NATIONAL CANCER POLICY FORUM

Cancer Engineering: The Convergence of Engineering and Health to Advance Cancer Research and Care: A Workshop

May 20-21, 2025

National Cancer Policy Forum
Board on Mathematical Sciences and Analytics
Board on Life Sciences

National Academy of Sciences Building – Auditorium
2101 Constitution Ave NW
Washington DC 20418

Workshop Website

WORKSHOP AGENDA

TUESDAY, MAY 20, 2025 EASTERN TIME ZONE	
8:00 am	**Breakfast and Registration** (30 minutes)
8:30 am	**Welcome and Introductory Remarks** (~15 minutes) *Co-Chairs:* *Hedi Hricak, Memorial Sloan Kettering Cancer Center* *Roderic Pettigrew, The Texas A&M University System* *Rohit Bhargava, Cancer Center at Illinois, University of Illinois Urbana-Champaign* **Academies Presidents Remarks** (~30 minutes) • Marcia McNutt, President of the National Academy of Sciences and Chair of the National Research Council • Victor Dzau, President of the National Academy of Medicine *(video remarks)* • John Anderson, President of the National Academy of Engineering *(video remarks)*
9:15 am	**Session 1: Overview of Cancer Engineering** (~1 hour, 30 minutes) *Co-Moderators:* *Roderic Pettigrew, The Texas A&M University System* *Rohit Bhargava, Cancer Center at Illinois, University of Illinois Urbana-Champaign* *Session Objective:* Discuss the potential for convergence in engineering and cancer research and care. **Session Keynote: The Power of Convergence in the Fight Against Cancer** (~20 minutes) • Phillip Sharp, Massachusetts Institute of Technology **Perspectives from the National Cancer Policy Forum** (~10 minutes) • Robert Winn, Virginia Commonwealth University **Perspectives from an Engineering Dean with an Allied Medical School** (~10 minutes) • Rashid Bashir, University of Illinois Urbana-Champaign **Transforming Cancer Research and Care through Convergence: Data Science, Artificial Intelligence and Virtual/Digital Platforms** (~10 minutes) • Cheryl Willman, Mayo Clinic **Federal Support to Advance this Emerging Field** (~10 minutes) • Bruce Tromberg, National Institute of Biomedical Imaging and Bioengineering **Discussion and Audience Q&A** (~30 minutes)

10:45 am	**Break** (15 minutes)
11:00 am	**Session 2: Engineering in Cancer Prevention and Diagnostics** (~1 hour, 25 minutes) *Co-Moderators:* *Hedi Hricak, Memorial Sloan Kettering Cancer Center* *Bruce Tromberg, National Institute of Biomedical Imaging and Bioengineering* *Session Objective:* Examine the breadth of major areas in cancer engineering and discuss examples of how convergence of disciplines can lead to fundamental understanding and advances in improving patient outcomes. **Session Keynote: Collaborative Team Science: Early Detection and Interception** (~15 minutes) • Julian Adams, Stand Up To Cancer **Lessons from Capture of Circulating Tumor Cells** (~10 minutes) • Mehmet Toner, Massachusetts General Hospital **mRNA Vaccines and Pancreatic Cancer** (~10 minutes) • Vinod Balachandran, Memorial Sloan Kettering Cancer Center **Opportunistic Artificial Intelligence for Predicting Cancer Outcomes** (~10 minutes) • Anant Madabhushi, Emory University **Systems Engineering to Improve Early Cancer Detection and Prevention in Low-Resource Settings** (~10 minutes) • Rebecca Richards-Kortum, Rice University **Discussion and Audience Q&A** (~30 minutes) • Christina Chapman, Baylor College of Medicine
12:25 pm	**Lunch** (1 hour) *(Student Assembly and Photo Session)*
1:25 pm	**Session 3: Engineering in Drug Development and Therapeutics** (~1 hour, 30 minutes) *Co-Moderators:* *Bissan Al-Lazikani, The University of Texas MD Anderson Cancer Center* *Hadiyah-Nicole Green, Ora Lee Smith Cancer Research Foundation* *Session Objective:* Examine existing and emerging engineering approaches, from basic molecular biology to cellular therapy, that can enhance drug development and treatment of cancer. **Session Keynote: Yesterday, Today, and Tomorrow** (~20 minutes) • Robert Langer, Massachusetts Institute of Technology **T-cell engineering CAR-T Therapy** (~10 minutes) • Carl June, University of Pennsylvania **Engineering Natural Killer (NK) Cell Engineering Against Cancer** (~10 minutes) • Katy Rezvani, The University of Texas MD Anderson Cancer Center **Engineering Molecular and Cellular Imaging and Image-Guided Therapy** (~10 minutes) • Samuel Achilefu, University of Texas Southwestern **Theranostics in Precision Oncology** (~10 minutes) • Hossein Jadvar, University of Southern California **Panel Discussion and Audience Q&A** (~30 minutes)
2:55 pm	**Break** (15 minutes)

