Davis, the BIRCWH program provides Ph.D. and M.D. faculty with interdisciplinary training to ensure establishment of their independent biomedical research careers in areas relevant to women's health. For up to 3 years, BIRCWH scholars are mentored by established researchers and devote a minimum of 75 percent of their professional time towards developing independent research programs.

There currently exist 26 active BIRCWH programs in the United States and each program supports four or more scholars per institution. To support an interdisciplinary approach, the program requires that half of the scholars be M.D.s and the other half Ph.D.s. At a national level, BIRCWH includes an annual congregation of key individuals in all BIRCWH programs to share information and best practices.

WORKSHOP THEMES

Specific themes emerged throughout the meeting. They helped provide background and context to many of the meeting's discussions and also helped shape the recommendations provided by the working groups. Themes included:

- » A strong need exists for training and other types of mentoring grants.
- » The fact that all women are not the same—there is a need to take greater care to ensure that we consider issues relating to women of color.
- » Past models of one-on-one mentoring may not work effectively in all situations.
- » Strategies and interventions should be based on evidence, which is important to support the development of new policies and programs.
- » Change needs to be systematic; thus, it may be important to examine issues from a "systems" point of view.
- » It is important to address the cultural change of institutions as well as the timing of institutional change through various models.
- » Researchers should take advantage of what social and behavioral sciences can offer with regard to mentoring, especially in the area of evaluation.
- » Cross-agency mentoring efforts should be integrated and mentoring efforts from the private and nonprofit sectors should also be examined.
- » There is a need to quantify, but it is also important to instill a degree of accountability. ("If we can't measure it and hold people accountable to it, it might not happen.").

5

Model of a Successful Mentoring Program: UNC Working on Women in Science

(<http://www.unhealthcare.org/site/newsroom/news/2007/Sep/wows/>)

The Working on Women in Science (WOWS) program was designed to foster the careers of women in science at the University of North Carolina through public recognition, leadership training, mentoring, and networking. Its overarching aim is to ensure women make contributions as investigators and leaders.

The program grew from a 2006 NSF grant proposal and offers support for five scholars: two from the school of arts and sciences, two from medicine, and one from dentistry.

WOWS aims to:

- Assist in recruitment by providing mentoring for search and promotion committees through a series of proven interventions.
- Facilitate the retention of women scientists by providing mentoring and role modeling.
- Provide funding for investigators in transition points in their careers.

WORKSHOP RECOMMENDATIONS

Participants convened in small groups to develop recommendations in six specific mentoring areas: (1) mentee and mentor training, (2) insights into mentoring in biomedical careers from social science research, (3) models for evaluating mentoring, (4) mentoring in clinical departments, (5) mentoring minority women in biomedical research, and (6) determining gaps in mentoring programs and developing novel models for successful mentoring. Listed below are specific recommendations from each concurrent workshop. A summary of the overall workshop recommendations is listed in Box 7.

6

Model of a Successful Mentoring Program: Mentoring in Medicine (www.medicalmentor.org)

Mentoring in Medicine finds and nurtures socioeconomically disadvantaged students in urban schools from third grade onwards to help them develop the necessary tools to successfully achieve their goal of becoming a healthcare professional. The program is currently implemented in New York and California.

Mentoring in Medicine exposes students to a variety of healthcare professionals of color who serve as role models and ignite an interest in health careers. Over 90 percent of the program's 400 mentors are either Latino or African American.

The Mentoring in Medicine program strives to obtain measurable increases in healthcare literacy for students and caregivers through multiple vehicles including professional seminars, student project presentations, health fairs, health screenings, and literature dissemination.

The program includes:

- Group and multi-level mentoring—middle school students are mentored by high school students, high school students by college students, and college students by professionals
- Seed mentoring—students are exposed to mentors in areas where they have particular interests (oncology, internal medicine, etc.)
- Broad recruitment methods—students are recruited by using newspapers, announcements in churches, and “street teams.”
- Addressing of social and emotional issues—a group of psychiatrists provides services to those in the program who need them.

Mentee and Mentor Training Workshop

Develop new workshops, modules, and training on mentoring

- » Develop courses, Web-based mentoring modules, and programs.
- » Ensure these modules or programs are “portable” to locations across the country.
- » Develop a formalized structure, curriculum or program on “How to Mentor.”
- » Develop special topics in mentoring (e.g., tailoring mentoring to individuals, cross-cultural mentorship).

Develop training on how to provide feedback and perform evaluations

- » Provide training on how to evaluate mentors and mentoring.
- » Provide training on how to provide feedback and evaluation.

Develop specific grants to study mentoring

- » Develop R21 and R01 grants to study mentoring.
- » Develop T32 grants with a primary focus on mentoring.
- » Develop grants to study best practices in mentoring.
- » Develop curriculum grants (similar to K30 grants) for mentoring training programs or for developing mentoring curricula.

Require mentor training in grants

- » Require mentor training on T32 and K12 awards.
- » Provide funds for mentors and mentoring.

Consider mentees as a resource

- » Teach mentees to also be mentors so they can mentor the next generation.
- » Teach mentoring as a skill.
- » Model effective mentoring.

Support mentoring

- » Add support and infrastructure for training grants.
- » Add support for staff running training grants.
- » Add support by protecting mentoring time in grants (e.g., T32, K12, and other training awards should include support for mentors).

Recognize career diversity

- » Appreciate and support a wide variety of career paths, including career paths outside academia.
- » Grant annual reports should also include as results more than just the percentage of individuals in academic careers or obtaining R01 grants.

Determining Gaps in Mentoring Programs and Developing Novel Models for Successful Mentoring Workshop

Define and research success metrics

- » Examine and fund comparative studies.
- » Determine the return on investment of mentoring.

Provide funding for research in mentoring

- » Provide seed grants for small mentoring programs.
- » Fund research to determine the impact of novel mentoring programs.
- » Examine comparative studies of mentoring models.
- » Fund research to develop methods to identify gaps.

Examine facilitated peer group/informal mentoring

- » Test and evaluate peer group/informal mentoring.

Accountability

- » Have NIH work with professional associations to define mentoring policies.
- » Call for a clear delineation of multiple sets of best practices in mentoring.
- » Have an institutional/NIH and A&P (appointments and promotions) reward system for mentoring.

Funding for mentoring

- » All NIH training grants should have a funded mentoring component.

Insights into Mentoring in Biomedical Careers from Social Science Research Workshop

Include various areas of scholarship

- » Mentoring programs should consider taking advantage of research concepts and practices from relevant areas of scholarship, including adult education, counseling, psychology, and other social sciences.

Support interdisciplinary mentoring

- » Mentoring programs should be inclusive across health sciences.
- » Mentoring programs should be based on the knowledge base of social science research.

Consider context

- » Mentoring is a small part of a bigger institutional issue regarding career development of women and men in academic medicine—a larger institutional transformation is needed.

Incorporate experts

- » Because this is a larger institutional cultural change issue, it might be necessary to bring in experts in organizational change, knowledge translation, and innovative diffusion to address institutional transformation.

Move beyond traditional mentoring models

- » Advancement of women also requires ongoing and proactive attention to multiculturalism, gender stereotypes and power differentials.

Fund research on innovative and collaborative mentoring models

- » All research should attend to cultural differences.
- » Build evaluation into all mentoring and career development grants.

Examine existing resources and synergies

- » Consider examining successful programs such as the National Science Foundation Advance Program.
- » Draw on existing mentoring best practices within HHS (e.g., from the Office of Research Integrity or National Institute of General Medical Sciences).
- » Bring together and disseminate existing mentoring knowledge and resources.
- » Develop a cost/benefit analysis of inadequate mentoring.

Logic Model for Evaluating Mentoring Workshop

The Logic Model provides a framework for evaluating the success of interventions. It helps divide a program into smaller steps and identify long-term outcomes. In essence, the Logic Model facilitates evidence-based evaluation of interventions. It can be applied to evaluate a wide variety of mentoring programs from early interventions such as high school programs all the way to postdoctoral programs.

Developing case studies

- » The Logic Model might be useful in developing case studies to illustrate its application of mentoring programs.

Allocation of resources

- » It is important that fiscal and intellectual resources for long-term follow up in evaluation studies be included in NIH's announcements and solicitations.

Examine existing evaluation technique

- » It might be helpful to examine mentoring programs outside of NIH, including other Federal agencies, to discover successful evaluation techniques (to keep from "reinventing the wheel").

Mentoring in Clinical Departments Workshop

Use a group or committee mentoring model

- » A one-on-one mentoring model does not always yield optimal results. Mentored awards should require a personalized mentoring committee rather than a single mentor.

Protect mentor's time

- » Serving as a mentor can be difficult when attempting to balance clinical service time versus research time. All mentored awards should include a stipend (\$5,000 to \$10,000) for the mentors to cover the time spent mentoring.
- » Research grant applications should provide at least 35 percent effort and time protected for research for the principal investigator.

Evaluate mentors and provide mentoring incentives

- » All faculty mentors should certify that they have mentoring training.
- » Promotion evaluations should consider mentoring activities as well as teaching activities.
- » Department chairs should be evaluated annually for the quality of departmental mentoring.
- » Biosketches in all NIH applications should include a section on mentoring activities.
- » Mentees should be asked to evaluate the mentoring they're received.
- » All NIH-funded institutions should be required to survey mentees. The results should be quantified and the scores publicized with an aim to inform everyone on how well an institution is doing in mentoring.

Develop formal mentoring systems and resources

- » Formal systems to mentor postdocs, fellows, and faculty should exist at the institutional level.
- » Curricula should be designed to mentor postdocs, fellows, and faculty. Career development information should also be available and distributed.
- » Institutions should consider developing a Faculty Development Office that provides all necessary information and resources.
- » NIH should consider awards for development of biomedical career materials in mentoring (i.e., resources to improve mentoring).
- » NIH should consider sponsoring several studies to evaluate mentoring.
- » NIH should consider developing Centers of Excellence in Mentoring.
- » NIH should consider having more RFAs that require both a basic scientist and a clinician as co-principal investigators to provide mutual mentoring.

Start early

- » Mentoring should start at the time of faculty appointment. Institutions should not wait until an individual is well into the faculty career before starting mentoring.

Mentoring Minority Women in Biomedical Research Workshop

Create overarching initiatives

- » Create overarching initiatives that address issues surrounding women of color (e.g., cross-agency initiatives or initiatives involving academic institutions and professional associations).

Conduct and support both quantitative and qualitative research

- » Understand and conduct quantitative and qualitative research to capture and document experiences of women of color.
- » Research should also document the career progression of women of color.
- » Include women of color in “best practices” studies. Collect and analyze best practice examples in various environments in which women of color are progressing.
- » Research how culture and values play into mentoring.
- » Research the psychosocial and environmental interactions and how they relate to factors that lead to success, slowdown, or attrition.
- » Examine the use of alternative models for study such as business models or models for organizational change.

Support practice recommendations

- » Implement training and teaching for mentors regarding issues of women of color.
- » Develop models, guides, and curricula.
- » Within best practices delineate the experience of women of color.
- » Provide resources for an ongoing dialogue on issues regarding women of color. Also provide resources for the convening of individuals to address this topic.

Support policy recommendations

- » Begin collecting and reporting disaggregated data on women of color so that there are no more future reports that study the experience of women without incorporating the experience of women of color.
- » Incorporate themes and issues regarding women of color in future meetings, RFAs, etc., to keep it from being an “invisible” topic.
- » Integrate gender and minority issues. Introduce gender issues into programs targeting minorities and introduce minority issues in programs targeting women.

7

Summary of Major Recommendations

Move beyond traditional mentoring models

- One-on-one mentoring models do not always yield optimal results. One should also consider alternative mentoring models (group mentoring, peer mentoring, etc.).
- Models should include ongoing and proactive attention to multiculturalism, gender stereotypes, and power differentials.

Examine existing resources and synergies

- Draw on existing mentoring best practices within NIH and other Federal agencies.
- Consider examining successful mentoring programs such as National Science Foundation’s (NSF) ADVANCE Program.
- Gather and disseminate existing mentoring knowledge and resources.

Develop new mentoring workshops, modules, and training

- Develop general Web-based mentoring modules, courses, or programs.
- Also develop special topics in mentoring (e.g., tailoring mentoring to individuals, cross-cultural mentorship).
- Develop and distribute career development information.

Develop formal mentoring systems and resources

- Develop formal systems—at the institutional level—to mentor postdocs, fellows, and faculty.

Start early

- To encourage and sustain research careers, mentoring should start early in the trainee’s career. Mentoring of faculty should start at the time of appointment, rather than waiting until an individual is well into the faculty career.

Protect a mentor’s time

- Awards should include mentor stipends to cover time spent mentoring.

Support interdisciplinary mentoring

- Mentoring programs should be inclusive across the health sciences. To promote interdisciplinary careers, several mentors representing different disciplines must be part of the mentoring team. Coordination of collaborative multidisciplinary aspects of both the scientific and career aspects is important for interdisciplinary approaches.

Provide mentoring incentives

- Promotion evaluations should consider mentoring activities as well as teaching activities.
- Department chairs should be evaluated annually for the quality of departmental mentoring.
- Consider awards for development of biomedical career materials in mentoring (i.e., resources to improve mentoring).

Include various areas of scholarship

- Mentoring programs should consider taking advantage of research concepts and practices from relevant areas of scholarship, including adult education, counseling, psychology, and other social sciences.

Provide funding for mentoring research

- Develop grants to study best practices in mentoring.
- Provide seed grants for small mentoring programs.
- Develop grants to determine the impact of novel mentoring programs.
- Develop grants to examine comparative studies of mentoring models.

Provide funding for mentoring

- Add support for staff running training grants.
- Add support by protecting mentoring time in grants (e.g., T32, K12, and other training awards should include support for mentors).

Create accountability

- Call for a clear delineation of multiple sets of best practices in mentoring.
- Have an institutional/NIH appointments and promotions (A&P) reward system for mentoring.
- Have NIH work with professional associations to define specific policies related to mentoring.

Support mentoring and mentor training in grants

- Require mentor training on awards.
- Certify that faculty mentors have mentoring training.

Consider the needs of minority women in biomedical research

- Create overarching initiatives that address issues surrounding women of color (e.g., cross-agency initiatives or initiatives involving academic institutions and professional associations).
- Understand and conduct quantitative and qualitative research to capture and document experiences of women of color.
- Include women of color in “best practices” studies. Collect and analyze best practice examples in various environments in which women of color are progressing.
- Research the psychosocial and environmental interactions and how they relate to factors that lead to success, slowdown, or attrition.
- Implement training and teaching for mentors regarding issues of women of color.
- Develop specific models, guides, and curricula.
- Begin collecting and reporting disaggregated data on women of color.

Incorporate other experts

- Because this is a larger institutional cultural change issue, it might be necessary to bring in experts in organizational change, knowledge translation, and innovative diffusion to address institutional transformation.

Evaluate

- Examine mentoring programs, including those funded by the NIH and other Federal agencies, to determine successful mentoring evaluation techniques.
- Allocate resources, both fiscal and intellectual, for long-term followup in evaluation studies.
- Use the Logic Model as an evaluation tool. Develop case studies illustrating the application of the Logic Model to mentoring programs.
- Define and research success metrics for mentoring.
- Build evaluation into all mentoring and career development grants.
- Encourage mentees to evaluate their mentors.

MENTORING TIPS AND BEST PRACTICES

Meeting presentations and panel discussions generated a series of mentoring tips and best practices that can help support both mentees and mentors through the mentorship experience.

Best practices were grouped into five specific areas: 1) traits of a good mentor, 2) strategies for effective mentoring, 3) good mentoring practices, 4) how to get needed mentoring, and 5) how to be mentored well.

Tips and best practices for mentors

Traits of a good mentor*

- » Be accessible.
- » Be empathetic.
- » Be open-minded.
- » Be consistent.
- » Be patient.
- » Be honest.
- » Be savvy.
- » Be humble (accept the fact that sometimes you just don't know).

Strategies for effective mentoring*

- » Make everything a learning opportunity.
- » Set specific goals and measures of accomplishments.
- » Encourage strategic thinking and creativity.
- » Uphold professional standards.
- » Impart skills.
- » Provide networking opportunities.
- » Provide moral support.

Good mentoring practices

- » Be approachable—mentees should not feel afraid to share.
- » Be persistent—stick to it and keep the relationship going.
- » Be a liaison—act as a liaison to upper administration when needed.
- » Be a sponsor—nominate mentees for leadership programs, awards or committee positions.

- » Be authoritative (but not authoritarian)—share your body of experience and knowledge.
- » Be a role model—model behavior that is effective.
- » Be a teacher—teach the mentorship process so that mentees can become future mentors.
- » Be inspirational—mentors should inspire.
- » Be motivational—provide pushing, pulling, pleading, and prodding as needed.
- » Be a friend—help them be accepted, confirmed and counseled.

Tips and best practices for mentees

How to get the mentoring you need*

- » Establish relationships with a set of official mentors (also seek out informal mentors if needed).
- » Meet regularly with formal mentors
- » Keep meetings professional.
- » Establish a set of confidants with whom you can share information.
- » Don't let go of your old mentors—follow them through your entire career.

How to be mentored well*

- » Have foresight (plan ahead).
- » Be proactive.
- » Ask probing questions.
- » Have respect for your mentor.
- » Express gratitude.
- » Reciprocate (if appropriate).
- » Be humble (accept critical feedback).

*Derived from *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty*. Howard Hughes Medical Institute and the Burroughs Wellcome Fund, 2006.

FUTURE ACTIONS

Although women today make up an increasing proportion of science and engineering majors, women still are underrepresented in leadership positions of academic institutions, scientific and professional societies, and honorary organizations.

The *National Leadership Workshop on Mentoring Women in Biomedical Careers* generated a series of recommendations and best practices related to mentoring. These recommendations will be shared with the *NIH Working Group on Women in Biomedical Careers* as well as with other organizations inside and outside of NIH.

Meeting Proceedings

I. OPENING SESSION

INTRODUCTION

Vivian W. Pinn, M.D., *Associate Director for Research on Women's Health and Director, Office of Research on Women's Health, National Institutes of Health, Bethesda, Maryland*

The National Academies Committee on Science, Engineering, and Public Policy, with support from the National Academies standing committee, Committee on Women in Science and Engineering (CWSE), appointed a committee to address current issues relevant to women in academic science and engineering. Donna Shalala, Ph.D., President of the University of Miami and former Secretary of the Department of Health and Human Services, was appointed to serve as the Chair of this newly formed *Committee on Maximizing the Potential of Women in Academic Science and Engineering*. The National Institutes of Health (NIH) Office of Research on Women's Health (ORWH), along with Eli Lilly and Co., the National Science Foundation, the Ford Foundation, and the National Academies, supported this effort. In September 2006, the resulting report, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, was issued by the National Academy of Science, National Academy of Engineering, and Institute of Medicine, of the National Academies, calling for an urgent, broad, national effort to maximize the potential of women scientists and engineers in academia, eliciting much attention in both the public media and the scientific community.

The report offered a broad range of recommendations for universities, government agencies, and Congress. In response to the challenge for Federal agencies to address their policies and practices to better support the full participation of women, Dr. Elias A. Zerhouni, NIH Director, appointed the *NIH Working Group on Women in Biomedical Careers* (NIH Working Group) to develop innovative strategies and tangible actions that could be implemented to promote the advancement of women in research careers, within both the NIH intramural and extramural research communities.

I have the pleasure of serving as co-chair, with Dr. Zerhouni, of this NIH Working Group, which is composed of senior leadership as well as extramural grant administrators and intramural researchers; a list of the full membership appears in Appendix A.

In addition to considering recommendations from the National Academies report, the NIH Working Group was charged to give attention to the NIH intramural community and the concerns of intramural women scientists; consider the broader context of girls and women in science; and provide special attention to issues of barriers, minority women scientists, and mentoring.

Because of the importance of mentoring in sustaining the advancement of women leaders in academic science and engineering, the ORWH and the NIH Working Group began planning the *National Leadership Workshop on Mentoring Women in Biomedical Careers*. In addition to providing a forum for discussing aspects of mentoring, this workshop was designed to provide an opportunity for great scientific minds (including those just beginning their careers, as well as senior researchers) to come together and exchange ideas. The purpose of the workshop was to enhance leadership in mentoring to sustain the advancement of

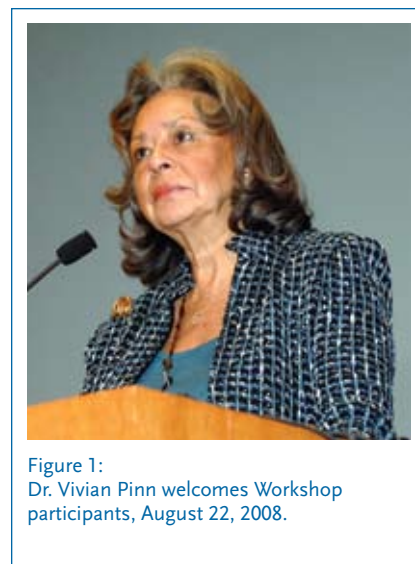


Figure 1:
Dr. Vivian Pinn welcomes Workshop participants, August 22, 2008.

women in biomedical careers. The workshop goals were to:

1. Provide attendees with innovative tools to improve or initiate effective mentoring programs in their institutions or organizations.
2. Define mentoring as it applies across the career span of women in biomedical research careers.
3. Determine best ways to evaluate the effectiveness of mentoring programs.
4. Learn lessons from established biomedical research mentoring programs.
5. Develop new models for successful mentoring programs.
6. Design new pathways for mentoring women in the private and public biomedical research sectors.
7. Construct leadership strategies for success in the global biomedical research environment.

In planning this workshop, M.R.C. Greenwood, Ph.D., Professor, University of California–Davis, and Chancellor Emerita, University of California–Santa Cruz, and Co-chair of the Workshop Planning Committee, mentioned that “Mentoring is Everybody’s Business,” which subsequently became the theme of the workshop. In addition, we were delighted to have the assistance of Mary Clutter, Ph.D., former Assistant Director for the Biological Sciences, National Science Foundation, as Co-chair of the Workshop Planning Committee. We are indebted to the entire Workshop Planning Committee (Appendix B), who provided sage advice and comments on what topics would be helpful for workshop participants.

The ORWH and the NIH Working Group will consider the issues and recommendations discussed during this workshop. In addition, the Committee on Women in Science, Engineering, and Medicine of the National Academies participated in this workshop, and will collaborate in taking forward the action items from workshop discussions.



Figure 2:
Dr. Elias Zerhouni, Director, NIH, (right) is accompanied by Dr. Lawrence Tabak.

Lawrence Tabak, D.D.S., Ph.D., *Director of the National Institute of Dental and Craniofacial Research, NIH, Bethesda, Maryland, and Chair, Mentoring Subcommittee of NIH Working Group*

Dr. Tabak welcomed workshop participants and emphasized the importance of mentoring in advancing women’s careers in biomedical research. He shared a parable that summarized his key point, “the topic of your thesis does not matter; only that you have a good mentor.”

Conference Preamble: New Paradigm for Mentoring

M.R.C. Greenwood, Ph.D., *Professor, University of California–Davis, and Chancellor Emerita, University of California–Santa Cruz, and Co-chair, Workshop Planning Committee*

Quoting the *Beyond Bias and Barriers* report, Dr. Greenwood noted, "It is not lack of talent, but rather unintentional biases and outmoded institutional structures that are hindering the access and advancement of women." The *Beyond Bias and Barriers* report put forward recommendations to address these issues and delineated a broad spectrum of stakeholders to whom these recommendations were addressed, including: trustees; university presidents and provosts; deans; department chairs; higher education organizations; scientific, professional and honorary societies; journals and foundations and Federal funding agencies. A previous National Academies report, *Rising Above the Gathering Storm*, raised awareness about the challenges faced by the United States in maintaining competitiveness and international and global leadership in the sciences. Dr. Greenwood highlighted the central tenet common to both reports, that the economic future of the United States will depend on the Nation's ability to develop women as leaders, which is why "mentoring is everybody's business."

Dr. Greenwood provided 5-year statistical trends in the numbers of women obtaining bachelors, masters, and doctoral degrees in science and engineering, in addition to the effect of Title IX on women's attainment of science and engineering degrees.



Figure 3:
Dr. M.R.C. Greenwood explains why "Mentoring is Everybody's Business."

Much of the work to advance women's careers has been based on increasing women's access and on overcoming past discrimination. However, access is not enough; providing support to succeed is critical. What women face when attempting to move their careers forward has been alternately described as a glass ceiling, a glass cliff, and a labyrinth of leadership. Problems for women exist from the entry level, in developing leaders, to the highest levels of leadership. Dr. Greenwood emphasized that success in advancing women at all levels is at the heart of the Nation's future success.

II. OPENING KEYNOTE ADDRESS

On Belay: Ready To Climb

France Córdoba, Ph.D., *President, Purdue University, West Lafayette, Indiana*

Dr. Córdoba, noted astrophysicist and 11th president of Purdue University, was introduced by Barbara M. Alving, M.D., Director, National Center for Research Resources, NIH.

Dr. Córdoba touched on several issues of mentorship and summarized her personal career trajectory. As a young girl, Dr. Córdoba was discouraged from science because it was “not for girls,” and very few female role models existed in the sciences at that time. The first moon landing and a PBS broadcast about neutron stars sparked her interest in x-ray astronomy, which was just emerging as a field. As the first female and Latina president of Purdue University, she described briefly some of the issues she faces at Purdue and shared personal words of wisdom.

- » Take the road less travelled; there is plenty of room there.
- » Change is central to success. If you want to move up, you have to be willing to move, period.
- » If you don't fail, you will never know how far you can go.
- » Many pathways to career success exist. Each woman needs to define her own path.



Figure 4:
Dr. France Córdoba expresses personal words of wisdom.

She explained that “on belay: ready to climb” is what rock climbers yell out when they cannot see their partners and are ready to climb. She likened rock climbing to a career in biomedical research, where mentors (like climbing partners) are needed for support and success. Dr. Córdoba described how she ‘misspent’ her weekends while in graduate school rock-climbing in California.

III. PANEL ONE: MODELS OF SUCCESSFUL MENTORING

Mary Clutter, Ph.D., Former Assistant Director for the Biological Sciences, National Science Foundation, served as the moderator for this session, which addressed models of successful mentoring programs currently in practice. Participants were asked to provide their perspective on mentoring programs based on their experiences and leadership in promoting women in science careers.

MentorNet: Ten Years of Success and Lessons Learned

Carol B. Muller, Ph.D., Founder, President, and Chief Executive Officer of MentorNet, San José, California

MentorNet's mission is (1) to further the progress of women and others underrepresented in scientific and technical fields through the use of a dynamic, technology-supported mentoring network, and (2) to advance individuals and society—and enhance engineering and related sciences—by promoting a diversified, expanded, and talented global workforce.

MentorNet provides e-mentoring infrastructure for organizations in higher education, industry, government, and the nonprofit sector. It is a large-scale, multi-institutional online network that offers extensive, diverse pools of participants, access to extensive networks, focused expertise, and economies of scale with the potential to avoid redundancies. MentorNet partners currently include 116 institutions of higher education, 11 corporations, 2 government laboratories, and 15 professional societies and nonprofit organizations.

MentorNet was a leader in the development of the concept of external mentors. Individuals in a mentoring relationship can benefit when the mentors are knowledgeable and experienced professionals in a similar field and are located at an institution other than the mentee's location. The MentorNet community is composed of a one-on-one mentoring program, *MentorNet News*, a student résumé database, the E-forum—a series of topic-based online discussion groups, and other resources and links.

Dr. Muller provided a summary of mentoring definitions and issues.

- » Mentoring is a two-way learning process in which a more experienced person guides or advises a less experienced person.
- » Mentoring provides intergenerational transmission of knowledge and know-how; it bridges gaps and adds value to professions, organizations, and individuals.



