DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL CANCER INSTITUTE

5th Virtual Meeting of the BOARD OF SCIENTIFIC ADVISORS

Summary of Meeting

March 15–16, 2021

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

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL CANCER INSTITUTE

BOARD OF SCIENTIFIC ADVISORS

SUMMARY OF MEETING
15–16 March 2021

The Board of Scientific Advisors (BSA), National Cancer Institute (NCI), convened for its 5th virtual regular meeting on Monday, 15 March 2021, at 1:00 p.m. BSA members and NCI staff attended virtually. 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, presided as Chair. The meeting was open to the public on Monday, 15 March 2021, from 1:00 p.m. until 4:42 p.m. and on Tuesday, 16 March 2021, from 1:00 p.m. until 3:46 p.m. for the consideration of new requests for applications (RFAs), Cooperative Agreements (Coop. Agr.), requests for proposals (RFPs), and program announcements with special receipt, referral, and/or review (PARs) of new and re-issue concepts presented by NCI Program staff.

BSA Board Members Present

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
Dr. Carol E. Ferrans
Dr. Keith T. Flaherty
Dr. Karen E. Knudsen
Dr. James V. Lacey, Jr.
Dr. Michelle M. Le Beau
Dr. Sylvia Katina Plevritis
Dr. W. Kimryn Rathmell
Dr. Leslie L. Robison
Dr. Martine F. (Sherr) Roussel
Dr. Robert D. Schreiber
Dr. Victoria L. Seewaldt
Dr. Kevin M. Shannon
Dr. David Sidransky
Dr. Ian M. Thompson, Jr.
Dr. Robert H. Vonderheide
Dr. Eileen P. White

Board Members Absent

Dr. David A. Tuveson
Dr. Cheryl L. Willman

Others Present: Members of NCI's Scientific Program Leadership Committee, NCI staff, members of the extramural community, and press representatives.

TABLE OF CONTENTS

MONDAY, 15 MARCH 2021

TUESDAY, 16 MARCH 2021

MONDAY, 15 MARCH 2021

I. CALL TO ORDER AND OPENING REMARKS—DR. DAFNA BAR-SAGI

Dr. Dafna Bar-Sagi called to order the 5th virtual meeting of the Board of Scientific Advisors (BSA or Board) and welcomed current members of the Board, National Institutes of Health (NIH) and National Cancer Institute (NCI) staff, guests, and members of the public. Dr. Bar-Sagi reminded the Board members of the conflict-of-interest guidelines and confidentiality requirements. Members of the public were invited to submit to Dr. Paulette S. Gray, Director, Division of Extramural Activities (DEA), in writing and within 10 days, comments regarding items discussed during the meeting.

Dr. Bar-Sagi called attention to future meeting dates contained in the agenda. She noted that the 2022 meeting dates of the BSA need to be confirmed.

Motion. A motion to approve the 2022 meeting dates of the BSA was approved unanimously.

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

Dr. Norman E. Sharpless, Director, NCI, welcomed BSA members and attendees to the 5th virtual meeting of the BSA. He provided an update on the 50th anniversary of the National Cancer Act (NCA) of 1971, Cancer Moonshot℠, NCI appropriations and paylines, coronavirus disease 2019 (COVID-19) impacts and activities, Childhood Cancer Data Initiative (CCDI), NCI Equity and Inclusion Program, and research highlights.

Dr. Sharpless remarked on the strong interest from President Biden's Administration in science and cancer research, reflected in the visits to the NIH, the NCI, and other research-related organizations within weeks following the inauguration. In January 2021, President Biden and Vice President Kamala D. Harris visited the NIH and in February 2021, First Lady Dr. Jill Biden visited the NCI virtually and the Massey Cancer Center at Virginia Commonwealth University in person, accompanied by Dr. Sharpless. Also in February 2021, President Biden visited the Pfizer Inc. facility in Kalamazoo, Michigan. On 3 March 2021, in a White House briefing on cancer research from the Oval Office, the President introduced his concept for presiding over and stopping cancer. Showcased during Dr. Biden's visit were perspectives presented by three NCI leaders: Dr. Worta McCaskill-Stevens, Chief, Community Oncology and Prevention Trials Research Group, Division of Cancer Prevention (DCP), who described the NCI Community Oncology Research Program (NCORP) and its success in minority accruals for clinical trials; Dr. Stephanie L. Goff, Associate Research Physician, Surgery Branch, Center for Cancer Research, who discussed cutting-edge treatments at the NIH Clinical Center; and Dr. Ligia Pinto, Director, Vaccine, Immunity and Cancer Program, Frederick National Laboratory for Cancer Research (FNLCR), who reported on NCI's serology efforts in response to the COVID-19 pandemic. Dr. Sharpless noted that cancer is one of Dr. Biden's top three areas of focus as First Lady (the other two being education and support for military families).

50th Anniversary of the NCA of 1971. BSA members were informed that on 8 February 2021, the NCI launched the NCA-50 campaign in commemoration of the 50th Anniversary of the NCA of 1971, with the theme "Nothing Will Stop Us." The NCA-50 is an opportunity to ignite and inspire a new generation of cancer researchers and supporters of cancer research. The NCI is excited about the potential of the NCA-50 activities to spotlight 5 decades of cancer research accomplishments across the Nation, from basic science to translational research. Dr. Sharpless conveyed that the NCA-50 provides the NCI a platform to highlight existing opportunities for progress in cancer care and discovery. To begin the conversation on progress in cancer nationally, the NCI developed materials (non-NCI–branded) with the tagline and logo commemorating the NCA-50, which can be disseminated widely and used by any groups

or individuals interested in cancer research. Updates on the stories of progress can be accessed from the NCA-50 webpage.

NCI Cancer Moonshot℠. Dr. Sharpless announced that the Cancer Moonshot℠ is at its midpoint and that progress remains impressive. As part of the 21st Century Cures Act, Congress appropriated the NCI a 7-year funding allotment beginning in fiscal year (FY) 2017. The 240 research projects and initiatives funded during FY 2017–2020 span the cancer continuum, extending from fundamental understanding of the drivers of childhood cancer to genetic counseling and screening of individuals with inherited predispositions to cancers to direct engagement with patients. Although the NCI investments already are resulting in new national resources and clinical trials, it will take years to translate the projects into clinical benefits (i.e., diagnostics and treatments). Further details on progress can be accessed from *Cancer Currents: An NCI Cancer Research Blog*. Dr. Sharpless and Dr. Dinah S. Singer, Deputy Director, Scientific Strategy and Development, NCI, soon will publish a Cancer Moonshot℠ midpoint progress update in *Cancer Cell*. The NCI is planning for future projects beyond the end of the 7-year funding period in FY 2023 and is exploring ways to transition those efforts into existing programs.

An analysis of Cancer Moonshot℠ extramural awards (excluding grant supplements) by the NCI Center for Research Strategy (CRS) demonstrated that the Cancer Moonshot℠ is achieving its key goal of increasing the pool and diversity of ideas about cancer research at the NCI. The data revealed that as of 1 February 2021, 343 extramural principal investigators had received awards. Of the 343 recipients, 75 percent were established principal investigators, of whom 12 percent had no prior NCI funding, and 25 percent were new investigators. Of the 25 percent of new investigators, 5 percent were early-stage investigators (ESIs).

NCI Appropriations and Paylines. Dr. Sharpless reported that the FY 2021 NIH budget includes an annual appropriation of $42.9 billion (B), which is an increase of $1.25 B above the FY 2020 enacted budget, and includes $6.56 B to the NCI, which is an increase of $119 million (M). The NCI regular appropriations include $195 M for the Cancer Moonshot℠ and $50 M for Year 2 of the CCDI. The FY 2021 budget also designates $37.5 M to the NCI, both to prioritize competing grants (e.g., Type 2) and to sustain the commitments in continuing grants (i.e., Noncompeting Continuation [Type 5] awards) within the Research Project Grant (RPG) pool. In FY 2020, the fourth COVID-19 emergency bill allotted the NCI $306 M for serology research, which the NCI is implementing actively.

Dr. Sharpless noted that the continued support and commitment from Congress has enabled the NCI to establish paylines for FY 2021 competing grants (Type 2, R01): 11th percentile for established and new investigators, 16th percentile for ESIs, and 9th percentile for exploratory grants (R21). Noncompeting Continuation Type 5 awards will be funded at 100 percent. In its *Annual Plan and Budget Proposal for Fiscal Year 2022*, the NCI proposed a "5 in '25" plan to increase funding for the RPG pool, gradually reaching a 15th percentile payline for R01 grants for established investigators by FY 2025.

COVID-19 Impacts and Activities. Dr. Sharpless remarked on the NCI's contributions to the Nation's response to the COVID-19 pandemic, all conducted while maintaining focus on the Institute's central mission—cancer research and ensuring progress for patients with cancer. The NCI's COVID-19 activities include supporting foundational research with the Serological Sciences Network (SeroNet), clinical and translational serology studies, and COVID-19-related cancer research and care. BSA members were updated on two COVID-19 efforts. The NCI COVID-19 in Cancer Patients Study (NCCAPS) has enrolled nearly 1000 patients from 875 trial sites across the NCI's National Clinical Trials Network (NCTN) and NCORP in all 50 states; Washington, D.C.; Puerto Rico; and Canada. NCCAPS will allow longitudinal data and biospecimen collections, all critical to understanding the natural history of SARS-CoV-2 (the coronavirus causing COVID-19) infection in cancer patients and those with weakened immune systems.

