

**Meeting Minutes**  
**Department of Health and Human Services**  
**National Institutes of Health**  
**National Institute of Diabetes and Digestive and Kidney Diseases Advisory Council**

**I. CALL TO ORDER**

*Dr. Rodgers*

Dr. Rodgers called to order the 195<sup>th</sup> meeting of the National Diabetes and Digestive and Kidney Diseases Advisory Council at 8:30 a.m., May 14, 2014, in Conference Room 10, Building 31, the NIH Campus, Bethesda, Maryland.

**A. ATTENDANCE – COUNCIL MEMBERS PRESENT**

Dr. Domenico Accili	Dr. Jean Schaffer
Dr. Gopal Badlani	Dr. Alan Shuldiner
Dr. David Brenner	Dr. Irving Smokler
Dr. Eugene Chang	Dr. Bruce Spiegelman
Ms. Cindy Hahn	Dr. William Steers
Dr. Kenneth Kaushansky	Mr. John Walsh
Ms. Ellen Leake	Dr. David Klurfeld
Ms. Robin Nwankwo	Dr. Robert Vigersky
Dr. Jerry Palmer	Dr. Mark Zeidel
Dr. Thomas Robinson	

**Also Present:**

Dr. Gregory Germino, Deputy Director, NIDDK  
Dr. Brent Stanfield, Executive Secretary, NIDDK Advisory Council

**B. NIDDK STAFF AND GUESTS**

Agodoa, Lawrence - NIDDK	Copeland, Randy - NIDDK
Andersen, Dana - NIDDK	Cowie, Catherine - NIDDK
Appel, Michael - NIDDK	Davila-Bloom, Maria - NIDDK
Barnard, Michele - NIDDK	Densmore, Christine - NIDDK
Begum, Najma - NIDDK	Dirks, Dale – Health and Medicine Counsel
Bishop, Terry - NIDDK	Doherty, Dee - NIDDK
Bleasdale, John - CSR	Donohue, Patrick - NIDDK
Blondel, Olivier - NIDDK	Drew, Devon - NIDDK
Bourne, Phil – NIH OD	Duggan, Emily - NIDDK
Bourque, Sharon – NIDDK	Eggerman, Thomas - NIDDK
Bremer, Andrew – NIDDK	Evans, Mary - NIDDK
Brown, Sherry - NIDDK	Farishian, Richard - NIDDK
Buchanan, Sarah - Health and Medicine Counsel	Feld, Carol - NIDDK
Byrd-Holt, Danita – Soc. and Sci. Sys., Inc.	Flessner, Michael - NIDDK
Calvo, Francisco - NIDDK	Fonville, Olaf - NIDDK
Carrington, Jill - NIDDK	Fradkin, Judith - NIDDK
Castle, Arthur - NIDDK	Gallivan, Joanne - NIDDK
Cerio, Rebecca - NIDDK	Gansheroff, Lisa - NIDDK

Garcia, Martha - CSR  
Garofolo, Robert - CSR  
Goter-Robinson, Carol - NIDDK  
Graves, Reed - CSR  
Grey, Michael - NIDDK  
Guo, Xiaodu - NIDDK  
Guyer, Mark - NHGRI  
Haft, Carol - NIDDK  
Hamilton, Frank - NIDDK  
Hanlon, Mary - NIDDK  
Hoff, Eleanor - NIDDK  
Hoofnagle, Jay - NIDDK  
Hoover, Camille - NIDDK  
Horlick, Mary - NIDDK  
Hoshizaki, Deborah - NIDDK  
Hubbard, Van - NIDDK  
Hunter, Christine - NIDDK  
Hyde, James - NIDDK  
Imrie, Anne - Soc. and Sci. Sys., Inc.  
Irvins, Jon - CSR  
James, Stephen - NIDDK  
Jerkins, Ann - NIDDK  
Jones, Teresa - NIDDK  
Karp, Robert - NIDDK  
Ketchum, Christian - NIDDK  
Kimmel, Paul - NIDDK  
Kirkali, Ziya - NIDDK  
Kranzfelder, Kathy - NIDDK  
Kuczmarski, Robert - NIDDK  
Kurian, Ravee - NIDDK  
Kusek, John - NIDDK  
Laakso, Joseph - Endocrine Society  
Larkin, Jennie - NIH OD  
Laughlin, Maren - NIDDK  
Leschek, Ellen - NIDDK  
Linder, Barbara - NIDDK  
Malozowski, Saul - NIDDK  
Margolis, Ronald - NIDDK  
Martey, Louis - NIDDK  
Maruvada, Padma - NIDDK  
Mowrer, Karen - Lewis-Burke Associates  
Moxey-Mims, Marva - NIDDK  
Narva, Andrew - NIDDK  
Newman, Eileen - NIDDK  
Nurik, Jody - NIDDK

Pawlyk, Aaron - NIDDK  
Perry-Jones, Aretina - NIDDK  
Pike, Robert - NIDDK  
Podskalny, Judith - NIDDK  
Polglase, William - NIDDK  
Rankin, Tracy - NIDDK  
Rasooly, Rebekah - NIDDK  
Reiter, Amy - NIDDK  
Roberts, Tibor - NIDDK  
Rosenberg, Mary Kay - NIDDK  
Rosendorf, Marilyn - NIDDK  
Rushing, Paul - NIDDK  
Rys-Sikora, Krystyna - NIDDK  
Sato, Sheryl - NIDDK  
Savage, Peter - NIDDK  
Scanlon, Elizabeth - NIDDK  
Sechi, Salvatore - NIDDK  
Serrano, Jose - NIDDK  
Sheard, Nancy - CSR  
Shepherd, Aliecia - NIDDK  
Sherker, Averell - NIDDK  
Silva, Corinne - NIDDK  
Smith, Philip - NIDDK  
Spain, Lisa - NIDDK  
Star, Robert - NIDDK  
Tatham, Thomas - NIDDK  
Teff, Karen - NIDDK  
Tilghman, Robert - NIDDK  
Torrance, Rebecca - NIDDK  
Tuncer, Diane - NIDDK  
Turner, Linda - NIDDK  
Wallace, Julie - NIDDK  
Wellner, Robert - NIDDK  
Wright, Elizabeth - NIDDK  
Yang, Jian - NIDDK  
Yanovski, Susan - NIDDK

## C. ANNOUNCEMENTS

### **NIDDK-Funded Scientists Recently Elected to the National Academy of Sciences**

*Marius Clore*, a researcher in the NIDDK Intramural Research Program, is an NIH Distinguished Investigator within the Institute's Laboratory of Chemical Physics, the Protein Nuclear Magnetic Resonance Section. His laboratory studies the structure and dynamics of proteins, protein-protein complexes, and protein-nucleic acid complexes

using multidimensional nuclear magnetic resonance (NMR) spectroscopy. It develops and applies novel NMR and computational methods to further these studies.

