Fourth Annual Alavi-Bradley Symposium on Molecular Imaging and Theranostics

SMC Campus Center
University of Maryland, Baltimore

October 7, 2025

Keynote Address:

Vasken Dilsizian, MD, University of Maryland School of Medicine

Additional Speakers:

Wengen Chen, BM, PhD, MSc, University of Maryland School of Medicine

Sharmila Dorbala, MD, MPH, Harvard Medical School and Brigham and Women's Hospital

Rohan Fernandes, PhD, University of Maryland College Park

Craig Malloy, MD, UT Southwestern Medical Center

Arvind Pathak, PhD, Johns Hopkins University School of Medicine

Sangeeta Ray, MS, PhD, Johns Hopkins University School of Medicine

Albert J. Sinusas, MD, Yale University School of Medicine

Jiadi Xu, MS, PhD, Kennedy Krieger Institute and Johns Hopkins University School of Medicine

The symposium is organized by the Department of Diagnostic Radiology and Nuclear Medicine and made possible by a generous gift from Drs. Abass and Jane Alavi.

The Alavi-Bradley Organizing Committee: Vikas Kundra, MD, PhD (Chair), Vasken Dilsizian, MD, Dirk Mayer, Dr rer nat, Piotr Walczak, MD, PhD, and Dheeraj Gandhi, MBBS

Dear Colleagues:

As the newly appointed Chair of the Department of Diagnostic Radiology and Nuclear Medicine, it is my pleasure, on behalf of the organizing committee, to welcome you to the **Fourth Annual Alavi-Bradley Symposium on Molecular Imaging and Theranostics** at the University of Maryland School of Medicine. This symposium continues our tradition of providing an enriching forum for learning, networking, and the exchange of ideas across institutions, with this year's focus on **cardiac molecular imaging**.

This event is made possible by a generous gift from **Drs. Abass and Jane Alavi** to our department. While they are unable to join us in person this year, they remain strong supporters of our work. I had the privilege of hosting Dr. Alavi during his visit to our Center for Advanced Imaging Research this past September, where he reviewed the submitted abstracts and expressed his enthusiasm for the breadth and quality of the work presented.

We are honored to feature an outstanding program of speakers. Our keynote address will be delivered by **Dr. Vasken Dilsizian**, Division Head of Nuclear Medicine at UMSOM. Joining him are eight distinguished experts: **Dr. Wengen Chen** (UMSOM), **Dr. Sharmila Dorbala** (Harvard), **Dr. Rohan Fernandes** (UMCP), **Dr. Craig Malloy** (UT Southwestern), **Dr. Albert Sinusas** (Yale), and from Johns Hopkins, **Drs. Arvind Pathak, Sangeeta Ray, and Jiadi Xu**. We are grateful to each of them for sharing their expertise and advancing dialogue in this rapidly evolving field.

The organizing committee received numerous abstract submissions, from which five were selected for **oral presentations**. The other abstracts will be presented as posters that can be viewed throughout the day. Full texts of these abstracts can be accessed in the program and on the Alavi-Bradley website.

I extend my sincere thanks to our sponsors for their educational grants and to all who contributed to planning and preparing this year's symposium.

Once again, welcome to the Alavi-Bradley Symposium. I hope you find today's sessions both intellectually stimulating and inspiring.

Sincerely,

Tarek N. Hanna, MD, FASER
Professor and Dean John M. Dennis Chair
Department of Diagnostic Radiology and Nuclear Medicine
University of Maryland School of Medicine

AGENDA

8:00 AM	*Breakfast & Registration* SMC Campus Center Ballroom Reception Area
8:30 – 8:50	*Introduction:* **Vikas Kundra with a message from Abass Alavi**
8:50 – 9:00	*Opening Remarks:* **Mark T. Gladwin, MD,** Dean, University of Maryland School of Medicine, Vice President for Medical Affairs, University of Maryland, Baltimore, John Z. and Akiko K. Bowers Distinguished Professor and Dean
Session One	**Moderator: Vikas Kundra**
9:00 – 9:50	*Keynote Address* **Vasken Dilsizian:** "50 Years of Myocardial Perfusion Imaging"
9:50 – 10:00	*Questions*
10:00 – 10:25	**Sharmila Dorbala:** "Advances in Molecular Imaging of Cardiac Amyloidosis"
10:25 – 10:50	**Wengen Chen:** "FDG PET/CT for Imaging Left Ventricular Assist Device Infection and Predicting Outcome"
10:50 – 11:00	*Round Table* Drs. Dilsizian, Dorbala and Chen
11:00 – 11:20	*Coffee Break and Networking*
Session Two	**Moderator: Dirk Mayer**
11:20 – 11:45	**Jiadi Xu**: "Saturation Transfer MRI: From Molecular Detection to Water Dynamics"
11:45 – 12:10	**Rohan Fernandes:** "Theranostic Applications of Prussian Blue Nanoparticles" applications include oncology
12:10 – 12:35	**Arvind Pathak:** "Neurosurveillance – Insights from Functional Brain Imaging in Awake Animals"
12:35 – 12:45	*Round Table* Drs. Mayer, Xu, Fernandes and Pathak
12:45 – 1:45	*Lunch and Poster Presentations*
Session Three	**Moderator: Vasken Dilsizian**
1:45 – 2:10	**Sangeeta Ray:** "Emerging Directions in PSMA-based Radiotheranostics"
2:10 – 2:35	**Craig Malloy:** "Detecting Mitochondrial Pathways in Human Liver and Heart"
2:35 – 3:00	**Albert Sinusas:** "Image-Guided Interventions: Cardiovascular Theranostics"
3:00 – 3:10	*Round Table* Drs. Dilsizian, Ray, Malloy and Sinusas
3:10 – 3:30	*Coffee break*

