

**DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
NATIONAL CANCER INSTITUTE**

**4th VIRTUAL JOINT MEETING
of the
BOARD OF SCIENTIFIC ADVISORS AND
NATIONAL CANCER ADVISORY BOARD**

**Summary of Meeting
June 14–15, 2021**

**Virtual Meeting
National Cancer Institute
National Institutes of Health
Bethesda, Maryland**

**BOARD OF SCIENTIFIC ADVISORS and
NATIONAL CANCER ADVISORY BOARD JOINT MEETING
BETHESDA, MARYLAND
Summary of Meeting
14–15 June 2021**

The Board of Scientific Advisors (BSA) of the National Cancer Institute (NCI) and the National Cancer Advisory Board (NCAB) convened for the 4th Virtual Joint Meeting on 14–15 June 2021. The meeting was open to the public on Monday, 14 June 2021, from 12:05 p.m. to 3:55 p.m. and Tuesday, 15 June 2021, from 1:00 p.m. to 3:09 p.m., and closed to the public on Monday, 14 June 2021, from 4:02 p.m. to 5:26 p.m. The NCAB Acting Chair, Dr. Scott W. Hiebert, Hortense B. Ingram Chair in Cancer Research, Professor of Biochemistry, Department of Biochemistry, Vanderbilt University School of Medicine; and BSA Chair, Dr. Dafna Bar-Sagi, Saul J. Farber Professor, Department of Biochemistry and Molecular Pharmacology and Medicine, Executive Vice President and Vice Dean for Science, and Chief Scientific Officer, New York University (NYU) Langone Health, NYU School of Medicine, presided during the open session. Dr. Hiebert presided during the closed session. In the open session, the BSA considered new requests for applications (RFAs), cooperative agreements (Coop. Agr.), and program announcements with special receipt, referral, and/or review (PARs) of new and re-issue concepts presented by NCI Program staff.

BSA Members

Dr. Dafna Bar-Sagi (Chair)
Dr. Kenneth C. Anderson
Dr. Michael John Becich
Dr. Mary C. Beckerle
Dr. Melissa L. Bondy
Dr. Otis W. Brawley
Dr. Graham A. Colditz
Dr. Christopher M. Counter (absent)
Dr. Carol E. Ferrans
Dr. Keith T. Flaherty (absent)
Dr. Karen E. Knudsen
Dr. James V. Lacey, Jr.
Dr. Michelle M. Le Beau
Dr. Sylvia Katina Plevritis (absent)
Dr. W. Kimryn Rathmell
Dr. Leslie L. Robison
Dr. Martine F. (Sheer) Roussel
Dr. Robert D. Schreiber
Dr. Victoria L. Seewaldt
Dr. Kevin M. Shannon
Dr. David Sidransky
Dr. Ian M. Thompson, Jr.
Dr. David A. Tuveson
Dr. Robert H. Vonderheide (absent)
Dr. Eileen P. White
Dr. Cheryl L. Willman

NCAB Members

Dr. Scott W. Hiebert (Acting Chair)
Dr. Peter C. Adamson
Dr. Francis Ali-Osman
Dr. Anna D. Barker
Dr. Deborah Watkins Bruner
Dr. Yuan Chang
Dr. Howard J. Fingert
Mr. Lawrence O. Gostin
Dr. Andrea A. Hayes-Jordan
Dr. Nikan Khatibi (absent)
Dr. Timothy J. Ley
Dr. Electra D. Paskett
Dr. Nancy J. Raab-Traub
Dr. Margaret R. Spitz
Dr. Susan Thomas Vadaparampil
Dr. Max S. Wicha

Alternate *Ex Officio* NCAB Members

Dr. Michael A. Babich, CPSC
Dr. Joseph R. Graber, DOE
Dr. Michael Kelley, VA
Dr. Aubrey Miller, NIEHS
Dr. Richard Pazdur, FDA (absent)

Dr. Craig D. Shriver, DoD
Dr. Kerry Souza, NIOSH (absent)
Dr. Lawrence A. Tabak, NIH (absent)
Dr. Aaron Tustin, OSHA

Members, Scientific Program Leaders, National Cancer Institute, NIH

Dr. Norman E. Sharpless, Director, National Cancer Institute
Dr. L. Michelle Bennett, Director, Center for Research Strategy
Dr. Oliver Bogler, Director, Center for Cancer Training
Dr. Philip E. Castle, Director, Division of Cancer Prevention
Dr. Stephen J. Chanock, Director, Division of Cancer Epidemiology and Genetics
Dr. Henry P. Ciolino, Director, Office of Cancer Centers
Dr. Robert Croyle, Director, Division of Cancer Control and Population Sciences
Dr. William Dahut, Scientific Director for Clinical Research, Center for Cancer Research
Dr. James H. Doroshow, Deputy Director for Clinical and Translational Research
Dr. Dan Gallahan, Director, Division of Cancer Biology
Mr. Peter Garrett, Director, Office of Communications and Public Liaison
Dr. Satish Gopal, Director, Center for Global Health
Dr. Paulette S. Gray, Director, Division of Extramural Activities
Dr. Ed Harlow, Special Advisor to the NCI Director
Dr. Toby T. Hecht, Deputy Director, Division of Cancer Treatment and Diagnosis
Dr. Tony Kerlavage, Director, Center for Biomedical Informatics and Information Technology
Dr. Kristin Komschlies McConville, Acting Director, Office of Scientific Operations, NCI at Frederick
Dr. Douglas R. Lowy, Principal Deputy Director, National Cancer Institute
Dr. Glenn Merlino, Scientific Director for Basic Research, Center for Cancer Research
Dr. Tom Misteli, Director, Center for Cancer Research
Dr. Margaret Mooney, Associate Director, Cancer Therapy Evaluation Program
Dr. Henry Rodriguez, Director, Office of Cancer Clinical Proteomics Research
Mr. Jeff Shilling, Chief Information Officer and Chief of Infrastructure and Information Technology Services Branch, Center for Bioinformatics and Information Technology
Ms. Donna Siegle, Executive Officer and Deputy Director for Management, Office of the Director
Dr. Dinah Singer, Deputy Director, Science Strategy and Development
Dr. Sanya Springfield, Director, Center to Reduce Cancer Health Disparities
Dr. Louis M. Staudt, Director, Center for Cancer Genomics
Mr. Michael Weingarten, Director, Small Business Innovation Research and Small Business Technology Transfer Programs
Dr. Robert Yarchoan, Director, Office of HIV and AIDS Malignancy
Dr. Maureen Johnson, Executive Secretary, Office of the Director

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MONDAY 14 JUNE 2021

I. CALL TO ORDER AND OPENING REMARKS—DRS. SCOTT W. HIEBERT AND DAFNA BAR-SAGI

Dr. Scott W. Hiebert called to order the 4th Virtual Joint Board of Scientific Advisors (BSA) and National Cancer Advisory Board (NCAB) meeting. He welcomed members of the Boards, *ex officio* members, 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. Dr. Hiebert reviewed the confidentiality and conflict-of-interest practices required of Board members in their deliberations.

Motion. A motion to accept the minutes of the 11 February 2021 NCAB meeting was approved unanimously.

Motion. A motion to accept the minutes of the 15–16 March 2021 BSA meeting was approved unanimously.

Dr. Hiebert called Board members' attention to the future meeting dates listed on the agenda.

II. NCI DIRECTOR'S REPORT—DR. NORMAN E. SHARPLESS

Dr. Norman E. Sharpless, Director, NCI, welcomed members of both the BSA and NCAB to the 4th Virtual Joint Meeting of these Boards and reviewed the agenda. He provided an update on the NCI budget, activities related to coronavirus disease 2019 (COVID-19), and NCI programs and initiatives.

NCI Budget and Appropriations. Dr. Sharpless reminded the BSA and NCAB members that NCI regular appropriations have increased steadily since fiscal year (FY) 2015. The FY 2021 budget continues the appropriations for the Cancer MoonshotSM and Childhood Cancer Data Initiative (CCDI). The NCI also received a \$306 million (M) supplemental appropriation to support COVID-19 serology, awarded in April 2020. Dr. Sharpless joined Dr. Francis S. Collins, Director, NIH, and other Institute and Center (IC) Directors to testify at the House Appropriations Subcommittee on Labor, HHS, Education, and Related Agencies (Labor-HHS) and the Senate Appropriations Subcommittee on Labor-HHS hearings on the FY 2022 NIH budget request on 25 May 21 and 26 May 2021, respectively. Topics included updates on NCI priorities and opportunities in cancer research. The President's FY 2022 budget had not been released at the time of these hearings. Congress is considering the President's budget as the next step in the NIH/NCI appropriations process. Dr. Sharpless noted that Ms. M.K. Holohan, Director, Office of Government and Congressional Relations (OGCR), NCI, will provide further details on the NCI FY 2022 budget later in the meeting.