***Dr. Martin R. Pollak***, an NIDDK grantee, is the Chief of the Renal Division at Beth Israel Deaconess Medical Center in Boston, Massachusetts, and also a member of the Cancer Genetics Program at the Dana-Farber/Harvard Cancer Center. His laboratory studies the genetic basis of kidney disease, with particular emphasis on proteinuria and glomerulosclerosis. His research team also works to identify genes involved in the development of focal segmental glomerulosclerosis (FSGS) in minority populations. Dr. Pollak has several active NIDDK R01 awards in addition to an NIDDK MERIT award.

### **International Congress on Obesity (ISO) Awards**

***Dr. Rudy Leibel***, former NIDDK Council member and grantee, received the Werthheimer Award for basic research at the International Congress on Obesity (ICO) of the World Obesity Federation. Dr. Leibel is the Christopher J. Murphy Professor of Diabetes Research in the Departments of Pediatrics and Medicine at Columbia University. He is also Co-director of the Naomi Berrie Diabetes Center and head of the Division of Molecular Genetics at Columbia.

***Dr. Steven Blair***, a former member of the NIDDK Clinical Obesity Research Panel, received the ICO's Population Science and Public Health Award. The award was established in 2006 to recognize an individual who has made outstanding contributions to the field of obesity. Dr. Blair is a Professor at the Arnold School of Public Health at the University of South Carolina.

### **"In Memoriam"**

***Dr. Richard W. Hanson***, an NIDDK grantee for nearly 40 years, died in February 2014. He was the Leonard and Jean Skeggs Professor of Biochemistry and Distinguished University Professor at Case Western Reserve School of Medicine. A brilliant scientist and award-winning teacher, Dr. Hanson was known to his friends and colleagues as the "maestro of metabolism." Dr. Hanson served as a member of the NIDDK's Board of Scientific Counselors (BSC) from 1995 to 1997, and as its Chair from 1997 to 2000.

### **NIDDK Staff Members**

***Dr. Catherine McKeon***, the NIDDK Senior Advisor for Genetic Research, retired in early May 2014, after a thirty-three year career at the Institute. She made major contributions to advancing NIDDK-funded research on the genetics of type 2 diabetes, genetic metabolic diseases, and cystic fibrosis, as well as gene therapy research. Her work in developing a consortium to find genes for type 2 diabetes is an important part of the foundation for a new NIH initiative, "Accelerating Medicines Partnership (AMP)." Her leadership of cystic fibrosis research furthered the development of new therapies for the disease, and was recognized with the NIH Director's Award. In 2013, Dr. McKeon,

and the late Dr. Sonia Skarlatos of the NHLBI, received the first Distinguished Service Award from the American Society of Gene and Cell Therapy.

**Dr. Peter Perrin** joined the NIDDK Division of Digestive Disease and Nutrition in May 2014. His program is evolving, and will include gastrointestinal immunology, microbiology and epithelial biology. Dr. Perrin received his Ph.D. from the University of Pennsylvania, where he studied the immunopathology of granuloma formation in the liver. During his research career, he has held positions at the Naval Medical Research Institute, the Uniformed Services University of the Health Sciences, and the University of Pennsylvania, where he continued investigating various aspects of immunology. He received NIH and private foundation support for his work. More recently, Dr. Perrin was a Scientific Review Officer (SRO) within the Digestive, Kidney, and Urological Systems Integrated Review Group of the NIH Center for Scientific Review (CSR).

### **NIDDK Information Network (dkNET)**

The formal launch of the NIDDK Information Network, or dkNET, is planned for May 2014. This Network is intended to further the transition of biomedical research data into a digital enterprise including data, software, patient records, and publications. The dkNET will seek to foster centralized *in silico* discovery of data and resources in ways designed to inform stakeholders and to lead to new research advances. As a first step, the NIDDK has developed a highly linked digital data warehouse--starting with many of the Institute's basic science consortia, together with several human genetics databases. A web portal enables users to search through datasets and resources to enhance ongoing work, thereby facilitating research advances ([www.dkNET.org](http://www.dkNET.org)). Where appropriate, links to related sources of data take the user to the broader universe of online digital networks. By creating an index of NIDDK-supported research, the dkNET has anticipated the more comprehensive NIH Initiative, "Big Data to Knowledge (BD2K)," which will enhance scientific discovery through the broader use of data. Dr. Rodgers acknowledged the many contributions of Drs. Ron Margolis, Art Castle, Kristin Abraham and other NIDDK staff to establishing dkNet.

## **II. CONSIDERATION OF SUMMARY MINUTES OF THE 194<sup>th</sup> COUNCIL MEETING**

***Dr. Rodgers***

Following the motion of a Council member, the Council approved, by voice vote, the Summary Minutes of the 194<sup>th</sup> Council meeting, which had been sent to members in advance for review.

## **III. FUTURE COUNCIL DATES**

***Dr. Rodgers***

Dr. Rodgers directed the Council members to the following future Council dates in the agenda.

**2014**

September 3-4 (Wednesday and Thursday)  
Building 31, Conference Rooms 10, 6 and 7

**2015**

January 28-29 (Wednesday and Thursday)  
May 13-14 (Wednesday and Thursday)  
September 9-10 (Wednesday and Thursday)  
Building 31, Conference Rooms 10, 6 and 7

**2016**

January 27-28 (Wednesday and Thursday)  
May 18-19 (Wednesday and Thursday)  
September 7-8 (Wednesday and Thursday)  
Building 31, Conference Rooms 10, 6 and 7

The expectation is that meetings will be a single day. However, Council members were asked to hold two days on their calendars to ensure flexibility should a situation arise where a longer meeting is required.

**IV. ANNOUNCEMENTS**

*Dr. Stanfield*

**Confidentiality**

Dr. Stanfield reminded the Council that material furnished for review purposes and discussion during the closed portion of the meeting is considered confidential. The content of discussions taking place during the closed session may be disclosed only by the staff and only under appropriate circumstances. Any communication from investigators to Council members regarding actions on an application must be referred to the Institute. Any attempts by Council members to handle questions from applicants could create difficult or embarrassing situations for the members, the Institute, and/or the investigators.