Awards Session (Talks from submitted abstracts chosen for podium presentation)

Moderator: Piotr Walczak

3:30 – 3:35 **Lucia Fadon Padilla** (UMSOM) "Engineered Mesenchymal Stem Cells Targeting P2X7 Receptor for Immunomodulation in Traumatic Brain Injury"

3:35 – 3:40 **Shriya Madan** (UMSOM) "Breaking Barriers: A Boosted Osmotic Method for Enhanced Antibody Delivery in Glioblastoma"

3:40 – 3:45 **Kexin Wang** (JHU) "Non-Invasive Monitoring of Brain Metabolic Alterations During Stroke Using Chemical Exchange Saturation Transfer (CEST) MRI: A Multi-Field Study in Two Mouse Models"

3:45 – 3:50 **Safiya Aafreen** (JHU) "Metabolic Glycoengineering Confers CEST MRI Visibility to Extracellular Vesicles"

3:50 – 3:55 **Dillip K. Senapati** (JHU) "Mapping of GABA and Glutamate in Tuberous Sclerosis Complex Using Edited-MRSI"

3:55 – 4:00 *Presentation of Awards*

Panel Discussion

4:00 – 4:30 *Panel discussion on the topic voted by the participants (~5 proposed topics) & Future Directions: All speakers. Moderator: Dr. Kundra*

4:30 – 4:45 *Closing Remarks*

End

This symposium is approved for Continued Medical Education (CME). The University of Maryland School of Medicine has designated this live activity for a maximum of 6.25 AMA PRA Category 1 Credits™. *Physicians should claim only the credit commensurate with the extent of their participation in the activity.*

SPEAKERS

Keynote Speaker: Vasken Dilsizian, MD

Professor, Department of Diagnostic Radiology and Nuclear Medicine
University of Maryland School of Medicine

Dr. Dilsizian has been a professor of radiology and medicine at the University of Maryland School of Medicine since 2001, and chief of the nuclear medicine division since 2007. Prior to moving to the School of Medicine, he spent 13 years at the National Institutes of Health, where he served as the Director of Nuclear Cardiology from 1992 to 2001.

He graduated from Tufts University School of Medicine in 1982. This was followed by Internal Medicine residency at Georgetown University School of Medicine in 1982-85, Fellowship in Cardiology at Boston University Medical Center 1985-87, Nuclear Cardiology Fellowship at Massachusetts General Hospitals 1987-88, and Nuclear Medicine residency at the National Institutes of Health 1991-1992. He is a Diplomate of the American Board of Internal Medicine, Cardiovascular Diseases, and Nuclear Medicine.

He served as the President of the Society of Nuclear Medicine and Molecular Imaging (SNMMI; 2019-2020). He was awarded the 2009 Bruce Roberts Line Award by our own Department for his Outstanding Research, the 2014 Hermann Blumgart Award by the Cardiovascular Council of the SNMMI, the 2023 Taplin Memorial Lecture Award by the SNMMI, and the 2024 Mario Verani Memorial Lecture Award for his innumerable contributions to the science of nuclear cardiology by the American Society of Nuclear Cardiology (ASNC).

He served as the Vice-Chair of the Nuclear Regulatory Commission (NRC) Advisory Committee on the Medical Uses of Isotopes (ACMUI; 2021-2022), and Vice-Chair of the Board of Scientific Counselors of the National Institutes of Health, Clinical Center (2022-2024). He is currently serving on the Maryland Board of Physicians (2024-2027).

He is the Deputy Editor of the Journal of American College of Cardiology - Cardiovascular Imaging, and has published over 295 original, peer-reviewed manuscripts and invited editorials/articles, 11 books, and 51 book chapters.

