National Human Genome Research Institute (NHGRI)
National Institutes of Health
Department of Health and Human Services

NHGRI's 11th Annual Meeting of DAP and T32 Training Programs
The Broad Institute of MIT and Harvard - Cambridge
October 27th – 28th, 2014

PURPOSE OF MEETING: This meeting will give participants an opportunity to discuss solutions to challenges they face in: (1) mentoring and keeping T32 trainees and DAP participants in the pipeline and (2) developing individual development plans. There will also be opportunities for DAP participants to share their experiences and for participants to hear the latest scientific advances from local scientists. Experts have been invited to share their knowledge with participants.

Agenda Planning Committee:

Alexander Hernandez-Siegel Harvard DAP	Zia Isola UCSC DAP	Steve Finkel USC DAP
Bruce Birren Broad/MIT DAP	Alison Gammie Princeton T32	Junhyong Kim U Penn T32
Treva Rice Wash-U DACC	Donna Jeffe Wash-U DACC	Heather Junkins NHGRI

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AGENDA

NHGRI's 11th Annual Meeting of DAP and T32 Training Programs

The Broad Institute of MIT and Harvard
415 Main Street First Floor, Auditorium and Lobby, Cambridge, MA
10:00 am October 27, 2014 – 12:35 pm October 28, 2014

Monday, October 27, 2014 **415 Main Street**

8:30 am Registration/Coffee/Continental Breakfast/Meet/Greet

10:00 am Welcome, Introductions, Meeting Overview
Bruce Birren, Broad/MIT DAP and Heather Junkins, NHGRI Program Director

10:15 am Student Panel: Research and Training Experiences
(20 minutes/speaker + discussion)
Moderator: Alex Hernandez-Siegel, Harvard University DAP

- Emily, undergraduate intern from MIT in the George Church Lab
- Stephany, recent graduate from Brown University, summer student in the George Church Lab
- Alex, PhD student at Harvard (biostatistics)
- Luis, PhD student at Harvard (bioinformatics)
- Margo, PhD, Post-doc in George Church Lab (genetics)

12:15 pm Lunch

1:15 pm Mentoring and Individual Development Plans, Day 1
Moderator: Alison Gammie, Princeton University T32

- Vivian Lewis, MD, University of Rochester
- Keith Micoli, PhD, New York University
- Emorcia Hill, PhD, Harvard University

3:15 pm Break

3:30pm IDP Design and Implementation
Moderator: Zia Isola, UCSC DAP

4:15 pm New Directions and Opportunities for NHGRI's Training and Career Development Programs
Speaker: Tina Gatlin, NHGRI Program Director

5:00 pm Adjourn

Tuesday, October 28, 2014 **415 Main Street**

8:00 am Coffee/Continental Breakfast/Meet/Greet

8:30 am Research and Mentoring from the Viewpoint of T32 Program Directors
David Schwartz, PhD, University of Wisconsin-Madison T32
Maja Bucan, PhD, University of Pennsylvania T32

9:30 am Mentoring and Individual Development Plans, Day 2
Moderator: Zia Isola, UCSC DAP

- Cynthia Fuhrmann, PhD, University of Massachusetts
- Douglas Stevens, PhD, Salish Kootenai College
- Raymond Samuel, MD, PhD, Hampton University

11:00 am Group Photo/Break

11:20 am Program Accomplishments from the DACC
Speaker: Treva Rice, PhD

12:20 pm Research Training Advisory Committee
Historical perspective of program and challenges ahead

- Merna Villarejo, PhD, University of California, Davis
- Kim Nickerson, PhD, University of Maryland, College Park
- Vanessa Northington Gamble, MD, PhD, George Washington University

12:35 pm Final Words, Heather Junkins

12:35 ADJOURN

(NHGRI and DACC closed session)

Minutes

October 27th Monday

10:00 am Welcome and Introductions

Bruce Birren, Director Genomic Center for Infectious Diseases, Co-Director Genome Sequencing and Analysis Program, Broad Institute of MIT, Founding advisor to MIT's Diversity Initiative in Scientific Research

This is the last meeting under the current format. In the beginning (Phase 1) the question was: What do underrepresented minority students need and what can we do to help them advance? In Phase 2 we asked: What can the institutions do to increase diversity and assist the students' progress toward their career goals? We are now entering Phase 3. As individuals and institutions we must become aware of students from diverse backgrounds (in particular from groups that are underrepresented (URM) in the biomedical sciences) and related biases. The questions we must now ask are: What, if any, are the problems with our summer programs, and how do we know that we actually influenced any outcome or had an effect?

Heather Junkins, Program Director, Division of Genomic Medicine, National Human Genome Research Institute (NHGRI), National Institutes of Health (NIH)

Heather introduced herself and Tina Gatlin, our NHGRI Program Officers, and provided a welcome from NHGRI to all attendees at the 11th annual meeting of the DAPs and T32s. Heather announced that Bettie Graham was not attending this year because she was in a fencing competition in Hungary. Heather reviewed the program for the next two days. The program was a joint effort from the Program Agenda Committee, with a variety of invited speakers whose talks this year would focus on Individual Development Plans (IDPs) and mentoring.

Thanks was given to members of the Agenda Committee: Alexander Hernandez-Siegel from Harvard, Steve Finkel from USC, Junhyong Kim from the University of Pennsylvania, Zia Isola from UCSC, Alison Gammie from Princeton University, Bruce Birren from the Broad Institute,

Treva Rice and Donna Jeffe from the DACC at Washington University in St. Louis, the NHGRI Program Officers Heather Junkins and Tina Gatlin, and NHGRI Director of the Division of Extramural Operations Bettie Graham.

10:15 am **Student Panel:** Research and Training Experiences

Moderator:
Alex Hernandez-Siegel, Harvard Medical School, Department of Genetics

Alex Hernandez-Siegel from Dr. George Church's lab at Harvard organized, enlisted students, and moderated the student panel. Students were asked to talk extemporaneously about how they came to the decision to become researchers, how they ended up in Dr. Church's lab and in other student diversity summer programs at Harvard, and their experiences there, and about their ongoing and future career paths. Dr. Church's lab is an unusually rich research and learning environment, with currently 80-100 members including faculty, students, and visiting scientists, all working on a variety of projects that cross multiple fields such as synthetic biology, genomics, and bio-omics. Alex Hernandez-Siegel opened this session with a brief but inspirational reminiscence about an URM student who wasn't sure about his future career in research. His uneven practical experience in a prior setting had nearly convinced him that research was not right for him. However, his brief 2-month summer experience in the Church lab renewed his desire to continue his original path in research. This change in attitude was directly attributed to **good mentoring and coaching from the top (PIs, post-docs) to the bottom (student peers) and a cooperative and collaborative spirit in the lab**.

The following individuals on the panel are either former or current lab members in the Church lab and other Harvard summer science programs with strong diversity initiatives who are continuing STEM and/or Research careers, although their particular career paths are quite different.

(1) ***Margo, PhD*** **(**currently is a post doc in the Church lab at Harvard): She received her BS from the University of Florida in biomaterials and a PhD in biomedical engineering from Boston University. She was working with mechanical devices but the physical limitations of the materials led to restricted accuracy and specificity in certain measurements. Consequently, she moved on to biomedicine and genetics since, at the cellular level, there was expected to be a greater degree of accuracy and specificity.

Her projects in the Church lab have involved engineering the mitochondrial genome, reversing aging phenotypes, and working with ancient genotypes (woolly mammoth) ***[see "How to Clone a Woolly Mammoth" which premiered November 29, 2014 on the Smithsonian Channel]***. Margo's transition to the Church lab from mechanical and biomedical engineering was academically, environmentally and personally difficult. However, her determination and motivation, coupled with excellent training, support and encouragement in Church's lab, helped ensure her success. Her experience provides an excellent example of **cross-field training** at the post-doc level. Margo also talked about her underrepresented background, being Native American and female. **Suggestions** for improving the training program: In addition to the excellent mentors already present in the lab, it would be helpful to identify a specific lab member for each summer student who could help with that summer student's particular needs. In Margo's case, someone to help her cross-field train would have eased her transition. Although Margo had the determination and motivation to find what she needed, other students may need specialized assistance.

