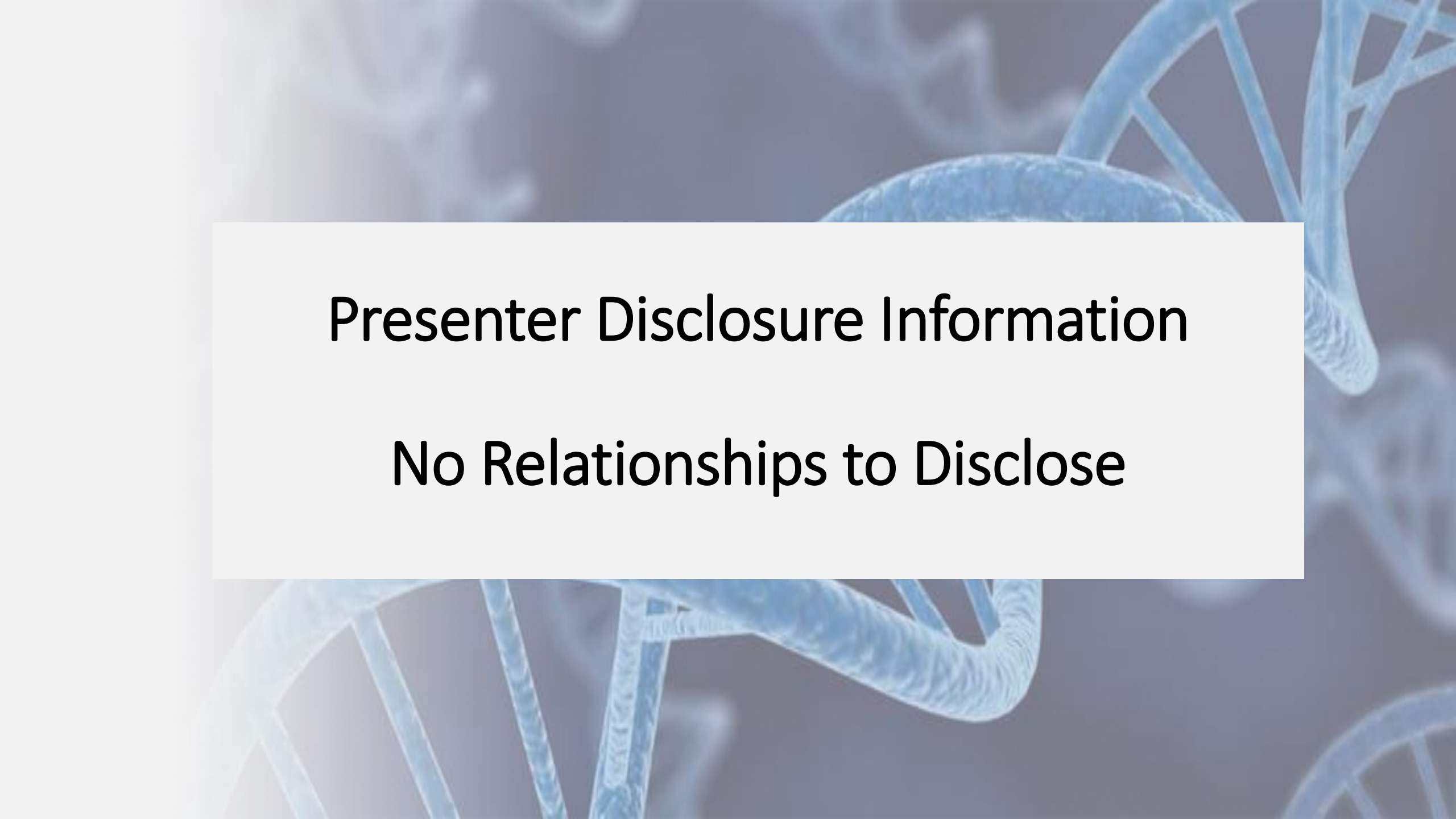
Cancer Moonshot

- Immuno-Oncology Translational Network - (IOTN)

Society for Immunotherapy of Cancer
November 8th, 2019

Kevin Howcroft, PhD
Division of Cancer Biology, NCI

NIH NATIONAL CANCER INSTITUTE



Presenter Disclosure Information

No Relationships to Disclose

Cancer Moonshot – Blue Ribbon Panel

The ***"Cancer Moonshot"*** began in 2016 with the overarching goal to dramatically accelerate efforts to prevent, diagnose, and treat cancer.

