

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
NATIONAL INSTITUTES OF HEALTH  
NATIONAL CANCER INSTITUTE  
7<sup>TH</sup> JOINT MEETING OF THE BOARD OF SCIENTIFIC ADVISORS  
AND THE NATIONAL CANCER ADVISORY BOARD**

**Summary of Meeting  
June 21, 2016**

**Building 31C, Conference Room 10  
National Institutes of Health  
Bethesda, Maryland**

**BOARD OF SCIENTIFIC ADVISORS and  
NATIONAL CANCER ADVISORY BOARD  
BETHESDA, MARYLAND  
Summary of Meeting  
June 21, 2016**

The Board of Scientific Advisors (BSA) and the National Cancer Advisory Board (NCAB) convened for the 7<sup>th</sup> Joint Meeting on 21 June 2016, in Conference Room 10, C Wing, Building 31, National Institutes of Health (NIH), Bethesda, MD. The meeting was open to the public on Tuesday, 21 June 2016, from 8:30 a.m. to 3:10 p.m., and closed to the public from 3:10 p.m. to 5:00 p.m. The NCAB Chair, Tyler E. Jacks, Director, Koch Institute for Integrative Cancer Research, David H. Koch Professor of Biology, Massachusetts Institute of Technology, and the BSA Chair, Dr. Chi V. Dang, Director, Abraham Cancer Center, Professor of Medicine, Perelman School of Medicine, University of Pennsylvania, presided during the open session. Dr. Jacks presided during the closed session.

**BSA Members**

Dr. Chi V. Dang (Chair)  
Dr. Francis Ali-Osman  
Dr. Kenneth C. Anderson  
Dr. Dafna Bar-Sagi (absent)  
Dr. Ethan M. Basch  
Dr. Sangeeta N. Bhatia  
Dr. Andrea Califano  
Dr. Arul M. Chinnaiyan (absent)  
Dr. Graham A. Colditz  
Dr. Joseph M. DeSimone (absent)  
Dr. Daniel C. DiMaio (absent)  
Dr. Brian J. Druker (absent)  
Dr. Karen M. Emmons  
Dr. Carol E. Ferrans  
Dr. Stanton L. Gerson  
Dr. Joe W. Gray  
Dr. Chanita Hughes-Halbert  
Dr. James V. Lacey  
Dr. Theodore S. Lawrence (absent)  
Dr. Maria E. Martinez (absent)  
Dr. Luis F. Parada  
Ms. Diane Zipursky Quale  
Dr. Martine F. Roussel  
Dr. Victoria L. Seewaldt  
Dr. Kevin M. Shannon (absent)  
Ms. Mary L. Smith  
Dr. Lincoln D. Stein  
Dr. Gregory L. Verdine (absent)  
Dr. Cheryl L. Walker  
Dr. Eileen P. White  
Dr. Kevin P. White

**NCAB Members**

Dr. Tyler E. Jacks (Chair)  
Dr. Peter C. Adamson  
Dr. Deborah Watkins Bruner  
Dr. Yuan Chang (absent)  
Dr. David C. Christiani  
Dr. Marcia R. Cruz-Correa  
Dr. Kevin J. Cullen  
Dr. Judy E. Garber  
Dr. Elizabeth M. Jaffee  
Dr. Beth Y. Karlan  
Dr. Timothy J. Ley  
Dr. Olufunmilayo F. Olopade  
Dr. Mack Roach III  
Dr. Jonathan M. Samet  
Dr. Charles L. Sawyers (absent)  
Dr. William R. Sellers (absent)  
Dr. Max S. Wicha

**Alternate Ex Officio NCAB Members**

Dr. Robert T. Anderson, DOE (absent)  
Dr. Michael A. Babich, CPSC (absent)  
Dr. Robbie Barbero, OSTP (absent)  
Dr. Vincent J. Cogliano, EPA (absent)  
Dr. Michael Kelley, VA (absent)  
Dr. Aubrey Miller, NIEHS (absent)  
Dr. Richard Pazdur, FDA (absent)  
Dr. Craig D. Shriver, DOD  
Dr. Kerry Souza, NIOSH (absent)  
Dr. Lawrence A. Tabak, NIH (absent)  
Dr. Richard J. Thomas, OSHA/DOL

**President's Cancer Panel**

Dr. Barbara K. Rimer (Chair) (absent)  
Mr. Hill Harper (absent)  
Dr. Owen Witte (absent)

**Members, Scientific Program Leaders, National Cancer Institute, NIH**

Dr. Douglas R. Lowy, Acting Director, National Cancer Institute  
Dr. Jeff Abrams, Director, Division of Cancer Treatment and Diagnosis  
Dr. Lynn Austin, Executive Officer, Deputy Director for Management  
Dr. L. Michelle Bennett, Director, Center for Research Strategy  
Dr. Stephen J. Chanock, Division of Cancer Epidemiology and Genetics  
Dr. Henry P. Ciolino, Acting Director, Office of Cancer Centers  
Dr. Robert Croyle, Director, Division of Cancer Control and Population Sciences  
Dr. James Doroshow, Deputy Director for Clinical and Translational Research  
Dr. Paulette S. Gray, Director, Division of Extramural Activities  
Dr. Peter Greenwald, Associate Director for Prevention  
Dr. Ed Harlow, Special Advisor to the Acting Director  
Dr. Toby Hecht, Deputy Director, Division of Cancer Treatment and Diagnosis  
Dr. Warren Kibbe, Acting Deputy Director and Director, Center for Bioinformatics and Information Technology  
Dr. Barry Kramer, Director, Division of Cancer Prevention  
Dr. Jerry Lee, Director, Center for Strategic Scientific Initiatives  
Dr. Glenn Merlino, Acting Scientific Director for Basic Research, Center for Cancer Research  
Dr. Tom Misteli, Director, Center for Cancer Research  
Dr. Craig Reynolds, Director, Office of Scientific Operations, NCI Campus at Frederick  
Dr. Dinah Singer, Acting Deputy Director and Director, Division of Cancer Biology  
Dr. Sanya Springfield, Director, Center to Reduce Cancer Health Disparities  
Dr. Louis Staudt, Director, Center for Cancer Genomics  
Dr. Ted Trimble, Director, Center for Global Health  
Mr. Michael Weingarten, Director, Small Business Innovation Research  
Dr. Jonathan Wiest, Director, Center for Cancer Training  
Dr. Robert Wiltrout, Special Advisor to the Acting Director  
Dr. Robert Yarchoan, Director, Office of HIV and AIDS Malignancy  
Dr. Maureen Johnson, Executive Secretary, Office of the Director

