



National Institute of
Biomedical Imaging
and Bioengineering

*Technologies to Shape
the Future of Health*

Building Bridges Across NIH and the Broader Engineering Community

Program Book

Tuesday, October 22, 2024
Masur Auditorium
Building 10 – NIH Campus
Bethesda, MD

Building Bridges Across NIH and the Broader Engineering Community

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NIH Institutes and Center Abbreviations

NCI	National Cancer Institute	NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
NEI	National Eye Institute	NIEHS	National Institute of Environmental Health Sciences
NHGRI	National Human Genome Research Institute	NIGMS	National Institute of General Medical Sciences
NHLBI	National Heart, Lung, and Blood Institute	NIMH	National Institute of Mental Health
NIA	National Institute on Aging	NIMHD	National Institute on Minority Health and Health Disparities
NIAAA	National Institute on Alcohol Abuse and Alcoholism	NINDS	National Institute of Neurological Disorders and Stroke
NIAID	National Institute of Allergy and Infectious Diseases	NINR	National Institute of Nursing Research
NIAMS	National Institute of Arthritis and Musculoskeletal and Skin Diseases	NLM	National Library of Medicine
NIBIB	National Institute of Biomedical Imaging and Bioengineering	CC	Clinical Center
NICHD	National Institute of Child Health and Human Development	CIT	Center for Information Technology
NIDA	National Institute on Drug Abuse	CSR	Center for Scientific Review
NIDCD	National Institute on Deafness and Other Communication Disorders	FIC	Fogarty International Center
NIDCR	National Institute of Dental and Craniofacial Research	NCATS	National Center for Advancing Translational Sciences
		NCCIH	National Center for Complementary and Integrative Health

Welcome Letter

Dear Colleagues and Guests,

Welcome to the “Building Bridges Across NIH and the Broader Engineering Community” event!

As the inaugural Director of the NIH-wide Center for Biomedical Engineering Technology Acceleration, commonly known as the BETA Center, it is an honor to host this event and to welcome this distinguished group of engineers, researchers, and clinicians to the main campus of the National Institutes of Health. We are very excited about the number of students that are participating in today’s event in the hopes they will begin to imagine a future career at the NIH, using their engineering skills to advance the healthcare priorities of the United States and the world. If this is the first time you have visited our campus, we hope that it will not be your last.

NIH is the largest funder of biomedical research in the world, and it is also houses its own intramural research program investigators. The BETA Center was conceived by Dr. Bruce Tromberg, Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB), as an NIH-wide resource housed within the NIBIB Intramural Research Program to serve as a new model for facilitating interdisciplinary, technology-driven research and clinical impact across NIH and beyond. Our goal is to bring together researchers with engineering and imaging expertise, including biomedical imaging, biosensing, biomechanics, engineered/synthetic biology, nano/biomaterials, artificial intelligence, modeling, computation, and informatics, and help make these tools available to researchers at the NIH. BETA Center was founded in 2023, and we have recruited more than 100 intramural researchers from at least 16 different NIH Institutes and Centers to become BETA Center Affiliates to share research, establish new collaborative ideas, and mentor graduate and undergraduate students in bioengineering and biomedical imaging through the training programs we are funding and managing.

Your attendance and participation today will allow for inspiring discussions and opportunities for new partnerships that leverage engineering, technology, and biomedical research. Each session is designed to mix academic and NIH researchers in thematic areas so that each can be exposed to new ideas of how engineering solutions can drive new avenues of healthcare and clinical impact. Today’s event represents the kind of collaborative energy and shared purpose that I dream about at night! I am especially grateful to all who have helped bring this day to fruition and for the many hours, conversations, and strategic planning that was involved. I look forward to engaging with you today, and watching you engage with each other, as we build these bridges together.

Warmest regards,



Manu O. Platt, Ph.D., FBMES, FAIMBE
Director, BETA Center
Senior Investigator, NIBIB
NIH Distinguished Scholar
Head, Mechanics and Tissue Remodeling In Computational & Experimental Systems (MATRICES)
Associate Director for Scientific DEIA, NIBIB
National Institute of Biomedical Imaging and Bioengineering
National Institutes of Health



Agenda

Tuesday, October 22, 2024

Masur Auditorium, Building 10, NIH Campus Bethesda, MD

*All times are listed in Eastern Daylight Time

*Sessions take place in the Masur Auditorium (located on the 1st floor of Building 10) unless otherwise noted.

- 9:00 a.m.–9:20 a.m.** **Welcome Remarks**
Monica Bertagnolli, M.D., Director, National Institutes of Health (NIH)
- 9:20 a.m.–9:35 a.m.** **Fireside Chat and Q&A with Monica Bertagnolli**
Moderator: Bruce Tromberg, Ph.D., Director, National Institute of Biomedical Imaging and Bioengineering
- 9:35 a.m.–10:20 a.m.** **NIH Intramural Keynote Talk:**
Bone Marrow Transplants and Gene Therapy for Sickle Cell Disease
John Tisdale, M.D., Senior Investigator, National Heart, Lung, and Blood Institute (NHLBI)
- 10:20 a.m.–10:45 a.m.** **Break** (*Posters for Session 1 may be viewed in the FAES Terrace*)
- 10:45 a.m.–11:45 a.m.** **Invited Talks**
Introducing the Crystal Ribcage, Enabling Multiscale Probing from Whole-Organ to Single-Cell Level of a Functioning Lung with Extracorporeal Cross-Circulation
Hadi Nia, Ph.D., Boston University
Understanding the Language of Immunity through NF-κB Signaling
Myong-Hee “Mia” Sung, Ph.D., National Institute on Aging
Developing Light-Activatable Systems to Control Protein Interactions
Maryam Raeeszadeh-Sarmazdeh, Ph.D., University of Nevada, Reno
- 11:45 a.m.–12:15 p.m.** **Rapid Fire Talks featured from the Poster Session**
John Karanian, Center for Interventional Oncology, Clinical Center, NIH
Ashlee Ford Versypt, Ph.D., University of Buffalo
Isha Patel, NIH Clinical Center
Shengjie “Patrick” Zhai, Ph.D., University of Nevada Las Vegas
Chieh-Ren “Jeremiah” Hsia, Ph.D., National Cancer Institute
Yuhua Song, Ph.D., The University of Alabama at Birmingham
Connie Wen, Ph.D., The Pennsylvania State University
- 12:15 p.m.–1:30 p.m.** **Lunch Break**
- 12:15 p.m.–1:00 p.m.** **Poster Session 1**
FAES Terrace
- 12:30 p.m.–3:00 p.m.** **NIH Facilities and Lab Tours** (*Advance registration is required. If you registered in advance, please see your confirmation email for more information.*)