Blue Ribbon Panel

- **28 members** representing clinicians, researchers, advocates, and representatives from pharm and IT
- **7 Working Groups** spanning enhanced data sharing, cancer immunology, tumor evolution, implementation science, pediatric cancer, precision prevention, and early detection.
- Each WG **identified major scientific opportunities that were poised for acceleration**.
- The BRP selected **10 "Moonshot" recommendations**.

https://www.cancer.gov/research/key-initiatives/moonshot-cancer-initiative/blue-ribbon-panel/blue-ribbon-panel-report-2016.pdf

Blue Ribbon Panel Recommendations

Establish a network for **direct patient involvement**

Create a translational science network devoted to **immunotherapy**

Develop ways to overcome **resistance to therapy**

Build a national cancer **data ecosystem**

Intensify research on the major drivers of **childhood cancer**

Minimize cancer treatment's debilitating **side effects**

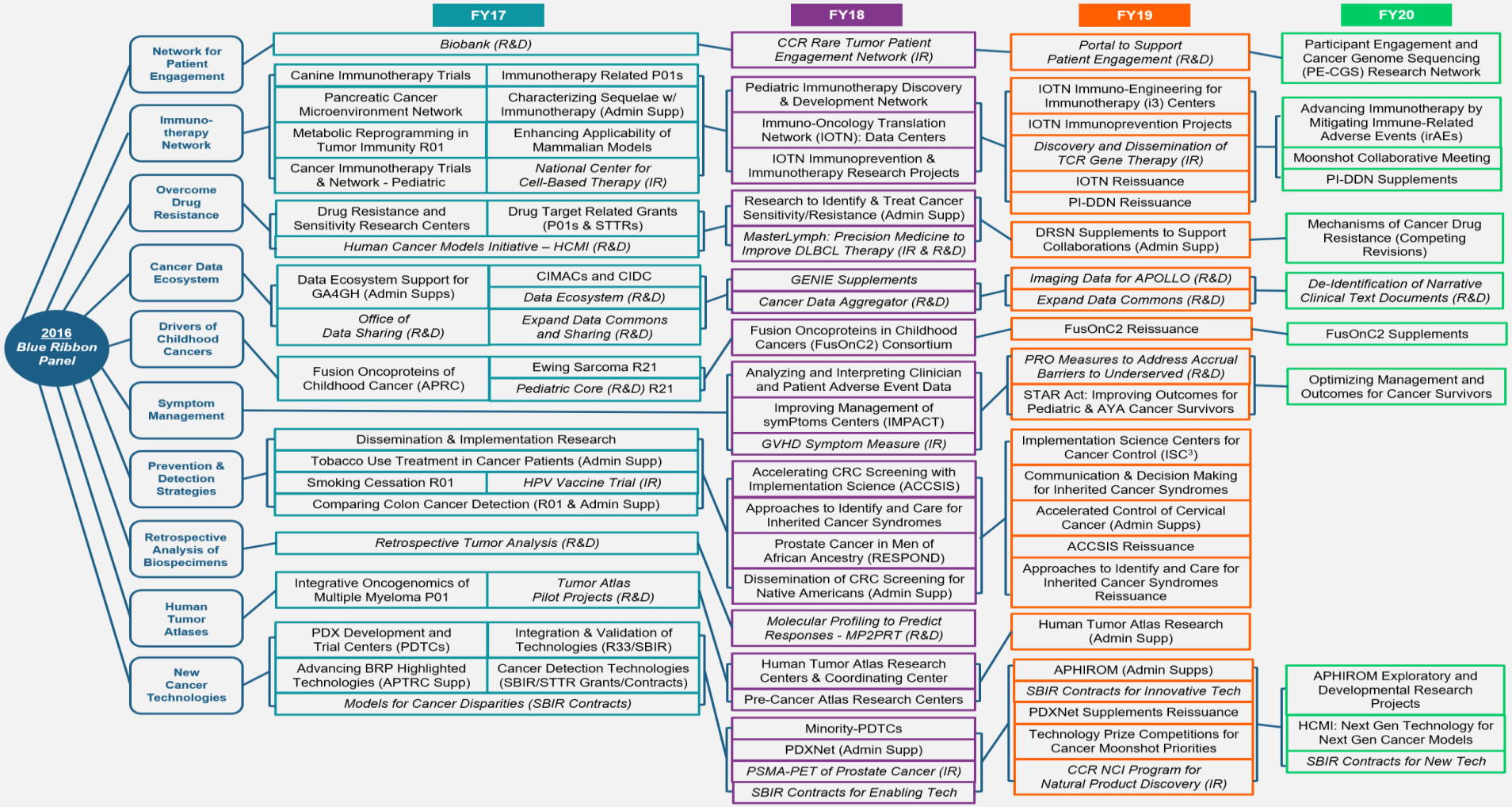
Expand use of proven **prevention and early detection** strategies

