4th ICP Network Symposium
Physiological and Functional MRI of the Brain: Emerging Techniques and Clinical Applications

September 13-15, 2019

Chevy Chase Bank Conference Center
The Sheikh Zayed Tower
The Johns Hopkins Hospital
Baltimore, Maryland

This activity has been approved for *AMA PRA Category 1 Credits™.*

DESCRIPTION

This symposium will discuss recent advances in physiological and functional MRI techniques, challenges and limitations, and their applications in basic and clinical neuroscience.

WHO SHOULD ATTEND

This activity is intended for scientists and clinicians interested in MRI imaging techniques for brain function, physiology and diseases.

OBJECTIVES

After attending this activity, the participant will demonstrate the ability to:

- List typical brain physiological and functional parameters that can be obtained with advanced MRI.
- Describe available approaches to measure brain blood supply using MRI and their potential strengths and limitations.
- Explain techniques to probe brain function, both under resting-state and under a task.
- Outline MRI techniques to probe molecular properties of the brain.
- Illustrate clinical applications of physiological and functional MRI techniques.

ACCREDITATION STATEMENT

The Johns Hopkins University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

CREDIT DESIGNATION STATEMENT

The Johns Hopkins University School of Medicine designates this live activity for a maximum of 9.5 *AMA PRA Category 1 Credits™.* Physicians should claim only the credit commensurate with the extent of their participation in the activity.

OTHER CREDITS

The Johns Hopkins University has approved this activity for 9.5 **contact hours for non-physicians.**

POLICY ON SPEAKER AND PROVIDER DISCLOSURE

It is the policy of the Johns Hopkins University School of Medicine that the speaker and provider globally disclose conflicts of interest. The Johns Hopkins University School of Medicine OCME has established policies in place that will identify and resolve conflicts of interest prior to this educational activity. Detailed disclosure will be made prior to presentation of the education.

GENERAL INFORMATION

REGISTRATION

September 13, 2019 • 8:00 a.m. – 8:30 a.m.

LOCATION

Chevy Chase Bank Conference Center
The Sheikh Zayed Tower
The Johns Hopkins Hospital
1800 Orleans Street, Main Level
Baltimore, Maryland 21287

The Sheikh Zayed Tower is located on Orleans Street between Broadway and Wolfe Streets. Directions and campus parking information are available on our website under the Contact Us tab at https://HopkinsCME.cloud-cme.com. The closest garage is the Orleans Street Garage, which is located on Orleans Street (Route 40) between Wolfe Street and Broadway. Handicapped parking is also available in the McElderry Street Garage. Johns Hopkins is smoke free.

FEES

Register Online: https://hopkinscme.cloud-cme.com/aph.aspx?P=5&EID=18027

Methods of Payment: We require full payment prior to the start of the activity. On-site payments by credit card only. The registration fee includes continental breakfasts, refreshment breaks, lunches, and one dinner.

Faculty/Physicians/Scientists/Staff.....$300

Residents/Fellows/Students/Postdocs/Other Trainees.....$100

You will receive a confirmation by e-mail. If you have not received it by September 7, 2019, call (410) 502-9636 to confirm that you are registered. A transcript of attendance will be available upon attestation of your credit hours and submission of the post activity online evaluation. The Johns Hopkins University reserves the right to cancel or postpone any activity due to unforeseen circumstances. In this event, the University will refund the registration fee but is not responsible for travel expenses. Additionally, we reserve the right to change the venue to a comparable venue. Under such circumstances registrants will be notified as soon as possible.

LATE FEE AND REFUND POLICY

A $50 late fee applies to registrations received after 5:00 p.m. ET on September 7, 2019. A handling fee of $50 will be deducted for cancellation. Refund requests must be received by fax or mail by September 7, 2019. No refunds will be made thereafter. Transfer of registration to another Johns Hopkins activity in lieu of cancellation is not possible.