Figure 5: The main component of the MentorNet community is the One-on-One Program. (Figure provided by Dr. Carol Muller.)

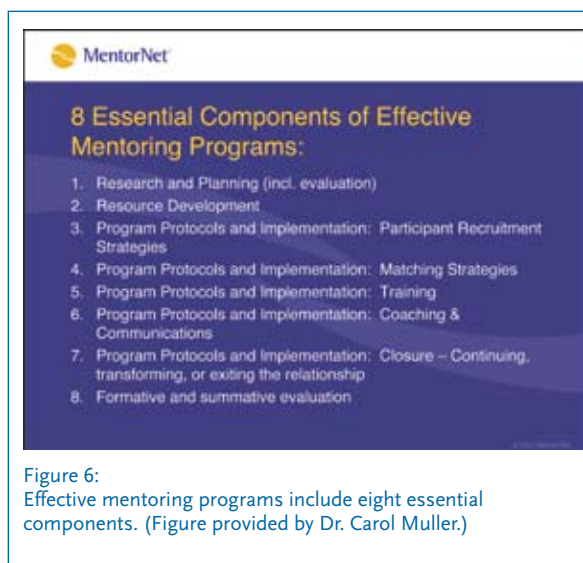


Figure 6: Effective mentoring programs include eight essential components. (Figure provided by Dr. Carol Muller.)

- » Mentoring can be effective, ineffective, or toxic (sometimes termed “tormenting”).
- » The notion of one mentor guiding a mentee throughout an entire career trajectory is rarely found in practice; most people experience and need different simultaneous and sequential mentors.

- » Mentoring occurs in stages: preparation, initiation/negotiation, cultivation/enabling, and separation/redefinition/closure. Evaluation should be considered throughout all stages.
- » Mentoring is especially critical in retaining women and underrepresented people of color in the sciences for two reasons.
 - They are likely to experience feelings of isolation that could be alleviated by mentoring.
 - Studies show they are more likely to report an unmet need for mentoring.

Evaluation of the MentorNet's One-on-One program indicates that protégés are generally satisfied with the e-mentoring experience and that MentorNet increases the confidence and motivation of protégés and increases the likelihood of retention of students in STEM fields. In addition, protégés gain the essential knowledge of how to succeed.

ELAM Program: Mentoring at the Senior Level
 Page S. Morahan, Ph.D., *Co-Director, Executive Leadership in Academic Medicine (ELAM), Drexel University College of Medicine, Philadelphia, Pennsylvania*

ELAM was designed to (1) increase the number of women faculty in leadership positions in academic health centers and related institutions; (2) ensure the sustained success of women faculty

Overall Lessons Learned: Teaching Leadership to Women

<p>Skills & Knowledge</p> <ul style="list-style-type: none"> • Assessment • Expert instruction, adult learning principles • In-depth skill development • Networking 	<p>Close Community</p> <ul style="list-style-type: none"> • Prolonged contact via <ul style="list-style-type: none"> • Learning teams, action learning projects (real) • Repeated meetings & follow up connection <p>Increased Self-efficacy</p> <ul style="list-style-type: none"> • Reflection/self-discovery • Coaching, mentoring • Increased visibility • Working with bosses
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Figure 7: The ELAM Program has yielded several "Lessons Learned." (Figure provided by Dr. Page Morahan.)

ELAM National Outcomes at 13 Years

<p>ELAM Alumnae (> 550)</p> <ul style="list-style-type: none"> • Deans of US medical/dental/PH schools: 24% (11/46) • University: Chief Academic Officer, VPs, Provosts, and Deans • Hospital: President & CEO, Chief Medical Officer • VA: Chief of Staff • Foundation: Executive Director • Association: Associate VP ~ As of Jan 2007 	<p>Benefits to Institution</p> <ul style="list-style-type: none"> • Broadened knowledge & perspective: leadership and management skills to address AHC challenges • Action project: to advance a goal or address a need of AHC, adding value to school, department, committees • Access: to national network of skilled leaders
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ELAM National Outcomes at 13 Years

<p>Impact on Programs & Institutions</p> <ul style="list-style-type: none"> • ELAM @ other programs <ul style="list-style-type: none"> • Foundation for Advancement of International Medical Education and Research (FAIMER) Institute • Bryn Mawr College's Nonprofit Executive Leadership Institute (NELI) • Consultation <ul style="list-style-type: none"> • AAMC and ADEA • NIH ORWH (AXOS); OWH (CoE Women's Health Leadership); Fogarty Internat'l Ctr • Bishop Fellowship Program • NSF ADVANCE programs • Consultation on positions/advancement 	<p>Research & Evaluation</p> <ul style="list-style-type: none"> • Longitudinal within group study <ul style="list-style-type: none"> • pre-post surveys, in-depth interviews • Analysis of written statements <ul style="list-style-type: none"> • application, listserv • Comparison surveys <ul style="list-style-type: none"> • AAMC matched women, non-accepted women • Organizational climate interview & survey <ul style="list-style-type: none"> • Deans
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Figure 8: The ELAM Program, after 13 years in existence, has measurable national outcomes. (Figure provided by Dr. Page Morahan.)

in leadership positions; and (3) change the culture of these institutions to value the contributions of all members.

ELAM is a well-established, year-long, part-time program that is composed of intensive study with nationally recognized faculty, application of principles via development of projects at the home institution, and creation of an ongoing learning community with fellow alumnae. The ELAM curriculum includes traditional MBA topics, emerging issues in academic medicine, personal professional development topics, and a Dean's Forum on Emerging Issues in which deans join the fellows in the last two days of the program. With approximately 525 fellows enrolled to date, ELAM has enrolled fellows from 90 percent of United States schools of medicine, 50 percent of schools of dentistry, and, more recently, several schools of public health.

As the Co-director of the Executive Leadership in Academic Medicine (ELAM) program, Dr. Morahan summarized ELAM's national outcomes at the program's 13-year mark by reporting the current academic appointments of ELAM alumnae and demonstrating the benefits of ELAM to the home institutions. In its first decade using this structured leadership educational program, ELAM has successfully facilitated the promotion of its fellows. In its second decade, ELAM is continuing this mission, as well as focusing more attention on sustaining women in leadership positions in order to develop a critical mass of successful women leaders necessary for changing the organizational culture of academic health centers.

Mentoring Through ADVANCE: Speed Mentoring and ADEPT

Sue V. Rosser, Ph.D., *Professor and Dean, Ivan Allen College of Liberal Arts, Georgia Institute of Technology, Atlanta, Georgia*

The National Science Foundation (NSF) funds the ADVANCE Program to increase the participation and advancement of women in academic science and engineering careers. One component of the ADVANCE Program is Institutional Transformation (IT), in which awards are made to institutions to support innovative and comprehensive programs to improve the institutional climate by advancing women to positions in senior leadership in STEM fields.

The Georgia Institute of Technology (Georgia Tech), which received an ADVANCE-IT grant in the first round of funding, has the following aims:

- » Establish a network of termed professorships to mentor women faculty.
- » Provide a series of leadership retreats with women faculty and senior institutional leaders.
- » Establish a series of family-friendly policies.
- » Conduct data gathering and interviews to chart equity progress.
- » Introduce a formal tenure and promotion training process to remove subtle gender, racial, and other biases.

The first aim, establishing a network of termed professors, represents a substantial portion of the financial support provided by the grant. The funding for a termed professor is equivalent to an endowed chair (about \$60,000 per year); and each college appoints one tenured, full professor with a strong research record, to focus on recruiting and mentoring junior faculty.

Dr. Rosser described two successful and popular programs from the Georgia Tech ADVANCE program—speed mentoring and ADEPT. Speed mentoring was created to give quick feedback to candidates about their readiness for promotion and tenure, based on their curriculum vitae (CV). Candidates consult for 15 minutes with several senior faculty members who have experience with promotion and tenure committee service; these reviewers identify gaps and offer suggestions

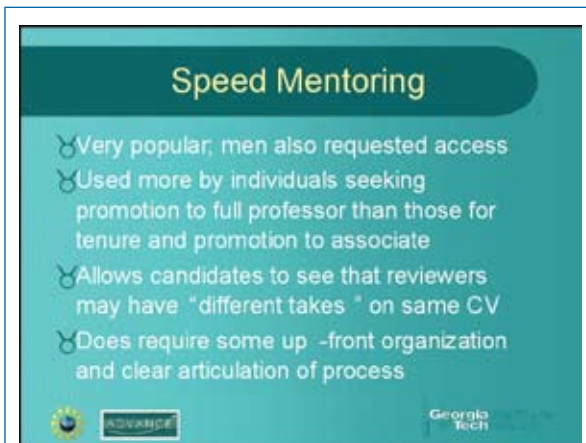


Figure 9: The ADVANCE Program at Georgia Tech provided a “Speed Mentoring” workshop to promotion and tenure candidates. (Figure provided by Dr. Sue Rosser.)

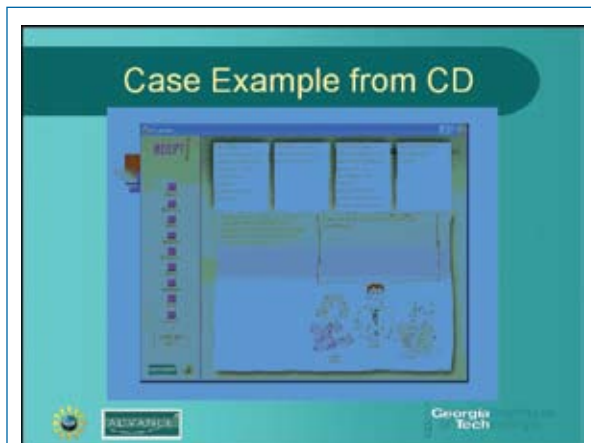


Figure 10: The ADVANCE Program at Georgia Tech developed a computer simulation game called ADEPT. (Figure provided by Dr. Sue Rosser.)

for strengthening the candidate’s approach. ADEPT (Awareness of Decisions in Evaluating Promotion and Tenure) is a computer simulation game that works through case studies to educate players on bias in promotion and tenure. The principles of ADEPT are applicable to other research institutions and the simulation is available on the Georgia Tech Web site.

Mentoring the Next Generation of Faculty Researchers: The UC–Davis BIRCWH Program

Claire Pomeroy, M.D., M.B.A., *Vice Chancellor of Human Health Sciences and Dean, School of Medicine, University of California–Davis*

The ORWH developed and implemented the Building Interdisciplinary Research Centers in

Women’s Health (BIRCWH) program, an NIH Mentored Research Scientist Development Program Award using the K12 mechanism. The BIRCWH program, which began in 2000, recognizes the need for mentored career development in interdisciplinary research in basic, clinical, translational, behavioral, or health services research in any area relevant to women’s health. BIRCWH promotes the mentoring of junior faculty by established investigators who have a commitment to fostering interdisciplinary approaches to research in women’s health and sex and gender factors. The BIRCWH scholars learn not only research techniques, but also the skills to become independent investigators and mentors. This program has developed a cadre of almost 300 scholars who can further advance and perpetuate an interdisciplinary team approach to science and gender-specific health care.

Approximately 50 BIRCWH awards have been made since 2000, with 26 currently active BIRCWH centers across the United States. Almost 300 scholars, with an equal mix of Ph.D. and M.D. recipients, have been trained. BIRCWH institutions are required to match BIRCWH scholars with at least two mentors. Partnerships among BIRCWH scholars and between BIRCWH-funded institutions are encouraged. Keys to success in the BIRCWH program include effective mentor-scholar matches, tailored didactic experiences, protected time, interdisciplinary perspectives, and leveraged institutional resources.

BIRCWH: Programmatic Keys to Success

- ⌘ Good mentor: scholar matches
- ⌘ Tailored didactic experiences
- ⌘ Protected time
- ⌘ Interdisciplinary perspectives
- ⌘ Leveraging institutional resources
- ⌘ Focus on evaluation
- ⌘ National network of BIRCWH programs
- ⌘ Impact on institutional culture

UC DAVIS HEALTH SYSTEM

Figure 11: The BIRCWH Program at UC–Davis has identified several “Keys to Success.” (Figure provided by Dr. Claire Pomeroy.)

Lessons Learned

- ⌘ Communication with institutional leaders key to scholar recruitment/ program awareness
- ⌘ Scholar responsibilities need to be explicitly defined for all and documented on a regular basis
- ⌘ Institutional research infrastructure key to BIRCWH program success
- ⌘ Take advantage of opportunities to leverage institutional resources

UC DAVIS HEALTH SYSTEM

Lessons Learned

- ⌘ Networking with other programs in institution is effective
- ⌘ Regional and national networking between programs is important
- ⌘ Formal evaluation programs essential and input from evaluation experts recommended
- ⌘ Individual attention from NIH/ORWH leadership has a big impact

UC DAVIS HEALTH SYSTEM

Figure 12: The BIRCWH Program at UC–Davis identified several “Lessons Learned.” (Figure provided by Dr. Claire Pomeroy.)

Awarded in 2006, the BIRCWH program at the University of California–Davis (UC–Davis) includes six scholars and focuses on neurosciences, nutrition, cardiovascular disease, and lifespan biology through shared leadership utilizing co-principal investigators and co-project directors. Hallmarks of the UC–Davis BIRCWH program include scholar training on mentors’ expectations, mentor development opportunities, informal feedback from mentors and program directors, and quarterly formal written feedback. Dr. Pomeroy noted that the BIRCWH program is creating a culture of mentoring at UC–Davis.

Lessons learned by the UC–Davis BIRCWH program participants include the following.

- » Communication with institutional leaders is key to scholar recruitment and program awareness.
- » Scholar responsibilities should be explicitly defined and documented on a regular basis.
- » Institutional resources, such as networking with other institutional training programs should be leveraged for maximum success.
- » A formal evaluation program is essential.
- » Regional and national networking among other BIRCWH programs and interactions with NIH and ORWH leadership have a significant impact on the success of the scholars and the overall program.

Working on Women in Science (WOWS)

Patricia Byrns, M.D., *Associate Dean, Office of Research and Faculty Development, University of North Carolina–Chapel Hill*

Working on Women in Science (WOWS) is an interim measure toward obtaining an NSF grant, and it grew out of data obtained from 20 basic

science departments at the University of North Carolina–Chapel Hill (UNC–Chapel Hill). WOWS goals are (1) to assist in recruiting women faculty, (2) to facilitate retaining women faculty, and (3) to enhance the likelihood of professional success and representation of women within institutional leadership.

One of the creative approaches of WOWS is using theatre as a medium to engage faculty and senior leadership in learning how to use normative criteria for recruitment and promotion. The theatre performances were provided by the University of Michigan’s CRLT Players (Center for Research on Learning and Teaching); after each sketch, the audience dialogued with the actors, who stayed in character, and a trained facilitator guided the discussion and provided professional expertise and research-based information about the topic. Audience members included distinguished faculty chosen as WOWS Scholars; they will ensure the implementation of the best practices discussed in the sketches by working with search committees in the Schools of Medicine, Dentistry, and the College of Arts & Sciences.

Additional initiatives of WOWS include sustained institutional support for leadership opportunities (such as ELAM and AAMC workshops); a lecture series featuring distinguished national role models; implementation of paid family leave for faculty; and establishment of productivity maintenance awards, which provide instructional and administrative personnel to assist scientists in the lab when they encounter unexpected family responsibilities that might otherwise slow career advancement.

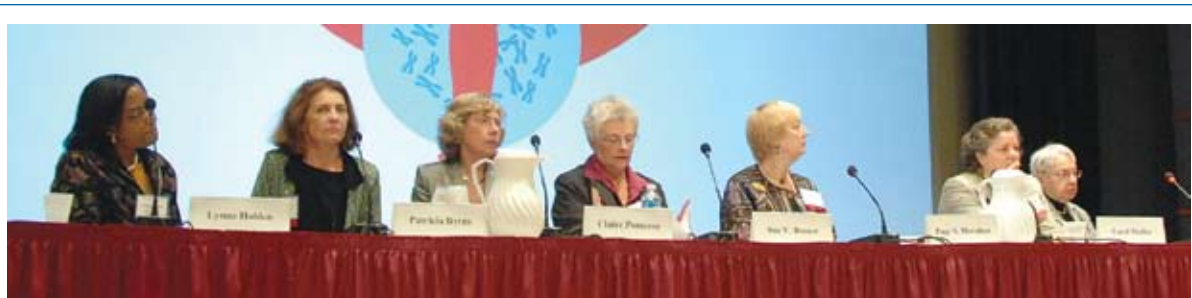


Figure 13:
Dr. Patricia Byrns (second from left) discusses the WOWS program with co-panelists.

Dr. Byrns highlighted the new collaborations between the College of Arts and Sciences and Health Affairs, and the raised consciousness of institutional leaders about the issues of recruitment, retention, and progression of women in science at UNC–Chapel Hill. These results have occurred because of the WOWS Program, and will be used as preliminary data for an NSF grant application.

Turning Dreamers into Doctors: Best Practices in Mentoring Future Healthcare Professionals

Lynne Holden, M.D., *President, Mentoring in Medicine, and Assistant Professor, Department of Emergency Medicine, Albert Einstein College of Medicine, Yeshiva University, New York, New York*

Mentoring in Medicine aims to reduce health-care disparities by increasing the diversity of the healthcare workforce in socioeconomically challenged areas. The program's mission is to ignite interest in the health professions among minority and disadvantaged youth, to encourage admission to and graduation from health professional schools, and to improve health-care literacy. Mentoring in Medicine programs target students beginning in third grade and go through post-baccalaureate professional school education. These programs include an annual conference entitled *Yes, I Can be a Health Care Professional!*; the *Pathway to Success* invited lecture series; the Future Health Professional Leadership Academy; the Future Health Care Professional After School Club; Health Professional Leadership Development Seminars; and the Emergency Department Clinical Exposure, Research, and Mentoring Program.

Realizing that health professionals are extremely busy, Mentoring in Medicine utilizes four models: group mentoring, seed mentoring, one-on-one mentoring, and multilevel mentoring. Group mentoring places several students with one health professional; seed mentoring and one-to-one mentoring matches one student to one professional. Multilevel mentoring techniques facilitate discussions among health professionals, health professional students, college students, and high school students about careers in medicine.

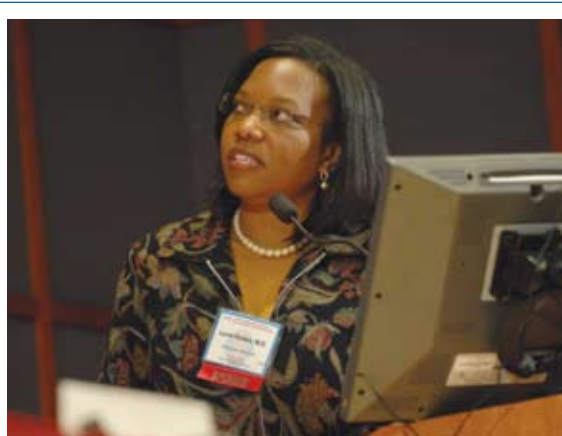


Figure 14:
Dr. Lynne Holden is the Founder of Mentoring in Medicine, Inc..

Mentoring in Medicine has developed the following best practices.

- » All programs are designed with help from the population being served.
- » Broad recruitment methods are used, such as recruitment from schools, churches, housing developments, and other organizations.
- » Students interacting one-on-one with professionals neutralizes the stereotypic threat posed by doctors and other medical professionals.
- » Social and emotional issues are addressed by incorporating a group of psychiatrists and churches to work within the program.

IV. PANEL TWO: TRANSFORMING LEADERSHIP IN MENTORING: CHALLENGES FOR DEVELOPING AND SUSTAINING LEADERSHIP

Shirley Malcom, Ph.D., Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science, served as the moderator for this panel session, in which participants were asked to provide perspectives on transforming leadership in mentoring based upon their experiences and leadership in promoting women in science careers.



Figure 15:
Dr. Shirley Malcom, moderator, introduces panelists.

Mentoring as a Component of Institutional Transformation

Susan Bryant, Ph.D., *Vice Chancellor for Research, University of California–Irvine*

A critical aspect of institutional transformation is assurance of equity in hiring and advancement; the NSF ADVANCE program at the University of California–Irvine includes these components. Dr. Bryant discussed progress made through the Equity Advisor and Career Partner programs of the ADVANCE program at the University of California–Irvine (UC–Irvine).

Equity Advisors (EAs) are senior and respected faculty members appointed for each school. The NSF grant provided funding for EAs in the STEM areas, and UC–Irvine provided funding for the remainder of EAs in all other schools at UC–Irvine. Each EA serves a 3-year term as the faculty assistant to the dean of a school, and receives an annual stipend of \$15,000. The primary roles of EAs are in recruitment, retention, and mentoring. In recruitment, the EA meets with search committees at the beginning, and at critical later points in the search, to discuss relevant data and literature, and to review the best-practices brochure and DVD, which includes relevant situational vignettes. The EAs can require extensions of searches if necessary, and they have signature authority on key forms needed for recruitment and hiring. EAs are also responsible for implementing a mentoring program in each school and proactively investigating any inequities.

Another way that UC–Irvine’s ADVANCE program is addressing institutional transformation is the Career Partner Program (CPP), introduced in 2001. Since that time, 54 faculty members (27 couples) have been hired campus-wide. In 15 partner cases, the initiating partner was a man and in 12 cases the initiating partner was a woman. As a result, 28 women and 26 men were added to the faculty. Of the women hired through CPP, more than half (15) were in STEM disciplines.

The ADVANCE program has been institutionalized at UC–Irvine. The campus has committed to maintaining one EA per school and expanding the EA role to include attention to ethnic diversity in faculty hiring, mentoring, retention, and advancement. In addition, the university has appointed a senior faculty member to a (half-time) 3-year term as ADVANCE Director, with compensation modeled on that of department chairs. The ADVANCE Director reports to the Executive



Figure 16:
Dr. Sue Bryant discusses the Equity Advisor positions at UC–Irvine.

Vice Chancellor and Provost (EVCP), and is a member of the Academic Council led by the EVCP, consisting of Deans and all administrators who report to the EVCP. The Director and an EA serve on the Academic Planning Group, the joint administration/senate group that reviews and recommends to the EVCP on requests for faculty lines. Institutional transformation is in progress as increasing numbers of faculty are exposed over time to the issues and solutions, as they serve on search committees. Adoption of these “best practices” has expanded the search pools and changed practices, resulting in increased representation among new hires of women and underrepresented minorities. ADVANCE has provided a mechanism for sharing best practices across units; focused attention on gender and diversity issues at all levels; including allocation of faculty lines and strategic planning processes; and customized mentoring in each unit. Top-level leadership at the EVCP level is essential to maintaining momentum, and the deans play a critical role in ensuring faculty accountability for diversity goals.

Cracking the Glass Ceiling in Academic Medicine

Eve Higginbotham, M.D., *Dean and Senior Vice President of Academic Affairs, Morehouse School of Medicine, Atlanta, Georgia*

As a recently appointed medical school dean, Dr. Higginbotham offered her perspectives on the current state of affairs for women in academic medicine and assessed the future for women in academia. The data on the proportions of inclusion of women among medical students, faculty, division chiefs, department chairs, and deans, beg the question, “Why don’t women make it to the top positions in academic medicine when they represent nearly one-half of the medical students?” At some institutions, women are joining medical faculty almost as quickly as others leave, which results in only a small net positive number.



Figure 17: Dr. Eve Higginbotham provides tips on gaining leadership positions and “moving beyond the middle.”

Approaches to gaining leadership positions and “moving beyond the middle” that Dr. Higginbotham found successful include engaging mentors (both men and women), networking with peers (editing a book develops relationships with colleagues), collaborating on projects and publishing, staying focused on specific goals, and developing specific skills. She acknowledged that a critical issue for her future will be survival as a leader in a changed landscape that is more political than academic. In addition, she recognized that she will need to engage a mosaic of advisors, remain connected with key constituencies, continue to develop new skills, and strive to achieve balance in her personal life.

In the future, women in academia will need to find mentors and develop effective mentoring relationships, and network with peers both inside and outside of medicine. Women will need to assess their strategic goals, continue to develop professional skills, and seriously consider leadership development opportunities, all in the context of balancing this focus on profession with desires and demands related to family and friends.

Incentives for Mentoring: Transforming Institutional Culture

Linda McCauley, Ph.D., *Associate Dean for Nursing Research, University of Pennsylvania School of Nursing, Philadelphia, Pennsylvania*

Coaching is an important component of mentoring and is a learned skill. Dr. McCauley pointed out that most individuals do not have all of the components of a quality mentor; however, training can be beneficial in honing mentoring and coaching skills.

Mentoring consists of three elements: coaching that helps develop protégés’ skills; counseling that provides support and bolsters protégés’ self-confidence; and sponsorship that manifests as active intervention on behalf of protégés, lobbying to get them visible assignments, and advocating for them to receive recognition



Figure 18: Dr. Linda McCauley identifies three elements of mentoring.

and awards. Effective coaches provide support and bolster protégés' self-confidence, have knowledge of the "sport," and are motivated and empathic. Motivation may vary depending on the "match," although effective coaches view a mentee's success as the mentor's success as well. The downside to an informal mentoring system is that mentors tend to choose protégés who are similar to themselves in such characteristics as ethnicity and gender because those relationships may be most comfortable. As a result, minorities and women are less likely to be mentored/sponsored in an informal system.

Dr. McCauley paraphrased the Atlanta Braves' Kurt Kemp in stating that a person who is highly and naturally gifted may not be the best coach, and that the person who worked to develop his or her coaching skill may be a better teacher.

Letting the Girls into the Clubhouse

Sharon P. Turner, D.D.S., J.D., *Dean and Professor of Oral Health Practice, College of Dentistry, University of Kentucky, Lexington, Kentucky*

The challenges of establishing a successful mentorship program include the time it takes to develop the formal program, the requisite funds to support the program, and acknowledgement from the leadership of the institution that the status quo is no longer appropriate or effective. In addition to ensuring good matches

Career-Related Mentor Support

- ✧ Sponsorship
- ✧ Exposure and visibility
- ✧ Coaching
- ✧ Protecting
- ✧ Giving challenging assignments that lead to professional growth

Figure 19: Career-related mentor support includes five components. (Figure provided by Dr. Sharon Turner.)

We Have to Move Beyond Talk

- Recognition that structured mentorship must occur
- We cannot rely on department chairs, chance, or the sheer "pluck" of young faculty
- We must move beyond competition to true collaboration and measure and reward what we say we value
- Leaders have to advocate for appropriate changes
- Leaders have to budget for faculty development for all levels of faculty, including our leaders and emerging leaders

Figure 20: There are several reasons for moving "beyond talk" in mentoring women. (Figure provided by Dr. Sharon Turner.)

Psychosocial Mentor Support: AKA Ole' Boys (GIRLS) Network

- Role modeling
- Acceptance
- Confirmation
- Counseling
- Friendship

The goal is to confer an enhanced sense of competence, identity, and effectiveness on the job.



Figure 21: The benefits of a female mentoring network are many. (Figure provided by Dr. Sharon Turner.)

of mentors and mentees, a successful program requires a cultural breakthrough at the institutional level that acknowledges the need for change and an understanding that there are issues unique to women faculty.

Dr. Turner discussed the leader's role in mentorship and described two types of mentoring: (1) psychosocial support (also known as "the old boys' network") that emphasizes the interpersonal aspects of workplace relationships, and (2) career-related support that emphasizes advancement within the organization.

Mentors inspire people to want to advance and therefore should be secure in their own positions and should not feel threatened by their junior rising stars. An inclination toward motivating people is helpful, and an authoritative—but not authoritarian—approach works best. Mentors need to be approachable and should be excellent communicators. Mentoring is valuable to academic institutions because it helps develop and retain good faculty and administrators and it improves workplace morale and productivity. The role of the department chair in mentoring is crucial; unfortunately, a 2002 survey of dental school deans indicated that only two schools had formal mentoring programs.