**Liaison Representatives**

Ms. Carolyn Aldige, Cancer Research and Prevention Foundation  
Ms. Paula Bowen, Kidney Cancer Association  
Mr. William Bro, Kidney Cancer Association  
Dr. Carol Brown, Society of Gynecologic Oncologists  
Dr. Margaret Foti, American Association for Cancer Research  
Dr. Leo Giambarresi, American Urological Association  
Dr. Francis Giardiello, American Gastroenterological Association  
Dr. Mary Gullatte, Oncology Nursing Society  
Ms. Shandi E. Hill, American Society of Therapeutic Radiology and Oncology  
Ms. Ruth Hoffman, Candlelighters Childhood Cancer Foundation  
Dr. Gerald F. Joseph, Jr., American College of Obstetricians and Gynecologists  
Ms. Rebecca A. Kirch, American Cancer Society  
Dr. Steven Klein, National Science Foundation  
Ms. Laura Levit, American Society of Clinical Oncology  
Dr. W. Marston Linehan, Society of Urologic Oncology  
Ms. Margo Michaels, Education Network to Advance Cancer Clinical Trials  
Dr. Patricia Mullan, American Association for Cancer Education  
Ms. Shelley Fuld Nasso, NCI Council of Research Advocates

Ms. Leah Ralph, Association of Community Cancer Centers  
Ms. Christy Schmidt, American Cancer Society  
Ms. Susan Silver, National Coalition for Cancer Survivorship  
Ms. Barbara Duffy Stewart, Association of American Cancer Institutes  
Dr. Johannes Vieweg, American Urological Association  
Ms. Pamela A. Wilcox, American College of Radiology  
COL (Ret.) James E. Williams, Jr., Intercultural Cancer Council

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**TUESDAY, JUNE 21, 2016**

**I. CALL TO ORDER AND OPENING REMARKS—DRS. CHI V. DANG AND TYLER E. JACKS**

Dr. Jacks called to order the 7<sup>th</sup> Joint BSA and NCAB meeting and welcomed members of the Board, *ex officio* members of the Board, liaison representatives, staff, and guests. Members of the public were welcomed and invited to submit to Dr. Paulette S. Gray, Director, Division of Extramural Activities (DEA), National Cancer Institute (NCI), in writing and within 10 days, any comments regarding items discussed during the meeting. Drs. Chi and Jacks reviewed the confidentiality and conflict-of-interest practices required of Board members in their deliberations.

**Motion.** A motion to approve the minutes of the 29 March 2016 BSA meeting was approved unanimously.

**II. FUTURE BOARD MEETING DATES—DRS. CHI V. DANG AND TYLER E. JACKS**

Dr. Jacks called Board members' attention to future meeting dates.

**III. NCI ACTING DIRECTOR'S REPORT—DR. DOUGLAS R. LOWY**

Dr. Douglas R. Lowy, Acting Director, welcomed members of both the NCAB and BSA to the seventh joint meeting of these Boards. Dr. Lowy reviewed the agenda and provided an update on recent NCI activities, including the Precision Medicine Initiative in Oncology (PMI-Oncology) and the Vice President's Cancer Initiative (VPCI). He was joined by Dr. James H. Doroshov, Deputy Director, who provided an update on the NCI-Molecular Analysis for Therapy Choice (NCI-MATCH) trial, and Dr. Warren Kibbe, Acting Deputy Director, who described the Genomic Data Commons (GDC) project.

**Precision Medicine Initiative in Oncology (PMI-Oncology).** Dr. Lowy reminded members that PMI-Oncology aims to improve cancer treatments through genomics by using preclinical models that predict the right drug to the right patient at the right time. He described a recent funding opportunity announcement (FOA) to improve preclinical models for evaluating targeted therapeutics and immunotherapy. In addition, the NCI has awarded multiple administrative supplements to NCI-designated Cancer Centers to support research in canine immunotherapy, enhanced preclinical drug development and preclinical trials using patient-derived xenograft (PDX) models, biomarker development and correlative studies associated with clinical trials of immunotherapy, the microenvironment in pancreatic adenocarcinoma, and T-cell therapies and good manufacturing processes (GMP) for the production of autologous T-cell therapy products. The NCI also has provided administrative supplements to the Cooperative Groups and Specialized Programs of Research Excellence (SPOREs) to study mechanisms of cancer sensitivity and resistance to therapy using samples and information of human clinical trials; create a repository of molecularly analyzed samples of resistant disease; and expand the use of tumor profiling methods, such as circulating tumor cells and fragments of tumor DNA in the blood, to understand and monitor disease progression.

Dr. Lowy described exciting results from one of the Cancer Centers' trials on Merkel cell carcinoma, in which two groups of patients who were virus-positive and virus-negative both had long-term responses to a PD-1 checkpoint inhibitor compared to patients who did not have a long-term response to conventional therapy. Researchers hypothesize that one or more of the tumor virus-encoded epitopes actually is immunogenic in this particular setting, because the number of mutations present in the patients who responded varied significantly, with virus-negative patients having on average

approximately 1,100 mutations per tumor genome in contrast to virus-positive patients, who had fewer than 15 mutations per tumor genome.

**Vice President's Cancer Initiative (VPCI).** Dr. Lowy provided brief context for the VPCI, which was presented in more detail later in the meeting. Members were reminded that, during the 2016 State of the Union address, President Barack Obama announced the VPCI, which provides an opportunity for focused research and recent technological innovations to accelerate progress on specific projects that can have a substantial impact on understanding or improving the outcome for patients. Dr. Lowy stated that the NCI will support other meritorious research not addressed by the initiative. In addition to taking advantage of new understanding and new innovative technology, the VPCI also aims to increase the dissemination and implementation of standards of care to ensure that a greater number of cancer patients benefit from the most current, most effective therapeutic approaches.

**Virtual Drug Formulary.** Dr. Doroshow informed members that the notion of a virtual drug formulary resulted from discussions from Cancer Center Directors and investigators about the challenges in obtaining access to multiple investigational agents from separate companies for investigator-initiated trials. The NCI has successfully negotiated with more than 20 pharmaceutical companies during the past 2 years to obtain access to 24 therapeutic compounds and will serve in a broker position through a novel cooperative research and development agreement (CRADA) to facilitate the access process between the investigators and industry. The aim is to have an initial batch of drugs available by the end of 2016.

**NCI-MATCH Trial.** Members were informed that the NCI-MATCH trial reopened on May 31 and now includes 24 arms in a Phase 2 umbrella trial. PMI-Oncology funding is supporting the processing and sequencing centers to ensure that work proceeds expeditiously. The NCI is providing additional resources to increase the number of patients screened from 3,000 to 5,000. This will provide a MATCH rate of approximately 20 percent, or 1,000 patients who will receive treatment through one of the MATCH Phase 2 trials. In addition to the MATCH screening panel, a full molecular characterization (e.g., RNA sequencing, exome analysis) will be completed for the tumors of all of the patients who receive treatment.