The NCI has a history of supporting research addressing vaccine hesitancy in its efforts to eradicate cervical/human papillomavirus (HPV)–associated cancer and hepatitis-related liver cancer. Vaccine hesitancy is an issue in the COVID-19 pandemic. A recent NIH report, *COVID-19 Vaccination Communication: Applying Behavioral and Social Science to Address Vaccine Hesitancy and Foster Vaccine Confidence*—a joint effort of the NCI Division of Cancer Control and Population Sciences (DCCPS) and the NIH Office of Behavioral and Social Sciences Research—focuses on the NCI's lessons learned on this topic. This report—which has been widely shared across the U.S. Department of Health and Human Services (HHS), National Science Foundation, and other public health agencies—supports evidence-based communication adaptable to real-time changes in vaccine research. The DCCPS and several other agencies soon will release a commentary on this topic, which leverages risk communication science across federal agencies.

CCDI. Dr. Sharpless explained that in Year 2 of the CCDI, the NCI will engage the childhood cancer care and research community spanning advocates, pediatric cancer foundation researchers, care providers, and research networks. Four working groups—co-chaired by the NCI and extramural experts and composed of members of the NCI staff, external experts, and advocates—will manage building and overseeing implementation of the CCDI. The Childhood Cancer Data Platform Working Group is developing an infrastructure for and enhancing sharing of new and existing data from children's cancer institutions and community-based and NCI-supported sources. The National Childhood Cancer Cohort Working Group is gathering data from every child diagnosed with cancer in the United States. The Childhood Molecular Characterization Protocol Working Group is developing a national strategy to provide clinical and molecular characterization for every child diagnosed with cancer in the United States. A CCDI Coordination Center Working Group is developing guidelines and approaches to address cutting-edge issues. The CCDI Steering Committee will oversee the activities of the four working groups and will be informed by a CCDI Engagement Committee.

NCI Equity and Inclusion Program. BSA members were informed that the NCI has been working closely with the new NIH UNITE initiative to address structural racism in biomedical research. The NCI's own Equity and Inclusion Program consists of an NCI Equity Council and five working groups. Dr. Sharpless is the Council chair, and Dr. Paulette S. Gray serves as vice-chair. Three of the five working groups will address the program content represented in three broad aspects of inclusion: cancer health disparities, research workforce, and equitable community. The remaining working groups will address crosscutting themes on equity activities, including systemic tracking and evaluation and community and outreach, respectively. The working groups are addressing short- and long-term proposals.

Research Highlights. Dr. Sharpless discussed recent cancer research progress. The NCI partnered with Cancer Research United Kingdom (UK) to sponsor the Cancer Grand Challenges (CGC) to award grants to international multidisciplinary research teams seeking to address cancer research problems. Nine CGCs were published in October 2020 and can be accessed from the NCI website. Letters of intent will be accepted through 22 April 2021. BSA members were reminded that the CGC leverages the NCI Provocative Questions (PQ) Initiative, will use the PQ Initiative funds every other year, and is supported by Cancer Research UK funds. Because of the COVID-19 pandemic and implementation of the CGC program, the NCI will not solicit applications for the PQ Initiative in FY 2021 and is taking this opportunity to conduct an internal program evaluation.

NCI Intramural Research Program investigators collaborated with the University of Pittsburgh Medical Center Hillman Cancer Center to treat immunotherapy-refractory melanoma patients using fecal microbiota transplant (FMT). This first-of-a-kind FMT study, reported in the 3 February 2021 issue of *Science*, revealed that FMT promotes an improved response in these patients treated with a challenged

dose of an immune checkpoint inhibitor, suggesting that the composition of the colonic microbiome can augment the efficacy of these immunotherapy agents. These findings, from a first interventional trial, align with published data and will need to be corroborated in a larger study.

On 9 March 2021, the U.S. Preventive Services Task Force (USPSTF) released updated recommendations for lung cancer screening, emphasizing annual low-dose computed tomography (LDCT). The USPSTF recommendations are credited partly to the to the NCI National Lung Screening Trial (NLST) and report from the NCI Cancer Intervention and Surveillance Modeling Network (CISNET). These recommendations double the number of individuals eligible for screening, particularly women and patients from underrepresented minority groups.

The NCI chimeric antigen receptor (CAR) T-cell manufacturing program to support immunotherapy clinical trials is operational at the FNLCR and can enable multicenter trials in the NCI IRP and academic institutions across the country. Vector core manufacturing capabilities also are operational at the FNLCR. A new video describing this program has been developed and can be accessed on the NCI website.

Last, Dr. Sharpless announced that on behalf of the Clinical Trials and Translational Research Advisory Committee (CTAC) *ad hoc* Working Group on Cancer Screening Trials, the Chair, Dr. Nancy Davidson, Senior Vice President and Director, Clinical Research Division, Fred Hutchinson Cancer Research Center, will present the Working Group's report at the 17 March 2021 CTAC virtual meeting. BSA members were encouraged to attend.

In the discussion, the following points were made:

- Although the paylines for R01s are increasing, the funding for career development awards (K awards), program grants (P01), and cooperative agreements (U01) remain at a plateau. An in-depth review of the NCI funding mechanisms for training by the NCI Center for Cancer Training (CCT) and the effects of COVID-19 would be informative.

- Funding 25 K awards annually seems to be the lowest level, particularly for the Career Development Award for Clinical Oncology (K12). This trend speaks to the need to balance the Mentored Clinical Scientist Research Career Development Award (K08) for physician scientists with the demand across Cancer Centers.

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

Ms. M.K. Holohan, Director, Office of Government and Congressional Relations, reported on the new Administration, the 117th Congress, COVID-19 funding, and FY 2022 appropriations. As of 11 March 2021, the U.S. Senate Committee on Health, Education, Labor and Pensions has confirmed 16 of 23 of President Biden's cabinet nominees. President Biden has elevated the Director, White House Office of Science and Technology Policy (OSTP), to a Cabinet-level position, the first time in the history of the OSTP. Dr. Eric Lander, a geneticist, has been nominated to fill this position and currently is advisor to the Administration. In December 2020, then President-Elect Joseph R. Biden, Jr., nominated Mr. Xavier Becerra, California Attorney General and former 12-term member of the House of Representatives, as Secretary of HHS. On 11 March 2021, the Senate voted to discharge Mr. Becerra's nomination for floor debate/vote.

In the 117th Congress, the House has 221 Democrats (D), 211 Republicans (R), and 4 vacancies. The Senate has 50 Republicans and 50 Democrats; the Vice President can resolve a tie vote. The 117th is the most racially and ethnically diverse Congress in history, with 23 percent representation in the voting members and 27 percent of seats held by women. Ms. Holohan called attention to the leadership changes

of the committees that authorize NIH funding. For the House Energy and Commerce Committee and Health Subcommittee, Rep. Cathy McMorris Rodgers (R-WA) is Full Committee Ranking Member and Rep. Brett Guthrie (R-KY) is Health Committee Ranking Member. In the Senate Health, Education, Labor and Pensions Committee, Sen. Patty Murray (D-WA) is Committee Chair and Sen. Richard Burr (R-NC) is Committee Ranking Member. These committees authorize the NIH annual appropriations to fund specific programs, which may have specific directions attached.

Regarding the appropriations committees, Rep. Rosa DeLauro (D-CT) is Chair of the House Appropriations Committee and Chair of the House Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies (L-HHS), which allots the NCI's appropriations. No changes were made to the ranking members of the House Appropriations Committee and L-HHS Appropriations Subcommittee. Sen. Patrick Leahy (D-VT) is Chair of the Senate Appropriations Committee, Sen. Richard Shelby (R-AL) is the Committee Ranking Member, Sen. Patty Murray (D-WA) is Chair of the L-HHS Appropriations Subcommittee, and Sen. Roy Blunt is L-HHS Appropriations Subcommittee ranking member. Ms. Holohan pointed out that these legislators are not new to Congress; they have long-standing relationships with one another, and many have a vested interest in cancer research.

In terms of major COVID-19 relief packages and bipartisanship, Ms. Holohan noted that in FY 2020, Congress developed and passed four emergency spending packages totaling $2.6 trillion within just 7 weeks. In December 2020, Congress passed an FY 2021 omnibus spending bill combined with a $900 B COVID-19 relief package. The recent COVID-19 bill, the American Rescue Plan Act, signed into law 11 March 2021, was a strictly partisan vote. The House majority used the reconciliation process established by the Congressional Budget and Impoundment Control Act of 1974, allowing expedited approval of this bill without Senate filibuster. After a record-setting deliberation, the budget resolution passed out of the House committees. Legislation was drafted in 12 authorizing subcommittees, and bill markups were completed. This $1.9 trillion authorizing (i.e., not supplemental) bill includes $92 B for the HHS and other agencies. No new funding specifically for the NIH is included, but the details still are emerging.

Recognizing that the COVID-19 pandemic has affected biomedical research, resulting in loss of productivity across laboratories, members of Congress reintroduced the Research Investment to Spark the Economy (RISE) Act on 5 February 2021. The RISE Act authorizes nearly $25 B of support to U.S. researchers affected by the pandemic and includes $10 B for the NIH. Prior efforts to include funding for lost productivity and restart costs during the 116th Congress either did not become law or were not included in the final appropriation. The NCI anticipates that new legislation will include provisions for research restart costs.