Dr. Turner explained the need for an “old girls network” that could nominate, recommend, support, counsel, and generally advance women in biomedical and science careers, until such time as the playing field is truly leveled.

Response to Panel Presentations

The discussion following the panel was led by two invited responders, who offered comments from their particular vantage points.

Luisa Borrell, D.D.S., Ph.D., *Assistant Professor, Department of Epidemiology, Mailman School of Public Health, Columbia University, College of Dental Medicine, New York*

Kristen Mitchell, Ph.D., *Postdoctoral Fellow, Department of Pharmacology & Toxicology, University of Texas Medical Branch, Galveston, Texas*



Figure 22:
Dr. Luisa Borrell (left) and Dr. Kristen Mitchell (right)
provide comments from their vantage points.

Acknowledging that financial support and role models are both needed, Dr. Borrell asked what happens when an institution has neither and wondered how it will be possible to reach mentoring goals in this era of “soft” money. Dr. Mitchell mentioned three separate hurdles affecting women in the sciences—mentoring, hiring, and promotion. While there appear to be many mentoring opportunities available, the people who need mentoring the most may not realize they do. Training programs help create a more level playing field. Dr. Mitchell decried the separate-but-equal environment of an “old girls network” and stated her preference for a workplace in which gender does not play a role.

V. REFLECTIONS FROM THE NIH DIRECTOR

Elias A. Zerhouni, M.D., Director, NIH, Bethesda, Maryland

Dr. Zerhouni addressed the workshop panelists and participants on why it had been necessary to establish the NIH Working Group on Women in Biomedical Careers—and why it is imperative that the NIH Working Group succeeds.

He began by telling of his own first encounter with the challenges faced by women who pursue biomedical careers in the United States. It came shortly after he and his wife, both recent medical school graduates, emigrated from Algeria to Baltimore. His wife sought to meet other women who were interns or medical students at Johns Hopkins Medical School. Both Drs. Zerhouni were shocked to learn that these women were quite few in number relative to men. Today, the numbers of women are closer to parity, but women scientists and physicians continue to face deeply entrenched biases and barriers to their efforts for professional success. Clearly, there is still much work to be done.

Dr. Zerhouni observed that the Working Group's task was less to focus on bias in *individuals* than it was to address the *system* that produced the larger reality. There is a fundamental truth about systems: they are designed to give the results they produce. This particular system was constructed long ago, and, unfortunately, gender bias is inherent in it. It does not offer a level playing field to its "new entrants." To illustrate this point, Dr. Zerhouni highlighted his experiences with a particular subsystem: search committees. These committees rely heavily on networks of involved individuals and their mentors. Generally, such insider networking results in the appointment of the system's traditional candidates. Consequently, women and minorities, who often lack such influential advocates, are underrepresented. Any number of similar examples could be mentioned. It is just such examples that comprise the larger system, and that make that system so intractable.



Figure 23:
Dr. Elias Zerhouni reflects on the importance of mentoring in successful women's careers.

It is therefore imperative that NIH go beyond simply *asserting* that we will fight bias. We must embrace a transformative leadership role that will work toward creating a more flexible and fair system—one that is open to ongoing adaptations and improvements. In so doing, we must step away from conventional approaches, take risks, and have a candid dialogue about system-level behavior without engaging in a blame game. Only then will we be able to develop the innovative strategies and new ideas necessary to sustain the advancement of women, and young men, in biomedical careers.

In closing, Dr. Zerhouni shared the advice of the late Nobel Laureate Dr. Julius Axelrod: "Don't forget to do the experiment." He challenged participants to approach the task at hand *as* scientists and engineers. First and foremost, they should design experiments to alter the system. Some of these experiments will certainly fail. Yet, in both their failures and their successes, these experiments will help us survey our landscape more accurately, ultimately allowing us to create a system that starts, and continues, on a level playing field.

VI. KEYNOTE ADDRESS

Mentoring in the Biomedical Sciences: What is the Definition of Success?

Gail Cassell, Ph.D., *Vice President for Scientific Affairs and Distinguished Lilly Research Scholar for Infectious Diseases at Eli Lilly & Company, Indianapolis, Indiana*

Dr. Cassell was introduced by Joan P. Schwartz, Ph.D., Assistant Director, NIH Office of Intramural Research, who recalled Dr. Cassell's former service on the Advisory Committee to the Director, NIH, and as Co-chair of the External Advisory Committee that reviewed the Intramural Research Program and made a series of influential recommendations that are still relevant today.

As a Vice President for Scientific Affairs at a major pharmaceutical company, Dr. Cassell offered reflections and comments on the differences between academia and industry and discussed career development of female scientists in the pharmaceutical industry.

In contrast to an academic environment, an industry environment offers constant peer review and immediate feedback based on objective job performance measures. Mentees are allowed to choose their mentors, with the acknowledgement that multiple mentors are needed for each individual. Mentors have a different outlook and plan of action in this team-based atmosphere compared with an individual-based atmosphere such as that found in academia. Because human capital is recognized as a company's greatest asset, succession planning is ongoing so that the employee ranks are constantly being searched for leadership potential; and assessment of recruitment and retention rates is the responsibility of managers and leaders. One of the challenges for the pharmaceutical industry is keeping scientists motivated regarding drug discovery since most researchers will never work on a drug that will actually be given to patients (only 10 percent of experimental drugs make it to market and the industry average is 14 years from discovered target to successful drug).

Dr. Cassell discussed what mentees can do to ensure they receive the mentoring they need. Most importantly, she counseled individuals not to let go of prior mentors, since those relationships will be useful in the future.

Mentees should establish a relationship with official, formal mentors as well as with confidantes and informal mentors.

Meetings with formal mentors should be set up on a regular basis and should be maintained on a professional level.

Based on her experiences, Dr. Cassell offered the following words of wisdom regarding the keys to success.

- » It is important to have career goals, but it is equally important to be open to opportunities. Follow your instincts.
- » Do something every day that scares you; for example, make a phone call to or meet with someone you find intimidating.
- » Success is about adding unique value to whatever you do.
- » There is no substitute for tenaciousness and perseverance.

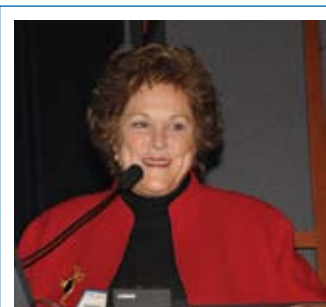


Figure 24:
Dr. Gail Cassell offers her perspective on careers for females in industry.

VII. PERSPECTIVES ON APPROACHES TO ELIMINATING BIAS AND BARRIERS

Raynard S. Kington, M.D., Ph.D., *Deputy Director, NIH, Bethesda, Maryland*

Dr. Kington stated that the National Academies report "*Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*", has galvanized the NIH and other institutions to revisit and redouble efforts to eliminate barriers to women in science careers. Intrinsic to this task is the need to develop the evidence base and apply that knowledge as we formulate new policies and effective interventional strategies. The subcommittee chaired by Dr. Kington is focusing on the evidence-base of the effectiveness of programs to advance the careers of women in science and on factors that explain the current patterns of careers of men versus women in science and engineering. The subcommittee has formulated several questions.

- » What is known about the efficacy of existing programs to support the careers of women in science? Which programs work and why? At present, there appears to be a dearth of rigorous outcome analyses of these programs. Many of the programs are new, small, and narrowly targeted to a specific institution in a specific context. As we design new programs, it is essential to incorporate better outcomes evaluation methodology to rigorously assess program efficacy.
- » What is known about the factors that explain the existing different career patterns of men and women in science and engineering? As an example, we might learn from exploring the factors that underlie the rapid, large increase of women in veterinary medicine over recent years in contrast to the more modest changes in the number of women in engineering. Is there evidence supporting the commonly voiced concern that women in science, and particularly minority women, carry a disproportionate burden of committee service and/or advising duties in the critical early phases of their careers?

- » How can NIH support efforts to build the evidence base to inform policies to promote the careers of women in science? The subcommittee is developing a Request for Applications (RFA) based on the National Institute of General Medical Sciences (NIGMS) RFA entitled "Efficacy on Interventions that Promote Research Careers" that will support research to strengthen the evidence base in the areas described above.



Figure 25:
Dr. Raynard Kington exhorts the use of scientific rigor when formulating new policies and intervention strategies that target women in biomedical careers.

In response to questions, Dr. Kington remarked that (1) mentoring solutions for junior and senior leadership will differ; (2) we need better study designs, including, when feasible, randomized experimental designs, to obtain better information on which interventions work and why; and (3) we must build research capacity to answer these important questions. To conclude, Dr. Kington emphasized that the Nation cannot afford to lose a single mind with the potential to expand science and health research to prevent and treat diseases.

VIII. CONCURRENT WORKSHOPS

Six concurrent workshops met for a total of 3½ hours over 2 days. Workshop Chairs, Co-Chairs, and Participants discussed aspects of mentoring and career development, and suggested recommendations for career progression and advancement.

Concurrent Workshop I—Can Mentoring Be Taught: Training of Mentors and Mentees

Chair: Eugene Orringer, M.D., *Professor of Medicine and Executive Associate Dean for Faculty Affairs & Faculty Development, School of Medicine, University of North Carolina–Chapel Hill*

Co-chair: Morris Weinberger, Ph.D., *Distinguished Professor of Healthcare Quality Management, Department of Health Policy and Administration, School of Public Health, University of North Carolina–Chapel Hill*

Introduction

Participants discussed whether or not mentoring can be taught. The Co-chairs expressed their views on mentoring as experienced at the University of North Carolina–Chapel Hill (UNC–Chapel Hill). During the first session, two mentor-mentee groups described their experiences, conveying the overarching message that mentoring can in fact be taught and taught effectively. In the second session, the Co-chairs discussed mentoring and participants discussed how to support mentoring efforts at various institutions. The workshop culminated in generating a list of recommended action items.



Figure 26:
Dr. Eugene Orringer and Dr. Morris Weinberger (right) listen to mentor-mentee presentations.

Discussion

First Mentor-Mentee Group

Leslie Parise, Ph.D., *Professor and Chair, Department of Biochemistry, University of North Carolina–Chapel Hill*

Julie E. Brittain, Ph.D., *Assistant Professor of Biochemistry, University of North Carolina–Chapel Hill*

Dr. Parise discussed her experience as a mentee and a mentor. She described her experiences as a mentee while in Chicago, while at the University of California at San Francisco, and later as a faculty member at UNC–Chapel Hill. One of her mentors at UNC–Chapel Hill, Rudy Juliano, Ph.D., suggested that she participate in the Executive Leadership in Academic Medicine (ELAM) Program, an experience that helped to propel her to the next stage of her career and to the next level in her mentoring capabilities. In fact, her ELAM experience was critically important to her competing successfully for the Chair of Biochemistry at UNC–CH.

Dr. Parise discussed her mentoring work in the laboratory and as chair of an academic department, and her efforts to mentor faculty members. She provided the following advice for faculty members mentoring within the laboratory or within an academic department and to all who want to reach their goals:

- » Take advantage of opportunities when they are presented to you.
- » Set goals—put them on paper, give yourself a deadline, and picture yourself obtaining these goals.
- » Keep goals front and center.
- » Work around obstacles.
- » Sustain change as necessary.

Dr. Brittain, mentee of Dr. Parise, spoke of her mentoring relationship with Dr. Parise through the BIRCWH program, mentioning that Dr. Parise's mentorship was crucial to her development as a researcher. Dr. Brittain described the qualities of a mentor and provided a definition of "mentor."

"A mentor is a special type of volunteer. . . . A mentor is committed to expending the time and energy necessary to put the student on the right track. The role of the mentor is multifaceted. A mentor is a big brother or sister; role model; and, most of all, a friend to the student."

Dr. Brittain described how her mentoring relationships at UNC–Chapel Hill had helped her to transition to an independent research career, emphasizing that her mentors helped her to become "fearless" in her research. She highlighted three things that are crucial for a successful mentoring relationship: modeling, constructive criticism, and identifying resources.

Second Mentor-Mentee Group

Janet Rubin, M.D., *Professor of Internal Medicine, University of North Carolina–Chapel Hill*

Margaret Gourlay, M.D., *Assistant Professor of Family Medicine, University of North Carolina–Chapel Hill*

Maria Escolar, M.D., *Assistant Professor of Pediatrics, University of North Carolina–Chapel Hill*

Although Dr. Rubin's personal experience as a mentee has largely been "self-mentoring," she described her belief that mentoring is "farming for the future" and emphasized that mentoring directly benefits the career of the mentor as well as that of the mentee.

Dr. Gourlay discussed her mentoring experience with Dr. Rubin and other mentors. Dr. Gourlay benefited from a panel of four mentors from both basic science and clinical backgrounds, and she relayed the following lessons learned from her mentoring experiences.



Figure 27:
Participants in the Concurrent Workshop focus on presentations from the Chair and Co-chair.

- » The best way to learn mentoring is to practice it.
- » Knowledge in crosscutting disciplines can make you an "expert" at any stage.
- » Interesting opportunities often come from outside your research field.

Dr. Escolar described her experiences as a mentee, noting that the mentors she had during her career each had a unique style of mentoring. Her first mentor had a hands-off style that challenged her to solve problems on her own as they arose. Dr. Escolar described her current mentoring relationships with Drs. Rubin and Gourlay, the differences in their mentoring styles, and how all of these individuals helped her succeed in scientific research.

Summary of Discussions

Suggestions for a successful mentoring relationship include guidelines for both the mentee and the mentor. For example, the mentee should respect the mentor's time and the mentor should provide appropriate credit for ideas, especially in manuscripts.

Dr. Weinberger and Dr. Orringer defined two types of mentoring relationships: a mentoring panel and a formal structure between a scholar and a primary mentor. A mentoring panel should be composed of the primary mentor plus a cross-disciplinary sample of faculty members, to help the mentee overcome discipline barriers. A primary mentor provides emotional support and career counseling and, as such, it is important for the research interests and personalities of the mentor and mentee to match.

One of the major obstacles to developing clinical researchers is that clinical departments are not able to financially support the research career interests of young investigators. A main hurdle in faculty career development for NIH-funded investigators often occurs at the transition between K and R support. As inspiration to the group, Dr. Orringer provided his personal philosophy, "At the end of the day, it is the young people who are absolutely critical to the growth and the ultimate success of any school of medicine or any institution."

Recommendations

Convinced that mentoring *can* be taught, Group I recommended the following action items for enhancing mentorship opportunities at academic medical centers and research institutions.

- » Encourage institutional "buy-in" by procuring institutional matching funds for programs; and receiving a commitment to provide resources such as libraries, biostatisticians, and mock reviews.
- » Use modeling effective behavior from successful mentor-mentee relationships as an educational strategy for all faculty and future faculty, especially mentees.
- » Grantee reports on trainee success should include mention of trainees who continue in "alternative" research careers, acknowledging the diversity of research careers, and broadening the accepted paradigm of success.
- » Encourage "cross-mentoring" between disciplines and "panel mentoring" where one mentee can call on more than one mentor for advice.



Figure 28:
Dr. Eugene Orringer summarizes recommendations from the group.

- » Develop new types of workshops, modules, and training on mentoring, similar to modules required for IRB approval for human subjects' research. The formalized training should be portable, for use at many institutions, and could include special topics.

Group I recommended the following action items specifically for the NIH.

- » Foster regular interactions between program directors and NIH staff, using the BIRCWH program and annual meetings as a model.
- » Develop broadly based T32 grant programs focused on mentoring rather than on a research discipline.
- » Develop new Requests for Applications to study mentoring through research (R awards), evaluation, and curriculum development (K30 awards).
- » Consider increasing the percentage of indirect costs for training grants to be more in line with indirect costs for research grants at the same institution.
- » Include a mentor training requirement on training awards, such as the T32 and K12 awards, with set-aside funding for mentors. A modest stipend for mentors would increase faculty interest and make the NIH commitment obvious to the extramural community.

- » Institutions, the NIH and other Federal agencies, and nongovernmental organizations should develop mentor awards and incentives.
- » Educational, non-government funding agencies, and NIH should provide training on how to evaluate mentoring and evaluate and provide feedback to mentors to enhance their performance.

Workshop participants offered the following general comments in response to Group I.

- » The scientific literature on mentoring is scattered and the field would benefit from a review of published articles and studies.
- » Development of mentoring training modules should include an “experience” component, rather than merely online or classroom training.

Concurrent Workshop II—Determining Gaps in Mentoring Programs and Developing Novel Models for Successful Mentoring

Chair: Hannah Valantine, M.D., M.R.C.P., FACC, *Senior Associate Dean for Diversity & Leadership and Professor of Medicine, Stanford University School of Medicine, California*

Co-chair: Christy I. Sandborg, M.D., *Professor of Pediatrics and Chief of Medical Staff of Lucile Packard Children’s Hospital, Stanford University School of Medicine, California, and Immediate Past Chair, Childhood Arthritis and Rheumatology Research Alliance*

Co-chair: Linda McLaughlin, *Director of Academic Affairs and Faculty Development, Pediatrics, Stanford University School of Medicine, California*

Overview

Dr. Valantine noted a recent article in *Fortune* magazine about mentoring being an important part of succession planning for the biomedical professions. She emphasized the need to address the difficult problem of changing the culture of mentoring along with the challenge of representation of women in academic medicine. Retention of women is not keeping up with the pipeline of future professionals, thus turning the “pipeline” into a “funnel” or “revolving door.” She emphasized the need for diversity in faculty and discussed current metrics on diversity and leadership.



Figure 29: Dr. Hannah Valantine (right), Dr. Christy Sandborg (middle), and Ms. Linda McLaughlin (left) lead the panel on Determining Gaps in Mentoring Programs and Developing Novel Methods for Successful Mentoring.

Group II characterized the “pipeline” for women in academic medicine as more of a “leaky funnel.” With that image in mind, Group II members discussed the following issues.

- » Assessing mentoring gaps and faculty needs.
- » Establishing an institutional culture of mentoring and accountability.
- » Designing new mentoring programs.
- » Identifying, training, and compensating mentors.
- » Peer and small group mentoring and informal network mentoring.

Discussion

Ms. McLaughlin and Dr. Sandborg described their work at Stanford University on studying mentoring success in the Department of Pediatrics. They conducted a survey on mentors and mentor roles and determined the following findings.

- » People wanted to balance income, career growth, and work/life.
- » When answering questions about their perceptions, most respondents kept to the traditional mentoring paradigm.
- » Many junior investigators do not know the keys to promotion.
- » Innovative, novel, and robust programs are needed for junior investigators.



Figure 30:
Dr. Christy Sandborg (right) observes one of the group discussions.

From these findings and other studies in the literature, the Pilot Pediatric Mentoring Program was developed, which is based on the concept of multiple mentors for a group of mentees in the Department of Pediatrics. This program is complementary to the traditional primary mentor model, and provides access to a variety of mentor styles and expertise for each mentee to choose from. Focus areas of the mentors include research (basic and clinical), academic goals, teaching/clinical obligations, and work-life balance. Key components of this program include mentor/mentee training, individual and group mentoring venues, measurement of short and long term outcomes, and developing techniques to insure mentees access the mentoring

program. A curriculum covering important general topics such as promotion criteria, negotiating skills, and mentored award strategies, is included. Compensation for mentor time was a key aspect of this program, ensuring commitment, accountability, and engagement of mentors.

On the second day of the workshop, the group generated recommendations after discussing the following topics in small groups: Closing the Gaps & Assessing Faculty Needs; Institutional Change; Identification of Problems and Issues; Systems Issues; and the Role of Peer and Small Group Mentoring.

Recommendations

Group II recommended the following action items.

- » The NIH Working Group should make widely available the best practices for mentoring identified during this workshop
- » NIH, professional associations, and institutions should define policies to increase mentoring accountability.
- » Institutions and universities should incorporate mentoring into tenure-and-promotion reward systems, leading to a system where mentoring is expected, valued, and rewarded, with defined metrics, for appointments and promotion.



Figure 31:
Concurrent workshop participants work in small groups to develop recommendations.

- » Funding agencies should provide funding for research on mentoring to study mentoring models in a comparative fashion and identify gaps in current programs.
- » Funding agencies should encourage development of novel programs through seed grants and pilot programs.
- » A randomized trial should be funded to evaluate the effectiveness of different mentoring approaches, such as peer group and informal mentoring.
- » Institutional funding for mentoring should be required for NIH funding, and all applicants for NIH grants should be required to explicitly describe their institution's mentoring plans and track record of success, prior to being awarded grants.
- » All NIH training grants should have a funded mentoring component.
- » The success metrics of mentoring programs should be defined at the onset of the programs and the return on investment (for example, effect on recruitment and retention) should be considered along with the cost of mentoring.

Concurrent Workshop III—Insights into Mentoring in Biomedical Careers from Social Science Research

Chair: Molly Carnes, M.D., M.S., *Professor, Medicine and Industrial & Systems Engineering, University of Wisconsin–Madison*

Co-chair: Ruth Fassinger, Ph.D., *Professor and Interim Chair, Department of Counseling and Personnel Services, College of Education, University of Maryland–College Park*

Co-chair: Cecilia Ford, Ph.D., *Professor of English, University of Wisconsin–Madison*

Co-chair: Linda Pololi, M.B.B.S., M.R.C.P., *Senior Scientist and Principal Investigator of the National Initiative on Gender, Culture, and Leadership in Medicine: C-Change, Brandeis University, Waltham, Massachusetts*

Introduction

The objectives of this workshop were (1) to familiarize biomedical researchers and academic medical leaders with salient social science research on gender relevant to mentoring, and (2) to develop recommendations to the NIH for future investments in research to maximize participation of all scientists in the biomedical research enterprise.



Figure 32: Dr. Molly Carnes (right) chairs the Concurrent Workshop session with Dr. Linda Pololi (left).

This workshop highlighted two core values (1) that the advancement of women in biomedical sciences requires institutional and organizational change and (2) that advancement of women requires ongoing and proactive attention to multiculturalism, gender stereotypes, and power differentials.

The group agreed on four overall observations.

- » Mentoring programs generally are not taking advantage of research concepts and practices from relevant areas of scholarship, including adult education, counseling, psychology, and other social sciences.
- » A more significant institutional cultural change is needed—not just development of new mentoring programs.
- » Experts in organizational change, knowledge translation, and innovative diffusion should be consulted for institutional change.
- » It is important to move beyond traditional mentoring models.

Discussion

Dr. Fassinger highlighted common barriers to women's optimal career development, with particular focus on mentoring as a means of overcoming some of those barriers. She used data from her large national studies of the careers of highly achieving women (National Study of Women's Achievement) and women in industrial chemistry (Project ENHANCE) to illustrate salient issues in the vocational psychology of women. Dr. Fassinger also discussed the importance—and challenges—

of mentoring in the career development of women and offered recommendations to foster the career success of women in biomedical careers.



Figure 33:
Dr. Ruth Fassinger expounds on the careers of highly achieving women, using data from the National Study of Women's Achievement.

More specific goals for mentoring include providing information about actual job activities; reviewing organizational materials (e.g., curricula) for inclusiveness; providing mandatory training and cocurricular, extracurricular, and professional development activities; and putting women in visible, important projects that provide them with leadership opportunities. It is important to build structural supports in organizations, work toward achieving a critical mass of women in

the workplace, and attend to women who are further marginalized by race, disability, or other factors.



Figure 34:
Dr. Linda Pololi discusses the C-Change Initiative.

Dr. Pololi discussed the application of principles and evidence-based practices from adult education and psychology to the mentoring and career development of faculty in biomedical careers. Such approaches can provide an alternative framework for mentoring and mentor training beyond traditional methods. Parallels between needed cultural change in medical schools and cultural change to transform mentoring inform the

work of the National Initiative on Gender, Culture, and Leadership in Medicine: C-Change. C-Change is a partnership of five medical schools collaborating to address the lack of women and underrepresentation of minority faculty in leadership positions in U.S. medical schools and to facilitate all faculty in reaching their potential.

Dr. Pololi's research was a collaborative group peer relationship model consisting of a team that implemented a 9-month program and consisted of 12 assistant professors (six men and six women), M.D.s and Ph.D.s, drawn from across each medical school. Results showed that adults learn most effectively when they identify their own issues, can direct their own learning, and can apply what they have learned as soon as possible. People flourish when they are provided with both a high level of challenge (to stretch themselves and to speak out in their own voices) and a high level of support (active listening, legitimacy, and support). The attributes of an effective teacher include accepting, caring for, and respecting the learning; emotional congruency; and active listening with empathic understanding. Because the facilitator modeled these attributes, the participants in this model adopted these attributes for themselves and each other. The program proved successful for both men and women, and all participants learned how to be mentors as they were mentoring each other. The program was also able to circumvent many of the difficulties and inconsistencies inherent in traditional pairings.

Dr. Carnes discussed gender bias in scientific review and procedures that can activate or mitigate such bias. Research over decades has shown that women and the work performed by women receive lower evaluations—even when the work is identical to that being performed by men and regardless of whether they are being evaluated by men or women. Taking an evidence-based approach, Dr. Carnes discussed the following ways to mitigate gender bias.

- » Reducing time pressures and cognitive distractions during evaluation.
- » Including at least one member of the social category being evaluated.
- » Including at least 25 percent women in the pool being evaluated.
- » Including a specific instruction to try to avoid prejudice in evaluation.
- » Counter-stereotype imaging (e.g., telling evaluators to "imagine a strong woman and the type of job she would have.")
- » Establishing the value of credentials before any applicant is seen in order to avoid "redefining" merit.

She discussed the changes made in the solicitation and review processes in the NIH Director's Pioneer Award after no female recipients were selected in the first round of funding. Another example of bias and mitigation involved tenure criteria at the top 25 research academic medical centers—183 gender-stereotyped words were found in the tenure criteria of those top schools, and the presence of the word "leader" correlated to a greater likelihood of fewer women than the norm receiving tenure.



Figure 35:
Dr. Ford discusses a career advising approach she calls "Fix the Woman."

Dr. Ford offered a critique of common "fix the woman" advice regarding ways of communicating. Her data demonstrated a variety of ways in which women utilize effective speaking strategies. "Fixing" can take various forms, commonly including assertiveness training, which is based on the belief that women do not have the skills to be taken seriously in the professional workplace.

Dr. Ford's research has found that women are being effective, women are not being ignored, and women do not need to fix themselves. Such findings and the methods used to arrive at them are resources for mentors and mentees who wish to find alternatives to the gender schemas that dominate people's views of themselves and others. The spotlight should be focused on what is being done correctly so that the scientific community can move away from a "fix the woman" attitude and focus instead on the real work—while at the same time continuing to question persistent and consequential obstacles to the advancement of underrepresented groups in specific workplaces.

Participants broke into five small groups to discuss the ideas that had been presented and to generate recommendations.

Recommendations

Workshop participants believed that NIH should take a leadership role in supporting mentoring as a valued area of rigorous research and scholarship.

In particular, NIH, organizations, educational institutions, and funding agencies should:

- » Fund research on innovative and collaborative mentoring models.
- » Ensure that all research attends to cultural differences.
- » Fund mentoring components in all research and training grants.
- » Build evaluation into all mentoring and career development grants.
- » Initiate a K07 award for the development of mentoring programs.
- » Mandate and fund mentoring and mentor training, especially in training awards.

Participants suggested the following additional action items.

- » The knowledge base from social science research should be used to develop mentoring programs.
- » Synergies such as the NSF ADVANCE program, and existing NIH programs (e.g., the Office of Research Integrity at the National Institute of General Medical Sciences) should be used to collate and disseminate existing knowledge and resources.
- » A cost/benefit analysis of inadequate mentoring should be conducted.

In concluding the question period, Dr. Carnes likened the process of institutional transformation to smoking cessation, in that the transtheoretical model for readiness to change could be applied to both situations—precontemplation, contemplation, preparation for action, action, and maintenance.