**Genomic Data Commons (GDC).** Dr. Kibbe told members that the GDC is an existing effort to standardize and simplify submission of genomic data to the NCI. Vice President Joseph Biden expressed strong support for the GDC and data sharing on June 6, 2016, during his visit to the University of Chicago, which manages the GDC, and in a talk at the American Society of Clinical Oncology (ASCO) annual meeting. The GDC operates under the principles of making data findable, accessible, interoperable, and reusable (FAIR). It went live with approximately 4.1 petabytes of data and 1.5 petabytes of harmonized data, and it includes data from The Cancer Genome Atlas (TCGA), Therapeutically Applicable Research to Generate Effective Treatments (TARGET), and the Cancer Genome Characterization Initiative (CGCI). Dr. Kibbe described the data portal and the data submission process. He noted that in addition to the GDC, the NCI is supporting cloud pilots to make data more accessible and properly credit investigators for their data and associated algorithms. The GDC provides an opportunity to engage patients in the data process.

## Questions and Answers

In response to a query by Dr. Jacks, Dr. Doroshow confirmed that both investigators conducting preclinical trials and clinical scientists will have access to the virtual drug formulary. Dr. Joe W. Gray, Gordon Moore Endowed Chair, Department of Biomedical Engineering, Director, OSHU Center for Spatial Systems Biomedicine, and Associate Director, Knight Cancer Institute, Oregon Health and Science University, asked about the process for drug access by the extramural community. Dr. Doroshow responded that the process will be accelerated, with pharmaceutical companies reviewing study concepts

in 8 weeks or less. Dr. Andrea Califano, Director, Columbia Initiative in Systems Biology, Director, Sulzberger Columbia Genome Center, Associate Director, Herbert Irving Comprehensive Cancer Research Center, and Professor of Systems Biology, Department of Biochemistry and Molecular Biophysics, Biomedical Informatics, and Institute of Cancer Genetics, Columbia University Medical Center, asked about the potential for compassionate use, and Dr. Doroshov indicated that approval from the U.S. Food and Drug Administration (FDA) would be required.

Dr. Marcia R. Cruz-Correa, Associate Professor of Medicine and Biochemistry, University of Puerto Rico, Basic and Translational Science Director, University of Puerto Rico Comprehensive Cancer Center, requested data on the gender, ethnic, and racial distribution of the patients who have submitted samples to NCI-MATCH. Dr. Doroshov said that of the initial 795 patients, 38 percent were male and 62 percent female; 81 percent were non-Hispanic white, 11 percent black, 5 percent Hispanic, 3 percent Asian, 1 percent Native American, and 4 percent race not specified.

Dr. James V. Lacey, Director and Associate Professor, Division of Cancer Etiology, Department of Population Sciences, Beckman Research Institute, City of Hope, asked about lessons learned from the GDC launch. Dr. Kibbe noted the challenges in scaling existing algorithms for analysis for both the Cloud Pilots and the GDC.

Dr. Kevin J. Cullen, Director, Marlene and Stewart Greenebaum Cancer Center, and Professor of Medicine, University of Maryland, requested an update on the recompetition for the Frederick National Laboratory for Cancer Research (FNLCR) contract and the effect of the VPCI on the recompetition. Dr. Lowy responded that at its May meeting, the Frederick National Laboratory Advisory Committee (FNLAC) encouraged the NCI to re-envision the FNLCR's role in implementing Blue Ribbon Panel (BRP) recommendations, as well as the broad scientific scope that the FNLCR could encompass as a National Laboratory.

Ms. Mary L. Smith, Co-Founder, Research Advocacy Network, asked about changes to the patient selection criteria to increase the MATCH rate, including the enrollment of less sick patients, and plans to monitor sites to ensure that the criteria are met. Dr. Jeff Abrams, Director, Division of Cancer Treatment and Diagnosis (DCTD), replied that the eligibility criteria have been eased to recruit more patients with uncommon mutations, and the NCI has ensured that laboratories have the capability to meet the 14-day, rapid turnaround.

#### **IV. LEGISLATIVE REPORT—MS. M. K. HOLOHAN**

Ms. M. K. Holohan, Director, Office of Government and Congressional Relations, reported on the status of Congressional appropriations activities for fiscal year (FY) 2017. The President's budget request for FY 2017 Budget included a \$1 billion (B) reduction in discretionary funding for the NIH coupled with a \$1.8 B increase in mandatory funding. The budget specified \$680 million (M) for the VPCI. While Ms. Holohan reported strong bipartisan support to again increase NIH funding (the NIH budget was increased by \$2 billion in FY 2016), she also explained that Congressional appropriators have had a uniformly negative reaction to this approach (cutting discretionary funding), regardless of the overall increased total funding level being proposed. The Chair of the House Committee on Appropriations has stated that he is firmly against mandatory funding for NIH, and the appropriations subcommittees have indicated that they will not be able to support the VPCI funding until they can review the final reports from the BRP and Task Force. Ms. Holohan forecasted that the NCI likely will operate under a Continuing Resolution for at least part of FY 2017.

## Questions and Answers

Dr. Lowy stated that the BRP report, VPCI report, and NCI's Bypass Budget reports for FY 2017 and 2018, will be useful documents as the appropriators consider future NCI appropriation.

Drs. Joe Gray and Lincoln D. Stein, Director, Informatics and BioComputing Platform, Ontario Institute for Cancer Research, asked about the timeframe of Congress' expectations for deliverables on the VPCI. Drs. Lowy and Jacks replied that, unlike the moon landing, which serves as a metaphor and inspiration for the VPCI, there is not a single target or endpoint; unlike one rocket trip, cancer is complex and consists of at least 200 diseases. Ms. Holohan added that congressional audiences respond well to tangible examples that demonstrate the immediacy of opportunities promised by the VPCI, such as improvements in early detection by testing body fluids for circulating tumor cells.

### **V. PHYSICAL ACTIVITY AND CANCER RISK—DRS. STEPHEN CHANOCK AND STEVEN C. MOORE**

Dr. Stephen Chanock, Director, Division of Cancer Epidemiology and Genetics (DCEG), introduced Dr. Steven C. Moore, investigator, DCEG, who described studies on the relationship between physical activity and cancer risk. An NCI cohort consortium study of 660,000 participants suggested that substantial health benefits are derived from physical activity, particularly in terms of reducing the risk of colorectal, endometrial, and postmenopausal breast cancers. Dr. Moore stated that a large-scale, prospective study of 1.44 million patients from 12 cohorts in Europe and the United States corroborated these findings and further provided the first systematic evidence for links between physical activity and reduced risk for 10 additional cancers, including esophageal adenocarcinoma, liver, gastric cardia, and rectal cancers.

Dr. Moore described an additional analysis that adjusted for body-mass index (BMI). Obesity is often associated with physical inactivity and is considered a risk factor. For 10 of the 13 cancers in question, physical activity continued to show a significant correlation with reduced cancer risk even after adjusting for BMI. A notable exception to these results is endometrial cancer, which BMI-adjusted analysis showed to be correlated mainly with obesity rather than physical inactivity. Researchers have noted a paradoxical correlation between physical activity and increased risk for prostate cancer and malignant melanoma as the misleading consequence of confounding factors (the association of sun exposure with both physical activity and melanoma) or possible screening bias (prostate cancer).