The NIH/NCI FY 2022 budget appropriations process faces several complications, including the timing for the President's Budget Request and expiration of the debt limit suspension on 31 July 2021. In addition, the U.S. election years have tended to affect the completion of the NIH appropriations process, with long delays in FYs 2012 and 2016 and approvals of long-term continuing resolutions. Legislation on broader infrastructure modifications and science and technology are being discussed.

IV. NCI CENTER FOR GLOBAL HEALTH: CELEBRATING 10 YEARS AND LOOKING AHEAD—DR. SATISH GOPAL

Dr. Satish Gopal, Director, Center for Global Health (CGH), provided an update on the status and plans of the CGH. Coinciding with the NCA-50, the CGH is celebrating its 10th Anniversary in 2021. The commemorative campaign, CGH 10, is anticipated to amplify the broader NCA message, with reach to international partners. Many countries know the importance of the NCA in accelerating progress against cancer in the United States and are seeking ways to achieve similar advancement in their own settings.

Dr. Gopal remarked that the simultaneous occurrence of CGH 10 is allowing the NCI to highlight important global health stories within the larger NCA 50 narrative, many of which predate the establishment of the CGH.

Dr. Gopal reviewed some history of global cancer research, touching on successes, failures, and inequities over the past decades. In 1958, researchers discovered a new human tumor, Burkitt lymphoma, among children in Uganda, leading to the detection of a new human oncogenic virus, Epstein-Barr virus (EBV), in 1964. These advances, many of which were supported by NCI investments, contributed to multiagent chemotherapies, effective Burkitt lymphoma treatments, and discovery of the 8:14 translocation in the cellular myelocytomatosis (*c-myc*) gene. Further discoveries have led to comprehensive molecular profiling of Burkitt lymphoma demonstrating that the tumor biology depends on the absence or presence of EBV, rather than geographical location or clinical setting in which the tumor occurred. Last, therapeutic optimizations based on these insights have resulted in significant outcomes for patients across all age groups enrolled in clinical trials. Although these data from discovery to the clinic have been significant, the field lags in progress to build on the known tumor biology and therapeutic vulnerabilities to develop effective and less toxic treatments for these patients living in Africa.

The NCA of 1971 directed the NCI to engage in global cancer research and training. Subsequently, the NCI established the CGH to help incorporate cancer control into global health programs, foster relevant research activities throughout the NCI's extramural and intramural divisions, and work closely with potential collaborators who have displayed an interest in shared objectives. It is estimated that low- and middle-income countries (LMICs) will have 69 percent of global cancer deaths by 2040, with the low-income countries experiencing the largest proportional cancer increases. LMICs reported marked cancer service disruptions due to COVID-19 in 2020, with declines in testing, diagnosis, and treatment. The CGH issued an administrative supplement opportunity to study the impact of COVID-19 on global cancer prevention and control. Any knowledge gained will inform new research and health system resiliency for cancer control in the current and future pandemics.

Dr. Gopal informed the BSA that the CGH has been working over the past year to update its strategy for leading global health for the NCI, with a refreshed mission, vision, and goals. The CGH supports the NCI mission by advancing global cancer research and coordinating NCI engagement in global cancer control to reduce worldwide cancer burden through global scientific discovery and dissemination. The CGH vision is to achieve reduced worldwide cancer suffering through global scientific discovery and dissemination, with activities oriented on the core values of impact, equity, and collaboration.

The work of the CGH is centered on four main goals, to: (1) support innovative, impactful research that addresses key scientific issues in global cancer control and/or leverages unique scientific opportunities afforded by global collaboration; (2) support cancer research training that enables equitable, impactful scientific collaboration with global partners; (3) promote the integration of current scientific knowledge into global cancer control policies and practice; and (4) represent the NCI and promote its engagement with key partners in global cancer research and control.

The primary focus for CGH-led programs will be on LMICs and unrealized cancer research and cancer control opportunities. The CGH plans to organize its efforts across the broad themes of accelerating innovative, effective, and deployable technologies; accelerating global cancer implementation science; understanding and addressing global cancer health disparities; increasing support for cancer clinical trials in LMICs; and increasing understanding of cancer etiology and biology through collaboration with global investigators and populations. The CGH portfolio contains initiatives in each of these thematic areas, many of which have been reviewed and approved by the BSA.

Dr. Gopal highlighted recent research, training, dissemination, and partnership activities. One outcome of the Affordable Cancer Technologies (ACTs) Program was to accelerate portable thermocoagulator development to ablate cervical precancer. The World Health Organization (WHO) has incorporated the use of these devices into its guidelines. Preliminary data from the Household Air Pollution Intervention Network (HAPIN) multicenter study evaluating a clean cookstove intervention to reduce household air pollution exposure in pregnant women across four countries showed health-relevant reduction in fine particulate matter exposure at the trial sites located in India. The NCI is collaborating with other NIH Institutes and Centers to evaluate cancer-associated biomarkers in the HAPIN study.

For training, a new CGH D43 program on strengthening institutional capacity for conducting global cancer research was launched, and responses to the RFA were robust. The CGH anticipates announcing awards in the coming weeks, and the next application date will occur in June 2021. The CGH also supports career development awards for U.S. and LMIC ESIs in collaboration with the Fogarty International Center and shorter-term training awards.

The CGH assists in scientific dissemination of global cancer control by coordinating efforts on implementing national cancer control plans for the International Cancer Control Partnership and the International Cancer Screening Network. The CGH—along with the American Society of Clinical Oncology, American Association for Cancer Research, and Consortium of Universities for Global Health—co-hosted the 9th Annual Symposium on Global Cancer Research, which was held virtually.

In terms of partnerships, the CGH worked with the Cancer Centers to facilitate the Global Oncology Survey of NCI-Designated Cancer Centers, collaborated with the NCI CRS to initiate the International Cancer Research Partnership, provided external advice to the International Agency for Research on Cancer Medium-Term Strategy Working Group, and supported international agreement and collaboration in support of the NCI.

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

Division of Cancer Treatment and Diagnosis

Canine Cancer Immunotherapy Network (K9CIN) (New RFA)—Dr. Connie Sommers

Dr. Connie Sommers, Health Science Administrator, Immunology Branch, Division of Cancer Treatment and Diagnosis (DCTD), presented a new RFA concept to establish a network dedicated to canine cancer immunotherapy, K9CIN. Companion canines are good patients to model in translational studies for human cancers for several reasons. Spontaneous cancers in canines occur at high frequencies, and many are similar to those that arise in humans in terms of heterogeneity, course of disease, and treatment responses. The canine patient is an immunocompetent host and has a shorter lifespan and compressed disease progression timeline compared with humans. Researchers are provided the ability to test investigational new drugs (INDs) in early or minimal disease states, allowing earlier clinical trial initiations. In addition, the canine research field receives high cooperation from pet owners interested in improving care for pets and people with cancer.

Dr. Sommers reminded the BSA that the Cancer Moonshot℠–funded PRE-medical Cancer Immunotherapy Network Canine Trials (PRECINCT), established in 2017, consists of a Coordinating Center (U24) and a consortium of five veterinary medical center sites (U01s). PRECINCT, at the end of Year 3 of a 5-year funding cycle, reported the outcomes of two projects: one focused on identifying the best combination of tumor microenvironment modulators in osteosarcoma and one evaluated a combination of immune checkpoint target peptide, CD200, and tumor lysate vaccine in glioblastoma.

Data from both studies have enabled canine Phase I clinical trials in these cancers. The PRECINCT consortium also supported the development and release of a NanoString canine immune-oncology 800-gene panel (nCounter®) to harmonize immune monitoring across studies and address the limited supply of canine-specific reagents.

Despite its many accomplishments, PRECINCT does not include all cancer types, is missing combinations with other treatments (e.g., radiation), and has limited cell-based and anti-programmed cell death protein 1/ligand 1 (PD-1/L1) immune checkpoint therapies. Within the NCI portfolio, only three R-type grants (non-Cancer Moonshot℠)–funded) focusing on canine immunotherapy studies exist; the majority have similar evaluations in mouse models. This new RFA will support companion canine clinical trials in naturally occurring tumors using immunotherapeutic agents alone or combined with other modalities, with the end goal of informing cancer therapeutics in humans.

Subcommittee Review. Dr. Robert H. Vonderheide, John H. Glick MD Abramson Cancer Center's Professor, Professor of Medicine, Perelman School of Medicine, Director, Abramson Cancer Center, University of Pennsylvania, expressed the Subcommittee's enthusiasm and support for the concept, which is spurring development and a new and unique model for cancer. Dr. Vonderheide emphasized that veterinary cancer research is underdeveloped in the areas of radiotherapy and cell-based therapies and that this RFA would build on the accomplishments and successes of PRECINCT. The Subcommittee underscored the importance of developing the much-needed canine-specific reagents for immunotherapy studies, which this research will enable.

In the discussion, the following points were made:

- PRECINCT, which is funded by the Cancer Moonshot℠, will end in FY 2022. K9CIN will extend that effort, continuing to prioritize cancers common in humans and canines.

- Neither PRECINCT nor K9CIN is evaluating therapies that will become approved veterinary therapeutics, and neither is regulated by the U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine. The Networks are supporting studies of cancer agents being advanced for human use, and the research is approved by the respective Institutional Animal Care and Use Committee.

- The NCI clarified that projects originating—but not completed—in PRECINCT representing the best science and most promising therapies will be considered for funding in the new RFA, regardless of the cancer type being studied.

- Because the Cancer Moonshot℠ initiatives and projects will be ending at the close of their respective funding cycles, members recommended that the NCI develop a strategy to prioritize, categorize, and transition these projects for funding in the RPG pool.