Questions: "What do you want to do after your post-doc?" Margo responded that she wanted to work on translatable technology in health care, including improving communications with law and policy-makers. For example, Margo cited the untimely shutting down of "23 and me" due in part to misunderstandings about technology, including the furor over stem-cell research. "Why did you choose to move into genomics?" Margo realized that physical mechanics was too limiting for her and she needed to get to cellular level. "At what point did you decide to focus on research and why?" Margo responded she decided on research during undergraduate school (junior year). As first generation college student, she had not known that research experiences could increase her chances of getting into graduate school. She came to understand this ONLY through casual discussions with her college roommate who was doing research for this purpose. Thus, it was peer example AND her internal motivation to observe and succeed that steered her into research. Margo then directed a few questions to the audience: "Why did you want to hear us speak, and what was the point of our talking to you?" The audience responded that they wanted to understand her experiences as a student, and get feedback on what worked for her and what might need to change. Another question from Margo: "Are there efforts to recruit high school students? Having a portal for high school students, or a central location to search for opportunities, would be helpful since a passion for science starts in high school or even earlier." Although the NHGRI traditionally has provided the K12 summer programs, due to limited resources early training will now concentrate on the undergraduate level and up. It was suggested that NSF may be concentrating more on K12. Regarding the portal issue for K12, the "Upward Bound" program on undergraduate campuses connects with K12s in STEM areas.
[also see http://www.pathwaystoscience.org/]

(2) ***Stephany*** (Science Writer for Recombine, is an alumnus of the Church lab summer training program, and is a recent graduate of Brown University with a biology degree): Currently she is a science writer for a start-up group. As a student, she worked in small-scale genomes. She did not do undergraduate research at Brown, but did do the summer research program in Church's lab. She is self-motivated and learned self-advocacy to find out things when needed. Her ultimate pathway to science writing started in college when she experienced problems in communicating what she did with family and friends at home who were not in academia, particularly since she was first generation US and a first generation college student. Her interest in science writing for the public stemmed from her desire to be able to communicate the importance of what she did to her family and friends. In the Church lab, mentoring was of key importance, not only for science questions, but also for personal questions such as how do I, as a Hispanic woman, fit into this scientific community? Presentations in lab before her peers and at national meetings were helpful training experiences and promoted her growth in being able to communicate science to others.

Questions: "How did you find the Church lab?" During her studies for her biology undergraduate degree, she realized she did not learn enough genetics and wanted to get more. Her google-search for summer training opportunities in genetics led to the Church lab. She attributes this to her characteristic of self-advocacy; sometimes you must look for and find your own way, and you can't be afraid to look. She also advocates being an ambassador to encourage younger minority students from her home to be self-advocates and search for the opportunities that will get them further along the path towards their goals. She also indicated that guidelines should be developed to teach prospective students how to be self-advocates and how to do calculated searches to find out information. Alex, who is in charge of recruiting for Church's lab, indicated that he always asks students how they found out about Church's lab. Many find out from their teachers, so Alex has amplified his efforts to go to different universities and various departments to talk to them about summer research opportunities in the lab. A suggestion from the audience regarding how to show your family the importance of what you do would be to have someone follow you for a day or so and video what you do. "How did you find the start-up company for your career outside of academia?" Stephany did an on-line search for other (nonacademic) companies doing genetic work. "Was your high school strong in STEM, encourage post-secondary training and research, and provide resources to help direct your career planning?" Stephany stated that she also attended a specialized high school that encouraged extended training, STEM and research, and was originally encouraged by her biology teacher.

(3) ***Luis*** (PhD student in the Harvard Biophysics and the Harvard-MIT Health Sciences Technology Bioinformatics and Integrative Genomics programs): Luis received his undergraduate degree from the University of Texas at Austin in physics and math. As a junior he did a summer research program in biology which led to his transition to

genetics. He cited the recent and escalating groundbreaking advancements in genetics (e.g. next generation sequencing) as examples that pushed this transition. In fact, Luis participated in one of Harvard's summer science programs managed by Dr. Susanne Churchill as an undergraduate summer student and now he is a graduate student and participates as a TA / student-mentor in an i2b2 summer program. Having participated on both sides (summer student trainee and peer mentor) has been very educational. His participation in the summer program as an undergraduate was helpful in letting him know if he would fit into that environment (i.e. different geographical area, culture, etc.). **Suggestions** for improvements, or things to watch for: First, sometimes mentors really don't want to be your mentor. So, making a good match is important. Second, an ancillary group that can "coach" or help mentor (e.g. "older" peers to students) would be helpful. Third, non-academic mentoring also is important (cultural, personal). Fourth, a portal is needed that provides a central resource for finding all of these summer research training opportunities**.**

Questions: "What do you want to do when you get your degree?" It's intimidating but he is seriously thinking about it. Considerations include funding issues and skills. For example, at what level does he want to participate, which depends on funding issues (i.e. work in someone else's lab, or set up his own lab, or move to industry / non-academia, etc.)? What skills does he want to use (i.e. a place that needs both his computational expertise and has application to genetic and environment issues). "Is there a way to screen out post docs who don't want to be mentors?" Group discussion indicated the mentor/mentee pairings should be closely monitored and the program should be ready to make changes as needed. Some mentors are good for some mentees but not others, and other mentors may need mentoring training to become good mentors. Knowing the characteristics of both the mentors and the mentees is important in making the pairings. "What was your life like before UT-Austin?" Luis grew up in Mexico, father Mexican, and mother American, and both parents were professionals (father engineer and mother physician), so he always was encouraged to go into STEM.

(4) ***Alex*** (PhD student in biostatistics at the Harvard T.H. Chan School of Public Health): Alex is first-generation college, and currently is a pre-doc at Harvard University in biostatistics doing research in the School of Public Health. He did an undergraduate degree in statistics at the University of Michigan and has a strong computational background. He participated in several different summer programs, for example in social media to predict health outbreaks (currently working on Ebola). In general, the summer programs gave him the confidence to believe he actually could get a PhD and be at a place like Harvard ***[see Imposter Syndrome]***. He had a good coach early on (a colleague at a summer research program***) who helped him get in*** to graduate school. For example, his coach explained what to say and not say in the application which was quite revealing to Alex. He believes that while the PI and faculty do provide needed

guidance and overall mentoring, *t*hey are too busy to devote the daily one-on-one time needed time to coach the students.

Questions: "Do you know about the 'imposter syndrome' and have you been to SACNAS meetings." Alex responded no to both questions. The Imposter syndrome was discussed.

> **Imposter Syndrome:** (Wikipedia) Psychological phenomenon in which people are unable to internalize their accomplishments. Despite external evidence of their competence, individuals remain convinced that they are frauds and do not deserve the success they have achieved. Proof of success is dismissed as luck, timing, or a result of deceiving others into thinking they are more intelligent and competent than they believe themselves to be.

(5) ***Emily*** (third year undergraduate at MIT): Emily participated in the Church lab summer program while a rising junior at MIT in computational biology. Currently, she is working on creating a genome interpreter from uploaded genome files. This website provides feedback on variants that may lead to diseases and is Wikipedia-ish. Emily originally is from a small town in Florida and her high school was not strong in STEM. She was the only one to participate in the science fair from her school. Her interest in science was influenced by her mother. Upon arrival at MIT Emily discovered she was not academically prepared for the rigors of the school and program. However, the diversity group at MIT (through the Office of Minority Affairs) sponsored a summer training program that helped tutor her so she could pass. This summer program consisted of experimental study groups (6 students to 1 faculty), and encouragement to take summer short-courses to catch up on areas that she could not get in the regular courses, e.g. programming. She discovered the Church lab while looking for summer internship opportunities including receiving several e-mails from Alex's e-mail recruiting campaign. Regarding the Church lab experience itself, the presentations at the end provided helpful feedback and helped boost her self-confidence. She felt the mentorship was helpful and that her post doc advisor was easy to talk to about many things, including imposter syndrome. Emily's question to the audience was: Upon graduation, how do you keep the smart programmers in academia and not applying to large corporations like Google who offer large salaries?

Questions: "Did you have difficulty in expressing what you do to parents (non-scientists)." "How do we get politicians up to speed in understanding what we do?" "Have you ruled out the possibility of running for public office?" If so, "what is it about your training that beat that desire out of you?" "What are your next plans?" "Have you done an IDP?"