A collaborative study with the Shanghai Cancer Institute used a metabolomics approach to identify biomarkers associated with physical activity and found several biochemical mechanisms by which physical activity might reduce cancer risk. The effects of long-term physical activity on blood metabolites of a group of men and women with an average age of 60 years were measured. Preliminary data suggest a correlation of physical activity with elevated levels of betaine and threonate and decreased levels of mannose, glucose, and seven amino acids. The seven amino acids shared a common biochemical pathway and also were found to be associated with a higher risk for diabetes. In addition, estrogen receptor-associated breast cancer has been shown to be associated with higher levels of at least five of these amino acids.

Physical activity is associated with lower risk for 13 types of cancer and affects many organ systems at multiple organizational levels. Researchers face challenges in identifying the most relevant biochemical factors, with potential mechanisms encompassing insulin, sex-steroid, and inflammatory pathways. In addition, new high-throughput approaches, such as untargeted metabolomics, may reveal novel mechanistic clues that elucidate the relationship between physical activity and cancer.

## Questions and Answers

In response to a query by Dr. Peter Adamson, Chair, Children's Oncology Group, Alan R. Cohen Endowed Chair in Pediatrics, The Children's Hospital of Philadelphia, about the cancer status of the study cohort, Dr. Moore clarified that the subjects in the Shanghai study were a pre-diagnosis cohort; none were cancer patients at the beginning of the study. Dr. Francis Ali-Osman, Margaret Harris & David Silverman Distinguished Professor of Neuro-Oncology Research, Professor (Tenured) of Surgery and Pathology, Department of Surgery and Pathology, and Associate Director for Translational Research, Duke University School of Medicine, Duke University Medical Center, questioned the association of physical activity with a higher risk of prostate cancer. Dr. Moore indicated that the researchers considered the association to be an artifact of bias.

Members asked about the effects of confounding factors in addition to obesity. Dr. Califano wondered about diet and smoking. Dr. Luis F. Parada, Albert C. Foster Chair, Director, Brain Tumor Center, Member, Cancer Biology and Genetics Program, Attending Neuroscientist, Department of Neurology and Department of Neurosurgery, Sloan Kettering Institute, Memorial Sloan Kettering Cancer Center, observed that many healthy, athletic people get cancer and asked about the effects of diet on the metabolic profiles. Dr. Moore responded that the analysis adjusted for several factors in addition to BMI, including diet; because smoking is correlated with a 30-fold increase in cancer risk, none of the subjects in the study were current smokers, and the analysis distinguished between previous smokers and those subjects who had never smoked. In response to a query by Dr. Jacks about the use of animal models and the use of intratumoral metabolomics, Dr. Moore replied that only a few animal studies have been conducted and that they used acute physical activity interventions rather than assessments of longer term physical activity.

Dr. Cheryl L. Walker, Professor and Director, Institute of Biosciences and Technology, Center for Translational Cancer Research, Welch Chair in Chemistry, Texas A&M Health Science Center, asked whether physical activity levels of children were predictive for physical activity later in life. Dr. Moore indicated that such a correlation was not found.

Dr. Max S. Wicha, Deputy Director of the Taubman Institute, Distinguished Professor of Oncology, and Professor, Internal Medicine, Division of Hematology and Oncology, University of Michigan, observed that patients undergoing bariatric surgery have greatly reduced rates of cancer and diabetes and asked whether metabolomics might provide clues to the effects of changes in digestive patterns. Dr. Moore agreed that the data on bariatric surgery effects are notable and that metabolomics might provide some clues as to the basis for those effects; potential correlations with postsurgical changes in gut flora provide an opportunity for future research.

Dr. Victoria L. Seewaldt, Ruth Ziegler Professor, and Chair, Department of Population Sciences, Beckman Research Institute, City of Hope, stressed the importance of mechanistic clinical trials, including both preventive and cancer treatment trials, to make clinical progress. Dr. Olufunmilayo F. Olopade, Walter L. Palmer Distinguished Service Professor of Medicine and Human Genetics, Associate Dean for Global Health, and Director, Center for Clinical Cancer Genetics, The University of Chicago Pritzker School of Medicine, emphasized the need to merge smaller scale mechanistic studies with large population-level studies to enable the development of individualized precision therapies for individual patients. Dr. Lacey asked how epidemiologic science could refine larger scale associations into specific actionable results. Dr. Moore reiterated the potential of metabolomics to accelerate the translation of research findings into effective clinical innovations, which can reveal unexpected relationships that later can be tested through mechanistic studies.

**VI. RECOGNITION OF RETIRING NCAB AND BSA MEMBERS—DR. DOUGLAS R. LOWY**

On behalf of the NCI, Dr. Lowy recognized the contributions made by members of the BSA and NCAB whose terms of office have expired. He expressed appreciation for their service and dedication over the course of their terms.

The following BSA members are retiring: Dr. Francis Ali-Osman, Margaret Harris & David Silverman Distinguished Professor of Neuro-Oncology Research, Professor (Tenured) of Surgery and Pathology, Department of Surgery and Pathology, and Associate Director for Translational Research, Duke University School of Medicine, Duke University Medical Center; Dr. Andrea Califano, Director, Columbia Initiative in Systems Biology, Director, Sulzberger Columbia Genome Center, Associate Director, Herbert Irving Comprehensive Cancer Research Center, and Professor of Systems Biology, Department of Biochemistry and Molecular Biophysics, Biomedical Informatics, and Institute of Cancer Genetics, Columbia University Medical Center; Dr. Brian J. Druker, Director, Oregon Health & Science University (OHSU) Knight Cancer Institute, Associate Dean for Oncology, OHSU School of Medicine, and JELD-WEN Chair of Leukemia Research, Oregon Health and Science University; Dr. Stanton L. Gerson, Shiverick Professor of Hematological Oncology, Director, Case Comprehensive Cancer Center, Director, National Center for Regenerative Medicine, Case Western Reserve University, and Director, Siedman Cancer Center, University Hospitals Case Medical Center; Dr. Joe W. Gray, Gordon Moore Endowed Chair, Department of Biomedical Engineering, Director, OHSU Center for Spatial Systems Biomedicine, and Associate Director for Biophysical Oncology, Knight Cancer Institute, OHSU; Dr. Theodore S. Lawrence, Isadore Lampe Professor and Chair, Department of Radiation Oncology, University of Michigan Medical School; Max S. Wicha, M.D. Distinguished Professor of Oncology, Director, University of Michigan Comprehensive Cancer Center, and Chair, Department of Radiation Oncology, University of Michigan; and Dr. Lincoln D. Stein, Director, Informatics and BioComputing Platform, Ontario Institute for Cancer Research and Gregory L. Verdine, Ph.D., Erving Professor Chemistry, Department of Stem Cell and Regenerative Biology, Harvard University

The following NCAB members are retiring: Dr. Marcia R. Cruz-Correa, Associate Professor of Medicine and Biochemistry, University of Puerto Rico, Basic and Translational Science Director, University of Puerto Rico Comprehensive Cancer Center; Dr. Kevin J. Cullen, Director, Marlene and Stewart Greenebaum Cancer Center, and Professor of Medicine, University of Maryland; Dr. Tyler E. Jacks, Director, Koch Institute for Integrative Cancer Research, and David H. Koch Professor of Biology, Massachusetts Institute of Technology; Dr. Olufunmilayo F. Olopade, Walter L. Palmer Distinguished Service Professor of Medicine and Human Genetics, Associate Dean for Global Health, and Director, Center for Clinical Cancer Genetics, The University of Chicago Pritzker School of Medicine; and Dr. Jonathan M. Samet, Professor and Flora L. Thornton Chair, Department of Preventive Medicine, Keck School of Medicine, and Director, Institute for Global Health, University of Southern California and William R. Sellers, M.D., Vice President/Global Head of Oncology, Novartis Institutes for BioMedical Research, Inc.

