

# Roundtable on Translating Genomic-Based Research for Health

2012 Annual Report



INSTITUTE OF MEDICINE  
OF THE NATIONAL ACADEMIES

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# Message from the Co-Chairs

Wylie Burke and Sharon F. Terry



The potential of genomics to improve health care is becoming a reality. New molecular tools are now being used to diagnose disease, predict the potential for adverse events, reduce the use of unnecessary medical services, and tailor therapeutic regimens. As genomic medicine is implemented further, it holds tremendous potential to enable the health care system to provide better care at a lower cost. However, many important questions must be addressed to ensure that this new technology is used responsibly. Decreasing genome sequencing costs and innovative science

have placed genomics and related molecular tools at the center of biomedical research; but translation into health care applications remains difficult due to a currently underdeveloped evidence base, a misalignment between basic research and clinical needs, and the lack of a robust knowledge generating system that incorporates genomic information from both basic and clinical research. Overcoming these obstacles is not an easy task, but the Roundtable on Translating Genomic-Based Research for Health provides an opportunity for strategic thinking and action to solve these paramount issues.

As a forum for academia, industry, advocacy and provider groups, government, and others, we stimulate discussion, press to clarify complex concepts, and seek pathways to solutions. In 2012, the Roundtable sponsored workshops and meetings on developing precision therapeutics, demonstrating clinical utility for molecular diagnostics in oncology, the economics of genomic medicine, sharing clinical research data, and improving the translation of genome-based research. Essential to our process is discourse that allows all perspectives to be voiced, with special attention given to clarifying competing views and the identification of actions and strategies for resolving issues.

Our agenda for 2013 will include further exploration of these important topics, with a focus on practical innovations in the area of data sharing. We will be sponsoring a workshop on conflict of interest, because these policies are important in accelerating innovation; focusing on the co-development of therapeutics and diagnostics; and exploring genome-based strategies for drug repurposing. We look forward to a productive year with the participation of all stakeholders.

Sincerely,

A handwritten signature in blue ink that reads "Wylie Burke".

Wylie Burke, M.D., Ph.D.  
Co-Chair

A handwritten signature in blue ink that reads "Sharon F. Terry".

Sharon F. Terry, M.A.  
Co-Chair

# Reflecting Back

## Roundtable Activities in 2012

### Roundtable Meetings

Roundtable members met three times in 2012 to continue their discussions on emerging and enduring issues in advancing the field of genomics. Meeting topics that were discussed included ongoing efforts to develop a genetic variant database, stressors on the health care system, systems approaches to identifying and overcoming inefficiencies in translating basic genomic discoveries, access to medicines, and grand challenges in genomics.

### New Paradigms in Drug Discovery: How Genomic Data Are Being Used to Revolutionize the Drug Discovery and Development Process: A Workshop (March 21, 2012)

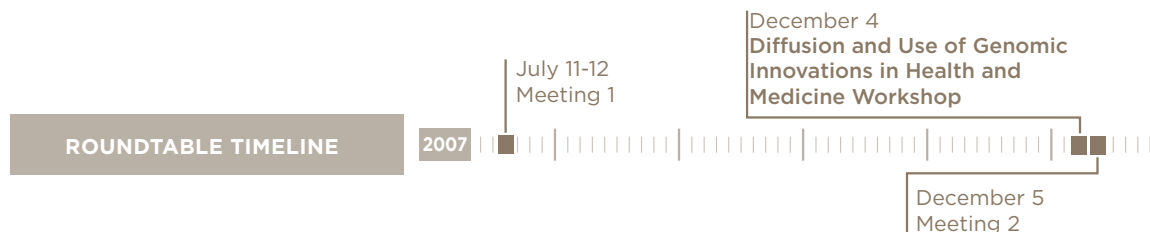
New drug approvals have remained reasonably steady for the past 50 years, while the total spending on health-related research and development has tripled since 1990. There are many theories about the causes of this trend, including increased regulatory barriers, rising costs of scientific inquiry, and lack of production models that have successfully incorporated new technology. Regardless of the cause, this trajectory is not economically sustainable, and in response many companies are turning toward collaborative models of drug development. The Roundtable hosted a public workshop to investigate how genetic and genomic information is currently being used and how it will be used in the future to improve the process of drug development. The goal of the workshop was to examine the current investment in, use of, and utility of genetic and genomic data in drug development strategies. The presentations and discussions explored various aspects of the issue, including target identification, clinical trial design, strategic partnerships, and the use of emerging technologies such as next-generation sequencing. The workshop also investigated the economic drivers, incentives, and models that use genomics in drug development and featured an array of stakeholders, including leaders from academia, industry, and government organizations.