Open Discussion: Since this was the last student panelist there was an extended discussion in response to these and other questions. For example, underrepresented students often are asked to be ambassadors by their "home" institution (high school or college) to actively encourage other minority students to get involved and stay in STEM. Discussion centered on whether the students felt this was a worth-while endeavor, if they felt overburdened by these requests, and if they believed it made a difference. The students all indicated they deemed it rewarding and felt it was their duty to give back to the community. However, the audience encouraged the students to balance this "duty" with the need to be the best they can while they are students. To the degree that this "giving back" would interfere with their making progress towards their own goals, they should concentrate on their own development for now. There will be lots of time in the future once they are settled and would have even more influence to give back to their community.

Additional questions were raised about generational issues in giving back to the community. For example, do the young students of today receive the message better if a younger or older minority student returns with inspirational messages? There was some recognition that attitudes could be very different for younger versus older Latinos. The older "successes" came from a very small (likely elite) group of achievers while the current students are a much larger and heterogeneous group. Each generation has different views (not elaborated during discussion). It was generally felt by students that at least in the Hispanic community the younger graduates had a more relevant outlook while there was some degree of disconnect with the older generation. They also added that that any burden they felt was accompanied by a sense of pride in being successful enough to be asked to do this.

Advice was provided by the audience on how to gracefully say "no" to such requests. For example, the student might say that this was indeed a very important request, they were so honored by the invitation, and that it kills them to have to say no at this time. Then, they should suggest that Dr. (e.g.) Maggie Werner-Washburn (name drop with contact information) would be so much better than me to do that at this time.

Should recruiters be older or younger, like the minority or like the majority? Students felt that a variety of recruiters is preferred. Older recruiters can describe how they got there and younger ones understand the current hurdles and how to overcome them. A mixture of racial/ethnic recruiters also demonstrates an open and collegial community of individuals.

Words of caution were provided by the Advisors: For example, a distinction should be drawn between mentor and recruiting group. Defining good mentors and good recruiters may involve different characteristics. Regarding mentors, there are many qualities that that define a good mentor, and like me or not like me is rarely the most important defining characteristic. The advisors also encouraged the students to talk to their faculty advisors about their career goals, to get help with defining the opportunities that are out there, in planning what needs to take place in the next few years to be prepared for that opportunity, and periodically reviewing progress to stay on target. In fact, this is the idea behind the Individual Development Plan (IDP) which will be discussed in latter sessions of this meeting. Other considerations brought forward

were how to tell your mentor or advisor, during these career discussions, that you do NOT want to be like them. That is, you career goal may be very different from your advisor. This should be part of the boundaries that are set "up front" with the advisor. It should be understood that it's okay to look outside academic as part of your career development.

12:15 pm Lunch Break

1:15 pm Mentoring and Individual Development Plans

Moderator:
Alison Gammie, Senior Lecturer in Molecular Biology, Director of Diversity Program and Graduate Recruiting, Director of Summer Undergraduate Research Program in Molecular and Quantitative and Computation Biology, Princeton University

Speaker:
Vivian Lewis, MD, University of Rochester Medical Center, Professor, Department of Obstetrics and Gynecology and Vice Provost for Faculty Development and Diversity

Presentation Title: Approaches to Mentor Training

Associated Presentation File Name: Lewis - NHGRI 10-2014.pdf

Dr. Lewis talked about the CTSI at U Rochester Medical Center and why mentoring and IDPs are important. In general, those faculty and trainees who have mentors tend to be more satisfied and stay in their careers longer. Some characteristics of a good mentoring are:

- Developing a plan with the trainee
- Making your approach individual, geared towards the trainee
- Introducing the breadth of opportunities available
- Introducing concrete activities to attain the trainee's goals

A year-long Mentor Development Program was instituted at Rochester. The goal was to improve and standardize the mentoring that was available to CTSI scholars (graduate students, medical students, fellows, and junior faculty). The program was described as a two-way street, with both mentor and trainee being responsible for making the relationship work. The program consisted of 4 components.

- Orientation
- Mentor training
- IDP
- CTSI mentor committee umbrella of individual and program support

The IDP is the focal point of the plan, i.e. the communication tool. It contributes to determining what is needed for the trainee, encouraging responsibility and autonomy of the trainee, encouraging reflective practice, and serving as a motivation to learn and educate. The central questions are: what do you need to learn, why do you need to learn it, how do you learn it, how do you know if you have learned it, was this a good idea, and what will I do with it now that I know it.

Implementing the IDP involves outlining both long and short term goals, delineating specific methods to implement these goals, and specifying timelines to implement them. **The IDP is considered a "living document" that will change and evolve over time.**

The general procedure is for the trainee to self-assess, survey their goals and opportunities, write their IDP, share this plan with the mentor, revise and implement the plan, and continue to revise as needed. The mentors should get to know the plan, discuss options with the trainee, help review and revise the IDP, and establish regular progress reviews. *(Aside: However, there is some discussion later in the meeting questioning whether the mentor should see all or only part of the plan.)*

The Mentor Development Program also has a mentor training element involving reflective answers to several case-based scenarios in 15 domains of mentoring practice. The answers across all mentors are compiled and de-identified, and then a workshop with the mentors is held to discuss the group submissions and have the mentors learn from each other. Sample questions include: How do you communicate your expectations, and how will you promote your trainee internally and externally?

A mentor development core committee reviews each mentor-trainee dyad. The members of this core committee are senior faculty who are experienced mentors, are interested in mentoring, are part of the grant, and are self-identified and thus not "forced" to do it. The committee meets formally with the mentor-trainee dyad midyear, and informal meetings may be held more often if needed. The IDP is used to guide the conversation at these meetings. For example, was something missing from the IDP, was there something that either the mentor or

trainee was reluctant to bring up. The committee (sans mentors and trainees) also meets at midyear to discuss each of the dyads and identify and address any problems. If problems exist, recommendations may involve approaching the department chair or mentor, and if deficiencies persist a new mentor may be identified.

The entire process is evaluated using anonymous surveys at the beginning and end of the year. Evaluations of this CTSI mentor program have been positive since the program's inception in 2007.

Dr. Lewis also described her recent study, focusing on underrepresented scholars. This was a randomized trial of different mentoring interventions in 150 mentor-protégé dyads from 3 medical schools and 8 colleges and universities. There were 4 groups in the trial: (1) a mentoring education or psychosocial (CARES) model; (2) a peer mentoring group; (3) a combined (CARES and peer mentoring) group; and (4) a control group using "usual practices" involving no special instruction. After 1 year, the control group was not as successful as the treatment group in terms of career planning, teaching, balancing work and life, and adequacy of mentoring time. The addition of peer mentoring (above the CARES model) added the perception of quality time and a wider range of subject matter discussed. The psychosocial (CARES) approach facilitated the discussion of diversity related issues. This model is now being adapted for other parts of Rochester.

Speaker:
Keith Micoli, PhD, Departments of Administration and Sackler Institute, and Director of the Post-doc program, NYU Langone Medical Center

Presentation Title: The Mentor-Mentee Relationship

Associated Presentation File Name: Micoli - NHGRI 10-2014.pdf

In 2009, NSF began requiring more formally structured mentored training for post-docs funded by training grants, but no such requirements were in force for those funded by research grants. It was deemed difficult to require the research grants to do this since there was no perceived benefit to the institution.

The structured training program (for both pre- and post-docs) involved specifying how often mentor-trainee dyads would meet, surveying the satisfaction of these meetings, and determining what activities took place such as participation at national meetings, publications,

etc. NYU also instituted improvements in their mentoring programs for post-docs which included a variety of workshops, with duration lasting anywhere from 1 hour through several days through an entire semester.

To improve the mentor-trainee matching process, an early matching plan was instituted. Here, pre-docs did 3-4 rotations in the labs of different faculty to find the best fit. Monthly research talks by faculty were given to the pre-docs, and the pre-docs also met with the graduate program Dean. Post-docs were given an orientation emphasizing the potential for multiple mentors, a number of workshops were provided on topics that covered issues such as communications, conflict management, negotiations, and how to take charge of your own career.