**Conflict of Interest**

Dr. Stanfield reminded the Council that advisors and consultants serving as members of public advisory committees, such as the NIDDK National Advisory Council, may not participate in situations in which any violation of conflict of interest laws and regulations may occur. Responsible NIDDK staff shall assist Council members to help ensure that a member does not participate in, and is not present during review of applications or projects in which, to the member's knowledge, any of the following has a financial interest: the member, or his or her spouse, minor child, partner (including close professional associates), or an organization with which the member is connected.

To ensure that a Council member does not participate in the discussion of, nor vote on, an application in which he/she is in conflict, a written certification is required. A statement is provided for the signature of the member, and this statement becomes a part of the meeting file. Dr. Stanfield noted that each Council member's folder contained a statement regarding conflict of interest in his or her review of applications. He said that each Council member should read it carefully, sign it, and return it to the NIDDK before leaving the meeting.

Dr. Stanfield said that, at Council meetings when applications are reviewed in groups without discussion, that is, "en bloc" action, all Council members may be present and may participate. The vote of an individual member in such instances does not apply to applications for which the member might be in conflict. With respect to multi-campus institutions of higher education, Dr. Stanfield said that: An employee may participate in any particular matter affecting one campus of a multi-campus institution of higher education, if the employee's financial interest is solely employment in a position at a separate campus of the same multi-campus institution, and the employee has no multi-campus responsibilities.

#### **NIH Resubmission Policy**

Dr. Stanfield announced a change in the NIH resubmission policy for application due dates after April 16, 2014. (<http://grants.nih.gov/grants/policy/amendedapps.htm>) Following an unsuccessful resubmission (A1) application, applicants may submit the same idea as a new (A0) application for the next appropriate due date. The NIH will not assess the similarity of the science in the new (A0) application to any previously reviewed submission when accepting an application for review. Dr. Stanfield noted that this policy change will likely reduce the number of appeals that the Council will have to consider.

#### **Expected Change in Biosketch**

Dr. Stanfield said that the NIH is likely to change the Biosketch requirements for applicants. The concept is to replace the current listing of publications with a section entitled "Contributions to Science." In this new section, each applicant would provide a short description of up to five significant contributions, his or her role in these contributions, and reference to a few publications documenting that role. This idea will take the form of a pilot for a number of reviews scheduled in the fall of 2014. It is likely to be fully implemented for applications submitted after January 1, 2015.

### **V. REPORT FROM THE NIDDK DIRECTOR**

*Dr. Rodgers*

#### **FY 2014 Operating Plan**

The NIH is currently operating at a total program level of \$30.15 billion. The NIH amount is an increase of \$1 billion over the agency's comparable FY 2013 level, but

below its FY 2012 level. For the NIDDK, the total program level is approximately \$1.88 billion--an increase of about \$46 million over the Institute's FY 2013 funding level. This NIDDK figure includes about \$139 million for the congressionally-mandated Special Statutory Funding Program for Type 1 Diabetes Research, which the Institute administers on behalf of the Department of Health and Human Services in collaboration with other NIH components and the CDC.

The NIDDK plans to use the additional funds provided to support more research project grants, research training grants, and special emphasis grants than last year, and perhaps to undertake one or more new initiatives. Consistent with the Institute's core principles, the highest NIDDK priority is to raise paylines for investigator-initiated R01 research project grants. In general, the NIDDK will try to reach a 13th percentile payline for awards supporting new competing R01 grants (Type 1s) or competing continuations (Type 2s). The NIDDK will prioritize R01 applications that have a primary assignment to the Institute, request less than \$500,000 in direct costs per year, and score at or better than the 13th percentile through the peer review process. A more stringent payline will be applied to R01 applications requesting \$500,000 or more in direct costs for any year. Special emphasis will be placed on supporting Early Stage Investigators (ESIs). In addition, when possible and appropriate, the full period of recommended support will be awarded to ESIs. The NIDDK's FY 2014 Award Funding Policy is posted on the Institute's website (<http://www.niddk.nih.gov/research-funding/process/award-funding-policy>).

### **FY 2015 President's Budget Request**

The President's FY 2015 budget request for the total program of the NIH is about \$210 million above the agency's FY 2014 operating level. For the NIDDK, the request is about \$12 million above the FY 2014 level. House and Senate hearings on the proposed budget were held on March 26 and April 2, respectively, by the appropriations subcommittees with jurisdiction over the NIH. The written testimony of NIH Director Francis Collins is posted on the NIH website (<http://www.nih.gov/about/director/budgetrequest/fy2015testimony.htm>).

During the hearings, subcommittee members encouraged Dr. Collins to share examples of research advances widely so that the public can learn more about the contributions of the NIH to fighting disease and improving health. Several members expressed support for the NIH mission and for increased funding. Dr. Collins noted that the future of biomedical research has never been brighter. He highlighted three examples of scientific opportunity: developing a universal flu vaccine; undertaking the "Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative;" and developing targeted cancer treatments. In response to a question about whether it would be better to have sustained, steady growth in funding for the NIH or a "Manhattan Project" approach to research, Dr. Collins said it would be most helpful for the research community to be able to count on a stable trajectory of funding increases.

Delays in finalizing the FY 2014 budget resulted in delays in submission of the FY 2015 budget. Since the hearings, a few appropriations bills have passed the House, but none has yet passed the Senate. It is hoped that the Congress will pass all 12 regular appropriations bills during the summer and send them to the President for signature before October 1, 2014--the start of FY 2015. If that does not happen, FY 2015 funding for some agencies will likely be provided through one or more continuing resolutions or an omnibus spending bill.

### **Extension of Special Statutory Funding Program for Type 1 Diabetes Research**

This congressionally-mandated program has been extended for an additional year, through FY 2015. Because the program is considered mandatory, it will continue to be subject to a sequestration process that is not being applied to discretionary programs. As a result, the program's actual funding level in FY 2015 will be about \$139 million, instead of the full \$150 million authorized in the legislative extension. Funding plans include moving forward the most promising research on development of an artificial-pancreas from the level of single-site, short-duration studies to the level of multi-center, longer-term studies. Plans are also under way to integrate the various large data sets in genomics, proteomics, metabolomics, and the microbiome that are emerging from the trial, "The Environmental Determinants of Diabetes in the Young (TEDDY)."