### **Evidence for Clinical Utility of Molecular Diagnostics in Oncology: A Workshop (May 24, 2012)**

Since the sequencing of the human genome, an ever-growing number of linkages between specific genetic variants and diseases have been identified. These findings have been translated into molecular diagnostic tests that are used today in a variety of settings, from predicting the risk of developing Alzheimer's to determining targeted therapeutic treatment options for cancer patients. However, there are questions regarding the clinical value of many of these tests and so far relatively few have been adopted into clinical practice. A major limiting factor for the use of these tests has been the lack of clear evidence of clinical utility. Confounding this issue is that there is no consensus among stakeholders regarding the type of evidence, the methodology to collect it, or the level of evidence that is needed to move a test into clinical practice. Capturing the benefits of molecular diagnostics will require stakeholders to help shape and define methodologies for efficiently generating reliable information about which tests have value and in what patient groups they should be utilized. Sustained dialogue among stakeholders is needed to help close the current evidence gap and foster the development of clinically valuable tests. The Roundtable co-hosted a workshop with the Center for Medical Technology Policy to discuss research methodologies related to demonstrating and assessing the clinical validity and utility of molecular diagnostics for oncology. The presentations and discussions explored the challenges in and identified potential opportunities for advancing the development and use of molecular diagnostic tests for guiding the treatment and management of oncology patients. Stakeholders, including patients, health care providers, policy makers, payers, diagnostic test developers, guideline developers, and others were invited to present their perspectives.

### **Assessing the Economics of Genomic Medicine: A Workshop (July 17-18, 2012)**

The sequencing of the human genome and the identification of links between specific genetic variants and disease formation have led to an explosion of genomic-based innovation and technology and the advent of genomic medicine. These advancements have the ability to direct patient treatment toward more effective or less harmful options and potentially to reduce health care costs caused by unnecessary or ineffective treatments. However, this is not a certainty and some stakeholders are concerned that genomic technologies will simply add cost to the health care system without providing significant benefit to patients. To better understand



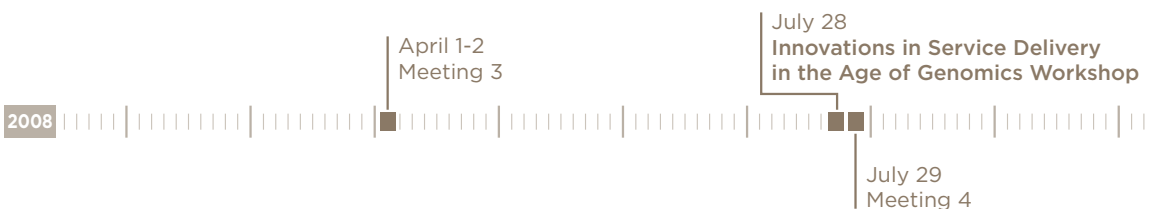
the health economic issues that may arise in the course of integrating genomic data into health care, the Roundtable hosted a workshop that brought together economists, regulators, payers, biomedical researchers, patients, providers, and other stakeholders to discuss the many factors that may influence this implementation.

### Sharing Clinical Research Data: A Workshop (October 4-5, 2012)

Pharmaceutical companies, academic institutions, and government agencies hold large quantities of clinical research data. Much of this information, however, is never published or is statutorily restricted from being made publicly available. Data sharing within and across sectors could facilitate scientific and public health advances and could enhance the analysis of safety and efficacy. The Roundtable and three Institute of Medicine (IOM) forums—the Forum on Drug Discovery, Development, and Translation; the Forum on Neuroscience and Nervous System Disorders; and the National Cancer Policy Forum—jointly conducted a public workshop that focused on strategies to facilitate the sharing of clinical research data. Participants included members of industry, academia, government agencies such as the Food and Drug Administration (FDA) and the National Institutes of Health, disease advocacy groups, and other stakeholders. The workshop featured invited presentations and discussions that examined the benefits of and barriers to sharing clinical research data, specifically clinical trial data, and strategies for enhancing sharing within and among sectors to facilitate the research and development of effective, safe, and needed products.

### Improving the Efficiency and Effectiveness of Genomic Science Translation: A Workshop (December 3, 2012)

Most of the anticipated health care development that was predicted at the completion of the Human Genome Project has not, for the most part, culminated in products or processes that are used in medical settings. This lack of translation between basic genome science and clinical research has frustrated many scientists, health care practitioners, investors, policy makers, and patients. Recognizing the growing divide between these sectors, the Roundtable held a workshop to examine how basic science can best be positioned to foster the successful translation of early discoveries.