Dr. Sharpless informed the BSA and NCAB members that the FY 2022 President's budget includes a 2.73 percent increase for the NCI over the FY 2021 enacted budget. Noting the costs of grants that will continue in the next year, inflation, other costs, and new investments (e.g., cybersecurity), Dr. Sharpless conveyed that an appropriation at this level would slow efforts to increase the NCI paylines to reach the aspirational goal of achieving 15th percentile for established investigator by 2025. At this level of support, the NCI models that the established investigator paylines would decrease to the 11th percentile in FY 2021 and to the 10th percentile in FY 2022. This would require cuts to noncompeting awards and internal programs. Achieving a 15th percentile payline by 2025 remains a goal of the NCI, Dr. Sharpless remarked, noting that progress along this trajectory will be determined by the funds

appropriated by Congress and the number of R01 applications NCI receives, which are important variables in determining success rates.

Dr. Sharpless announced that in addition to the base appropriation for the NIH and the NCI, the President's budget request also includes \$6.5 billion (B) to establish a new entity: the Advanced Research Projects Agency for Health (ARPA-H) that emulates the Defense Advanced Research Projects Agency. The ARPA-H would be housed within the NIH and focus on cancer, Alzheimer's disease, diabetes, and likely additional diseases and conditions. This \$9 B total increase to the NIH budget is the largest in some time. Discussions are ongoing on the specific ARPA-H capabilities and how it would function and be deployed for cancer research. Also, during a discussion at the House and Senate hearings, Dr. Collins discussed the idea of using ARPA-H capabilities to evaluate multi-cancer early-detection blood-based tests to screen healthy populations for cancer. NCI would welcome further investigations in this developing area. Dr. Eric Lander, Director, White House Office of Science and Technology Policy (OTSP), President's Science Advisor, spoke at the 11 June 2021 NIH Advisory Committee to the Director, outlining his vision for ARPA-H.

NCI COVID-19 Activities. Dr. Sharpless provided an update on some of the NCI COVID-19 research projects. The NCI COVID-19 in Cancer Patients Study (NCCAPS)—a prospective longitudinal study—is ongoing. As of 8 June 2021, 875 trial sites have been activated nationally. More than 1,100 patients have been screened and 894 enrolled in NCCAPS, and the trial is now open to pediatric cancer patients. COVID-19 infections in the United States have declined. With vaccination rates increasing, enrollment in NCCAPS has declined from 50 enrollments per week in May 2020 to less than 10 per week in May 2021. Interim data from NCCAPS were presented in two abstracts (#6565 and #6566) at the 2021 American Society of Clinical Oncology (ASCO) Annual Meeting. These findings revealed ongoing symptoms of COVID-19 patients after acute infection, cancer treatment disruptions in the initial months following SARS-CoV-2 infections, and hospital inpatient experiences.

The NCI Frederick National Laboratory for Cancer Research (FNLCR), National Institute of Allergy and Infectious Diseases, and Centers for Disease Control and Prevention (CDC) have organized and placed into a public repository the online COVID-19 Seroprevalence Studies Hub ([COVID-19 SeroHub](#)). Data on health care settings, SARS-CoV-2 antibodies, and national prevalence studies are included. From these data, researchers can observe the broad increase in serum prevalence over time, stratified by state and health care setting.

Dr. Sharpless pointed out that the COVID-19 pandemic has affected cancer screening significantly in the United States. The NCI's Population-based Research to Optimize the Screening Process (PROSPR) network, a consortium designed to evaluate improved cancer screening processes and outcomes, provided a perspective on this topic in the March 2021 issue of *Gastroenterology*. In this retrospective analysis, PROSPR researchers compared breast, cervical, colorectal, and lung cancer screening rates before and during the pandemic. Data were collected in eight large health care systems in seven states, evaluating 11 million individuals. The results revealed a near zero rate screening across target populations for all cancer types studied during the early phase of the pandemic. Estimates suggest 10 million fewer screening events in the United States occurred during the pandemic: a reduction that will significantly affect the stage of cancer diagnosis and outcomes in some patients. Interestingly, fecal immunochemical test home-based screening decreased less, suggesting that this type of examination is robust during certain kinds of public health problems not observed with hospital-based or client-based screening.

NCI Programs and Initiatives. Dr. Sharpless touched on two key areas that will be discussed in detail later in the meeting. First, the NCI has been working closely with the new NIH initiative, [UNITE](#), to address structural racism in biomedical research and has established an [NCI Equity and Inclusion](#)

[Program](#) (EIP). The program consists of an NCI Equity Council and five working groups. Dr. Sharpless is the Council chair, and Dr. Paulette S. Gray serves as co-chair. Three of the five working groups address the program content represented in three broad aspects of inclusion: cancer health disparities, research workforce, and equitable community. Co-chairs from those groups will present updates on the immediate actions and long-term planning later in the meeting. Second, as of June 2021, the coverage of the U.S. population in the NCI SEER has expanded to approximately 50 percent and the program collects data on hundreds of thousands of patients annually. SEER is one of the programs that originates with the National Cancer Act (NCA) of 1971 and represents capabilities the NCI has been focused on building.

The Cancer MoonshotSM is at its midpoint, and the progress of various initiatives is being shared with the public in a number of ways. Dr. Sharpless and Dr. Dinah S. Singer, Deputy Director, Scientific Strategy and Development, NCI, published a Cancer MoonshotSM midpoint progress update in *Cancer Cell*, in which they summarized the progress of the 70 programs and initiatives across 240 projects. The NCI is planning for projects beyond the end of the 7-year funding period in FY 2023 and is exploring ways to transition those efforts into existing programs. Webinars describing the individual initiatives can be accessed from the NCI website, two of which Dr. Sharpless highlighted: Human Tumor Atlas Network (HTAN) and Cancer Center Cessation Initiative (C3I).

HTAN is a large network focusing on constructing three-dimensional atlases of the cellular, biological, and molecular features of human cancers through time. These atlases represent a diverse population of people with cancer, including minority and underserved patients of all ages, with different cancer types at different stages of disease, as well as individuals with high-risk hereditary tumors. More than 10 reports describing the initial analysis and HTAN findings across eight organ sites are anticipated for publication later this fall. Pre-prints are available in the [bioRxiv HTAN Channel](#). The data and metadata have been made available through an online portal accessible to the broader research community. Initial data from the first nine atlases have been added to the portal, with additional data being released throughout the summer.

The C3I was developed in response to the lack of tobacco cessation services within NCI-Designated Cancer Centers (Cancer Centers). The long-term goal is to help Cancer Centers build and implement sustainable tobacco cessation treatment programs to address tobacco cessation routinely with cancer patients. Since 2018, C3I has reached more than 50,000 patients with tobacco treatment programs, which this implementation more than doubles. The NCI is exploring whether the combination of a broader adoption of lung cancer screening and cessation counseling can have an impact on lung cancer rates in the future.

Dr. Sharpless remarked that several NCI-supported science advances were reported at the 2021 ASCO Annual Meeting. The Olaparib as Adjuvant Treatment in Patients With Germline BRCA Mutated High-Risk HER2 Negative Primary Breast Cancer (commonly called OlympiA) trial sponsored by the NCI and AstraZeneca demonstrated that adjuvant treatment with olaparib after completion of neoadjuvant chemotherapy significantly improved 3-year invasive disease-free survival and distant disease-free survival for BRCA1 mutated HER2 negative early breast cancer. Other research reported included core data from the PROSPR consortium showing low adherence to lung cancer screening recommendations, an evaluation of compliance with trial eligibility criteria among Cancer Therapy Evaluation Program (CTEP) trials, and updated data from the NCI Pediatric Molecular Analysis for Therapy Choice (MATCH) trial on participant enrollment and factors affecting treatment protocol enrollment. The NCI continues to present exciting advances at national meetings—such as ASCO, the American Association for Cancer Research (AACR), and American Society for Radiation Oncology—highlighting, what Dr. Sharpless called, a golden age of cancer research.

Dr. Sharpless highlighted recent publications of the NCI Clinical Proteomic Tumor Analysis Consortium (CPTAC). In the February 2021 issue of *Cancer Cell*, the Consortium reported on the proteogenomic and metabolomic characterization of human glioblastoma. This study, an interagency collaboration with the Departments of Justice and Veterans Affairs (VA), was a large initiative to connect genomic and proteomic data collected in 99 patients, which makes it the largest and most detailed proteomic characterization of adult glioblastoma. New signaling hubs, particularly phosphorylated protein tyrosine phosphatase non-receptor type 11 (PTPN11) and Phospholipase C, gamma 1 (PLCG), were identified in receptor tyrosine kinase (RTK)-altered tumors in some patients, as well as gene expression patterns involved in epithelial to mesenchymal transition. Dr. Sharpless noted that this represents an important characterization at the protein and genomic levels of glioblastoma disease, an area in which the field has not seen sufficient progress.