Title: “50 Years of Myocardial Perfusion Imaging”

Abstract

The greatest interest in the field of nuclear cardiology lies in the new discoveries or in the novel applications of previously approved radiotracers. By targeting small, biologically relevant molecular processes, such as metabolic pathway, receptor biology, or enzyme regulation, nuclear cardiac imaging offers the clearest insight into the unsolved—but in principle solvable—mechanisms for disease processes and/or areas of controversy.

Over the past 50 years, the field of nuclear cardiology has evolved from being subjective to a more objective, digital-based, quantitative technique, providing insight into the physiological and biological processes of cardiovascular disorders and predicting patient outcome. As we enter the golden age of nuclear medicine, the technology used to image myocardial perfusion, metabolism, and molecular targets has made major leaps from planar to singlephoton emission computed tomography (SPECT) and then to a more contemporary rapid SPECT, positron emission tomography (PET), and hybrid SPECT-computed tomography (CT), PET-CT, and PET–magnetic resonance imaging (MRI) techniques. Whole body PET scanners can now add even more functionality to these techniques. In parallel, radiotracers have succeeded from planar potassium-43 and red blood cell–tagged blood pool imaging to SPECT thallium-201 and technetium-99m (99mTc)- labeled perfusion tracers, PET rubidium-82, 13N-ammonia, and, more recently, 18F-flurpiridaz perfusion tracers, glucose metabolism with 18F-fluorodeoxyglucose (18F-FDG), and several new molecular imaging targets, such as early detection of transthyretin cardiac amyloidosis, cardiac fibrosis using fibroblast activation protein inhibitors (FAPIs), and plaque activity using NaF. Beyond the well-established diagnostic value of visual interpretation of myocardial perfusion studies with SPECT and PET, emerging data suggests the incremental prognostic value of absolute myocardial blood flow and myocardial flow reserve in patients with suspected coronary artery disease. By acquiring dynamic, gated myocardial perfusion data, PET studies provide insight into reduction of regional myocardial blood flow due to focal or diffuse epicardial coronary artery disease and microvascular and/or endothelial dysfunction. As in patients with epicardial coronary artery disease, the degree of vasodilator capacity of the coronary circulation and microvascular dysfunction are also predictive of future cardiovascular outcome in patients with hypertrophic cardiomyopathy or with nonischemic dilated cardiomyopathy.

Pairing nuclear medicine techniques with artificial intelligence (AI) is likely to be the next revolution, allowing high throughput, denoised images, better diagnosis, and improved risk stratification, especially when one can use explainable AI. Judging by the current advances and rich history of the field of nuclear cardiology, many groundbreaking innovations and key discoveries lie ahead that are even more exciting than those of the past.

Reference:

Dilsizian V, Chandrashekhar Y. What is New and Novel in Nuclear Cardiology. J Am Coll Cardiol Img 2025; July issue; 18(7): 848-51.

Learning Objectives:

1. Understand the history and progress of the field of nuclear cardiology, from the early development and application of myocardial perfusion tracers to the advancement of imaging technology.
2. Learn differences between planar, single-photon emission computed tomography (SPECT) and positron emission tomography (PET) instrumentation.
3. Explain the properties of SPECT and PET myocardial perfusion tracers, mechanisms of uptake, image display, and interpretation.
4. Describe the role of SPECT and PET for detection of coronary artery disease (CAD), risk stratification, and patient management.

Sharmila Dorbala, MD, MPH
Professor of Radiology, Harvard Medical School
Director of Nuclear Cardiology, Brigham and Women's Hospital

Dr. Dorbala is Director of Nuclear Cardiology, Brigham and Women's Hospital, and Professor of Radiology, Harvard Medical School, in Boston, MA. Dr. Dorbala is a cardiovascular imaging specialist with clinical expertise in nuclear cardiology and echocardiography. Dr. Dorbala is passionate about teaching nuclear cardiology and cardiac PET. She has received the Eugene Braunwald Teaching Award from the Brigham and Women's Hospital and a Research Mentorship Grant from the NIH. Dr. Dorbala has served as a past President of the Cardiovascular Council of the SNMMI and the ASNC. She is a Senior Associate Editor of the Journal of Nuclear Cardiology and an Associate Editor of Journal of Nuclear Medicine. Dr. Dorbala's research is focused on amyloidosis and has been funded by the NIH, AHA, Foundation and Industry grants. She has published >300 papers.