# Looking Forward

## Roundtable Activities in 2013

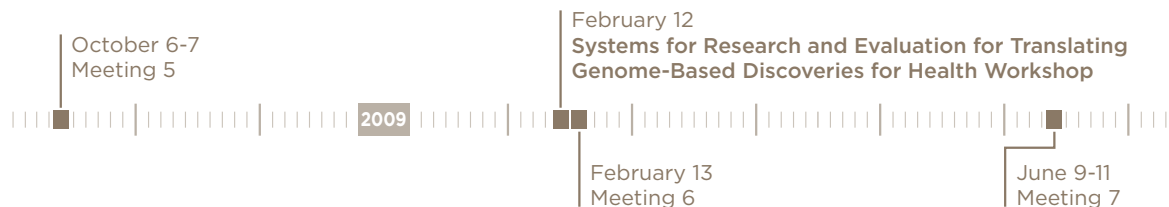
### Roundtable Meetings

Roundtable members will meet on February 28, June 25, and December 4-5, 2013. Meeting topics to be discussed include evidence; governance; developing a knowledgeable health care system for genomics; and education, engagement, and cultural change.

### Refining Processes for the Co-Development of Genome-Based Therapeutics and Companion Diagnostic Tests: A Workshop (February 27, 2013)

Genome information can identify new drug targets for both common and rare diseases, can identify patients who are likely to respond to a specific treatment, and has the potential to significantly reduce the cost of clinical trials by reducing the number of patients that must be enrolled to demonstrate safety and efficacy. Recently, benefits such as these have led to the development and approval of a number of targeted therapeutics for diseases such as non-small-cell lung cancer, metastatic melanoma, and cystic fibrosis. A key component of each of these new drug approvals is the ability to identify the population of patients who will benefit from treatment, and this has largely hinged on the co-development and co-submission to

the FDA of a companion molecular test. This has led to a major alteration in the way drugs are developed, with traditionally separate entities—pharmaceutical and diagnostic companies—now working in close collaboration. Although these early co-development successes have bolstered the industry and demonstrated to some extent the efficacy of a genome-based approach to







companion diagnostic, need for multiple tests for ever smaller diagnostic tissue specimens, and many others. The Roundtable will host a workshop to examine the challenges of and potential solutions for the co-development of molecular tests and targeted therapeutics.

### Genomics-Enabled Drug Repurposing and Repositioning: A Workshop (June 24, 2013)

The path of drug development can be expensive and time consuming. Recent estimates predict, on average, an expenditure of at least \$1 billion and a time frame of 10 years to bring a drug to the U.S. market. Although spending on drug research has increased, the number of drugs approved by the FDA, on average, has not. In response, pharmaceutical companies are examining options to either give drugs not commercially available a new chance at approval or search for new indications for existing drugs. Technological advances and the increasing availability of genomic data and computational systems have resulted in new methods to systematically identify both drug targets and pathways for detecting drugs with secondary, oftentimes seemingly unrelated, indications. The Roundtable will host a workshop to assess the current landscape of drug-repurposing activities in industry, academia, and government; examine enabling tools and technology; and evaluate the business models and economic incentives for drug-repurposing programs. Stakeholders, including government officials, pharmaceutical company representatives, academic researchers, regulators, funders, and patients, will be invited to present their perspectives and participate in discussions during the workshop.

August 31-September 1  
Direct-to-Consumer Genetic  
Testing Workshop

2010

November 16-17  
Meeting 8

March 22  
The Value of Genetic and Genomic  
Technologies Workshop

March 23  
Meeting 9

# Working Groups

Four working groups have been established within the Roundtable to examine various topics and aspects of translating genomic information into appreciable health care applications. Each group meets regularly by teleconference as well as in person at Roundtable meetings. Together, they discuss issues of mutual interest to the group as well as suggest, plan, and complete Roundtable workshops, seminars, and commissioned papers.

## Clinical Practice and Public Health

This working group was established by the Roundtable to focus on issues related to the development and implementation of genetic and genomic technologies in clinical and public health practice. Members examine issues such as the economic impact of genomic medicine, the educational needs of the health care workforce, and the intersection between bioinformatics and clinical practice.





## Drug Development Informed by Genetics and Genomics

The Roundtable established a working group to examine the drug discovery and development process. This group focuses on topics such as using collaborative research paradigms to advance drug development, data sharing, biospecimen resources, and genomic and genetic strategies for drug discovery and development.