### **"Accelerating Medicines Partnership (AMP)"**

In February 2014, NIH Director Francis Collins announced the formation of a new initiative, the "Accelerating Medicines Partnership" (AMP), to be managed through the Foundation for the NIH (FNIH; <http://www.nih.gov/science/amp/index.htm>). The AMP is a joint effort involving the NIH, 10 biopharmaceutical companies, and several non-profit organizations. The AMP is intended to transform the current model for developing new diagnostics and treatments through the collaborative identification and validation of promising biological targets of disease. The ultimate goals are to increase the number of new diagnostics and therapies for patients, and to reduce the time and cost of developing them. Through the cross-sector partnership of the AMP, the NIH and industry will share expertise and resources in an integrated governance structure that will enable the best informed contributions to science from all participants. A critical component of the undertaking is that industry partners have agreed to make the AMP data and analyses publicly accessible to the broad biomedical research community. The AMP will begin with three pilot projects to pursue research plans developed by NIH and industry scientists for characterizing effective molecular indicators of disease (biomarkers) and for distinguishing biological targets that are most likely to respond to new therapies. These pilot projects will set the stage for broadening the AMP to other diseases and conditions.

Type 2 diabetes will be the focus of one of the three pilot projects. That pilot will build on the NIDDK's substantial investment in diabetes research. To date, scientists have identified nearly 80 genes known to have common variants that raise or lower the risk of type 2 diabetes. Advances in technology have enabled the study of these genes in hundreds of thousands of people with and without diabetes in order to identify rare

mutations that can significantly reduce the risk of developing the disease. Two objectives of the AMP's type 2 diabetes pilot project are to support deep sequencing studies of diabetes genes, and to set up a diabetes genetics knowledge portal. The portal will be designed to aggregate, organize, and facilitate the interpretation of massive amounts of genetic information, and thus make it more rapidly and easily usable for drug development purposes. Dr. Rodgers acknowledged the contributions of the NIDDK's Dr. Phil Smith, who has served as the co-director of the steering committee for the type 2 diabetes pilot project.

Following the NIH Director's announcement of the AMP, staff the House and Senate authorizing committees for the NIH requested briefings. Dr. Rodgers said that he described the type 2 diabetes project at a briefing in March 2014.

## **VI. BRAIN RESEARCH THROUGH ADVANCING INNOVATIVE NEUROTECHNOLOGIES (BRAIN) INITIATIVE**

*Dr. Story Landis, Director, National Institute for Neurological Disorders and Stroke (NINDS)*

*Dr. Rodgers introduced Dr. Story Landis, who has been Director of the National Institute for Neurological Disorders and Stroke (NINDS) since 2003. Dr. Landis received her Ph.D. from Harvard University. After postdoctoral work at Harvard, she served on the faculty of the Department of Neurobiology there. In 1985, she joined the faculty of Case Western Reserve University School of Medicine, where she created the Department of Neurosciences which, under her leadership, achieved an international reputation for excellence. Throughout her research career, Dr. Landis has made fundamental contributions to the understanding of nervous system development. Dr. Landis has garnered many honors, is an elected fellow of the Institute of Medicine, the Academy of Arts and Sciences, the American Association for the Advancement of Science, and the American Neurological Association, and in 2002, she was elected President of the Society for Neuroscience.*

### **Research Needs and Opportunities**

Dr. Landis provided an overview of the new "Brain Research through Advancing Innovative Neurotechnologies" Initiative (BRAIN), which President Obama announced at the White House on April 2, 2013 (<http://www.nih.gov/science/brain/>). The President said that the BRAIN initiative will give scientists "the tools they need to get a dynamic picture of the brain in action, and to better understand how we think and how we learn and how we remember." Through the Initiative, scientists will learn the language of the brain.

Identified as a high-priority "Grand Challenge" by the Office of Science and Technology Policy, the initiative currently includes the participation of several NIH Institutes: the National Institute of Neurological Disorders and Stroke (NINDS), the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), the National Institute of Biomedical Imaging and Bioengineering (NIBIB), and the NIH components

that are participating in the “Blueprint for Neuroscience Research.” Participants also include the National Science Foundation (NSF), the Food and Drug Administration (FDA), and the Defense Advanced Research Projects Agency (DARPA) of the Department of Defense. The President envisions the BRAIN Initiative as a broad national effort and is therefore also interested in discussions with companies, philanthropies, foundations, non-profits, universities and state governments to explore the possible contributions they can make to leverage expertise and resources.

Dr. Landis noted that the BRAIN initiative is timely and compelling because it is at the intersection of serious health needs and promising research opportunities. Brain disorders are widespread, and they place a heavy burden on patients, their families and society. For example, the annual cost of dementia care in the U.S. is estimated to be about \$200 billion. The neurodegenerative disorders include Alzheimer’s, Parkinson’s, and Huntington’s diseases, as well as Amyotrophic Lateral Sclerosis (ALS). Cognitive and affective disorders range from schizophrenia and bipolar disorder to depression, anxiety and obsessive compulsive disorder. Among the neurodevelopmental disorders are autism, attention-deficit disorder, epilepsy, and intellectual disability. Injury-induced and insult-induced disorders include Post-Traumatic Stress Disorder (PTSD), traumatic brain injury and stroke. Many Americans are acutely aware of these serious health issues because family members and friends are struggling with them.

To help address these health needs, the BRAIN initiative will focus on tools and technologies to capitalize on new insights into brain structure and function that have been recently achieved through interdisciplinary and integrative research. Neuroscientists are harnessing knowledge from many areas, including chemistry, physics, genetics, nanotechnology, and informatics. Dr. Landis presented a series of visuals that show how new tools and technologies are already deciphering the workings of the brain to reveal the way the nervous system functions in health and disease. Imaging techniques have been particularly important in tracking the processes of brain cells. One technique called “CLARITY” is a revolutionary method for transforming brain tissue by making it transparent, while maintaining important properties, thereby enabling the tissue to be stained and studied more easily than through traditional methods. For example, Dr. Landis noted that this technique has been used for 3D analysis of intact mouse brain tissue. She pointed out that the technique has application not only to brain tissue, but also to tissue of the digestive system or kidneys, which may be of interest to NIDDK investigators (<http://www.nature.com/nature/journal/v497/n7449/full/nature12107.html>).

### **Guiding and Overseeing the BRAIN Initiative**

Although research advances have been remarkable, Dr. Landis said that the ability of scientists is still limited with respect to understanding how the brain encodes, stores, and retrieves information. Additional tools and technologies are therefore needed to assess how the parts of the brain work together to generate patterns of activity; how these patterns are translated into thoughts, behaviors, and emotions; and how experiences alter the brain’s organization. Neural circuitry must be deciphered. In tackling these issues, the BRAIN Initiative will be guided by a newly established Working Group of the

Advisory Committee to the Director, NIH (ACD), co-chaired by Drs. Cornelia Bargmann of The Rockefeller University and William Newsome of Stanford University. The NIH organizational locus for the BRAIN Initiative will be the Office of the NIH Director.

