Roundtable on Inclusion and Engagement of Underrepresented Populations in Genomics

National Human Genome Research Institute
National Institutes of Health

September 16, 2015

Executive Summary

On September 16, 2015, the National Human Genome Research Institute (NHGRI) convened a roundtable to discuss the opportunities and challenges associated with the inclusion and engagement of underrepresented populations in genomics research.

The roundtable discussed the lack of ancestrally diverse populations represented in genomic studies and how that results in limitations for genomic science and medicine. Presentations and discussion highlighted current research being done to increase the inclusion of underrepresented ancestral populations in genomics research and address health inequities in genomic medicine, the targeted incorporation of environmental data, the translation of research into the clinic, and the role that NHGRI can play in the design and execution of future research efforts, including aligning these aims with funding opportunities.

In their recommendations, the roundtable participants stressed that NHGRI has an obligation to inform the scientific community and the public as to why inclusion of diverse ancestral populations is important in genomics research. The role of NHGRI as a funding agency in influencing the direction of research was recognized. A key recommendation was for greater diversity in future research studies to promote participant heterogeneity not only in ancestry, but also in socioeconomic background and environmental exposures. In order to achieve this, recommendations included flexibility in recruitment approaches is needed to target underserved communities and allow for meaningful and sustained community engagement, better utilization of existing biosamples from participants from diverse backgrounds, and encouraging collaboration with researchers who have demonstrated success in engaging diverse participants. Finally, a need for the development of new genomic data-analysis methods was identified as a barrier to the inclusion of diverse populations in genomic research and medicine.

The general roundtable recommendations include that NHGRI: 1) provides leadership in promoting genomics research that addresses minority health and health disparities, 2) examines institutional factors (such as the application review process and infrastructure) that impede greater inclusion of underrepresented populations in genomics research, 3) incorporates environmental variables in the genomics research supported by the Institute, 4) promotes strategies for analyzing existing biospecimens from underrepresented populations, and 5) gives a greater focus on sustained community engagement and community-based participatory research in genomic medicine and sciences.

Overview

As we advance our understanding of the interaction between gene expression and disease, genomic medicine has the potential to dramatically improve health outcomes. However, as advanced and personalized treatments become the standard of care in medicine, the current lack of diverse ancestral populations in genomics research creates a risk of exacerbating existing health disparities in underrepresented populations.

On September 16, 2015, the National Human Genome Research Institute (NHGRI) convened a roundtable to discuss the opportunities and challenges associated with the inclusion and engagement of underrepresented populations in genomics research. It brought together experts from academic, medical, and nonprofit bodies from across the country, as well as from multiple NIH institutes and centers, for a day-long discussion, ultimately culminating in recommendations to NHGRI on the Institute's role in improving minority health and health disparities (MH/HD).

The goal of the roundtable was to bring together genomic scientists and health disparities researchers who are actively involved in working with populations that are underrepresented in genomics. The objective was to have a collaborative brainstorming session to identify the scientific problems brought about by the lack of diverse ancestral populations in genomics research and the existing barriers that limit underrepresented populations from participating in genomics research; further focus was aimed at formulating strategies to address those barriers. In addition, the roundtable aimed to identify research opportunities to study health disparities in genomic and Ethical, Legal and Social Implications (ELSI) research science.

The roundtable began with a "Charge for the Day" by Dr. Eric Green, NHGRI Director, who emphasized the importance as well as the difficulty of the discussion ahead. He encouraged open discussion and solicited advice from the experts in the room, highlighting the significance of the roundtable to upcoming NHGRI activities such as the renewal of its flagship Genome Sequencing Program and the increased interest in medical treatments specifically guided by an individual's genomic make-up. After introductions, the day was divided into five sessions, each including opening comments followed by a moderated discussion.

Sessions began with a framing of "The Problem," broadly defined as the lack of ancestral diversity in genomics studies that limit the potential of genomic science and medicine with respect to benefiting all populations. The moderated discussion that followed revealed not only the importance of greater inclusion of ancestrally diverse populations in genomics research, but also the need to more specifically engage populations with health disparities, including those underserved. The interaction of genes and the environment has a profound impact on health outcomes, and presents many unanswered questions for genomics.

Session descriptions and recommendations are captured later in this report. The day concluded with closing comments from Mr. Vence Bonham, NHGRI Senior Advisor on Genomics and Health Disparities, and Dr. Green encouraging ongoing dialogue and engagement with NHGRI. Mr. Bonham also noted that NHGRI will incorporate feedback from the roundtable into this report, which will be presented to the National Advisory Council on Human Genome Research (NACHGR) in February, 2016.

The purpose of this report is to provide a summary of the day's proceedings, distill the recommendations from the roundtable, and inform NHGRI and its sister institutes as they develop their research programs in this area.