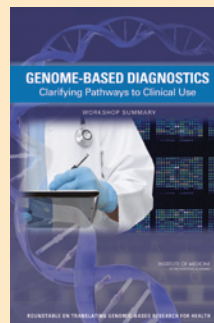
### Diagnostic Applications

The Roundtable established the Diagnostic Applications working group to discuss issues related to the development and use of molecular diagnostics. This group has focused its discussions on three key elements in the development and adoption of clinically useful genome-based diagnostic applications: evidence gaps, regulatory policy, and reimbursement for genomic tests.

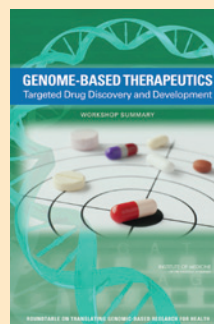
### Overview Group

This working group was established by the Roundtable to examine issues that are overarching and crosscutting for all members and stakeholder groups. Members of this working group also coordinate timely responses to emerging issues within the field where input from the Roundtable would be of significant value to larger public discussions.

## Reports Released in 2012



**Genome-Based Diagnostics:  
Clarifying Pathways to Clinical Use:  
Workshop Summary**



**Genome-Based Therapeutics:  
Targeted Drug Discovery and  
Development: Workshop Summary**

July 19  
Integrating Large-Scale  
Genomic Information into  
Clinical Practice Workshop

July 20  
Meeting 14

November 15  
Facilitating Development and  
Utilization of Genome-Based  
Diagnostic Technologies Workshop

November 16  
Meeting 15

2012

# Roundtable Members

(as of December 2012)

**Wylie Burke, M.D., Ph.D. (Co-Chair)**  
University of Washington

**Sharon Terry, M.A. (Co-Chair)**  
Genetic Alliance

**Naomi Aronson, Ph.D.**  
Blue Cross and Blue Shield  
Association

**Euan Ashley, M.R.C.P., D.Phil.,  
FACC, FAHA**  
American Heart Association

**Paul R. Billings, M.D., Ph.D.**  
Life Technologies Corporation

**Bruce Blumberg, M.D.**  
Kaiser Permanente

**Denise E. Bonds, M.D., M.P.H.**  
National Heart, Lung, and  
Blood Institute

**Philip J. Brooks, Ph.D.**  
Office of Rare Diseases Research

**C. Thomas Caskey, M.D., FACP**  
Baylor College of Medicine

**Sara Copeland, M.D.**  
Health Resources and Services  
Administration

**Michael J. Dougherty, Ph.D.**  
American Society of Human Genetics

**Victor Dzau, M.D.**  
Duke University Health System

**W. Gregory Feero, M.D., Ph.D.**  
*Journal of the American Medical  
Association*

**Andrew N. Freedman, Ph.D.**  
National Cancer Institute

**Geoffrey Ginsburg, M.D., Ph.D.**  
Duke University

**Richard Hodes, M.D.**  
National Institute on Aging

**Sharon Kardia, Ph.D.**  
University of Michigan School  
of Public Health

**Mohamed Khan, M.D., Ph.D.**  
American Medical Association

**Muin Khoury, M.D., Ph.D.**  
Centers for Disease Control and  
Prevention

**Thomas Lehner, M.P.H., Ph.D.**  
National Institute of Mental Health

**Debra Leonard, M.D., Ph.D.**  
College of American Pathologists

**Elizabeth Mansfield, Ph.D.**  
Food and Drug Administration

**Kelly McVearry, Ph.D.**  
Northrop Grumman Health IT

**Robert L. Nussbaum, M.D.**  
University of California, San Francisco,  
School of Medicine

**Michelle Ann Penny, Ph.D.**  
Eli Lilly and Company

**Aidan Power, M.B., B.Ch., M.Sc.,  
M.R.C.Psych.**  
Pfizer Inc.

**Victoria M. Pratt, Ph.D., FACMG**  
Quest Diagnostics Nichols Institute

**Ronald Przygodzki, M.D.**  
Department of Veterans Affairs

**Allen D. Roses, M.D.**  
Duke University

**Kevin A. Schulman, M.D.**  
Duke University

**Joan A. Scott, M.S., C.G.C.**  
National Coalition for Health  
Professional Education in Genetics

**David Veenstra, Pharm.D., Ph.D.**  
University of Washington

**Michael S. Watson, Ph.D.**  
American College of Medical Genetics  
and Genomics

**Lt. Col. Daniel Wattendorf, M.D.**  
Department of the Air Force

**Catherine A. Wicklund, M.S., C.G.C.**  
National Society of Genetic Counselors

## Roundtable Staff

**Adam C. Berger, Ph.D.**  
Project Director

**Sean P. David, M.D., D.Phil.**  
James C. Puffer, M.D./American Board  
of Family Medicine Fellow, Stanford  
University School of Medicine