- 1:30 p.m.–2:15 p.m.** **Panel on Innovation, Industry, and NIH**
 Cherie Butts, Ph.D., Biogen
 Brad Wood, M.D., Clinical Center, NIH
 Peter Pinto, M.D., Clinical Center, NIH
 Vincent B. Ho, M.D., M.B.A., Uniformed Services University of the Health Sciences
- 1:30 p.m.–3:00 p.m.** **Concurrent Breakout Rooms and Oral Talks** *(Additional info on page 10.)*
FAES Classroom 1 Orthopedics and Neuromuscular Systems
FAES Classroom 2 Women’s Health and Engineering
FAES Classroom 3 Novel Biomedical Technologies
FAES Classroom 4 Cardio/Vascular Systems
FAES Classroom 6 Cancer Therapies and Technologies
FAES Classroom 7 Biomedical Imaging
- 2:15 p.m.–2:45 p.m.** **Rapid Fire Talks featured from the Poster Session**
 Aneesh Kshirsagar, The Pennsylvania State University
 Aniruddh Sarkar, Ph.D., Georgia Institute of Technology
 Pamela Robey, Ph.D., National Institute of Dental and Craniofacial Research (NIDCR)
 Kiara Lee, Ph.D., Rice360 Institute for Global Health Technologies, Fogarty International Center, and University of Washington
 Rubin Baskir, Ph.D., All of Us Research Program, NIH
- 2:45 p.m.–3:30 p.m.** **Poster Session 2**
FAES Terrace
- 3:30 p.m.–4:15 p.m.** **Extramural Keynote Talk:**
Bioengineering and Medicine: Personalized Diagnostics, AI, and Printing Cellular Machines
 Rashid Bashir, Ph.D., Grainger College of Engineering, University of Illinois at Urbana-Champaign
- 4:15 p.m.–5:15 p.m.** **Invited Talks**
Development of 3D Bioprinted Innervated and Vascularized Skin Tissues to Investigate Pain Pathways and Identify Non-Addictive Pain Medications
 S. Tori Ellison, Ph.D., National Center for Advancing Translational Sciences
Disturbed Flow Induces Reprogramming of Endothelial Cells (FIRE) and Atherosclerosis. From Mechanobiology to Mechanomedicine
 Hanjoong Jo, Ph.D., Emory University and Georgia Institute of Technology
FAME: Fabrication in Austere Military Environment
 Cate Wisdom, Ph.D., Uniformed Services University Center for Biotechnology
- 5:15 p.m.–5:30 p.m.** **Closing Remarks**
 Manu Platt, Ph.D., Director, BETA Center, National Institute of Biomedical Imaging and Bioengineering

Keynote Speakers



John Tisdale, M.D., National Heart, Lung, and Blood Institute

Dr. John Tisdale graduated from the College of Charleston in South Carolina with a B.A. in chemistry in 1986, then earned his M.D. from the Medical University of South Carolina in 1990. After an internship and residency at Vanderbilt University School of Medicine, he served as Chief Resident (1993–1994) at the Nashville Veterans Administration Medical Center. He joined the NHLBI in 1994, where he has been a hematology fellow, senior staff fellow, and Clinical Investigator. He joined the Molecular and Clinical Hematology Branch of the National Institute of Diabetes and Digestive and Kidney Diseases in 1998 as a tenure track Investigator and was tenured in 2007. In 2011, the College of Charleston recognized Dr. Tisdale with the Alumni of the Year Award and the Pre-Medical Society's Outstanding Service Award in Medicine. A member of

the American Society of Hematology, he was recently elected to the American Society for Clinical Investigation. Dr. Tisdale has authored or coauthored more than 140 papers.



Rashid Bashir, Ph.D., University of Illinois at Urbana-Champaign

Dr. Rashid Bashir is the Dean of the Grainger College of Engineering, a Grainger Distinguished Chair in Engineering, and Professor of Bioengineering at the University of Illinois Urbana-Champaign (UIUC). Previously, he was the Executive Associate Dean and Chief Diversity Officer at the Carle-Illinois College of Medicine (2017–2018), the Abel Bliss Professor of Engineering, Head of Department of Bioengineering (2013–2017), and Director of the Micro and Nanotechnology Laboratory (a campus-wide clean room research facility) (2007–2013).

Prior to joining UIUC, he was at Purdue University (1998–2007) with faculty appointments in Electrical and Computer Engineering and Bioengineering. From 1992 to 1998, he worked at National Semiconductor Corporation in Santa Clara, CA as Sr. Engineering Manager. From 2014 to 2017, he was a member of the core founding team and co-chair of the inaugural curriculum committee for the UIUC Carle-Illinois College of Medicine, the world's first engineering-based College of Medicine.

He graduated with a Ph.D. in Electrical Engineering from Purdue University in 1992. He has authored or co-authored over 250 journal papers, over 200 conference papers and conference abstracts, and over 120 invited talks. He has also been awarded 50 patents and has been involved in three startups that have licensed his technologies. In addition, he has received the National Science Foundation's (NSF) Faculty Early Career Award, the 2012 IEEE Engineering Medicine & Biology Society's Technical Achievement Award, and the 2018 Pritzker Distinguished Lectureship Award from the Biomedical Engineering Society (BMES). He is a fellow of IEEE, the American Institute for Medical and Biomedical Engineering (AIMBE), the American Association for the Advancement of Science (AAAS), BMES, the International Academy of Medical and Biological Engineering (IAMBE), the Royal Society of Chemistry (RSC), American Physiological Society (APS), and the National Academy of Inventors (NAI).

His research group is interested in developing new technologies for precision and personalized medicine and in 3D bio-fabrication of cellular systems. Using bio-nanotechnology, biomedical microelectromechanical systems (BioMEMS), and lab-on-a-chip (LOC) devices, Dr. Bashir is working at the interface of biology and engineering from the molecular to the tissue scale, aiming to make an impact on grand challenges in health and medicine, including cancer, sepsis, and others.

NIH Director



Monica M. Bertagnolli, M.D., Director, National Institutes of Health

Monica M. Bertagnolli, M.D., is the 17th Director of the National Institutes of Health (NIH). She was nominated by President Joe Biden on May 15, 2023, confirmed by the U.S. Senate on November 7, 2023, and took office on November 9, 2023. She is the first surgeon and second woman to hold the position. As the NIH Director, Dr. Bertagnolli oversees the work of the largest funder of biomedical and behavioral research in the world. Previous positions include serving as the 16th director of the National Cancer Institute (NCI), as the Richard E. Wilson Professor of Surgery in surgical oncology at Harvard Medical School, as a surgeon at Brigham and Women’s Hospital, and as a member of the Gastrointestinal Cancer Treatment and Sarcoma Centers at Dana-Farber Cancer Institute.

Throughout her career, Dr. Bertagnolli has been at the forefront of the field of clinical oncology. Her laboratory focused on advancing our understanding of the genetic drivers of gastrointestinal cancer development and on the role of inflammation as a promoter of cancer growth. As a physician–scientist, she led translational science initiatives from 1994 to 2011 within the NCI-funded Cooperative Groups Program (now known as NCI’s National Clinical Trials Network or NCTN), and from 2011 to 2022 served as group chair of the Alliance for Clinical Trials in Oncology, an NCTN member organization. In addition, from 2007 to 2018, she served as chief of the division of Surgical Oncology for the Dana-Farber Brigham Cancer Center.