Figure 36:
Dr. Molly Carnes likens the process of Institutional Transformation to the phases of smoking cessation.

**Concurrent Workshop IV—
Logic Model for Evaluating Mentoring**

Chair: Joseph F. West, Sc.D., *President, Westwell Group, Consulting and Research, Chicago, Illinois*

Co-chair: Jeanne Sinkford, D.D.S., Ph.D., *Associate Executive Director and Director of the Center for Equity and Diversity, American Dental Education Association (ADEA)*

Facilitator: Jennifer Reineke Pohlhaus, Ph.D., *American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow, ORWH, NIH, Bethesda, Maryland*

Presenter: W. Sue Shafer, Ph.D., *Consultant, Women's Careers in Science*

Introduction

Many different programs have been established to mentor women in biomedical careers, but relatively few have undergone any form of evaluation more rigorous than gathering anecdotes and success stories. Dr. Sinkford suggested that the time has come for these mentoring

programs to undergo formal evaluations using objective measures, and that the Logic Model—a well-established tool for program design and evaluation—could be adapted to this purpose.

Participants arrived at consensus that it is possible to have an evidence-based evaluation of a mentoring program, and that the Logic Model would be a helpful tool in such an evaluation.



Figure 37: Dr. Jeanne Sinkford recommends evaluation of mentoring programs.

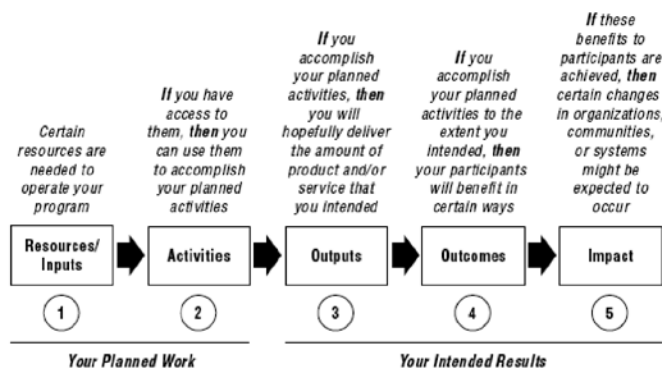
The following observations were offered about the use and usefulness of the Logic Model.

- » The Logic Model connects plan to results and identifies inputs, outputs, and outcomes.
- » The Logic Model facilitates evidence-based evaluation and is iterative, allowing for corrections.
- » The Logic Model identifies data to be collected, including strategic plans, logs, surveys, periodic reporting, interviews, recordkeeping, and traditional scientific output measures.

- » The Logic Model does not follow a linear path; therefore, it may be easier to identify long-term outcomes and then work backward.
- » It may be helpful to divide the program/issue into smaller steps when applying the Logic Model.
- » The Logic Model takes into account external factors that should be considered when identifying outcomes.



Figure 38: Dr. Joseph West explains the Logic Model.



Logic Model Development Guide (2004) W.K. Kellogg Foundation; Battle Creek, Michigan www.wkkf.org.

Discussion

The Logic Model builds evaluation into program design by focusing on the logical connections between inputs, outputs, and outcomes, and by stressing the need to collect data on what actually happens at each stage of the process. Only by analyzing and reporting the data can it be known whether the program is working as intended and achieving the intended outcomes, whether changes should be made in the program design, and whether additional resources are needed.



Figure 39: Dr. Jennifer Pohlhaus facilitates the Concurrent Workshop on the second day.



Figure 40:
Dr. Sue Shafer reports on
the deliberations of the
Concurrent Workshop.

The Logic Model is, by its nature, an iterative process that relies on learning and adjustments along the way, as well as adaptation to surprises and unexpected outcomes. Output measures should be objective and quantitative, but every group will have its own definition of success. While some of the long-term goals and impacts can sound somewhat grand (e.g., “producing Ph.D.s who are ready

to be faculty members” or “producing clinicians who also teach”), the challenge is to make these outcomes as explicit and specific as possible.

Participants discussed using the logic model to evaluate their particular activities and goals.

- » The AAAS Science & Technology Policy Fellowship Program is a mature fellowship program that places postdocs in Federal agencies in hopes of producing “policy-savvy scientists.”
- » The University of California–San Francisco surveyed faculty in 2001 and identified the need for a formal mentoring program for all new faculty, but they now need some form of followup.
- » The Johns Hopkins University and Columbia University both have mature mentoring programs, but new directors are interested in more objective evaluation techniques.
- » The National Library of Medicine wants to measure the effect of its interventions.
- » The Maternal and Child Health Bureau needs to evaluate its program under the Government Performance and Results Act requirements.
- » The Department of Commerce has a range of “e-mentoring” activities for high school girls, including a Listserv of mentors, seminars, and field trips, but they want metrics that are more objective than “participant satisfaction.”
- » The Administration on Aging is looking for a logic model to evaluate the effectiveness of its grants.
- » The University of Nevada–Las Vegas wants to measure retention of older women in a service-oriented dental program.

Recommendations

Participants agreed on the following recommendations for organizations, institutions, NIH, and other funding agencies:

- » Develop case studies illustrating the application of the Logic Model to mentoring programs.
- » Examine mentoring programs inside and outside of the NIH to discover successful evaluation techniques (“don’t reinvent the wheel”).
- » Ensure that evaluation studies include resources for long-term followup.

Group V—Mentoring in Clinical Departments

Chair: Phoebe Leboy, Ph.D., *President-Elect of Association for Women in Science, and Professor of Biochemistry, University of Pennsylvania School of Dental Medicine, Philadelphia, Pennsylvania*

Co-chair: Jeremy Boss, Ph.D., *Professor, Department of Microbiology and Immunology, Emory University School of Medicine, Atlanta, Georgia*

Co-chair: Carol Hampton, M.M.S., *Associate Dean for Faculty and Instructional Development, Office of Faculty Affairs, School of Medicine; Director of Leadership, Institute for Women’s Health, Virginia Commonwealth University, Richmond, Virginia*

Co-chair: Scott Hultgren, Ph.D., *Helen L Stoeber Professor of Microbiology and Director, Center for Women’s Infectious Disease Research, Washington University School of Medicine, St. Louis, Missouri*

Introduction

The charge for this group was to examine and discuss mentoring in clinical departments. Panelists and participants noted that emphasis should be placed on the significance of mentoring, the careers of physician-scientists, the ways mentoring can become more effective, and the barriers to effective mentoring. The facilitators in this workshop have experience mentoring clinical fellows and have encountered several issues with the methods of mentoring that are commonly practiced within clinical departments, despite the fact that some of them do not hold a clinical degree or have their primary appointments in a clinical department.



Figure 41:
Dr. Phoebe Leboy expounds
on the benefits of a
multiple-mentor model.

Discussion

Dr. Leboy noted that mentoring is often based on authority and power rather than counseling and coaching. She attributed this trend to the fact that most clinical departments have a model in which a single senior advisor/mentor is assigned to each junior faculty member. However, that mentor is often a clinical chief or department chair, a setting that creates significant

opportunity for conflicts of interest when the mentor is under pressure to staff the clinics and increase clinical income. The one-on-one model of mentoring is not the strongest and best suited for mentees. In contrast, a model in which the mentee has more than one mentor is likely to lead to better outcomes, in part because the mentee will have the benefit of gleaning knowledge, skills, and attitudes from different viewpoints. A further bonus to the multiple mentor model is that each mentor receives the benefit of learning from fellow mentors.

Dr. Boss noted that fellows and trainees can be reluctant to enter academia because of work/home conflicts, limited funding, job security issues, and stress. Therefore, in order to attract and retain these highly trained researchers, there is a significant need for effective mentoring

programs. Trainees considering a career in academia need to achieve a realistic and healthy balance between clinical service time and research time. Equal consideration should also be given to research management. Achieving the appropriate match between mentor and mentee is critical.

Ms. Hampton discussed the need for information sharing and transparency in effective mentoring. She explained that mentoring cannot be effective unless both operate simultaneously, and examined the linkages between career development and mentoring. She discussed the need for and benefits of utilizing a mentoring guide, a resource that provides the necessary background and clarity for entering into a mentoring relationship. Creating documents that aid the one-on-one mentoring relationship and formalizing mentoring as a necessary academic activity are important for building the much-needed institutional support structure for mentoring. Examples that increase institutional support are mentoring awards, mentoring academies for research and/or teaching, career development seminars, women in science/medicine student organizations, and CV formats where mentoring is included. While a reward system is acknowledged as necessary to perpetuate an effective mentoring model, more clarity is needed regarding the most appropriate system.

Dr. Hultgren acknowledged that the current system of mentoring is broken and stimulated discussion among the participants about how



Figure 42:
Concurrent Workshop Chairs and Co-chairs discuss Mentoring in Clinical Departments (seated at table from left to right: Dr. Scott Hultgren, Ms. Carol Hampton, Dr. Jeremy Boss, and Dr. Phoebe Leboy).

to repair the system. Citing his experience as a mentor, Dr. Hultgren explained that he makes every effort to thoroughly understand the interests of the potential mentee and then creates an individual program based on the mentee's needs. He recommends the recruitment of a full complement of mentors to address the mentee's needs and ensure her or his success. Dr. Hultgren expressed his belief that placing women in leadership positions is a critical step that leads to women thriving, succeeding, and enjoying their accomplishments. He also discussed the value of peer mentoring (trainees or faculty mentoring each other) and the reciprocal effect of the mentoring relationship, stating that he is challenged and grows as a result of interactions with mentees.

The group discussed the need to quantify mentoring time and effort and decided that a system should be developed and implemented that will judge the effectiveness of mentors, in addition to creating a formalized mentoring system. Additional thought is needed to develop the standards for such a rating system, including special consideration of how to include mentoring in faculty evaluations.

Recommendations

Group V pointed out that improvement of mentoring is only one component of institutional change and suggested the following recommendations.

Issue 1: The one-on-one mentoring model does not yield optimal results. The mentee needs to be exposed to different viewpoints; this goal is achieved by utilizing a group and/or committee mentoring model. **Recommendations:**

- » All mentored awards should require a personalized mentoring committee akin to the model of a thesis committee or a proactive promotions and tenure committee.
- » All faculty mentors should certify that they have been trained in mentoring.

Issue 2: Effective mentoring takes time and resources in addition to clinical service time and research time; formalized time protection is needed for mentors and mentees.

Recommendations:

- » All mentored awards should include a stipend (\$5,000 to \$10,000) for mentors to cover the time spent mentoring.
- » All research grant applications should require the Principal Investigator to commit at least 35 percent effort to the project, including time for mentoring trainees, and steps should be taken to ensure that clinical principal investigators (those actively attending clinics in addition to their research activity) have protected time for research.
- » More NIH RFAs should require a basic scientist and a clinician as co-principal investigators, with mutual (peer) mentoring. The multiple-PI option on research awards or the BIRCWH program could be used as models.

Issue 3: In order to attract mentors, a system of incentives and evaluation should be implemented. **Recommendations:**

- » Funding organizations should require applicant biosketches to include a section on mentoring activities.
- » Within an institution, promotion evaluations should consider mentoring activities as well as teaching activities and mentees should be asked to evaluate a candidate's mentoring.
- » Department chairs should be evaluated annually for the quality of departmental mentoring.
- » All NIH-funded institutions should be required to survey mentees; the results should be quantified and the scores publicized.

Issue 4: Curricula designed to mentor postdocs, fellows, and faculty members should be prepared and career development information should be distributed. **Recommendations:**

- » All institutions should have a faculty development office with relevant information and resources available to postdocs, fellows, and faculty members.
- » The NIH should sponsor studies to evaluate mentoring and should develop specialized strategies to promote mentoring in all academic medical centers.
- » Funding agencies should consider grants and awards for developing biomedical career materials to be used as resources for improved mentoring.



Figure 43: Participants in the Concurrent Workshop react to questions from the panelists.

- » Mentoring should start at the time of faculty appointment and at the beginning of the fellowship period.

In response to questions from the Receiving Panel, Dr. Leboy highlighted the different issues experienced by researchers, who experience difficulty *entering* their system, compared to clinicians, who experience difficulty *staying in* their system.

One meeting participant suggested collaboration(s) with insurance companies, considering the difficulty in procuring malpractice insurance for clinicians who job-share.

Another participant recommended that, although more study is needed, Federal agencies should develop programs to be implemented as soon as possible because the problem is not improving as time passes.

Concurrent Workshop VI—Mentoring Minority Women in Biomedical Research

Chair: Evelyn M. Hammonds, Ph.D., *Senior Vice Provost for Faculty Development and Diversity, Barbara Gutmann Rosenkrantz Professor of the History of Science of African and African-American Studies, Harvard University, Cambridge, Massachusetts*

Co-chair: Joan Y. Reede, M.D., M.P.H., M.S., *Dean for Diversity and Community Partnership, Associate Professor of Medicine, Harvard Medical School, Associate Professor of Society, Health and Behavior, Harvard School of Public Health, Boston, Massachusetts*

Introduction

Using a systemic, evidence-based approach, this group examined the ways in which race/ethnicity and gender can shape mentoring relationships, with a special focus on the problems and opportunities for women of color including:

- » Challenges in cross race/gender mentoring,
- » Needs and obstacles of varying career changes,
- » The role of institutional culture in inhibiting attention to women of color.

Group VI compiled the following list of experiences of women of color in the workplace:

- » Minority women experience a continued lack of representation, even within a group of women.
- » Feelings of exclusion and isolation are common.



Figure 44: Dr. Joan Reede (at podium) and Dr. Evelyn Hammonds (front right) lead the discussion on Mentoring Minority Women.

- » In a group, minority women are often the only person of color, so they are assumed to represent all minorities.
- » Most minority women are a “first” in at least one of their professional groups, leading to a greater pressure to succeed and added stress/pressure.
- » Minority women work to overcome stereotyped views of performance expectations and career paths.

One key finding was that women of color appear to have no “home” because they are considered either a minority or a woman; the lack of disaggregated data on women of color in biomedical careers spotlights this theme.

Discussion

Dr. Hammonds shared research data collected by Donna Nelson, Ph.D., from the University of Oklahoma on the demographics of tenured/tenure track faculty of the top 50 research universities. Significant underrepresentation of women and minorities was found in the engineering and science departments, and women of color were almost nonexistent in science and engineering departments at research universities. Even in disciplines where female doctoral recipients outnumbered males, fewer women

were among the faculty ranks. Dr. Hammonds concluded that the scientific community has not done well in improving the number of underrepresented minorities in the academic pipeline.

Dr. Hammonds noted that women often leave academia because of a poor “fit.” She shared an example of the moment at which a woman of color recognized that there was not a good fit for her in academe—the “tipping point” stemmed from an unfavorable interaction with a senior male faculty member.



Figure 45: Dr. Evelyn Hammonds notes the disproportionately low number of underrepresented minorities in academia.

Dr. Reede provided data on the experiences of people of color in biomedical careers. She shared data collected by the Association of American

Medical Colleges (AAMC), revealing low numbers of people of color among the ranks of medical school staff. Data show that the majority of underrepresented minority faculty members stall at the rank of assistant professor.

Retention data reveal that female, non-white, and clinical faculty members leave full-time appointments at a higher rate than male, white, and basic science faculty members.

Dr. Reede’s review of the literature revealed a gap in studies about women of color in biomedical careers. She noted that the National Academies report, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*, does not effectively disaggregate data on women of color. More substantial studies exist about the experiences of women and people of color in the business world, where for example, a *Harvard Business Review* article highlighted cross-race mentoring relationships. Research on women of color in biomedical careers is needed in order to fully identify trends and develop targeted solutions for addressing recruitment and retention challenges, as well as to foster an environment for optimal professional achievement.

To explore consensus about mentoring concepts and potential system issues, workshop participants split into two discussion groups on informal and formal mentoring.

Subgroup 1: informal mentoring

Participants discussed the tendency of women faculty and staff to accept informal mentoring opportunities more readily than male counterparts. Students often reach out to female faculty and staff; however, given the current culture at many institutions, informally mentoring these students may be a career liability in that informal mentoring relationships may distract from other career opportunities that are more highly rewarded by institutions. Although mentoring is a core principle of education, most institutions do not recognize the time involved and do not reward informal mentoring. Strategies for combating this paradigm include pushing for institutional change, engaging students in spotlighting good mentors, and recommending formal acknowledgement (merit pay, awards) for positive mentors.

Subgroup 2: formal mentoring

Mentoring programs targeted to women or people of color often adopt a model of deficit; programs built on this premise are poised for potential backlash. The group also discussed the important need to incorporate mentoring at all career stages. In order to build trust, mentoring must become a normal part of career development; otherwise, mentees may not want to participate because they do not want to expose their vulnerabilities. Institutional challenges with formal mentoring programs paralleled informal mentoring system issues—institutions need to redefine success, include mentoring as an expectation, and provide acknowledgement for mentoring. In addition, women need to “get out there like the guys do” and learn to work the system. The participants also emphasized the importance of training—for both the mentor and the mentee.



Figure 46:
Dr. Joan Reede shares recommendations from the Concurrent Workshop.

Recommendations

Group VI offered the following research, practice, and policy recommendations.

Research recommendations:

- » Create an overarching, cross-agency initiative, including academic health centers, that addresses issues surrounding women of color.
- » Identify the different paradigms people are working under—perspectives, institutional culture, and values of the mentors, mentees, and institution.
- » Conduct qualitative research on the experiences of women of color and on their career progression.
- » Research the psychosocial and environmental interactions related to factors that lead to success, slowdown, or attrition.

- » Collect and analyze best practice examples of environments in which women of color are progressing.
- » Examine the use of alternative models for study, such as business models and other models for organizational change.
- » Understand the impact of lack of research studies on these issues.

Practice recommendations:

- » Implement mentor training and teaching regarding issues of women of color by developing models, guides, and curricula.
- » Collect and document best practices, delineating the experiences of women of color.
- » Introduce gender issues into programs targeting minorities and introduce minority issues into programs targeting women.
- » Provide networking resources for ongoing dialogue and convening of individuals with a focus on women of color.

Policy recommendations:

- » Collect and report disaggregated data on women of color from, e.g., the NIH, the National Academies, and the Institute of Medicine.
- » Recognize the efforts—often in the form of additional time commitment—of women of color who mentor.
- » Incorporate “women of color” as an issue/theme to be addressed in future meetings and RFAs.

In response to audience comments and questions, Dr. Reede challenged all of the meeting participants—whether or not they are women of color—to bring the issues of women of color to discussions.



Figure 47:
On the Receiving Panel, Dr. Walter Schaffer questions Concurrent Workshop Chairs.

IX. CLOSING SUMMARY: LESSONS LEARNED AND ACTIONS FOR THE FUTURE

Drs. Alving, Clutter, Greenwood, and Tabak provided summary comments about the lessons learned from this mentoring workshop and what actions might be forthcoming as a result of this workshop.

Some examples of lessons learned were cited in the summary session.

- » These issues should be viewed in a systems way—partly embedded in the cultural change of institutions.
- » Biomedical scientists should embrace lessons from social and behavioral sciences.
- » It is important to quantify and instill a degree of accountability; unless “it” can be measured and people can be held accountable for “it,” “it” does not happen.
- » The wisdom of crowds is essential— one-on-one mentoring may not work.
- » All women are not the same. Greater care should be taken to consider the special issues of women of color.
- » The rise of women in academic institutions in STEM is the projection of the future. This talent will either be captured and those women will be the leaders of the future, or the scientific community will be forced to use the second tier of talent, which will be a national loss.
- » While it may not be the job of the NIH to change academic institutions, those institutions cannot change without the participation of their funding agencies. It is appropriate for a coalition of Federal agencies to speak clearly to the needed objectives for national competitiveness and what institutions must do to meet those objectives.

Some recommended actions for the future include:

- » Determining where and how career success for women is maintained and sustained is a

national economic issue and should be a priority for all biomedical research stakeholders.

- » This workshop included many discussions about reforming higher education for everyone. All agencies should be involved with the solutions; a cross-agency program could be developed through the National Science and Technology Council.
- » These discussions and issues represent an opportunity for the NIH to partner with other agencies to identify what to do with training, as well as an opportunity for the NIH to re-evaluate its training grants.

Workshop attendees noted three topic areas that deserve additional attention:

- » What are the ethical and legal issues surrounding mentoring? Mentors are supposed to help their mentees, but what should they do if they see something they personally would not tolerate—should they take action? This dilemma undergirds why some people do not want to mentor.
- » Rather than focusing on the extramural grantee situation, future discussions should consider issues impacting women who are on the intramural and extramural staff within NIH. Leadership by example on these issues would demonstrate to the extramural grantee community the importance that NIH places on advancing women’s research career success.
- » There are some negative consequences about mentoring, such as being caught in a power play within an organization, or being caught in a sexual harassment accusation.



Figure 48: From left to right, Dr. M.R.C. Greenwood, Dr. Mary Clutter, Dr. Barbara Alving, and Dr. Lawrence Tabak sum up the “lessons learned” from the meeting.

It is important to be aware of the potential ramifications involved in advising others.

Dr. Pinn affirmed that audience discussion and comments, in addition to the recommendations from the six concurrent workshops, will be considered by the NIH Working Group and will also be made available to the Committee on Women in Science and Engineering of the National Academies. In addition, she encouraged all participants to take the ideas and recommendations back to their colleagues, organizations, and institutions for feedback, implementation, and inspiration.



Figure 49:
Dr. Elias Zerhouni (center), NIH Director and Co-Chair of the NIH Working Group on Women in Biomedical Careers, greets Workshop Co-chairs, Dr. Mary Clutter (left) and Dr. M.R.C. Greenwood (right).



Figure 50:
Workshop participants gather outside during an unexpected fire drill.



Figure 51:
Workshop Organizers pose for a photo (from left to right: Dr. Jennifer Pohlhaus, Dr. M.R.C. Greenwood, Dr. Vivian Pinn, Ms. Joyce Rudick, and Dr. Mary Clutter).

Appendix A: NIH Working Group on Women in Biomedical Careers

Co-chairs

Elias A. Zerhouni, M.D., Director, NIH
Vivian W. Pinn, M.D., Director, Office of Research on Women's Health; Associate Director for Research on Women's Health, NIH

Institute and Center Directors

Barbara Alving, M.D., Director, National Center for Research Resources
Jeremy Berg, Ph.D., Director, National Institute of General Medical Sciences
Patricia Grady, Ph.D., R.N., F.A.A.N., Director, National Institute of Nursing Research
Story Landis, Ph.D., Director, National Institute of Neurological Disorders and Stroke
Donald Lindberg, M.D., Director, National Library of Medicine
Lawrence Tabak, D.D.S., Ph.D., Director, National Institute of Dental and Craniofacial Research

Office of the Director

Raynard S. Kington, M.D., Ph.D., Deputy Director, NIH
Ruth L. Kirschstein, M.D., Senior Advisor to the Director, NIH
Janine Austin Clayton (formerly Smith), M.D., Deputy Director, Office of Research on Women's Health
Catherine Manzi, J.D., Attorney Advisor, Public Health Division, DHHS, Office of the General Counsel
Joyce Rudick, Director, Programs and Management, Office of Research on Women's Health
Lawrence Self, Director, Office of Equal Opportunity and Diversity Management (Ex-Officio)

Intramural Research

Michael Gottesman, M.D., Director, Office of Intramural Research; Deputy Director for Intramural Research, NIH
Joan Schwartz, Ph.D., Assistant Director, Office of Intramural Research

Edward Giniger, Ph.D., Investigator, National Institute of Neurological Disorders and Stroke
Catherine Kuo, Ph.D., Postdoctoral Fellow, Cartilage Biology and Orthopedics Branch, National Institute of Arthritis and Musculoskeletal and Skin Diseases
Elaine Ostrander, Ph.D., Chief & Senior Investigator, Cancer Genetics Branch, National Human Genome Research Institute
Ira Pastan, M.D., Chief, Laboratory of Molecular Biology, National Cancer Institute
Kathryn Zoon, Ph.D., Scientific Director, National Institute of Allergy and Infectious Diseases

Extramural Research

Norka Ruiz Bravo, Ph.D., Director, Office of Extramural Research; Deputy Director for Extramural Research, NIH
Walter Schaffer, Ph.D., Senior Scientific Advisor for Extramural Research, Office of Extramural Research
J. Taylor Harden, Ph.D., Assistant to the Director for Special Populations, National Institute on Aging
Pamela Marino, Ph.D., Program Director, Pharmacology, Physiology, and Biological Chemistry Division; Co-Director, Pharmacology Research Associate Program, National Institute of General Medical Sciences
Belinda Seto, Ph.D., Deputy Director, National Institute of Bioengineering and Biomedical Imaging

Staff to Working Group

Amy Bany Adams, Ph.D., Special Assistant to the NIH Director
Joslyn Yudenfreund Kravitz, Ph.D., AAAS Science & Technology Policy Fellow, Office of Research on Women's Health
Jennifer Reineke Pohlhaus, Ph.D., AAAS Science & Technology Policy Fellow, Office of Research on Women's Health

Appendix B: Workshop Planning Committee

Co-chairs

Mary Clutter, Ph.D., former Assistant Director for the Biological Sciences, National Science Foundation

M.R.C. Greenwood, Ph.D., Professor, University of California–Davis, and Chancellor Emerita, University of California–Santa Cruz

Office of Research on Women’s Health

Vivian W. Pinn, M.D., Associate Director for Research on Women’s Health, and Director, Office of Research on Women’s Health, NIH

Joyce Rudick, Director of Programs and Management, Office of Research on Women’s Health, NIH

Jennifer Reineke Pohlhaus, Ph.D., AAAS Science & Technology Policy Fellow, Office of Research on Women’s Health

Members

Barbara Alving, M.D., Director of the National Center for Research Resources, National Institutes of Health

Molly Carnes, M.D., M.S., Director, Center for Women’s Health Research, School of Medicine and Public Health, University of Wisconsin

Valarie Clark, M.P.A., Director of Faculty Development, Association of American Medical Colleges

Phoebe Leboy, Ph.D., President-Elect of Association for Women in Science; and Professor of Biochemistry, University of Pennsylvania School of Dental Medicine

Nancy Neilson, M.D., Ph.D., President-Elect of the American Medical Association; and Senior Associate Dean for Medical Education, University of Buffalo School of Medicine and Biomedical Sciences

Eugene Orringer, M.D., Executive Associate Dean for Faculty Affairs and Professor of Medicine, University of North Carolina, Chapel Hill

Joan Y. Reede, M.D., M.P.H., M.S., Dean for Diversity and Community Partnership and Associate Professor of Medicine, Harvard Medical School

Sue Rosser, Ph.D., Dean and Professor, Ivan Allen College of Liberal Arts, Georgia Institute of Technology

Walter Schaffer, Ph.D., Senior Scientific Advisor for Extramural Research, National Institutes of Health

Joan Schwartz, Ph.D., Assistant Director of Intramural Research, National Institutes of Health

Jeanne Sinkford, D.D.S., Ph.D., Associate Executive Director, American Dental Education Association

Lawrence Tabak, D.D.S., Ph.D., Director of the National Institute of Dental and Craniofacial Research, National Institutes of Health

Hannah Valantine, M.D., Senior Associate Dean for Diversity and Leadership and Professor of Medicine, Stanford University

Appendix C: Workshop Agenda

DAY 1: TUESDAY, NOVEMBER 27, 2007

- 8:00 am – 8:30 am **Registration**
- 8:30 am – 9:00 am **Welcome and Introductions**
Vivian W. Pinn, M.D., Associate Director for Research on Women's Health and Director, Office of Research on Women's Health, NIH
Lawrence A. Tabak, D.D.S., Ph.D., Director, National Institute of Dental and Craniofacial Research, NIH
Mary Clutter, Ph.D., Former Assistant Director for the Biological Sciences, National Science Foundation, Workshop Planning Committee Co-Chair
M.R.C. Greenwood, Ph.D., Professor, University of California–Davis and Chancellor Emerita, University of California–Santa Cruz; Workshop Planning Committee Co-Chair
- 9:00 am – 9:30 am **Conference Preamble: New Paradigm for Mentoring**
M.R.C. Greenwood, Ph.D.
- 9:30 am – 10:15 am **Opening Keynote Address**
Introduction of Speaker
Barbara Alving, M.D., Director, National Center for Research Resources, National Institutes of Health

OPENING KEYNOTE: On Belay: Ready to Climb
France Córdova, Ph.D., President, Purdue University
- 10:15 am – 10:30 am **BREAK**
- 10:30 am – 12:15 pm **Panel: Models of Successful Mentoring**
Moderator
Mary Clutter, Ph.D.

