DIRECTOR’S REPORT

National Advisory Council for Human Genome Research

September 2017

Eric Green, M.D., Ph.D.
Director, NHGRI
## Director's Report-Related Documents: September 2017

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<th>No.</th>
<th>Relevant Documents</th>
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<td>NIH-ACMG Fellowship in Genomic Medicine Program Management</td>
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<td>Genomics and Health Disparities Lecture Series</td>
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<td>Genomics and Health Disparities Scientific Interest Group</td>
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<td>Francis Collins 'Retained' as NIH Director</td>
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<td>New NIH Deputy Director for Management</td>
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<td>Naming of New Director, National Cancer Institute</td>
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<td>7</td>
<td>First Director, NIH Tribal Health Research Office</td>
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[genome.gov/DirectorsReport](genome.gov/DirectorsReport)
Open Session Presentations

- Next Generation Researchers Initiative
  Larry Tabak

- Report: Update on the eMERGE Network
  Rex Chisholm

  A Decade of Discovery
  Carolyn Hutter
Open Session Presentations

  
  Wendy Chung

- Report: Genomic Medicine Working Group Activities in 2017
  
  Teri Manolio

- Report: Update on the NSIGHT Program
  
  Anastasia Wise
Director’s Report Outline

I. General NHGRI Updates
II. General NIH Updates
III. General Genomics Updates
IV. NHGRI Extramural Research Program
V. NIH Common Fund/Trans-NIH
VI. NHGRI Division of Policy, Communications, and Education
VII. NHGRI Intramural Research Program
Director’s Report Outline

I. General NHGRI Updates
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Retirement of NHGRI Program Director

Jean McEwen, J.D., Ph.D.
NIH-ACMG Fellowship in Genomic Medicine Program Management

- Increase pool of physicians who can manage research and implementation programs in genomic medicine
- First fellow (Jennifer Krupp) started this month
- Applications for 2018 fellowship due December 1; two-year fellowship begins July 2018
Herman Taylor, Jr., M.D., M.P.H
September 19, 2017
Director, Cardiovascular Research Institute
Morehouse School of Medicine

Richard Cooper, M.D.
November 7, 2017
Professor and Chair, Public Health Sciences
Loyola University Medical School

Jose Florez, M.D., Ph.D.
February 22, 2018
Chief, Diabetes Unit and Investigator, Center for Genomic Medicine
Massachusetts General Hospital
Harvard Medical School
Genomics and Health Disparities
Scientific Interest Group

Vence Bonham, J.D.  
NHGRI

Hannah Valantine, M.D.  
NIH OD and NHLBI

Sara Hull, Ph.D.  
NIH Clinical Center and NHGRI

Gary Gibbons, M.D.  
NHLBI

Rasika Mathias, Ph.D.  
Johns Hopkins University

Timothy Thornton, Ph.D.  
University of Washington

Wylie Burke, M.D., Ph.D.  
University of Washington

Charles Rotimi, Ph.D.  
NHGRI

October 11, 2017 at 3:00 pm EST
Genomic Data Science Working Group

Eric Boerwinkle
Lon Cardon
George Hripcsak
Trey Ideker
Gail Jarvik
Mark Johnston
Nancy Cox
Michael Boehnke
Anthony Philippakis

Current Council Member
Former Council Member
Current Council Member
Current Council Member
Current Council Member
Former Council Member

National Human Genome Research Institute
Director’s Report Outline

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Francis Collins ‘Retained’ as NIH Director

Francis Collins, M.D., Ph.D.
New NIH Deputy Director for Management

Alfred Johnson, Ph.D.
Naming of New Director, National Cancer Institute

Norman Sharpless, M.D.
First Director,
NIH Tribal Health Research Office

David Wilson, Ph.D.
Josie Briggs Departs as Director, National Center for Complementary and Integrative Health

Josephine Briggs, M.D.
New Commissioner,
U.S. Food and Drug Administration

Scott Gottlieb, M.D.
New Director, U.S. Centers for Disease Control and Prevention

Brenda Fitzgerald, M.D.
New U.S. Surgeon General

Jerome Adams, M.D.
Alberto Gutierrez Retiring as Director, FDA Office of In Vitro Diagnostics and Radiological Health

Alberto Gutierrez, Ph.D.
Upcoming policy changes aim to improve stewardship of NIH-funded clinical trials

New requirements go into effect for applications due on or after January 25, 2018
### NIH Appropriations

<table>
<thead>
<tr>
<th></th>
<th>Fiscal Year 2017 Budget</th>
<th>Fiscal Year 2018 Senate Appropriations Labor-HHS Spending Bill</th>
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</thead>
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<tr>
<td><strong>NIH</strong></td>
<td>$34.1 B</td>
<td>$36.1 B</td>
</tr>
<tr>
<td><strong>NHGRI</strong></td>
<td>$528 M</td>
<td>$547 M</td>
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Global Genomic Medicine Collaborative (G2MC)

Athens, April 2017

- Leading effort to convene major large-scale cohort studies and promote interoperability and sharing
- Meeting planned for early 2018
New Executive Director,
American Society of Human Genetics

Mona Miller, M.P.P.
• Recommends against the use of germline gene editing that would result in pregnancy

• Asserts that in vitro studies of germline gene editing should continue without restriction of public funds
Albany Medical Center Prize in Medicine and Biomedical Research
Allen Distinguished Investigator Awards

Fei Chen, Ph.D.  Jason Buenrostro, Ph.D.

