August 9, 2016

In the DC area, we are now in the midst of the 'dog days of summer.' With Congress out of session, August tends to be a quiet month legislatively, but it is also just the 'lull before the storm.' Once the fall begins, our heads will spin with all the important events – the last Fiscal Year 2016 meeting of the National Advisory Council for Human Genome Research, yet more developments with the Precision Medicine Initiative, and (of course) the Presidential election – not to mention the inevitable exciting developments in genomics!

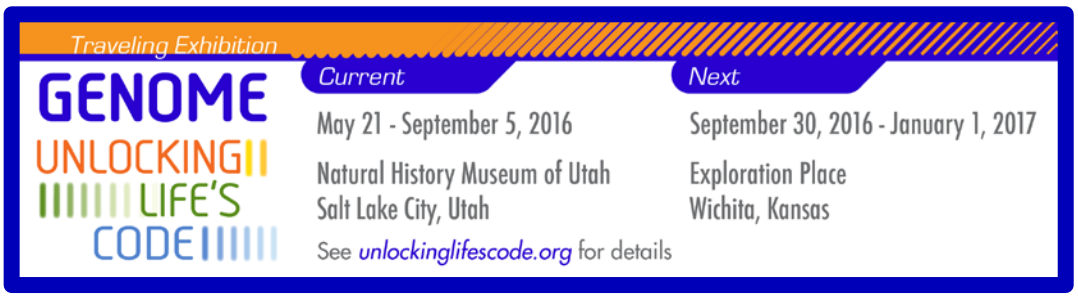
In this issue of *The Genomics Landscape,* we feature NHGRI's 9th Genomic Medicine Meeting. We then remain with a genomic medicine theme by highlighting a recent meeting with Israeli research leaders, and an opportunity to comment on new guiding principles for DNA sequencing-based clinical tests.

Specifically, August's *The Genomics Landscape* features stories about:

- From Bedside Back to Bench: Bringing Genomic Medicine Full Circle
- Genomic Medicine: Israeli Efforts
- New Drafts on Guiding Principles for DNA Sequencing-Based Clinical Tests

All the best,

Watch here for current and upcoming locations of the Smithsonian-NHGRI exhibition "Genome: Unlocking Life's Code" as it tours North America!



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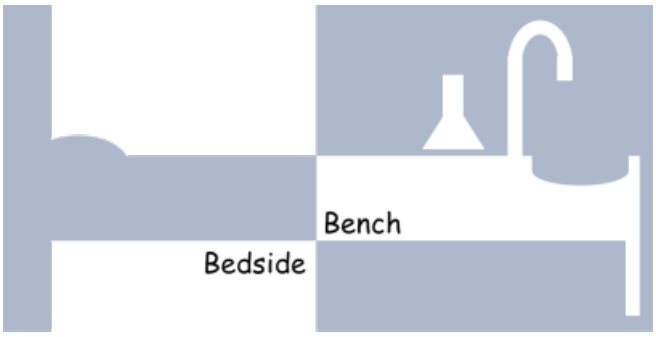
From Bedside Back to Bench: Bringing Genomic Medicine Full Circle

To explore the complexity of the human genome and its involvement in human disease, genomicists approach research questions from many angles. In an effort to advance genomic medicine research, NHGRI continually explores ways to use genomic-based clinical tools from the "bedside" and basic tools from the "bench."

In April, NHGRI's Genomic Medicine Working Group held its 9th Genomic Medicine Meeting (GM9), entitled "Bedside to Bench - Mind the Gaps." GM9 aimed to continue our long-term effort to address the many challenges of bringing genomics to medicine. GM9 explored how to engage basic genome scientists to tackle the many applied research questions in genomic medicine. A key thematic question explored was, "Can things learned in clinical genomics be used by basic genome scientists to inform fundamental questions in genome biology?"

The problem is that basic genome scientists and clinical genomicists often do not interact. GM9 explored measures that could stimulate such interactions. Objectives of the meeting included reviewing examples of successful collaborations between basic and clinical genomicists to understand what made them successful; identifying ways to enhance communications between basic and clinical genomicists; and establishing effective ways to incorporate clinically important questions into basic research projects.



Genomic Medicine Meeting 9

A fundamental approach to identifying genomic causes of disease is to look for genomic variants that differ among people affected by a disease and those who are not. While we sometimes know what impact the knowledge of these variants will make for clinical care of those patients, at other times it is not so straightforward. One of the most difficult problems is characterizing and interpreting the clinical significance of variants that are not clearly classifiable as pathogenic or benign—those known as "variants of uncertain significance" (VUSs).

The GM9 participants discussed how basic research can provide insights about the genomic mechanisms involved in human disease. Such insights help in the development of approaches for understanding the clinical significance of VUSs. The discussion also explored the computational approaches for predicting the possible functional significance of a VUS, including strategies for data

Genomic Medicine: Israeli Efforts

Recently, NHGRI Division of Genomic Medicine Director Teri Manolio and I attended a conference in Israel, entitled "Founder Populations and Their Contribution to Our Understanding of Biology and History - Lessons from the Jewish Genome." The conference focused on the Jewish community as a founder population, and how genomic studies of this population have yielded insights into pathways that contribute to disease. Other aspects of the conference delved into historical movements of populations in ancient times, and social and ethical frameworks for genomic studies in a unique population. While in Israel, we took advantage of the opportunity to meet with a group of Israeli genomic leaders from government, industry, and academia. We explored areas for potential future interactions and collaborations, particularly in genomic medicine. Such a meeting represents NHGRI's ongoing efforts to learn from others and discuss projects of mutual interest in the international genomic medicine community.

integration through the development and implementation of biomedical ontologies.