Panelists
MentorNet: Ten Years of Success and Lessons Learned
Carol Muller, Ph.D., Founder, President, and Chief Executive of MentorNet
ELAM Program: Mentoring at the Senior Level
Page S. Morahan, Ph.D., Co-Director, Executive Leadership in Academic Medicine (ELAM), Drexel University College of Medicine
Mentoring through ADVANCE: Speed Mentoring and ADEPT
Sue V. Rosser, Ph.D., Professor and Dean of Ivan Allen College of Liberal Arts, Georgia Institute of Technology
Mentoring the Next Generation of Faculty Researchers: The UC–Davis BIRCWH Program
Claire Pomeroy, M.D., M.B.A., Vice Chancellor of Human Health Sciences and Dean, School of Medicine, University of California–Davis
Working on Women in Science (WOWS): An Initiative to Recruit, Retain, and Promote Women at UNC
Patricia Byrns, M.D., Associate Dean, Office of Research and Faculty Development, University of North Carolina–Chapel Hill

Turning Dreamers into Doctors: Best Practices in Mentoring Future Health Care Professionals
Lynne Holden, M.D., President, Mentoring in Medicine; and Assistant Professor, Department of Emergency Medicine, Albert Einstein College of Medicine

Audience Discussion

12:15 pm – 1:45 pm

Lunch (on own) with Posters and Table-Talk

1:45 pm – 3:30 pm

Panel: Transforming Leadership in Mentoring: Challenges for Developing and Sustaining Leadership

Moderator

Shirley Malcom, Ph.D., Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science

Panelists

Mentoring as a Component of Institutional Transformation

Susan Bryant, Ph.D., Vice Chancellor for Research, University of California–Irvine

Cracking the Glass Ceiling in Academic Medicine

Eve Higginbotham, M.D., Dean and Senior Vice President for Academic Affairs, Morehouse School of Medicine

Incentives for Mentoring: Transforming Institutional Culture

Linda McCauley, Ph.D., Associate Dean for Nursing Research, University of Pennsylvania School of Nursing

Letting the Girls into the Clubhouse

Sharon P. Turner, D.D.S., J.D., Dean and Professor of Oral Health Practice, College of Dentistry, University of Kentucky

Responders

Luisa N. Borrell, D.D.S., Ph.D., Assistant Professor, Department of Epidemiology, Mailman School of Public Health, Columbia University, College of Dental Medicine

Kristen Mitchell, Ph.D., Postdoctoral Fellow, Department of Pharmacology & Toxicology, University of Texas Medical Branch

Audience Discussion

3:30 pm – 3:45 pm

Reflections from NIH Director and Charge to Workshops

Elias A. Zerhouni, M.D., Director, NIH

3:45 pm – 5:15 pm

Concurrent Workshops

I. Can Mentoring be Taught: Training of Mentors and Mentees

Chair **Gene Orringer, M.D.**, Professor of Medicine, Executive Associate Dean for Faculty Affairs & Faculty Development, School of Medicine, University of North Carolina–Chapel Hill

Co-Chair **Morris Weinberger, Ph.D.**, Distinguished Professor of Healthcare Quality Management, Department of Health Policy and Administration, School of Public Health, University of North Carolina–Chapel Hill

II. Determining Gaps in Mentoring Programs and Developing Novel Models for Successful Mentoring

Chair **Hannah A. Valentine, M.D., M.R.C.P., FACC**, Senior Associate Dean for Diversity & Leadership and Professor of Medicine, Stanford University School of Medicine

Co-Chair **Christy I. Sandborg, M.D.**, Professor of Pediatrics and Chief of Medical Staff of Lucile Packard Children's Hospital, Stanford University School of Medicine; and Immediate Past Chair, Childhood Arthritis and Rheumatology Research Alliance

III. Insights into Mentoring in Biomedical Careers from Social Science Research

Chair **Molly Carnes, M.D.**, Professor, Medicine and Industrial & Systems Engineering, University of Wisconsin–Madison

Co-Chair **Linda Pololi, M.B.B.S., M.R.C.P.**, Senior Scientist, PI of the National Initiative on Gender, Culture, and Leadership in Medicine: C-Change, Brandeis University

Co-Chair **Ruth Fassinger, Ph.D.**, Professor and Interim Chair, Department of Counseling and Personnel Services, College of Education, University of Maryland–College Park

Co-Chair **Cecilia Ford, Ph.D.**, Professor of English, University of Wisconsin–Madison

IV. Logic Model for Evaluating Mentoring

Chair **Joseph F. West, Sc.D.**, President, Westwell Group, Consulting and Research

Co-Chair **Jeanne C. Sinkford, D.D.S., Ph.D.**, Associate Executive Director and Director of the Center for Equity and Diversity, American Dental Education Association

V. Mentoring in Clinical Departments

Chair **Phoebe Leboy, Ph.D.**, President-Elect of Association for Women in Science; and Professor of Biochemistry, University of Pennsylvania School of Dental Medicine

Co-Chair **Jeremy Boss, Ph.D.**, Professor, Department of Microbiology and Immunology, Emory University School of Medicine

Co-Chair **Carol L. Hampton, M.M.S.**, Associate Dean for Faculty and Instructional Development, Office of Faculty Affairs, School of Medicine; Director of Leadership, Institute for Women's Health—Center of Excellence Leadership, Virginia Commonwealth University

Co-Chair **Scott Hultgren, Ph.D.**, Helen L. Stoever Professor of Microbiology and Director, Center for Women's Infectious Disease Research, Washington University School of Medicine

VI. Mentoring Minority Women in Biomedical Research

Chair **Evelynn M. Hammonds, Ph.D.**, Senior Vice Provost for Faculty Development and Diversity, Barbara Gutmann Rosenkrantz Professor of the History of Science of African and African American Studies, Harvard University

Co-Chair **Joan Y. Reede, M.D., M.P.H., M.S.**, Dean for Diversity and Community Partnership and Associate Professor of Medicine, Harvard Medical School

DAY 2: WEDNESDAY, NOVEMBER 28, 2007

- 8:30 am – 8:45 am **Welcome**
- 8:45 am – 9:30 am **Keynote Address**
Introduction of Speaker
Joan Schwartz, Ph.D., Assistant Director of Intramural Research,
 Office of Intramural Research, NIH
Keynote Address
Gail Cassell, Ph.D., Vice President for Scientific Affairs and Distinguished
 Lilly Research Scholar for Infectious Diseases, Eli Lilly and Company
- 9:30 am – 9:45 am **BREAK**
- 9:45 am – 11:45 am **Concurrent Workshops** (continued from Day 1)
- 11:45 am – 1:00 pm **Lunch (on own) with Posters**
- 1:00 pm – 1:40 pm **Workshop Reports and Recommended Strategies**
 (Workshops 1&2) with Panel and Audience Response
Receiving Panel
Lawrence A. Tabak, D.D.S., Ph.D.
Mary Clutter, Ph.D.
M.R.C. Greenwood, Ph.D.
Valarie Clark, M.P.A., Director of Faculty Development, Association of
 American Medical Colleges
Nancy Nielsen, M.D., Ph.D., President-Elect of the American Medical
 Association and Clinical Professor of Medicine, University of Buffalo
 School of Medicine and Biomedical Sciences
Walter Schaffer, Ph.D., Senior Scientific Advisor for Extramural Research,
 Office of Extramural Research, NIH
- 1:40 pm – 2:00 pm **Perspectives on Approaches to Eliminating Bias and Barriers**
Raynard S. Kington, M.D., Ph.D., Deputy Director, NIH
- 2:00 pm – 3:30 pm **Workshop Reports and Recommended Strategies**
 (Workshops 3-6) with Panel and Audience Response
- 3:30 pm – 4:00 pm **Closing Summary: Lessons Learned and Actions for the Future**
Comments from NIH Working Group on Women in Biomedical Careers
Lawrence A. Tabak, D.D.S., Ph.D.
Barbara Alving, M.D.
Comments from Workshop Co-Chairs
Mary Clutter, Ph.D.
M.R.C. Greenwood, Ph.D.
Final Remarks
Vivian W. Pinn, M.D.
- 4:00 pm **Adjourn**

Appendix D: Poster Titles and First Authors

1. *Mentoring Model of UPR Master in Clinical Research Program*
Adriana Báez, University of Puerto Rico
2. *The Advanced Research Institute (ARI) in Geriatric Mental Health Blind*
Martha Bruce, Department of Psychiatry, Weill Medical College of Cornell University
3. (not presented)
4. *Faculty Mentorship Program at the University of Pennsylvania School of Nursing*
Norma Cuellar, University of Pennsylvania School of Nursing
5. (not presented)
6. *Academic Advancement of Women in Medicine: A Facilitated Peer Mentoring Model*
Julia A. Files, Mayo Clinic
7. *A Study of Mentoring and Social Support in Medical Residents*
Freda Giblin, Wayne State University
8. *Establishing Women in Medicine and Science Student Organizations: Supporting Future Women Physicians and Scientists*
Coral Hampton, Virginia Commonwealth University (VCU) School of Medicine
9. *The Arizona Cancer Center (AZCC) Cancer Prevention and Control (CPC) Program's R25 Postdoctoral Training Program*
Lisa Hess, Arizona Cancer Center (AZCC), University of Arizona
10. *Mentoring in Medicine*
Lynne Holden, Mentoring in Medicine
11. *Web-based Tools for Effective Mentoring*
Rebecca R. Kameny, The 3-C Institute for Social Development
12. *"See One, Do One, Teach One"*
Tracy L. Marx, Ohio University College of Osteopathic Medicine (OUCOM)
13. *Functional Mentoring: Defining Outcomes and Measuring Success*
Robert J. Milner, Penn State College of Medicine
14. *The E-Mentoring Network for Diversity in Engineering and Science*
Carol B. Muller, MentorNet
15. *The Association for Women in Science*
Lilian G. Perez, Association for Women in Science
16. *Improving Research Experiences: The Merits of Training Mentors*
Christine Pfund, University of Wisconsin–Madison
17. *The RAISE Project*
Stephanie Pincus, Society for Women's Health Research
18. *An Ecological Model of Interdisciplinary Mentoring*
Sheryl B. Ruzek, Department of Public Health, College of Health Professions, Temple University
19. *University of California–San Francisco Faculty Mentoring Program*
W. Sue Shafer, Community Health Education Team, Emergency Communication System, Centers for Disease Control and Prevention
20. (not presented)
21. *NSF ADVANCE Institutional Transformation Award*
Barb Silver, University of Rhode Island (URI)
22. *Multifaceted Mentoring for Minority Researchers to Address HIV Health Disparities: Local Response for Global Impact*
Carmen D. Zorrilla, University of Puerto Rico Medical Sciences Campus



Figures 52-57:
Workshop participants gather and talk during
Poster Sessions.

Appendix E: Speaker Biographies

Barbara M. Alving, M.D., M.P.H.

*Director, National Center for Research Resources,
National Institutes of Health*

Dr. Barbara M. Alving is the Director of the National Center for Research Resources (NCRR) at the National Institutes of Health. NCRR provides laboratory scientists and clinical researchers with the environments and tools they need to understand, detect, treat, and prevent a wide range of common and rare diseases. Dr. Alving earned her medical degree *cum laude* from Georgetown University School of Medicine, where she also completed an internship in internal medicine. She received her residency training in internal medicine at the Johns Hopkins University Hospital, followed by a fellowship in hematology. Dr. Alving then became a research investigator in the Division of Blood and Blood Products at the Food and Drug Administration. In 1980, she joined the Department of Hematology at the Walter Reed Army Institute of Research and became Chief of the Department in 1992. She left the Army at the rank of Colonel in 1996 to become the Director of the Medical Oncology/Hematology section at Washington Hospital Center in Washington, D.C. In 1999, she joined the National Heart, Lung, and Blood Institute (NHLBI), serving as the Director of the extramural Division of Blood Diseases and Resources until becoming the Deputy Director of the Institute in September 2001. From September 2003 until February 1, 2005, she served as the Acting Director of NHLBI. In March 2005 she became the Acting Director of NCRR and was named Director in April 2007. Dr. Alving is a Professor of Medicine at the Uniformed Services University of the Health Sciences in Bethesda, a Master in the American College of Physicians, a former member of the subcommittee on Hematology of the American Board of Internal Medicine, and a previous member of the FDA Blood Products Advisory Committee. She is a co-inventor on two patents, has edited three books, and has published more than 100 papers in the areas of thrombosis and hemostasis.

Luisa N. Borell, Ph.D., D.D.S.

*Assistant Professor in the Department of
Epidemiology, Mailman School of Public
Health, and the College of Dental Medicine,
Columbia University*

Luisa N. Borell is an Assistant Professor in the Department of Epidemiology, Mailman School of Public Health, and the College of Dental Medicine at Columbia University, New York. She received her dental (D.D.S.) and master's in public health (M.P.H.) degrees from Columbia University, New York, and her Ph.D. in epidemiologic sciences from the University of Michigan, Ann Arbor, Michigan. Her research interest is on race and ethnicity, socioeconomic position, and neighborhood effects as they act as social determinants of health. She has expertise in racial/ethnic disparities in health, research methods and the analysis of large databases, including survey, census and spatially linked data. In addition, Dr. Borell has an extensive record in mentoring master, doctoral and postdoctoral students. She is the Director of the Master's Program in Epidemiology, the Director of the Kellogg Health Scholars Program Multidisciplinary-Disparities Track and the Associate Director of the Robert Wood Johnson Health and Society Scholars Program at Columbia University. As of February 2008, Dr. Borell expected to join the faculty at in the Department of Health Sciences, Lehman College/City University of New York as an Associate Professor.

Jeremy Boss, Ph.D., M.S.

*Professor, Department of Microbiology
and Immunology, Emory University School
of Medicine*

Dr. Boss earned his B.S., M.S., and Ph.D. degrees from the State University of New York at Albany. His doctoral work focused on understanding the genetics and regulation of the yeast cytochrome c gene and was carried out under the mentorship of Dr. Richard Zitomer. His postdoctoral work was performed under the guidance of Dr. Jack L. Strominger at Harvard University. As a fellow, he cloned major histocompatibility complex class II (MHC-II) genes and began to elucidate the

mechanisms by which they were regulated. Dr. Boss joined the Microbiology and Immunology Department at Emory University School of Medicine in 1986 and continued working on MHC-II gene expression and regulation. He expanded his studies to include how genes were regulated by tumor necrosis factor. By 1997 he had risen through the ranks and was promoted to professor. His laboratory discovered properties, identities, and activities of the transcription factors that regulate MHC-II genes and cloned one of the genes. Dr. Boss studies the regulation of the monocyte chemoattractant protein-1 (MCP-1) and manganous superoxide dismutase (MnSOD or SOD2) genes. In studying these systems, Dr. Boss and his group have been able to unravel mechanisms by which distal enhancer regions function to activate gene expression. Today, his lab investigated the role that chromatin and epigenetic modifications play in regulating gene expression. Dr. Boss has published 100 articles on the regulation of MHC-II genes and TNF regulated gene expression. He has been continuously funded by grants from the National Institutes of Health for the last 19 years. Dr. Boss has been a devoted teacher and educator. He has directed several major courses, including the microbiology and immunology course to physician assistants and the graduate introductory immunology course. He also lectures on a variety of topics that often include gene expression and regulation. He has trained 14 Ph.D. students and 20 postdoctoral fellows. He has served on over 70 Ph.D. dissertation committees and is currently a faculty mentor for the three Associate Professors and three Assistant Professors. Dr. Boss has been an advocate for graduate education and is the Director of the graduates program in Genetics and Molecular Biology at Emory. He is currently also the Program Director of the Genetics training grant. Dr. Boss has served on numerous grant and journal review panels and is currently a Deputy Editor for the *Journal of Immunology*. He was recently selected to become Editor-in-Chief of the *Journal of Immunology* beginning in 2008. Dr. Boss believes in active mentorship and career and guidance. In 2002, he and his co-author, Dr. Susan Eckert published *Academic Scientists at Work: Navigating the Biomedical Career*. *Academic Scientists at Work* is a career guidance book that provides advice for young

scientists on their journey from postdoc to tenured associate professor. The book was revised and published in second edition in 2006. With Dr. Eckert, Dr. Boss published 12 articles in *Science's Next Wave* on career development and education issues.

Julia E. Brittain, Ph.D.

Assistant Professor of Biochemistry & Biophysics and Obstetrics & Gynecology, BIRCWH Scholar, University of North Carolina—Chapel Hill

Dr. Julia Brittain is a junior faculty member in the Departments of Biochemistry & Biophysics and Obstetrics & Gynecology. She is also a recipient of a Building Interdisciplinary Research Careers in Women's Health (BIRCWH) scholar award. Dr. Brittain is a translational investigator whose research focuses on the mechanisms of vaso-occlusion in sickle cell disease. She is also developing a clinical aspect of her work by identifying the mechanisms related to maternal risk during pregnancy in sickle cell disease. Dr. Brittain was the recipient of a hematology training award and has received several awards from the American Society of Hematology.

Susan Bryant, Ph.D.

Vice Chancellor for Research, University of California—Irvine

Dr. Susan Bryant became Vice Chancellor for Research at University of California—Irvine in August 2006, after serving as Dean of Biological Sciences for more than 6 years. She joined the faculty of the Department of Developmental and Cell Biology at University of California—Irvine, with a Ph.D. from the University of London, and postdoctoral training at Case Western Reserve University. Her research focuses on understanding the mechanisms by which some adult vertebrates can regenerate functional body parts. With her collaborator, Dr. David Gardiner, this research has resulted in over 100 publications. She has served on several national committees, including the Advisory Boards for the VA Office of Regeneration Programs, and the Indiana University Axolotl Colony, and has also served as Program Director for Developmental Biology at the National Science Foundation (NSF). She currently serves as a member of BIOAC, the Advisory Committee for NSF's Directorate for

Biological Sciences, as a member of the of the California Independent Citizen's Oversight Committee (ICOC) of the California Institute for Regenerative Medicine (CIRM), the state agency for stem cell research, and as a council member of the California Council on Science and Technology (CCST). She also serves on the Editorial Boards of several journals in her field. In 2001, she was elected a Fellow of the American Association for the Advancement of Science and, in 2005, a Fellow of the Association for Women in Science. Her goals are to facilitate and advance research locally and nationally, and to work for the full participation of women and minorities in the scientific enterprise.

Patricia J. Byrns, M.D.

Associate Dean, Faculty Development, School of Medicine, University of North Carolina–Chapel Hill

Dr. Patricia Byrns is Associate Dean for Faculty Development in the Office of Research at the School of Medicine at University of North Carolina–Chapel Hill (UNC). Trained in internal medicine at the University of Colorado, Dr. Byrns' own research is in pharmacoepidemiology. She is Associate Director of the NIH-funded Clinical Research Curriculum, and Program Director for the NIH-funded K12 award, "Building Interdisciplinary Research Careers in Women's Health (BIRCWH)" and administers two other K12 awards funded by NIH. All of these programs involved mentoring senior fellows and junior faculty. Dr. Byrns is involved in helping implement the "Working on Women in Science (WOWS)" program at UNC, which was designed by a team of women scientists from across the entire campus.

Molly Carnes, M.D.

Professor, Departments of Medicine, Psychiatry, and Industrial & Systems Engineering, University of Wisconsin–Madison

Dr. Molly Carnes is a Professor in the Departments of Medicine, Psychiatry, and Industrial & Systems Engineering at the University of Wisconsin and Vice Chair for Faculty Development in the Department of Medicine. She directs the University of Wisconsin Center for Women's Health Research and three federally funded training and career development programs in women's health. Dr. Carnes is the

founder and director of the Women's Health Program at the Wm. S. Middleton VA Hospital and co-founder and director of the Women in Science and Engineering Leadership Institute (WISELI) in the University of Wisconsin College of Engineering. Dr. Carnes performed her undergraduate work at the University of Michigan and received her M.D. from the State University of New York at Buffalo. She trained in internal medicine and geriatrics at the University of Wisconsin, where she earned an M.S. in population health. She has trained over 50 physicians and scientists in geriatrics or women's health and has had more than 100 articles and books published. Dr. Carnes serves on the Board of Directors of the Wisconsin Women's Health Foundation and is a sought-after guest speaker on the advancement of women in academic medicine, science, and engineering, and the recipient of numerous awards, including the Association of American Medical Colleges (AAMC) 2004 Women in Medicine Leadership Development Award and the 2006 Joseph T. Freeman Award given to a prominent physician in the field of aging both in research and practice. Most recently, she was named the 2007 Helen Dickie Woman Physician of the Year by the American College of Physicians.

Gail Cassell, Ph.D.

Vice President, Scientific Affairs and Distinguished Lilly Research Scholar for Infectious Diseases, Eli Lilly and Company

Dr. Gail H. Cassell is currently Vice President, Scientific Affairs and Distinguished Lilly Research Scholar for Infectious Diseases, Eli Lilly and Company in Indianapolis, Indiana. She is the former Charles H. McCauley Professor and Chairman of the Department of Microbiology at the University of Alabama Schools of Medicine and Dentistry at Birmingham, a department that ranked first in research funding from the National Institutes of Health during the decade of her leadership. She obtained her B.S. from the University of Alabama in Tuscaloosa and in 1993 was selected as one of the top 31 female graduates of the 20th century. She obtained her Ph.D. in Microbiology from the University of Alabama at Birmingham and was selected as its 2003 Distinguished Alumnus. She is a past President of the American Society for Microbiology (the oldest and single largest life

sciences organization with a membership of over 42,000). She was a member of the National Institutes of Health Director's Advisory Committee and a member of the Advisory Council of the National Institute of Allergy and Infectious Diseases of NIH. She was named to the original Board of Scientific Counselors of the Center for Infectious Diseases, Centers for Disease Control (CDC), and served as Chair of the Board. She recently served a 3-year term on the Advisory Board of the Director of the CDC and as a member of the Secretary of Health and Human Services Advisory Council of Public Health Preparedness. Currently she is a member of the Science Board of the Federal Food and Drug Administration Advisory Committee to the Commissioner. Since 1996 she has been a member of the U.S.–Japan Cooperative Medical Science Program responsible for advising the respective governments on joint research agendas (U.S. State Department/Japan Ministry of Foreign Affairs). She has served on several editorial boards of scientific journals and has authored more than 250 articles and book chapters. Dr. Cassell has received national and international awards and an honorary degree for her research in infectious diseases. She is a member of the Institute of Medicine (IOM) of the National Academy of Sciences and is currently serving a 3-year term on the IOM Council, the governing board. Dr. Cassell has been intimately involved in the establishment of science policy and legislation related to biomedical research and public health. For 9 years she was chairman of the Public and Scientific Affairs Board of the American Society for Microbiology; has served as an advisor on infectious diseases and indirect costs of research to the White House Office of Science and Technology Policy, and has been an invited participant in numerous congressional hearings and briefings related to infectious diseases, antimicrobial resistance, and biomedical research. She has served two terms on the LCME, the accrediting body for U.S. medical schools as well as other national committees involved in establishing policies in training in the biomedical sciences. She has just completed a term on the Leadership Council of the School of Public Health of Harvard University. Currently she is a member of the Executive Committee of the Board of Visitors of Columbia University

School of Medicine, is a member of the Board of Directors of the Burroughs Wellcome Fund, and the Advisory Council of the School of Nursing of Johns Hopkins.

Valarie Clark, M.P.A.

Director of Faculty Development, Association of American Medical Colleges (AAMC)

As Director of Faculty Development, Ms. Clark is responsible for managing the longstanding Women in Medicine Program and the Group on Faculty Affairs. Also included in her purview is: Supporting the Faculty Affairs group, over 200 faculty affairs assistant and associate deans with responsibility for programs, policies, and procedures in the areas of faculty appointment, promotion and career development, and tenure; Organizing a Faculty Affairs professional development conference addressing promotions and tenure guidelines, salary and compensation structures, faculty career tracks, promotion of teaching effort, and faculty mentoring; and developing and monitoring resources for faculty. *Faculty Vitae*, a quarterly electronic publication shares faculty development resources, spotlights faculty and leaders in academic medicine; and communicates the purpose and mission of the AAMC Faculty Development and Leadership Programs and resources. Go to: <http://www.aamc.org/members/facultydev/septo4/start.htm> Ms. Clark has been at the AAMC for ten years. Prior to her current position she held positions at the National Association of County and City Health Officials, National Medical Association and the Boston Massachusetts Women's Commission.

Mary E. Clutter, Ph.D., M.A.

Former Assistant Director for the Biological Sciences, National Science Foundation, Leadership in Mentoring Workshop Planning Committee Co-Chair

Dr. Mary E. Clutter is the former Assistant Director of the National Science Foundation (NSF) for the Biological Sciences, a directorate with four disciplinary divisions supporting all major areas of fundamental research in biology, plus a virtual division, Emerging Frontiers, stressing high risk, interdisciplinary research. Dr. Clutter came to NSF from Yale University and served in a number of positions at the Foundation including a stint as Acting Deputy

Director. Her special interest areas are plant and microbial biology, genomics, ecology of infectious diseases and cyberinfrastructure. During her career at NSF, Dr. Clutter served as U.S. Chair of the U.S.–European Commission Task Force on Biotechnology Research, was a member of the Board of Trustees of the international Human Frontiers Science Program, Chair of the Biotechnology Subcommittee of the Committee on Science of the National Science and Technology Council (NSTC), Co-chair of the NSTC Committee on Science's Interagency Working Group on Plant Genomes and served on the National Interagency Genomics Sciences Coordinating Committee. She was also a member of the Board of Regents of the National Library of Medicine and the Army Science Board. Dr. Clutter is a member of numerous professional societies, and is a Fellow of the American Association for the Advancement of Science (AAAS), the Association for Women in Science and the American Society of Plant Biologists. She served on the Board of Directors of the AAAS and is currently on the Board of Directors of the Boyce Thompson Institute of Cornell University. She is also a member of the Policy and Global Affairs Committee of the National Research Council/National Academies of Science. Dr. Clutter received the Bachelor of Science degree in biology from Allegheny College and her masters and doctoral degrees from the University of Pittsburgh. She received honorary doctorates of science from Allegheny College and Mount Holyoke College and the Bicentennial Medallion of Distinction from the University of Pittsburgh. She has received many awards from professional societies and numerous Senior Executive Service Awards, including the Meritorious and Distinguished Executive Presidential rank awards from three U.S. Presidents as well as the NSF Distinguished Service Award.