On 10 June 2021, President Joseph Biden and Prime Minister Boris Johnson, United Kingdom (UK), revitalized the 80-year Atlantic Charter and issued a joint statement committing to international bilateral cooperation in cancer research and to convene the first U.S.-U.K. Bilateral Cancer Summit. This summit aims to bring together researchers, patients, and other stakeholders to share ideas and identify opportunities for collaboration to accelerate advances in lifesaving approaches to cancer, which remains a leading cause of death worldwide. The summit builds on NCI's other international collaborations: the NCI-Cancer Research U.K. Cancer Grand Challenges and the renewed memorandum of understanding for the Ireland-Northern Ireland-NCI Cancer Consortium. These efforts have largely been led through the NCI Center for Global Health (CGH), which just celebrated its 10th Anniversary.

Dr. Sharpless reminded the BSA and NCAB members that the NCI is continuing to commemorate the 50th anniversary of the NCA of 1971 and has been taking this opportunity to convey the progress made over the last five decades, as well as the obstacles that remain in order to meet the challenges. The NCI has been energized and inspired by the President and First Lady's commitment to "end cancer as we know it." This is a striking moment for cancer research, with a number of positive factors converging to ignite public enthusiasm for cancer research. Communities across the nation are reopening thanks to science, allowing people to resume being with their friends and families in-person. A societal movement has focused on racial justice, which is bringing additional light to cancer health disparities, an area in which the NCI hopes to make progress to end cancer for all patients. The NCI tagline "Nothing Will Stop Us" conveys NCI's commitment to promote its mission, regardless of the situation or circumstance.

Questions and Answers

Dr. Deborah Watkins Bruner, Senior Vice President for Research, Robert W. Woodruff Professor in Nursing, Emory University, expressed concern that cancer researchers who have been surviving modestly during the past 15 months of the COVID-19 pandemic may not recover, especially with the prospects of the paylines potentially decreasing based on the FY 2022 proposed budget. She suggested a robust discussion on the available opportunities. Dr. Sharpless explained that Congress is aware of this issue and included language for the NCI to address this problem in the FY 2021 appropriations bills report. He agreed that an updated presentation on the funding opportunities and the Research Project Grant (RPG) pool would be informative.

Dr. Francis Ali-Osman, Margaret Harris and David Silverman Distinguished Professor of Neuro-Oncology, Professor Emeritus of Neurosurgery, Duke University Medical Center, asked whether the differences in seropositivity among states could be attributed to vaccination rates. Dr. Sharpless emphasized that data collection likely plays a role in the results, but deferred this question to the Division of Cancer Epidemiology and Genetics (DCEG) scientists, including Dr. Neal D. Freedman, Senior Investigator, who monitors these trends and would be best to address this topic.

Dr. Kevin M. Shannon, American Cancer Society Research Professor, Auerback Distinguished Professor of Molecular Oncology, Professor, Department of Pediatrics, School of Medicine, University of California, San Francisco, inquired on the percentage of the NCI budget allotted to the RPG pool. Dr. Sharpless noted that NCI's investments in the RPG pool has exceeded the commitment of other NCI components over the last few years. An updated review as discussed earlier will provide more insight.

Dr. Melissa L. Bondy, Chair and Professor, Department of Epidemiology and Population Health, Co-Director, Center for Population Health Sciences, Associate Director for Population Sciences, Stanford Cancer Institute, asked about the number of applications for large grants and the Specialized Programs of Research Excellence (SPORE) and how those affect the RPG pool. Dr. Sharpless remarked that the SPORE grants are highly competitive and experienced a sharp increase in applications in FY 2021, but they are separate from the RPG pool.

III. RECOGNITION OF RETIRING BSA MEMBERS— DR. NORMAN E. SHARPLESS

On behalf of the NCI, Dr. Sharpless recognized the contributions made by members of the BSA 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. Dafna Bar-Sagi, Saul J. Farber Professor of Biochemistry and Molecular Pharmacology, Executive Vice President and Vice Dean for Science, Chief Scientific Officer, New York University (NYU) Langone Health, NYU School of Medicine
- Dr. Kenneth C. Anderson, Kraft Family Professor of Medicine, Harvard Medical School, Director, Jerome Lipper Multiple Myeloma Center, Dana–Farber Cancer Institute
- Dr. Graham A. Colditz, Niess-Gain Professor of Surgery, Professor of Medicine and Associate Director Prevention and Control, Alvin J. Siteman Cancer Center, Deputy Director, Institute for Public Health, Chief, Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine in St. Louis
- Dr. Christopher M. Counter, Professor, Department of Pharmacology and Cancer Biology, Duke University School of Medicine
- Dr. Carol E. Ferrans, Harriet Werley Endowed Chair for Research, Professor, Department of Biobehavioral Health Sciences, College of Nursing, University of Illinois at Chicago
- Dr. James V. Lacey, Jr., Director and Professor, Division of Health Analytics, Department of Computational and Quantitative Medicine, Beckman Research Institute, City of Hope
- Dr. Martine F. Roussel (Sherr), St. Jude Children's Research's Endowed Chair in Molecular Oncogenesis, Department of Molecular Sciences, The University of Tennessee, Full Member, Department of Tumor Cell Biology, St. Jude Children's Research Hospital
- Dr. Victoria L. Seewaldt, Ruth Ziegler Professor, Chair, Department of Population Sciences, Beckman Research Institute, City of Hope
- Dr. Kevin M. Shannon, American Cancer Society Research Professor, Auerback Distinguished Professor of Molecular Oncology, Professor, Department of Pediatrics, School of Medicine, University of California, San Francisco
- Dr. Eileen P. White, Chief Scientific Officer, Deputy Director, Associate Director for Basic Research, Rutgers Cancer Institute of New Jersey, Distinguished Professor, Molecular Biology and Biochemistry, Rutgers, The State University of New Jersey
- Dr. Cheryl L. Willman, The Maurice and Margaret Liberman Distinguished Endowed Chair in Cancer Research, University of New Mexico (UNM) Distinguished Professor of Pathology, UNM School of Medicine, Director and CEO, UNM Comprehensive Cancer Center, UNM

IV. COVID-19: DEVELOPING A VACCINE DURING A PANDEMIC—DR. DAN H. BAROUCH

Dr. Dan H. Barouch, Director, Center for Virology and Vaccine Research, Beth Israel Deaconess Medical Center, William Bosworth Castle Professor of Medicine, Harvard Medical School, provided an overview of his research on vaccine development during the COVID-19 pandemic. He also highlighted data generated in the Serological Sciences Network for COVID-19 (SeroNet) program. In December 2019, a new disease emerged presenting with pneumonia of an unknown cause. On 10 January 2020, the SARS-CoV-2 gene sequence was released, with 41 cases and 1 death being reported. This prompted many groups worldwide to begin vaccine development, including Dr. Barouch and his laboratory. Today, cases total 175 million and deaths 3.8 million, affecting all globally.

The World Health Organization (WHO) reports that more than 200 COVID-19 vaccine candidates are under development across a variety of platforms, including, DNA, RNA to protein, vector, and inactivated virus. Three vaccines have been approved for emergency use authorization (EUA) in the United States: two mRNA vaccines, Pfizer and Moderna, and one adenovirus (Ad) vector vaccine, Johnson & Johnson. Five Phase III COVID-19 vaccine efficacy trials have launched in the United States, enrolling 30,000 to 45,000 participants in each trial and all demonstrating strong efficacy. Developers include Moderna, Pfizer, Johnson & Johnson, AstraZeneca, and Novavax. Dr. Barouch noted that advancing a vaccine generally takes several years or even decades to achieve a promising candidate. Producing multiple COVID-19 vaccines in 1 year reflects decades of advances in virology, immunology, and the development of gene-based vaccine platforms, many of which were tested previously for other pathogens. The development activities were performed in parallel, rather than in series. Although the tolerance of programmatic and financial risk was high, neither patient safety nor regulatory integrity was compromised.

Regarding vaccine development research, Dr. Barouch explained that from 2003 to 2007, he and his laboratory generated replication-incompetent Ad26 vaccine vectors. Six were selected as candidates for HIV (Ad-26-HIV) and further developed until 2018 in collaboration with NIAID and Johnson & Johnson. From 2016 to 2020, the Ad26 vaccine vector platform was used in response to a pandemic to develop a Zika virus vaccine (Ad26-ZIKV), with demonstrated efficacy in Phase I/II trials as a single-shot vaccine. Vaccine vectors for Ebola and respiratory syncytial viruses were developed and advanced. The team parlayed this knowledge into developing the Ad26-based COVID-19 vaccine in a timeline that started with the release of the virus sequence in January 2020 and collaborated with Johnson & Johnson for production. Preclinical studies were completed in February 2020 and Phase I/II trials initiated the end of July 2020. On 21 September 2020, the Ad26-COVID vaccine single-shot Phase III clinical trial was launched and 45,000 participants enrolled. The two-shot Phase III clinical trial opened on 21 November 2020 with 30,000 enrolled in the United States, Argentina, Brazil, Chile, and South Africa. On 29 January 2021, the interim safety and efficacy data were announced, and the United States Food and Drug Administration (FDA) EUA was granted 27 February 2021. Johnson & Johnson committed to producing and deploying 1 billion vaccines from January 2021 to December 2021.