Develop a 3D **cancer atlas**

Mine past patient data to predict future **patient outcomes**

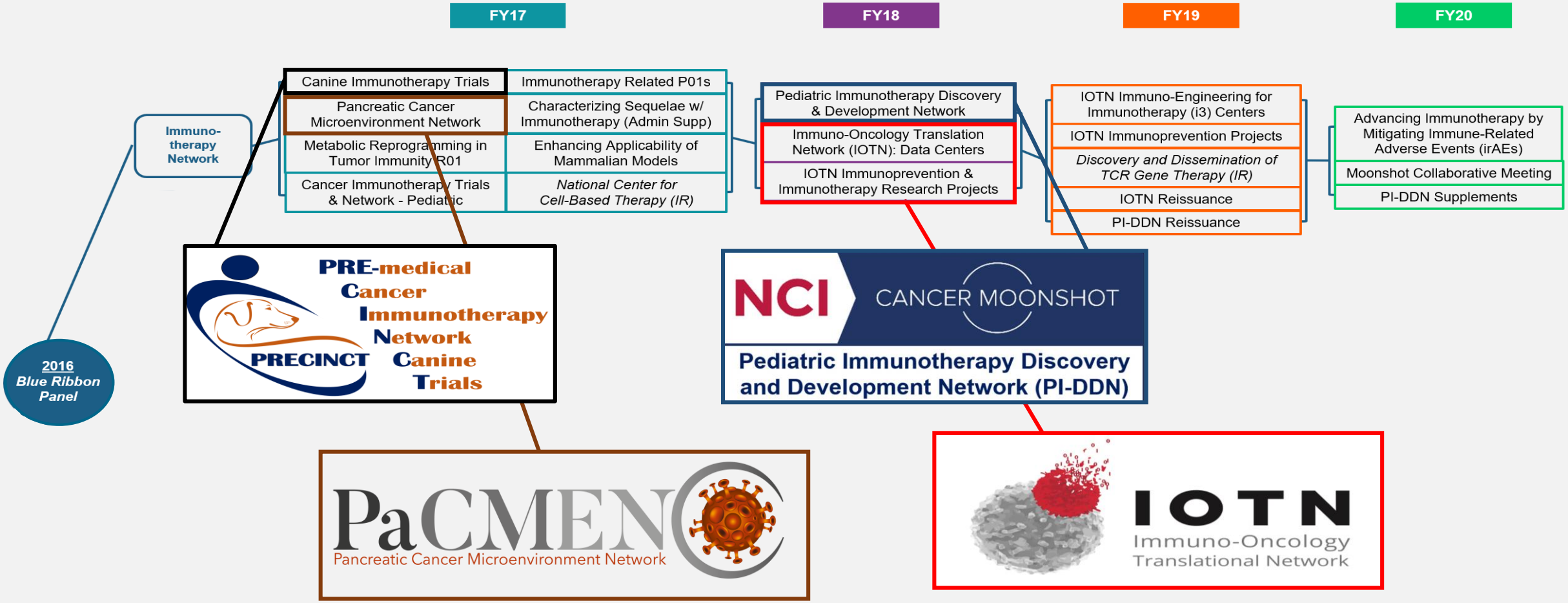
Develop new cancer **technologies**

Cancer Moonshot Landscape



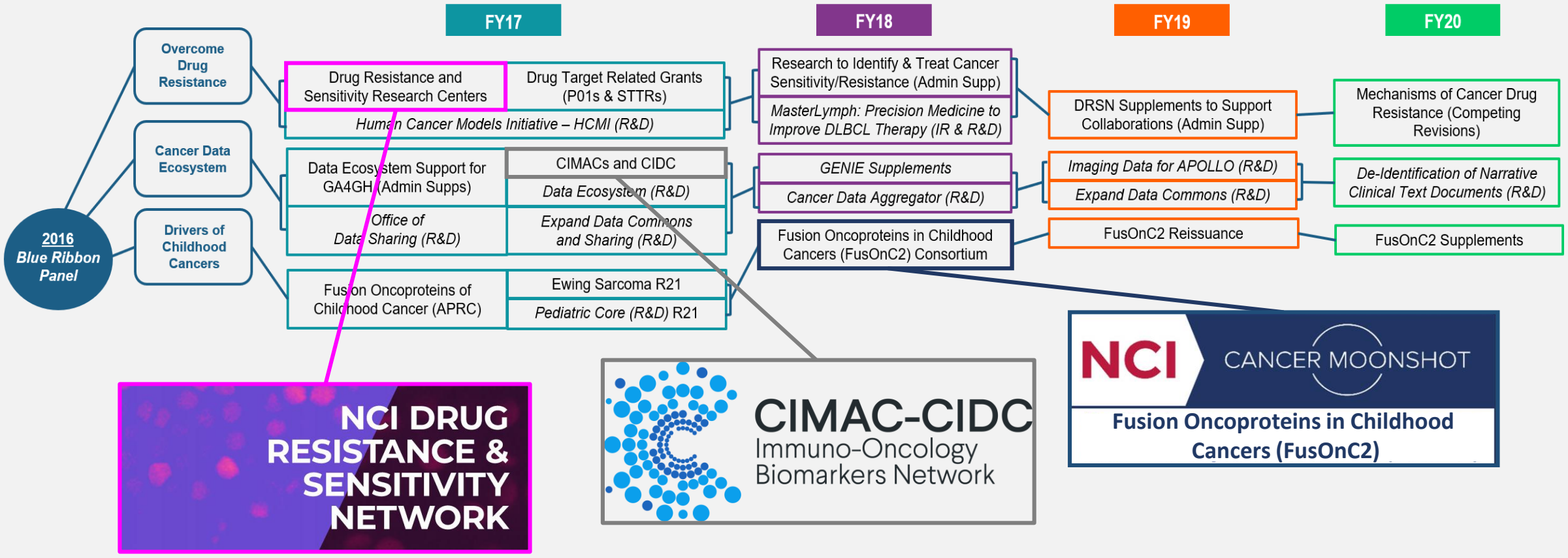
Created by C.E. McCarthy, Ph.D., Division of Cancer Biology