France A. Córdova, Ph. D.
President, Purdue University

France A. Córdova became the eleventh president of Purdue University on July 16, 2007. Prior to joining Purdue, Córdova served as Chancellor at the University of California (UC)–Riverside from 2002–2007. She also

was Distinguished Professor of Physics and Astronomy at UC–Riverside. An internationally recognized astrophysicist, Córdova has also served as professor of Physics and Vice-Chancellor for Research at UC–Santa Barbara. Before joining UC–Santa Barbara in 1996, she was Chief Scientist at NASA from 1993 to 1996, serving as the primary scientific advisor to the NASA administrator and the principal interface between NASA headquarters and the broader scientific community. Córdova headed the Department of Astronomy and Astrophysics at Pennsylvania State University from 1989 to 1993. She was a member of the staff of the Space Astronomy and Astrophysics Group at the Los Alamos National Laboratory from 1979 to 1989, where she also served as Deputy Group Leader. Córdova's scientific career contributions have been in the areas of observational and experimental astrophysics, multi-spectral research on x-ray and gamma ray sources, and space-borne instrumentation. She has published more than 150 scientific papers, and has a current experiment flying on the European Space Agency's X-Ray Multi-Mirror Mission. She is the winner of NASA's highest honor, the Distinguished Service Medal, and was recognized as a 2000 Kilby Laureate, for "contributions to society through science, technology, innovation, invention, and education." She is a fellow of the American Association for the Advancement of Science (AAAS) and the Association for Women In Science (AWIS). In September 2007, she was named to the board of directors of BioCrossroads, Indiana's initiative to grow the life sciences through a public-private collaboration that supports the region's research and corporate strengths while encouraging new business development. The oldest of 12 children, Córdova attended high school in La Puente, California, east of Los Angeles. She then entered Stanford University, where she graduated cum laude with a bachelor's degree in English, and, among other activities, conducted anthropological field work in a Zapotec Indian pueblo in Oaxaca, Mexico. She earned a Ph.D. in Physics from the California Institute of Technology in 1979. In 1997, she was awarded an honorary doctorate by Loyola Marymount University, Los Angeles.

Maria Escolar, M.D., M.S.

Associate Professor of Pediatrics, Center for Development and Learning, University of North Carolina–Chapel Hill

Dr. Maria Escolar is originally from Bogota, Colombia, where she graduated from the Escuela Colombiana de Medicina in Bogota, Colombia. She has a Master of Science in Human Nutrition from Columbia University and completed her pediatric internship and residency at The New York Hospital–Cornell University Medical Center. Dr. Escolar also completed a fellowship in Child Development and Behavioral Pediatrics at the same institution. During the last ten years, she has worked with rare genetic neurodegenerative conditions and in the year 2002 established the Program for Neurodevelopmental Function in Rare Disorders, an internationally known program that delivers clinical service and also conducts clinical trials and translational research. She presently holds an appointment as Associate Professor of Pediatrics at the Center for Development and Learning. Dr. Escolar received the Translational Science Award from the Dean's Office of the School of Medicine, University of North Carolina–Chapel Hill.

Ruth Fassinger, Ph.D.

Professor and Chair, Department of Counseling and Personnel Services, College of Education, University of Maryland

Dr. Ruth E. Fassinger is Interim Chair of the Department of Counseling and Personnel Services, Professor of Counseling Psychology, and a Distinguished Scholar-Teacher at the University of Maryland (UMD). She received her Ph.D. in psychology from the Ohio State University in 1987 and joined the UMD faculty after holding staff psychologist positions at the University of California–Santa Barbara and Arizona State University. Her primary research interests are in the psychology of women and gender, the psychology of work and career development, sexuality and sexual orientation, diversity and advocacy in the mental health arena, and the history of psychology. She is a Fellow of the American Psychological Association (APA) in Divisions 17 (Society of Counseling Psychology), 35 (Society for the Psychology of Women), and 44 (Society

for the Psychological Study of Lesbian, Gay, and Bisexual Issues). She serves on the editorial boards of the *Journal of Lesbian Studies* and *The Counseling Psychologist*, and is currently President of APA's Division 44. She has received numerous awards for her scholarship, teaching, and professional contributions, including: Outstanding Achievement Award (APA Committee on Lesbian, Gay, and Bisexual Concerns); Early Career Scientist-Practitioner Award (Division 17); Distinguished Contributions to Education and Training Award (Division 44); and Outstanding Scientific Contributions to Psychology Award (Maryland Psychological Association). She is a licensed psychologist in Maryland and maintains a psychotherapy and consultation practice specializing in issues related to gender, work, and sexuality.

Cecilia E. Ford, Ph.D.

*Professor of English, University of Wisconsin–Madison
Cecilia E. Ford is Professor of English (Language and Linguistics/Rhetoric and Composition)*

Dr. Ford's articles and book chapters focus on language as an interactional phenomenon. In her books and edited collections, *Grammar and Interaction: Adverbial Clauses in American English Conversations* (1993), *Interaction-Based Studies of Language* (1996), *The Language of Turn and Sequence* (2002), *Sound Patterns in Interaction: Cross-linguistic Studies of Phonetics and Prosody for Conversation* (2004), and *Women Speaking Up: Getting and Using Turns in Workplace Meetings* (In Press), Ford draws on conversation analysis as a framework for discovering the ways that humans construct, on a moment-by-moment basis, the social orders that make up our lives—including the provisional and emergent practices we call language. <http://mendota.english.wisc.edu/~ceford/>.

M.R.C. Greenwood, Ph.D.

Professor, University of California–Davis and Chancellor Emerita, University of California–Santa Cruz, Leadership in Mentoring Workshop Planning Committee Co-Chair

Dr. M.R.C. Greenwood is a nationally and internationally known expert on obesity and diabetes. She has numerous publications investigating the basis of obesity and diabetes. She is a member of the Institute of Medicine at

the National Academies of Sciences, has been President of the North American Association for the Study of Obesity (NAASO) now the Obesity Society, President of the American Society of Clinical Nutrition and has chaired the Food and Nutrition Board of the Institute of Medicine. In addition, she is Chancellor Emerita, University of California–Santa Cruz and currently Professor of Nutrition and Internal Medicine at the University of California–Davis. She also holds an appointment as Adjunct Professor of Public Health and Nutrition at the University of California, Berkeley. From April of 2004 to November of 2005, Dr. Greenwood served as Provost and Senior Vice President for Academic Affairs for the ten-campus University of California (UC) system, the second highest position in the ten-campus system. Dr. Greenwood previously served with distinction as Chancellor of UC–Santa Cruz, a position she held from July 1996 to April 2004. In addition to her administrative responsibilities, Dr. Greenwood also held a UC–Santa Cruz appointment as professor of biology. Prior to her UC–Santa Cruz appointments, Dr. Greenwood served as Dean of Graduate Studies, Vice Provost for academic outreach, and Professor of Nutrition and Internal Medicine at UC–Davis. While at UC–Davis she maintained an active, well-supported research program focusing on the genetic basis for diabetes and obesity and in areas related to women’s health. In addition, she served as Associate Director for science in the White House Office of Science and Technology Policy from 1993 to 1995. There she provided authoritative information and advice on a broad array of scientific areas to the Director of the Office of Science and Technology Policy in support of the President of the U.S.A. and his objectives and programs. She is chair of the Division of Policy and Global Affairs (PGA) of the National Research Council and a former chair of the Council’s Office of Science and Engineering Policy Advisory Board. She has served in many advisory capacities and on numerous committees. She is a fellow of the American Academy of Arts and Sciences, is a fellow and past president of the American Association for the Advancement of Science (AAAS). She is a former, U.S. senate confirmed, member of the National Science Board and was also a member of the Laboratory Operations Board of the U.S. Department of Energy. She

was a member of the board of directors of the National Association of State Universities and Land-Grant Colleges (NASULGC). Among numerous other distinctions, she was a member of the National Oceanic and Atmospheric Administration (NOAA) Science Advisory Board and of the Task Force on the Future of Science Programs at the U.S. Department of Energy. She was a member of the National Commission on Writing in America’s Schools and Colleges, appointed by the College Board. She is a member of the biotech company, Maxygen, Inc., Board of Directors and has also served on various other for profit and non-profit advisory boards.

Margaret L. Gourlay, M.D., M.P.H.

Assistant Professor, Department of Family Medicine, University of North Carolina–Chapel Hill

Dr. Gourlay received her M.D. degree from Rush Medical College in Chicago in 1998 and completed her Family Medicine residency at the University of California, San Diego Medical Center in 2001. She served as the American Family Physician Medical Editing Fellow at Georgetown University from 2001 to 2002. From 2002 to 2004, she was a research fellow in the Robert Wood Johnson Clinical Scholars Program at UNC, and earned an M.P.H. in the UNC School of Public Health. Dr. Gourlay is currently an Assistant Professor in the UNC Department of Family Medicine. She is supported on an NIH K23 career development award to study selective screening for osteoporosis in younger postmenopausal women.

Evelynn Hammonds, Ph.D., S.M.

Barbara Gutmann Rosenkrantz Professor, History of Science and of African and African American Studies, Harvard University

Dr. Evelynn M. Hammonds, Barbara Gutmann Rosenkrantz Professor of the History of Science and of African and African American Studies at Harvard University became Harvard’s first Senior Vice Provost for Faculty Development and Diversity in July 2005. In this role, Dr. Hammonds directs Harvard’s institutional policies and transformation, university-wide, in areas of faculty growth and diversity. Her scholarship focuses on the intersection of

scientific, medical, and socio-political concepts of race in the United States. She is the author of *Childhood's Deadly Scourge: The Campaign to Control Diphtheria in New York City, 1880-1930*. She co-edited *Gender and Scientific Authority* with Barbara Laslett, Sally G. Kohl, and Helen Longino, and she is completing two new books on the history of race in science and medicine. Dr. Hammonds earned a Ph.D. in the History of Science from Harvard University, an S.M. in physics from Massachusetts Institute of Technology (MIT), a B.E.E. in electrical engineering from the Georgia Institute of Technology, and a B.S. in physics from Spelman College. She is an Associate Member of the Broad Institute of Harvard/MIT. Dr. Hammonds serves as a member of the Board of Governors, University of California Humanities Research Institute, a member of the Board of the Association of American Colleges and Universities, a member of the Board of Overseers, Museum of Science, Boston, and a member, of the Board of Trustees, of the Social Science Research Council.

Carol L. Hampton, M.M.S.

Associate Dean for Faculty and Instructional Development, Office of Faculty Affairs, School of Medicine; Director of Leadership, Institute for Women's Health, Virginia Commonwealth University

Carol L. Hampton is Associate Dean for Faculty and Instructional Development, Office of Faculty Affairs at the Virginia Commonwealth University (VCU) School of Medicine (SOM), Medical College of Virginia Campus, Richmond, VA. Appointed in October 1994, she established the first faculty development office at the School. Her responsibilities are to provide leadership and administration for instructional development, faculty development, and women in medicine and science. She has served as Director of Leadership for the Institute of Women's Health Center of Excellence since 2003. She received the School of Medicine's Award for Educational Innovation in 2000 and the Women in Science, Dentistry, and Medicine (WISDM) Professional Achievement Award in 2004. In 1998-99, she was appointed by the Governor of the Commonwealth of Virginia to the Southern Governors' Task Force on Medical Technology, focusing on telemedicine in the southern region. She was

key in development of the VCU SOM Women in Medicine Program, which received the Association of American Medical Colleges' 2000 Women in Medicine Leadership Development Award. Previous appointments at VCU include six years as the School's chief administrator for telemedicine, which is now integrated into the VCU Health System's ambulatory care clinics; Director of Instructional Development in the Office of Continuing Medical Education, leading the development of the Virginia Hospital Television Network with broadcasts of video and audio conferences nationwide; and Associate Professor and Biomedical Communications Specialist in Visual Education Department. Her background includes 25 years in instructional development, program innovation, and applications of technology to medical education for students, residents, and practitioners. Her master's degree in biomedical communication is from Tulane University.

Eve J. Higginbotham, M.D., M.P.H., S.M.

Dean and Senior Vice President for Academic Affairs, Morehouse School of Medicine

An internationally renowned expert in the treatment of glaucoma, Dr. Eve J. Higginbotham assumed the position of Dean and Senior Vice President for Academic Affairs at Morehouse School of Medicine (MSM) in Atlanta, Georgia, on April 24, 2006. Upon her appointment in 1994 as Chair of the Ophthalmology and Visual Sciences Department at the University of Maryland School of Medicine in Baltimore, Higginbotham became the first woman to head a university-based ophthalmology department in the United States. Prior to joining the faculty at the University of Maryland, Higginbotham was Chief of the Glaucoma Clinic at the University of Illinois (1985-90) and was an associate professor with tenure at the University of Michigan (1990-94), where she served as assistant dean for Faculty Affairs. Higginbotham has served on the Advisory Council of the National Eye Institute, the Board of Trustees of the American Academy of Ophthalmology, the Board of Women in Ophthalmology, and the Helen Keller Foundation. She is the past president of the Maryland Society of Eye Physicians and Surgeons and recently completed her term as the 100th

President of the Baltimore City Medical Society. In 2001, she completed a 4-year term as a voting member of the FDA Ophthalmic Devices Panel. She currently serves as Chair of the Planning Committee for the National Eye Health Education Program of the National Eye Institute (NEI) and she is a member of the Data and Safety Monitoring Committee for the NEI's Clinical Research Center. Higginbotham is a member of the Friends of the Congressional Glaucoma Caucus Foundation (FCGCF). As the director of Outreach Services for the FCGCF, she developed a program that encourages medical students to screen for glaucoma in their local communities and, as a result, enhances their exposure to ophthalmology. Student Sight Savers programs are now under way in more than 30 medical schools nationally. Higginbotham was elected to the Institute of Medicine in 2000. She has published more than 100 peer-reviewed articles, and she has co-edited four textbooks in ophthalmology. Higginbotham has received numerous awards and honors during her career, including the Suzanne Veroneaux-Troutman Award and the Roman Barnes Achievement Award. She was one of 65 nominees recognized nationally for the AAMC Humanism in Medicine Award in 2004. She has lectured extensively both nationally and internationally on a range of topics, including physiology of the trabecular meshwork, total quality management, surgical advances in glaucoma and lessons learned from clinical trials. She has been listed among the Best Doctors in America for more than a decade, as one of the top 10 Baltimoreans in 2000, and among the "Top Docs" in Baltimore and Michigan. Higginbotham received her S.B. and S.M. degrees in chemical engineering from the Massachusetts Institute of Technology (MIT). She earned her medical degree from Harvard Medical School. She completed her fellowship training in the subspecialty of glaucoma at the Massachusetts Eye and Ear Infirmary in Boston. She is a board-certified ophthalmologist. Higginbotham is a native of New Orleans. Her husband is Dr. Frank Williams, formerly the CEO of the Boys and Girls Clubs of Central Maryland and now Principal, Williams Advisory Group, LLC.

Lynne Holden, M.D.

President, Mentoring in Medicine, and Assistant Professor, Department of Emergency Medicine, Albert Einstein College of Medicine

Dr. Lynne Holden graduated from Howard University for her undergraduate studies in 1987. She attended Temple University for medical school graduating in 1991. She relocated to New York in 1992 to complete her residency training in Emergency Medicine at Jacobi Hospital where she served as chief resident.

She began her practice at Kings County Hospital in Brooklyn in 1995 before moving to Montefiore Medical Center, where she has been an attending physician for 11 years. In addition to caring for patients, her activities include conducting research on back pain, teaching Physical Diagnosis at the Albert Einstein College of Medicine, serving for 8 years as co-chairperson of the Admissions Committee at the Albert Einstein College of Medicine, and serving for 6 years as Associate Residency Director for the Jacobi-Montefiore Emergency Medicine Residency Program, the largest training program in emergency medicine in the northeast. Dr. Holden created the Emergency Department Clinical Exposure and Mentoring Program at Montefiore in November 2002 for Black and Hispanic college students interested in pursuing a medical career gain experience volunteering and in clinical research. Dr. Holden helps each student to develop a strategic plan for successful entry into a health profession. To date, 247 students have completed the program with over 75 percent in a health-related profession. Dr. Holden realized that students need to be prepared earlier in life for a career in medicine and in March 2006, she and three colleagues started a national nonprofit called Mentoring in Medicine, which operates in New York and Oakland, California. The mission is to address healthcare disparities through mentorship, academic enrichment, and leadership development in Black, Hispanic, and Native American students from third grade through health professional school. In just over 1 year, Mentoring in Medicine programs have served nearly 1,500 students. Dr. Holden has received several national awards including the Universal Sisters Commitment to Women's Health

Award in September 2006, the Prostate Net In the Know Community Leadership Award in September 2007, and the Maybelline NY/Essence Empowerment through Education Award in October 2007. She is married to Mr. Andrew Morrison and they are the proud parents of a 10-year-old daughter.

Scott Hultgren, Ph.D.

Helen L. Stoeber Professor of Molecular Microbiology and Director, Center for Women's Infectious Disease Research, Washington University in St. Louis School of Medicine

Dr. Hultgren received his undergraduate education at Indiana University and his Ph.D. at Northwestern University in Chicago. He completed his postdoctoral training at Umeå University in Sweden under the tutelage of Staffan Normark. His major interests have been in elucidating basic mechanisms of bacterial pathogenesis. His work has represented a unique blend of the power of genetics with X-ray crystallography, protein chemistry, high-resolution electron microscopy, immunology, and cell biology to study the molecular details of host-pathogen interactions that occur during urinary tract infections (UTIs) caused by *E. coli*. He has become a world authority in issues relating to the structure and function of adhesive fibers, called pili that play critical and unexpected roles in host-pathogen interactions. Studying UTIs, he found that bacterial entry into epithelial cells of the bladder provides a safe haven for bacterial persistence by activating the formation of intracellular bacterial communities (IBCs). Elucidation of the IBC program is changing the way UTIs are evaluated and treated and is reshaping models of bacterial infections in general. His studies are teaching us fundamental aspects of bladder physiology that have implications for normal epithelial renewal and bladder cancer. He also is investigating amyloid-like fibers, called curli, produced by *E. coli*. This work has implications for the pathology of Alzheimer's and other amyloid diseases. Work in his lab is spawning new technologies to design novel vaccines and anti-microbial therapeutics that will block the ability of bacteria to adhere to host tissues and prevent their ability to establish infections. Dr. Hultgren received the Eli Lilly award in 1998, which is the preeminent award granted in

Microbiology for individuals under 40. Among his other honors are a Nobel Fellowship and recognition as a Nobel Fellow; an NIH Merit grant; a Shipley Lecturer at Harvard University and Chairman of a Gordon Conference on Microbial Attachment; and an honorary Doctor of Philosophy at Umeå University in Sweden. He was recently selected as Coursemaster-of-the-Year at Washington University in St. Louis in honor of his dedication to teaching. This year he was selected as the Director of the Center for Women's Infectious Disease Research, which he is establishing at Washington University and was also awarded the Academic Women's Network Mentor of the Year Award, which recognizes an individual who has served as an outstanding mentor to female faculty and trainees. Web site: <http://www.hultgrenlab.wustl.edu>

Raynard S. Kington, M.D., Ph.D., M.B.A.

Deputy Director, National Institutes of Health (NIH)

Dr. Raynard S. Kington was appointed Deputy Director of the National Institutes of Health (NIH) as of February 9, 2003. The Deputy Director, NIH, functions as the Principal Deputy Director to the Director, NIH; and shares in the overall leadership, policy direction, and coordination of NIH biomedical research and research training programs of NIH's 27 Institutes and Centers. Prior to this appointment, he had been Associate Director of NIH for Behavioral and Social Sciences Research since September, 2000. In addition to this role, from January, 2002 to November, 2002, he served as Acting Director of the National Institute on Alcohol Abuse and Alcoholism. Prior to coming to NIH, Dr. Kington was Director of the Division of Health Examination Statistics at the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). As Division Director, he also served as Director of the National Health and Nutrition Examination Survey (NHANES), one of the Nation's largest studies to assess the health of the American people. Prior to coming to NCHS, he was a Senior Scientist in the Health Program at the RAND Corporation. While at RAND, Dr. Kington was a Co-Director of the Drew/RAND Center on Health and Aging, a National Institute on Aging Exploratory

Minority Aging Center. Dr. Kington attended the University of Michigan, where he received his B.S. with distinction and his M.D. He subsequently completed his residency in Internal Medicine at Michael Reese Medical Center in Chicago. He was then appointed a Robert Wood Johnson Clinical Scholar at the University of Pennsylvania. While at the University of Pennsylvania, he completed his M.B.A. with distinction and his Ph.D. with a concentration in Health Policy and Economics at the Wharton School and was awarded a Fontaine Fellowship. He is board-certified in Internal Medicine and Public Health and Preventive Medicine. Dr. Kington's research has focused on the role of social factors, especially socioeconomic status, as determinants of health. His current research includes studies of the health and socioeconomic status of black immigrants, differences in populations in willingness to participate in genetic research, and racial and ethnic differences in infectious disease rates. His research has included studies of the relationship between wealth and health status; the health status of U.S. Hispanic populations; the determinants of healthcare services utilization; the economic impact of health care expenditures among the elderly; and racial and ethnic differences in the use of long-term care.

Phoebe Leboy, Ph.D.

President-elect, Association of Women in Science, and Professor of Biochemistry, University of Pennsylvania School of Dental Medicine

Dr. Phoebe Leboy received her B.S. from Swarthmore College and her Ph.D. from Bryn Mawr College. She joined the faculty of the University of Pennsylvania in 1966, where she remained until retiring in 2005. While at Penn, she was a faculty member in the Cell and Molecular Biology and Bioengineering Graduate Groups, served as Chair of the University Faculty Senate, Chair of the Graduate Group in Molecular Biology, and chair of her department. She served as chair of the NIH SBDD Study Section and is President-elect of the Association for Women in Science (AWIS). During 2000-2001 she co-chaired Penn's Task Force on Gender Equity, and she continues to serve as a liaison from Penn to the MIT/9 University consortium

on gender equity in science. Dr. Leboy has received a NATO Postdoctoral Fellowship (1966-67), NIH Research Career Development Award (1971-76), Fogarty Senior International Fellowship (1989-90), and a Lindback Award for Distinguished Teaching (2005).

Shirley Malcom, Ph.D.

Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science

Dr. Shirley Malcom is Head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom serves on several boards, including the Heinz Endowments and the H. John Heinz III Center for Science, Economics, and the Environment and is an honorary trustee of the American Museum of Natural History. In 2006 she was named as co-chair (with Leon Lederman) of the National Science Board Commission on 21st Century Education in STEM. She serves as a Regent of Morgan State University and as a trustee of Caltech. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. Dr. Malcom is a former trustee of the Carnegie Corporation of New York. She is a fellow of the AAAS and the American Academy of Arts and Sciences. She served on the National Science Board, the policymaking body of the National Science Foundation, from 1994 to 1998, and from 1994-2001 served on the President's Committee of Advisors on Science and Technology. Dr. Malcom received her Ph.D. in ecology from Pennsylvania State University; M.S. degree in zoology from the University of California, Los Angeles; and B.S. degree with distinction in zoology from the University of Washington. She also holds 15 honorary degrees. In 2003 Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.

Linda McCauley, Ph.D., FAAN, FAAOHN, R.N.*Associate Dean, School of Nursing,
University of Pennsylvania*

Dr. Linda McCauley is the Associate Dean for Research in the School of Nursing at the University of Pennsylvania. She is an accomplished researcher in the area of environmental and occupational health, with a substantial history of research funding by the National Institutes of Health (NIH), Centers for Disease Control and Prevention (CDC), U.S. Department of Defense, U.S. Department of Veterans' Affairs, and Agency for Healthcare Research and Quality (AHRQ). She is recognized for her integration on community-based participatory research models with vulnerable populations. Dr. McCauley has a long career of education and mentorship of interdisciplinary scholars in nursing, law, neuropsychology, medicine, epidemiology, and public health. At the University of Pennsylvania she oversees the mentorship of postdoctoral fellows in the School of Nursing and sets guidelines for mentorship of junior members and students in the school's established nursing research centers.

Kristen Mitchell, Ph.D.*Postdoctoral Fellow, Department of Pharmacology
& Toxicology, University of Texas Medical Branch*

Dr. Kristen Mitchell is currently a Postdoctoral Fellow in the Department of Pharmacology and Toxicology at the University of Texas Medical Branch (UTMB) in Galveston, TX. She completed her Ph.D. in Pharmacology/Toxicology at Washington State University in Pullman, WA. Her research interests lie in understanding the molecular events by which exposure to toxicants modulates normal homeostatic processes such as immune function and cell cycle progression. Since her arrival at UTMB in 2003, Dr. Mitchell has served as Chair of the UTMB Organization for Postdoctoral Scientists and has been a member of several committees within the National Postdoctoral Association. Currently, she serves as Chair of the Postdoctoral Assembly Board in the Society of Toxicology (SOT), where she works with board members and SOT Council to provide mentoring opportunities and leadership experiences to postdocs within the Society. In January 2008,

Dr. Mitchell will begin a tenure-track faculty position in the Department of Biology at Boise State University. She is grateful for the excellent mentoring she received throughout her graduate and postdoctoral training and looks forward to developing her mentoring skills as she trains graduate students in her own laboratory.

Page S. Morahan, Ph.D.*Co-director, Executive Leadership in Academic
Medicine (ELAM), Drexel University College
of Medicine*

Page S. Morahan, Ph.D., is Co-director of the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) Program for Women, and Co-director of the Foundation for Advancement of International Medical Education and Research (FAIMER) Institute. A tenured part-time professor in microbiology and immunology at Drexel University College of Medicine, she has a consulting practice and conducts research in leadership development; strategic career planning; faculty affairs; and advancement of women. Dr. Morahan previously was Associate Provost for Faculty Affairs at MCP Hahnemann University and Founding Director of the National Center of Leadership in Academic Medicine, and Chair of the Department of Microbiology and Immunology for ten years at the Medical College of Pennsylvania. She was the first woman President of the Association of Medical School Microbiology and Immunology Chairs in 1990. Dr. Morahan was an American Council on Education (ACE) Fellow in 1992-93, participated in the Harvard University Graduate School of Education's Management Development Program, and has received certification in several organizational and personnel developmental processes. She has served on committees and taskforces of the National Board of Medical Examiners, Association of American Medical Colleges (AAMC), National Institutes of Health (NIH), and American Society for Microbiology. Her honors include an NIH Research Career Development Award, Lindback Award for teaching excellence, AAMC Women in Medicine Leadership Development Award, The Network Annual Leadership Award from the ACE Office of Women in Higher Education; the Society for Executive Leadership

in Academic Medicine Award of Excellence; Fellow of American Women in Science, Fellow in American Academy of Microbiology and membership in the Forum of Executive Women. Dr. Morahan received her B.S., *magna cum laude*, from Agnes Scott College; M.A., from Hunter College; and Ph.D. in Microbiology from Marquette University. Additional information can be found at www.drexelmed.edu/ELAM and www.faimer.org.

Carol Muller, Ph.D.

Founder and Chief Executive Officer, MentorNet, E-Mentoring Network for Diversity in Engineering and Science

Carol B. Muller, Ph.D., is the founder and Chief Executive Officer of MentorNet (www.MentorNet.net), the E-Mentoring Network for Diversity in Engineering and Science, a nonprofit organization, and consulting associate professor of mechanical engineering at Stanford University. An educator and social entrepreneur, she has spent 30 years working in higher education, including work in academic administration, strategic planning and budget development, external relations, faculty recruitment, admissions, educational program development, implementation, and evaluation, and facilities program planning and development. A long-standing interest in gender equity in education and employment, coupled with professional work in engineering and science education beginning in 1987, prompted her to develop a number of new initiatives to tap the full range of human resources in scientific and technical pursuits. Both the Women in Science Project at Dartmouth, developed when she served as associate dean for Thayer School of Engineering, and MentorNet have been awarded the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Dr. Muller has authored numerous papers; is frequently an invited speaker; has received grants for her work from private foundations, corporations, and the Federal Government as well as a variety of awards; and serves on a number of boards. Dr. Muller received her A.B. in philosophy/English from Dartmouth College in 1977, her A.M. in 1981, and her Ph.D. in Administration & Policy Analysis from Stanford University in 1985.

Nancy Nielsen, M.D., Ph.D.