Dr. Barouch described some of the data from the COVID-19 vaccine trials, all of which have been published. The nonhuman primate studies demonstrated that a single-shot Ad26 vaccine afforded vaccinated animals protection from a SARS-CoV-2 challenge. Results in humans showed similar responses as the preclinical studies, with the induction of neutralizing antibodies (Nabs) post-vaccination and higher responses after the two-shot vaccine. In addition, the vaccine also raised cluster of differentiation 8 (CD8) and CD4 positive cells in humans. Variants to SARS-CoV-2 (B.1.1.7 and B.1.3.5.1) emerged and threaten vaccine efficacy. Despite this occurrence, the interim results showed protection against symptomatic infection—72 percent in the United States, 68 percent in Latin America, and 64 percent in South Africa; and protection against severe disease (85 percent) and hospitalizations

(100 percent). In mid-April 2021, after six to seven million doses of vaccine was administered, adverse events of severe thrombosis were reported and resulted in a 10-day pause in vaccinations. The CDC and FDA investigated and determined that benefits greatly outweigh the risks and reinstated the vaccine, with no restrictions. The health community was alerted to this condition and proper treatment defined.

Dr. Barouch and his colleague, Dr. Galit Alter at Beth Israel Deaconess Medical Center, through SeroNet, further evaluated the immunogenicity of the COVID-19 mRNA vaccines (Pfizer and Moderna) in specific populations not included in the vaccine clinical trials. Data revealed high immunogenicity in pregnant and lactating women to these vaccines, but substantial low responses in immunocompromised individuals (e.g., transplant or cancer patients), with no detectable Nabs.

In closing, Dr. Barouch presented some key perspectives. Vaccine development for COVID-19 proceeded faster than for any pathogen in history; safety and public trust are critical. Viral variants require further study, vaccines may need to be updated, and additional variants will likely emerge. NAb responses are reduced, but functional antibodies and CD8 T cell responses largely are preserved against variants. Multiple vaccines need to be implemented in parallel to accelerate the vaccine launch in the United States and around the world.

Questions and Answers

NCAB Acting Chair Dr. Hiebert asked about the SARS-CoV-2 mutation rate and potential to provide vaccines not being used in the United States to other countries. Dr. Barouch explained that the sequence diversity of SARS-CoV-2 appears minimal. He continued that the U.S. and global vaccination campaigns are important and are not mutually exclusive. Education is needed to further facilitate U.S. vaccinations, and supply and distribution are the needs globally.

Dr. W. Kimryn Rathmell, Hugh Jackson Morgan Chair in Medicine, Professor, Departments of Medicine and Biochemistry, Chair, Department of Medicine, Physician-in-Chief, Vanderbilt University Medical Center, inquired on lessons learned in how to communicate messages on adverse events in clinical trials and maintain public trust. Dr. Barouch commented on the necessity of open communication to maintain public trust, which was conveyed in the pause of the Johnson & Johnson vaccine.

Dr. Andrea A. Hayes-Jordan, Byah Thompson Doxey Distinguished Professor of Surgery, Division Chief, Pediatric Surgery, Surgeon-in-Chief, University of North Carolina Children's Hospital, asked about differences in the immune response to the vaccine among ethnic groups. Dr. Barouch explained that all five vaccine studies made significant efforts to recruit minority populations to trials, but it would be premature to fully address this question today.

Mr. Lawrence O. Gostin, University Professor, Faculty Director, Founding Linda D. and Timothy J. O'Neill Professor in Global Health Law, O'Neill Institute for National and Global Health, Georgetown University, asked whether adverse events were likely to occur within days, weeks, or months after vaccination. Dr. Barouch explained that questions on late adverse effects of COVID-19 vaccinations would be challenging to address because those long-term, follow-up data are still being collected and reviewed and have yet to be made available.

V. LEGISLATIVE REPORT—MS. M.K. HOLOHAN

Ms. Holohan reported on the congressional climate, appropriations hearings, the FY 2022 budget request, and congressional calendar. She remarked on the challenging time for congressional leadership in terms of differences on such issues as legislation on broader infrastructure modifications and the commission to investigate the 6 January 2021 Capitol riot. With these complications and the current fiscal

year ending on 30 September 2021, negotiating the FY 2022 spending bills likely will still be in progress until winter.

On 9 April 2021, the President's discretionary budget request was released, which is the first step in the NIH/NCI appropriations process. On 28 May 2021, the President's full budget was released after the budget hearings. Ms. Holohan anticipates the House's taking action to set the top-line spending in lieu of a FY 2022 budget resolution. The May 2021 House and Senate Appropriations Subcommittees on L-HHS budget hearings were virtual for members and witnesses. The ARPA-H appropriation was a topic of the discussions and likely will gain the attention of the authorizing committees. Several questions were raised on the duplication of efforts in ARPA-H and at the NIH among the ICs, to which responses are pending. The FY 2022 budget request includes a \$9 B increase for the NIH, which includes \$6.5 B for ARPA-H and \$174 M for the NCI.

Ms. Holohan announced that the Endless Frontier Act has been renamed the U.S. Innovation and Competition Act of 2021 and was passed out of the Senate early June 2021. This Act, aimed at competing with China, will augment the National Science Foundation budget by \$80 B over 5 years and add an engineering and science component. The House is likely to pursue major changes.

Regarding the congressional calendar, Ms. Holohan noted that both chambers will be in session for 2 weeks in June and July, with a recess at the end of July. The debt limit suspension expires on 31 July 2021. Time will be short, and legislators will need to vote to increase the debt limit, triggering budget discussions on overall spending and having an impact on the FY 2022 budget proposal process.

VI. NCI EQUITY AND INCLUSION PROGRAM—DRS. NORMAN E. SHARPLESS, TIFFANY WALLACE, LEEANN BAILY, AND PAIGE A. GREEN

Dr. Sharpless noted that the NCI began discussing this effort after the events of summer 2020, with overwhelming interest to examine the areas of highest inequality related to structural racism. Building on existing efforts to develop a diverse workforce and inclusive NCI culture, the EIP working groups have been addressing what can be improved.

Working Group 1: Enhancing Research to Address Cancer Health Disparities. Dr. Tiffany Wallace, Program Director, Center to Reduce Cancer Health Disparities (CRCHD), and Co-Chair, Working Group 1, explained that the group is charged to develop research recommendations to determine the precursors to cancer disparities and implement research programs to eliminate disparities and promote health equity. Working Group 1 aligns with the UNITE Committee N: New research on health disparities, minority health, and health equity. The goals are to perform a landscape analysis and engage stakeholders, develop and prioritize research recommendations, and promote and implement research activities.

Dr. Wallace detailed the Working Group's immediate actions, as follows. Publish two requests for information, seeking stakeholder input (NOT-CA-21-066 and NOT-CA-21-067). Host a multi-stakeholder summit on increasing inclusion and health equity in cancer clinical research and clinical trials. Expand the NCI Intramural Trainee Awards for Cancer Disparities and Minority Health Research. Facilitate the Connecting Underrepresented Populations to Clinical Trials (CUSP2CT) program, which the BSA will consider later in the meeting. Reissue or re-imagine NCI initiatives focused on enhancing cancer disparities research.

Dr. Wallace noted that the landscape analysis is underway and involves extracting key information from published reports. Future efforts include promoting and implementing research activities, advancing research in the Persistent Poverty Counties, and coordinating with similar groups across the NCI and NIH.

Working Group 2: Ensuring Diversity of Thought and Background in the Cancer Research Workforce. Dr. LeeAnn Bailey, Chief, Integrated Networks Branch, CRCHD, and Co-Chair, Working Group 2, noted that this group focuses on enhancing NCI's efforts to develop a diverse and balanced cancer research workforce that is fully reflective of the people served. Efforts also focus on enhancing current research training endeavors at all levels and identifying new approaches to support and sustain equal representation of underrepresented groups (e.g., Black/African American, Hispanic/Latino) in the research training pipeline. Working Group 2 aligns with the UNITE Committee E: Extramural research ecosystem—changing policy, culture, and structure to promote workforce diversity.