Making a good match: It was determined that the process is individualized and that no one size fits all. In general, good matches are based on mutual benefits, personality matches, similar management styles, shared communication preferences, shared research goals, and mutually agreed upon expectations. Red flags warranting early intervention included low motivation, reduced productivity, reduced communications, and increased conflicts. Interventions involved one-on-one meetings with the mentors and trainees, followed by group sessions, with the possibility of switching labs if problems remained unresolved. It was emphasized that repairing damaged relationships involves a much greater cost than fixing problems before they get to that point. Thus, regular monitoring of the dyads and early intervention were highly suggested. One incredibly informative way of assessing the ongoing process involved informal monthly community (program-wide) meetings with the Director of the program for coffee. In summary, this program focuses on improving mentoring at a personal level.

Speaker:
Emorcia V. Hill, PhD, Director, Converge: Building Inclusion in the Sciences through Research, Office for Diversity Inclusion and Community Partnership, Harvard Medical School

Presentation Title: Building Inclusion in the Sciences Through Research

Associated Presentation File Name: None

Diversity Inclusion as a strategy for mentoring is a novel paradigm created by the Office for Diversity Inclusion and Community Partnership at Harvard Medical School. It begins with the underlying assumption that diversity is an emerging and evolutionary process that transforms institutions into places that value and are inclusive of everyone within the institution.

There are multiple dimensions to diversity, e.g. academic, racial, intellectual, social, etc. Taking into account these multiple dimensions and characteristics that are present within institutions will contribute to and enhance an institution's capacity to achieve its missions, as it makes the best use of its human capital resources. Thus, efforts to infuse diversity throughout the medical school, is a necessary and invaluable aspect of the institution's centralized function.

One key question is what are the characteristics of mentoring that we want to infuse in the institution to ensure a supportive environment for all stakeholders? The essence of good mentoring is that it is a reciprocal process that benefits the junior as well as the senior and the individual as well as the institution, that it is collaborative, and that learning should be tailored to specific developmental stages.

Mentoring is a collaborative learning relationship, and the Individual Development Plan (IDP) is a formal expression of that relationship and the shared responsibilities and accountabilities. The mentoring relationship is customized for and specific to each mentor-trainee dyad and includes two dimensions, career and personal. For career mentoring, functions include sponsorships, coaching, protecting and challenging. On the personal level, functions include role modeling, counseling, acceptance, confirmation, and friendship. There are multiple forms of mentoring, from one-on-one (which is highly individualized and personal) to team (a collaborative and joint enterprise) and network mentoring, peer mentoring and distance mentoring. If mentoring relationships are productive and effective, then a supportive environment where faculty and students alike will thrive is created and the likelihood that the institution can fulfill its mission is enhanced.

A distinction between policies versus practices and processes was made. If not careful, practices and processes can trump and undermine policies. The program provides a plan of action to achieve specific results. The Diversity Inclusion program for mentoring, by definition, includes all faculty and not just faculty from URM groups or faculty mentoring students from URM groups. Among HMS's practices are Mentor Excellence Awards for junior and senior faculty. Its policies include promotion criteria that recognize mentoring as part of the process. Programs include training for both mentors and trainees to provide some level of uniformity in mentoring across the institution. For accountability, benchmarks and metrics are being developed to specify what it takes to be a good mentor, with variations based on race, ethnicity, rank, field, and career level. Results will be disseminated at annual career development conferences and by participating in events such as this NHGRI Annual Meeting.

General Discussion of all 3 speakers:

There are mentors and then there are mentors. The PI or research advisor may or may not be the mentor. And, there may be different mentors for career development versus research. The following distinctions are general, and actual definitions may vary from group to group.

> *Developmental network*: A network provides multiple mentors for a given trainee, and usually is structured so participants know who is responsible for what. For example, a career mentor may help the trainee negotiate the political environment of the university or perhaps negotiate psychosocial issues, while a research mentor may help with study methods, funding environments, etc. A network may also refer to the mentor's network of collaborators and initiation of the trainee into this network.
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> *Advisor versus Mentor*: Although not universally agreed upon, the general feeling was that an "*advisor*" functions more on career-development while a "*mentor*" may offer advice on multiple levels such as career development, research, and personal sides.
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> *Mentor versus Coach:* Mentoring is more like functioning as a sounding board and providing advice, while the trainee is still free to choose what to do (i.e. autonomy). In contrast, a coach is trying to direct a person to some specific end result. While the trainee may choose the route to that end, the coach is strategically assessing and monitoring progress and giving advice to effectively and efficiently guide the trainee to a specific place.
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> *Peer Mentor:* A peer mentor is on the same career level as the trainee (e.g. faculty with faculty, student with student) but the mentor is more senior or experienced. Usually these pairs have common interests regarding disciplines or research interests. Generally, career interests drive the peer mentoring process and dyads (or groups or networks) tend to self-aggregate and continually evolve.

How often do (should) mentor-trainee dyads meet? Some shock was expressed at how irregularly some dyads meet, from never or rarely to very frequent. There appear to be differences by gender (women meeting more rarely than men) and type of mentoring (research mentors meeting more frequent than career mentors), and a divergence in perception of meeting frequency across mentors (perceive as more frequent) and trainees (perceive as less frequent) regardless of type of mentoring (career or research).

Are some mentoring paradigms more effective than others? It appears that the effectiveness of different models of mentoring (e.g. one-on-one versus group) varies depending on the career level of the trainee. For undergraduates, having large special group meetings (seminars and workshops) may be the best method. At the undergraduate level, this style leads to reinforcing each other. Many undergraduates may feel they are not yet "mentor-ready", although this

point was not universally shared among the meeting attendees. Some felt that undergraduates may benefit more from a coaching rather than mentoring model.

How do we make mentoring institutionally desirable? In general, mentoring must be a win-win proposition (for you and for the university) to be sustainable, regardless of the funding environment. If mentoring is a one-way street (i.e. good only for you), then it is dependent on funding. Building a university-wide reputation of good mentoring should contribute to making it institutionally desirable. A reputation of good mentoring factors highly in recruitment so that your institution becomes a more desirable choice among all recruits, including the "stars."

How do I get good trainees? In competing with "stars" or well-known mentors at your institution (or at other institutions), your best strategy is to build a reputation as a good mentor for the trainees you do get. Eventually, the word will get out that you are a good mentor and therefore highly desirable. You must "grow" into it.

The Mentoring Process Involves Developing Strategies: Hope is not a plan. Mentors must encourage their trainees to "mentor-up" and take charge of their own development (i.e. autonomy). "I need a job; I hope this experiment works so that I can get a job." That is not a plan. Trainee may need to take time away from the lab to do activities that will lead to a job, usually in the afternoon or on weekends. These activities may involve building communication skills or writing skills. PIs need to allow trainees time to do this, and may need to be educated that allowing trainees to take the time will eventually ADD to lab productivity and not take away from it.

How do we educate team science? Science is more and more team-oriented and interdisciplinary and educating in team science should be part of the IDP. Thus mentoring networks are gaining popularity. However, there may be challenges to the trainee if mentors are giving conflicting demands so the team process should be centrally monitored (i.e. a network). In addition to team mentoring, trainees should have the opportunity to observe team science, for example observing how a mentor negotiates in a team-science environment.

How to deal with conflicts or disconnects between career goals of trainee and mentor. There may be perceived conflicts for the trainee in truthfully completing an IDP if their real career goals are different (disconnected) with those of the mentor. One way to deal with this is to have mentees complete full IDPs for themselves, but only divulge parts of it with the mentor (the parts they have in common). The IDP is intended to get the trainee started thinking for his- or herself and should not be thought of as homework that must be turned in. Another way to deal with this disconnect issue is to educate or re-educate both the mentor and the trainee that "going corporate" or going in a different direction than the mentor is not cause for penalization. The biomedical workforce includes not only academia, but also corporate America (contracts, industrial, pharma), and interestingly, academia probably is the smaller of the two groups.

Grant reviewers also may need re-education about this point ("you haven't produced enough PIs"). Provided both the mentor and the trainee are aware and accept this point, then sharing the entire set of IDP goals and activities may be beneficial.

> *What can you be with a PhD?* Micoli gives a seminar that covers at least 20-25 careers that you can choose with a PhD degree.