In an Interim Report issued in September 2013, the Working Group of the ACD laid out the framework for the Initiative (<http://www.nih.gov/science/brain/11252013-Interim-Report-Final.pdf>). Based on input obtained by canvassing neuroscientists throughout the country, the Working Group outlined key principles, which include using appropriate experimental systems and models; crossing boundaries in interdisciplinary collaborations; integrating spatial and temporal scales; establishing platforms for sharing data; validating and disseminating technology; and considering ethical implications of neuroscience research. The Working Group also identified the following high-priority research areas: generate a census of cell types; create structural maps of the brain; develop new large-scale, network-recording capabilities; develop a suite of tools for circuit manipulation; link neuronal activity to behavior; integrate theory, modeling, statistics, and computation with experimentation; delineate mechanisms underlying human imaging technologies; create mechanisms to enable collection of human data; and disseminate knowledge and training. The Working Group expects to issue a final report that will be presented to the ACD in June 2014, and made available to the public.

In addition to guidance from the Working Group of the ACD, the Brain Initiative will benefit from expert oversight provided by a Multi-Council Working Group, which is representative of the NIH Institutes and Centers (ICs) that have BRAIN-focused research, as well as *ex officio* representation from other agencies involved in the BRAIN Initiative. The Multi-Council Working Group will integrate BRAIN research across the NIH, and will draft concepts and recommendations for review and consideration by one or more of the National Advisory Councils of the participating NIH components.

### **NIH Efforts and Planned Funding Levels**

Based on the recommendations of the BRAIN Working Group of the ACD, during the winter the NIH issued six Requests for Applications (RFAs) outlining funding opportunities (<http://www.nih.gov/science/brain/funding.htm>). Two of the funding announcements called for developing methods for classifying and accessing the diverse cells and circuits of the brain. Three focused on developing and optimizing technologies for recording and modulating collections of cells that function together as a circuit. One announcement supported the formation of interdisciplinary teams of scientists to develop the next generation of non-invasive imaging technologies for human research. It is expected that the projects funded through these RFAs will be announced in September 2014.

For the NIH, the investment in the Brain Initiative in FY 2014 is estimated to be \$40.7 million. Of that total, an estimated \$22 million is considered “new money” that would not otherwise have been provided to the NIH without the Initiative. The \$40.7 million reflects contributions from several sources, including: \$12.85 million from NIMH; \$12.85 million from NINDS; \$4 million from NIDA; and \$1 million from NIBIB. The

\$40.7 million also includes \$10 million contributed through the NIH "Blueprint for Neuroscience Research," which involves the participation of several NIH components (NCCAM, NEI, NIA, NIAAA, NIBIB, NICHD, NIDA, NIDCD, NIDCR, NIEHS, NIGMS, NIMH, NINDS, NINR, OBSSR; [http://neuroscienceblueprint.nih.gov/blueprint\\_basics/about\\_bp.htm](http://neuroscienceblueprint.nih.gov/blueprint_basics/about_bp.htm)).

Dr. Landis emphasized that the \$40.7 million for the BRAIN Initiative is a relatively small part of the total NIH investment in neuroscience research, which is approximately \$5.5 billion annually. She said that the goals of the BRAIN Initiative are already high-priority areas for the participating NIH components; therefore, the Initiative is compatible with existing scientific emphases and objectives. Clearly, neuroscience research--and particularly investigator-initiated regular research grants (R01 grants)--will continue to be supported throughout the NIH beyond the parameters of the BRAIN initiative. Moreover, the BRAIN Initiative is expected to develop innovative tools and technologies that will accelerate other areas of neuroscience research by enhancing scientific capabilities for conducting hypothesis-driven, disease-focused research through R01 grants. Thus, the tools and technologies that will emanate from the BRAIN Initiative will not be ends in themselves, but rather enablers of further research to obtain insights about the workings of the brain in health and disease states.

Dr. Landis pointed out that the President's Budget for FY 2015 requests approximately \$60 million in additional funds for the BRAIN Initiative, raising the planned total investment to approximately \$100 million for that fiscal year. She is optimistic that funding for the Initiative will continue to increase as the initial projects begin to bear fruit, thereby providing momentum for additional funding to support the development of consortia and other long-term projects.

### **Planned Efforts of Other Agencies**

Dr. Landis gave some examples of the planned contributions of some other agencies to the BRAIN Initiative.

***Defense Advanced Research Projects Agency (DARPA):*** Four efforts are currently planned along the following general lines: (1) development of system-based neurotechnology for emerging therapies; (2) restoration of active memory (RAM) through a wireless device that would repair brain damage and restore memory loss; (3) development of prosthetic hand proprioception and touch interfaces; (4) issuance of an open solicitation for proposals to enable revolutionary advances at the intersection of biology/neurosciences with engineering/physical/computer sciences.

***National Science Foundation (NSF):*** A Science and Technology Center is planned, with a focus on "Brains, Minds, and Machines." Research Coordination Networks are also planned for organizing the scientific community and for increasing BRAIN Initiative collaborations. The NSF is prioritizing research in three areas: (1) integrative and interdisciplinary research; (2) new theories, computational models, and analytical tools; and (3) development of innovative technologies and data infrastructure to handle large-

scale datasets resulting from this research. Several meetings are planned to help move the BRAIN initiative forward.

### **Development of Core Bioethical Standards for Neuroscience Research**

As part of the BRAIN Initiative, the Presidential Commission for the Study of Bioethical Issues has been charged with proactively identifying a set of core ethical standards to guide not only the Initiative, but the entire area of neuroscience research, and to address ethical dilemmas raised by the application of research findings. To this end, the Commission held public meetings in August and December of 2013, and in February 2014. In May 2014, the Commission issued the first volume of its planned two-part report to respond to ethical issues in this rapidly evolving field. The report is entitled: *Volume I--Gray Matters: Integrative Approaches for Neuroscience, Ethics, and Society*. (<http://bioethics.gov/node/3543>).

Collectively, these and other efforts are expected to further the President's goal of accelerating "the development and application of new technologies that will enable researchers to produce dynamic pictures of the brain that show how individual brain cells and complex neural circuits interact at the speed of thought."

### **Council Questions and Discussion**

Several Council members commended Dr. Landis on her presentation. They noted that it is a very exciting time for brain research, and that the BRAIN Initiative provides a relatively new governance approach for research. The issues raised by the Council members related primarily to funding, and the scientific scope of the BRAIN initiative--specifically, its relationship to the NIDDK research mission.