The goals are threefold: devise and implement strategies to sustain gains made; increase the number of investigators from underrepresented groups engaged in cancer research at all levels; and increase the number of R01 applications submitted from, and awarded to, investigators from underrepresented groups. Dr. Bailey called attention to the demographics of the NCI R01-equivalent principal investigators (PIs) for FY 2020 that highlight two challenges. The applications from underrepresented groups are disproportionately low. The funding gap leads to lower representation in NCI awardees compared with the applicant pool.

The immediate action to address this NIH-wide problem transitions extramural and intramural early-career investigators to independence by establishing an Early Investigator Advancement program. The components will consist of education via monthly webinars, grant application preparation, mentors and a professional network, and a virtual hub for communications and resources. The NCI anticipates supporting one cohort per year composed of 20 participants, all meeting established outcomes.

Future Working Group 2 activities include coordinating with NIH UNITE to discuss efforts to increase diversity; connecting with Working Group 4, Tracking and Evaluation, to begin establishing metrics, a baseline, and landscape analysis; initiating an evaluation of other efforts to increase the participation of underrepresented groups in the R01 pipeline, with a focus on Historically Black Colleges and Universities; and soliciting new and innovative ideas across the NCI for consideration by the EIP Working Groups. Efforts also will leverage existing NIH programs and initiatives, such as the Faculty Institutional Recruitment for Sustainable Transformation (FIRST) Program, and will promote diversity in major funding mechanisms.

Working Group 3: Promoting an Inclusive and Equitable Community at NCI. Dr. Paige A. Green, Chief, Basic Biobehavioral and Psychological Sciences Branch, Division of Cancer Control and Population Sciences (DCCPS), and Co-Chair, Working Group 3, pointed out the group's purpose to ensure an NCI culture that is inclusive, equitable, supportive, and reflective of the diversity of the U.S. population; and enhance internal recruitment, retention, recognition, and promotion of individuals from underrepresented racial and ethnic groups. The goals are fourfold: assess NCI's internal diversity, equity, and inclusion landscape; engage NCI leaders, staff, and advisors; identify and implement recommendations; and create an NCI that achieves diversity, equity, and inclusion in a transparent, accountable, and sustainable manner.

Dr. Green detailed the Working Group's four immediate actions. The first action is to initiate an internal diversity, equity, and inclusion landscape analysis. An analysis of the full-time internal workforce and workplace experience was completed in May 2021. The NIH Office of Equity, Diversity, and Inclusion, Scientific Workforce Diversity Office, Federal Employee Viewpoint Survey (FEVS), and NIH Exit Survey comprise the data sources. Results will be shared with the internal community and advisors on an ongoing basis. An analysis that includes NCI contractors and training fellows will be conducted at a future date. Preliminary results revealed that the NCI federal employee workforce differs from the NIH employee workforce and civilian labor force. The representation of Black/African American and

Hispanic/Latino senior scientists was strikingly low ($N = 337$) for positions in the NCI Intramural Research Program. The Black/African American federal employee workforce was distributed differently, with more representation in administrative positions. Black/African American and Hispanic/Latino staff appear likely to perceive NCI as inclusive and report more negative experiences when leaving the NCI for other positions.

The second action is to expand the transparency of FEVS results. The response rates for each NCI work unit with at least 10 respondents was posted at mynci.cancer.gov in May 2021. Posting the 2020 work unit-specific results to NCI supervisors and managers was completed in May 2021. Posting the 2020 NCI-wide results by demographic characteristics on the intranet is to be completed summer 2021.

The third action is to refine, pilot, and promote the Supervisor/PI Diversity, Equity, and Inclusion Toolkit. Refining the Toolkit was completed in May 2021 and training NCI facilitators on how to use the Toolkit will be completed in June 2021. A pilot of the Toolkit with NCI supervisors, intramural principal investigators, and staff is expected to be completed in summer 2021.

The fourth action is to initiate an NCI-wide Diversity, Equity, and Inclusion Speaker Series. The first session occurred on 9 June 2021, and another is planned for 26 October 2021.

Dr. Green noted that in the next steps, Working Group 3 will partner with NCI leaders, staff, and advisors to identify and implement short- and long-term strategies to achieve transparent, accountable, and sustainable change; leverage ongoing activities and resources of the Diversity Task Force and the Workplace Civility Committee; and coordinate efforts and implement the UNITE recommendations.

Questions and Answers

Dr. Willman, who is a member of an AACR Task Force drafting the 2022 *State of the Nation in Cancer Health Disparities Report*, asked how the NCI circumscribes its investments to address such an issue that extends beyond research in health, health equity, and disparities. In a broader context, she asked how the AACR can best frame the NCI-supported research and mission to researchers; the larger disparities are not likely to be addressed through grants, but could be addressed by partnering with other agencies. Dr. Sharpless explained that the NCI budget does not allow solving societal problems that are larger than any single agency can address. The NCI's aim is to understand cancer problems and cancer disparities and address solutions. Dr. Wallace commented on seeking nontraditional multidisciplinary approaches to addressing disparities and investigating upstream precursors, noting that the EIP working groups are discussing solutions. Dr. Bailey added that addressing cancer health disparities and workforce diversity, particularly in underrepresented groups, require immediate action to dually train the next generation of researchers in cancer health disparities and cancer research.

Dr. Otis W. Brawley, Bloomberg Distinguished Professor of Oncology and Epidemiology, The Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University, commented that one major reason health disparities remain is the lack of preventive screening, diagnosis, and treatment among Americans. He called attention to an American Cancer Society report indicating that the largest disparate population is White/Caucasian, suggesting a socioeconomic issue, not a racial one.

Dr. Electra D. Paskett, Marion N. Rowley Professor of Cancer Research, Director, Division of Cancer Prevention and Control, Department of Internal Medicine, College of Medicine, The Ohio State University, pointed out that the NCAB *ad hoc* Subcommittee on Population Science, Epidemiology, and Disparities will soon convene the NCAB *ad hoc* Working Group on Strategic Approaches and Opportunities for Research on Cancer Among Racial and Ethnic Minorities and Underserved Populations to address some of these issues.

Dr. Shannon observed that the attrition from the biomedical workforce pipeline is worse for young investigators from underrepresented groups and encouraged educating trainees early in how to write an R01 grant. Dr. Bailey noted the CRCHD's Continuing Umbrella of Research Experiences (CURE) program, which provides career development support for middle school students up to the first faculty appointment.

Dr. Peter C. Adamson, Global Head, Oncology Development and Pediatric Innovation, Sanofi, suggested outreach to other cancer research organizations (e.g., AACR) to determine the best group to address such a multidimensional, widespread problem as institutional racism.

From the perspective of a CURE program mentor, Dr. Seewaldt suggested investing in creative writing strategies to educate new researchers, especially underserved minority researchers, on how to write successful research proposals.

VII. UPDATE: NCI SURVEILLANCE, EPIDEMIOLOGY, AND END RESULTS (SEER) PROGRAM—DR. LYNN PENBERTHY

Dr. Lynne Penberthy, Associate Director, Surveillance Research Program (SRP), DCCPS, provided an update on the SEER program. Established in 1975, SEER has the mission to monitor cancer trends, as well as to support research on the diagnosis, treatment, and outcomes of cancer. In terms of growth over time, SEER version 9 (SEER-9) initiated in 1975 provided coverage that represented 9 percent of the U.S. population. SEER-21, in 2021, expanded and now represents 48 percent of the U.S. population. In 2020, 17,000 publications used SEER data for primary analysis, and more than 86,000 referenced SEER data in SRP-supported grants, totaling \$55.3 M, of which \$37.3 M was related to the SEER program as the primary focus. Users access SEER frequently, with more than 4,500 downloads annually.

SEER was enhanced to meet real-world data needs to address the rapid change in cancer patient diagnosis and disease management, the lack of data outside of a clinical trial, and nonrepresentative treatment guidelines. The solution: population-level data. The approaches used to increase SEER relevance include expanding the data and methods for data capture through linkages with external partners that are holding key clinical data and using automated methods for data capture through deep learning and natural language processing. Efforts also focused on expanding the breadth of patients covered in SEER.

Dr. Penberthy described the 2021 SEER coverage expansion. To represent real-world data at the population level, data coverage needed to be increased to enable reporting trends in more refined, clinical categories, such as histologic subtype, biomarker status, treatment categories, and population subgroups. She echoed Dr. Sharpless on SEER covering approximately 50 percent of the U.S. population and further elaborated that this percentage represents more than 850,000 incident cancers reported annually. The subgroup representation has been increased and is now 15 percent Black/African American and 25 percent Hispanic/Latino. Two categories of registries have been added: Core Registries and Research Support Registries. Core Registries will submit data annually to the SEER program. Research Support Registries will be eligible to participate in specific activities that include the Virtual Pooled Registry (VPR), Virtual SEER-Linked Biorepository, National Childhood Cancer Registry (NCCR), special research projects and pilots, and linkages with external data partners. Three Core and nine Research Support Registries have been added to the SEER program.