Dr. Bertagnolli has championed collaborative initiatives to transform the data infrastructure for clinical research and is the founding chair of the minimal Common Oncology Data Elements (mCODE) executive committee. She also is a past president and chair of the board of directors of the American Society of Clinical Oncology and has served on the board of directors of the American Cancer Society and the Prevent Cancer Foundation. In 2021, she was elected to the National Academy of Medicine, having previously served on the National Academies National Cancer Policy Forum.

The granddaughter of Italian and French Basque immigrants, Dr. Bertagnolli grew up on a ranch in southwestern Wyoming. She graduated from Princeton University with a Bachelor of Science in Engineering degree and attended medical school at the University of Utah. She trained in surgery at Brigham and Women’s Hospital and was a research fellow in tumor immunology at the Dana-Farber Cancer Institute.

NIBIB Director



Bruce Tromberg, Ph.D., National Institute of Biomedical Imaging and Bioengineering

Dr. Tromberg is the Director of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) at NIH, where he oversees a portfolio of research programs focused on developing, translating, and commercializing engineering, physical science, and computational technologies in biology and medicine. In addition, he leads NIBIB's Rapid Acceleration of Diagnostics (RADx Tech) program, a \$1.7 billion initiative to increase SARS-COV-2 testing capacity and performance. His laboratory, the Section on Biomedical Optics (SBO) in the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), develops portable, bedside, non-contact, and wearable technologies for quantitative sensing and imaging of tissue composition and metabolism.

Prior to joining NIH in January 2019, Dr. Tromberg was a professor of biomedical engineering and surgery at the University of California, Irvine (UCI). During this time he served as director of the Beckman Laser Institute and Medical Clinic (BLIMC; 2003–2018) and the Laser Microbeam and Medical Program (LAMMP), an NIH National Biomedical Technology Center at the BLIMC (1997–2018). Dr. Tromberg specializes in the development of optics and photonics technologies for biomedical imaging and therapy. He has co-authored more than 450 publications and holds 25 patents in new technology development as well as bench-to-bedside clinical translation, validation, and commercialization of devices. He has trained more than 80 students and fellows, is co-founder of the biophotonics company, Modulim, Inc, and has served on numerous advisory boards in academia, industry, government, and private foundations.

Dr. Tromberg received his undergraduate training in chemistry from Vanderbilt University (1979) and M.S. and Ph.D. degrees in chemistry from the University of Tennessee (1988) where he was a U.S. Department of Energy/Oak Ridge Associated Universities Fellow at the Oak Ridge National Laboratory. He was a Hewitt Foundation Photomedicine Fellow at the BLIMC and joined the UC Irvine faculty in 1990. Recent honors and awards include election to the 2024 class of the National Academy of Engineering and election to the 2022 class of the National Academy of Medicine. Other recognition includes the R&D 100 award, the Michael S. Feld Biophotonics Award from The Optical Society (OSA), the Britton Chance Biomedical Optics Award from the International Society of Optical Engineering (SPIE), and the Horace Furumoto Innovator Award from the American Society for Laser Medicine and Surgery (ASLMS). Dr. Tromberg is a Fellow of the OSA, SPIE, AIMBE, and the National Academy of Inventors (NAI).

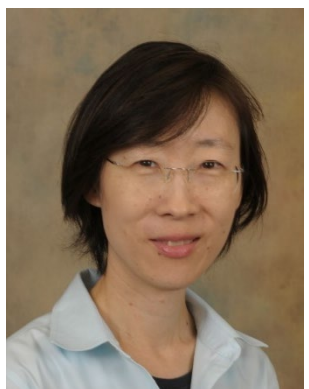
Morning Invited Speakers



Hadi Nia, Ph.D., Boston University

Dr. Hadi T. Nia, Assistant Professor of Biomedical Engineering at Boston University, received his B.Sc. degree from Sharif University of Technology and did his doctoral training at Massachusetts Institute of Technology (MIT) under the supervision of Drs. Alan Grodzinsky and Christine Ortiz. He then moved to Massachusetts General Hospital, Harvard Medical School for his post-doctoral training under the mentorship of Dr. Rakesh Jain. There he studied the tumor microenvironment with a focus on the physical hallmarks of cancer. Dr. Hadi's current research includes developing novel models and tools for imaging the lung in real-time and at the cellular resolution to probe the links between lung physics, biology, and immunity in health and disease. He has received multiple awards for his research, including the NIH Director's New

Innovator Award (DP2), Sloan Research Fellowship, NSF CAREER, Beckman Young Investigator, DoD Idea Award, and the NIBIB Trailblazer Award.



Myong-Hee "Mia" Sung, Ph.D., National Institute on Aging

Dr. Sung received her Ph.D. in Mathematics from The State University of New York at Stony Brook and pursued postdoctoral training in Dr. James Yorke's nonlinear dynamics group at the University of Maryland at College Park. Dr. Sung transitioned to biology when she started in the bioinformatics group of Dr. Richard Simon at NCI, and then worked as a Staff Scientist for Dr. Gordon Hager, CCR/NCI, between 2005 and 2015. She began her independent investigator position at LMBI, NIA, Baltimore, in the fall of 2015.

Dr. Sung uses diverse systems biology approaches to study cell signaling dynamics and transcription control. Using mathematical modeling and optical imaging techniques, she revealed sustained asynchronous oscillations of NF-kappaB activity in individual cells exposed to a pro-inflammatory cytokine TNF- α . She has also developed novel computational methodologies to analyze and extract biologically meaningful information from massive epigenomics data such as DNase-seq, CHIP-seq, and 4C.



Maryam Raezadeh-Sarmazdeh, Ph.D., University of Nevada, Reno

At the University of Nevada, Reno (UNR), Dr. Maryam Raezadeh-Sarmazdeh is the Program Director of the chemical engineering graduate program and an Assistant Professor in the Chemical and Materials Engineering Department. Her research group at UNR is interested in protein engineering and design for developing novel therapeutics, drug delivery, and bioimaging tools. Previously a senior research fellow in the Department of Cancer Biology at the Mayo Clinic, Dr. Sarmazdeh's research focused on engineering novel protein-based therapeutics based on natural enzyme inhibitors. As a postdoctoral scholar in the University of Delaware's Chemical and Biomolecular Engineering Department, her research centered on enzyme engineering. To date, she has received funding grants from NIH (NIGMS, NIA, NICHD), and DOE-BES. She was an early

career editorial board member of the Journal of Biological Chemistry (JBC) and is the past chair of Women in Chemical Engineering at AIChE.