THE PAUL G. ALLEN FRONTIERS GROUP
JAMA Insights: Genomics and Precision Health

Precision medicine is a rapidly evolving approach to disease treatment and prevention that matches treatments to patients based on individual genetic variability. To help clinicians understand the latest developments in precision medicine so they can make the most informed decisions for their patients, JAMA in 2017 is publishing a series of essays to explain the state of the field, its concepts, and technologies.
Genomes In The News…
I. General NHGRI Updates

II. General NIH Updates

III. General Genomics Updates

IV. NHGRI Extramural Research Program

V. NIH Common Fund/Trans-NIH

VI. NHGRI Division of Policy, Communications, and Education

VII. NHGRI Intramural Research Program
## Genome Sequencing Program

Centers for Common Disease Genomics

<table>
<thead>
<tr>
<th>Disease Category</th>
<th>Sequence Type</th>
<th>Sequenced Samples</th>
<th>Approved Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>Genomes</td>
<td>22,729</td>
<td>46,300</td>
</tr>
<tr>
<td></td>
<td>Exomes</td>
<td>10,861</td>
<td>21,000</td>
</tr>
<tr>
<td>Immune-Mediated</td>
<td>Genomes</td>
<td>5,383</td>
<td>25,000</td>
</tr>
<tr>
<td></td>
<td>Exomes</td>
<td>0</td>
<td>2,000</td>
</tr>
<tr>
<td>Neuropsychiatric</td>
<td>Genomes</td>
<td>9,366</td>
<td>15,300</td>
</tr>
<tr>
<td></td>
<td>Exomes</td>
<td>11,450</td>
<td>32,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>59,789</strong></td>
<td></td>
<td><strong>141,600</strong></td>
</tr>
</tbody>
</table>
Genome Sequencing Program
Centers for Mendelian Genomics

**Exome Sequence Production**
- Number of Samples:
  - Funding Phase 1: 20,612
  - Funding Phase 2: 14,782

**Disease Gene Discovery**
- Number of Genes:
  - Conservative:
    - Novel: 970
    - Known: 812
  - Suggestive:
    - Novel: 738
    - Known: 56

**CMG Publications**
- Number of Publications:
  - Funding Phase 1: 221
  - Funding Phase 2: 153

Matchmaker Exchange
Connected Nodes
Technology Development Program

- Advanced Genomic Technology Development Meeting - May 2017

- Novel Genomic Technology Development
  PAR-16-14 (R01, also linked R21 and R43/44)
  Next due date: October 31, 2017
SCREEn: Search Candidate Regulatory Elements by ENCODE

SCREEn is a web interface for searching and visualizing the Registry of candidate Regulatory Elements (cREs) derived from ENCODE data. The Registry contains 1.31M human cREs in hg19 and 0.52M mouse cREs in mm10, with orthologous cREs cross-referenced. SCREEn presents the data that support biochemical activities of the cREs and the expression of nearby genes in specific cell and tissue types.

You may launch SCREEn using the search box below or browse a curated list of SNPs from the NHGRI-EBI Genome Wide Association Study (GWAS) catalog to annotate genetic variants using cREs.

Browse GWAS
ENCyclopedia Of DNA Elements (ENCODE)

Publications Using ENCODE Data

- ENCODE Community Publications
- ENCODE Consortium Publications

Number of Publications

Years: 2007 to 2017
Centers of Excellence in Genomic Science (CEGS) Program

- Center for Genome Editing and Recording

- PI - Jennifer Doudna

- Create methods to detect, alter, and record the sequence and output of the genome in individual cells and tissues
eMERGE and Beyond: The Future of EHR and Genomics Workshop
October 30, 2017

- Evidence generation for genomic medicine
- Identification of novel & disruptive opportunities
- Electronic phenotyping
- EMR integration of genomic results
Clinical Genome Resource (ClinGen)

Clinical Laboratories Meeting
Minimum Data Sharing Requirements

Ambry
ARUP
Athena
U. Medical Centre Ljubljana
Children’s Mercy Hospital
Counsyl
EGL Genetics
GeneDx
Illumina
Invitae
Partners Healthcare LMM
Quest Diagnostics
University of Chicago