Regarding SEER data enhancements, SEER data collected traditionally included demographics, geospatial data, characterization of the tumor at diagnosis, treatment (first course), and survival and cause

of death. The new data being integrated into SEER will collect detailed and longitudinal treatment, expanded tumor characteristics, metastatic recurrence, and longitudinal residential history. From 2003 to 2020, SEER captured pharmacy data by linking with CVS, Walgreens, and Rite Aid in 11 of the 20 registries (prior to the expansion) and collected information on prescriptions for existing and new treatments.

The SRP/NCI collaborated with the Department of Energy (DOE) on SEER data automation in conjunction with the population-level pilot (or Pilot 3) of the Joint Design of Advanced Computing Solutions for Cancer (JDACS4C) program (i.e., NCI–DOE Collaborations). Dr. Penberthy co-leads the Pilot 3 effort, in which three application programming interfaces (APIs) have been developed. The API for auto-extraction of cancer site key elements (e.g., histology, behavior, laterality, grade) automatically extracts 20 percent of all pathology reports and 50 percent partially, at speeds 18,000 times faster than the manual process. Tested in the Georgia registry, this API automatically extracted 24,000 reports and cleared their backlog in less than 2 minutes. The next step will be to develop a privacy-preserving version of the API that can be shared with the CDC and VA. The ultimate goal is to support near real-time incidence reporting. The API for reportability of cancer pathology reports selects cancer-related pathology data for case finding and is now being modified to use radiology reports. The API for recurrent metastatic disease reports was developed for modifying radiology reports and also is being modified to use radiology reports.

In terms of data access, SEER data are collected by registries under state public health reporting authority. States require all health care providers to report to a central cancer registry. Reporting to registries is Health Insurance Portability and Accountability Act of 1996 (or HIPAA)-exempt, and SEER receives a limited data set for dissemination to researchers. SEER traditionally has been and will remain broadly available. With the increase in detailed data collected, the risk of re-identifiability of individuals increases. The SRP has, therefore, developed a multitiered authentication and authorization process, with increasing security requirements across four tiers.

Dr. Penberthy reported on other significant SEER program activities. The VPR, a centralized process for linking cohorts and other studies to all U.S. registries, captures information on cancers and outcomes. To date, 45 U.S. registries are participating in the VPR and use a central website for data submission and linkage. The VPR also includes templated institutional review board (IRB) and data use authorization forms and is supported by a central SRP IRB contract as of May 2021. The NCCR is a component of the CCDI ecosystem and consists of a centralized data system for 23 registries across the United States, reflecting 77 percent of all childhood cancers. The NCCR data include complete abstracts from participating state registries, National Death Index and state vital records, and Lexis Nexis and VPR linkage. Several additional data linkages are planned for 2021, and data access plans have been included.

Questions and Answers

Dr. Michael John Becich, Chairman and Distinguished University Professor, Department of Biomedical Informatics, Professor of Pathology, Computing/Information, Clinical/Translational Sciences, and Bioengineering, Associate Vice Chancellor for Informatics in the Health Sciences, Co-Director, Center for Commercial Application (CCA) of Healthcare Data, Associate Director, Hillman Cancer Institute (HCI), Associate Director, Clinical and Translational Science Institute (CTSI), University of Pittsburgh School of Medicine, commented that the vendors control the software and asked whether a Small Business Innovation Research component had been considered for the SEER program. Dr. Penberthy explained that the SEER program generally leverages the academic community and, to a lesser extent, the commercial community. The NCI–DOE Collaboration team has been working with external partners and vendors to leverage their expertise and share data.

Dr. Leslie L. Robison, Chairman, Department of Epidemiology and Cancer Control, St. Jude Children’s Research Hospital, Associate Director, St. Jude Comprehensive Cancer Center, asked about the level of quality control being built into SEER. Dr. Penberthy explained that quality control is built in for manually collected data and noted that linking to the original source provides the most complete and comprehensive data.

VIII. NATIONAL CANCER ADVISORY BOARD (NCAB) CLOSED SESSION—DR. SCOTT W. HIEBERT

“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).”

There was a review of grants and a discussion of personnel and proprietary issues. Members absented themselves from the meeting during discussions for which there was potential conflict of interest, real or apparent.

The Board was informed that a comprehensive listing of all grant applications to be included in the **en bloc** vote was in the Special Actions package. Those grant applications, as well as those announced during the closed session, could be considered for funding by the Institute.

The NCAB **en bloc** motion to concur with IRG recommendations was unanimously approved. During the closed session, a total of 2,718 NCI applications were reviewed requesting direct cost support of \$1,077,908,245 and two FDA applications requesting direct cost support of \$267,262.

TUESDAY, 15 JUNE 2021

IX. CALL TO ORDER AND OPENING REMARKS—DRS. SCOTT W. HIEBERT AND DAFNA BAR-SAGI

Dr. Hiebert called to order Day 2 of the 4th Virtual Joint Board Meeting of the BSA and NCAB and welcomed members of the Board, *ex officio* members, liaison representatives, staff, and guests.

X. RFA/COOP. AGR. AND PAR CONCEPTS—NEW AND RE-ISSUE—NCI PROGRAM STAFF

Office of the Director

Implementation Science for Cancer Control in People Living with HIV (PLWH) in Low- and Middle-Income Countries (New RFA/Coop. Agr.)—Dr. Vidya Vedham

Dr. Vidya Vedham, Program Director, CGH, presented a new RFA concept on implementation science for cancer control in HIV in PLWH in low- and middle-income countries (LMICs), which was developed with input from DCCPS, Office of HIV and AIDS Malignancy, and Division of Cancer Prevention (DCP). As of 2019, the WHO reports that 38 million people are living with HIV worldwide, of whom 26 million have access to antiretroviral therapy (ART). Approximately 90 percent of PLWH reside in LMICs. Data have shown that with increased access to ART, PLWH in LMICs are surviving longer, with increasing cancer morbidity and mortality.

Although evidence-based cancer control interventions are available for PLWH in high-income countries, those interventions are limited in LMICs, suggesting opportunities for cancer control in these

countries. Dr. Vedham pointed out three such opportunities: Leverage and build on community infrastructure for HIV treatment and prevention to promote the uptake of evidence-based cancer control interventions; integrate or bundle evidence-based cancer control interventions into HIV treatment and prevention programs that engage remote and vulnerable communities; and develop or adapt innovations in telemedicine and mobile health to improve the uptake and reach of evidence-based cancer control interventions in PLWH.

This concept proposes an implementation science strategy for cancer control in LMICs. The goal is to support the development, adaptation, and testing of implementation strategies to deliver evidence-based interventions, tools, and technologies for cancer control among PLWH in LMICs. This RFA aligns with the priorities of the Office of AIDS Research (OAR) *NIH Strategic Plan for HIV and HIV-Related Research* and will leverage congressionally mandated NCI HIV/AIDS funds.

Subcommittee Review. Dr. Ferrans expressed the Subcommittee’s enthusiasm and support for the concept. The Subcommittee appreciated the NCI staff responses to its recommendations to include in the RFA additional requirements for applicants, in terms of intervention delivery and equitable partnerships; refine the exclusion criteria; and make effective use of the U01 cooperative agreement funding mechanism. The Subcommittee strongly encouraged the NCI to conduct an in-depth review of the successes and lessons learned across the CGH-funded initiatives focusing on boosting research and infrastructure in the LMICs.

The first-year cost is estimated at \$5 M for six to eight U01 awards, with a total cost of \$25 M for 5 years.

Questions and Answers

Dr. Robison sought clarity on the preliminary data for the interventions. Dr. Vedham clarified that the intent is that data be collected in the LMICs, but noted the need to test an intervention in a high-income setting, which then would be adapted for a LMIC.

Motion. A motion to approve the Office of the Director’s (OD’s) new RFA/ Coop. Agr. entitled “Implementation Science for Cancer Control in People Living with HIV (PLWH) in Low- and Middle-Income Countries” was approved unanimously.

A Multi-Level Approach to Connecting Underrepresented Populations to Clinical Trials (CUSP2CT) (New RFA)—Dr. LeeAnn Bailey

Dr. Bailey presented a new RFA concept for CUSP2CT. Given the recent findings on disparities and the Executive Order on advancing racial equity and support for underserved communities through the federal government, CUSP2CT is timely. This concept innovatively advances outreach and education interventions designed for underrepresented minority populations and referring physicians through a collaborative team effort using community health educators and lay health advisors. The purpose is to implement and evaluate multilevel and culturally tailored outreach and education interventions with the primary goal of increasing referral of racial and ethnic minority populations to NCI-supported clinical trials.