Afternoon Invited Speakers



S. Tori Ellison, Ph.D., National Center for Advancing Translational Sciences

Dr. S. Tori Ellison is a Postdoctoral Fellow in the 3D Bioprinting Lab at the NIH National Center for Advancing Translational Sciences (NCATS). She earned her Ph.D. in Material Sciences and Engineering with a focus on Clinical Translational Sciences from the University of Florida. Her doctoral research involved 3D printing cellular structures into jammed microgels to study their mechanical behavior and developing *in vitro* tissue culture platforms.

At NCATS, Dr. Ellison develops and refines methods for biofabricating physiologically relevant tissue models, enhancing our understanding of healthy and diseased tissues. She has pioneered 3D bioprinted skin tissues for high-throughput screening, assessing 740 compounds for efficacy and toxicity against HSV-1 infection. Additionally, she has innovated methods to induce psoriatic phenotypes in bioprinted skin and developed innervated, vascularized skin tissues to explore non-addictive pain medications. Her goal is to leverage her expertise to create accurate, cost-effective, and reproducible models of tissues for drug development.



Hanjoong Jo, Ph.D., Emory University and Georgia Institute of Technology

Dr. Hanjoong Jo is the Coulter Distinguished Chair Professor and Associate Chair in the Department of Biomedical Engineering and the Department of Medicine at Emory University and Georgia Tech (GT), where he directs the Cardiovascular Mechanobiology, Therapeutics, and Nanomedicine Lab. He is also the Director of the Cardiovascular Biomechanics T32 Graduate Training Program at Emory/GT. He received his Ph.D. degree from The Pennsylvania State University.

Dr. Jo studies how blood flow regulates vascular endothelial function, leading to atherosclerosis and aortic valve disease. He has trained more than 60 individuals, including PhDs and postdocs, has published more than 240 peer-reviewed papers, and has written three books. He is an elected fellow of the AAAS, BMES, AIMBE, American Heart Association, and APS, and received a Marshall Distinguished Investigator Award from the British Society of Cardiovascular Research. Past Vice President of the Korean-Am Scientists and Engineers Association, Dr. Jo chaired the 2012 Annual BMES Meeting, the 2023 Gordon Research Conference in Biomechanics of Vascular Biology and Disease, and the International Symposium in Biomechanics in Cardiovascular Diseases. In addition, he has served as an Editorial Board Member and Associate Editor of many high impact journals.



Cate Wisdom, Ph.D., Uniformed Services University Department of Radiology and Bioengineering

Cate Wisdom is an Assistant Professor in the Department of Radiology and Bioengineering at the Uniformed Services University (USU) in Bethesda, Maryland. She joined the Uniformed Services University (USU) as a Postdoctoral Fellow working in the Center for Biotechnology (4DBio³). Prior to joining USU, Dr. Wisdom earned a Ph.D. in Bioengineering from the University of Kansas and a B.S. in Chemical Engineering from the University of New Mexico. Her research interests include additive manufacturing, tissue engineering, antimicrobial development, and organ on a chip platforms.

Concurrent Breakout Rooms and Oral Talks

These sessions will take place concurrently from 1:30 p.m.–3:00 p.m.

FAES Classroom 1		Orthopedics and Neuromuscular Systems
Moderator: Pamela Robey, Ph.D., National Institute of Dental and Craniofacial Research (NIDCR)		
1:30 p.m.–1:45 p.m.	Feasibility of Gait Event Detection from Thigh Segment Kinematics in Children with Cerebral Palsy , Jordan Dembsky, NIH, Clinical Center	
1:45 p.m.–2:00 p.m.	Biomechanics of Mental Health , Taher Saif, Ph.D., University of Illinois at Urbana-Champaign	
2:00 p.m.–2:15 p.m.	The Microwell-Mesh Culture Device: Studying BMSC Chondrogenesis Using Microtissues , Kathryn Futrega, Ph.D., NIDCR	
2:15 p.m.–2:30 p.m.	A ‘Synovium-on-a-Chip’ for Dissecting the Inflammatory Mechanism Underlying Rheumatoid Arthritis , Ruiqi Chen, New York University	
2:30 p.m.–2:45 p.m.	Protein Corona Impacts Association and Trafficking of Layer-by-Layer Nanoparticles , Simon Douglas-Green, Ph.D., Georgia Institute of Technology/ Emory University	
2:45 p.m.–3:00 p.m.	Customizable 3D Printed Osteoinductive Implants , Todd Heil, Theradaptive, Inc.	
FAES Classroom 2		Women’s Health and Engineering
Moderator: Elizabeth Barr, Ph.D., NIH Office of Research on Women’s Health		
1:30 p.m.–1:45 p.m.	A Multimodal Biosensor to Monitor Pregnancy Health Noninvasively , Thien Nguyen, M.D., National Institute of Child Health and Human Development (NICHD)	
1:45 p.m.–2:00 p.m.	An Insect-Based Bioelectronic Sensor for Detection of Endometriosis , Simon Sanchez, Ph.D., Michigan State University	
2:00 p.m.–2:15 p.m.	Developing a Point-of-Care Cervical Cancer Screening Test Based on TOP2A Protein Detection , Sayeh Dowlatshahi, Purdue University	
2:15 p.m.–2:30 p.m.	In Vivo Oviduct Imaging Uncovers Dynamics and Processes Leading to Pregnancy , Shang Wang, Ph.D., Stevens Institute of Technology	
2:30 p.m.–2:45 p.m.	Lipid Nanobubbles as Delivery Vehicles for Tolerogenic Hybrid Insulin Peptides in a Mouse Model of Autoimmune Diabetes , Mark Ciccaglione, Ph.D., University of Colorado Anschutz Medical Campus	
2:45 p.m.–3:00 p.m.	Bridging Racial Disparity with Non-Invasive, Hand-held Device for Breast Cancer Screening , Pegah Rezaei, M.D., University of Maryland Baltimore County	
FAES Classroom 3		Novel Biomedical Technologies
Moderator: Nicole Morgan, Ph.D., National Institute of Biomedical Imaging and Bioengineering (NIBIB)		
1:30 p.m.–1:45 p.m.	Toward Long-Term Recording of Cell History , Theresa Loveless, Ph.D., Rice University	
1:45 p.m.–2:00 p.m.	Improved Functional Rescue from Peripheral Nerve Injury through Cellular Reprogramming , Ana Salazar Puerta, Ph.D., The Ohio State University	
2:00 p.m.–2:15 p.m.	Using Engineering to Understand the Thyroid Immune Microenvironment , Parinaz Fathi, Ph.D., NIBIB	
2:15 p.m.–2:30 p.m.	Development of Bio-foundry Lines for Advancement of Cell-Tissue-Organ Manufacturing , Martine Behra, Ph.D., Advanced Regenerative Manufacturing Institute	
2:30 p.m.–2:45 p.m.	Light-induced Extracellular Vesicle Adsorption , Colin Hisey, Ph.D., Northwestern University	
2:45 p.m.–3:00 p.m.	Quantifying Steady-State Transport of Water at the Cellular Level with NMR , Nathan Williamson, Ph.D., NICHD	