**VII. MOONSHOT UPDATE: NCAB BLUE RIBBON PANEL—DRS. TYLER JACKS, ELIZABETH M. JAFFEE, AND DINAH SINGER**

Drs. Jacks; Elizabeth Jaffee, Deputy Director, The Sidney Kimmel Comprehensive Cancer Center, Co-Director, Skip Viragh Center for Pancreas Cancer, The Dana and Albert “Cubby” Broccoli Professor of Oncology, Johns Hopkins University; and Dinah Singer, Acting Deputy Director, NCI, provided an update on the VPCI. Since it was announced by President Obama in his State of the Union speech in January 2016, the Initiative has moved ahead rapidly. The President appointed a Task Force chaired by Vice President Joseph R. Biden, with representatives of several Federal agencies and VPCI

Executive Director Greg Simon as members, to produce a set of recommendations by December 31, 2016, to accelerate progress in cancer research, particularly the pace at which cutting-edge research is translated into innovations and improvements in cancer care across the United States. Key goals of the Task Force include expanded, timely access to research data; reduction of unnecessary regulatory barriers; and the development of collaborative partnerships among universities, government agencies, and the private sector. The BRP was established to provide expert scientific advice to the NCAB, which will transmit its recommendations to the NCI and ultimately to the Task Force. The specific charge to the BRP includes articulation and implementation of scientific research goals for the VPCI and identification of opportunities and impediments in cancer research. To realize these goals, the BRP has established seven Working Groups to provide scientific expertise in those research areas that show the greatest promise of acceleration with targeted funding: cancer immunology; precision prevention and early detection; tumor evolution and progression; expansion of clinical trials; implementation sciences research; pediatric cancer; and enhanced data sharing. Each Working Group is composed of specialists from industry, government agencies, and academia and co-chaired by two members of the BRP.

Co-Chairs of the Working Groups presented progress reports and recommendations for cross-cutting themes of concern to the BRP in mid-June. These themes included the need for a national network of patient biology and clinical data; a greater focus on prevention; research on health disparities; biomarkers of cancer; development of preclinical models, such as organoid culture; data sharing and computational modeling; and collaboration and public-private partnerships. The conference culminated in a meeting with the Vice President, whose enthusiasm and optimism energized the BRP. Each Working Group will submit scientific recommendations for inclusion in the final BRP report, which will be submitted to the NCAB in September. In addition to its scientific recommendations, the Working Groups also have identified policy issues that emerged from their discussions; these policy issues will be forwarded for consideration by the Task Force.

Noting that access and outreach are particular priorities of Vice President Biden, Dr. Jaffee described BRP outreach efforts to the broader scientific community and the public. The Panel and Working Groups have considered ideas submitted by the broader cancer research community and the public through an online idea repository and one-on-one input via email submissions. They have reached out to colleagues through professional meetings and through listening sessions with ASCO and the American Association of Cancer Research (AACR). On June 29, the Vice President is hosting a Moonshot Summit to stimulate national involvement in the initiative. The Co-Chairs thanked their BRP colleagues for their engaged and committed participation and for the spirit of inclusiveness that has marked the project thus far.

## **Questions and Answers**

Dr. Ali-Osman asked about plans for the BRP to monitor progress on the VPCI after submission of its report. Dr. Singer expressed the hope that the BRP would continue to give feedback as the VPCI progresses. Dr. Judy E. Garber, Director, Center for Cancer Genetics and Prevention, Dana-Farber Cancer Institute, and Professor of Medicine, Harvard Medical School, asked for more details on the process of selecting the final recommendations. The Co-Chairs affirmed that the final selection will present challenges, but noted that the BRP agreed at its June 13 meeting that cross-cutting themes should be prioritized.

Dr. Joe Gray queried about the mechanism that would be used to implement BRP recommendations. Dr. Jacks encouraged the NCI to help the initiative develop fresh approaches to realizing the project goals. Dr. Singer stated that the choice of mechanisms to implement the project depends importantly on the recommendations that emerge from the working groups; a commitment to particular mechanisms before initiative priorities are decided would be constraining. Dr. Wicha asked

about opportunities for NCAB feedback on the BRP report in advance of submission of the final BRP report. Dr. Singer agreed that additional input of the NCAB would be helpful and noted that the BRP is planning an August teleconference to solicit NCAB feedback on the BRP report before moving into the implementation phase. Dr. Jacks encouraged the NCAB to be vigilant in its guidance on implementation. Dr. Mack Roach III, Professor of Radiation Oncology and Urology, Director, Particle Therapy Research Program & Outreach, Department of Radiation Oncology, University of California, San Francisco, Helen Diller Family Comprehensive Cancer Center, requested clarification of “implementation” in the BRP discussion. Dr. Jacks distinguished between implementation of the recommendations versus population-level issues addressed by the Implementation Science Working Group.

Dr. Ethan M. Basch, Associate Professor of Medicine, Division of Hematology/Oncology, and Director, Cancer Outcomes Research Program, University of North Carolina at Chapel Hill, asked about the Working Groups’ inclusion of broad infrastructure initiatives, including mechanisms of data sharing and the gathering of longitudinal data. The Co-Chairs responded that infrastructure has emerged as one of the cross-cutting themes, with a central role in many Working Group discussions, and noted that gathering longitudinal data would require new structures.

Dr. Timothy J. Ley, Professor of Medicine and Genetics, Division of Oncology, Washington University School of Medicine, raised concerns about the effect of sustainability and cost on the prioritization of BRP recommendations. Dr. Lowy replied that the BRP has focused on the evaluation and prioritization of scientific recommendations. Dr. Stanton L. Gerson, Shiverick Professor of Hematological Oncology, Director, Case Comprehensive Cancer Center, Director, National Center for Regenerative Medicine, Case Western Reserve University, and Dr. Timothy J. Ley, Professor of Medicine and Genetics, Division of Oncology, Washington University School of Medicine, encouraged the BRP to emphasize sustainability in its report and commented that new structures could be the key to acceleration and sustainability. The Co-Chairs agreed that sustainability is a critical issue, especially because long-term funding at this point is unknown.