Mentoring re-education. Mentors and trainees alike need information (seminars, workshops, etc.), and trainees need one-on-one mentoring. However, this education and re-education process is not a one-time shot. Realize that people absorb what they need at that time. At a later time they will be receptive to additional or alternative information. To answer the question, 'are you mentor-ready' may need repetition to eventually arrive at that point.

Vernacular. The field is stepping away from using the term "academic pipeline" to prefer "pathways." What are the pathways to success and what are the factors that influence attaining the pathways?

Mentoring contracts, how many trainees, how long should a trainee be mentored, and how do you transition from trainee to mentor? The answer is it depends. Capacity: A mentoring circle involves a group of mentors, and a trainee may approach any one of those mentors depending on various factors (preferences, expertise, etc.). This significantly increases the capacity of a single mentor to participate. While the idea of group mentoring is good for capacity, many PIs are reluctant to participate since it would involve giving up some control of the mentoring process for a given trainee. This could lead to conflicts with the trainee stuck in the middle. A developmental network is a similar concept (leading to increased mentoring capacity), but it is more structured than a circle. In a developmental network, a mentor is tasked for advising only for a given dimension such as career development or research and the process is typically overseen by a committee or director. How long and how to transition: This is a highly individualized process and it depends on the characteristics of dyad. Some may consider a particularly helpful mentor their mentor for life. But practically, the mentoring process should evolve to a more collaborative venture as the trainee gains independence.

3:30 pm IDP Design and Implementation: Panel discussion with T32 and DAP Training Coordinators & Directors

Moderator:

Zia Isola, Director of Diversity Programs at UC Santa Cruz Center for Biomolecular Science and Engineering

Questions regarding IDPs: How hands-on it is? Who is involved (individual mentor, thesis committee)? How do you implement it? What is the format? How do you introduce it? How do you train people to use it? The following four groups have developed (or are developing) IDPs for use in their training programs and they will present their experiences. Question and answer time wraps up this session.

Anita Blanco, Director of Diversity Recruitment and Engagement, Stanford University School of Medicine, Stanford University:

It takes a while for an institution to formulate a plan, develop the form, train the users and implement the plan. At Stanford's School of Medicine, this process has occurred over a year and half. They are developing it for use across the entire Medical School, which reduces duplication of effort across different training programs within Stanford. Representatives from each department convened as part of the existing graduate admissions committee to spearhead the effort. It was implemented via a website through Stanford Biosciences. The trainee is provided information about the IDP and completes a first draft of the form, and then is responsible for scheduling an appointment with the mentor where they will discuss the IDP. The IDP is revised by the trainee as necessary and progress is reviewed with the mentor on a regular basis. The mentor-trainee dyad must report to a central online reporting system that an annual review has taken place by verifying online that an appointment was made and the appointment was kept. The IDP information provided to the trainee consists of 3-5 workshops (conducted by senior faculty) that occur along the way, in order to help supplement the IDP meetings (i.e. the workshops help to explain the IDP and how to make the most of the process.) In addition, there has been an effort to educate pertinent faculty and staff on the purpose and

process of IDPs. The Stanford IDP website was shared, which is fairly comprehensive for both trainees and faculty, and contains timelines, FAQs, and pertinent forms)http://biosciences.stanford.edu/current/idp/).

Louise Pape, Coordinator, Genomic Sciences Training Program, University of Wisconsin, Madison

One of the key points presented by Louise is that you are not required to share everything from the IDP with your advisor although some parts (i.e. goals and activities that the dyad will work on) must be shared for meaningful conversations and mentoring. A tracking system is used to ensure that each trainee (1) reports having an IDP and (2) reports they met with their advisor to discuss it. The advisor is not required to verify this information. The IDP is implemented via a website, with different versions for different levels of trainees (faculty, post-doc, pre-doc, etc.). Workshops are provided to discuss the concepts and key mentoring components. Experts are usually brought in to give the workshops.

Jeanette Papp, Director, Genotyping and Sequencing Core, Adjunct Professor, Department of Human Genetics, David Geffen School of Medicine, UCLA

UCLA does not yet have a system-wide IDP plan for all training programs. Currently, for our T32, we use our weekly seminar course to instruct our students on the process. The concept of the IDP is introduced to the students by a senior-level student. The student gives a presentation on IDPs, including a discussion of the goals of the IDP, strategies for developing an effective IDP, sample formats, examples from the student's own IDP, and a presentation of the myIDP site (http://myidp.sciencecareers.org/). We do not have a required format, but allow the students to choose the format most relevant to their own needs and goals, from among the many templates available. The seminar course requirement is an IDP from each student, signed by their research advisor, submitted by the last day of the quarter. A new IDP is required each year, and guidance is given on using the yearly IDP to effectively evaluate the students' progress toward their goals. The main challenge faced the first year was resistance from some faculty to yet another training requirement, as UCLA faculty often feel overburdened by bureaucracy that takes time away from research.

Debra Murray, Instructor, Department of Molecular and Human Genetics, Minority Diversity Initiatives Programs, Baylor College of Medicine

Currently there is a "Contract for Success" system already in place which ultimately will morph into the IDP. The Contract is used in the post-bacc program. A long-term (recurring) seminar explains the contract and what parts of it are required. For example, short-term goals are explicitly listed (i.e. take the GRE by a specific date).

Open questions from the audience:

Does NIH (which now requires an IDP) require proof that an IDP was completed, for example a copy of the form from each trainee? Proof is not required. NIH requires assurance that a form was completed and that it was discussed at a meeting between trainee and mentor. They believe this assurance is a step in right direction of making sure each trainee has access to advisors and/or mentors where the trainees goals and aspirations and their plans for achieving them are discussed. For reporting to NIH, copies of the completed forms are not required.

Does completing IDPs increase the danger that a decision will be made too early, before the trainee is fully informed? No. IDPs are living documents and are expected to change over time. They should be reevaluated on a regular basis (at least 1-2 times per year).

How does the fact that there are changes in IDP over time impact funding over time? It will not affect funding, and in fact changes over time are expected.

How sensitive is this information? It is not required that the mentor or the committee will see all of the IDP form completed by the trainee. The trainee should feel free to share as much of the document as they are comfortable with sharing since the information is for and about the trainee. However, enough information should be provided to the mentor so that a meaningful discussion about the trainee's goals and progress can occur.

How is the IDP evaluated? To plan a proper evaluation, one must know the purpose of the survey. In this case, the objective is to be sure there is open and regular communication between the mentor and his/her trainee to discuss the trainee's goals, aspirations and progress. NIH simply wants to be assured that this process is occurring. Evaluation of the process itself, if any, is up to the individual programs to determine how well the developed methods, forms, and strategies are viewed by the participants.

4:15 pm New Directions and Opportunities for NHGRI's Training and Career Development Programs

Speaker:

Tina Gatlin, Program Director, Division of Genome Sciences, National Human Genome Research Institute (NHGRI), National Institutes of Health (NIH)

Presentation Title: New Directions and Opportunities for NHGRI's Training, Career Development, and DAP Programs

Associated Presentation File Name: Gatlin - NHGRI 10-2014.pdf

Tina summarized the changes that have been made to NHGRI's training program over the course of the past year.

The NRSA (training and career development) programs have been restructured to: 1) expand training into genomic medicine; 2) maintain investment in genomic sciences training while expanding the statistical and informatics component; and 3) increase NHGRI's training investment so that it is more on par with average NIH-wide investment. This has implemented by:

- Continuing the existing T32 program which has an emphasis in **genomic sciences** but expanding into informatics.
- Adding a new T32 program which encompasses training in genomic medicine.
- Continue the K01 individual mentored career development award in genomic sciences with more emphasis on informatics.
- Signing on to the K08, which is the individual mentored clinical scientist career development award and having the focus on genomic medicine.

The DAP program underwent a comprehensive review, and a full progress report of the program was given at the May 2014 Council. The outcome was to restructure key elements of the program:

- Modify the program goal: To increase the number of URMs who obtain PhDs and MD/PhDs and who are then fully prepared to pursue a wide variety of genomics-related scientific careers.
- Participation the DAP is now optional, however it is strongly encouraged. Council and NHGRI staff remain strongly committed to URM training. While participation is optional, PIs and applicants should provide a strong argument in writing to opt out of the program.