The first year's cost is estimated at $3.42 M for five U01 awards and one U24 award, with a total cost of $17.1 M for 5 years.

Motion. A motion to approve the DCTD's new RFA entitled "Canine Cancer Immunotherapy Network (K9CIN)" was approved was approved with 22 ayes, zero nays, and 1 abstention.

Radiation Oncology–Biology Integration Network (ROBIN) (New RFA)—Drs. Jeffrey Buchsbaum and Michael Graham Espey

Dr. Jeffrey Buchsbaum, Medical Officer, Clinical Radiation Oncology Branch, DCTD, introduced a new RFA concept to support establishing the ROBIN, a joint DCTD and Division of Cancer Biology (DCB) initiative. Approximately 50 percent of all cancer patients receive radiation therapy (RT), but limited data are collected to test hypotheses on the biological basis for patient responses to this therapy. A portfolio analysis of active NCI-funded RT grants revealed a relative absence of industry and integrated NCI programs to support data collection and hypothesis testing during RT. In 2019, the NCI established a CTAC *ad hoc* Working Group on Radiation Oncology to review such gaps. This RFA aligns with the 2020 specific recommendations of this Working Group to: prioritize and support research to investigate the biological consequences of radiation treatment; support longitudinal collection of clinically annotated research biospecimens before, while in treatment, and after RT; and develop a multidisciplinary workforce to best inform clinical radiation oncology studies.

ROBIN will focus on deep multidimensional characterization trials of RT, with assessments of small study cohorts before, while on, and after (BOA) radiation treatment. The aim is to generate longitudinal molecular characterization data sets of biological responses to RT. Dr. Buchsbaum noted that small sample size (i.e., *N*) data-dense characterization studies—such as those proposed in ROBIN and demonstrated in existing NCI initiatives (e.g., Human Tumor Atlas Network [HTAN])—provide added advantages of serial sampling from the same patient volunteer, as well as nimble structure with rapid progress. Evidence has shown that molecular characterization of RT responses can be obtained from these small-sized studies (N = 4–45) and can have an impact on the standard of care in RT.

Dr. Michael Graham Espey, Chief, Radiotherapy Development Branch, DCTD, explained that the proposed network will foster interdisciplinary team science, effectively linking clinical radiation oncology with cutting-edge research aimed to characterize the biological underpinnings of RT responses. Each center will test a central hypothesis and address the priority areas outlined by the Working Group. This RFA will support establishing a molecular characterization patient cohort and conducting interdisciplinary research projects, with provisions for core services (e.g., imaging, dosimetry, training). The overall ROBIN program will consist of a network of three U54 centers, trans-ROBIN projects, a steering committee and team science subgroups, and community affiliates, internal and external to the NCI.

Subcommittee Review. Dr. Sylvia Katina Plevritis, Chair and Professor of Biomedical Data Science, Professor of Radiology, Director, Biomedical Informatics Graduate Program, Stanford University School of Medicine, expressed the Subcommittee's enthusiasm and support of the concept, which extends beyond technology development in the radiation sciences. Dr. Plevritis noted that this research, which aims to associate deep molecular profiling of clinical samples with RT responses, links a relatively available but less-used area for radiation oncology. The Subcommittee appreciated NCI staff responses to their recommendations to bring closer attention to hypothesis testing and generation in the biological basis of the radiation response, include a cross-training core and combination treatments, and to establish a data repository plan.

In the discussion, the following points were made:

- Funding for RT research remains at a low level, and revisiting this area within the NCI portfolio at a future date would be appropriate.

- Other translational committees within the National Surgical Adjuvant Breast and Bowel Project, Radiation Therapy Oncology Group (RTOG), and Gynecologic Oncology Group (collectively

known as NRG Oncology) performed similar work, of which, synergy with ROBIN and duplicative areas should be determined.

The first year's cost is estimated at $6 M for three U54 awards, with a total cost of $30 M for 5 years.

Motion. A motion to approve the DCTD's new RFA, entitled "Radiation Oncology–Biology Integration Network (ROBIN)," was approved unanimously.

Division of Cancer Prevention

CASCADE: A Global Clinical Trials Network to Improve Screening and Preventive Therapy Outcomes for Cervical Cancer among Women Living with HIV (New RFA/Coop. Agr.)— Dr. Vikrant Sahasrabuddhe

Dr. Vikrant Sahasrabuddhe, Program Director, DCP, presented a new RFA concept to establish a global clinical trials network to improve screening and preventive therapy outcomes for cervical cancer among women living with HIV, CASCADE. Two epidemics of high public health significance intersect this RFA: HIV/AIDS and cervical cancer. The clinical and public health burden of these epidemics—in terms of morbidity and mortality—remains high, especially in LMICs and U.S. regions disproportionately affected by health disparities.

HIV-related immunosuppression significantly increases the risk of the incidence and progression of HPV-related cancers, including cervical cancer. As a result of massive global mobilization of humanitarian resources over the past 2 decades, millions of people living with HIV now are accessing affordable antiretroviral therapy and are inevitably living longer lives. Despite these improvements, women with HIV remain at risk of dying due to cervical cancer in the absence of effective cervical cancer prevention services. This RFA attempts to address some of these challenges and examine the problem of the disproportionate impact of persistent racial and ethnic disparities, prominent features influencing the burden of both HIV/AIDS and cervical cancer in the United States.

Two key advances have underpinned the development of the CASCADE initiative: first, significant acceleration in key catalytic technologies and regulatory pathways, such as HPV sub-sampling, point-of-care visual/diagnostic approaches, and portable treatment devices; second, renewed momentum on bilateral and multilateral initiatives focused on cervical cancer screening and treatment globally. Two such initiatives include Go Further (an expanded U.S. President's Emergency Plan for AIDS Relief [PEPFAR] program) and the WHO's Global Cervical Cancer Elimination Initiative. The proposed CASCADE clinical trials network will leverage this momentum and seek to conduct pragmatic clinical trials evaluating the effectiveness of clinically proven interventions in intended-use settings, with a goal of optimizing the cervical cancer secondary prevention cascade for women living with HIV.

CASCADE will focus on four major areas: screening uptake, screen-positives management, precancer treatment access, and precancer treatment optimization. The clinical trials network—consisting of UG1 clinical sites, UG1 research bases, and a U24 coordinating center—will conduct six to eight multicenter clinical trials over a 5-year project period, both in LMICs and the United States. 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. Carol E. Ferrans, Harriet Werley Endowed Chair for Research, Professor, Department of Biobehavioral Health Sciences, College of Nursing, University of Illinois at Chicago, expressed the Subcommittee's strong enthusiasm and support for the concept, noting the use of pragmatic trials focusing on secondary prevention of cervical cancer in women with HIV. Dr. Ferrans pointed out

the challenges of conducting trials in low-resource areas regarding staff, resources, and data collection. The Subcommittee recommended increasing the RFA budget to ensure and facilitate high-quality data collection in low-resource settings across the country.

In the discussion, the following point was made:

- To enable generalizable outcomes from CASCADE, the pragmatic trials should evaluate the most challenging environments of the intended-use settings (e.g., LMICs), which speaks to the likely need for additional resources beyond the proposed budget.

The first year's cost is estimated at $5 M for two to three UG1 awards (research bases), six to eight UG1 awards (clinical sites), and one U24 award, with a total cost of $25 M for 5 years.

Motion. A motion to approve the DCP's new RFA/Coop. Agr. entitled "CASCADE: A Global Clinical Trials Network to Improve Screening and Preventive Therapy Outcomes for Cervical Cancer among Women Living with HIV" was approved unanimously.

NCI Cancer Prevention–Interception Targeted Agent Discovery Program (CAP-IT) (New RFA/Coop. Agr.)—Dr. Shizuko Sei

Dr. Shizuko Sei, Medical Officer, Chemopreventive Agent Development Research Group, DCP, introduced a new RFA concept for a cancer prevention–interception targeted agent discovery program (CAP-IT). In CAP-IT, primary prevention occurs before the oncogenic process begins, and interception is defined as the disruption of the oncogenic process during the preinvasive stage extending to carcinoma *in situ*. Cancer prevention strategies can be tiered to the: (1) general population to avoid or reduce modifiable cancer risks, (2) high-risk cohorts with tailored approaches, or (3) cancer patients with efficacious therapeutics. Because high-risk cohorts can be composed of individuals with heritable cancer syndromes with or without precancer to individuals exposed to carcinogens with no heritable cancers to individuals with precancer, a cancer prevention–interception strategy is needed. The most common treatment modality for high-risk cohorts is surgery based, and very few are tailored.

The CAP-IT Program, a precision cancer prevention initiative, will build a streamlined, targeted agent discovery pipeline specifically focused on high-risk groups. The objectives will be to validate targets for interventions using existing molecular databases and discover new cancer prevention–interception agents, addressing a major discovery roadblock and NCI programmatic gap. CAP-IT will leverage (not duplicate) existing NCI programs, such as the PREVENT Cancer Preclinical Drug Development Program (PREVENT) or NCI Experimental Therapeutics (NExT).

This RFA will support multi-principal investigator–led integrated and streamlined projects focusing on specific cancer sites; three to four specialized centers (U54) containing target validation/agent discovery and efficacy testing units; and a data resource coordination center. Dr. Sei explained that per the portfolio analysis, none of the existing premalignant genome-based projects focus on all elements of the CAP-IT research objectives, from molecular or immune target validation to the discovery of potentially efficacious agents for cancer prevention–interception.