Title: "Advances in Molecular Imaging of Cardiac Amyloidosis"

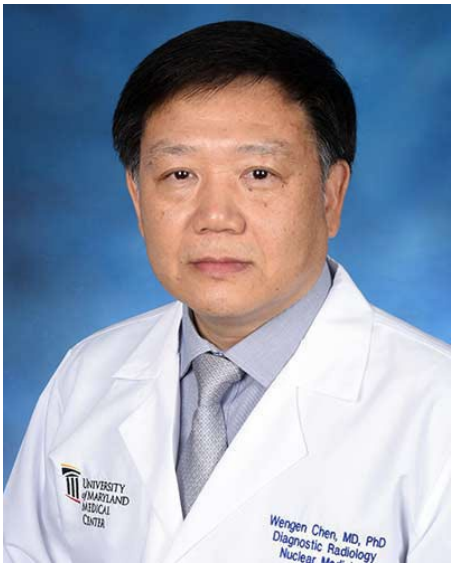
Abstract

Cardiac amyloidosis comprises a group of protein misfolding disorders characterized by the deposition of amyloid fibrils in the myocardial extracellular space, leading to progressive cardiac dysfunction and high mortality. In this talk, I will highlight recent developments in molecular imaging techniques, with a particular focus on amyloid PET radiotracers. I will explore their emerging role in the diagnosis, risk stratification, and therapeutic monitoring of cardiac amyloidosis. I will focus on the application of PET imaging in light chain (AL) amyloidosis, transthyretin (ATTR) amyloidosis, and less common amyloid subtypes. I will also present an overview of two ongoing phase 3 clinical trials evaluating novel amyloid PET tracers for the diagnosis of cardiac amyloidosis. Finally, I will discuss the need for further research in broader, unselected patient populations to fully define the clinical utility and optimize the integration of amyloid PET imaging into routine care.

Learning Objectives:

1) Discuss novel PET radiotracers to image cardiac amyloidosis
2) Review the emerging role of PET tracers in light chain cardiac amyloidosis
3) Discuss the future role of PET tracers in transthyretin and other forms of cardiac amyloidosis

Wengen Chen, BM, PhD, MSc
Professor, Department of Diagnostic Radiology and Nuclear Medicine
University of Maryland School of Medicine



Dr. Wengen Chen is a professor and the Director of the Nuclear Medicine Residency Program in the Department of Diagnostic Radiology and Nuclear Medicine, at the University of Maryland School of Medicine. Dr. Chen's research interest is in the molecular imaging of atherosclerosis, and PET/CT imaging of cardiac device infection. He has a unique combination of extensive experiences in both basic science research and molecular imaging of atherosclerosis and infection. He has published more than 100 original papers and review articles. Dr. Chen was a Board of Directors of the American Board of Nuclear Medicine and served on the Cardiovascular Council of the SNMMI. He is the post President of the Mid-Eastern Chapter of the SNMMI.

Title: "FDG PET/CT for Imaging Left Ventricular Assist Device Infection and Predicting Outcome"

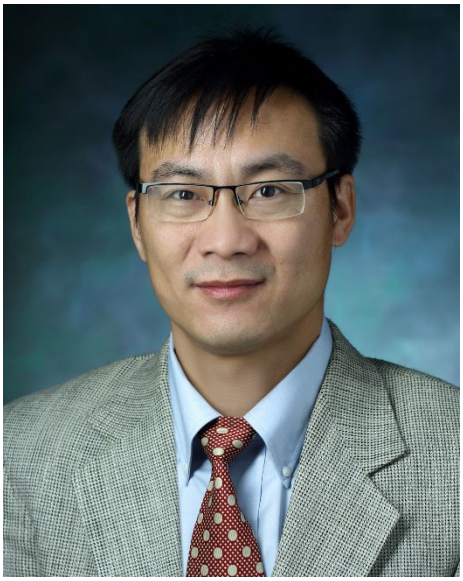
Abstract

Left ventricular assist device (LVAD) is increasingly used as both bridge to heart transplant and as destination therapy for heart failure patients. Infection is one of its main complications, and early diagnosis of infection is critical for patients' management and improved outcomes. Conventional imaging modalities such as echocardiography and CT are limited in this application due to artifacts. As a functional imaging tool, FDG PET/CT has shown promising roles in the early diagnosis of LVAD infection, guiding management and predicting outcomes.

Learning Objectives:

1. To understand what a Left Ventricular Assist Device (LVAD) is and its clinical applications
2. To explore the role of FDG PET/CT in diagnosing LVAD-related infections
3. To evaluate the utility of FDG PET/CT in predicting outcomes of LVAD infections

Jiadi Xu, PhD
Associate Professor, Kennedy Krieger Institute & Department of Radiology, Johns Hopkins University



Jiadi Xu, PhD, is an Associate Professor at the Kennedy Krieger Institute and in the Department of Radiology at the Johns Hopkins University. He earned his PhD from the University of Manitoba, Canada, and completed postdoctoral training at the University of Michigan. As an MR physicist, Dr. Xu has dedicated his career to the development of NMR and MRI techniques for investigating a wide range of biological systems. His current research focuses on advancing chemical exchange saturation transfer (CEST) MRI for probing brain protein metabolism, as well as developing spin labeling methods to noninvasively study cerebrospinal fluid (CSF) production and flow.