- Moving forward, transition to support only 3 career levels – undergraduate, postbaccalaureate and graduate students.
- Reconstitute the advisory committee with fixed terms and include Council members.
- Fold the DAP/T32 meeting into the larger annual network meeting which will be focused on enhancing the experiences of the trainees.

Discussion:

Will we continue to have annual meetings? Yes, although the format will change.

Why cap support to only 10 trainees (T32s)? Council agreed to "spread the wealth" around. Large on-going T32 programs will experience a reduction in the number of trainees in order to accommodate new programs.

Heather Junkins, Program Director, Division of Genomic Medicine, National Human Genome Research Institute (NHGRI), National Institutes of Health (NIH)

Clarifications regarding training and DAP awards:

(1) Under the new training awards system, a given university may have two T32 programs IF they are in different areas and have different PIs.

(2) The DAPs are NOT open to general competition. Rather, a DAP program must have CEGS or DB or SEQ award as the parent (even though it may be funded as a separate R25). However, a given CEGS, DB or SEQ is NOT REQUIRED to have a DAP. That is, the parent may opt out of providing a diversity training program but will need to provide a compelling reason to not participate with program staff for review.

(3) For IDPs, the training programs are NOT required to submit any data to NHGRI on their progress report. Rather, they only need to show what forms are used, how they are used, and if they are working. If they are not working, then substitutes should be provided for that same purpose.

October 28th Tuesday

8:30 am Research and Mentoring from the Viewpoint of T32 Program Directors

Speaker:

David Schwartz, Professor of Chemistry and Genetics, School of Medicine & Public Health, University of Wisconsin, Madison

Presentation Title: ***Millimeter-long DNA Molecules: Genomics and Young Genomicists***

Associated Presentation File Name: None

Research today is multidisciplinary, requiring input from genomics, physics, biology, microfluidics, computers and software development, optical mapping, nanotubes, etc. Consequently, training the new researchers today to create new paradigms that will be required in the future means we need multidisciplinary approaches with synergistic layers of training activities.

The Schwartz training program exploits the interfaces across multiple disciplines using complementary coursework. For example, if the trainee is an engineering student then cross-training in genetics and systems biology will be required. If the trainee is a biologist, then cross-training in statistics, bioinformatics, computer science, et cetera is required. David feels that the "best" candidates for multidisciplinary approach may be those who come from a chemical and electrical engineering background, although biologists and mathematicians, et cetera, are not ruled out.

Building communities across disciplines is required, and genomics research thrives on teamwork collaborations. Seminars and genomics sciences courses are designed with this in mind. This empowers the trainees to be bold, be visionary, be inventive, and shift the paradigms.

Speaker:

Maja Bucan, Professor, Department of Genetics, School of Medicine, University of Pennsylvania

Presentation Title: The Penn Computational Genomics Training Program

Associated Presentation File Name: None

Dr. Bucan is a genomicist working on the genetic basis of neuropsychiatric disorders. In her research, Dr. Bucan combines studies in model organisms (mice) and in humans, including population isolates. She described a vignette from her studies of bipolar disorder in the Old Order Amish. Recent GWAS showed that bipolar disorder is complex and genetically heterogeneous. It is expected that genetic isolates, such as the Old Order Amish, harbor a smaller number of risk alleles. Dr. Bucan's laboratory used genotypes for 500 family members (average of 7 children per family) with Whole genome sequence for several dozen parent-child trios, to get sequence data on all 500 members. A combination of candidate CNVs, common variants and rare variants will need to be experimentally validated and tested in a larger population.

Dr. Bucan described the Penn Computational Genomics Training program, which started in 1999 from multiple doctoral programs across several schools (Arts and Sciences, Engineering, Medicine). Thus, this is also an interdisciplinary program, with students often guided by two advisors (experimental vs computational, etc.). Co-advising also provides an opportunity for more experienced mentors to work with junior faculty with limited training experience.

The Advising committee for the 1st and 2nd year students consists of the faculty covering the three major areas; experimental genomics, statistics and computer science. After the candidacy exam (end of the 2nd year), graduate students meet regularly with the Thesis committee (advisor, 4 Penn faculty with complementary expertise and an external committee member). In addition, there are several opportunities for formal and informal career mentoring. The Penn School of Medicine umbrella graduate program (Biomedical Graduate Studies) worked closely with seven graduate groups to develop two forms of IDP (for junior graduate students and students in thesis labs). Components of the IDP include questions for discussion between the mentor-trainee dyad, such as skills needed, motivating factors, and career plans in terms of action plans, expectations, and assessments of progress by advisors. A "public" portion of the IDP is submitted to the Thesis committee and the graduate program. The IDPs are reviewed by the graduate program chair and members of the thesis committee, who also make recommendations about the progress. Dr. Bucan explained that historically many faculty advisors discussed the topics covered by the IDP with their students, but that the

new policy ensures that all students are receiving the same high quality mentoring on a regular basis.

9:30 am Mentoring and Individual Development Plans

Speaker:

Cynthia Fuhrmann, Assistant Dean, Career and Professional Development, Graduate School of Biomedical Sciences, University of Massachusetts Medical School (UMMS) – Co-developer of the AAAS myIDP website (http://myIDP.sciencecareers.org)**:**

Presentation Title: The Individual Development Plan: Enhancing Productivity in Research and Career Development

Associated Presentation File Name: Fuhrmann - NHGRI 10-2014.pdf

PhD graduates pursue a multitude of careers, both within and outside of academia. However, many individuals lack knowledge about their career options and skills to research career options efficiently. Moreover, all career paths are highly competitive. There are no fallback options; in addition to stellar research skills, trainees need career-specific knowledge, skills, experience, and a professional network to succeed in most careers.

An Individual Development Plan (IDP) enables students and postdocs to be more proactive in assessing his/her own needs and setting achievable goals for the coming year, to help her/him progress in research and professional development in a more time-efficient manner. The plan should include goals pertinent to the trainee's current research, but also those related to skills development and career advancement. The process of planning will help the trainee see the big picture, focus the student's efforts to maximize outcomes, more easily recognize and take advantage of lucky opportunities, and self-advocate. The plan can also provide a framework for conversations with mentors and is valuable for all trainees regardless of the career intentions or career level.

myIDP (http://myIDP.sciencecareers.org) is an online career planning tool designed to walk trainees through the steps of creating an IDP: self-assessment (interests, skills, values), career exploration, setting goals, and implementing a plan. myIDP provides a list of twenty categories

of careers commonly pursued by PhD scientists, along with resources and strategies for learning more about these careers.

Tips for mentors: It is helpful to have a big-picture discussion with each trainee every six months. This is an opportunity to ask the trainee to discuss progress to date on prior goals (projects, skills, career planning), challenges faced, plans for the next 6-12 months, and resources or mentoring needed. Offer constructive feedback to the mentee on their progress and skills. Communicate your openness related to the student's career interests, and encourage the student to take action toward her/his goals. Share contacts within your own network who have pursued similar career paths. Note that attending workshops, networking, and additional courses may be needed. Trainee should be encouraged to discuss their IDP goals with multiple mentors, and to reach out to campus career counselors as needed.

Use of IDPs at our university: At UMass Medical School, we see the IDP process as a natural step in the annual advising cycle. Students develop an IDP annually at the time of their thesis committee meeting, helping them reflect on their research and development goals prior to engaging with this valuable set of mentors. Students in their third year and later (typically post-qualifying exam) are required to create an IDP annually. IDPs are kept confidential and compliance is tracked by the graduate school. Students create their first IDP as part of a nine-hour minicourse, "Career Planning via an IDP." Details about the UMMS IDP process, including a sample IDP, are available at http://career.umassmed.edu ("Plan").