HOTEL AND TRAVEL INFORMAITON

Residence Inn Baltimore at the Johns Hopkins Medical Campus
Phone: (443) 524-8400
800 North Wolfe Street
Baltimore, Maryland 21205

HOTEL RESERVATION CUT-OFF DATE: August 13, 2019

The Residence Inn Baltimore is located on the Johns Hopkins Medical Campus. Make your reservation by clicking here or call the hotel directly and specify that you are attending the **Johns Hopkins ICP Network Symposium** to receive the special group rate of $149.00 for one bedroom king suite, plus tax. On-site parking is available at the hotel at an additional charge. Check-in time is 4:00 p.m. Check-out time is 12:00 p.m.

SOCIAL EVENT

A dinner for registrants and faculty will be held at the Residence Inn Baltimore at the Johns Hopkins Medical Campus on Friday, September 13, 2019 from 6:00 p.m. – 8:00 p.m. Please indicate your attendance on the registration form.

HOW TO OBTAIN CREDIT

Post activity, an online evaluation will be available to attendees to evaluate the activity and individual presentations and to identify future educational needs. Upon completion of the evaluation, the learner must attest to the number of hours in attendance. Credits earned will be added to the learner's transcript and immediately available for print. The last day to access the evaluation and attest to your credits is **October 30, 2019**.

An outcome survey will be sent to all physician attendees within two months post activity to assist us in determining what impact this activity had on the learner's practice.

EMERGENCY CALLS

On September 13-15, 2019, direct emergency calls to the Hopkins registration desk, (443) 287-5426. Messages will be posted for participants.

AMERICANS WITH DISABILITIES ACT

The Johns Hopkins University School of Medicine fully complies with the legal requirements of the ADA and the rules and regulations thereof. *Please notify us if you have any special needs.*

SYLLABUS

The syllabus will be accessible online and via your mobile device in the CloudCME App prior to the activity. All registrants will receive a program and paper for note-taking.

TO REGISTER OR FOR FURTHER INFORMAITON

Register Online..... https://hopkinscme.cloud-cme.com/aph.aspx?P=5&EID=18027
Register by Phone.....(410) 502-9636
Register by Fax.....(866) 510-7088
Confirmation/Certificates/Transcripts.....(410) 502-9636
General Information.....(410) 955-2959
E-mail the Office of CME.....cmenet@jhmi.edu

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Organization Code: HopkinsCME

For website and CloudCME mobile app technical difficulties, email:
cmetechsupport@jhmi.edu

For general information, please visit the activity webpage at
https://hopkinscme.cloud-cme.com/aph.aspx?P=5&EID=18027

SPEAKERS

ACTIVITY DIRECTOR

Hanzhang Lu, PhD
Professor of Radiology and Radiological Science
Johns Hopkins University School of Medicine

JOHNS HOPKINS SPEAKERS

Jun Hua, PhD
Associate Professor of Radiology
Kennedy Krieger Institute

Peiying Liu, PhD
Assistant Professor of Radiology and Radiological Science
Johns Hopkins University School of Medicine

Jiadi Xu, PhD
Assistant Professor of Radiology
Kennedy Krieger Institute

Peter Van Zijl, PhD
Professor of Radiology and Radiological Science
Director, F.M. Kirby Research Center
Johns Hopkins University School of Medicine

GUEST SPEAKERS

John Detre, MD
Professor of Neurology and Radiology
Director of the Center for Functional Neuroimaging in the Department of Radiology, Vice Chair for Research in Neurology
University of Pennsylvania Perelman School of Medicine

Bruce Pike, PhD
Professor of Radiology and Clinical Neuroscience
CAIP Chair in Healthy Brain Aging
Head of Image Science
Hotchkiss Brain Institute
University of Calgary

Nicholas Blockley, PhD
Assistant Professor of Physiology
School of Life Sciences
University of Nottingham

Manus Donahue, PhD
Associate Professor of Radiology, Neurology, Psychiatry, and Physics
Vanderbilt University

Peter Bandettini, PhD
Principal Investigator
Chief of Section on Functional Imaging Methods
Director of FMRI Core Facility
NIMH, NIH