FAES Classroom 4 Cardio/Vascular Systems

Moderator: Robert Fischer, Ph.D., National Heart, Lung, and Blood Institute (NHLBI)

- 1:30 p.m.–1:45 p.m. **Mechanobiology of hiPSC Cardiomyocytes in Health and Disease**, Beth Pruitt, Ph.D. UC Santa Barbara
- 1:45 p.m.–2:00 p.m. **New Non-Surgical Catheter based Procedures in Patients by Navigating Devices within the Walls of the Beating Heart**, Korel Yildirim, Ph.D., NHLBI
- 2:00 p.m.–2:15 p.m. **Development of a Bone-Marrow-on-a-Chip Model to Study Radiation Exposure Sequelae**, Nicholas Chartrain, Ph.D., Uniformed Services University
- 2:15 p.m.–2:30 p.m. **Investigating the Impact of Non-Myeloablative Hematopoietic Cell Transplantation on Organ Pathology in the Murine Model of Sickle Cell Disease**, Ayotimofe Idowu, NHLBI
- 2:30 p.m.–2:45 p.m. **Development of Hydrogel Carrier and In Vitro Model for Improved Hematopoietic Stem Cell Transplantation**, Mykel Green, Ph.D., Tulane University
- 2:45 p.m.–3:00 p.m. **High-Speed Cardiac Pressure-Volume Simulations Using a Novel Neural Network Finite Element Approach**, Michael Sacks, Ph.D., University of Texas at Austin

FAES Classroom 6 Cancer Therapies and Technologies

Moderator: Matthew Wolf, Ph.D., National Cancer Institute

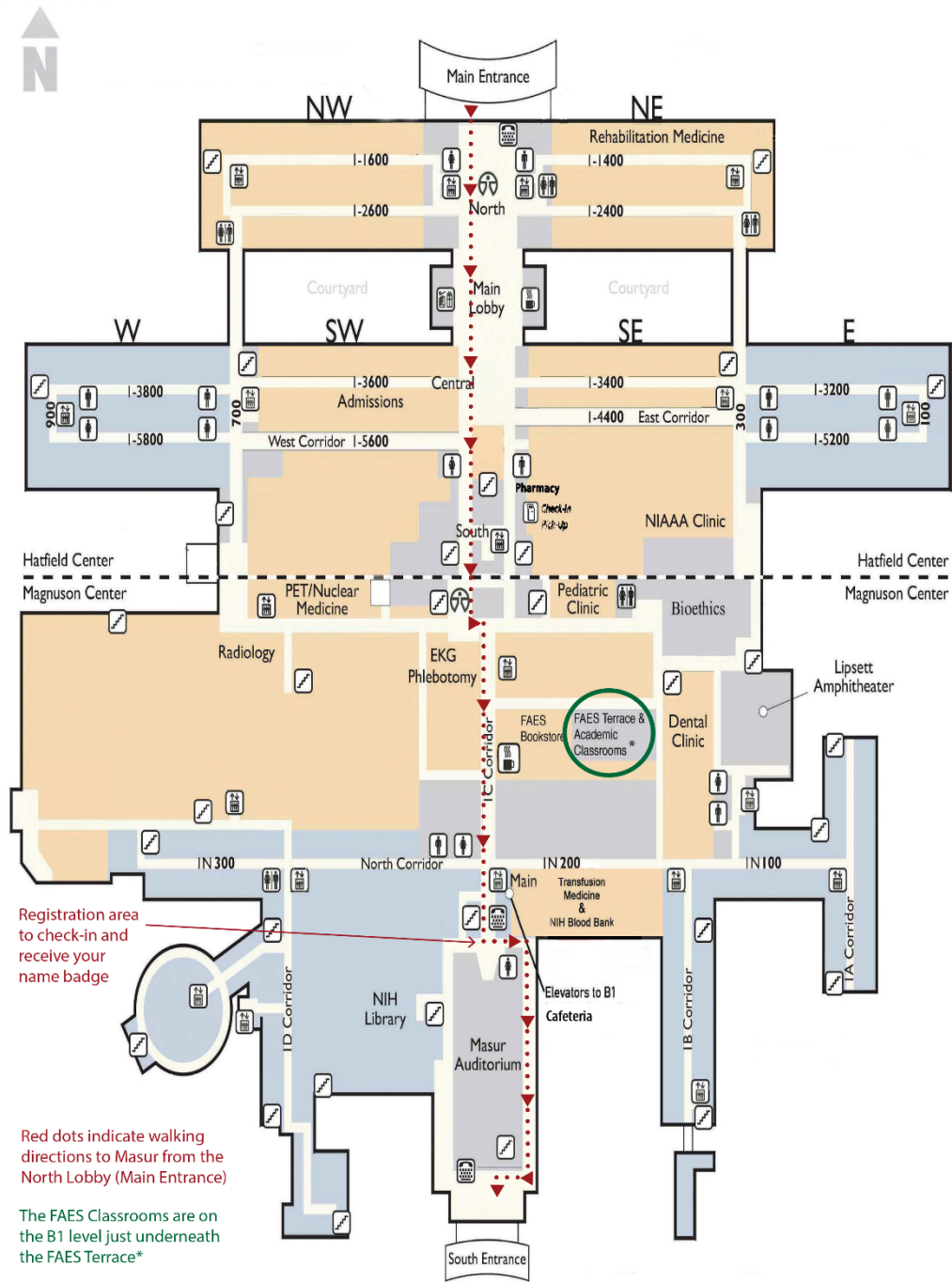
- 1:30 p.m.–1:45 p.m. **Designing Dynamic In Vitro Models of Pancreatic Cancer and Lymphatics**, Catherine Whittington, Ph.D., Worcester Polytechnic Institute
- 1:45 p.m.–2:00 p.m. **Sialic Acid Perturbation Leads to Profound Remodeling of Glycocalyx Architecture and Cellular Mechanics in Pancreatic Cancer Cells**, Andrew Massey, Ph.D., NIBIB
- 2:00 p.m.–2:15 p.m. **A Thermosensitive Gel, Imageable with X-rays and Ultrasound, that can be Injected Directly into Liver Tumors to Minimize the Adverse Effects of Anti-Cancer Agents**, Jose Delgado, Ph.D., Center for Interventional Oncology, Clinical Center, NIH
- 2:15 p.m.–2:30 p.m. **Matrix Stiffness Drives Piezo1 Activity in Oral Cancer Spheroids and Secreted Extracellular Vesicles**, Leyla Esfandiari, Ph.D., University of Cincinnati
- 2:30 p.m.–2:45 p.m. **Engineering Hydrogels to Investigate the Role of Extracellular Matrix Cues on Natural Killer Cell Functions**, Suzanne Lightsey, Ph.D., University of Florida
- 2:45 p.m.–3:00 p.m. **Controlled Delivery of Prodigiosin for Localized and Targeted Triple-Negative Breast Cancer Therapy**, Ali Salifu, Ph.D., Boston College