Speaker:

Douglas Stevens, Head of Department of Life Sciences, Salish Kootenai College

Presentation Title: Mentoring Undergraduate Tribal College Students in STEM

Associated Presentation File Name: Stevens - NHGRI 10-2014.pdf

Salish Kootenai College is a member of the Tribal Colleges and Universities (TCU) and responds to low success rates of Native American students in mainstream institutions. The TCU serves geographically isolated Native American populations, with 36 current programs in the US and 1 in Canada. There is no entrance exam, but rather a placement exam. About 60% of the entrants need at least one remedial course in the life sciences. It is hoped these programs will increase Native American representation in the biomedical sciences and advanced STEM fields. These colleges are funded through NIH RISE (3rd cycle) with some other smaller grant awards. To date, there have been 27,000 students from 250 Native American nations served. There is a very low student-to-teacher ratio, with lots of individual attention and mentoring.

Minority student success depends on developing a sense of self-efficacy, academic integration, social integration (perception of belonging), professional activities, and cultural validation (as a Native American scientist). The take home message is that undergraduate research is an integral component of the program, and students will have 3 years of undergraduate research upon graduation. The research component is the main student-instructor mentoring interface; it is intense, one-on-one, and research is focused on local/tribal issues.

There are barriers for Native American students entering main-stream universities. For example, some students may have trouble satisfying institutional recruitment criteria. Some students may feel the studies are too hard and that the return in terms of available jobs is too low. There are no (or very few) good role models, little financial support, a negative view of western science, and a need for child daycare (many single parents).

Some of the questions these students ask include the following: Is there good mentoring for Native American students when they get to graduate school in mainstream universities? Will demands from family ties back home trump educational demands? Will there be a Native American presence on campus or will I be the sole Native American student? In the larger university culture, am I just a number? Will I adjust to the large class sizes given the smaller sizes encountered at the tribal schools? Is there a lack of tribally-relevant STEM projects? Will I be able to practice my culture or will my cultural be marginalized? Is there an expectation of me assimilating into main-stream culture or can I retain my cultural identity?

Speaker:

Raymond Samuel, Assistant Dean, School of Engineering & Technology, Associate Professor, Department of Chemical Engineering, Hampton University

Presentation Title: Concerted Cultivation: The way beyond mentoring to sponsorship

Associated Presentation File Name: Samuel - NHGRI 10-2014.pdf

Dr. Samuel is from Hampton University, a private HBCU originally founded in the 1800's. He provided an inspirational discussion and several case histories of successful trainees that he has mentored using his method of "concerted cultivation." This method involves introducing bright students at Hampton to sponsors (with similar research interests) at large research-intensive universities. He initiates the cultivation process by telling each individual (mentor or trainee) about the other. A trainee who is highly motivated and a self-advocate will initiate contact that hopefully leads to a mentor-trainee relationship, typically starting with a summer training

experience. Thus the trainee seizes these opportunities to help direct their future career choices by making contacts and developing networks, etc. In general, this "concerted cultivation" method is an intentional, highly individualized, cultivation of students. To sum up, in a few words: mentors are good, sponsors (advocates) are better.

12:20 pm Research Training Advisory Committee:
Historical perspective of program and challenges ahead

Merna Villarejo, Professor Emeritus, Microbiology and Molecular Genetics, UC Davis College of Biological Sciences

Future worries: (1) With the small size of the programs, particularly the T32s, is there a large enough community for the trainees to interact and network. This could increase the likelihood of non-continuing. (2) Transitions between levels and from one institution to another may be difficult. Students may need help making connections to transition from one institution to the next and one level to the next. Hopefully, the new meeting design will mitigate this problem. When trainees from different programs and different levels come together at the annual meeting, there should be an opportunity for networking and making these connections. The format of the new meeting style should support this activity. (3) Reduction of career levels to focus on undergraduates, pre-docs and post-docs is likely a good use of resources to maximize outcomes.

Kim Nickerson was not able to attend.

Vanessa Northington Gamble, University Professor of Medical Humanities, George Washington University, Medical Historian

We've come a long way. Vanessa was one of those inner city kids. Talk about diversity and justice but don't talk about transmission of values. Values change, science changes, people's perceptions and ideas change. Kim told her to say that you had good meeting last year without them when the government shut down.

AWARDS: Heather Junkins distributed Awards for Service given to Vanessa and Merna. These plaques were signed by Eric Green and thanked them for their service on the training and advisory committee these last 5+ years.

11:20 am DACC Annual Report

Speaker:

Treva Rice, Professor, Division of Biostatistics, Washington University in St. Louis School of Medicine:

Presentation Title: DACC Annual Report

Associated Presentation File Name: Rice - NHGRI 10-2014.pdf

The DACC presented an update on the REDCap database by describing the participating programs and sample sizes, and summarizing some of the measures indexing success using aggregate data. Detailed tables and figures for the results described here are provided in the power point presentation.

DAP Programs

For the DAP programs, aggregate data were presented by combining information across similar types of programs. For example (**Table 1**), data on K-12 participants (N=272) was aggregated across 5 programs (University of Washington, Seattle, Broad Institute, Dana Farber Cancer Institute, Jackson Laboratories and Johns Hopkins University).

As shown in **Table 1**, the DAP programs combined have data on 1,432 participants and 62% of these individuals (N = 883) have one or more follow-up records in the REDCap database. The number of individuals with follow-up data varies from 51% in the undergraduate summer groups (UG-Sum) to 85% in the K-12 programs. Also note that data were combined across come career levels. That is, data for DAP programs with post-docs, medical fellows and faculty participants were combined since the sample sizes were generally quite small for the individual categories.

The DAP total sample size of 1,432 represents an 8% increase in data entry over the previous year (previously 1,325), or an average increase of nearly 11 individuals per active program in the last year (107 individuals / 10 active institutions).

The DAPs were designed to serve primarily those individuals who are underrepresented in the STEM and biomedical sciences, or who are disabled or disadvantaged. Race and ethnicity information is based on self-report. Detailed breakdowns are provided in the DACC presentation by career levels (K-12 through Post-Graduate). In general, 37% of the participants are Hispanic, 44% are Black or African American, 5% are American Indian/Alaska Native or Pacific Islander/Native Hawaiian, and 3% report more than 1 racial background. The remaining ~11% are self-classified as Asian (6.5%) or White (2.9%), or they did not provide race/ethnicity

information (1.5%). Most of the Hispanic individuals (37% of the total sample) also report their race as White (34% of the total), with the remaining being Black or African American (1.2%), more than 1 race (1.4%) or American Indian or Pacific Islander (<1%).

Table 1. Sample Sizes for the Individual DAP programs (aggregate data were created by combining across institutions/programs for a given career level)

Institution	Yr Start	PI	K-12	UG-Sum	UG-AY	PB	GR	PG	Total
Total			**272**	**825**	**151**	**96**	**69**	**19**	**1,432**
U Washington, Seattle	2003	Swanson	47	180	27	-	27	-	281
Baylor College of Medicine	2003	Gibbs	-	88	-	52	-	-	140
Broad Institute	2003	Lander	125	51	-	-	-	14	190
Dana Farber Cancer Institute	2007	Vidal	7	6	-	9	-	-	22
Harvard University	2008	Church	-	12	-	16	-	2	30
Jackson Laboratories	2003	Eppig	14	19	-	-	-	-	33
Johns Hopkins (inactive)	2005	Feinberg	79	-	-	-	-	-	79
UC, Santa Cruz	2001	Kent	-	-	40	-	30	-	70
University of New Mexico	1997	Gelbart	-	20	-	10	-	3	33
U Southern California	2003	Tavare	-	68	84	-	12	-	164
Washington U, St. Louis	2007	Wilson	-	80	-	9	-	-	89
Yale University (inactive)			-	301	-	-	-	-	301

The gender distribution in the DAP programs is approximately equal in programs with older students, but there are somewhat more females in the younger groups. For example, overall 40% of the sample is male. However, the percentage of males varies from as low as 34-35% in the undergraduate and post-bacc groups to 46-47% in the graduate and post-graduate groups.

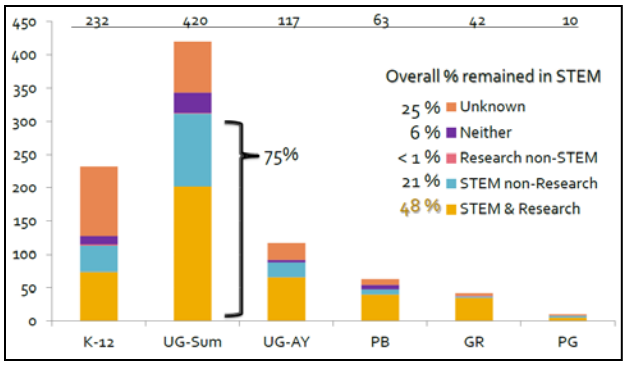
An important question surrounding this data collection effort is whether our efforts are leading to increased diversity in the STEM and biomedical fields in the long run. This will involve comparing the success rates of our alumni with national averages and is a topic for the next grant cycle. However, in the short-term, we can look at several indices of "success" in the follow-up data.