List as of Sept. 5, 2017

Save the Date!
May 23-25, 2018
Wellcome Genome Campus
Hinxton, England
Clinical Sequencing Exploratory Research Program

- Enrolled 5,477 adults and 1,434 children
- 345 total publications, 21 working group publications

**Annals of Internal Medicine**

*The Impact of Whole-Genome Sequencing on the Primary Care and Outcomes of Healthy Adult Patients*

**ORIGINAL RESEARCH**

Vassy, et al. PMID 28654958

- Demonstrated feasibility of returning genomic results by primary care providers
- Discovered monogenic disease risk in 22% of patients
- Recommended new clinical actions for 34% of patients
Clinical Sequencing Evidence-Generating Research Program

Phase II of CSER: Clinical Sequencing Evidence-generating Research Program

Clinical Sites:
- Baylor College of Medicine
- HudsonAlpha Institute of Biotechnology
- Kaiser Foundation Research Institute
- Icahn School of Medicine at Mount Sinai
- University of California, San Francisco
- University of North Carolina, Chapel Hill

Coordinating Center:
- University of Washington
IGNITE RFAs released: RFA HG-17-008, -009, -010
Receipt date: November 3, 2017
Computational Genomics and Data Science Program

NHGRI Genomic Data Science Analysis, Visualization, and Informatics Lab-space (AnVIL)

- RFA-HG-17-011 release: July 17, 2017
- Application due date: November 9, 2017
Ethical, Legal, and Social Implications (ELSI) Research Program

▪ Genomics and Society Working Group annual meeting

▪ ELSI Program Announcements:

  Genomic Research, Genomic Healthcare, and Broader Legal, Policy, and Societal Issues

  Participating Institutes and Centers: FIC, NCI, NIA, NIAID, NICHD, NIDCD, NIEHS, NIMHD, NINDS

▪ Centers of Excellence in ELSI Research (CEER) RFA:

  Letter of Intent Due: September 30, 2017

  Application Due Date: October 31, 2017
4th ELSI Congress
Expanding the ELSI Universe #ELSICon

- June 2017
- Jackson Laboratory, CT
- 300+ attendees
- Videos of plenary presentations available on ELSICon website
2017 Meeting in St. Louis

The Chase Park Plaza
St. Louis, Missouri
April 12-14, 2017

2018 Meeting: March 18-20 in Los Angeles
Three new T32 programs:

Duke University (PI: Geoffrey Ginsburg)  
Genomic Medicine

U. of Pennsylvania (PI: Katherine Nathanson)  
Genomic Medicine

U. of Pennsylvania (PI: Steven Joffe)  
ELSI Research
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Knockout Mouse Phenotyping Project (KOMP2)

- Annual IMPC Meeting – Athens, November 2017
- Sexual dimorphism paper published in *Nature Communications*
- Human disease models paper published in *Nature Genetics*
- Deafness paper in press in *Nature*
Human Heredity and Health in Africa (H3Africa)

- Last Consortium meeting for Stage I in May 2017
  Guest speaker: Eric Green, NHGRI Director

- Awards for Stage II anticipated soon
- First Consortium meeting for Stage II in March 2018

Document 35
Undiagnosed Diseases Network (UDN)

UDN Applications and Acceptances

- 1,606 applications, ~71 per month
- 639 acceptances, ~28 per month
- ~50% Accepted
- ~25% Diagnosed

93 Diagnoses
Undiagnosed Diseases Network (UDN)

Phase II FOAs

- Clinical Sites: 8-10, RFA-RM-17-019
- Coordinating Center: 1, RFA-RM-17-018
- Model Organisms Screening Center(s): 1-2, RFA-RM-17-017
- Sequencing Core(s): 1-2, RFA-RM-17-016
- Metabolomics Core(s): 1-2, RFA-RM-17-015

All Applications Due November 2, 2017
23 cohorts (>18,000 samples) available

Genome sequencing:
- BCM & WashU ($12.6M, 2015)
- Broad Institute & HudsonAlpha/St. Jude ($31M, 2016-2019)
- ~9,000 samples sequenced to date

Data resource center:
- CHOP ($15M, 2017-2022)

Data analysis
 NIH Data Commons Pilot Phase

- Data Commons Pilot Phase Consortium
- Datasets: GTEx, TOPMed, AGR
- Stage 1: Develop prototypes & implementation plan
  Kickoff meeting: Fall 2017 (Bethesda)
- Stage 2: Full implementation

Other Transactions (OT) Research Opportunity Announcement (RM-17-026)
All of Us Research Program Advisory Panel Launches Genomics Working Group

August 15, 2017

The All of Us Research Program Advisory Panel recently established a new working group to help inform the program’s comprehensive genomics strategy. The group will consider various issues, including the evolving nature of genome sequencing technologies, the analysis of genomic data on a large scale, and the program’s commitment to return information to participants. The group’s work is expected to last approximately four months, during which time the group will prepare a final report for the advisory panel.