*Sustainability of Initiative: Will the BRAIN Initiative have a sustainable budget when the first set of funded investigators apply for continued support? Will applications focused on tools and technologies fare well in peer review, given that many reviewers tend to deal with applications that are disease-oriented and translation-oriented?* Dr. Landis replied that the \$40.7 million funding commitment for FY 2014 will not cease when the first set of "starter" grants reach their end dates. The President's budget for FY2015 calls for the total NIH investment in the Initiative to rise from \$40.7 million to about \$100 million that year. Moreover, it is likely that new discoveries will fuel additional funding increases in the future. For example, optogenetics technology is now revolutionizing the neurosciences by enabling the use of light to turn specific subsets of neurons "on" or "off" in circuits within living brain tissue. More than 200 NIH grantees have already obtained supplemental funds to incorporate the technology into their ongoing studies. Optogenetics is the type of tools that can be expected to emerge from the BRAIN initiative to drive the funding of new research and discoveries.

*Attracting Capital: How can the NIH help to prime the pump for the BRAIN Initiative, which appears to be woefully underfunded? Can the Initiative attract non-government capital that is sitting uninvested on the sidelines of this country?* Dr. Landis responded

that many groups and individuals are being considered as potential partners, including the Allen Institute for Brain Science, the Howard Hughes Medical Institute, and the Simons Foundation. In the corporate arena, General Electric, Qualcomm and Google are some of the companies that appear interested in the Initiative. Obtaining non-government support will be essential for the BRAIN Initiative to reach fully operational levels, which could involve the investment of hundreds of millions of dollars annually. Importantly, it is recognized that the Initiative should not disrupt ongoing federal research programs, such as those focused on therapies for neurodegenerative diseases, development of prostheses, functional electrical stimulation for spinal cord injuries, and other clinically-oriented areas. Dr. Landis emphasized that the Initiative will not detract from the NIH funding of investigator-initiated R01 research grants.

***NIDDK Metabolic and Obesity Research Relevant to the Brain:*** *Although the NIDDK is not currently involved in the BRAIN Initiative, it probably should consider participating in some way in light of the Institute's brain-related research in metabolism and other areas. For example, obesity is an important research area for the NIDDK and the NIH generally. This research needs increased funding given that the pharmaceutical industry is retreating from studies of the central nervous system (CNS) as a target for anti-obesity drugs--partly because of increasingly difficult regulatory hurdles. Human obesity is primarily a brain disease, involving many mutated genes whose main action is in the brain. Therefore, human obesity should be included in disease-focused research for which the BRAIN Initiative could have application, and its inclusion could attract renewed investments by the pharmaceutical industry.* Dr. Landis commented that the retreat of the pharmaceutical industry from CNS studies is adversely affecting many disease areas, including the development of therapeutics for psychiatric disorders. However, part of the reason that new drugs with new mechanisms have not emerged in CNS-related areas is because of insufficient fundamental knowledge about the brain. The BRAIN Initiative is a way of investing in the acquisition of that knowledge.

***Collaborative Opportunities:*** *If the BRAIN Initiative becomes a "call to action," then each NIH component may want to consider announcing collaborative funding opportunities, possibly through consortia, in which neuroscientists who are developing new technologies work together on projects with scientists who conduct research on the physiology of diseases related to the brain stem and other parts of the body. These diseases, such as gastrointestinal disorders, represent considerable health burdens and are a huge part of the NIH research portfolio.* Dr. Landis replied that there will be opportunities for the broad research community to adopt technologies generated by the BRAIN Initiative. Collaborations among neuroscientists and other scientists could be furthered through projects that integrate the talents of researchers who have used different strategies to study a particular area, such as neural plasticity. Scientists who are not working on brain issues can probably find highly skilled counterparts in the neuroscience or neurobiology departments of their academic institutions and establish fruitful collaborations. One could also look at research opportunities presented by the variety of mice that express fluorescent proteins and subsets of neurons in somatic tissue.

**Assessing Return on NIDDK Investments:** *Where can the NIDDK get the highest return on its investment in brain-related research in this time of limited resources? The NIDDK needs to assess carefully the importance of a particular brain-related research area to the Institute's overall mission, and whether the area is really ripe for successful synergistic interactions. Many problems in neuroscience research, such as neurodegeneration, do not seem to be on the brink of resolution. However, in areas such as feeding behavior, the NIDDK has a strong interest and has already had a huge leadership impact. Dr. Landis noted that the NIDDK has an opportunity to join the "Blueprint for Neuroscience Research," which is part of the BRAIN Initiative. However, whether or not the NIDDK formally participates, the BRAIN Initiative will produce tools and technologies likely to be useful in answering questions that are important to the NIDDK research mission.*

**Narrow Focus of BRAIN Initiative:** *Are there plans to include the social sciences in the BRAIN Initiative given that interactions between biology and social/physical environments are being increasingly recognized as important to brain function and health? Dr. Landis commented that the neuroscience field is an incredibly broad discipline, which includes the social sciences. However, in order to make the BRAIN Initiative workable within the funds provided, it needs to adhere to the narrow focus of tools and technologies to understand brain circuits and how they function, including the use of appropriate model systems. The approximately \$5.5 billion that the NIH is expending on the neurosciences will support other research areas including the social sciences, the potential therapeutic use of stem cells for brain disorders, and the identification of genes that affect the nervous system.*

**VII. UPDATE FROM THE NIH ASSOCIATE DIRECTOR FOR DATA SCIENCE: Big Data to Knowledge (BD2K) and Beyond  
Dr. Philip Bourne, Associate Director for Data Science, NIH**

*Dr. Rodgers introduced Dr. Philip Bourne, who very recently joined the NIH as the first permanent NIH Associate Director for Data Science. Dr. Bourne will lead an NIH-wide priority initiative to take greater advantage of the exponential growth of biomedical research datasets. He comes to the NIH from the University of California, San Diego, where he was the Associate Vice Chancellor for Innovation and Industry Alliances, Office of Research Affairs, and Professor in the Department of Pharmacology and the Skaggs School of Pharmacy and Pharmaceutical Sciences. He was also Associate Director of the Research Collaboratory for Structural Bioinformatics (RCSB) Protein Data Bank. Dr. Bourne was trained as a physical chemist and obtained his Ph.D. from The Flinders University in South Australia. His professional interests focus on relevant biological and educational outcomes derived from computation and scholarly communication. This work involves the use of algorithms, text mining, machine learning, metalanguages, biological databases, and visualization applied to problems in systems pharmacology, evolution, cell signaling, apoptosis, immunology, and scientific dissemination. Dr. Bourne has published over 300 papers and five books. One area to which he is especially committed is furthering the free dissemination of science through*

*new models of publishing and through the better integration and subsequent dissemination of data and results.*

Dr. Bourne presented seven factors that favor a system in which scientific data are shared and available in an open way for all potential users.