In response to Dr. Roach’s query about the usefulness of the Listening Sessions, Dr. Jaffee replied that the AACR session was particularly useful, in part because of the participation of many younger AACR members. Dr. Gerson observed that close to 25 percent of the ideas submitted to the public idea repository were classified as “other exceptional opportunities” that did not fit into the themes of any of the Working Groups, and he wondered whether these ideas were receiving adequate attention. The Co-Chairs replied that the VPCI is focused explicitly on projects that can be accelerated; the NCI will look separately at supporting research projects that are not recommended by the BRP.

Dr. Eileen P. White, Deputy Director and Associate Director for Basic Science, Rutgers Cancer Institute of New Jersey, Distinguished Professor of Molecular Biology and Biochemistry, Rutgers, The State University of New Jersey, commented that posting manuscripts online in advance of publication would speed dissemination of results. Dr. Singer replied that the NIH is considering methods for posting manuscripts before official publication and that the Data Sharing Working Group also is considering mechanisms to post analytical tools online to ensure proper credit to tool developers. Dr. Jacks referred to Vice President Biden’s consistent focus on the need for accessibility of data and open access to manuscripts. Dr. Califano emphasized the need for analytical tools to maximize the effectiveness of data sharing. The Co-Chairs replied that the BRP does appreciate the importance of developing analytics and that technological recommendations will emerge from each Working Group.

Dr. Olopade asked about the VPCI’s plans to use databases on carriers of cancer-susceptible genes to improve cancer treatment. Drs. Singer and Lowy responded that Lynch syndrome is being proposed as a demonstration project precisely because it can be used as a model for early detection and prevention of many cancers.

Dr. Cruz-Correa expressed the need to redress deficiencies in the implementation of cancer detection and treatment guidelines in disadvantaged communities. Dr. Jacks replied that the Implementation Science Working Group had identified health disparity as a major focus, and he observed that although changing outcomes can take time, changing access can be measured quickly and can serve as a metric for project success.

Dr. Martine Roussel, St. Jude Children's Research's Endowed Chair in Molecular Oncogenesis, Full Professor, Department of Molecular Sciences, The University of Tennessee, and Full Member Department of Tumor Cell Biology, St. Jude Children's Research Hospital, asked about the involvement of the pharmaceutical industry in the Moonshot Initiative. The Co-Chairs responded that the industry has been heavily involved in the process, with representation on the BRP and several Working Groups. The pharmaceutical industry is expected to be involved in the implementation phase of the Initiative, particularly in drug development and evaluation.

Dr. C. Kenneth Anderson, Kraft Family Professor of Medicine, Harvard Medical School, and Director, Lebow Institute for Myeloma Therapeutics, Dana-Farber Cancer Institute, asked about the role of regulators in facilitating innovative clinical trials that could accelerate the translation of basic research to implementation of novel therapeutics. Dr. Singer replied that FDA representatives are included in the clinical trials and immunology Working Groups, and that Dr. Lowy has initiated conversations with the FDA commissioner. Dr. Doroshow described a proposal that is under consideration to allow FDA, NCI, NIH, and the Centers for Medicare and Medicaid Services (CMS) to share data.

## **VIII. RFA/COOPERATIVE AGREEMENT CONCEPTS—NCI STAFF**

### **Office of the Director (OD)**

#### **Collaborative Consortia for the Study of HIV-Associated Cancers: U.S. and Low- and Middle-Income Country Partnerships (New RFA/Coop. Agr)—Dr. Robert Yarchoan**

Dr. Robert Yarchoan, Director, Office of HIV and AIDS Malignancy (OHAM), presented a concept to support interdisciplinary research in HIV-associated malignancies in sub-Saharan Africa conducted by collaborative consortia between African and U.S. institutions. Dr. Yarchoan stated that the HIV epidemic affects 36 million people worldwide, most of whom are in low- and middle-income countries (LMIC), such as many of the African nations. The mortality from AIDS has decreased partly due to the increased global availability of effective therapies, such as highly active ART (HAART), and the success of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). Along with the increased survival of people with AIDS, however, comes an increased susceptibility to cancer, and HIV-related cancer is a major health problem in LMICs. Targeted cancer prevention and new treatment strategies are needed for AIDS-related cancers.

The BSA *Ad Hoc* Subcommittee on HIV and AIDS Malignancy provided the following recommendations on HIV-associated cancers in LMIC: Improve data on cancer epidemiology; define factors that influence cancer risk in LMICs; define optimal methods for screening and prevention; investigate other virally associated cancers (e.g., oral and liver cancer); and identify optimal therapies, taking into account the limitations of the medical infrastructure.

The concept aims to address high-priority research questions in HIV-associated cancers in LMICs and to help increase the quality of LMIC institutions that serve as national and regional resources for investigator training and mentoring in cancer research careers. Grants will encompass three research projects and two mandatory cores—as well as optional cores providing clinical/translation, epidemiologic, and laboratory services—and will be limited to countries that were not funded under a

prior U54 project that supported research in some African countries. Possible research areas include the role of sequence variations of causative oncoviruses, HIV-associated tumor cofactors, regional tumor pathogenesis, development of pathological and immunohistochemical (IHC) tools, and strategies to improve the integration of HIV and cancer care. Dr. Yarchoan reviewed the evaluation criteria and noted that the Office of AIDS Research (OAR) approved the funding opportunity as high-priority AIDS research.

**Subcommittee Review.** Dr. Karen M. Emmons, Vice President and Research Director, Kaiser Foundation Research Institute, expressed the Subcommittee's support for the proposal, noting its importance in funding AIDS research and developing partnerships with LMICs and its potential to change the disease burden in the LMICs. Dr. Emmons reflected on how the concept—which extends across the scientific continuum to include basic, clinical, and prevention research—builds on the previous efforts of the Fogarty International Center (FIC), which successfully expanded capacity in Africa. The Subcommittee thinks that the funding requested is appropriate for the work to be performed, supports the focus on capacity building and professional mentoring, and agrees with the use of the cooperative agreement funding mechanism, which will facilitate program management.

The first year cost is estimated at \$2.2 M for 2–3 U54 awards, with a total cost of \$9–11 M for 5 years.

### Questions and Answers

Dr. Dang asked about the baseline assessments and metrics for measuring the effect on research capacity building. Dr. Yarchoan noted that grant applicants were required to articulate their current and future plans for influencing AIDS-related cancer research. In addition, OHAM staff performed site visits to monitor progress and to assess improvement that had been made. Dr. Geraldina Dominguez, OHAM, pointed out that evaluations of technical training and mentorship of new investigators in LMICs were both capacity-building metrics.

Dr. Ali-Osman encouraged inclusion of doctoral students to expand the cadre of AIDS researchers. Dr. Dominguez referred to the FIC's training center efforts in training Ph.D. students for AIDS research and pointed out that the objective of the collaborative consortia is to engage existing clinicians or other researchers with advanced degrees.

Dr. Beth Y. Karlan, Director, Women's Cancer Program, Samuel Oschin Comprehensive Cancer Institute, Director of Gynecologic Oncology, Department of Obstetrics and Gynecology, Cedar-Sinai Medical Center, and Professor, Obstetrics and Gynecology, David Geffen School of Medicine, University of California, Los Angeles, recommended that the association between human papillomavirus (HPV) and head and neck cancers be explored in the HIV/HPV population.