The GM9 participants generated a robust list of recommendations. All agreed that bringing together basic and clinical genomics researchers would accelerate the use of functional studies for answering important clinical questions, such as those related to VUSs. Such efforts would also help to identify 'clinically impactful' genes and to prioritize their study; encourage the development of high-throughput assays and animal models for studying these genes; involve basic researchers in developing guidelines for generating evidence about the significance of genes and VUSs; and identify a core set of functional assays for characterizing genomic variants.

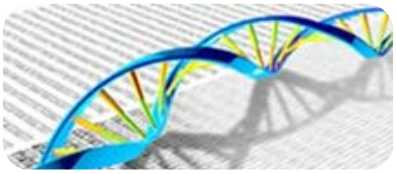
Participants in the Genomic Medicine 9 Meeting: Bedside to Bench - Mind the Gaps.

Recommendations were also made to establish more innovative and systematic approaches for capturing clinical phenotype data; to develop structured ways to acquire family history, socioeconomic, cultural, and exposure data; to encourage the use of common vocabularies; to improve ontologies; to enhance interactions among bench scientists and clinicians; and to develop funding opportunities that require basic and clinical research partnerships.

We are best served by bringing all tools to bear on the complex problems associated with understanding human biology and disease. It will not just be research from the clinical side or the basic side that generates the important breakthroughs in genomic medicine; rather, contributions from both sides are essential. Through such integration, we should be able to uncover the full range of benefits of using genomics in medicine.

To access the full set of recommendations from the GM9 meeting, see genome.gov/multimedia/slides/gm9/gm9_executivesummary.pdf. To access the meeting summary, materials, and video, see genome.gov/27564185.

New Drafts on Guiding Principles for DNA Sequencing-Based Clinical Tests



On July 6, 2016, the U.S. Food and Drug Administration announced two draft guidances regarding principles that will oversee the utilization of next-generation DNA sequencing (NGS) technologies. NGS has the ability to provide a more complete picture about how a patient's genomic makeup contributes to their health and disease. These guidances will help provide oversight frameworks for NGS-based clinical tests. Specifically, the guidances will be used to establish the regulatory processes to simultaneously encourage innovations in genomic testing and guarantee that such sequencing-based tests are safe and effective for clinical use. NHGRI strongly encourages the genomics community to provide feedback about the draft guidance documents during the comment period, which closes on October 6, 2016. For more information, visit genome.gov/27565646.

Spotlight on the Precision Medicine Initiative (PMI)

nih.gov/precisionmedicine

- NIH awards $55 million to build million-person precision medicine cohort.
- President Obama details "Medicine's Next Step."
- In an article in *Forbes*, Dr. Francis Collins discusses the new awards for the million-person Precision Medicine Initiative Cohort Program.
- NIH funds precision medicine research with a focus on health disparities.
- Precision Medicine Initiative® Cohort Program Healthcare Provider Organization Enrollment Centers announces a Notice of Intent to Publish a Reissue of Funding Opportunity Announcement (UG3/UH3) and a Soon to be Issued Other Transaction (OT) Funding Opportunity.

Genomics Research

Researchers Make Advance in Possible Treatments for Gaucher, Parkinson's Diseases

International "Big Data" Study Offers Fresh Insights into T2D

Microbiome Genes on the Move

Uncovering a New Principle in Chemotherapy Resistance in Breast Cancer

Five Misconceptions About the Role of Genomics in Public Health

Americans More Worried than Enthusiastic About using Gene Editing, Brain Chip Implants, Synthetic Blood to 'Enhance' Human Abilities

Tapping Crowd-Sourced Data Unearths a Trove of Depression Genes

Novel Genetic Mutation May Lead to the Progressive Loss of Motor Function

Researchers Flag Hundreds of New Genes that Could Contribute to Autism

Media Availability

Genetics of Type 2 Diabetes Revealed in Unprecedented Detail

Vaccine Strategy Induces Antibodies that Can Target Multiple Influenza Viruses

Funding Opportunities

Initiative to Maximize Research Education in Genomics: Diversity Action Plan

Ruth L. Kirschstein National Research Service Award (NRSA) Fellowships

Small Research Grants for Analyses of Data for the Gabriella Miller Kids First Data Resource

Development of the Gabriella Miller Kids First Pediatric Data Resource Center (U2C)

Social Epigenomics Research Focused on Minority Health and Health Disparities: R01 and R21

Resource-Related Research Projects for Development of Animal Models and Related Materials

Funding News

NIH/BD2K Participation in the Joint NSF/NIH Initiative on Quantitative Approaches to Biomedical Big Data

Health-Research Sector Small Businesses Invited to Learn about NIH funding at National Conference

The Alzheimer's Disease Sequencing Project Policy (ADSP) on the Publication of Study-Related Data

NIH/NHGRI News of Interest

NIH Launches Largest-Ever Study of Breast Cancer Genetics in Black Women

International Collaboration to Create New Cancer Models to Accelerate Research

Unlocking Life's Code: July 2016 Newsletter – Current Genetics News Stories for Your Classroom

A Look at Trends in NIH's Model Organism Research Support

The Predictive Nature of Criterion Scores on Impact Score and Funding Outcomes

NIH Names Dr. Joshua Gordon Director of the National Institute of Mental Health

Request for Comment: NIH Guidelines for Human Stem Cell Research and t NIH Steering Committee's Consideration of Certain Human-Animal Chimera Research

New Videos

Astronauts Talk about the Use of DNA Sequencer on the International Space Station

Upcoming Videocast

IGNITE and Beyond: The Future of Genomic Medicine Implementation – August 30, 2016