An agenda, participant list, and acknowledgements are included as appendices to this report.

Recommendations

Provide leadership for the field of genomics in promoting in health disparities research using genomic methods.

- Support the formation of interdisciplinary Centers of Excellence in Genomics and Health Disparities research.
- Promote genomics research that incorporates social and environmental exposures.
- Conduct genomic studies of underrepresented populations that are inclusive of translational and implementation research.
- Convene conversations and meetings to explore opportunities to collaborate in the areas of genomics and health disparities.

Examine institutional factors that impede greater inclusion of underrepresented populations in genomics research.

- Assure that study sections have the expertise to evaluate applications studying underrepresented populations in genomics research.
- Enhance review criteria to evaluate inclusion of underrepresented populations in the application review process.
- Recognize the greater expense and longer recruitment timelines for certain underrepresented populations.

Promote the incorporation of environmental data into genomics studies.

- Incorporate the use of environmental variables into new research initiatives.
- Fund research specifically to incorporate and explore physical and social environmental factors in genomics research.
- Support training in comprehensive analysis of populations and multifactorial determinants of health.

Promote comprehensive strategies for analysis of existing biospecimens from underrepresented populations.

- Incentivize processing and analysis of existing sample collections from ancestrally underrepresented populations.

- Support creation of new analysis methods and localized centers of expertise to analyze samples from diverse populations, especially those with small sample sizes.
- Lead the development of a national genomics resource of diverse populations.

Support sustained community engagement and community-based participatory research.

- Stimulate dialogues to hear community perspectives and develop research priorities meaningful to underrepresented populations.
- Build long-term relationships with communities, including the capacity to receive and respond to community feedback.
- Study recruitment and recruitment methods in new and existing grants of the NHGRI portfolio.

Session Summaries

Session 1: "The Problem"

Presentation by Eric Boerwinkle, Ph.D. — University of Texas Health Center at Houston

Boerwinkle's presentation outlined the problem of the current dearth of ancestral diversity in genomic science and laid out the scientific reasons to include more diversity in research. He discussed the high prevalence of rare genomic variation unique to certain populations that makes it essential for researchers to seek out diverse groups to capture the breadth of human variation. He described the need to understand both the variance between *and* within groups to understand the effects in both. He pointed out that rather than simply trying to increase our study sizes to capture more diversity, we need to focus recruitment to capture diversity at a useful level. Boerwinkle and many members of the roundtable also emphasized the need to reflect on all forms of diversity that affect health, noting that poverty is often a greater predictor of health disparities than ethnicity and also requires urgent attention.

Session 2: "Response to the Problem"

Opening comments by:

Rick Kittles, Ph.D. — University of Arizona College of Medicine
Leslie Biesecker, M.D. — NHGRI
Carlos Bustamante, Ph.D. — Stanford University School of Medicine

Conversation moderated by Teri Manolio, M.D., Ph.D. — NHGRI

The responses during this discussion focused on how to avoid broadening health disparities when conducting research and making advances in the area of genomic medicine. Discussants noted the alarming lack of diversity in research studies and the downstream effects—Biesecker explained that we have half of the ability to find incidental findings in African Americans compared to Europeans. The discussants described a number of important considerations moving forward, including the need to be mindful with resources (e.g., instead of sequencing everyone's genome, restrict such studies when it will be uniquely useful), be honest about the

necessary trade-offs that come with a commitment to inclusion, find solutions to recruitment and engagement issues for longitudinal research, tease out genetic versus environmental and socioeconomic determinants of health, and be vigilant about helping people receive care for conditions found through research.

The group brainstormed possible solutions for increasing diversity in research and addressing health disparities. 1) "Move the milk to herd the cats," or shift funding requirements and incentives to promote inclusion, 2) include diversity requirements in Requests for Applications (RFAs) and target funding for projects with underserved populations, and 3) set up concrete goals and metrics for inclusion—for example, there is a higher rate of genomic variants of unknown significance in minorities, and NHGRI can specifically set a goal to reduce this disparity and easily measure if this aim has been accomplished.

Session 3: Response to "The Problem" Discussion

Discussion during this session echoed many of the points made earlier. David Williams of Harvard School of Public Health emphasized the need to understand the complex interplay of factors that contribute to health disparities, especially given that economic disparities often play a larger role than race and ethnicity in health outcomes. There were additional suggestions for improvement in the area. Williams proposed targeted interventions to improve the health of disadvantaged and medically underserved populations. Biesecker proposed a scientific goal of using quantitative objectives based on statistical genetics to compile a reasonably complete understanding of allelic diversity in the world. Attendees also noted the need for better genomics tools to work with diverse populations. Discussion established that though NHGRI is a fairly small institute, it has a history of pushing the envelope and setting an example and can do the same to promote inclusion and diversity in research.