President-Elect, American Medical Association and Clinical Professor of Medicine, University of Buffalo School of Medicine and Biomedical Sciences

Dr. Nancy H. Nielsen, an internist from Buffalo, N.Y., was elected president-elect of the American Medical Association (AMA) in June 2007. Previously, Dr. Nielsen served four terms as speaker of the AMA House of Delegates (HOD) and three terms as vice speaker. She is a delegate from New York and served two terms on the AMA Council on Scientific Affairs. Dr. Nielsen worked with colleagues on the Council on Scientific Affairs to help formulate policy positions for AMAHOD debates on the diagnosis and treatment of depression, alcoholism among women, Alzheimer's disease, priorities in clinical preventive services, colorectal cancer screening, asthma control, nicotine content of cigarettes, and safety in dispensing prescriptions. Among other AMA positions, Dr. Nielsen has served as a member of the National Patient Safety Foundation board of directors, the Commission for the Prevention of Youth Violence, and the Task Force on Quality and Patient Safety. She currently serves as a delegate to the AMA Medical School Section, and she is a liaison to the Council on Medical Education. In 2002 Dr. Nielsen was appointed to serve on the U.S. Department of Health and Human Services Advisory Committee on Regulatory Reform. She is the AMA representative on several quality initiatives, including the National Quality Forum, the AMA-convened Physician Consortium for Performance Improvement®, and the Ambulatory Care Quality Alliance. She serves on the Institute of Medicine's Roundtable on Evidence Based Medicine, and on the Consumer Empowerment Committee of America's Health Information Community. Dr. Nielsen was speaker of the Medical Society of the State of New York House of Delegates and a member of the board of directors of the Medical Liability Mutual Insurance Company—one of the largest malpractice carriers in the country. She has also served as president of her county medical society and of her hospital's medical staff. Dr. Nielsen holds a Ph.D. in microbiology and received her M.D. from the State University of New York (SUNY) at

Buffalo School of Medicine and Biomedical Sciences, where she is Clinical Professor of Medicine and Senior Associate Dean for Medical Education. She has served as a trustee of SUNY and as a member of the board of directors of Kaleida Health—a five-hospital system in western New York. Dr. Nielsen, who was born and raised in West Virginia, is the mother of five children.

Eugene Orringer, M.D.

Professor of Medicine, Executive Associate Dean for Faculty Affairs & Faculty Development, School of Medicine, University of North Carolina—Chapel Hill

Eugene P. Orringer received an A.B. in Zoology from the University of Michigan in 1965 and an M.D. from the University of Pittsburgh School of Medicine in 1969. He then moved to Chapel Hill, NC where, in 1975, after training in both Internal Medicine and Hematology, he joined the faculty as an Assistant Professor in the Department of Internal Medicine. Dr. Orringer was promoted to Associate Professor in 1979 and to Professor in 1986. He served as the Program Director of UNC's NIH-funded General Clinical Research Center (GCRC) for a 10 year period that began in 1989. In 1999, he was named to his present position as Executive Associate Dean for Faculty Affairs and Faculty Development in the UNC School of Medicine. Dr. Orringer's research activities have focused primarily on the membrane transport properties of the normal human erythrocyte and on its disordered physiology in a variety of pathological states, especially sickle cell disease. Dr. Orringer has consistently held peer-reviewed grant support from the NIH for the past 26 years. Upon assuming the Directorship of the GCRC, he began to focus more and more of his efforts on clinical and translational research. In addition to his own research activities, Dr. Orringer has been consistently involved in the training of young people. He has for years been a participant in numerous NIH-funded pre- and postdoctoral training programs. In 1995, Dr. Orringer assumed the Directorship of the UNC M.D.-Ph.D. Program that has now grown from 12 to 65 students. Two years after taking

on this new role, Dr. Orringer wrote UNC's first successful *Medical Scientist Training Program* (MSTP) grant, an award that has enabled the enrollment of the UNC M.D.-Ph.D. Program to grow from 10 to 65 students. Dr. Orringer is also the Principal Investigator on three separate K12 awards from the NIH. These include: the Building Interdisciplinary Research Careers in Women's Health (or BIRCWH) award; the Mentored Clinical Research Scholar Program Award; and the Multidisciplinary Clinical Research Career Development (Roadmap) Award. In addition, Dr. Orringer developed and currently directs two institutionally funded junior faculty development programs: the Simmons (Minority) Scholar Program and the UNC Program in Translational Science. The three K12 awards combined with the two institutionally funded programs are currently supporting 40 junior faculty members, all of whom are committed to academic, research-oriented careers. In addition to these training programs, Dr. Orringer and Dr. Marilyn Telen, his counterpart from Duke University, together direct the combined Duke–UNC Comprehensive Sickle Cell Center. This five year center grant from National Heart, Lung, and Blood Institute (NHLBI) employs the U54 mechanism to support a variety of basic and clinical research projects at their two institutions. Drs. Telen and Orringer also developed two additional sickle cell-related R01 grants, *Outcome Modifying Genes in Sickle Cell Disease* and *Pulmonary Complications of Sickle Cell Disease*. Dr. Orringer has served as a member (and Chairperson) of the NIH Sickle Cell Disease Advisory Committee, as a member of the NIH GCRC Study Section, and as the President of the National GCRC Program Directors' Association. He is Treasurer and a member of the Steering Committee Clinical Research Forum. He currently serves as a member of two NIH Advisory Committees: the Sickle Cell Disease Branch of the NHLBI and the Office of Research on Women's Health. Finally, Dr. Orringer was the 2006 recipient of the Philip Hench Award, an honor given to an individual selected by the School of Medicine of the University of Pittsburgh as its most distinguished alumnus of the year.

Leslie V. Parise, Ph.D.

Professor and Chair, Department of Biochemistry and Biophysics, University of North Carolina–Chapel Hill

Dr. Parise is a recognized leader in cardiovascular research, especially in area of blood platelets, which cause heart attacks and stroke and sickle cell disease. Her research is specifically focused on the structure and function of adhesion receptors and associated proteins that contribute to both cardiovascular disease and cancer. Her work involves a wide array of techniques ranging from x-ray crystallography to determine protein structure, mouse models of diseases, and even a clinical trial in patients that resulted from basic research in her lab. Dr. Parise received her undergraduate degree in Chemistry and Biology from the University of Illinois, Urbana-Champaign in 1976 and her Ph.D. in Pharmacology from the University of Illinois–Chicago in 1982 where she trained with Dr. Guy Le Breton in platelet physiology. Her postdoctoral studies were at the Gladstone Foundation/UCSF with Dr. David Phillips where she studied the platelet integrin GPIIb-IIIa. She became an assistant professor in the Department of Pharmacology at the University of North Carolina–Chapel Hill in 1988, was appointed full professor in 1999 and Vice-chair of Pharmacology in 2002. In September 2006 she was appointed Chair of the Department of Biochemistry and Biophysics at UNC-CH. Dr. Parise serves on several editorial boards including *The Journal of Cell Biology and Blood* and has served on numerous study sections including *Hematology-1* and *Biomedical Research Training Review*. In 2003, Dr. Parise received the Stewart-Niewiarowski Award for Women in Vascular Biology from Temple University, she was elected a fellow of the American Association of the Advancement of Science in 2007, and was elected chair for the 2009 Gordon Research Conference on Cell Biology of Megakaryocytes and Platelets.

Vivian W. Pinn, M.D.

Associate Director for Research on Women's Health Director, Office of Research on Women's Health, National Institutes of Health

Vivian W. Pinn, M.D., is the first full-time Director of ORWH, an appointment she has held since November 1991 and since 1994, she was also named Associate Director for Research on Women's Health, NIH. Dr. Pinn came to NIH from Howard University College of Medicine in Washington, DC, where she had been Professor and Chair of the Department of Pathology since 1982. Dr. Pinn has been invited to present the ORWH's mandate, programs, and initiatives to many national and international organizations with an interest in improving women's health and the health of minorities. Her recent focus has been to raise the perception of the scientific community about the importance of sex and gender factors in basic science, clinical research, and health care. Dr. Pinn earned her B.A. from Wellesley College and received her M.D. from the University of Virginia (UVA) School of Medicine. She completed her postgraduate training in pathology at Massachusetts General Hospital, during which time she also served as Teaching Fellow at Harvard Medical School. Dr. Pinn then joined the faculty of Tufts University School of Medicine and Tufts-New England Medical Center Hospital until leaving for her position at Howard University. She is a member of many professional and scientific organizations, in which she held many positions of leadership. Dr. Pinn has received numerous honors and awards, and has been granted nine honorary degrees since 1992. She is a fellow of the American Academy of Arts and Sciences and was elected to the Institute of Medicine in 1995. She received an Alumni Achievement Award from Wellesley College in 1993 and the second annual Distinguished Alumna Award from UVA in September 1992. She has been recognized for her contributions to women's health and medicine by many professional organizations including the President's Achievement Award from AMWA, the James D. Bruce Memorial Award from the American College of Physicians for distinguished contributions in preventive medicine; the 2000 Women in Medicine Leadership Development Award from the AAMC; the Commonwealth

Fund's Margaret E. Mahoney Award for Outstanding Service for work in advancing the quality of health care for women; and the Lifetime Achievement Award from the Jacobs Institute of Women's Health. In 2007, Dr. Pinn received the University of Virginia Walter Reed Distinguished Alumni Achievement Award.

Jennifer Reineke Pohlhaus, Ph.D.

*AAAS Science & Technology Policy Fellow,
Office of Research on Women's Health,
National Institutes of Health*

Dr. Pohlhaus is currently in the AAAS Science & Technology Policy Fellow Program, where she works on women's career advancement in the biomedical sciences in the Office of Research on Women's Health (ORWH) at the National Institutes of Health (NIH). Her experience at the NIH has allowed her to focus on national science policy issues, especially how Federal policy impacts academic health centers and research institutions. As the primary staff to the NIH Working Group on Women in Biomedical Careers, she has been a key player in its efforts to advance women's careers in biomedical research. Her interest in science policy began in graduate school, where she received a Graduate Certificate in Health Policy and participated in the Duke University Global Health Initiative and was instrumental in creating the successful application to establish a Global Health Certificate Program for both undergraduates and graduates. She did a post-doctoral fellowship in genomics at the Duke University Center for Public Genomics, where she performed a world survey of publicly funded genomics research, in addition to studying the ethical, legal, and social implications (ELSI) of genomics research. Dr. Pohlhaus received her B.S. in Biochemistry/Biophysics, with a minor in Management, *summa cum laude* from Rensselaer Polytechnic Institute and her Ph.D. in Biochemistry from Duke University, where she studied mechanisms for DNA damage during microbial replication. She was recently elected to the Board of Directors of the National Postdoctoral Association (NPA).

Linda Pololi, M.B.B.S., M.R.C.P.

Senior Scientist, Brandeis University

Dr. Pololi received her medical degree and postgraduate training at the University of London, UK. She completed a hematology/oncology fellowship at the University of Illinois College of Medicine at Chicago, and became a Research Assistant Professor of Medicine and a VA-funded Associate Investigator in stem cell research. After taking some years with her children, Dr. Pololi reentered academic medicine in General Internal Medicine at Brown University, focused her research on physician-patient communication and behavioral change in preventive medicine, implemented competency-based preventive medicine and medical interviewing courses for medical students and residents, and founded Brown's standardized patient program. As Assistant Dean at East Carolina University (ECU), Dr. Pololi continued her research in medical education, established a number of innovative major courses for students that emphasized humanistic approaches in medical education and founded the School's Office of Faculty Development. She designed and implemented a series of highly successful interdisciplinary model faculty development programs to foster the professional and personal development of medical faculty. A hallmark of these programs was their foundation in relationship, self-awareness, and collaboration. At ECU, she was PI on multiple sub-grants for the RWJ Generalist Physician Initiative, as well as co-investigator on a Department of the Army grant on culturally based interventions for breast cancer in rural African Americans. Recognition of the effective innovations she brought to faculty development work led to her being funded by US DHHS, Office on Women's Health as PI and Founding Center Director to establish one of four vanguard National Centers of Leadership in Academic Medicine. Through that Center, Dr. Pololi established innovative mentoring programs for medical faculty with the goals of career advancement of junior faculty and gender equity in academic medicine. She has served as consultant to medical schools and to the

U.S. Surgeon General's Physician Professional Advisory Committee on developing mentoring and mentor training programs, as well as facilitating faculty development programs on intercultural awareness and communication at a number of schools and for the Public Health Services Office of Minority Health. Dr. Pololi continues to be active with the American Academy on Communication in Healthcare and is a trained facilitator for its national faculty development courses and for the retreats of the Center for Courage and Renewal. Dr. Pololi's efforts to improve education for students and faculty have emphasized humanizing the learning environment, learner-centered and relationship-based methodologies facilitative of learning, the parallel between the physician-patient and teacher-learner relationships, mentoring and multiculturalism. Prior to joining the Scholars Program at Brandeis, she was Professor of Medicine and Vice Chancellor for Education at the University of Massachusetts Medical School. At Brandeis University, Dr. Pololi is currently PI on a national action-research initiative to facilitate change in the culture of academic medicine, and to understand and address the intransigent underrepresentation of women, minority and generalist faculty in leadership and senior positions in medical schools.

Claire Pomeroy, M.D., M.B.A.

*Vice Chancellor for Human Health Sciences and Dean, School of Medicine
University of California–Davis*

Dr Claire Pomeroy, Vice Chancellor for Human Health Sciences at University of California–Davis and Dean of the UC–Davis School of Medicine, is an expert in infectious diseases and a professor of internal medicine and microbiology and immunology. She oversees the UC–Davis Health System and all its academic, research and clinical programs, including the 800-member physician group known as UC–Davis Medical Group and the 577-bed acute-care hospital known as UC–Davis Medical Center. With an operating budget of nearly \$1 billion, patient visits of nearly 900,000, and more than \$120 million in outside research funding, UC–Davis Health

System is a major contributor to the health care and economy of the Sacramento region. Dr. Pomeroy joined UC–Davis in 2003 as executive associate dean of the School of Medicine. In that role, she guided the development of a new strategic plan, enhanced the infrastructure for research and educational programs, and integrated the operations of the medical school and teaching hospital. She founded the Center for Reducing Health Disparities at UC–Davis Health System. Dr. Pomeroy leads an active research team studying host responses to infectious diseases. She has published over 100 articles and book chapters and edited two books. With special expertise in HIV/AIDS, she is a long-time advocate for patients with HIV/AIDS and has a special interest in healthcare policy. She also has led efforts to advance electronic health records to improve healthcare quality. Dr. Pomeroy is a member of the Independent Citizens Oversight Commission that governs the California Institute for Regenerative Medicine, the stem-cell initiative approved by California voters in November 2004. Dr. Pomeroy received her B.A. and M.D. from the University of Michigan, and then completed her residency and fellowship training in internal medicine and infectious diseases at the University of Minnesota. She also earned an M.B.A. from the University of Kentucky. She held faculty positions at the University of Minnesota and the University of Kentucky prior to her move to UC–Davis. At the University of Kentucky, she served as Associate Dean for Research and Informatics and as a member of the University Board of Trustees. She lives in Sacramento with her husband, William Preston Robertson, a filmmaker and author.

Joan Y. Reede, M.D., M.P.H., M.S.

*Dean for Diversity and Community Partnership,
Harvard Medical School*

Dr. Joan Reede is Dean for Diversity and Community Partnership and Associate Professor of Medicine at Harvard Medical School and director of the Minority Faculty Development Program. She is responsible for the development and management of a comprehensive

program that provides leadership, guidance, and support to promote the increased recruitment, retention and advancement of underrepresented minority faculty at Harvard Medical School. This charge includes oversight of all diversity activities as they relate to faculty, trainees, students, and staff. Dr. Reede holds the appointment of associate professor of medicine at Harvard Medical School, associate professor of society, human development and health at the Harvard School of Public Health, and assistant in health policy at Massachusetts General Hospital. She has served on the Board of Governors for the Warren Grant Magnuson Clinical Center, the National Advisory Dental and Craniofacial Council of the National Institutes of Health, the Health and Human Services Advisory Committee on Minority Health, the Secretary's Advisory Committee on Genetics, Health, and Society, and as a commissioner of The Sullivan Commission on Diversity in the Healthcare Workforce. Dr. Reede currently serves on the Secretary's Advisory Committee to the Director of the National Institutes of Health and the Sullivan Alliance to Transform America's Health Professions. In 2005, Reede received the Herbert W. Nickens Award from the Society of General Internal Medicine and the Herbert W. Nickens Award from the Association of American Medical Colleges. In 2007, Dr. Reede was awarded the Riland Medal for Public Service from the New York College of Osteopathic Medicine, and an honorary Doctor of Science degree from the New York Institute of Technology. A graduate of Brown University and Mount Sinai School of Medicine, Dr. Reede completed her pediatric residency at Johns Hopkins Hospital in Baltimore, Maryland and a child psychiatry fellowship at Children's Hospital in Boston. She also holds an MPH and an MS in health policy and management from the Harvard School of Public Health.

Sue Rosser, Ph.D.

*Professor and Dean, Ivan Allen College,
Georgia Institute of Technology*

Dr. Sue Rosser received her Ph.D. in Zoology from the University of Wisconsin–Madison in 1973. Since July 1999, she has served as Dean of Ivan Allen College, the liberal arts college at Georgia Institute of Technology, where she is also Professor of Public Policy and of

History, Technology, and Society. She holds the endowed Ivan Allen Dean's Chair of Liberal Arts and Technology. From 1995-1999, she was Director for the Center for Women's Studies and Gender Research and Professor of Anthropology at the University of Florida-Gainesville. In 1995, she was Senior Program Officer for Women's Programs at the National Science Foundation. From 1986 to 1995 she served as Director of Women's Studies at the University of South Carolina, where she also was a Professor of Family and Preventive Medicine in the Medical School. She has edited collections and written approximately 120 journal articles on the theoretical and applied problems of women and science and women's health. She is the author of 10 books, *Teaching Science and Health from a Feminist Perspective: A Practical Guide* (1986), *Feminism within the Science and Health Care Professions: Overcoming Resistance* (1988), *Female-Friendly Science* (1990) from Pergamon Press, *Feminism and Biology: A Dynamic Interaction* (1992) from Twayne Macmillan, *Women's Health: Missing from U.S. Medicine* (1994) from Indiana University Press, and *Teaching the Majority* (1995), *Re-engineering Female Friendly Science* (1997), *Women, Science, and Society: The Crucial Union* (2000) from Teachers College Press, and *The Science Glass Ceiling: Academic Women Scientists and their Struggle to Succeed* (2004), her latest book is *Women, Gender, and Technology* (2006), co-edited with Mary Frank Fox and Deborah Johnson. She also served as the Latin and North American co-editor of *Women's Studies International Forum* from 1989-1993 and currently serves on the editorial boards of *NWSA Journal*, *Journal of Women and Minorities in Science and Engineering and Transformations*. She has held several grants from the National Science Foundation, including "A USC System Model for Transformation of Science and Math Teaching to Reach Women in Varied Campus Settings" and "POWRE Workshop"; from 2001-2006 she served as co-PI on a \$3.7 million ADVANCE grant from the National Science Foundation (NSF). She currently serves as PI on InTEL: Interactive Toolkit for Engineering Learning, a \$900,000 NSF grant. During the fall of 1993, she was Visiting Distinguished Professor for the University of Wisconsin System Women in Science Project.

Janet Rubin, M.D.

Professor of Medicine, University of North Carolina—Chapel Hill

Dr. Janet Rubin is a clinician-scientist working in the area of bone remodeling and osteoporosis. Before joining UNC in 2006, she was at Emory University and a senior scientist at the Atlanta Veterans Affairs Medical Center (VAMC) rising there through the VAMC career investigator track. Her current NIH-funded investigations concern the role of mechanical input in promoting bone formation at the level of both mesenchymal stem cells and pre-osteoblasts. These multidisciplinary investigations involve collaborators at University of Washington, Stony Brook, Jackson Labs, Yale and Georgia Tech. During her career at Emory and now at UNC, Dr. Rubin has been intimately involved in grant preparation and review; at the Atlanta VAMC she chaired the Research and Development Committee with a special interest in helping young investigators to be funded, and served as a reviewer for career development awards at the VAMC. She was a permanent reviewer on NIH study section and continues to serve as ad hoc for all types of grants. At Emory and now at UNC, she has been faculty on the divisional T32 Endocrine training grants. She also served on the newly established Career Development committee in the Department of Medicine at Emory. As such, Dr. Rubin has a longstanding interest in the mentoring of young investigators and is thrilled to be involved in the programs at UNC that support and develop careers of physicians in research.

Christy Sandborg, Ph.D.

Chief of Pediatric Rheumatology, Stanford University School of Medicine

Dr. Sandborg is Professor of Pediatrics at Stanford University School of Medicine, where her research focuses on clinical studies and clinical trials in systemic onset juvenile arthritis and pediatric SLE, and access to pediatric rheumatologist expertise. She is the Director of the Child Health Research Program at Lucile Salter Children's Hospital and Stanford School of Medicine, as well the Director of the Division of Pediatric Rheumatology and Chief of Staff of the

Children's Hospital. She is an internationally recognized leader in pediatric rheumatology, advocacy, education, and research. She has served on many national committees, including the American Board of Pediatrics Sub-board of Rheumatology, the American College of Rheumatology Board of Directors and other ACR committees, and local and national Arthritis Foundation committees. She has participated in several NIH Special Study Sections and invited workshops. She has been a member of the scientific advisory committees of several foundations, including the Lupus Foundation of America, Arthritis Foundation Southern California Chapter, and the Lupus Clinical Trials Consortium. She is one of the founders and immediate past-Chair of the Childhood Arthritis and Rheumatology Research Alliance (CARRA), a network of pediatric rheumatologists in the United States and Canada dedicated to clinical and translational research in pediatric rheumatic diseases. She has been the recipient of funding from the NIH, Arthritis Foundation, and other funding agencies, and she has mentored several pediatric rheumatology fellows and young faculty, who have received mentored career-development awards.

Walter T. Schaffer, Ph.D.

Senior Scientific Advisor for Extramural Research, National Institutes of Health

Wally Schaffer currently serves as the Senior Scientific Advisor for Extramural Research, National Institutes of Health. Prior to his move to the immediate office of the Deputy Director for Extramural Research, Dr. Schaffer served as Acting Director of the Office of Extramural Programs. He has also served as the NIH Research Training Officer for the NIH and Deputy Director of the Division of Program Analysis in the Alcohol Drug Abuse and Mental Health Administration. He has been a Scientific Review Administrator and a Senior Staff Fellow for the National Institute of Alcohol Abuse and Alcoholism. He joined the NIH in 1978 after earning a Ph.D. in Biochemistry at the University of Texas Health Science Center at San Antonio and a B.S. in Chemistry (1974) from the University of Washington. His research interests include hormonal influence on age-related changes and the regulation of oxidative metabolism in brain.

Joan Schwartz, Ph.D.*Assistant Director, Office of Intramural Research
National Institutes of Health*

Dr. Schwartz received her undergraduate degree in chemistry from Cornell University and her Ph.D. from Harvard University, with training in biological chemistry. After post-doctoral training at Rutgers Medical School, Dr. Schwartz moved to the NIH, where she has spent her entire professional career. Dr. Schwartz was a senior investigator, first in the National Institute of Mental Health, and then in the National Institute of Neurological Disorders and Stroke, studying neurotrophic factors. She is Assistant Director, Office of Intramural Research, Office of the Director, and has served as Acting Deputy Director, Office of Intramural Training and Education for 3 years. She chairs the NIH Committee on Scientific Conduct and Ethics, which developed the NIH course for tenure-track investigators, "How to Succeed as a PI at the NIH." She just finished chairing the Second Task Force on the Status of Intramural Women Scientists and is a member of the NIH Working Group on Women in Biomedical Careers, which is working to implement some of the recommendations of the Task Force.

W. Sue Shafer, Ph.D.*Consultant, Women's Careers in Science*

W. Sue Shafer, Ph.D., is a consultant to individuals about their careers as well as to institutions concerning women's careers in science and medicine. She has over 30 years of experience leading and managing broad-based scientific research programs in both Government and academia. She is adept at developing consensus about future research directions; and skilled at developing resources, overseeing expenditures, and educating others in the responsible conduct of research. Her particular interests are in scientific careers for women and minorities, developmental biology, biomedical ethics, and biomedical research policy. She's a seasoned team builder and mentor for both scientists and nonscientists. Trained as a developmental biologist, Dr. Shafer received her undergraduate degree from the University of Wisconsin, and her Ph.D. from

the University of Florida, Gainesville. She held positions of increasing responsibility at the National Institutes of Health, where she ultimately served as the Deputy Director of the National Institute of General Medical Sciences. She then moved to the University of California, San Francisco, where she was the Assistant Vice Chancellor for Research Administration and then the Deputy Director of the Institute for Quantitative Biomedical Research. Throughout her career, Dr. Shafer has mentored women and men (formally and informally) scientists, and non-scientists. She was a member of the Women in Cell Biology, Committee of the American Society for Cell Biology (ASCB) from 1990 through 2003 (chair from 1994 to 1998). She initiated the *Women in Cell Biology* column in the ASCB Newsletter (widely read by women and men for advice and insights to career development); and the ASCB's annual career lunch, a time for discussing career development issues among women (and men) scientists. She conceived and developed the idea for AXXS (Achieving XXcellence in Science) to facilitate and increase the contributions of women to science, working through their scientific societies. AXXS Committee activities (she was committee chair from 1998 to 2005) were supported by the Office of Research on Women's Health, NIH. As co-chair of UCSF Chancellor's Advisory Committee on the Status of Women, 2000 to 2002, she was co-principal investigator on a major study, commissioned by the Chancellor, of the climate for faculty at UCSF. The study paid particular attention to issues that impact women and men differently.

Jeanne C. Sinkford, D.D.S., Ph.D.*Associate Executive Director and Director
of the Center for Equity and Diversity
American Dental Education Association*

Dr. Jeanne Sinkford is Associate Executive Director of the American Dental Education Association, and Director of the Association's Center for Equity and Diversity. She is also Professor and Dean Emeritus, Howard University College of Dentistry. Dr. Sinkford's distinguished career in dental education includes serving as Dean of Howard University College of Dentistry from 1975-1991. Dr. Sinkford

is a nationally and internationally renowned dental educator, administrator, researcher, and clinician. She finished first in the dental class of 1958 at Howard University before pursuing graduate study at Northwestern University, where she received her M.S. (1962) and Ph.D. (1963). She completed a Pedodontic Residency at Children's Hospital National Medical Center in 1975. Dr. Sinkford became the first woman dean of a dental school in the United States in 1975. She served in that capacity for 16 years. She has served on numerous committees and advisory councils of national significance including the National Advisory Dental Research Council; Directors' Advisory Council, National Institutes of Health; Governing Board of the American Society for Geriatric Dentistry; Advisory Board, Robert Wood Johnson Health Policy Program; Committee A, Council on Dental Education and Chair, Appeal Board Council of Dental Education, American Dental Association; Council on Dental Research, American Dental Association; Tuskegee Study Advisory Panel; Special Medical Advisory Group (SMAG), Veterans Administration; Council, Institute of Medicine, National Academy of Sciences and the NRC Governing Board, National Academy of Sciences. She serves on Advisory Boards: Boston University Goldman School of Dental Medicine, Temple University School of Dentistry, Indiana University School of Dentistry and the New York University Oral Cancer Research for Adolescent and Adult Health Promotion (RAAHP) Center. Dr. Sinkford has more than 90 articles published in refereed journals and has written an instructional manual for Crown and Bridge Prosthodontics. She is co-author of *Women's Health in the Dental School Curriculum, Report of a Survey and Recommendations*. Dr. Sinkford holds honorary degrees from Georgetown University, the University of Medicine and Dentistry of New Jersey, and Detroit-Mercy University. She has received Alumni Achievement Awards from Northwestern University and Howard University and numerous other Citations for Exceptional Professional Achievement. Dr. Sinkford was selected as an Outstanding Leader in Dentistry by the International College

of Dentists. She is the first woman to be so honored. Dr. Sinkford has been a member of the Institute of Medicine, National Academy of Sciences since 1975.