**Motion.** A motion to concur on the Office of the Director's (OD) new Request for Application/Cooperative Agreement (RFA/Coop. Agr.) entitled "Collaborative Consortia for the Study of HIV-Associated Cancers: U.S. and Low- and Middle-Income Country Partnerships" was approved unanimously.

**Division of Cancer Treatment and Diagnosis (DCTD)**

**Blood and Marrow Transplant Clinical Trials Network (BMT CTN)  
(Reissue RFA/Coop. Agr.)—Dr. William Merritt**

Dr. William Merritt, Program Director, Cancer Therapy Evaluation Program, DCTD, presented a reissue concept for the Blood and Marrow Transplant Clinical Trials Network (BMT CTN), which was established in 2001 as a joint partnership between the National Heart, Lung, and Blood Institute (NHLBI) and the NCI. The goals are to provide the infrastructure needed to allow promising therapies in stem cell transplantation to be developed and evaluated in multicenter studies and to plan and coordinate Phase II and Phase III clinical trials. More than 125 centers exist nationwide, and the areas of study include anti-cancer cellular vaccine strategies, outcomes and quality of life for transplant populations, as well as transplant regimens, graft sources, biomarkers, and recurrence/relapse. Since its inception, 38 trials have been opened, of which six were NCI or principal investigator led, with a cumulative accrual of 8,700 patients at the end of 2015. The Phase III trial BMT 1201 was the first to involve the newly formed NCI Clinical Trials Network (NCTN), establishing a new model for conducting hematologic malignancy clinical trials. Key achievements include treatment of multiple myeloma, autologous transplant for lymphoma in HIV patients, transplant for acute myeloid leukemia (AML)/myelodysplastic syndrome (MDS) in patients older than age 60, myeloablative conditioning (MAC) as the standard of care for allogeneic transplant in AML/MDS patients, and optimal graft sources for allogeneic transplants. The reissue concept would fund new clinical studies to optimize transplants and prevent and treat associated toxicities in graft-versus-host disease and to implement cell therapies for treating patients with hematologic malignancies. The NCI would contribute approximately one-third of program costs, and funding would support a data coordinating center and 18 core centers to run trials.

**Subcommittee Review.** Dr. Anderson expressed the Subcommittee’s enthusiasm for the re-issue concept. The Subcommittee appreciates the BMT CTN’s ability to move Phase II trials into Phase III and its investment in the infrastructure in the 125 centers nationwide. The Subcommittee also commends the Network’s espousal of new emerging technologies (e.g., cellular transplant, oncolytic therapies, and vaccine therapies); adeptness in dealing with disparities in transplant research; and high productivity in publishing trial outcomes. Concerns were expressed about insufficient anticipation for clinical trial needs regarding cell therapy in immunotherapy trials, and the Subcommittee recommends that the NCI provide insight on how the BMT CTN would interact with the Cancer Immunotherapy Trials Network (CITN).

The first year cost is estimated at \$3.9 M (NCI component) for 18 U10 awards and one U24 award, with a total cost of \$27.3 M (NCI component) and \$72.3 M (NIH total) for 5 years.

**Question and Answer**

Dr. Dang suggested including serial sampling, particularly for resistant diseases, in the BMT CTN concept.

**Motion.** A motion to concur on the Division of Cancer Treatment and Diagnosis’ (DCTD) RFA/Coop. Agr. reissue entitled “Blood and Marrow Transplant Clinical Trials Network (BMT CTN)” was approved unanimously.

**Cancer Immunotherapy Trials Network (CITN)  
(Reissue RFA/Coop. Agr.)—Dr. Jeff Abrams**

Dr. Abrams described a reissue concept to design and implement early-phase multisite clinical trials in a network composed of leading immunotherapists and institutions. An immunotherapy workshop

in early 2016 yielded recommendations from expert cancer immunologists on ways to further the development of immunotherapy trials, including an emphasis on translational trials that identify ways to bring adoptive cell therapy to the clinic. From its inception in 2010 to 2015, CITN conducted 88 Phase I to Phase III immunotherapy trials, eight Phase II trials, 14 randomized Phase II trials, and study regimens that have included single and novel combinations. Dr. Abrams highlighted an achievement of early phase trials in the CITN, in which notable patient response in advanced Merkel cell carcinoma to anti-programmed death 1 (anti-PD-1) drug pembrolizumab was seen at seven CITN sites. Biomarker studies of various immunotherapies, such as indoleamine-pyrrole 2,3-dioxygenase (IDO) inhibitor effects on CD8-positive (CD8+) and CD4-positive (CD4+) T cells, have been conducted to better understand the immunomodulatory effects. Members were told that the reissue concept would integrate data management processes into the network by leveraging existing resources; limit member site composition to the best 20 sites; and shift the immune-monitoring core into a separate network that will be available to all NCI-sponsored networks. The future directions for the CITN will be to focus on study regimens that include combination therapies with checkpoint inhibitors, cytokines, and others.

**Subcommittee Review.** Dr. Lacey expressed the Subcommittee's strong support for the concept and appreciated the CITN's focus on many therapeutic areas, good infrastructure, and notable progress. The CITN has demonstrated its ability to initiate Phase I and Phase II trials for other networks and to serve as a component of other immunotherapy trials. The Subcommittee commends the establishment of a separate immune-monitoring core network and its potential to accelerate a broad range of immunotherapeutic endpoints.

The first year cost is estimated at \$1.5 M for one UM1 award, with a total cost of \$7.5 M for 5 years.

### **Question and Answer**

Dr. Joe Gray asked about the suitability of the archived samples from the 88 trials in the CITN for biomarker analyses and their availability to the scientific community. Dr. Abrams explained that samples suitable for biomarker evaluations from previous studies are dependent on the study design, and he pointed out that pre- and post-study tissue collection was highly encouraged on clinical trials in the network, with the ultimate goal of providing genomic data to NCI's GDC, which would be linked to the patient's raw data. He added that NCTN initiatives aim to have resources available 6 months after results are published in peer-reviewed journals.

**Motion.** A motion to concur on the Division of Cancer Treatment and Diagnosis' (DCTD) RFA/Coop. Agr. reissue entitled "Cancer Immunotherapy Trials Network (CITN)" was approved unanimously.

### **Cancer Immune Monitoring and Analysis Centers (CIMACs) Network (Re-Issue RFA/Coop. Agr)—Dr. Magdalena Thurin**

Dr. Magdalena Thurin, Program Director, DCTD, described a new concept to support the development of laboratory centers for correlative studies for NCI-supported immunotherapy trials. Immunotherapy has remarkable activity in a variety of cancers; however, only limited numbers of patients currently benefit. Strategies to optimize the patients' outcomes will rely on combination therapies to overcome intrinsic and acquired resistance and on discovery of predictive biomarkers to provide the most effective therapy to patients. The current DCTD trial networks have limited capacity for conducting effective biomarker studies and lack the following: fit-for-purpose biomarker assays, centralized platforms for biomarker identifications, adequate databases, and suitable informatics tools. The DCTD convened a cancer immunotherapy workshop to assess the overall needs and solutions for improving biomarker assay development in immunotherapy trials. An optimum biomarker development program

should have the following capabilities: collection of high-quality specimens from clinical trials, a multidisciplinary team and computational resources, a centralized database and bioinformatics, and a centralized laboratory.