FAES Classroom 7 Biomedical Imaging

Moderator: Harshad Vishwasrao, Ph.D., NIBIB

- 1:30 p.m.–1:45 p.m. **Surpassing the Diffraction Limit of the Living Human Eye for Improved Resolution in Adaptive Optics Optical Coherence Tomography**, Andrew Bower, Ph.D., NEI
- 1:45 p.m.–2:00 p.m. **Correlation between Stresses and Malignancy Stage of a Patient-Specific Breast Tumor**, Mahsa Dabagh, Ph.D., University of Wisconsin-Milwaukee
- 2:00 p.m.–2:15 p.m. **Micro-Elastography: Mechanics as a Non-Invasive Microscope**, Callan Luetkemeyer, Ph.D. University of Illinois Urbana-Champaign
- 2:15 p.m.–2:30 p.m. **Nature vs. Nurture—Assessing Heritability in the Brain using Diffusion Tensor-based Morphometry on the Human Connectome Project Data**, Rakibul Hafiz, Ph.D., NIBIB
- 2:30 p.m.–2:45 p.m. **MRI Robotics for In-Bore Interventions**, Kevin Cleary, Ph.D., Children's National Hospital
- 2:45 p.m.–3:00 p.m. **Advancing Image-Guided Therapy and Clinical Translation through Robotics and Innovative Devices**, Nobuhiko Hata, Ph.D., Brigham and Women's Hospital and Harvard Medical School

Map of Building 10



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|--------------------|-----------|-------------|
| Patient Areas | Restrooms | Hospitality |
| Research/Lab Areas | Stairs | TTY Phone |
| | Elevators | Coffee Shop |
| | | Gift Shop |

Poster Session 1 Information

12:15 p.m. – 1:00 p.m. (Location: FAES Terrace)

#	Name	Poster Title
Biomaterials		
1	Connie Wen	Aptamer-Functionalized In-Situ Injectable Hydrogel Formation Supported by Elastic Macroporous Matrix
2	David Peeler	Combinatorial Discretization of Ternary Complex Nanoparticle Structure Enables Targeted saRNA Vaccination
3	Ireolu Orenuga	Engineering the 3D Melanoma Tumor Microenvironment in Vitro Using Extracellular Matrix Enhanced Spheroids
4	Jonathan Dorogin	Scaffold-Reinforced Affibody-Conjugated Hydrogels for Tunable Protein Delivery In Vivo
5	Rajith Singh Manan	Novel Biodegradable Lipids for the Highly Potent Delivery of mRNA to the Liver and Genome Editing in Lung Epithelia
6	Michael Buckenmeyer	3D MatriSpheres Recapitulate Tumor Morphology and Phenotypic Heterogeneity
7	Narelli de Paiva Narciso	Injectable Hydrogels for the Delivery of Minicircle-Based Myocardial Infarction Therapy
8	Shue Wang	Engineering Multifunctional Nanoparticles for Mesenchymal Stem Cell Differentiation
9	Tugba Ozdemir	Design and Development of Hyaladherin Biomaterials for Tissue Regeneration
10	Simone Douglas-Green	Protein Corona Impacts Association and Trafficking of Layer-by-Layer Nanoparticles
11	Jorge Almodovar	Polymeric Biomaterials for Tissue Engineering, Cell Manufacturing, and Drug Delivery
Cancer		
12	Chieh-Ren Hsia	3D Bio-Printed Glioblastoma Model Reveals Unique Tumor Subpopulation with Abnormal Chromatin Content
13	Jeffery Yang	Antitumoral Immunity Induced by Ethyl Cellulose-ethanol Ablation to Treat Unresectable Colorectal Cancer Metastases in the Liver
14	Cole Simon	PRMT5 Modulation in the Production of Neoantigens
15	Laila Ghorab	Three-Dimensional Matrix Stiffness Drives Piezo1 Activity in Oral Squamous Cell Carcinoma Spheroids and Derived Small Extracellular Vesicles
16	John Karanian	Translational Development of Therapeutics and Image-Guidance Technology for Treatment of Cancer
17	Suzanne Lightsey	Engineering Hydrogels to Investigate the Role of Extracellular Matrix Cues on Natural Killer Cell Functions
18	Zhixiong Wang	Type I Photosensitizer-Polymersome to Deliver the STING Agonist for Amplifying Cancer Immunotherapy
Cardio/Vascular		
19	Jeremy Hannon	Shear Stress-Mediated Inflammation Regulates BMPRII Expression in the Aortas of Mice with Sickle Cell Disease
20	Julia Frank	Single-Cell RNA Sequencing Data Informs Research on Sickle Cell Disease Arteriopathy
21	Samuel Zhang	Computational Fluid Dynamics of Stenotic Carotid Arteries in Mice with Sickle Cell Disease
22	Sreenidhi Elayaperumal	Histological Confirmation of Disturbed Flow-Induced Protein Expression in Carotid Arteries of Mice with Sickle Cell Disease
23	Yonghui Ding	3D Printing of Multiscale Scaffolds with Microtopography for Guiding Tissue Organization and Regeneration
24	Isha Patel	Endothelial Senescence in Acute and Late COVID-19 Vasculopathy in Pulmonary Artery-on-a-Chip Model
25	Marissa Gionet- Gonzales	Engineering Viscoelastic Hydrogel Platforms for iPSC Cardiomyocytes Culture
26	Mykel Green	Development of Hydrogel Carrier and In Vitro Model for Improved Hematopoietic Stem Cell Transplantation
27	Myong-Hee "Mia" Sung	Understanding the Language of Immunity through NF-κB Signaling
Computational Modeling		
28	Himabindu Kovvali	Quantifying the Intercellular Processes of Ebolavirus Transmission Using Multi-scale Agent-Based Modeling
29	John Mutersbaugh	Evaluating Deep Learning Methods for the Classification of Children With and Without ASD, Using IMU Hand Tracking Data
30	Wenlin Zhang	Atomistic Simulations Reveal the Effective Interactions between Nanoplastics and Lipid Membranes
31	Ashlee Ford Versypt	Systems Biomedicine and Pharmaceuticals Lab: Multiscale Modeling of Tissue Remodeling and Damage