Lawrence A. Tabak, D.D.S., Ph.D.

Director, National Institute of Dental and Craniofacial Research, National Institutes of Health, Chair of Mentoring Subcommittee, NIH Working Group on Women in Biomedical Careers

Dr. Lawrence A. Tabak was appointed as the seventh director of the NIDCR in September 2000. As Director, he provides leadership for a team of some 500 scientists, administrators and support staff with an approximate annual budget of \$389 million. Prior to joining NIH, Dr. Tabak was the senior associate dean for research and professor of dentistry and biochemistry & biophysics in the School of Medicine and Dentistry at the University of Rochester in New York. A former NIH MERIT recipient, Dr. Tabak's major research focus has been on the structure, biosynthesis, and function of mucin-glycoproteins. He continues work in this area, maintaining an active research laboratory (within NIDDK, http://intramural.niddk.nih.gov/research/faculty.asp?People_ID=1560) in addition to his administrative duties. Dr. Tabak has served actively as co-chair of the Research Teams of the Future component of the NIH Roadmap that emphasizes new ways of doing team science to catalyze additional multi- and interdisciplinary research. The NIDCR Director has received several honors and awards for his work, including election as a fellow of the AAAS and a member of the Institute of Medicine of the National Academies. A native of Brooklyn, New York, Dr. Tabak received his undergraduate degree from City College of the City University of New York, his D.D.S. from Columbia University, and both a Ph.D. and certificate of proficiency in endodontics from the State University of New York at Buffalo.

Sharon P. Turner, D.D.S., J.D.*Dean, University of Kentucky, College of Dentistry*

Dr. Sharon P. Turner is Dean of the University of Kentucky College of Dentistry and Professor in the Department of Oral Health Practice. Dr. Turner received her D.D.S. from the University of North Carolina in 1979 and received her J.D. *magna cum laude* from the North Carolina Central University in 1995. Following graduation from dental school, she completed a 2-year postdoctoral fellowship in Craniofacial Pain Mechanisms and Controls, sponsored by the National Institutes of Health at the University of North Carolina–Chapel Hill (UNC). Her first academic position was also at UNC. Besides her faculty appointment, she held several administrative appointments there, including Director of Patient Admissions and Emergency Services, Director of the Dental Faculty Practice, and Associate Dean for Administration and Planning. She was a member of the law review staff during law school and was admitted to the North Carolina Bar in 1996. In 1998, she accepted the position as Dean of the School of Dentistry at Oregon Health and Science University and in 2003 she accepted her current position at the University of Kentucky. Dr. Turner has received numerous honors and awards. She was a 1997-98 Fellow in the Executive Leadership in Academic Medicine Program and was the first dentist to complete this fellowship. She is a member of several honorary organizations including Omicron Kappa Upsilon, the American College of Dentists, the International College of Dentists, the National Academy of Practice and the American College of Legal Medicine. Dr. Turner has published in both dental and legal journals and is a frequent speaker at regional, national, and international meetings.

Hannah A. Valantine, M.D., M.R.C.P., FACC*Senior Associate Dean for Diversity & Leadership and Professor of Medicine, Stanford University School of Medicine*

Dr. Hannah Valantine was born in the Gambia, West Africa, and grew up in England. She is a graduate of St. George's Hospital, London University and completed her residency at St. George's Hospital, Brompton Hospital and Guys Hospital London. Her cardiology fellowship training was at Royal Postgraduate Medical School in Hammersmith London. For her post-doctoral research fellowship training she came to Stanford University, and undertook research focused on Echocardiography for the diagnosis of acute reaction. During this time she also conducted clinical research to determine the role of conventional risk factors in transplant coronary artery disease and the application of intravascular ultrasound for detection and monitoring of the disease process. Currently, Dr. Valantine is a Professor of Cardiovascular Medicine at Stanford University. She is also the Co-director of heart transplantation, and Director of Clinical Transplant Research. Her current research interests include pathophysiology of transplant related atherosclerosis, with a focus on the role of infection and lipids; heart disease in women; and conduct of clinical trials. Her has been the recipients of several research grants from the NIH and AHA, and is currently the Co-Principal Investigator for an NIH-funded Program Project Grant in transplant arteriosclerosis. In November 2004, Dr. Valantine was appointed as Senior Associate Dean for Diversity and Leadership in the Stanford University School of Medicine. Dr. Valantine has served on many editorial boards including *Urban Cardiology*, *Journal of Heart & Lung Transplant*, *Transplantation* and *Circulation*. She is Past-president of the American Heart Association Western States Affiliate Board of Directors. Dr. Valantine is author of 160 peer-reviewed publications, ten book chapters, and has been invited to be a presenter at over 200 lectures.

Morris Weinberger, Ph.D.

Vergil N. Slee Distinguished Professor of Healthcare Quality Management, U.S. Department of Veteran Affairs

Dr. Morris Weinberger is the Vergil N. Slee Distinguished Professor of Healthcare Quality Management, HPAA, Research Professor of Medicine, and Adjunct Professor of Pharmaceutical Outcomes and Policy; he is also an investigator in the U.S. Department of Veterans Affairs. He is a health services researcher who designs and evaluates interventions to improve the quality and outcomes of care for socio-economically and medically vulnerable patients with chronic diseases. His research generally uses randomized trials with interventions that target patients, providers and/or the health care system. He is currently evaluating strategies to facilitate community pharmacists' role in improving patient outcomes and the effectiveness of group visits among veterans with diabetes. In 2002, he received the Vision Award for Groundbreaking Research in Chronic Illness Care from the Improving Chronic Illness Care Program. In 2003, he received the Under Secretary's Award for Outstanding Achievement in Health Services Research from the Department of Veterans Affairs. And in 2005, he received the John M. Eisenberg Mentorship Award from the Agency for Healthcare Research and Quality.

Joseph F. West, M.Sc., Sc.D.

President, Westwell Group Consulting and Research

Dr. Joseph F. West is President of Westwell Group Consulting and Research in Chicago. Westwell Group is an independent consulting and research firm dedicated to innovative solutions in health and medicine. The W.K. Kellogg Foundation is a client. Dr. West is the evaluator of the ADEA/WKKF Minority Dental Faculty Development (MDFD) grant. A graduate from the Harvard School of Public Health, Dr. West has over a decade of evaluation and research consulting experience.

Elias A. Zerhouni, M.D.

Director, National Institutes of Health

NIH Director, Elias A. Zerhouni, M.D., leads the Nation's medical research agency and oversees the NIH's 27 Institutes and Centers with more than 18,000 employees and a fiscal year 2007 budget of \$29.2 billion. Dr. Zerhouni, a world renowned leader in the field of radiology and medicine, has spent his career providing clinical, scientific, and administrative leadership. He is credited with developing imaging methods used for diagnosing cancer and cardiovascular disease. As one of the world's premier experts in magnetic resonance imaging (MRI), he has extended the role of MRI from taking snapshots of gross anatomy to visualizing how the body works at the molecular level. He pioneered magnetic tagging, a non-invasive method of using MRI to track the motions of a heart in three dimensions. He is also renowned for refining an imaging technique called computed tomographic (CT) densitometry that helps discriminate between non-cancerous and cancerous nodules in the lung. Since being named by President George W. Bush to serve as the 15th Director of the National Institutes of Health in May 2002, Dr. Zerhouni has overseen a number of milestones. Prior to joining the NIH, Dr. Zerhouni served as executive vice-dean of Johns Hopkins University School of Medicine, chair of the Russell H. Morgan department of radiology and radiological science, and Martin Donner professor of radiology, and professor of biomedical engineering. Before that, he was vice dean for research at Johns Hopkins. Dr. Zerhouni was born in Nedroma, Algeria and came to the United States at age 24, having earned his medical degree at the University of Algiers School of Medicine in 1975. After completing his residency in diagnostic radiology at the Johns Hopkins University School of Medicine as chief resident (1978), he remained at Hopkins, serving as instructor (1978-1979) and then as assistant professor (1979-1981). Between 1981 and 1985 he was in the department of radiology at Eastern Virginia Medical School and its affiliated DePaul Hospital. He returned to Johns Hopkins as an associate professor in

1985. In 1988, Dr. Zerhouni was appointed director of the MRI division. He was promoted to full professor of radiology in 1992 and of biomedical engineering in 1995. In 1996, he was named chairman of the radiology department. Since 2000, he has been a member of the Institute of Medicine. He served on the National Cancer Institute's Board of Scientific Advisors from 1998-2002. He was a consultant to both the World Health Organization (1988), and to the White House under President Ronald Reagan (1985). A resident of Baltimore, he has won several awards for his research including a Gold Medal from the American Roentgen Ray Society for CT research and two Paul Lauterbur Awards for MRI research. His research in imaging led to advances in Computerized Axial Tomography (CAT scanning) and Magnetic Resonance Imaging (MRI). He is the author of 212 publications in peer-reviewed journals and holds eight patents.

Appendix F: Bibliography

1. Mentoring Women and Minorities
2. Mentoring in Biomedical and Research Careers
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4. Web sites

1. Mentoring Women and Minorities

- Atcherson E, Jenny J (1983). What about mentoring and women in academe? Annual Midyear Conference of the American Educational Research Association: Research on Women and Education Special Interest Group, Tempe, AZ. (ERIC Document Reproduction Service No. ED 242 642).
- Blackwell JE (1989). Mentoring: An action strategy for increasing minority faculty. *Academe*, 75(5), 8-14.
- Chandler C (1996). Mentoring and women in academia: Reevaluating the traditional model. *National Women's Studies Association Journal*, 8(3), 79-100.
- Chesler NC, and Chesler MA (2002). Gender-Informed Mentoring Strategies for Women Engineering Scholars: On Establishing a Caring Community. *Journal of Engineering Education*, 91: 49-55.
- Haberman C (2006). NYC; Helping Turn Dreamers Into Doctors. *The New York Times*.
- Heim P, and Murphy S (2003). *In the Company of Women*. New York: Tarcher/Putnam
- Jaschik S (2008). The Mentoring Gap for Women in Science. *Inside Higher Education*.
- Luna G, and Cullen DL (1995). Mentoring women in academe. In J.D. Fife (Ed.), *Empowering the faculty: Mentoring redirected and renewed* (ASHE-ERIC Higher Education Report No. 3) (pp. 37-45). San Francisco: Jossey-Bass. (ERIC Document Reproduction Service No. ED 399 888).
- Nolan SA, et al. (2008). Training and Mentoring of Chemists: A Study of Gender Disparity. *Sex Roles*, 58(3), 235-250.
- Quinlan KM (1999). Enhancing mentoring and networking of junior academic women: What, why, and how? *Journal of Higher Education Policy & Management*, 21(1), 31-42.
- Padilla A (1994). Ethnic Minority Scholars, Research, and Mentoring: Current and Future Issues. *Educational Researcher*, 23(4), 24-27.
- Price EG, Gozu A, Kern DE, Powe NR, Wand GS, Golden S, and Cooper LA (2005). The Role of Cultural Diversity Climate in Recruitment, Promotion, and Retention of Faculty in Academic Medicine. *Journal of General Internal Medicine*, 20:565-571.
- Ragins BR, Cotton JL (1999). Mentor Functions and Outcomes: A Comparison of Men and Women in Formal and Informal Mentoring Relationships. *Journal of Applied Psychology* 84(4): 529-550.
- Roche VF (1990). Facilitating professional development in women pharmacy faculty: Role-models, mentors and networks as resources for academic success. *American Journal of Pharmaceutical Education*, 54(4), 367-369.
- Rodriguez YEG (1995). Mentoring to diversity: A multicultural approach. In M.W. Galbraith & N.H. Cohen (Eds.), *Mentoring: New strategies and challenges* (New Directions for Adult and Continuing Education, no. 66) (pp. 69-77). San Francisco: Jossey-Bass.
- Russell SH, Hancock MP and McCullough J (2007). THE PIPELINE: Benefits of Undergraduate Research Experiences. *Science*, 316(5824), 548-549.
- Seritan AL, et al. (2007). Society for women in academic psychiatry: a peer mentoring approach. *Academic Psychiatry*, 31(5), 363-6.
- Struthers NJ (1995). Differences in mentoring: A function of gender or organizational rank? *Journal of Social Behavior & Personality*. Special Issue: Gender in the Workplace, 10(6), 265-272.
- Thomas DA (2001). The Truth About Mentoring Minorities: Race Matters. *Harvard Business Review*, 99-107.
- Witt Smith J, Smith WJ, and Markham SE (2000). Diversity issues in mentoring academic faculty. *Journal of Career Development*, 26(4), 251-262.
- Women Chairs of the Association of Medical School Pediatric Department Chairs (2007). Women in Pediatrics: Recommendations for the Future. *Pediatrics*, 119:1000-1005.

Wunsch MA, and Johnsrud LK (1992). Breaking barriers: Mentoring junior faculty women for professional development and retention. In D.H. Wulff & J.D. Nyquist (Eds.), *To Improve the Academy*, vol. 11 (pp. 175-187). Stillwater, OK: New Forums Press and the Professional and Organizational Development Network in Higher Education.

2. Mentoring in Biomedical and Research Careers

(1997). *Advisor, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering*. Washington, DC, National Academy Press.

Aron DC, Lash R, Aucott JN (1999). Attending-Physician Role Models. *New England Journal of Medicine*, 340(20): 1598-1599.

Association for Women in Science (1993). *Mentoring Means Future Scientists*. Washington, DC, Association for Women in Science.

Bauchner H (2002). Mentoring Clinical Researchers. *Archives of Disease in Childhood*. 87(1): 82-84.

Benderly BL (2007). Making Mentoring Mandatory. *Science Careers*.

Bhattacharjee Y (2007). POSTDOCTORAL TRAINING: NSF, NIH Emphasize the Importance of Mentoring. *Science*, 317(5841), 1016b.

Bonetta L (2007). Training Postdocs: Communication is Key. *Science Careers*, 1141-1143.

Boss JM, and Eckert SH (2006). *Academic Scientists at Work: Navigating the Biomedical Career (Second Edition)*. New York, NY: Springer Science + Business Media.

Carr P, Bickel J, and Inui T, Eds. (2003). *Taking Root in a Forest Clearing: A Resource Guide for Medical Faculty*. Boston University School of Medicine. Boston: Boston University School of Medicine.

Carr PL, Palepu A, Szalacha L, Caswell C, Inui T (2007). 'Flying below the radar': A qualitative study of minority experience and management of discrimination in academic medicine. *Medical Education*, 41:601-609.

Cocolas GH (1998). Mentors and mentoring. *American Journal of Pharmaceutical Education*, 62(2), 227.

Dannels SA, Yamagata, H, McDade SA, Chuang YU, Gleason KA, McLaughlin JM, Richman RC, Morahan PS (2008). Evaluation of a leadership program: Use of a longitudinal design with two comparison groups to evaluate the impact of the Executive Leadership in Academic Medicine (ELAM) program for women. *Academic Medicine*. 83(5): 488-495.

DeAngelis CD (2000). Women in Academic Medicine: New Insights, Same Sad News. *New England Journal Medicine*. 342(6): 426-427.

Denofrio LA, et al. (2007). Linking Student Interests to Science Curricula. *Science*, 318(5858), 1872-1873.

Friedman PK, Arena C, Atchison K, Beemsterboer PL, Farsai P, Giusti JB, et al. (2004). Report of the ADEA President's Commission on Mentoring. *Journal of Dental Education*, 68(3), 390-6.

Guberman J, Saks J, Shapiro B, Torchia M (2006). *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty (Second Edition)*. Research Triangle Park, North Carolina and Chevy Chase, Maryland: Burroughs Wellcome Fund and Howard Hughes Medical Institute.

Handelsman J, Pfund C, Lauffer SM, Pribbenow CM (2005). *Entering Mentoring: A Seminar to Train a New Generation of Scientists*. Madison, WI: University of Wisconsin Press.

Illes J, Glover GH, Wexler L, Leung ANC, Glazer G (2000). A Model for Faculty Mentoring in Academic Radiology. *Academic Radiology*, 2000(7), 717-724.

Jackson VA, Palepu A, Szalacha L, Caswell C, Carr PL, Inui T (2003). "Having the Right Chemistry": A Qualitative Study of Mentoring in Academic Medicine. *Academic Medicine*, 78:328-334.

Keyser DJ, et al. (2008). Advancing institutional efforts to support research mentorship: A conceptual framework and self-assessment tool. *Academic Medicine: Journal of the Association of American Medical Colleges*, 83(3), 217-25.

Lee A, Dennis C, Campbell P (2007). Nature's guide for mentors. *Nature*, 447(7146), 791-797.

- McDade SA, Richman RC, Jackson GB, Morahan PS (2004). Effects of participation in the Executive Leadership in Academic Medicine (ELAM) program on women faculty's perceived leadership capabilities. *Academic Medicine* 79:302-309.
- Nattinger, AB (2007). Promoting the Career Development of Women in Academic Medicine. *Archives of Internal Medicine* 167: 323-324.
- Paukert JL (2001). From Medical Student to Intern: Where Are the Role Models? *Journal of the American Medical Association*. 285(21): 2781.
- Pfund C, Maidl Pribbenow C, Branchaw J, Miller Lauffer S, Handelsman J (2006). The Merits of Training Mentors. *Science*, 311(5760): 473-474.
- Pololi L (2006). Career development for academic medicine—A nine step strategy. *BMJ Careers*, 322 (7535) 38-39.
- Pololi L, Knight S (2005). Mentoring Faculty in Academic Medicine: A New Paradigm? *Journal of General Internal Medicine*, 20 (9): 866-870.
- Pololi LH, Knight SM, Dennis K, Frankel RM (2002). Helping Medical School Faculty Realize Their Dreams: An Innovative, Collaborative Mentoring Program. *Academic Medicine*, 77:377-384.
- Reshma J, Butterson JR, Starr R, Tarbell NJ (2007). A Targeted Intervention for the Career Development of Women in Academic Medicine. *Archives of Internal Medicine* 167: 343-345.
- Ritchie D, Burke J, Dahdal W, Holstad S, Maddux M, et al. (1999). Clinical faculty mentoring. American Association of Colleges of Pharmacy Annual Meeting, 100, 30.
- Rogers JC, Holloway RL, Miller SM, (1990). Academic mentoring and family medicine's research productivity. *Family Medicine*, 22(3), 186-190.
- Rosser SV, (2004). *The Science Glass Ceiling: Academic Women Scientists and their Struggle to Succeed*. New York, NY: Routledge.
- Sambunjak D, Straus SE, Marusic A (2006). Mentoring in Academic Medicine: A Systematic Review. *Journal of the American Medical Association*. 296: 1103-1115
- Seltzer SE (2000). A model for faculty mentoring in academic radiology [Commentary]. *Academic Radiology*, 7(9), 725-726.
- Shapiro B (2006). Training Scientists to Make the Right Moves: A Practical Guide to Developing Programs in Scientific Management. Research Triangle Park, North Carolina and Chevy Chase, Maryland: Burroughs Wellcome Fund and Howard Hughes Medical Institute.
- Shepard KR, Nihill P, Botto RW, McCarthy MW (2001). Factors Influencing Pursuit and Satisfaction of Academic Dentistry Careers: Perceptions of New Dental Educators, *Journal of Dental Education*, 65, (4).
- Skeff KM, Mutha S (1998). Role Models-Guiding the Future of Medicine. *New England Journal of Medicine*. 339(27): 2015-2017.
- Stange KC, Hekelman FP (1990). Mentoring needs and family medicine faculty. *Family Medicine*, 22(3), 183-185.
- Thron CD (1999). Attending-Physician Role Models. [correspondence] *New England Journal of Medicine*. 340(20): 1598-1599.
- Wright SC (1998). Attributes of Excellent Attending-Physician Role Models. *New England Journal of Medicine*. 339(27): 1986-1993.

3. General Mentoring

- (2003). *Mentoring Handbook*, First Edition. American Heart Association.
- 2007c. Workplace Loyalties Change, but the Value of Mentoring Doesn't. *Knowledge @ Wharton*. Available at: <http://knowledge.wharton.upenn.edu/article.cfm?articleid=1736#> [Accessed June 18, 2007].
- Allen TD, Eby LT, Poteet ML, Lentz E, Lima L (2004). Career Benefits Associated with Mentoring For Protégés: A Meta-Analysis. *Journal of Applied Psychology*, 89(1), 127-136.
- Allen T, Eby L, Lentz E (2006). Mentoring Behaviors and Mentorship Quality Associated with Formal Mentoring Programs: Closing the Gap Between Research and Practice. *Journal of Applied Psychology*, 9(3), 567-578.
- Beans BE (1999). Mentoring program helps young faculty feel at home. *APA Monitor on Psychology*, 30(3). Available: <http://www.apa.org/monitor/mar99/mentor.html>.

- Bhagia J, Tinsley JA (2000). The Mentoring Partnership. *May Clinic Proceedings* 75(5): 535-537.
- Bland CJ, Taylor AL, Shollen SL, Weber-Main AM, Mulcahy PA (in press, 2008). Faculty Success Through Mentoring: A Guide for Mentors, Mentees, and Leaders. In *ACE Series on Higher Education*. Washington, DC: American Council on Education.
- Bickel J (2003). Looking for Mentor Replacement Therapy? A Coach may be the Answer, *Journal of the American Medical Women's Association*, 58: 210-211.
- Bulstrode C, Hunt V (2000). What is Mentoring? *Lancet*. 356(9244): 1788.
- Bussey-Jones J, Bernstein L, Higgins S, Malebranche D, Paranjape A, Genao I, Lee B, Branch W (2006). Repaving the Road to Academic Success: The IMERGE Approach to Peer Mentoring. *Academic Medicine* 81:674-679.
- Daniell E (2006). *Every Other Thursday*. New Haven, CT: Yale University Press.
- Detsky AS, Baerlocher MO (2007). Academic Mentoring—How to Give It and How to Get It. *Journal of the American Medical Association*, 297(19), 2134-2136.
- Ensher E, Murphy S (2005). *Power Mentoring: How Successful Mentors and Protégés Get the Most Out of Their Relationships*. San Francisco, CA: Jossey-Bass.
- Feldman, DC (1999). Toxic Mentors or Toxic Protégés? A Critical Re-Examination of Dysfunctional Mentoring. *Human Resource Management Review*, 9(3):247-278.
- Galbraith MW, Cohen NH (1995). Issues and challenges confronting mentoring. In M.W. Galbraith & N.H. Cohen (Eds.), *Mentoring: New strategies and challenges* (New Directions for Adult and Continuing Education, no. 66) (pp. 89-93). San Francisco, CA: Jossey-Bass.
- Gearon C (2007). You're in Good Hands. *U.S. News & World Report*.
- Gibbons A, Morell V (1992). Key issue: Mentoring. *Science*, 255(5050), 1368-1369.
- Golian LM (1995). Strategies and resources for enhancing mentoring relationships. In M.W. Galbraith & N.H. Cohen (Eds.), *Mentoring: New strategies and challenges* (New Directions for Adult and Continuing Education, no. 66) (pp. 79-88). San Francisco, CA: Jossey-Bass.
- Higgins MC, Thomas DA (2001). Constellations and careers: Toward understanding the effects of multiple developmental relationships. *Journal of Organizational Behavior*, 22: 223-247.
- Hymowitz C (2007). Coaching Men on Mentoring Women Is Ernst & Young Partner's Mission. *Wall Street Journal*.
- Johnsrud LK (1990). Mentor relationship: Those that help and those that hinder. *New Directions for Higher Education*, 72, 57-65. San Francisco, CA: Jossey-Bass.
- Johnson BW, Ridley CR (2004). *The Elements of Mentoring*. New York, NY: Palgrave Macmillan.
- Kerka S (1998). New perspectives on mentoring. Office of Educational Research and Improvement, Digest No. 194. <http://www.peer.ca/Perspectives.html>.
- Kerry T, Mayes AS (1995). *Issues in Mentoring*, Routledge Publishing Company in New York, NY: association with The Open University.
- Kram KE (1985). *Mentoring at Work: Developmental Relationships in Organizational Life*, Glenview, IL: Scott Foresman Publishing Company.
- Lee JM, Anzai Y, Langlotz CP (2006). Mentoring the Mentors: Aligning Mentor and Mentee Expectations. *Academic Radiology*, 13:556-661.
- Mann M, Wolff J (2007). Finding the balance between professional and personal life. *San Diego Tribune*.
- McLennan N (1995). *Coaching and Mentoring*, Brookfield, VT: Gower Publishing Company.
- Menges RJ and Associates (1999). *Faculty in New Jobs*, San Francisco, CA: Josey Bass, Inc. Publishing Company.
- Merrill-Sands D (2005). Commentary on the Third Opinion. *Reflections*; 6:12
- Noe RA (1988). An Investigation of the Determinants of Successful Assigned Mentoring Relationships, *Personal Psychology*, 41, 457-479.
- O'Neill PN (2001). *Faculty Mentoring Guide* (Second edition). Houston, TX: The University of Texas Health Science Center at Houston.
- Senetar M (1998). *The Mentor's Spirit*, New York, NY: St. Martin's Griffin Publishing Company.

- Senge PM (1990). *The Fifth Discipline, The Art & Practice of the Learning Organization*, New York, NY: Doubleday Currency.
- Shea GF (2002). *Mentoring: How to Develop Successful Mentor Behaviors*, Menlo Park, CA: Third, Crisp Publications, Inc.
- Thorndyke LE, Gusic ME, George JH, Quillen DA, and Milner RJ (2006). Empowering Junior Faculty: Penn State's Faculty Development and Mentoring Program. *Academic Medicine* 81:668-673.
- Walker WO (2002). Mentoring for the New Millennium, *Medical Education Online* 7 (15), <http://www.med-ed-online.org>.
- Wasserstein AG, Quistberg DA, Shea JA (2007). Mentoring at the University of Pennsylvania: Results of a Faculty Survey. *Journal of General Internal Medicine*, 22:210-214.
- Wunsch MA, Ed. (1994). *Mentoring Revisited: Making an Impact on Individuals and Institutions*. San Francisco, CA: Jossey-Bass.
- Building http://www.provost.umich.edu/reports/faculty_mentoring_study/report.html
- University of Michigan: Giving and Getting Career Advice: A Guide for Junior and Senior Faculty <http://www.umich.edu/~advproj/career%20advising.pdf>
- University of Southern California: Center for Excellence in Teaching Mentoring & Collegial Consultation <http://www.usc.edu/programs/cet/mentoring/>
- Virginia Commonwealth University, Medical College of Virginia Campus: Faculty Mentoring Guide <http://www.medschool.vcu.edu/ofid/facdev/facultymentoringguide/fmguid.pdf>

4. Websites

- Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering. National Academies. Executive Summary: http://www.nap.edu/nap/cgi/execsumm.cgi?record_id=11741
- Comprehensive Mentoring Program, Clinical and Translational Science Institute at the University of California–San Francisco. http://ctsi.ucsf.edu/ca/mentor_program.php
- Medical College of Wisconsin: Junior Faculty Mentor Program <http://www.mcw.edu/display/router.asp?docid=1107>
- Robert Wood Johnson Medical School: UMDNJ Master Educators' Guild Faculty Mentoring Recommendations http://rwjms.umdnj.edu/faculty/faculty_development/mentoring.htm
- Stanford University: Provost Advisory Committee on the State of Women Faculty (PACSWF) <http://www.stanford.edu/dept/provost/womenfacultyreport/PACSWF.pdf>
- University of Massachusetts Medical School: Faculty Mentoring Program <http://www.umassmed.edu/facultyadmin/mentoring/>
- University of Michigan: Report of the Faculty Mentoring Study The Provost's Advisory Committee on Mentoring and Community



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