Dr. Xu has authored over 150 peer-reviewed journal articles, holds an h-index of 48, and has accumulated more than 8,000 citations. In recognition of his contributions to the field, he received the Distinguished Investigator Award from the Academy for Radiology & Biomedical Imaging Research. He currently serves as Chair of the ISMRM Chemical Exchange Saturation Transfer (CEST) Study Group.

Title: "Saturation Transfer MRI: From Molecular Detection to Water Dynamics"

Abstract

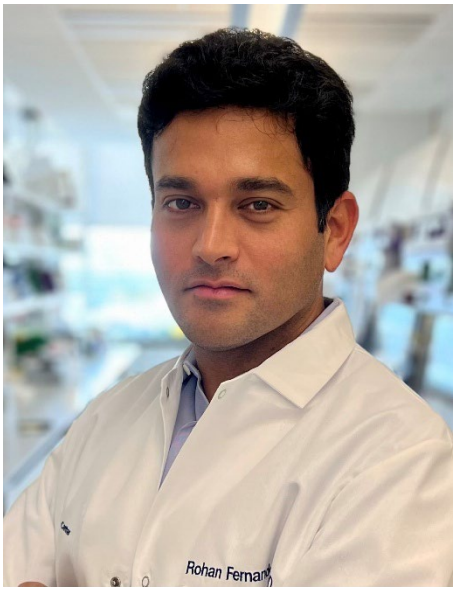
In this presentation, I will demonstrate how high-resolution mapping of phosphocreatine (PCr) and creatine (Cr) in the brain and muscle can be achieved using a type of saturation transfer MRI: Chemical Exchange Saturation Transfer (CEST) MRI. PCr and Cr are essential energy metabolites that play a central role in cellular energy buffering and transport, particularly in tissues with high and fluctuating energy demands such as the brain and skeletal muscle. Non-invasive mapping of these metabolites provides critical insight into cellular energetics and enables in vivo evaluation of mitochondrial function. Beyond molecular imaging, I will also discuss how saturation transfer-based spin labeling techniques can be used to detect cerebrospinal fluid (CSF) secretion and circulation through the recently characterized glymphatic system. Applications of saturation transfer MRI in stroke, brain tumors, and neurodegenerative diseases will also be explored.

Learning Objectives:

1. Understand the principles of CEST MRI and how it enables high-resolution mapping of phosphocreatine (PCr) and creatine (Cr) in brain and muscle tissue

2. Explore the application of MT-based spin labeling techniques for assessing cerebrospinal fluid (CSF) secretion and glymphatic circulation
3. Review clinical and preclinical applications of saturation transfer MRI in stroke, brain tumors, and neurodegenerative diseases

Rohan Fernandes, PhD
Associate Professor, Fischell Department of Bioengineering
University of Maryland College Park



Rohan Fernandes, PhD is a tenured Associate Professor who joined the faculty of the Fischell Department of Bioengineering at the University of Maryland College Park in September 2025. Dr. Fernandes' research lab will be located at the Edward and Jennifer St. John Center for Translational Engineering and Medicine in the 4MLK building in Baltimore. Dr. Fernandes completed a PhD in Bioengineering from the University of Maryland College Park and a postdoctoral fellowship from Johns Hopkins University. His research focuses on immunoengineering approaches to treat cancer and other diseases. More specifically, his research group has developed theranostic Prussian blue nanoparticles that can be used to elicit potent treatment responses from the immune system. Dr. Fernandes' research has been supported through multiple grants from the NIH (NCI and NIAID), DoD, and foundations such as the Alex's Lemonade Stand Foundation for Childhood Cancer. His research has been published in prestigious peer-reviewed journals, including Nature Nanotechnology, Small, and Clinical Cancer Research. Dr. Fernandes has previously served as President of the Society for Thermal Medicine (2022-23) and serves on the Editorial Board of Science Advances (2023-2026) and The International Journal of Hyperthermia (2022-present). He is also Founder and CEO of the startup ImmunoBlue, LLC that is presently funded by an NCI STTR Phase I grant for developing an immunoengineered T cell therapy for glioblastoma.