#	Name	Poster Title
32	Yuhua Song	Alzheimer's Disease-Associated Variants Impair Immune Receptor TREM2 Multimerization
33	Saikat Basu	A Mechanistic Model for Inhaled Transmission of Airborne Pathogens for Infection Onset at the Upper Respiratory Tract and Subsequent Bronchial Infection
35	Maya Evohr	Cathepsin Proteolytic Cleavage of SARS-CoV-2 Spike Protein and Identification of Cleavage Sites
Devices and Novel Technologies		
34	Michael Ciccaglione	Lipid Nanobubbles as Delivery Vehicles for Tolerogenic Hybrid Insulin Peptides in a Mouse Model of Autoimmune Diabetes
36	Pegah Rezaei	Bridging Racial Disparity with Non-Invasive, Hand-Held Device for Breast Cancer Screening
37	Sayeh Dowlatshahi	Developing a Point-of-Care Cervical Cancer Screening Test Based on TOP2A Protein Detection
38	Lei Wang	Mastering Cell Fate: Harnessing Synthetic Biology to Sense and Guide Cell State Transitions
39	Joshua Brownlee	RNAScope Technology from Bio-Techne
40	Will Makowski	Solving Bicycle Helmet Fit: Engineering and Entrepreneurship
41	Michelle Kwarteng	Development of a 3D Model System to Characterize the Effect of Oxygenation on Multidrug Resistance
42	Paniz Rezvan Sangsari	Continuing Development of Find-Seq for Gene Expression Analysis of Rare Cell Populations
43	Shengjie "Patrick" Zhai	Beyond Earth: Pioneering Human Reproduction for Interstellar Voyages
Biomedical Imaging		
44	Neysha Martinez-Orengo	[18F]-labeled J3 Nanobody is a Specific PET Tracer for Molecular Imaging of HIV-1 gp120
45	Jianhao Lai	PET imaging of Aspergillus Infection Using Zirconium-89 Labeled Anti- β -glucan Antibody Fragments
46	Nabil Daddaoua	Functional PET Imaging in Awake Macaques
47	Laura Brattain	ULTRA-AIR: Ultrasound Landmark Tracking for Real-time Anatomical Airway Identification and Reliability Check
48	Om Khanal	Timing Performance Studies for Direct Positron Emission Imaging Applications
49	Sara Keller	Towards Image-Guided Treatment of Bacterial Infections Using Bacteriophages
50	Stephen Adler	Description and First Results of the Quantitative Particle Identification Digital (QPID) Autoradiography Device
51	Tahsin Khajah	Novel Pseudo-Differential Methods to Drastically Increase Computational Speed and Accuracy for Biomedical Ultrasound Imaging
52	Amir Gandjbakhche	Exploring the Neural Mechanisms of Motor, Cognitive, and Social Interaction Tasks: Unveiling New Insights through Virtual Reality, Eye Tracking, and fNIRS—A Pilot Study
53	Bryan Ranger	Toward Deep Learning-Based Body Composition Prediction for Newborns using Ultrasound Images
54	Bente van den Bemd	Novel Technologies (Smart Instrumentation and Computer Vision) to Demonstrate a Wide Variety of Procedural Translational Applications
Orthopedic and Neuromuscular Engineering		
55	Srikanya Kundu	3D Bioprinted Addiction Circuitry Models for Drug Screening
56	Sydney Connor	Deciphering Transcriptional Programs of CD8+ T Cells Across Treatment Modalities in Resectable Lung Cancer
57	Amy Curry	Investigating Chronic Pain Following Forelimb Deafferentation in a Rat Model
58	Elizabeth Polydefkis	Instantaneously Adaptive Exoskeleton Control using Predicted Biological Knee Moment: Real-Time Implementation and Validation
59	Fujian Yan	Motion Primitives Learning for Mobility Deficit Diagnosis
60	Madeline Vinal	Biomechanical Effects of Assistive & Resistive Knee Torque during Overground Walking in Children with Cerebral Palsy: A Case Study
NIH Intramural Research Facilities		
61	Castle Kim	BETA Center Makerspace: Open Access Fabrication Resource for NIH
62	Nicole Morgan	Microfabrication for Biomedical Research: Resources in the NIH IRP
63	Harshad Vishwasrao	Advanced Imaging & Microscopy (AIM) Resource: NIH Shared Resource for Cutting Edge Microscopy and Image Computation
64	Jeydi Gonzalez-Guzman	Radiolabeling of Peptides, Nanobodies, and Aptamers for Positron Emission Tomography (PET) Imaging
65	John Kakareka	Instrumentation Development and Engineering Applications Solutions

Poster Session 2 Information

2:45 p.m. – 3:30 p.m. (Location: FAES Terrace)

#	Name	Poster Title
Biomaterials		
1	Clinton Smith	Friend or Foe: Evaluating Biodistribution and Surface Engineering of C. Neoformans for Trojan Horse Drug Delivery to the CNS
2	Iris Baurceanu	Material Characterization and Temporospacial Immune Response to Cryogenically Sintered Extracellular Matrix Particle Scaffolds in Volumetric Muscle Loss Injury
3	Johnson V. John	Modular Aerogels with Tunable Morphology for Accelerated Diabetic Wound Healing
4	Kyungsene Lee	Development of Biomimetic Extracellular Matrix for Cell Spheroid Encapsulation
5	Sanjay Pal	Extracellular Matrix Scaffold Assisted Cancer Vaccine Enhances Anti-Tumor efficacy and Provides Long-Term Protection
6	Vijay Boddapati	Preclinical Dose Response of a Novel Bone Protein, AMP2, to Inform Dose Selection for Human Clinical Trials
7	Yu-Chung “Joshua” Liu	Degree of Hyaluronic Acid Polymer Modification Guides Nascent Protein Deposition and Cell Fate Independent of Hydrogel Mechanics
Biomechanics		
8	Xiaocun Lu	Advancing Cellular Biomechanics, Bioimaging, and Biomaterials with Mechanochemical Tools
9	Uma Paithankar	Extracellular Vesicle (EV) Protein-Coding RNA Cargo Varies with Cell-Culture Mechanical Conditions in Pancreatic Ductal Adenocarcinoma
10	Andrew Robbins	Developing a General Inverse Kinetic Model for Ovine Models of Human Disease
11	Julian Rey	Wave Propagation Analysis in Agarose Gel for Low-Frequency Magnetic Resonance Elastography
12	Kelly Vazquez	Modulation of the β -cell Biomechanical Environment Alters β -cell Function and Actin Remodeling
13	Edivale Muianga	Actomyosin Cortex Remodeling Regulate Multiscale Organization and Mechanical Behavior of Pancreatic Cancer Cells
14	Pablo Fernandez	Structural and Mechanical Profiling of 3D Printed Collagen-Based Scaffolds for Tissue Regeneration and Tumor Organoids
15	Woong Young So	Macrophage Mediated Mesoscale Brain Mechanical Homeostasis Mechanically Imaged via Optical Tweezers & Brillouin Microscopy in Vivo
Cancer		
16	Elizabeth Barker	Hydrogel-Based Platform Technology for Local Drug Delivery of Chemotherapy, Radiation Sensitizers, and Radionuclides for Treatment of Adult and Pediatric Solid Tumors
17	Giana Vitale	Restricted Exchange Environment Chambers: An Engineered, In Vitro System for Modeling Cell-Generated Molecular Gradients in the Breast Cancer Tumor Microenvironment
18	Athenia Jones	PDAC Cell Lines Display Differential Responses to Obese Adipocyte Signaling Under Fibrotic Matrix Conditions in Vitro
19	Shaoli Lin	Heparan Sulfate Chain Modulation: Impact on the Distribution and Dynamics of Glypican-3 on Liver Cancer Cells
20	Grant Meredith	Ultrasound-Based Imaging Biomarkers Exist for Diabetes Mellitus
Cardio/Vascular		
21	Asma Sodager	Pulse Strength and Heart Rate Change in Response to a Breath-Holding Task
22	Han Tran	Real-Time Measurement of Intracellular Oxygen Using Inducible FLIM-FRET Probes: Myoglobin-mCherry and Myoglobin-mScarlet
23	Irene de Lazaro	In Situ Partial Reprogramming of Mouse Cardiomyocytes Induces Their Molecular Rejuvenation and Alleviates Cardiac Failure
24	Jinho Park	Simulated Breathing Patterns Classification Using Two-Stream Convolutional Neural Network for Monitoring of Respiratory Disease
25	Zsolt Ori	Tracking Cardio-Metabolic Health with Biosensors for Improving Insulin Resistance in Primary Care
Devices and Novel Technologies		
26	Aneesh Kshirsagar	Saliva-Based Detection of Triple Respiratory Viruses with Multiplexed RT-LAMP on a Machine Learning-Empowered Portable System