3:10 pm	**Session 4: From Cancer Biology to Engineering Solutions** (~1 hour, 20 minutes) *Co-Moderators:* *Phillip Sharp, Massachusetts Institute of Technology* *Christina Chapman, Baylor College of Medicine* *Session Objective:* Discuss cutting-edge technologies and developments to promote convergence in engineering and cancer research and care and facilitate access to the output of cancer engineering to promote the delivery of high-quality care. Highlight some of the scientific and grant opportunities. **Biomaterials for Cancer Immunotherapy** (~10 minutes) • David Mooney, Harvard University **Personalized mRNA-based Cancer Vaccines** (~10 minutes) • John Cooke, Houston Methodist Research Institute **Hybrid Advanced Molecular Manufacturing Regulator for Cancer Immunotherapy** (~10 minutes) • Omid Veiseh, Rice University **Translational Opportunities in Cancer Mechanobiology** (~10 minutes) • Cynthia Reinhart-King, Rice University **Panel Discussion and Audience Q&A** (~40 minutes)
4:30 pm	**Poster Exhibition** (1 hour)
5:30 pm	**Workshop Reception** (1 hour, 15 minutes)
6:45 pm	**Adjourn**

WEDNESDAY, MAY 21, 2025 EASTERN TIME ZONE	
8:00 am	**Breakfast and Registration** (30 minutes)
8:30 am	**Day 2 Welcome** (~5 minutes) *Hedi Hricak, Memorial Sloan Kettering Cancer Center*
8:35 am	**Session 5: Celebrating Tomorrow: Oral Poster Presentations** (~25 minutes) *Co-Moderators:* *Rohan Fernandes, The George Washington University* *Hadiyah-Nicole Green, Ora Lee Smith Cancer Research Foundation* **Oral Poster Presentations** (5 minutes each) • Haylie Helms, Oregon Health and Science University • Amrik Kang, University of California, San Francisco • Suyog Shaha, Harvard University • Shensheng Zhao, University of Illinois at Urbana-Champaign • Sampreeti Jena, University of Minnesota *(video remarks)*

9:00 am	**Session 6: Cancer Engineering: Education** (~1 hour, 15 minutes) *Co-Moderators:* *Roderic Pettigrew, The Texas A&M University System* *Rohan Fernandes, The George Washington University* *Session Objective:* Discuss opportunities to develop and expand the cancer engineering workforce, including leadership development, multidisciplinary education and training, collaborative research approaches, and use of dissemination and implementation science strategies. **Learning at the Interfaces at the MIT Koch Institute** (~10 minutes) • Paula Hammond, Massachusetts Institute of Technology **Memorial Sloan Kettering Cancer Center Cancer Engineering Program** (~10 minutes) • Kayvan Keshari, Memorial Sloan Kettering Cancer Center **Bioengineering at Moffitt Cancer Center** (~10 minutes) • Gregory Sawyer, Moffitt Cancer Center, University of Florida **Translational Research Institute at Cedars-Sinai** (~10 minutes) • Ze'ev Ronai, Cedars-Sinai Medical Center **Panel Discussion and Audience Q&A** (~35 minutes) Session speakers and: • Nastaran Zahir, Center for Cancer Training, National Cancer Institute, National Institutes of Health
10:15 am	**Break** (15 minutes)
10:30 am	**Session 7: Summary Discussion with Co-Moderators: Advancing Cancer Engineering** (~1 hour) *Co- Moderators:* *Hedi Hricak, Memorial Sloan Kettering Cancer Center* *Roderic Pettigrew, The Texas A&M University System* • Session 1: Roderic Pettigrew and Rohit Bhargava • Session 2: Hedi Hricak and Bruce Tromberg • Session 3: Bissan Al-Lazikani and Hadiyah-Nicole Green • Session 4: Phillip Sharp and Christina Chapman • Session 6: Roderic Pettigrew and Rohan Fernandes
11:30 am	**Adjourn**

You may also scan the QR code below to submit questions and comments.
Please state your name and affiliation prior to asking a question.

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