Subcommittee Review. Dr. Karen E. Knudsen, Executive Vice President, Oncology Services, Jefferson Health, Enterprise Director, NCI-Designated Sidney Kimmel Cancer Center at Jefferson, Chair and Hilary Koprowski Endowed Professor, Department of Cancer Biology, Thomas Jefferson University, expressed the Subcommittee's high enthusiasm and support for the concept, which would establish a creative and innovative precision cancer prevention program at the NCI. The Subcommittee appreciated the NCI staff responses to its suggestions to refine the RFA to allow flexibility for project entry points in

the discovery pipeline and provide mechanisms for non-CAP-IT investigators to participate in the research.

In the discussion, the following point was made:

- Because diagnostic markers also can serve as therapeutic targets, the program staff clarified that CAP-IT will coordinate efforts with the DCP Early Detection Research Network (EDRN) to prioritize biomarkers useful for prevention–interception studies.

The first year's cost is estimated at $6.5 M for three to four U54 awards and one U24 award, and $ 0.5 M for administrative supplements in Years 2–4, with a total cost of $34 M for 5 years.

Motion. A motion to approve the DCP's new RFA/Coop. Agr. entitled "NCI Cancer Prevention–Interception Targeted Agent Discovery Program (CAP-IT)" was approved unanimously.

Office of the Director

Clinician Scientist Research Award (CSRA) (New PAR)—Dr. James H. Doroshow

Dr. James H. Doroshow, Deputy Director for Clinical and Translational Research, and Director, DCTD, presented a PAR concept for establishing an R50 clinician scientist research award, a joint Office of Cancer Centers and Coordinating Center for Clinical Trials initiative. Dr. Doroshow explained that clinical investigators at academic institutions perform activities critical to the success of NCI clinical trials, such as accruing patients, developing national trials, and providing leadership for the clinical trials infrastructure within institutions. The clinical duties and requirements to generate clinical revenue challenge clinician investigators to dedicate the necessary time to clinical research. Encouraging a career path in academia with stable funding is key to retaining clinician scientists.

The NCI is proposing an R50 Clinician Scientist Research Award (CSRA) to provide a career path and stable salary support for exceptional clinician scientists to focus on designing and conducting NCI-funded clinical trials. The CSRA is not an independent research funding (i.e., R01) mechanism. A portfolio analysis showed no mechanisms offered by the NCI that provide a clinical career path with sustained salary support for clinician scientists. Related funding mechanisms—including the Cancer Clinical Investigator Team Leadership Award (CCITLA), P30 developmental funds, and K08 and K12 awards—provide limited support for early-stage (e.g., assistant professor) clinical investigators. The Research Specialist R50 award mechanisms are designed for laboratory or core-based scientists. Since 2009, the NCI has funded 132 CCITLAs, and 96 percent of recipients have remained in academic clinical research positions. Although a successful program, the CCITLAs provide limited support (15 percent effort), focus on mid-level clinical investigators (e.g., associate professors) solely at Cancer Centers, are 2-year administrative supplements to P30 grants, and are non-renewable.

This R50 CSRA will support clinician scientists with a clinical degree who are licensed and actively practicing in an oncology clinical setting; and individuals with a Ph.D. or other doctoral degree in clinical disciplines with direct patient contact, such as clinical psychology, nursing, clinical genetics, speech-language pathology, audiology, or rehabilitation. The CSRA is renewable and will fund 20 to 40 percent of effort, with a maximum NCI upper limit of 50 percent. The applicant (mid-to-senior-level) must conduct NCI-funded cancer clinical trials at an academic medical center and have a track record of involvement in cancer clinical trial–related activities. Any academic institution that conducts significant NCI-funded clinical trial activity is eligible to nominate applicants.

Subcommittee Review. 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, expressed the Subcommittee's strong support for the concept, noting the success of similar NCI R50 award mechanisms. Dr. Shannon conveyed the Subcommittee's interest in the CCT's establishing, at a future training review or update, a partner R51 minority clinician scientist award exclusively for clinical investigators from underrepresented minority groups. This award could model the Predoctoral Dual-Degree Training (F30) Program or Predoctoral Fellowships to Promote Diversity in Health-Related Research (F31) programs. Regarding application requirements, the Subcommittee encouraged the NCI to restrict multi-institution-led Cancer Centers to one applicant per receipt date.

In the discussion, the following points were made:

- Regarding institutional accountability in nominating applicants for the CSRA, no financial obligation is involved.

- Institutions are compensated appropriately for assisting with industry-sponsored clinical trials, but clinical investigators primarily pursuing these types of trials will not be eligible for the NCI R50 CSRA.

- Any clinical activity performed by qualified applicants and related to an NCI-sponsored trial involving direct patient contact is eligible, including community-based cancer control efforts.

- Because the requirement of 40 percent effort self-determines the pool of candidates as those at mid-level career or above, who likely have established NCI clinical trial portfolios, the CCITLA program will shift to support very early–stage clinical investigators.

- Specialized Programs of Research Excellence (SPORE)–led clinical trials, as well as philanthropic-supported/Cancer Center-led trials, are applicable.

The first year's cost is estimated at $3 M for 26 R50 awards, with a total cost of $15 M for 5 years.

Motion. A motion to approve the Office of Director's (OD) new PAR entitled "Clinician Scientist Research Award (CSRA)" was approved unanimously.

VI. ADJOURNMENT—DR. DAFNA BAR-SAGI

Dr. Bar Sagi adjourned Day 1 of the 5th BSA meeting.

TUESDAY, 16 MARCH 2021

VII. CALL TO ORDER AND OPENING REMARKS—DR. DAFNA BAR-SAGI

Dr. Dafna Bar-Sagi called to order Day 2 of the 5th virtual meeting of the BSA and welcomed members of the Board, NCI staff, and guests.

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

Division of Cancer Prevention

Early Detection Research Network (EDRN) (Re-Issue RFA/Coop. Agr.)— Dr. Philip E. Castle

Dr. Philip E. Castle, Director, DCP, presented a re-issue RFA for the EDRN. Established in 2000, the EDRN is the NCI's core program on biomarker discovery/early validation for screening and early detection of cancer. The overall objective is to support investigator-initiated research for the development and validation of biomarkers for early detection and progression. Dr. Castle reviewed the EDRN's organizational and operational structure. The Network maintains biomarker reference and development laboratories, clinical validation centers, and a data management and coordinating center. In this next phase, the biomarker reference and developmental laboratories will merge to form the biomarker characterization laboratory, enabling better integration. Steering and executive committees oversee operations and are informed by the Network Consulting Team. The Network supports four organ-specific collaborative research groups, interacts with several collaborators and partners in the pharmaceutical industry and the federal government, and has more than 350 associate members.

Regarding milestones and return on investment, an external review conducted by the Network Consulting Team recommended continuation of the program, citing that the progress and productivity of this program has been substantial. The BSA Subcommittee concurred with the external reviewer's report, and the reviewers' recommendations were incorporated into program modifications. To date, EDRN investigators have developed 8 FDA-approved tests (3 in this funding cycle) and 19 Clinical Laboratory Improvement Amendments (CLIA)-certified protocols (9 in this funding cycle) and have expanded the Clinical Reference Samples to include colon, pancreas, prostate, and uterine lavage. EDRN grants outperformed a comparable number of R01 grants that focused on biomarkers for early cancer detection in terms of patents (32 versus 1), CLIA-approved protocols/tests (19 versus 0), and publications (2,169 versus 1,149).

Dr. Castle informed the BSA that 12 EDRN-developed diagnostic tests are being used and reimbursed by the Centers for Medicare and Medicaid Services (CMS). He highlighted clinical applications of some of the EDRN efforts. Two assays—OVA1/OVERA and risk of ovarian malignancy (ROMA), for determining risk of ovarian malignancy in women with an adnexal pelvic mass who have been scheduled for surgery—have been FDA-approved and are commercially available. The multiplex-prostate score urine test (MiPS) has assisted in evaluating prostate cancer risk and disease aggressiveness. MiPS has averted 27 percent of unnecessary biopsies within the more than 1,600 tests performed. In addition, EDRN-supported transformative research has had significant impact on clinical practice. Investigator-reported findings have informed American Cancer Society guidelines on early-age screening for colon cancer. Blood-based biomarkers developed in the Network are being used to screen for colorectal cancer, with sensitivity and specificity comparable to the fecal immunochemical test. Innovative approaches combining LDCT with biomarkers improve risk stratification of patients for lung cancer screening. EDRN investigators helped to initiate liquid biopsy testing and contributed to identifying biomarkers for detecting circular RNAs in body fluids.

BSA members were reminded that the EDRN is a highly collaborative community. Investigators funded through other mechanisms (e.g., R01s, SPOREs, and Department of Defense Lung Cancer Research Program) participate in the Network. Non-EDRN investigators and industry partners pre-validate/validate their biomarkers in conjunction with EDRN Associate Membership Program. The Network has provided biospecimens and reference sets to more than 75 non-EDRN investigators. Technologies and data analytics/informatics resources are shared with the broader research community. Twenty-two of 26 funded grantees work in major comprehensive Cancer Centers, and an application to establish the EDRN as an FDA Collaborative Community is pending. Last, EDRN methodologies, guidelines, and novel approaches have contributed to several non-diagnostic devices with broad applications.