Molly Bright, PhD
Assistant Professor of Physical Therapy, Human Movement Sciences and Biomedical Engineering
Feinberg School of Medicine
Northwestern University

Kevin Murphy, PhD
Wellcome Trust Senior Research Fellow
Head of Brain Imaging Group
School of Physics and Astronomy
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Dan Bulte, PhD
Associate Professor of Engineering Science
The Institute of Biomedical Engineering
University of Oxford

Jean Chen, PhD
Senior Scientist, Associate Professor of Medical Biophysics
Rotman Research Institute
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Richard Hoge, PhD
Associate Professor of Neurology and Neurosurgery
Director of the Human Magnetic Resonance (MRI) Program
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Yulin Ge, MD
Professor of Radiology
New York University School of Medicine

Larry Wald, PhD
Professor of Radiology
Director, MGH NMR Core, Martinos Center
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David Feinberg, PhD
Adjunct Professor of Neuroscience
President of Advanced MRI Technologies
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Jack Wells, PhD
Principle Investigator
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Danny Wang, PhD
Professor of Neurology and Radiology
Director of Imaging Technology Innovation
Keck School of Medicine
University of Southern California

Felix Wehrli, PhD
Professor of Radiologic Science, Biochemistry and Biophysics
University of Pennsylvania Perelman School of Medicine

John Wood, MD, PhD
Professor of Pediatrics and Radiology,
Divisions of Pediatric Cardiology and Radiology, Keck School of Medicine, University of Southern California

Ze Wang, PhD
Associate Professor of Radiology
Director of the MRI Lab
Lewis Katz School of Medicine
Temple University

PROGRAM
Friday, September 13, 2019

8:00-8:30 a.m.	**Registration and Breakfast**	
Opening Session		
8:30-8:45 a.m.	Hanzhang Lu, PhD Karen Horton, MD	Welcome and Conference Goals
Session 1: Perfusion and Permeability (Qin Qin)		
8:45-9:05 a.m.	John Detre, MD	Recent Progress in Arterial Spin Labeling (ASL) MRI
9:05-9:25 a.m.	Danny Wang, PhD	Contrast Agent and Non-Contrast Agent Imaging of Blood-Brain Barrier (BBB) Permeability
9:25-9:45 a.m.	Jun Hua, PhD	MRI Techniques for Cerebral Blood Volume (CBV) Mapping
9:45-9:55 a.m.	Akansha Sehgal (Proffered Talk*)	GlucoCEST based Dynamic Glucose Enhanced (DGE) MRI at 3T
9:55-10:05 a.m.	Zixuan Lin (Proffered Talk*)	Non-contrast imaging of blood-brain barrier permeability in Mild Cognitive Impairment and its relationship with beta-amyloid
10:05-10:15 a.m.	Xingfeng Shao (Proffered Talk*)	Water exchange across blood-brain barrier is associated with CSF Amyloid-**β** 42 level in healthy older adults
10:15-10:45 a.m.	**Refreshment Break**	
Session 2: Oxygenation and Metabolism (Audrey Fan)		
10:45-11:05 a.m.	Felix Wehrli, PhD	Quantification of Cerebral Oxygen Consumption
11:05-11:25 a.m.	John Wood, MD, PhD	Oxygenation and Metabolism in Sickle Cell Disease (SCD)
11:25-11:45 a.m.	Bruce Pike, PhD	BOLD Response to Hyperoxia Challenge
11:45-11:55 p.m.	Wenbo Li (Proffered Talk*)	Quantification of Whole-Brain Oxygenation Extraction Fraction (OEF) and Cerebral Metabolic Rate of Oxygen Consumption (CMRO2) in Adults with Sickle Cell Anemia using Individual T2-based Oxygenation Calibrations
11:55-12:05 p.m.	Lisa Krishnamurthy (Proffered Talk*)	Loss of Cortico-Thalamo-Cortical connectivity results in Age- and Stroke-related declines in Thalamus volume
12:05-12:15 p.m.	Shengwen Deng (Proffered Talk*)	Aerobic Glycolysis: Quantitative Comparison of TRUST MRI and ^{15}O PET