Title: "Theranostic Applications of Prussian Blue Nanoparticles"

Abstract

Prussian blue nanoparticles (PBNPs) represent a flexible and potent theranostic platform well-suited for molecular imaging-guided cancer treatment. The modular structure of PBNPs allows for incorporation of imaging contrast elements, surface biofunctionalization for targeting, and use as photothermal therapy (PTT) agents. In the early work by my group (Dumont et al.; 2014), we engineered core-shell PBNPs doped with paramagnetic ions (e.g. manganese, gadolinium) that enable both MRI (T1 and T2 contrast) and fluorescence imaging. The PBNPs were biofunctionalized with targeting ligands e.g. antibodies, evaluated in vitro, and in orthotopic pediatric brain tumor models (evaluating biodistribution, organ/brain uptake, etc.). These studies demonstrated the multimodal molecular imaging capability of this PBNP platform. More recently (Olsson et al.; 2025), we have advanced the therapeutic side of the PBNP platform using ultrasound-guided interstitial photothermal therapy (US I-PTT). In this study, PBNPs were injected into neuroblastoma tumors, and an interstitial laser diffuser was placed under ultrasound

guidance to activate PBNPs thereby generating photothermal heating. Using US image guidance, PTT placement accuracy was improved compared to non-image-guided delivery, which translated to better tumor regression, tumor-free survival, and long-term survival in mouse models. In this talk, I will describe these imaging and therapy capabilities of PBNPs in enhancing delivery precision, and improving therapeutic outcomes. I will also discuss the translational potential of PBNP theranostics, design trade-offs, and challenges to clinical implementation.

Learning Objectives:

1. Describe the design features of Prussian blue nanoparticles that allow multimodal molecular imaging, specifically, MRI (T1 & T2) and fluorescence, and the strategies used to target brain tumors.
2. Summarize the in vitro and in vivo imaging results, including biodistribution and imaging specificity in pediatric brain tumor models.
3. Explain the methodology and advantages of ultrasound-guided interstitial photothermal therapy (US I-PTT) using PBNPs, compared to non-image-guided delivery.

Arvind P. Pathak, PhD
Professor, Depts. of Radiology, Biomedical and Electrical Engineering
The Sidney Kimmel Comprehensive Cancer Center
The Institute for NanoBioTechnology
The Institute for Computational Medicine
Translational Tissue Engineering Center
The Johns Hopkins University School of Medicine

Dr. Pathak is Professor of Radiology, Biomedical, and Electrical Engineering at Johns Hopkins University. He is a globally recognized expert in biomedical imaging and an award-winning educator and mentor. At Hopkins, he is also a member of the Sidney Kimmel Comprehensive Cancer Center, the Institute for NanoBioTechnology, the Institute for Computational Medicine, and the Translational Tissue Engineering Center. His distinguished track record of interdisciplinary research and collaboration includes multiple awards, continuous NIH funding, patents, industry partnerships, and high-impact publications. Dr. Pathak has held various leadership positions in imaging and bioengineering. He holds a BS in Electronics Engineering from the University of Poona, India, and obtained his Ph.D. in Functional Imaging from the joint biomedical engineering program between the Medical College of Wisconsin and Marquette University, where he was a Whitaker Foundation Fellow. He completed a postdoctoral fellowship in Molecular Imaging at the Department of Radiology at the Johns Hopkins University School of Medicine. Dr. Pathak is committed to mentoring the next generation of leaders in imaging, and has mentored over 120 prizewinning students, staff, and faculty. He was recognized as a *125 Hopkins Hero* for his dedication to education, research, and patient care.

Title: "Neurosurveillance – Insights from Functional Brain Imaging in Awake Animals"

Abstract

This seminar will highlight how new advances in hardware, software, and "wetware" tools are making "image-based systems biology" a reality. I will describe a new multimodality and multiscale imaging pipeline called "VascuViz", specifically designed for vascular systems biology applications. Next, I will showcase how the design of mini-microscopes or "miniscopes" for neuroimaging in awake, freely moving animals is providing invaluable insights into the brain's functioning in health and disease. The seminar will culminate with an illustration of how "neurosurveillance" in preclinical models with long-term wireless imaging is transforming our understanding of CNS disease evolution. In essence, this

seminar will reveal how advances in multiscale imaging, data visualization and computing, in conjunction with novel preclinical disease models are ushering in an era of image-based systems biology and shaping molecular imaging's next frontier.

Learning Objectives:

At the end of the talk, attendees will be able to answer:

1. What is image-based systems biology?
2. What is "wetware"?
3. What is neurosurveillance?

Sangeeta Ray, MD, PhD
Associate Professor of Radiology and Radiological Science
Johns Hopkins School of Medicine

Sangeeta Ray, PhD is an Associate Professor in the Department of Radiology and Oncology at Johns Hopkins University School of Medicine and a faculty member of the Kidney Cancer Research Program at Johns Hopkins University. She also holds a joint appointment at the Kennedy Krieger Institute. Her research spans the design and synthesis of novel radiopharmaceuticals, preclinical validation in small-animal PET/MRI models, and translational applications in radiotheranostics. She has particular expertise in prostate-specific membrane antigen (PSMA)–targeted imaging and therapy, advancing both diagnostic radiotracers and therapeutic isotopes to improve patient outcomes. In addition, her work explores new linker chemistries, radiometals, and novel combination therapy strategies to optimize efficacy while reducing toxicity. Dr. Ray has published extensively in the fields of radiopharmaceutical chemistry, molecular imaging, and targeted radionuclide therapy, and has contributed to the preclinical development of theranostic agents now in clinical trials. Through her translational research, she aims to expand the theranostics paradigm beyond prostate cancer to other tumor types and molecular targets.