Session 4: "Barriers and Strategies to Enhance Inclusion and Engagement"

Presentations by:

Goldie Byrd, Ph.D. — North Carolina A&T State University
Bert Boyer, Ph.D. — Center for Alaska Native Health Research at University of Alaska Fairbanks

Goldie Byrd and Bert Boyer described specific work and research that they conduct with underrepresented populations and the insights that this work has provided. Byrd works on studying Alzheimer's in African Americans and shared her insights that African Americans are willing to participate in research despite past abuses, that it is important to talk directly with communities and give back to the community in a meaningful way, and have staff that looks like the population being studied. Boyer works with a rural Alaska Native Yup'ik population. He explained the long but necessary timeline for recruitment (2 years), the need to demonstrate respect through open communication, responsibility for a long-term partnership, and reciprocity through capacity-building to benefit both groups. He echoed the idea that the Yup'ik liked learning about genetics from someone in their community and were more supportive of research afterward.

Opening comments by:

Esteban Burchard, M.D., MPH — University of California San Francisco Schools of Pharmacy and Medicine
Margaret Pericak-Vance, Ph.D. — University of Miami Miller School of Medicine
Joon-Ho Yu, Ph.D., MPH — University of Washington Department of Pediatrics

Conversation moderated by Chanita Hughes-Halbert, Ph.D. — Medical University of South Carolina

Discussion after the presentations focused on additional challenges for working with underrepresented communities. Pericak-Vance discussed the challenges of working with some populations in south Florida, including a lack of knowledge about genetics among the community, mistrust of researchers, lack of motivation to participate in research (because of unmet basic needs), and even a fear of incidental diagnosis because of the concern that individuals cannot act on diagnoses. Pericak-Vance discussed methods of community engagement that ameliorated these challenges, including education and incentives. She also discussed heterogeneous concerns about research among different populations.

Joon-Ho Yu described that the problems that we are discussing today are the same ones that the CDC and leaders in public health faced 15 years ago; because of this, there are public health models that we can follow and learn from. He described the importance of hearing from communities and thinking forward to implementation to get ahead of the game on barriers to implementation.

Session 5: Health Disparities and Inequities Research Opportunities: ELSI and Translational Research

Opening comments by:

Carol Horowitz, M.D., MPH – Icahn School of Medicine at Mount Sinai
Rick Kittles, Ph.D. – University of Arizona College of Medicine
David Williams, Ph.D. MPH – Harvard School of Public Health

Conversation moderated by Lawrence Brody, Ph.D. – NHGRI

Carol Horowitz opened with the remark that "maybe now people will know there is more to sickness than bad behavior," noting that doctors first hold people responsible for their behavior, such as not taking their medication, without considering that the individual may have underlying genetic reasons for the specifics of their condition and how it responds to medication. For example, African Americans with a certain APOE variant are on average on one more blood pressure medication than those without it, and they still have higher blood pressure. Horowitz had a few key messages: 1) talk specifically about race rather than shying away from it, 2) do not pit genomics and social issues against one another, but instead consider multiple determinants of health together, and 3) call for more collaborative research and democratize and share data for efficient progress.

Rick Kittles emphasized that the translation of research into medicine was the big opportunity for this area. David Williams again discussed the complexity of gene-environment interactions and the confounding variables one encounters when trying to understand the influence of social environments. Williams provided numerous examples of how this plays out.

Session 6: Health Disparities and Inequities Research Opportunities: Genomic Science

Opening comments by:

Kari North, Ph.D. –University of North Carolina Gillings School of Global Public Health
Carlos Bustamante, Ph.D. – Stanford University School of Medicine
Margaret Pericak-Vance, Ph.D. –University of Miami Miller School of Medicine
Timothy Thornton, Ph.D. – University of Washington School of Public Health

Conversation moderated by Ebony Madden, Ph.D. – NHGRI

Timothy Thornton discussed a study with Latino populations and the scientific challenges it posed. He specifically talked about challenges for data analysis. Analyzing data from groups with diverse ancestry is difficult because the tools for doing so do not yet exist, and researchers are currently trying to develop them. Thornton too noted the environmental factors that are difficult to take into account when conducting studies.

The group discussed opportunities to combat health disparities. Bustamante noted that NHGRI should have a baseline commitment to diversity so that when clinical studies are done, NHGRI can look at and see if the studies have the needed ancestral diversity. He noted the continued need for ongoing "talking" between projects such as ClinGen, PAGE, and eMERGE to bring them together and accomplish goals. Kari North emphasized the role of education in promoting diversity by training pre-doc and post-doc fellows in comprehensive analysis of populations. She reiterated an earlier point that genetic and environmental determinants both influence health and that rather than pitting them against each other, we should do genomics research in the context of environmental factors to understand health disparities.