Cancer Moonshot - Immunotherapy



Created by C.E. McCarthy, Ph.D., Division of Cancer Biology

Cancer Moonshot - Immunotherapy



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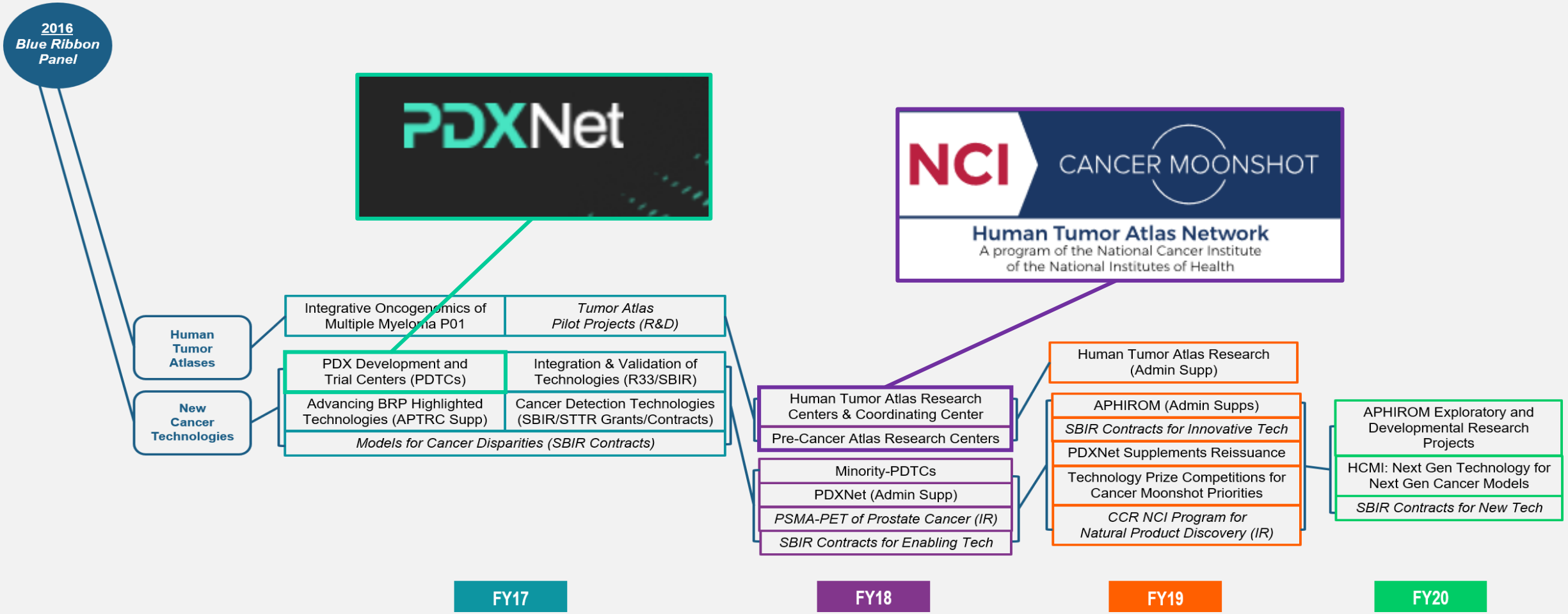
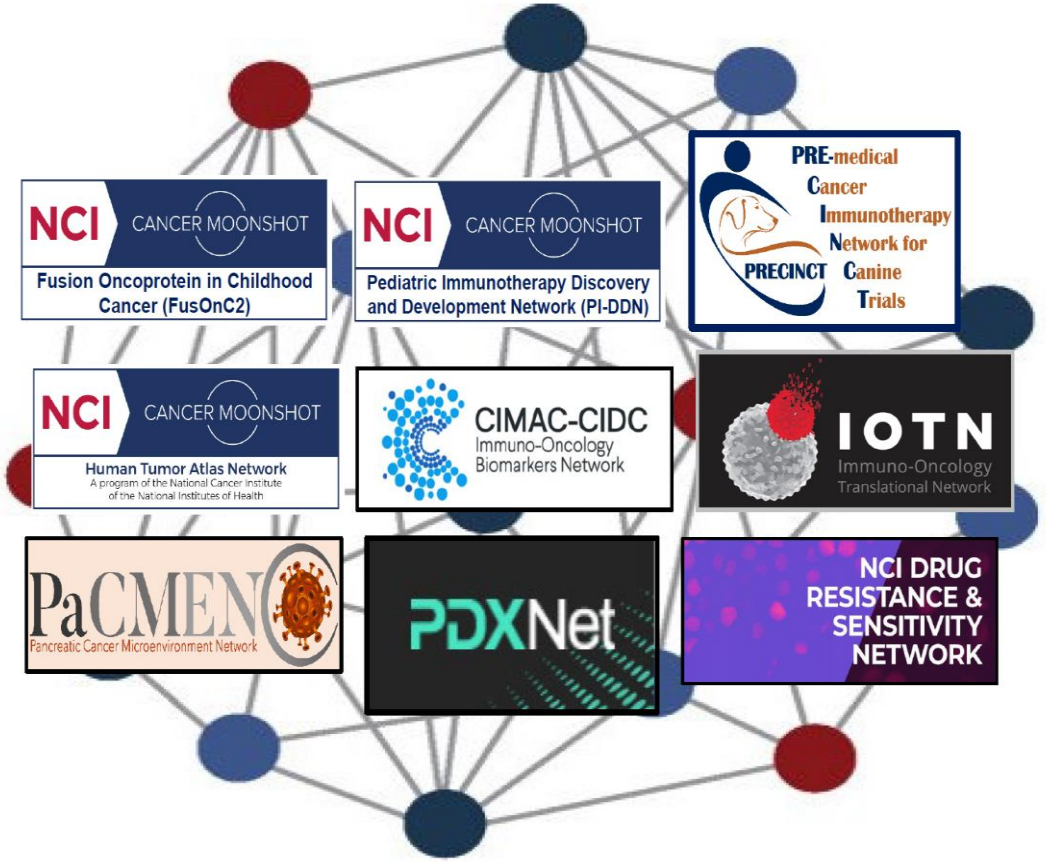
Cancer Moonshot - Immunotherapy