One short-term finding is that most of the alumni have remained in STEM or Research at the most recent follow-up and very few report a non-STEM or non-Research career. As shown in **Figure 1**, about 70% (overall) have remained in a STEM or Research field (student or employment). This retention percentage ranges from 49% in the K-12 group to 75% in the Undergraduate groups, 80% in the post-graduate and 88% in the graduate groups. Note that the percentage who are known to not remain in STEM or Research ("Neither" in **Figure 1**) is very small ranging from as low as 0% to as high as 11% in the post-bacc group. Most of those

who did not report a STEM or Research field at follow-up had missing data (25% overall, ranging from 10% in the graduate group to 45% in the K-12 group).

Other indices of "success" are publications and grants. For the DAP programs, a total of 937 publications were reported by 155 individuals in the follow-up data. The PowerPoint presentation shows that the number of publications per alumni ranges from 1 (125 individuals) to 30 (1 individual), with 18 individuals having 10 or more publications. A total of 27 career development (K) awards and 16 research awards also were reported at follow-up.

Figure 1: Retention in STEM or Research Fields at Follow-up (N = 688 individuals with baseline and follow-up information)



T32 Programs

For the T32 programs, aggregate data were presented by combining information across institutions. For example (**Table 2**), data on pre-doc programs (N=712) was aggregated across 11 programs. All programs trained pre-docs, while about half of the programs also trained post-docs.

Table 2. Sample Sizes for the Individual T32 programs (aggregate data were created by combining across institutions/programs for a given career level)

Institution	Year Start	PI	Miss	Pre	Post	Both	Total
Total			2	712	204	101	1,019
Harvard University (was MIT)	2001	Park					
MIT / Broad		Gifford	1	70	-	-	71
Princeton University	2004	Storey		58	-	1	59
Stanford University	1995	Snyder		136	56	-	192
University of California, Berkeley	2000	Rokhsar, Rine		118	19	1	138
University of California, Los Angeles	2002	Lange		50	-	-	50
University of Michigan	1995	Boehnke		1	-	93	94
University of Pennsylvania		Ungar		32	12	-	44
University of Washington, Seattle	1995	Swanson		129	65	2	196
University of Wisconsin, Madison	2003	Schwartz	1	43	21	4	69
Washington University, St. Louis	1997	Brent		41	10	-	51
Yale University		Breaker		34	21	-	55

As shown in **Table 2**, the T32 programs combined have data on 1,019 participants and 59% of these individuals (N = 598) have one or more follow-up records in the REDCap database. The number of individuals with follow-up data ranges from 63% in the pre-doc programs to 47% in the post-doc programs.

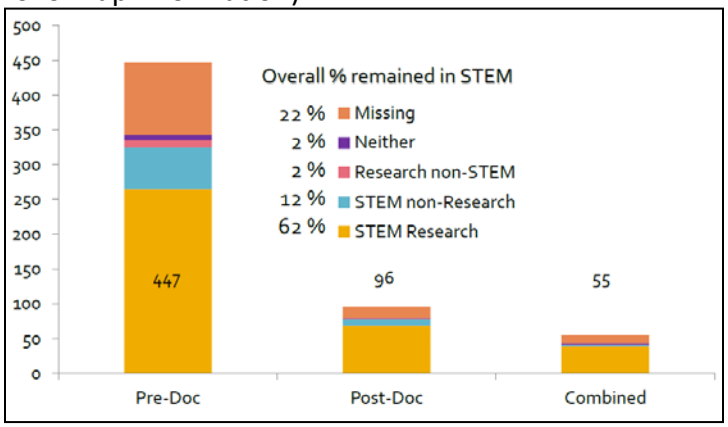
The T32 total sample size of 1,019 represents an 11% increase in data entry over the previous year (previously N = 941), or an average increase of nearly 9 individuals per institution in the last year (105 individuals / 12 programs).

The T32s were not designed to serve primarily those individuals who are underrepresented in the STEM and biomedical sciences, or who are disabled or disadvantaged. As with the DAP programs, race and ethnicity information in the T32 sample is based on self-report, and detailed breakdowns are provided in the DACC PowerPoint presentation. In general, 6.6% of the participants are Hispanic, 3% are Black or African American, 1% are American Indian/Alaska Native or Pacific Islander/Native Hawaiian, and 2.4% report more than 1 racial background. The remaining ~87% are self-classified as Asian (14.6%) or White (62.7%), or they did not provide race/ethnicity information (9.2%). Most of the Hispanic individuals (6.6% of the total sample) also report their race as White (4.4% of the total), with the remaining being Black or African American (0.3%), more than 1 race (0.3%) or American Indian or Pacific Islander (0.1%).

The gender distribution in the T32 programs is over 60% male (64% in the pre-doc and 62% in post-doc). This distribution is more similar to that reported in the older DAP groups. We also note that <1% of the T32 sample reports being disabled or disadvantaged (N = 5).

Follow-up data show that most of the alumni have remained in STEM or Research and very few report a non-STEM or non-Research career. As shown in **Figure 2**, about 76% (overall) have remained in a STEM or Research field (student or employment). This percentage varies from 75% in the pre-doc group. Note that the percentage that is known to not remain in STEM or Research ("Neither" in **Figure 2**) is very small ranging (< 2%). As with the DAP programs, most of those T32 individuals who did not report a STEM or Research field at follow-up had missing data (22% overall).

Figure 2: Retention in STEM or Research Fields at Follow-up (N = 598 individuals with baseline and follow-up information)



A total of 1,145 publications were reported by 228 individuals at baseline, and 4,663 publications were reported by 356

individuals at follow-up. The PowerPoint presentation shows that the number of publications per alumni ranges from 1 to over 300. Based on this self-report count data, a total of 15 career development (K) awards were reported by 4 individuals and 245 research awards also were reported by 33 individuals at follow-up.

Summary

Survey: In order to determine the factors that may help increase the amount of follow-up data, a survey was distributed to the program coordinators and program directors asking them to let us know if they had found anything that was particularly helpful in increasing the amount of follow-up compliance. The following suggestions were reported:

- Start early, upon entry into program.
    - Provide information to students about the tracking and follow-up study.
    - Solicit agreement to provide education and career information in the long-term.
    - Imbue them with a purpose: This information, in the long run, provides data showing that these programs really are making a difference!
- Maintain regular contact.
    - Annual personal e-mail from program coordinator / director to solicit information regarding current contact information, what are you doing now, what can we do to help you get to the next step, and congratulations on accomplishments.
    - Regular tips or news items via postings, for example blasts providing information about debt payback awards, other training opportunities in your area, etc.
- Establish an on-line community by encouraging accounts in LinkedIn or ResearchGate and have a program account they can subscribe to. This provides forum for discussions and blogs, e.g. regular tips or news items as above, job openings, etc.
- Provide incentives to respond.
    - Short, digital forms have higher likelihood of response than long and complicated.
    - Prizes (e.g. Amazon gift cards), although studies show this only marginally and temporarily boosts response rates.
- What to do when contact is lost?
    - Contact other trainees in the same cohort.
    - Contact their advisor/mentor/program.
    - Search university and departmental alum records.
    - Contact last-known working place.
    - Contact parents or lateral contacts.
    - Internet sleuthing (Google, LinkedIn, ResearchGate, Facebook, eRA Commons, Medline, NIH RePORTER, etc.).

- Always try again next year!

QC of data: The DACC now provides an opportunity for program coordinators and directors to look for data errors. REDCap reports can be generated by the programs using their current data. These reports provide information on missing data fields for important variables such as dates, race/ethnicity, career level at time of participation, STEM/research questions, etc.). Functions allow the user to go directly to the form of the affected individual so the data may be corrected. Plans for expanding these data QC checks are underway.

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