Although minority accrual to National Clinical Trials Network (NCTN) and NCI Community Oncology Research Program (NCORP) clinical trials has improved over the years, rates remain below the racial and ethnic representation of the U.S. population. A portfolio analysis of NCI-funded grants that focused on clinical trials and underrepresented populations revealed a gap in studies focusing on integrating best practices and establishing connections within the community. Several approaches are

ongoing in the existing NCI programs to narrow the gap in trial participation, such as targeted interventions (e.g., Spanish interpreters, promotional photographs) and partnerships between major cancer centers and satellite hospitals. CUSP2CT will leverage, enhance, and integrate these approaches and address the multi-level barriers to trial referrals for racial and ethnic minorities at the patient, provider, and site levels. CUSP2CT will engage a partnership of community health educators (CHEs) and lay health advisors (LHAs), clinical trial coordinators (CTCs), and referring providers.

The objectives are fourfold: educate racial and ethnic minority populations about NCTN trials using integrated teams of LHAs and CHEs; engage primary care and referring providers to increase clinical trial awareness to refer these populations to trials; enhance referral at all levels; and address barriers and facilitators that impede access to trials and identify and disseminate best practices. This concept will support a CUSP2CT Network composed of four U01 sites and a U24 data, evaluation, and coordinating center.

Subcommittee Review. Dr. Brawley expressed the Subcommittee’s enthusiasm and strong support for the concept. Dr. Brawley commented that the Black/African American representation in NCI-supported trials reflects that of the U.S. population and commended the NCI for achieving this level of participation, which far exceeds minority representation in industry-sponsored trials. The Subcommittee strongly encouraged the NCI to broaden the RFA budget or reduce the award size to include additional U01 centers.

The first-year cost is estimated at \$3.67 M for one to four U01 awards and one U24 award, with a total cost of \$18.28 M for 5 years.

Questions and Answers

Dr. Hayes-Jordan commented on having nurse navigators on the team to remove barriers some minorities have in accessing and understanding trials, emphasizing the need to have navigators reflect the minority population being served. Dr. Bailey explained that the NCI National Outreach Network has community health educators, many of whom are multilingual and reflect the demographic of the population being served, who liaise with community outreach in the Cancer Centers.

Dr. Howard J. Fingert, Consultant, noted industry efforts to generalize the value of some of the modern cancer therapies, especially those driven by biomarkers or devices. Canada-based Ventus Therapeutics, Inc., has generalized its trials and is succeeding in enrolling minority populations.

Dr. Karen E. Knudsen, Chief Executive Officer, American Cancer Society, Inc., American Cancer Society Cancer Action Network, , strongly encouraged emphasizing institution-level fund-matching.

Motion. A motion to approve the OD’s new RFA entitled “A Multi-Level Approach to Connecting Underrepresented Populations to Clinical Trials (CUSP2CT)” was approved unanimously, with an amendment to expand the budget to fund additional U01 awards.

Division of Cancer Prevention

Mechanisms that Impact Cancer Risk after Bariatric Surgery (New PAR)— Dr. Edward Sauter

Dr. Edward Sauter, Medical and Program Officer, DCP, presented a new PAR concept on mechanisms that impact cancer risk after bariatric surgery, which was developed as an NCI-wide

partnership. Obesity increases the risk of multiple cancers and soon will be the leading preventable cause of cancer, surpassing tobacco smoking. To date, bariatric surgery illustrates the most convincing evidence that weight loss leads to reductions in cancer risk and mortality. The Swedish Obese Subjects Study—the only prospective, controlled intervention trial to evaluate cancer incidence following bariatric surgery—resulted in a sustained mean weight reduction and lower cancer incidence.

The rate of bariatric surgery has steadily increased since 2019, with 250,000 procedures performed in the United States annually and more than 1 million worldwide. In addition to more initial and sustained weight loss, the results showed dramatic improvement in (or elimination of) type 2 diabetes mellitus and reductions in cardiovascular risk and obesity-related cancers. The mechanisms related to these reductions are not well understood.

Since 1978, the NIH has been evaluating bariatric surgery. From 1978 to 2008, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and National Heart, Lung, and Blood Institute sponsored consensus conferences and expert panels. In 2003, the NIDDK established the Longitudinal Assessment of Bariatric Surgery (LABS), with three subsequent studies focusing on diabetes risk. Cancer has not been interrogated rigorously in this cohort. The NCI has been monitoring the increased risk of cancer, bariatric surgery, and obesity, which is a priority outlined in the FY 2022 NCI *Annual Plan and Budget Proposal*. The possible mechanisms of obesity-related cancers intersect those related to bariatric surgery, but studies are limited. A portfolio analysis of current NCI obesity-related research revealed two studies: One had no surgical interventions, and another required human studies.

The purpose of this PAR is to promote studies examining the mechanisms associated with bariatric surgery and cancer risk. The aim is to attract talented scientists who understand the dynamic changes caused by bariatric surgery. This concept will support R21 grants for early-stage or resource development projects (clinical trial not allowed) and R01 grants to accommodate broader scope or in-depth mechanistic studies (clinical trial optional).

Subcommittee Review. Dr. Michelle M. Le Beau, Arthur and Marian Edelstein Professor of Medicine, Director, University of Chicago Comprehensive Cancer Center, The University of Chicago, expressed the Subcommittee’s strong support for the concept. The Subcommittee appreciated the NCI staff responses to its concerns about the appropriate study session for proposal reviews, including other NIH ICs, and understanding the racial and ethnic effects of obesity-related cancers.

No budget was associated with this concept.

Questions and Answers

Dr. Sauter clarified that the concept is focusing on an endpoint in cancer in animal models. Assessing the effects of bariatric surgery in humans is outside the scope of this RFA and requires large sample sizes and follow-up for 10 to 20 years, causing a delay in reporting outcomes.

Dr. Max S. Wicha, Madeline and Sidney Forbes Professor of Oncology, Director, Forbes Institute for Cancer Discovery, Founding Director Emeritus, University of Michigan Rogel Cancer Center, Professor of Internal Medicine, Division of Hematology and Oncology, University of Michigan, suggested focusing on the biology as an endpoint in bariatric surgery as opposed to automatically equating weight loss as the primary endpoint.

Motion. A motion to approve the DCP new PAR entitled “Mechanisms that Impact Cancer Risk after Bariatric Surgery” was approved unanimously.

**Cancer Prevention and Control Clinical Trial Planning Grant Program (New PAR)—
Dr. Brandy Heckman-Stoddard**

Dr. Brandy Heckman-Stoddard, Chief, Breast and Gynecologic Cancer Research Group, DCP, presented a new PAR concept for establishing a cancer prevention and control clinical trial planning grant program. The NCI currently funds clinical trials through standard mechanisms, including R21 for exploratory Phase I or nonrandomized Phase II trials; R01 for all trials except Phase III to test the efficacy of cancer-related oncologic interventions or Phase III trials of cancer imaging modalities; and network funding for early-phase and late-phase trials developed in-network.

The R34 (investigator-initiated) or U34 (network-facilitated) is an NIH mechanism to facilitate planning and overcome challenges in trial design or infrastructure. The goal is to provide support for the initial development of a clinical trial or research project, including establishment of a research team and development of tools. The planning grant permits early peer review of the rationale and concept, supports development of the essential elements of the trial, and leads to an application for the support of the full-scale trial based on elements developed during the planning period. The NIH R34 or U34 mechanism is used by several NIH ICs but not previously by NCI.

The purpose of this concept is to generate information that is scientifically necessary and sufficient to permit final decisions about the design or conduct of the large Phase II or beyond clinical trial. The application must include a summary of the future planned trial with a goal of saving time and cost to ensure future trial success. This planning grant is not a prerequisite for an R01-funded clinical trial or large trial through a network, but it creates an additional opportunity to gain the information needed to plan a robust trial.

Subcommittee Review. Dr. Robison expressed the Subcommittee’s support for the concept, which is responsive to the need to understand the relationship between obesity and cancer risk and to develop interventions. The Subcommittee commended the NCI for leveraging the existing NHLBI R34 and U34 models and including a pass/fail check after the evaluation. The Subcommittee appreciated the NCI staff responses to its concern about an appropriate study section to review this topic and recognized the need to limit the scope to bariatric surgery and cancer and not a broader context.

No budget was associated with this concept.

Questions and Answers

No further discussion was held on this topic.

Motion. A motion to approve the DCP’s new PAR entitled “Cancer Prevention and Control Clinical Trial Planning Grant Program” was approved unanimously.