**Lindsey Mette, M.S., M.Sc.P.H.**  
Christine Mirzayan Science and  
Technology Policy Graduate Fellow  
(August to November 2012)

**Claire Giammaria, M.P.H.**  
Research Associate (until July 2012)

**Tonia Dickerson**  
Senior Program Assistant

## Board on Health Sciences Policy Staff

**Andrew M. Pope, Ph.D.**  
Director

March 21  
**New Paradigms in Drug Discovery:  
How Genomic Data Are Being Used  
to Revolutionize the Drug Discovery  
and Development Process Workshop**

July 17-18  
**Assessing the Economics of  
Genomic Medicine Workshop**

December 3  
**Improving the Efficiency and  
Effectiveness of Genomic Science  
Translation Workshop**

March 22  
Meeting 16

May 24  
**Evidence for Clinical Utility of Molecular  
Diagnostics in Oncology Workshop**

July 18  
Meeting 17

October 4-5  
**Sharing Clinical Research  
Data Workshop**

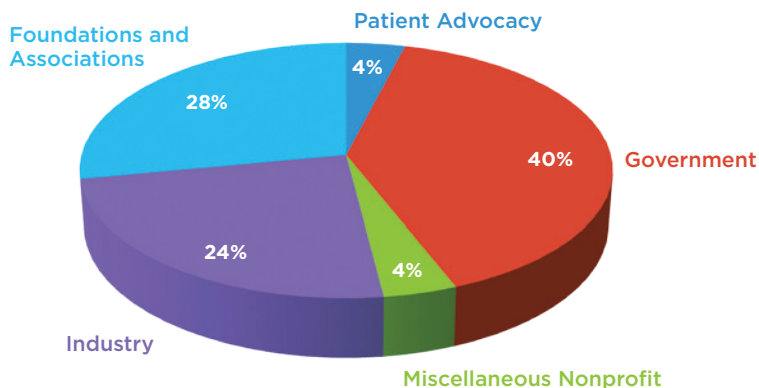
December 4  
Meeting 18

2013

# Roundtable Sponsors

(as of December 2012)

American College of Medical Genetics and Genomics  
 American Heart Association  
 American Medical Association  
 American Society of Human Genetics  
 Blue Cross and Blue Shield Association  
 Centers for Disease Control and Prevention  
 College of American Pathologists  
 Department of the Air Force  
 Department of Veterans Affairs  
 Eli Lilly and Company  
 Genetic Alliance  
 Health Resources and Services Administration  
 Johnson & Johnson  
 Kaiser Permanente/East Bay Community Foundation  
 Life Technologies Corporation  
 National Cancer Institute  
 National Coalition for Health Professional Education in Genetics  
 National Heart, Lung, and Blood Institute  
 National Human Genome Research Institute  
 National Institute of Mental Health  
 National Institute on Aging  
 National Society of Genetic Counselors  
 Northrop Grumman Health IT  
 Office of Rare Diseases Research  
 Pfizer Inc.



February 27  
 Refining Processes for the  
 Co-Development of Genome-Based  
 Therapeutics and Companion  
 Diagnostic Tests Workshop

June 24  
 Genomics-Enabled Drug Repurposing  
 and Repositioning Workshop

December 4-5  
 Meeting 21

2014

February 28  
 Meeting 19

June 25  
 Meeting 20

### About the Roundtable on Translating Genomic-Based Research for Health

The IOM's Roundtable on Translating Genomic-Based Research for Health brings together leaders from academia, industry, government, foundations, associations, and representatives of patients and consumers who have a mutual interest in addressing the issues surrounding the translation of genomic-based research.

The purpose of the Roundtable is to explore and implement strategies for improving health through the translation of genomic and genetic research findings into medicine, public health, education, and policy.

Translating genomic innovations involves many disciplines, and takes place within different economic, social, and cultural contexts, generating a need for increased communication and understanding across these fields. Furthermore, these innovations have produced a diversity of new issues to be addressed, including issues such as evidence of utility, economic implications, equal access, and public perspectives. As a convening mechanism for interested parties with different perspectives to meet and discuss complex issues of mutual concern in a neutral setting, the Roundtable fosters dialogue across sectors and institutions and facilitates collaboration among stakeholders.

To achieve its objectives, the Roundtable conducts structured discussions, workshops, and symposia, and publishes workshop summaries. Specific issues and agenda topics are determined by the Roundtable membership and span a broad range of issues relevant to the translation process.

For more information about the Roundtable on Translating Genomic-Based Research for Health, please visit our website at [www.iom.edu/genomicroundtable](http://www.iom.edu/genomicroundtable) or call Adam Berger at (202) 334-3756.



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