For more information, see the group’s charge and roster.

DNA double helix
Credit: National Human Genome Research Institute, NIH.
www.genome.gov
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ASHG-NHGRI Genetics and Public Policy Fellow

Nikki Meadows, Ph.D.
New Web Resources for Investigators and General Public

- For Investigators: Points to Consider Regarding the FDA’s Investigational Device Exemption Regulations
- For General Public: Genome Editing

**Points to Consider Regarding the FDA’s Investigational Device Exemption Regulations in the Context of Genomics Research**

Updated: July 27, 2017

Outline:

- Overview
- Does the IDE regulation apply to my study?
- Does my study pose a nonsignificant risk (NSR) or significant risk (SR) to participants?
- What do I do if my study is a nonsignificant risk (NSR)?
- What do I do if my study is a significant risk (SR)?
- Glossary

**Genome Editing**

What is genome editing?

Genome editing is a method that lets scientists change the DNA of many organisms, including plants, bacteria, and animals. Editing DNA can lead to changes in physical traits, like eye color and disease risk. Scientists use different technologies to do this. These technologies act like scissors, cutting the DNA at a specific spot. Then scientists can remove, add, or replace the DNA where it was cut.

The first genome editing technologies were developed in the late 1990s. More recently, a new genome editing tool called CRISPR, invented in 2009, has made it easier than ever to edit DNA. CRISPR is simpler, faster, cheaper, and more accurate than older genome editing methods. Many scientists who perform genome editing now use CRISPR.

For more details on how these technologies work, please visit How Does Genome Editing Work?

Genome Editing in the Lab

One way that scientists use genome editing is to investigate different diseases that affect humans. They edit the genomes of animals, like mice and zebrafish, because animals have many of the same genes as humans. For example, mice and humans share about 95 percent of their genes. By changing a single gene or multiple genes in a mouse, scientists can observe how these changes affect the mouse’s health and predict how similar changes in human genomes might affect human health.

Scientists at the National Human Genome Research Institute (NHGRI) are doing just this. The Burgess lab, for example, is studying zebrafish genomes. Scientists in this lab delete different genes in zebrafish one at a time using CRISPR to see how the deletion impacts the fish. The Burgess lab focuses on 56 zebrafish genes which are similar to the genes that cause human deafness so that they can better understand the genomic basis of deafness.
Genomics Imagery on Flickr
NHGRI History of Genomics Program

- Database users meeting
- NHGRI History of Molecular Biology and Genomics Lecture Series
Genome: Unlocking Life’s Code Exhibition

Travel Schedule

2017

June 12-September 11
Health Museum
Houston, TX

September 30-January 1
Science North
Sudbury, Ontario, Canada

2018

January 28-April 24
Rochester Museum and Science Center
Rochester, NY
The Immortal Henrietta Lacks Educator Workshop and Curriculum
NHGRI Short Course in Genomics
Middle/High School, Community College, and Tribal College Educators
Inter-Society Coordinating Committee for Practitioner Education (ISCC)
Method for Introducing a New Competency: Genomics (MINC)

A Method for Introducing A New Competency Genomics

Getting Started

The purpose of this Toolkit is to assist those interested in integrating genomics into practice. The creation of the Toolkit was recommended by leaders, just like you, who wanted to apply new scientific discoveries in patient care. Read more about options that could work in your clinical setting too!

Getting Started:

Are you an administrator or educator?

- Choose appropriate button at upper right on page to explore options of how to use the toolkit

Seeking answers to questions about what's involved in applying new competencies in practice?

- Click on each of the items to the left to learn more

Want to go right to the resources?

- Click on Browse Resources

Stories from the Trenches

Colin Edmonson DNP, RN, FACHE, NEA-BC
Chief Nursing Officer, Administration
Texas Health Presbyterian Hospital
Dallas, Texas

Pamela Edwards EdD, MSN, RN-BC, CNE
Associate Chief Nursing Officer, Education
Duke University Hospital
Durham, North Carolina
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2017 Rare Impact Award, National Organization for Rare Disorders

Cynthia Tifft, M.D., Ph.D.
New President-Elect, American Society of Human Genetics

Les Biesecker, M.D.
Social influence on 5-year survival in a longitudinal chemotherapy ward co-presentation network

A defect in myoblast fusion underlies Carey-Fineman-Ziter syndrome

*Staphylococcus aureus* and *Staphylococcus epidermidis* strain diversity underlying pediatric atopic dermatitis
To receive *The Genomics Landscape*,
go to list.nih.gov

Search for NHGRILANDSCAPE

Past issues can be accessed at:
[genome.gov/27541196](https://genome.gov/27541196)
Thanks!

Special Thanks!
Advancing human health through genomics research