(1). The era of open data has the potential to deinstitutionalize and democratize science. Dr. Bourne pointed out that the scientific establishment can benefit from “disruptions” in the usual practices and scientific culture with respect to generating, analyzing, and publishing data. He recounted a “disruption” that occurred when a 15-year-old high-school girl was able to produce an innovative scientific paper with her own methodology by using the open literature and available computer resources. According to Dr. Bourne, the NIH should be thinking about how it can take advantage of these types of “disruptions” that come from unexpected people and sources.

(2). It is becoming increasingly difficult to reproduce research findings, even for the investigators who first generated them. It can take a graduate student about 280 hours to reproduce published findings when all the data and software are readily available.

(3). Enormous amounts of data are accumulating. It is estimated that there will be 5,000 gigabytes of information for every person on the planet by the end of the decade.

(4). Little is known about how existing biomedical research data are being used. Yet, companies--such as Google, Amazon, and Netflix--are making very practical connections and marketing decisions based on the way their customers' use data. More effort could be spent on analyzing the uses of scientific data to facilitate practical connections among people who may be unaware they have common interests.

(5). Some suggest that society is at an inflexion point for change in the acquisition, storage and use of data. For example, commercial companies such as Google are now able to process, in real time, very large amounts of data to get an instantaneous result (*The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies* by Eric Brynjolfsson and Andrew McAfee).

(6). Aspects of scholarship appear to be broken. Thousands of scientific citations are never read because they don't cite data that is meaningful to people. The comparison of scientific papers in different journals based on citations can lead to flawed evaluations. Important data sets can be lost or become inaccessible because scientists lack storage capabilities. Little credit is given to scientists who edit journals. It would be helpful for university administrators to discuss developments in scholarship and share positive changes that represent best practices.

(7). The reward system for scientists is in need of repair. While publishing is important, rewards should also be offered for other forms of scholarship. Many talented young computer scientists don't have a road toward tenure at academic research institutions and

they are taking positions with private companies where they will receive greater compensation and recognition for their work.

### **Breaking Down Silos: Concept for a Biomedical Research Data Enterprise**

Dr. Bourne described some approaches that could help address problems in data science. One important, positive trend is that the federal government is issuing new policies and regulations calling for the sharing of data acquired through the use of public funds. However, at current resource levels, federal agencies do not have the wherewithal to establish data-sharing systems. Nevertheless, there are other drivers for data sharing, including the establishment of innovative conceptual and organizational approaches.

In that regard, Dr. Bourne presented the concept of a “Biomedical Research Digital Enterprise,” which would break down silos in data science and foster data-sharing efficiencies. The NIH and other partners in the enterprise would coalesce around the programmatic themes of Sustainability, Education, Innovation, Process, and Collaboration. Each theme would have one or more deliverables and features. The NIH would be guided by a Scientific Data Council and External Advisory Board established under the NIH Associate Director for Data Science. Dr. Bourne elaborated on the way the five themes would be pursued.

***Sustainability—The Power of the Commons:*** To realize a sustainable Biomedical Research Digital Enterprise that promotes data-sharing, Dr. Bourne believes that several changes would be required, such as giving more credit to data scientists; changing funding models; promoting more public/private partnerships, interagency coordination, and international cooperation; having better evaluation of and more informed decisions about the use of existing and proposed resources; and promoting the role of institutional data repositories.

The primary deliverable for the Sustainability Theme would be the creation of a digital science “Commons,” which would essentially characterize digital assets and promote their effective and efficient use. The Commons would not be a substitute for the publication of scientific papers, but rather, another means for sharing scientific results and discoveries. Dr. Bourne emphasized that the Commons would be “owned” and managed by the scientific community, with guidance from the NIH. It would be built through agile, incremental steps involving experiments with pilot projects. The Commons would be a way that investigators could store and make their data accessible to others, consistent with new data-sharing policies.

The Commons would build on NIH efforts already under way to catalogue existing software and datasets so that they can be “discoverable,” rather than resources that often disappear from use due to storage and accessibility problems. Clearly, a business model would have to be developed for the Commons, which would include public-private partnerships. An example of a community effort that is starting to coalesce around the idea of a Commons is the Global Alliance for Genomics and Health, which has attracted

the interest of private sector companies such as Google, Amazon, and Microsoft (<http://genomicsandhealth.org/>).

Dr. Bourne presented a schematic to display the way the Commons would work, with data science contributions from stakeholders, including NIH awardees, the rest of academia, government, and the private sector. Participants would work collaboratively to make the fruits of scientific discovery openly accessible in an interoperable system that would foster usability, metrics/standards, quality, reproducibility, security/privacy, and sustainable, drop-box-like storage using cloud computing. It is likely that enhanced collaboration and additional scientific discoveries would result from these features, which would promote the cross-fertilization of ideas.

Dr. Bourne described one possible end point of the concept he outlined. A scientist could click on a thumbnail of a figure in a scientific paper to pull up the underlying data, which would be rendered in a way to enable analysis and annotation. The paper would thus become an executable experiment in its own right based on the data associated with it. As more scientists annotated the paper and saw the annotations of others, a database/literature match-up could lead to the development of new collaborations and scientific progress that might not otherwise occur. Papers, data, and data bases would no longer exist as separate enterprises; instead, they would be linked together in a digital enterprise (Bourne, Philip. "The Path to Open Science," *PLoS Comp. Biol.* 2005 1(3) e34. Also: "What Big Data Means to Me" *JAMA* 2014 21:194).

To explore these ideas, Dr. Bourne intends to bring an NIH data science group together in the spring/summer of 2014 to gather information about the activities and needs of the Institutes and Centers, as well as external communities. He would like the group to discuss shared interests in developing a cloud-based Commons, investigate potential models of sustainability, and consider metrics of usefulness and success.

**Education/Training:** Another Programmatic Theme in the concept for a Biomedical Research Digital Enterprise is education. Dr. Bourne said that quite a lot of activity is taking place in education/training that may lead to improvements in data science, but more coordination is needed. One possible deliverable is the establishment of training centers along the lines of Cold Spring Harbor. For a week or two, graduate students, faculty, and post-docs could all use standardized data sets to work through some overarching data-science problems, and also have time to work on their own individual data issues.

**Innovation--BD2K:** The deliverable under the Innovation Theme is the NIH "Big Data to Knowledge" Initiative or B2DK, which is already under way. Data-sharing is a key part of this initiative, which is emblematic of the new directions the NIH can take in digital science. The B2DK initiative seeks to enable biomedical scientists to capitalize more fully on the extensive amount of data generated by the research community. By supporting research, implementation, and training in data science and other relevant fields, B2DK fosters the development of a new infrastructure in which approaches, standards, methods, tools, software, and competencies promote greater, more efficient

use of biomedical research data  
([http://bd2k.nih.gov/about\\_bd2k.html#sthash.BIO6kpfh.dpbs](http://bd2k.nih.gov/about_bd2k.html#sthash.BIO6kpfh.dpbs)).