In this next phase, the EDRN priorities will be to work closely with the HTAN Pre-Cancer Atlas Centers to identify molecular targets, neoepitopes, neoantigens and other molecular and cellular features of the evolving precancerous lesions. This re-issuance will continue the efforts of the EDRN, aligning with the recommendations of the Network Consulting Team on data science and artificial intelligence, integration, inclusion and diversity, and training. This RFA and budget increase will support additional clinical utility studies, more junior investigators, increased data analytics and modeling, expanded research on radiomics and image analysis, and increased accrual of underrepresented populations in clinical trials.

Subcommittee Review. Dr. Leslie L. Robison, Chairman, Department of Epidemiology and Cancer Control, St. Jude Children's Research Hospital, Associate Director, St. Jude Comprehensive Cancer Center, expressed the Subcommittee's support for the re-issue concept. Dr. Robison remarked on the 20-year accomplishments of the EDRN and significant return on NCI investments regarding FDA approvals, patents, CLIA-certified tests, and most important, clinical impact. Dr. Robison called attention to the value added because of the EDRN and emphasized that the work of this Network is not being performed elsewhere and would create a major gap if discontinued. The Subcommittee commended NCI staff on the external review and for the in-depth report of the EDRN Network Consulting Team.

In the discussion, the following points were made:

- Members lauded the EDRN leaders for prioritizing biomarker development and validation in populations of diverse race/ethnicity, particularly in lung cancer.

- The majority of the EDRN budget over the life of the program has supported the laboratories and validation centers, and it could be of value for the NCI to review the associated personnel research cost to inform future programs.

The first year's cost is estimated at $27.2 M and $37.5 M for Years 2–5 for 12 Clinical Validation Centers, 18 Biomarker Characterization Laboratories, and 1 Data Management and Coordinating Center, with a total cost of $177.2 M for 5 years.

Motion. A motion to concur on the re-issuance of the DCP's RFA/Coop. Agr. entitled "Early Detection Research Network (EDRN)" was approved with 21 ayes, zero nays, and 3 abstentions.

Division of Cancer Treatment and Diagnosis

Acquired Resistance to Therapy Network (ARTNet) (Re-Issue RFA/Coop. Agr.)—Dr. S. Percy Ivy

Dr. S. Percy Ivy, Associate Branch Chief, Investigational Drug Branch, DCTD, presented a re-issue RFA for the Cancer Moonshot^{SM} Drug Resistance and Sensitivity Network (DRSN), noting the name change to the Acquired Resistance to Therapy Network (ARTNet) to reflect program modifications. Research has shown that acquired resistance is a major cause of treatment failure, and understanding its cause—the

biology of tumor adaptation—and disease recurrence requires urgent attention. Focused, coordinated, and iterative investigations from preclinical models and clinical perspectives are necessary to better understand acquired drug resistance. The goal is to bridge the gap between basic and clinical translational research to overcome drug resistance and improve sensitivity to treatment.

In 2017, the NCI established the DRSN; in its original concept, the Network comprised five U54 centers to address the programmatic need to provide a better integrated basic–preclinical research program focused on developing evidence to inform strategies to overcoming drug resistance. The aim was to minimize silos and accelerate clinical research of drug combinations. Since its inception, the DRSN has reported findings in 134 publications, with 5,161 citations; issued 12 administrative supplements; initiated 2 revision projects; initiated 25 clinical trials evaluating new IND agents, including 2 agents from the NCI Cancer Therapy Evaluation Program (CTEP); and added a U24 coordination center. Dr. Ivy explained that non-DRSN investigators can collaborate via the supplement and revision program and noted that their work contributed to the efforts of this Network.

A 2020 mid-cycle external review and evaluation of the DRSN identified areas needing optimization, including emphasis on drug testing at the individual sites, increased hypothesis testing, further evaluation before clinical trials, and increased network functionality. The recommendations were to improve the range of existing treatments, prioritize the focus on acquiring resistance, and connect basic and translational research through hypothesis-testing approaches. A portfolio analysis of therapy resistance awards revealed no jointly held programs connecting and integrating across the basic–preclinical–clinical spectrum, a paucity of research focused on acquired resistance and disease recurrence, and limited studies incorporating the cellular constituents and complexities of the tumor microenvironment (TME) relative to the cancer cell autonomous processes.

The proposed ARTNet will expand the original DRSN, focus on acquired resistance/sensitivity and modeling cancer recurrence, incorporate a wider range of treatment modalities, and establish an iterative bridge between basic–mechanistic, preclinical, and clinical–translational science. This one-time re-issuance will support four to five U54 research programs conducting three or more projects, as well as one U24 coordinating and data management center.

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 re-issuance concept, which addresses a major clinical problem and barrier to effective therapy. Dr. Le Beau conveyed the Subcommittee's perspective that this concept is timely to capitalize on the opportunities and techniques available for an integrative bi-directional approach to basic, preclinical, clinical, translational components, all leveraging the lessons learned with the DRSN. The Subcommittee commended the NCI on the success of the DRSN, especially its productivity and accomplishments in its 3 years of operation. The Subcommittee also appreciated the NCI's approach to dedicating 15 percent of the RFA budget to incentivize trans-DRSN collaborations.

In the discussion, the following point was made:

- Acquired resistance is a robust line of investigation in cancer research, and ARTNet is poised to address in its unique design to connect the basic–preclinical–clinical to the translational component (i.e., clinical trials) of drug therapy resistance. This approach fills a gap in clinical research not represented in existing NCI-funded R01 grants.

The first year's cost is estimated at $7.6 M for four to five U54 awards and one U24 award, with a total cost of $38 M for 5 years.

Motion. A motion to concur on the re-issuance of the DCTD's RFA/Coop. Agr. entitled "Acquired Resistance to Therapy Network (ARTNet)" was approved with 22 ayes, zero nays, and 2 abstentions.

Pancreatic Ductal Adenocarcinoma (PDAC) Stromal Reprogramming Consortium (PSRC) (New RFA)—Dr. Peter Ujhazy

Dr. Peter Ujhazy, Deputy Associate Director, Translational Program, DCTD, presented a new RFA concept for establishing a PDAC consortium focusing on stromal reprogramming, PSRC. Dr. Ujhazy pointed out the clinical and biological challenges of treating PDAC. These include ineffective standard of care for advanced PDAC and the despairing 5 percent survival rate of patients, with modest improvements with combined 5-fluorouracil, leucovorin, irinotecan, and oxaliplatin (FOLFIRINOX), and limited effectiveness of other FDA-approved drugs (e.g., Olaparib or Sunitinib). In addition, recent attempts to enhance drug delivery and modulate the vascular and immune microenvironment have resulted in only partial clinical successes. The ongoing disconnect between basic and translational research have precluded comprehensive mechanistic characterization of stromal targets. Biological studies investigating the role of stroma as a co-organizer of tumor fate are limited.

This proposed PRSC will extend the Cancer Moonshot^{SM}–funded Pancreatic Cancer Microenvironment Network (PaCMEN), which is scheduled to end in FY 2022. This Network is composed of five U01 projects and one U24 resource center; has reported data in 74 publications, with more than 600 citations; has attracted more than 20 additional investigators from 12 U.S. institutions as associate members; and has initiated several bilateral and trilateral collaborative projects. In terms of PaCMEN's translational achievements, Dr. Ujhazy highlighted that the Losartan studies have informed clinical testing in two trials yielding promising results and that neoantigen vaccine studies led to a Phase I clinical trial currently accruing patients.

The overarching objectives of the PRSC will be to develop a community of PDAC researchers focusing on nontraditional TME elements driving PDAC progression and therapy response and adopting a comprehensive TME-co-organizer research model in pursuing novel biology-backed targets that disrupt multidimensional tumor-sustaining dynamics. The NCI anticipates this research will inform the design and testing of more effective combinatorial approaches in preclinical platforms and future clinical trials. The PRSC also will address understudied and underdeveloped areas, such as the influence of cancer-associated fibroblasts; the role of PDAC non-immune stromal dynamics; and the influence of the PDAC microbiome. An NCI portfolio analysis revealed no overlapping funded projects focused on stromal reprogramming. This RFA will support six U01 research programs focusing on integrated basic and translational research areas and one U24 coordinating and data management center.

Subcommittee Review. BSA Chair, Dr. Bar-Sagi expressed the Subcommittee's support for the concept, which addresses scientific topics central to understanding PDAC stromal biology. Dr. Bar-Sagi remarked on access to facilities and the necessary capabilities as rate-limiting in conducting these studies, emphasizing that the U24 mechanism may be the best model to provide centralized services. The Subcommittee commended the co-organizer research model of studying the TME and the focus on new areas of investigation.

In the discussion, the following point was made:

- The intent of the PRSC is not to compartmentalize the immune response from the TME but to begin with the stromal cells as a focal point.

The first year's cost is estimated at $6.93 M for six U01 awards and one U24 award, with a total cost of $34.65 M for 5 years.

Motion. A motion to approve the DCTD's new RFA entitled "Pancreatic Ductal Adenocarcinoma (PDAC) Stromal Reprogramming Consortium (PSRC)" was approved unanimously.

Research Projects for Molecular Imaging Inflammation in Cancer (MIIC) (New PAR)— Dr. Janet Eary

Dr. Janet Eary, Associate Director, Cancer Imaging Program, DCTD, presented a new PAR concept on research projects for imaging inflammation in cancer. Dr. Eary explained that this concept originated from discussions from the 2017 and 2019 trans-NIH workshops on chronic inflammation, in which participants highlighted needs common to many diseases, including cancer (e.g., fast-imaging tools, imaging approaches for clinical decisions). Research studies have demonstrated that inflammation plays a role in cancer behavior and treatment outcomes, but the cellular physiology of cancer inflammation is poorly understood. Research also has shown that cancer inflammation is dynamic and heterogeneous, suggesting that molecular *in vivo* imaging can quantitate cancer inflammation dynamics and heterogeneity noninvasively. A portfolio analysis revealed limited grants on *in vivo* imaging of inflammation in the NCI and across the NIH.