Office of the Director

PAR Re-Issue Concepts—Dr. Paulette S. Gray

Dr. Paulette S. Gray, Director, DEA, presented 31 re-issue PARs for BSA consideration and noted that the list with a link to each PAR was made available on the secure BSA-only website prior to the meeting. Dr. Gray reminded the BSA of the NIH policy established in 2019 that requires an open forum discussion and acceptance by an Advisory Council or Board for new and re-issue RFAs, RFPs, and

PARs. Because of the large volume of PAR re-issues that the NCI has annually, the BSA will review the re-issues as a group, not individually. Thus, the Board should vote to concur or non-concur with the PAR re-issuances listed below:

- Paul Calabresi Career Development Award for Clinical Oncology (K12 Clinical Trial Optional) (PAR-19-242)
- The NCI Transition Career Development Award (K22 Independent Clinical Trial Not Allowed) (PAR-18-467)
- NCI Mentored Research Scientist Development Award to Promote Diversity (K01 - Clinical Trial Required) (PAR-18-365)
- NCI Mentored Clinical Scientist Research Career Development Award to Promote Diversity (K08 Clinical Trial Required) (PAR-18-336)
- Basic Research in Cancer Health Disparities (R01 Clinical Trial Not Allowed) (PAR-18-654)
- Exploratory/Developmental Grants Program for Basic Research in Cancer Health Disparities (R21 Clinical Trial Not Allowed) (PAR-18-655)
- Physical Sciences-Oncology Network (PS-ON): Physical Sciences-Oncology Projects (PS-OP) (U01 Clinical Trial Optional) (PAR-19-101)
- Cancer Tissue Engineering Collaborative: Enabling Biomimetic Tissue- Engineered Technologies for Cancer Research (R01 Clinical Trial Optional) (PAR-19-113)
- Modulating Human Microbiome Function to Enhance Immune Responses Against Cancer (R01) (PAR19-198)
- Modulating Human Microbiome Function to Enhance Immune Responses Against Cancer (R21) (PAR19-199)
- Dissemination and Implementation Research in Health (R01 Clinical Trial Optional) (PAR-19-274)
- Dissemination and Implementation Research in Health (R21 Clinical Trial Optional) (PAR-19-275)
- Dissemination and Implementation Research in Health (R03 Clinical Trial Not Allowed) (PAR-19-276)
- Innovative Approaches to Studying Cancer Communication in the New Information Ecosystem (R01 Clinical Trial Optional) (PAR-19-348)
- Innovative Approaches to Studying Cancer Communication in the New Information Ecosystem (R21 Clinical Trial Optional) (PAR-19-350)
- Epidemiologic Research on Emerging Risk Factors and Liver Cancer Susceptibility (R01 - Clinical Trial Not Allowed) (PA-18-677)
- Epidemiologic Research on Emerging Risk Factors and Liver Cancer Susceptibility (R21 Clinical Trial Not Allowed) (PA-18-678)
- Exploratory Grants in Cancer Epidemiology (R21 Clinical Trial Optional) (PAR-19-277)
- Clinical Characterization of Cancer Therapy-induced Adverse Sequelae and Mechanism-based Interventional Strategies (R01 Clinical Trial Optional) (PAR-19-325)
- Utilizing the PLCO Biospecimens Resource to Bridge Gaps in Cancer Etiology and Early Detection Research (U01 Clinical Trial Not Allowed) (PAR-18-913)
- The Pancreatic Cancer Detection Consortium (U01; U24) (PAR-15-289)
- Imaging, Biomarkers and Digital Pathomics for the Early Detection of Premetastatic Aggressive Cancer (R01 Clinical Trial Optional) (PAR-19-264)

- Exploratory/Developmental Bioengineering Research Grants (EBRG) (R21 Clinical Trial Not Allowed) (PAR-19-149)
- Exploratory/Developmental Bioengineering Research Grants (EBRG) (R21 Clinical Trial Optional) (PAR-19-150)
- Toward Translation of Nanotechnology Cancer Interventions (TTNCI) (Clinical Trial Not Allowed) (PAR-20-116)
- Integration of Imaging and Fluid-Based Tumor Monitoring in Cancer Therapy (R01 Clinical Trial Optional) (PAR-19-363)
- Integrating Biospecimen Science Approaches into Clinical Assay Development (U01) (PAR-18-947)
- Small Cell Lung Cancer Consortium Resource Center (U01) (PAR-16-050)
- Microbial-based Cancer Therapy -Bugs as Drugs (R01; R21 Clinical Trial Not Allowed) (PAR-19-193, PAR-19-194)
- Cancer Target Discovery and Development Network Centers (U01) (RFA-12-006) (*re-issue as a PAR*)

Motion. A motion to concur on the 31 PAR re-issuances was approved unanimously.

ONGOING AND NEW BUSINESS—DRS. SCOTT W. HIEBERT AND DAFNA BAR-SAGI

NCAB Planning and Budget Subcommittee. Dr. Anna D. Barker, Chief Strategy Officer, Ellison Institute for Transformative Medicine, University of Southern California, Chair of the NCAB Planning and Budget Subcommittee, presented the report of the 14 June 2021 meeting. The NCI Director, Dr. Sharpless attended the meeting. The Subcommittee was provided an update of the FY 2021 and FY 2022 budgets—including appropriations history and trends—by Mr. Patrick McGarey, Associate Director for Finance and Legislation, and Executive Secretary. Dr. Barker noted that the Subcommittee was reminded that since 2016, the NCI has received \$12.85 B in increases, amounting to an overall 42.7 percent increase. The Subcommittee credited this history of increases to the continuous bipartisan support of Congress, particularly the House and Senate Appropriations Subcommittees on L-HHS leaders over the years. Although the FY 2021 budget allowed the NCI to increase R01 paylines, the Subcommittee expressed concern that the FY 2022 budget request, which includes a 2.67 percent increase for the NCI, will not maintain the established paylines or achieve the new goals for paylines.

Dr. Barker explained that the discussions next focused on ARPA-H and the potential role for the NCI, recognizing that modeled after DARPA, this initiative is counterintuitive to the way cancer researchers and investigators routinely operate. Dr. Sharpless in his comments to the Subcommittee, noted that new appropriations for cancer research are always beneficial. The Subcommittee discussed that the FNLRCR should be considered in the ARPA-H implementation because of its structure. Namely, the FNLRCR, a Federally Funded Research and Development Center (FFRDC), is the only one of its kind solely dedicated to biomedical research. Dr. Barker referred the BSA and NCAB members to the detailed report of the Subcommittee meeting and expressed appreciation to Mr. McGarey for his updates at this meeting and to the NCI DEA staff for their assistance in preparing for the meeting.

Questions and Answers

BSA Chair Dr. Bar-Sagi asked about the attraction to a DARPA-like model for funding this new initiative. Dr. Sharpless could not speak to the decision on a funding mechanism for the ARPA-H, noting that an ARPA-H entity would add capabilities the NCI does not have. He continued by calling attention to some key observations. During the Cancer MoonshotSM planning process, then-Vice President Biden

commented on areas of cancer research to improve and accelerate. The concept of an ARPA-H-type entity was described by presidential candidate Biden as one of his priorities.

Dr. Willman commented on how ARPA-H funds could be used in a Laboratory Directed Research & Development–like manner, similar to other FNLCR-led projects, with the NCI coordinating the research areas of focus and synergizing with other NCI programs. She asked whether the NCI envisions ARPA-H as a FNLCR-type model. Dr. Sharpless clarified his point that ARPA-H could use any available vehicle to conduct its scientific research, but does not think ARPA-H is a FNLCR-type model. He referred the BSA and NCAB members to Dr. Collins’s comments before the House and Senate Appropriations Subcommittees during the L-HHS FY 2022 budget hearings.

Motion. A motion to accept the report of the 14 June 2021 NCAB Planning and Budget Subcommittee meeting was approved unanimously.

Establish a BSA *Ad Hoc* CCDI Steering Committee. Dr. Bar-Sagi stated that the BSA will need to concur on establishing an *ad hoc* CCDI Steering Committee. The detailed goals and mission statement were provided in the Board book.

Dr. Sharpless commented that a BSA CCDI Steering Committee, on behalf of the NCI, would formally engage the childhood cancer community in the CCDI, noting that this initiative is a critical endeavor for the NCI. Dr. Sharpless clarified that this *Ad Hoc* CCDI Steering Committee would be active for some time because the CCDI appropriations spans 10 years. He agreed that international partners can be considered and acknowledged that broad representation extending beyond the pediatric oncology community (e.g., adult oncologists) can be included on the CCDI Steering Committee.

Motion. A motion to concur with establishing an *Ad Hoc* BSA CCDI Steering Committee was approved unanimously.

Future Agenda Items. The BSA and NCAB members were asked to forward any suggestions for potential future agenda items to the respective Board chairs and Dr. Gray.

XI. ADJOURNMENT—DRS. SCOTT W. HIEBERT AND DAFNA BAR-SAGI

Dr. Hiebert thanked all the Board members, as well as the visitors and observers, for attending. There being no further business, the 4th Virtual Joint Meeting of the BSA and NCAB was adjourned at 3:09 p.m. on Tuesday, 15 June 2021.

Date

Dafna Bar-Sagi, Ph.D., Chair, BSA

Date

Scott W. Hebert, Ph.D., Acting Chair, NCAB

Date

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