Created by C.E. McCarthy, Ph.D., Division of Cancer Biology

Cancer Moonshot Collaborative Meeting

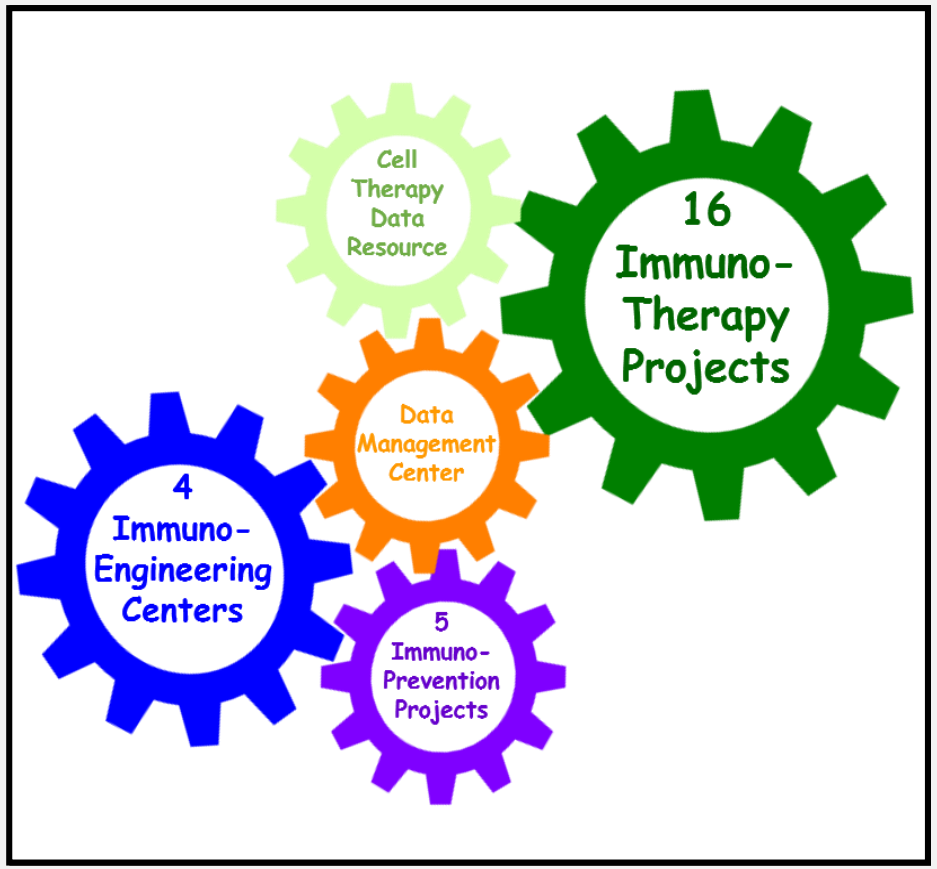
Bethesda North Marriott Hotel & Conference Center
#CMCM19



Monday November 18th – Wednesday November 20th 2019

IOTN | Immuno-Oncology Translational Network

Goal: Leverage expertise and resources of a collaborative network to improve immunotherapy outcomes for both "hot" and "cold" cancers and to prevent cancers before they occur.



Objectives:

- Define tumor immune microenvironments across organ sites.
- Identify novel immune checkpoints, tumor-specific T cell receptors and their cognate tumor targets (neoantigens).
- Uncover intrinsic and extrinsic resistance pathways.
- Identify actionable targets in pre-cancerous lesions; develop and validate early intervention vaccines for immunoprevention.
- Design and test improved immunotherapies and their combinations with other regimens for durable anti-cancer responses.
- Incorporate immunoengineering principles to improve upon promising approaches and **make immunotherapy more effective, safer, and accessible to more patients**.

IOTNMoonshot.org

Immuno-Oncology Translational Network (IOTN)

- Resource Centers -

U24CA232979

IOTN: Data Management and Resource-Sharing Center (DMRC)

Roswell Park Comprehensive Cancer Center

Hutson, Alan
Liu, Song
Morgan, Martin
Odunsi, Kunle

Network Support:

- Data Integration and Sharing
- Analytical/Technical support
- Bioconductor

IOTN Management:

- Monthly SC Meetings
- FTF Meeting SC Meetings
- IOTNMoonshot.Org

U24CA233032

IOTN: Cellular Immunotherapy Data Resource (CIDR)

Medical College of Wisconsin

Pasquini, Marcelo

Cellular Therapy Data Registry:

- Collect data on patients in clinical trials involving cellular therapy
- Demographics, tumor characteristics, treatment, manufacturing details, adverse events and outcomes; and
- Facilitate retrospective observational research to improve cell-based therapy.

Cancer Immunotherapy Research Projects

Goal: Develop improved tumor-specific immunotherapy approaches/combinations.