Participants discussed general recommendations from the day's discussions, including: 1) NHGRI providing leadership for the field of genomics in promoting in health disparities research using genomic methods, 2) examining institutional factors such as the application review process and infrastructure that impede greater inclusion of underrepresented populations, 3) incorporation of environmental variables in genomics research, 4) promoting strategies for analyzing existing biospecimens from underrepresented populations, and 5) greater focus on sustained community engagement and community-based participatory research.

Closing Comments

Eric Green, M.D., Ph.D. – NHGRI
Vence Bonham, J.D. – NHGRI

Eric Green and Vence Bonham challenged the group to share additional thoughts and suggestions. Some discussion followed about ways forward. Some advised an increase in methods analysis since methods grants are less expensive and can reveal important information. Some noted that we should start with the low-hanging fruit, such as adding diversity to existing RFAs and study criteria and making sure to ask for consent for re-contact from study participants even when there are not currently funds to support research. Attendees noted the difficulty of prioritizing because of the importance of all the goals mentioned. Green and Bonham thanked attendees for the productive meeting and informed them that NHGRI will create a report about the Roundtable and present it at the February meeting of the National Advisory Council for Human Genome Research.

Appendices

1. Agenda
2. Participants
3. Acknowledgements

Appendix 1

ROUNDTABLE AGENDA

Inclusion and Engagement of Underrepresented Populations in Genomics

National Human Genome Research Institute
National Institutes of Health

September 16, 2015

NIH Intramural Sequencing Center Conference Room
5625 Fishers Lane, Rockville, MD 20852

Objective of the Workshop

The goal of this roundtable is to bring together genomic scientists and health disparities researchers who are actively involved in working with populations that are underrepresented in genomics. The objective is to have a collaborative brainstorming session to identify the scientific problems brought about by the lack of diverse ancestral populations in genomic research and the existing barriers that limit underrepresented populations from participating in genomics research and strategies to address those barriers. In addition, we will identify research opportunities to study health disparities in genomic and ELSI science.

AGENDA

8:15 am – 8:30 am: **Introductions**
Vence Bonham, J.D. – NHGRI

8:30 am – 8:45 am: **Charge for the Day**
Eric Green, M.D., Ph.D. – NHGRI

8:45 am – 9:15 am: **"The Problem"**
The lack of ancestral diversity in genomic studies limits the potential of genomic science and medicine to benefit all populations.

Presentation by
Eric Boerwinkle , Ph.D. – The University of Texas Health Center at Houston

9:15 am – 9:45 am: **Response to "The Problem"**

Opening comments

Rick Kittles, Ph.D. – The University of Arizona College of Medicine

Leslie Biesecker, M.D. – NHGRI

Carlos Bustamante, Ph.D. (by telephone) – Stanford University School of Medicine

Conversation moderated by Teri Manolio, M.D., Ph.D. – NHGRI

9:45 am – 10:30 am: **Response to "The Problem" Discussion**

10:30 am – 10:45: **Morning Break**

10:45 am – 12:30 am: **Barriers and Strategies to Enhance Inclusion and Engagement**

Presentations by

Goldie Byrd, Ph.D. – North Carolina A&T State University

Bert Boyer, Ph.D. – Center for Alaska Native Health Research at University of Alaska Fairbanks

Opening comments

Esteban G. Burchard , M.D., MPH – The University of California San Francisco Schools of Pharmacy and Medicine

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Joon-Ho Yu, Ph.D., MPH – University of Washington Department of Pediatrics

Conversation moderated by Chanita Hughes-Halbert, Ph.D. – The Medical University of South Carolina

12:30 pm – 1:15 pm **Lunch**

1:15 pm – 2:30 pm: **Health Disparities and Inequities Research Opportunities: ELSI and Translational Research**

Opening comments

Carol Horowitz, M.D., MPH – Icahn School of Medicine at Mount Sinai

Rick Kittles, Ph.D. – The University of Arizona College of Medicine

David Williams, Ph.D. MPH – Harvard School of Public Health

Conversation moderated by Lawrence Brody, Ph.D. – NHGRI

2:30 pm – 2:45 pm **Afternoon Break**

2:45 pm – 3:45 pm: **Health Disparities and Inequities Research Opportunities: Genomic Science**

Opening comments

Kari North, Ph. D. – The University of North Carolina Gillings School of Global Public Health

Carlos Bustamante, Ph.D. (by telephone) – Stanford University School of Medicine

Margaret Pericak-Vance, Ph.D. – The University of Miami Miller School of Medicine

Timothy Thornton, Ph.D. – University of Washington School of Public Health

Conversation moderated by Ebony Madden, Ph.D. – NHGRI

3:45 - 4:00 pm: **Closing Comments**

Eric Green, M.D., Ph.D. – NHGRI

Vence Bonham, J.D. – NHGRI

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Inclusion and Engagement of Underrepresented Populations in Genomics

September 16, 2015

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