The NCI recognizes that developing molecular imaging capabilities will require robust collaboration between cancer biologists to identify new and existing inflammation targets as well as imaging scientists to synthesize the imaging agents and validate imaging approaches. In addition, existing, promising molecular imaging probes developed for preclinical *in vivo* imaging studies in non-cancer applications can be further evaluated in cancer. Examples of *in vivo* molecular imaging in cancer in the mouse model include magnetic resonance imaging (MRI) of cellular oxygenation and metabolites in prostate cancer, near-infrared resonance (NIR) imaging of apoptosis in prostate tumors, and single-photon emission computed tomography (SPECT)/computed tomography (CT) of cytokine activity.

This PAR will support 5-year R01 research projects for MIIC applying noninvasive, repeatable, fast, quantitative, specific, sensitive, and high-spatial resolution techniques and robust image and data analysis. The dynamic measurements should be able to capture inflammatory cellular physiology signatures, interactions and spatial information, and studies of inflammatory pathways. This PAR will focus on cancers with known inflammatory association of non-viral origin, such as breast, colon, pancreatic, prostate, and urinary bladder. The approaches should be hypothesis driven, with definitive agreement and collaboration between the cancer biologist and imaging scientist.

Subcommittee Review. Dr. Plevritis expressed the Subcommittee's enthusiasm and support for the concept, which is addressing an important gap, MIIC. The Subcommittee recommended that the role of the cancer biologist be defined explicitly in the PAR regarding hypothesis-generating research and that the tumor types being studied be expanded to others (within scope) identified by the principal investigators.

In the discussion, the following points were made:

- Because the process of inflammation is centered on immunology, the NCI anticipates that cancer biologists will collaborate with immunologists and immuno-cancer biologists to develop MIIC research projects. The concept imposes no restriction on collaborations, and language can be refined to include other relevant disciplines and expertise.

- Members encouraged emphasizing the use of newer technologies of three-dimensional (3D) imaging of cellular reconstruction, such as matrix-assisted laser desorption/ionization (MALDI) time-of-flight (TOF) imaging mass spectrometry.

There was no associated budget with this concept.

Motion. A motion to approve the DCTD's new PAR entitled "Research Projects for Molecular Imaging Inflammation in Cancer (MIIC)" was approved unanimously.

IX. BRIEF UPDATE FROM CANCER TRAINING BRANCH, CENTER CANCER TRAINING—DR. OLIVER BOGLER

Dr. Sharpless explained that in response to the BSA's questions about the NCI training grants, the agenda has been modified and Dr. Oliver Bogler, Director, Center for Cancer Training (CCT), was invited to present a brief update on this topic.

Dr. Bogler reported on the K08 and Institutional Training Grant (T32) portfolios, noting the 5-year averages from FY 2016 to FY 2020. The NCI currently has 185 active K08 awards, totaling $38.8 M annually. On average, 104 K08 applications were received per year, 36 of which were funded, equating to a success rate of 35 percent. The K08 success rates were highest in FY 2020, with 65 of 172 applications being funded. The current T32 portfolio consists of 190 active awards, with an annual commitment of $67.2 M. On average, 68 T32 applications are received annually and 36 funded (a 53 percent success rate). Dr. Bogler remarked that the success rate of the NCI funding mechanisms for training, including the Individual Research Fellowships (F awards) overall remains robust. He noted that these data are public and can be accessed from the NIH website.

Recent CCT highlights include launch of the NCI Awardee Skills Development Consortium (NASDC): Research Education Short Courses (UE5) and rejoining the NIH Mentored Quantitative Research Career Development Award (K25) program. regarding modifications to mechanisms, the CCT removed the T32 postdoctoral/predoctoral 3:1 ratio requirement and enhanced the K12 mentor and scholar community with support for an annual meeting.

In the discussion, the following points were made:

- Members expressed appreciation to the NCI for the CCT update and timely response to their questions.

- Given the challenge of retaining clinician scientists in academic medicine, it would be strategic to revisit the criteria for the K08 awards and/or similar mechanisms.

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

Division of Cancer Biology

Epstein Barr Virus (EBV) and non-Hodgkin's Lymphoma (NHL) (New PAR)— Dr. Elizabeth Read-Connole

Dr. Elizabeth Read-Connole, Head, Etiology Section, Cancer Immunology, Hematology, and Etiology Branch, DCB, presented a new PAR concept on EBV and NHL research that was developed in collaboration with the NCI Office of HIV and AIDS Malignancy (OHAM). Dr. Read-Connole pointed out that the characteristics of NHL and Hodgkin's disease differ in the population testing positive for HIV (i.e., HIV+) with EBV co-infection (i.e., EBV+), compared with the population testing negative for HIV (i.e., HIV−), with EBV+.

For NHL, EBV+, and HIV+ populations, aggressive B-cell lymphomas are AIDS-defining cancers when they occur in persons in this group; 40 percent of EBV+ U.S. NHL cases develop in this population. The most prevalent EBV+ NHL types are diffuse large B-cell lymphoma, Burkitt lymphoma, and central nervous system NHL. Despite treatment, people with HIV remain at an elevated risk for developing EBV+ NHL. Conversely, in the HIV− population, approximately 50 percent of NHL are T-cell and 13 percent of NHL B cell lymphomas are EBV+. In addition, the age of onset is higher, ranging from 64–74 years. In the Hodgkin's disease EBV+ and HIV+ population, the cellularity is mixed, and unique features of the TME are observed. Last, EBV+ differs in Hodgkin disease/ EBV+ HIV− population, with more frequent B-cell symptoms and a different age of onset.

The purpose of this PAR is to focus on the role of EBV infection on NHL and development with or without an underlying HIV infection and AIDS and provide insights into mechanistic differences of EBV infection and lymphomagenesis between persons who are HIV+ and HIV−. Potential research questions and studies that this PAR will address for NHL and EBV in HIV+ and/or HIV− individuals should reflect this purpose. This concept has been endorsed by the BSA *ad hoc* Working Group on HIV and AIDS Malignancy. Dr. Read-Connole noted that an NCI portfolio analysis of related awards in FY 2020 to current showed 24 funded grants evaluating EBV alone, and an extended analysis across the NIH revealed three grants partially investigating NHL and EBV. The NCI anticipates awarding three to four 5-year R01 grants and three to four 2-year R21 grants per funding cycle. The NIH OAR has approved cost-sharing in support of this research.

Subcommittee Review. Dr. Kenneth C. Anderson, Kraft Family Professor of Medicine, Harvard Medical School, Director, Jerome Lipper Multiple Myeloma Center, Dana–Farber Cancer Institute, expressed the Subcommittee's enthusiasm and support for the concept. The Subcommittee also appreciated the NCI's responses to its questions on the portfolio analysis and grants being supported.

The first year's cost is estimated at $2 M, with a total cost of $18 M for 5 years.

Motion. A motion to approve the DCB's new PAR entitled "Epstein-Barr Virus (EBV) and non-Hodgkin's Lymphoma (NHL)" was approved unanimously.

NCI Cancer Systems Biology Consortium (CSBC) (Re-issue RFA/Coop. Agr./Limited Competition)—Dr. Shannon Hughes

Dr. Shannon Hughes, Program Director, DCB, presented a re-issue RFA for the CSBC. Established in 2016, the CSBC supports investigator-initiated basic cancer biology research using a systems biology approach. The CSBC defines systems biology as integrating experimental biology and computational/mathematical modeling to build predictive models that can be tested in cancer-relevant contexts. The consortium consists of 13 U54 research centers, 1 U24 coordinating center shared with the NCI Physical Sciences in Oncology Network (PS–ON), and 23 U01 research projects. The U01 grants now are supported through PAR-19-287, and their reissuance is not requested in this RFA. A CSBC Steering Committee composed of principal investigators of the awarded grants provides oversight; the consortium hosts an annual meeting and focuses on outreach.

Dr. Hughes reminded the BSA members of the CSBC main goals and highlighted accomplishments and achievements. During this funding cycle (FY 2017 to FY 2021), CSBC investigators produced nearly 500 publications on therapy response and resistance and tumor heterogeneity and evolution themes, encompassing single-cell studies and methods, tumor–TME interactions, and experimental computational tools. New investigators interfaced with the consortium through workshops. CSBC and PS–ON resources and tools that were generated continued to be widely shared via the Cancer Complexity Knowledge Portal and can be accessed here. Eighty-six postgraduate trainees advanced from their CSBC positions, and the

majority remain within academia; 25 are new assistant professors, of whom 21 are participating in cancer systems biology research.

In a 2020 midterm evaluation of the program, an external expert panel indicated that the CSBC fosters a productive research community producing high-impact publications, tools, and resources that otherwise would not have been generated and also is generating a stable research community. The external reviewers recommended: (1) creating relationships between CSBC investigators and clinicians; (2) validating computational model predictions in systems relevant to human health; (3) increasing opportunities for focused cross-consortium collaborations; (4) requiring that CSBC investigators and the coordinating center share Findable, Accessible, Interoperable, and Reusable (FAIR) data sets and tools with the cancer research community; and (5) expanding outreach efforts to foster growth in the field and engage cancer biologists and clinicians. These recommendations have informed modifications to the CSBC program.