**Process:** The main deliverable under the Process Theme would be modification of the peer review for grant applications involving digital science. Currently, data science tends to be reviewed within applications focused on biological processes and therapeutics; therefore, the reviewers usually do not have the expertise to assess the data-science components. Moreover, best practices in the peer review of data science are not widely disseminated. One suggested change would be to have a standing Study Section for data science. Another possibility would be to have a team of data-science experts who could assist in the review of grants that have data-science elements. Portfolio analyses with respect to data science, as well as the development/dissemination of metrics, would also be useful modifications.

**Collaboration:** Improved communication among the stakeholders in a Biomedical Research Digital Enterprise would be the deliverable under the Collaboration Theme. One approach would be the convening of meetings to bring stakeholders together to share ideas, reduce inefficiencies, and forge partnerships.

### **Council Questions and Discussion**

Council members found that Dr. Bourne's presentation illuminated many of the challenging issues in data science. For example, on the input side, there is a lack of standardization regarding the way biomedical research studies are conducted and data are collected, thus making it difficult to compare study results. On the output side, enormous quantities of data are being generated, and problems with storage/accessibility are mounting.

**Standardization:** *What can be done to achieve greater standardization of data?* Dr. Bourne replied that greater standardization will require an evolutionary process within the scientific community, rather than an NIH investment in a monolithic system that may or may not be used by grantees. As a practical matter, the NIH cannot simply define and enforce data standards. Rather, the producers and users of data need to recognize that standards are needed, and then take steps to coalesce in order to define and adopt standards. The NIH role would be to nurture that process, and perhaps maintain the resulting new standards through the National Library of Medicine. As data become increasingly digitized and accessible, scientists would find it easier to reproduce the findings of others or explain the reasons for different findings. Important steps toward greater standardization would include cataloging of existing data, promoting data-sharing policies, and giving credit to software developers.

**Interoperability:** *Isn't there a need for a strong entity to step in and be a "driver" of interoperability? The reward system in academia reinforces a natural tendency to work in silos. Even the private sector seems incapable of furthering interoperability, as evidenced by the many different commercial systems for maintaining the electronic medical records of patients.* Dr. Bourne said that the issues confronting data science are

so serious right now that economics is the likely driver of change. It is simply not possible for data science to continue in its present state, with so many separate, redundant, functionally different databases and systems. The economic need for efficiencies can be expected to drive improvements in data storage/sharing, standards, and interoperability, and also the creation of partnerships. Undoubtedly, there would be resistance to change, but economic necessity is likely to prevail. Pilot studies and experiments could help lead the way. Ultimately, providing open, facile access to data would not only be efficient, but it would also enable researchers to perceive commonalities with each other, which in turn would spur new scientific collaborations and discoveries.

***Role of Medical Associations:*** *Is there a place for optimizing the sharing of clinical/translational data in the digital enterprise described? If so, should medical associations be part of the circle of partners?* Dr. Bourne replied affirmatively, noting that physician-scientists would probably benefit from greater access to data on very large patient cohorts. He also noted that he is working with the Patient Centered Outcomes Research Institute (PCORI).

***Useful Models:*** *In medical research, institutions have disparate policies on how to handle human studies data, and particularly genetic data. Can lessons be learned from the Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT Network) that provides a robust, standardized, and accessible infrastructure to facilitate clinical trials on neurological disorders?* Dr. Bourne responded that he is very interested in exploring possible models, and that he wants to learn more about the NeuroNEXT Network.

***Pilot Studies and Funding Mechanisms:*** *Could the NIH envision a pilot project wherein it would provide administrative supplements to encourage innovations relative to data analysis?* Dr. Bourne said that funding and review mechanisms would need to be evaluated going forward. For example, while the centers mechanism has been suggested, it may not be optimal for nurturing the entire Biomedical Research Digital Enterprise. There would need to be a reasonable governance model to encourage progress that would benefit the entire research community. Data-science competitions, micro-grants, and open reviews are some ideas for moving data science forward toward the creation of a Biomedical Research Digital Enterprise.

## **VIII. SCIENTIFIC PRESENTATION: The Good, the Bad, and the Ugly of Intestinal Heat Shock Proteins**

***Dr. Eugene Chang***

*Dr. Rodgers introduced the presentation by Council Member Dr. Eugene Chang, the Martin Boyer Professor of Medicine at the University of Chicago. Dr. Chang's research focuses on host-microbial interactions of the intestine. His work includes studies to understand how perturbations or types of enteric flora contribute to the development of digestive diseases, especially inflammatory bowel diseases (IBD). Dr. Chang has defined several novel mechanisms and mediators of action of probiotic organisms that are currently being developed as therapeutic agents. Dr. Chang earned his M.D. at the*

*University of Chicago Pritzker School of Medicine. He then completed his residency in internal medicine and fellowship in gastroenterology at the University of Chicago before joining the faculty there. He presently has an active NIDDK institutional research training grant award (T32 grant) that supports a program for postdoctoral trainees in digestive diseases and nutrition, and pre-doctoral trainees in metabolism and nutrition.*

## **IX. CONSIDERATION OF REVIEW OF GRANT APPLICATIONS**

A total of 1,434 grant applications, requesting support of \$459,506,974 were reviewed for consideration at the May 14, 2014 meeting. Funding for these applications was recommended at the Scientific Review Group recommended level. Prior to the Advisory Council meeting, an additional 932 applications, requesting \$274,771,428 received second-level review through expedited concurrence. All of the expedited concurrence applications were recommended for funding at the Scientific Review Group recommended level. The expedited concurrence actions were reported to the full Advisory Council at the May 14, 2014 meeting.

## **X. ADJOURNMENT**

*Dr. Rodgers*

Dr. Rodgers expressed appreciation on behalf of the NIDDK to the presenters and discussants. He thanked the Council members for their attendance and valuable input. There being no other business, the 195<sup>th</sup> meeting of the NIDDK Advisory Council was adjourned at 4:30 p.m. on May 14, 2014.

I hereby certify that, to the best of my knowledge, the foregoing summary minutes are accurate and complete.



Griffin P. Rodgers, M.D., M.A.C.P.  
Director, National Institute of Diabetes and Digestive and Kidney Diseases, and  
Chairman, National Diabetes and Digestive and Kidney Diseases Advisory Council