Objectives:

- Define immune interactions in TMEs.
- Identify novel immune checkpoints, tumor-specific T cell receptors and their cognate tumor targets (neoantigens).
- Uncover intrinsic and extrinsic resistance pathways.
- Test improved immunotherapies and their combinations with other regimens for durable anti-cancer responses.
- **Studies should be largely pre-clinical involving clinically-relevant models and endpoints for rapid translation.**

https://www.iotnmoonshot.org/en/members/immunotherapy/

Cancer Immunoprevention Research Projects

Goal: Develop early intervention vaccines based on actionable targets in pre-cancerous lesions.

Objectives:

Focus on cancers that occur in specific organ sites in high-risk cohorts.

- Lynch Syndrome (colon and endometrial cancer)
- Familial Adenomatous Polyposis (colon cancer)
- BRCA1/2 Carriers (breast and ovarian cancer)
- NF and TSC (neurologic and other cancers)
- Populations exposed to environmental carcinogens
- Other definable high-risk cohorts
- **Studies should be largely pre-clinical involving clinically-relevant models and endpoints for rapid translation.**

U01CA233097
Epithelium-Derived Alarmins Role in Breast Cancer Immunoprevention
Massachusetts General Hospital
Demehri, Shadmehr

U01CA233056
Neoantigen Vaccination for Lynch Syndrome Immunoprevention
Weill Medical College of Cornell University
MD Anderson Cancer Center
Lipkin, Steven
Vilar-Sanchez, Eduardo

UG3CA244687
Recurrent Tumor-specific Alternately Processed Transcripts As A Source Of Neoantigens For NF1-associated Malignant Peripheral Nerve Sheath Tumor Immunoprevention
University of Minnesota
Largaespada, David A.

U01DE029255
Robust Immuno-prevention Strategies For High-risk Oral Epithelial Dysplasia
University of Michigan
Lei, Yu Leo
Brenner, John Chadwick
Neamati, Nouri

UG3CA244697
Intercepting Progression From Pre-invasive To Invasive Lung Adenocarcinoma
Weill Medical College of Cornell University
Altorki, Nasser Khaled
Borczuk, Alain C
Elemento, Olivier
Mcgraw, Timothy E
Mittal, Vivek

https://www.iotnmoonshot.org/en/members/immunoprevention/

Immuno-Oncology Translational Network (IOTN)

- Immuno-Engineering *i3* Centers (U54) -

Goal:

- Incorporate bioengineering and systems biology approaches in the IOTN framework.
  - **Toolkit**: biomaterials, nanotechnologies, synthetic chemistry/biology & modeling.
- Quantitatively understand the physical basis of immune system function;
- Build predictive models;
- Regenerate compromised immune systems for therapeutic benefit; and
- Enable precise control of desired immune responses that are **more effective, safer, and more broadly available.**

U54CA244719
Nano-immuno-oncology Approaches To Overcome Tumor Immune Evasion
University of Texas Southwestern Medical Center
Jinming Gao,
Zhijian Chen

U54CA244711
Engineering The Next Generation Of T Cells
University of Pennsylvania
Carl June
Gerald Linette
Michael Milone

U54CA244438
UCSF Center For Synthetic Immunology: Tools To Reprogram The Immune System To Combat Cancer
University of California, San Francisco
Wendell Lim,
Kole Roybal and Tejal Desai

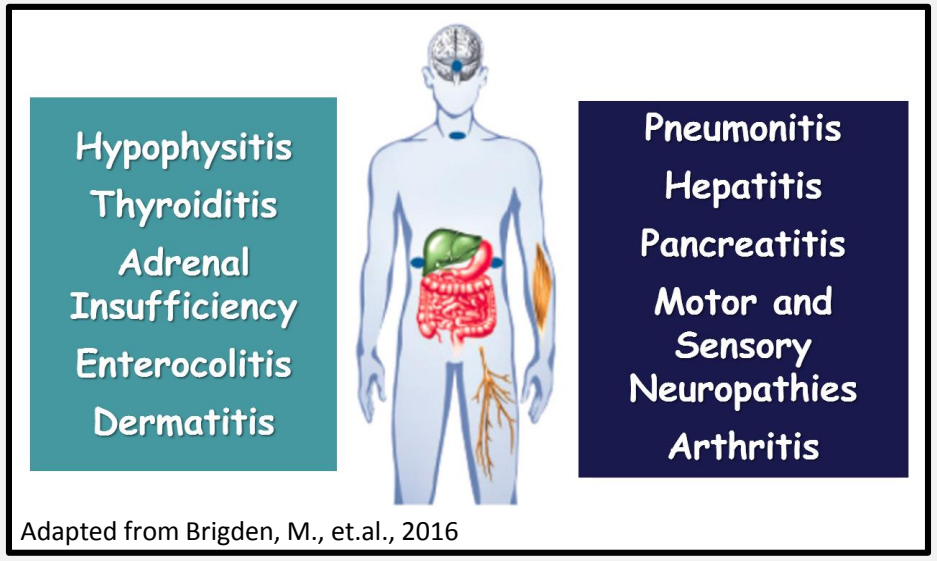
U54CA244726
Biomaterials To Create T Cell Immunity
Harvard University
David Mooney,
David Scadden, Catherine Wu
William Shih, & Stephen Hodi