Title: "Emerging Directions in PSMA-based Radiotheranostics**"**

Abstract

This talk will introduce theranostics as a combined diagnostic and therapeutic platform, highlighting the clinical success of PSMA-targeted radiotherapy, including 177Lu-PSMA and the VISION trial. While the field has matured rapidly, exciting new directions are emerging. These include alpha therapies (225Ac-PSMA, 212Pb-PSMA), novel isotopes (161Tb, 47Sc, Auger emitters), and innovative chemistry to improve pharmacokinetics and to reduce salivary gland radiotoxicity. Advances in combination strategies with immunotherapy, and DNA damage repair inhibitors will also be discussed. Beyond prostate cancer, the talk will explore PSMA expression in other tumor types and the adaptation of the theranostics paradigm to additional targets such as FAP, paving the way for next-generation multivalent radiotheranostics.

Learning Objectives:

1. Understand the principles of radiopharmaceuticals, radiotheranostics and review the clinical success of PSMA-targeted radiotheranostics.
2. Describe emerging therapeutic strategies, including alpha emitters, novel isotopes, and linker/ligand innovations to improve efficacy and reduce toxicity.
3. Discuss the potential of combination therapies that integrate PSMA theranostics with immunotherapy, PARP inhibitors, and DNA repair inhibitors.
4. Recognize opportunities for expanding theranostics beyond prostate cancer to other tumor types and non-PSMA molecular targets (e.g., FAP etc.).
5. Evaluate future directions and challenges in translating next-generation radiotheranostics

Craig Malloy, MD
Professor & Medical Director of the Advanced Imaging Research Center
Richard A. Lange Chair in Cardiology
UT Southwestern Medical Center

Craig Malloy received his bachelor's degree in chemistry from Stanford University and an MD degree from the University of California at San Francisco. An internal medicine residency at Parkland Hospital in Dallas was followed by further clinical and research training at Harvard and Oxford. During his research training, he worked on NMR spectroscopy of cardiac and liver metabolism, interests which have continued throughout his career. Dr. Malloy is a practicing cardiologist. He is currently Professor of Internal Medicine and Radiology at UT Southwestern Medical Center.

Title: "Detecting Mitochondrial Pathways in Human Liver and Heart**"**

Abstract

Life depends on metabolism of carbon-containing compounds. Consequently, indirect or preferably direct imaging of carbon biochemistry in enzyme-catalyzed reactions in humans is an important but challenging goal for physiologists and clinicians. Imaging carbon metabolism using magnetic resonance methods is severely limited by the low concentration of metabolites and the low sensitivity of the relevant nucleus, ^{13}C. Methods to improve MR sensitivity for detection of ^{13}C have been known for many decades, and more recently have been applied for human patients. Numerous common disorders are thought to be caused by or result in dysfunction of mitochondria. For example, pyruvate carboxylation may be increased in patients with fatty liver, contributing to excess hepatic gluconeogenesis. It has been proposed that the appearance of HP [^{13}C]bicarbonate from [1-^{13}C]pyruvate in the liver provides a direct measure of pyruvate carboxylation, and therefore an index of gluconeogenesis. This hypothesis was tested in patients with a range of liver fat. A second example is energy production in the heart of patients with severe coronary artery disease. Among these patients, it is generally accepted that preserved glucose uptake in the myocardium helps to identify patients who will benefit from revascularization. However, careful prospective clinical trials have been disappointing, perhaps because current methods do not directly detect a key pathway for energy production in the myocardium, flux through mitochondrial pyruvate dehydrogenase, PDH. The feasibility of monitoring PDH activity in patients with severe coronary artery disease

was evaluated. It is well-established that investigation of metabolism in human patients, some with severe disease, is safe using hyperpolarized [1-^{13}C]pyruvate. The major barrier to obtaining impactful clinical information is the limited signal with current approaches.

Learning objectives:

1. Explain why hyperpolarization methods are needed to image central carbon metabolism in patients.
2. Explain why excess pyruvate carboxylation may be important for patients with fatty liver.
3. Identify one key metabolic pathways in carbohydrate metabolism that is detected and one key pathway that is missed by [^{18}F]fluoro-deoxyglucose.
4. Identify one critical limitation in current clinical hyperpolarization methods and one possible solution.