This re-issuance will support continuing the U54 research centers; the internal pilot project program, with added focus on projects that increase the diversity of the research teams; and a proposed cross-consortium pilot project fund. This RFA also will support expanding the CSBC U24 data coordinating center to manage three additional DCB programs: Metastasis Research Network (MetNet), Cancer Tissue Engineering Collaborative (TEC), and Cancer Cell Biology Imaging Research (CCBIR). The new coordinating center will be a three-hub-and-spoke model focusing on resources, collaborations, and outreach to facilitate data deposits into the NCI Cancer Research Data Commons. Regarding the influence on the NCI portfolio, 2,163 grant applications have cited CSBC research during this funding cycle, and collaborative projects have resulted in substantial NIH funding (e.g., R01, R21, U01).

Subcommittee Review. 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 of Healthcare Data; Associate Director, Hillman Cancer Institute; Associate Director, Clinical and Translational Science Institute, University of Pittsburgh School of Medicine, expressed the Subcommittee's support for the re-issue concept. The Subcommittee commended the success of the CSBC and encouraged aggressive sharing of tools and knowledge as well as increased attention to outreach. The Subcommittee also appreciated the NCI's responses to its recommendation to solicit U24 applications in an open competition to encourage innovation in all aspects.

In the discussion, the following points were made:

- The added value of the CSBC extends beyond the technologies developed and broadly applied within the research community to knowledge processes that can be scaled across the NCI.

- Aligning with the NIH's statements on structural racism and the UNITE initiative, Members encouraged guarding against exclusivity in the CSBC and similar NCI-established consortia.

The first year's cost is estimated at $14.85 M 8 to 10 U54 awards and 1 U24 award, with a total cost of $136.125 for 5 years.

Motion. A motion to concur on the re-issuance of the DCB's RFA/Coop. Agr./Limited Competition entitled "NCI Cancer Systems Biology Consortium (CSBC)" was approved with 20 ayes, zero nays, and 3 abstentions.

Office of the Director

Small Business Innovation Research (SBIR) Contract Topics (New RFP)—Ms. Deepa Narayanan

Ms. Deepa Narayanan, Program Director and Team Leader, SBIR Development Center, presented 16 SBIR research and development (R&D) contract topics for funding in FY 2022. SBIR and Small Business Technology Transfer (STTR) programs are congressionally mandated and support commercial research by small businesses. In FY 2020, the NCI allocated 14 percent of the SBIR/STTR $150 M budget to R&D contracts. The aim is to address specific cancer community needs, stimulate commercialization in emerging areas, streamline product development, and support technology transfer from NIH laboratories to industry.

Ms. Narayanan explained that the NCI topics are developed once per calendar year to include in the NIH-wide SBIR contract RFPs. The topics reflect NCI priority areas, including Cancer Moonshot^{SM} topics, areas with commercial potential, and portfolio gaps. In FY 2021, topics also were submitted by the FDA Center for Devices and Radiological Health (CDRH). Two NCI technology advisory groups vetted the concepts for significance, innovation, and commercial potential and recommended 16 topics for publication. These fall into the areas of therapeutics, medical devices, diagnostics, information technology, and manufacturing technologies. Ms. Narayanan also highlighted that seven topics are aligned with the Cancer Moonshot^{SM} initiative and crosscutting themes. The SBIR Development Center staff assisted topic authors with concept development and commercialization analysis. Ms. Narayanan summarized the 16 topics and overall goals, noting that detailed reports have been provided in the electronic Board book.

Therapeutics Topics

Development of Senotherapeutic Agents for Cancer Treatment. Support the basic and preclinical development of senotherapeutic agents for research, neoadjuvant, adjuvant, or combination cancer therapy.

Cancer Treatment Technologies for Low-Resource Settings. Develop or adapt, apply, and validate existing or emerging technologies appropriate for cancer treatment in low-resource settings.

Synthetic Biology Gene Circuits for Cancer Therapy. Stimulate the development of gene circuit therapies for cancer; this is a re-issue topic.

Medical Devices Topics

Developing Unbiased Medical Technologies to Reduce Disparities in Cancer Outcomes. Advance the development of innovative, unbiased medical technologies to reduce disparities in cancer outcomes.

Ultra-Fast Dose Rate (FLASH) Radiation Detectors and Safety Systems. Advance the development or application of devices to allow FLASH radiation therapy to be properly evaluated and ultimately translated into the clinic.

Devices to Treat Secondary Lymphedema Following Cancer Treatment. Support the development of technologies that prevent, reduce, or eliminate lymphedema following removal or radiation of lymph nodes due to cancer in the upper body (e.g., neck, chest, arm, or thoracic cavity).

Clinical Diagnostics and Molecular Analysis Topics

New Technologies to Analyze Extra-Chromosomal (ec)DNA in Cancer. Develop new approaches or modify existing approaches to understand ecDNA and its role in cancer. In particular, develop new tools to analyze ecDNA sequence, structure, and regulation.

3D Spatial Omics for Molecular and Cellular Tumor Atlas Construction. Advance the development and dissemination of imaging workflows capable of omics-level measurements in thick tissue resections or whole biopsy cores; this is a re-issue topic.

Understanding Cancer Tumor Genomic Results: Technology Applications for Community Providers. Design and develop tools, technologies, or products to help oncology providers and their patients with latest next-generation sequencing (NGS) knowledge.

Advanced Sample Processing Platforms for Downstream Single-Cell Multi-Omic Analysis. Integrate the preanalytical workflow from tumor cell dissociation/isolation, enrichment, tracking, cell lysis, to biomolecular isolation on a single platform to enable single-cell multimodal-omic analysis.

Cancer Prevention and Diagnosis Technologies for Low-Resource Settings. Develop or adapt, apply, and validate existing or emerging technologies appropriate for cancer prevention and/or diagnosis in low-resource settings.

At-Home Screening for Hepatitis C Virus (HCV). Develop and validate a rapid sample-to-answer point-of-contact test for HCV exposure or active infection that can be used at home with noninvasive specimens that can be collected at home and that achieves the same analytic performance as predicate tests.

Quantitative Biomarkers as Medical Device Development Tools for Cancer. Stimulate the participation of small businesses in the FDA's Medical Device Development Tools (MDDT) Program to develop quantitative biomarker tests.

Information Technology and Bioinformatics Topics

Development of Computer-Aided Diagnosis Tools for Upper and Lower Gastrointestinal Tract Cancer Prevention. Advance the development and application of artificial intelligence–based algorithms to improve the visual human-based determination of precancerous lesions examined through visual inspection of upper and lower endoscopies.

Evaluation Data Sets as Medical Device Development Tools for Testing Cancer Technologies. Stimulate the participation of small businesses in the FDA's MDDT program to develop and demonstrate the utility of qualified data sets as MDDTs to assess medical devices subject to regulation by CDRH.

Manufacturing Technologies Topic

Advanced Manufacturing to Speed Availability of Emerging Autologous Cell-Based Therapies. Stimulate the development of advanced manufacturing technologies that substantially improve the speed and cost of producing autologous cell-based therapies; this is a re-issue topic.

SBIR R&D Contracts: Impact and Success Stories

Ms. Narayanan highlighted success stories resulting from previous and existing SBIR R&D contracts. CivaTech Oncology, Inc., was awarded an SBIR contract in FY 2010 in response to the NIH/NCI topic to

develop innovative devices protect radiosensitive organs and structures during RT. The company later was awarded two SBIR Phase 2 grants to develop and validate CivaSheet®, a customizable, implantable, unidirectional brachytherapy device/sheet. This device is FDA approved, commercially available, and being used in clinics to treat lung, pancreas, colorectal, sarcoma, and head and neck cancers. Medable, Inc., was awarded an SBIR contract in FY 2018 in response to the NIH/NCI topic to develop digital platforms for connecting cancer caregivers and care teams. The company developed a digital decentralized clinical trial platform for global clinical trials. In November 2020, Medable announced $91 M in new funding from investors to accelerate its platform, signifying industry's interest in digital and decentralized clinical trials.

BSA members were reminded that the SBIR Development Center performed a systematic analysis of the NCI SBIR grant funding from FYs 1998 to 2010, which was reported in the 2018 NCI SBIR Impact Study. In that period, the NCI awarded 690 Phase II SBIR/STTR grants to 444 companies, totaling $787 M. The NCI investments resulted in $9.1 B in sales with SBIR/STTR-funded technologies, generated 107,918 new U.S. jobs and $2.93 B in tax revenue, and added $26.1 B to the U.S. economy.

Subcommittee Review. Dr. Martine F. (Sherr) Roussel, St. Jude Children's Research 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, expressed the Subcommittee's enthusiasm and support for the concept. The Subcommittee lauded the NCI on the rigorous vetting process and timeliness and innovation of the topics, which span the cancer continuum.

In the discussion, the following point was made:

- The contract topics are reviewed by an NCI technical evaluation panel, scored, and funded within the SBIR/STTR paylines.

There was no associated budget with this concept.

Motion. A motion to approve the OD's new RFP entitled "SBIR Contract Topics" was approved unanimously.

XI. ADJOURNMENT—DR. DAFNA BAR-SAGI

There being no further business, the 5th virtual meeting of the BSA was adjourned at 3:46 p.m. on Tuesday, 16 March 2021.

_____ _____

Date Dafna Bar-Sagi, Ph.D.
Chair, Board of Scientific Advisors

_____ _____

Date Paulette S. Gray, Ph.D.
Executive Secretary, Board of Scientific Advisors