#	Name	Poster Title
27	Aniruddh Sarkar	Antibody-omics to Define Immunological Signatures of Disease State, Outcome and Vaccine and Therapeutic Efficacy
28	Anthony Politza	Development of a Multiplexed LAMP Device for HIV Viral Load Monitoring
29	Heather Kalish	Qualitative Tissue Analysis Using MALDI-TOF
30	Swarnali Roy	Dual Targeting of GPCR Assemblies Using Nanobody- Ligand Conjugates
31	Venkatesh Srinivasan	Non-Invasive Wearable Device for Early Detection of Opioid Induced Respiratory Depression
Microphysiological Systems and Tissue Engineering		
32	Fahimeh Shahabipour	An Image-based Assay Platform to Quantify Cancer Growth in 3D Bioprinted Vascularized Lung Tissues for Drug Screening
33	Hossein Abolhassani	Development of Functional Multi-Organ-on-a-Chip for Salivary Gland Disease Modeling and High-Throughput Drug Discovery
34	Madison Daminato	Development of Microfluidic Models for Sickle Cell Disease Mediated Carotid Artery Remodeling
35	Mandy Esch	Two-organ MPS with Liver and Heart Tissues for Early-Stage Drug Evaluation
36	Parinaz Fathi	Using Engineering to Understand the Thyroid Immune Microenvironment
37	Renita Horton	The Role of Air Pollution on Cardiovascular Health
38	Shayne Frebert	Engineering Spatially Guided Functional 3D Neural Circuits with Agarose-Xanthate Copolymers
39	Yen-Ting Tung	An Engineered Neurovascular Tissue Model with Perfusable Vascular Network for Disease Modeling and Drug Screening
Technology, Education, and Outreach		
40	Cheryl Green	Journeys in Spiritual Health Assessment: A Comparative Analysis of Patients Diagnosed with Cancer and Their Nurses' Stories
41	Jayfus Doswell	JiNi: A Culturally Competent, Empathetic, and Ethical (CCEE) Artificial Intelligent (AI) Student Nurse Instructor
42	John Drazan	Broadening Access to STEM Careers through Musculoskeletal Biomechanics Outreach Programs in Youth Sports
43	Kiara Lee	Expanding Opportunities for Innovators: Barriers and Facilitators to Medical Device Innovation in Peru
44	Rubin Baskir	Connection Through Collaboration: Evaluation of a Co- developed AI/ML Training Program to Increase Underrepresented Researchers in the Biomedical Workforce
Biomedical Imaging		
45	Siyu Huang	Data Augmentation and Adaption for Biomedical Foundation Models
46	Stefan Wilhelm	Expansion Microscopy to Understand Nanoparticle Biodistributions in Their Ultrastructural Context
47	Wilson Poon	Development of Chemical Tags for Universal Lipid Nanoparticle Visualization and Tracking in 2D and 3D Imaging
48	Qingsu Cheng	Improved Nuclei Segmentation by CNN-Modified Encoders in U-Net
49	Liana Hatoum	Bone Marrow Transplant Protects Mice from Sickle Cell-Mediated Large Artery Remodeling
50	Amritha Nayak	Diffusion Tensor Imaging (DTI) in Tissue Characterization of MRgFUS Lesion and its Evolution
51	Ayele H Negussie	Thermochromic Phantom for Characterizing Ablation Devices and Enhancing Minimally Invasive Percutaneous Interventions
52	Brett Setera	Performance of GaN FET in Ultra-High Field MRI Magnets
53	Giorgio Bonmassar	Nanofilm-Traces in EEG Nets for Safe MRI
54	M. Okan Irfanoglu	Diffusion MRI Atlases from the Human Connectome Project Data
55	Swati Shah	Specific Detection and Monitoring of Fungal Infections in Preclinical Models Using 2-deoxy-2- [¹⁸ F]fluorocellobiose
56	Wei-Lun Huang	A Shape-Aware Total Body Photography System for In- focus Surface Coverage Optimization
57	Mazen Mezher	Enhanced Nanoscale Viscoelastic Properties and Force Generation of T Lymphocytes During Immune Synapse Formation
Microphysiological Systems and Tissue Engineering		
58	Kehan Zhang	De Novo Design of RNA Translational Control Elements Using Deep Learning
59	Kristine Jones	Recombinant Plasmodium Circumsporozoite Proteins Demonstrate Functional Conformational Changes
60	Yi Wei Lim	Biofabrication of an Immunocompetent Three- Dimensional (3D) Skin Tissue Equivalent as a Pre- clinical Testing Platform
61	Yuguo Lei	Microbioreactors for Large-Scale Cell Production

#	Name	Poster Title
62	Sung Hee Ko	Rapid Emergence and Adaptive Evolution of Diverse SARS-CoV-2 Variants in Individuals with Advanced HIV Infection
Orthopedic and Neuromuscular Engineering		
63	Pamela Robey	Time- and Cell-Specific Activation of BMP Signaling Restrains Chondrocyte Hypertrophy
64	Charlie Sconiers	Isoform-Specific Function of C. elegans Tau, PTL-1
65	Christina Antich Acedo	Bioprinted Platform as High Throughput Model for Drug Screening and Discovery for Myopathies and Neuromuscular Diseases
66	Dave James	Investigating Lymphatic Disorders, Malignancies & Integrative Management
67	Emma Coltoff	A Multiplanar Kinematic Comparison of Cervical Spine Decompression Surgery Approaches
68	John Clegg	Depot-Based Brain Drug Delivery in Neurological Diseases Indicated for Neurosurgery

Poster Session Floor Plan