https://www.iotnmoonshot.org/en/members/immunoengineering/

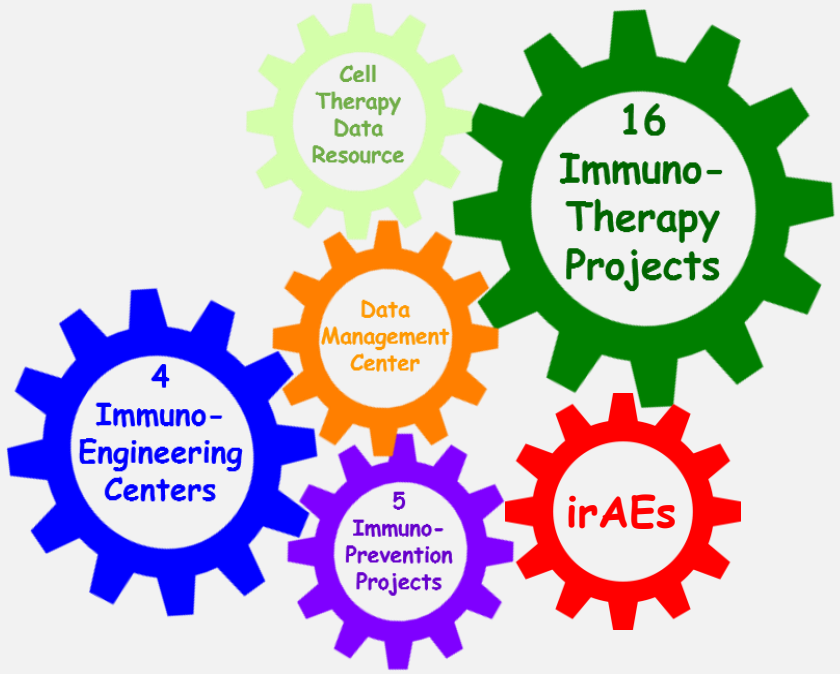
Mitigating Immune-Related Adverse Events

Advancing Cancer Immunotherapy by Mitigating Immune-Related Adverse Events (irAEs)

Adult (IOTN) and Pediatric (PI-DDN) Cancer Moonshot Programs



Adapted from Brigden, M., et.al., 2016



Immuno-Oncology Translational Network (IOTN)
- Implementation Team -

Nancy Boudreau, Lillian Kuo (**DCB**); Mansoor Ahmed, Helen Chen, Toby Hecht, Connie Sommers, Minkyung Song, Magdalena Thurin (**DCTD**), Katarzyna Bourcier (NIAID); Laura Brockway-Lunardi (**CSSI**); Rina Das (NIMHD); Ingrid Fernando, Robert Shoemaker (**DCP**); Jane Fountain (NINDS); Rebecca Fuldner (NIA); Kory Hallett (**SBIR**), Marie Mancini (NIAMS); Kimberly McAllister (NIEHS); Gary Murray (NIAAA); John Ojeifo (**CRCHD**); David Rampulla (NIBIB); Chiayeng Wang (NIDCR); Yu-Chung Yang (NHLBI)

Co-Chairs: Kevin Howcroft (DCB) and Elad Sharon (DCTD)

11 NIH Institutes
7 NCI Divisions & Centers

NCI Divisions and Centers: Division of Cancer Biology (DCB), Division of Cancer Prevention (DCP), Division of Cancer Treatment and Diagnosis (DCTD), Center for Biomedical Informatics and Information Technology (CBIIT), Center to Reduce Cancer Health Disparities (CRCHD), Center for Research Strategy (CRS), and the SBIR Development Center

Questions