Albert J. Sinusas, MD
Professor of Medicine and Radiology and Biomedical Imaging, Yale University School of Medicine
Professor of Biomedical Engineering, Yale University

Dr. Sinusas is Professor of Medicine and Radiology and Biomedical Imaging, Yale University School of Medicine, Professor of Biomedical Engineering, Yale University, and Director of the Yale Translational Research Imaging Center (Y-TRIC), and Director of Advanced Cardiovascular Imaging at Yale New Haven Hospital. He received his undergraduate degree at Rensselaer Polytechnic Institute, and MD degree at University of Vermont, College of Medicine, and trained in internal medicine at University of Oklahoma, and cardiovascular medicine at University of Virginia. He is board certified in Medicine, Cardiovascular Medicine, Nuclear Cardiology, and Cardiovascular CT. Dr. Sinusas is currently on the Board of Directors of the Cardiovascular Council (CVC) of the Society of Nuclear Medicine (SNM) and previously chaired the NIH Medical Imaging Study Section (MEDI) and Clinical Translational Imaging Science (CTIS) study sections. His research is directed at development, validation, and application of non-invasive cardiovascular imaging approaches for the assessment of cardiovascular pathophysiology, including the targeted molecular assessment of myocardial ischemic injury, post-infarction atrial and ventricular remodeling, peripheral artery disease, and cardiopulmonary disease. His research involves the translation of multi-modality imaging from animal models of cardiovascular and cardiopulmonary disease to humans. Dr. Sinusas is the principal investigator of several NIH grants involving multi-modality cardiovascular imaging, and directs a NIH funded T32 grant providing training in multi-modality molecular and translational cardiovascular imaging. He is the author of over 350 peer reviewed publications and invited reviews related to cardiovascular imaging, and co-edited a textbook entitled *Cardiovascular Molecular Imaging* published in 2007 and *Hybrid Imaging in Cardiovascular Medicine* in 2018.

Title: “Image-Guided Interventions: Cardiovascular Theranostics”

Abstract

There has been tremendous growth in the field of injectable biomaterials or polymers for treating myocardial infarction (MI) and ischemic heart disease. Experimental studies have demonstrated that limiting MI expansion with the introduction of biomaterials that affect

mechanical properties of the left ventricle can significantly attenuate post-MI remodeling. The use of these injectable materials has resulted in improvements in cardiac function, reduction of infarct size, and increased angiogenesis. These approaches have advanced from rodent studies to large animal models, and recently to early clinical trials. These hydrogels alter the microenvironment and can be used to provide local and sustained delivery of therapies to the heart, including drugs, gene therapy, cell therapy, microRNAs, and exosomes. We have demonstrated that epicardial delivery of bioresponsive and shear-thinning hydrogels offers safety advantages over endocardial delivery, reducing the risk of systemic embolization and improved feasibility. We are developing novel image-guided approach for the percutaneous delivery of therapeutic hydrogels and employing targeted molecular imaging to identify critical pathways by which these hydrogels influence post-MI remodeling. We have been using multimodality and multi-isotope SPECT imaging to evaluate changes in myocardial perfusion and function, inflammation, activation of reactive oxygen species (ROS), angiogenesis, matrix metalloproteinases, and fibroblast activation following MI and the effects of local hydrogel therapy.

Learning Objectives:

1. Role of molecular imaging in evaluation of novel therapy to the heart
2. Overview of the modes of administration of therapy to the heart
3. Define the role of multi-modality imaging for image guided delivery of therapeutics
4. Role of hydrogels for local delivery of therapeutics to the heart
5. Review of the components and use of a hybrid interventional suite

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Engineered Mesenchymal Stem Cells Targeting P2X7 Receptor for Immunomodulation in Traumatic Brain Injury

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Radiolabeling of Human Mesenchymal Stem Cells for Intra-arterial Brain Delivery to Treat Stroke

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CellposeCellCounter: A Web-Based AI-Driven Platform for Automated Cell Counting and Viability Assessment

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Breaking Barriers: A Boosted Osmotic Method for Enhanced Antibody Delivery in Glioblastoma

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High-Temporal-Resolution Monitoring of Cr and PCr Dynamics in Skeletal Muscle by CEST MRI at 3T

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Non-Invasive Monitoring of Brain Metabolic Alterations During Stroke Using Chemical Exchange Saturation Transfer (CEST) MRI: A Multi-Field Study in Two Mouse Models

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Engineering Extracellular Vesicle-Liposome Hybrids to Support Pancreatic Islet Transplantation in Type 1 Diabetes Treatment

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Microneedle Array Enables Broader Cortical Dispersion Compared with Hamilton Syringe

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In Vivo Imaging the Onset of Hypoperfusion in Mouse Brain Enabled by Remotely Controlled Micro-balloons

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Rapid Tissue–CSF Water Exchange in the Human Brain Revealed by Magnetization Transfer Indirect Spin Labeling (MISL) MRI

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