To address the biomarker needs for immunotherapy, the concept proposes establishing cancer immune monitoring and analysis centers (CIMACs) and a cancer immunological data commons (CIDC) for the CIMACs, both under the cooperative agreement and U24 funding mechanisms. The CIMACs would conduct correlative studies and provide immunoprofiling analyses for specimens from NCI-supported Phase 0 through Phase II trials within the DCTD-supported networks and from other NCI-supported trials outside the DCTD network. The CIMAC primarily would conduct biomarker studies and collaborate closely with clinical investigators and study statisticians. The CIMACs would provide various services and multidisciplinary expertise for fit-for-purpose assays as well as analytical and clinical validations of scale-up assays. The CIDC would serve as a bioinformatics core center for research data collection, data analyses, data integration, and data sharing for studies completed by the CIMACs. In addition, the CIDC will have an administrative core and laboratory coordinating committee as its governing body.

**Subcommittee Review.** Dr. Joe Gray expressed the Subcommittee's support for having biomarker discovery tightly coupled with NCI-supported clinical trials and with laboratories that have the expertise to perform the analyses. The Subcommittee voiced reservations about the implementation process and suggested that clear criteria be provided for proposal applications. The Subcommittee recommends revising the CIMACs Network concept to refine the structure expected among partners, including primary coordination responsibility and network linkages (technologies and assays), to ensure that the project yields discoveries rather than simply a data compendium.

The first year cost is estimated at \$7.5 M for four U24 awards, with a total cost of \$37.5 M for 5 years.

## Questions and Answers

Dr. Joe Gray asked about the mechanism for aligning immunological experts and top-tier core laboratories into a CIMAC. Dr. Thurin explained that the objective would be to leverage existing investigator infrastructures and encourage expert core laboratories to participate in forming a CIMAC. Dr. Abrams added that the DCTD-supported network would be encouraged to form partnerships with one or more of the CIMACs before responding to the RFA.

Dr. Parada asked for clarity on the mechanism for establishing a CIMAC, the expected partnerships, and whether a letter of support would preclude an application. Dr. Abrams explained that in the initial phase, the cooperative agreement would foster academic partnerships between laboratories that have the expertise and knowledge of the assays and immunotherapy and members in the DCTD trials network, with the intent of developing immunotherapies for early phase trials. The CIMAC would be evaluated on its ability to do work and integrate with the DCTD trials network.

Dr. Sangeeta N. Bhatia, John J. and Dorothy Wilson Professor, Division of Health Sciences and Technology and Electrical Engineering and Computer Science Institute for Medical Engineering and Science, Koch Institute for Integrative Cancer Research, Brigham and Women's Hospital, Massachusetts Institute of Technology, commented that the opportunity exists to develop validated biomarkers for immunotherapies and asked how biomarker discovery trials would be translated into validated immunotherapy trials. Dr. Joe Gray added that clinical validation should be distinguished from technical validation. Dr. Thurin explained that the concept would analyze samples from clinical trials with the expectation of completing the clinical biomarker validation process.

Dr. Olopade asked whether the DCTD concept would provide the translation research necessary for establishing a correlative science and biomarker program. Dr. Jaffee explained that many of the technologies needed for biomarker studies in immunotherapy are not readily available in the broader community, and this concept could provide an avenue for change. She also emphasized the importance of having an organizational structure to identify key technologies. Dr. Abrams noted that the structure of the new concept offers a streamlined approach to the current process for conducting correlative science immunotherapy trials by integrating a laboratory coordinating committee with the CIMACs to answer pertinent questions in early phase trials. The DCTD trials network would benefit from having the resources in a network of experts to guide the type of biomarker studies that would be performed in early phase trials.

**Motion.** A motion to defer the Division of Cancer Treatment and Diagnosis' (DCTD) new RFA/Coop. Agr. entitled "Cancer Immune Monitoring and Analysis Centers" was approved unanimously.

## **XI. ONGOING AND NEW BUSINESS—DR. TYLER E. JACKS**

**NCAB Ad Hoc Global Health Subcommittee.** Dr. Olopade provided a report of the Subcommittee's meeting on June 20, 2016, at which Dr. Ted Trimble, Director, Center for Global Health (CGH), presented an update report on NCI's global health activities. The Subcommittee discussed innovations in global cancer research and potential opportunities to support this research through the VPCI. Members were reminded that the CGH works to highlight and enhance where possible NCI's activities devoted to global cancer research, as well as the multiple resources available, such as partnerships with Cancer Centers and affordable cancer technologies. A central mission of CGH has been to provide advisory assistance to countries that want to invest in cancer research with a well-developed strategic plan. Among its activities, the CGH has helped Kenya with planning, Uganda with Burkitt's lymphoma research, global efforts to address cervical cancer, and the Asia-Pacific Economic Cooperation forum with noncommunicable diseases efforts, as well as an initiative to promote cross-talk and resource sharing between NCI-supported investigators and researchers in LMICs. Dr. Olopade indicated that the Subcommittee thinks the Center is well situated within the OD to continue coordinating the global cancer efforts supported by all of the NCI's divisions.

### **Questions and Answers**

Dr. Anderson asked about global activities in pediatric cancers. Drs. Olopade and Trimble explained that the International Network for Cancer Treatment and Research (INCTR) is coordinating a significant amount of global research in pediatric cancers and that the CGH is working closely with a number of partners, including St. Jude Children's Research Hospital, as it refines its global health program. Dr. Trimble added that NCI's work in global pediatric cancer research provides a good model for research in adult cancers.

**Motion.** A motion to accept the report of the 20 June 2016 NCAB Ad Hoc Global Health Subcommittee meeting was approved unanimously.

## **XII. NCAB CLOSED SESSION—DR. TYLER E. JACKS**

*This portion of the meeting was closed to the public in accordance with the provisions set forth in Sections 552b(c)(4), 552b(c)(6), Title 5 U.S. code, and 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. appendix 2).*

The NCAB **en bloc** vote for concurrence with IRG recommendations was unanimous. During the closed session, a total of 2,689 NCI applications were reviewed requesting direct cost support of \$876,436,695.

**XIII. ADJOURNMENT—DRS. TYLER E. JACKS AND CHI V. DANG**

There being no further business, the 7<sup>th</sup> joint meeting of the BSA/NCAB was adjourned at 5:00 p.m. on Tuesday, 21 June 2016.

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Date

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Chi V. Dang, M.D., Chair, BSA

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Date

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Tyler E. Jacks, M.D., Chair, NCAB

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Date

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Paulette S. Gray, Ph.D., Executive Secretary