12:15-1:00 p.m.	**Group photo & Lunch**	
1:00-3:00 p.m.	Poster Session*:	
	Franck Amyot	Correlation between post traumatic headache and traumatic cerebrovascular injury
	Venkatagiri Krishnamurthy	Correcting task fMRI signals for variability in baseline CBF improves BOLD-Behavior relationships: A feasibility study in an aging model
	Hyunyeol Lee	Cerebral Venous Blood Volume Mapping Using Velocity-Selective Venous-Spin-Labeling
	Xinyuan Miao	Task-based functional MRI and diffusion tensor imaging in human subjects wearing metallic orthodontic braces using magnetization prepared 3D fast gradient echo sequences
	Stefano Moia	Comparison of ICA-based denoising approaches in breath-holding task with ME-fMRI data
	Sandeepa Sur	Is Phase contrast based Cerebral Vessel Reactivity a good biomarker for vascular cognitive impairment?
	Shiyu Tang	Effects of Early Ethanol Exposure on Functional Connectivity of Multisensory Systems
	Zhiliang Wei	Longitudinal Time Courses of Brain Perfusion and Oxygen Consumption in Aging Mice
	Denfeng Xie	BOLD fMRI-based Brain Perfusion Prediction Using Deep Dilated Wide Activation Networks
	Han Yu	Olfactory bulb macrostructural and microstructural abnormalities on MRI in the elderly and dementia
3:00-4:00 p.m.	Peter Van Zijl, PhD	Keynote Lecture: CEST MRI to assess physiology and metabolism
4:00-5:00 p.m.	Guided Tour of the MRI Facilities	
6:00-8:00 p.m.	**Dinner at Residence Inn Baltimore**	

* This session is not eligible for *AMA PRA Category 1 Credit™.*

PROGRAM
Saturday, September 14, 2019

8:00-8:30 a.m.	**Breakfast**	
Session 3: Cerebrovascular Reactivity (Rao Gullapalli)		
8:30-8:50 a.m.	Nicholas Blockley, PhD	Cerebrovascular Reactivity (CVR) Mapping with Gas Challenges
8:50-9:10 a.m.	Peiying Liu, PhD	Cerebrovascular Reactivity (CVR) Mapping Without Gas Challenges
9:10-9:30 a.m.	Manus Donahue, PhD	Applications of Cerebrovascular Reactivity (CVR) in Aging and Brain Diseases
9:30-9:40 a.m.	Julia Huck (Proffered Talk*)	Influence of the vasculature on resting state measures of centrality
9:40-9:50 a.m.	Lin Chen (Proffered Talk*)	Revealing glucose transporter function in Alzheimer's disease mouse brain using on-resonance variable delay multiple pulse (onVDMP) MRI
9:50-10:00 a.m.	Zheng Han (Proffered Talk*)	Hemodynamic imaging in brain tumors using dextran1-enhanced CEST MRI
10:00-10:30 a.m.	**Refreshment Break**	
Session 4: Neurovascular Coupling (Shin-Lei Peng)		
10:30-10:50 a.m.	Peter Bandettini, PhD	Functional Mapping of Laminar Activation
10:50-11:10 a.m.	Molly Bright, PhD	Noise Versus Signal in fMRI Data
11:10-11:30 a.m.	Kevin Murphy, PhD	Neurovascular Coupling in Advanced Physiology Maneuvers
11:30-11:40 a.m.	Allen Champagne (Proffered Talk*)	The physiological basis underlying functional connectivity differences in older adults: A multi-modal analysis of resting-state fMRI
11:40-11:50 a.m.	Chunming Gu (Proffered Talk*)	Longitudinal Changes in Arteriolar Cerebral Blood Volume in Huntington's Disease
11:50-12:00p.m.	Dengrong Jiang (Proffered Talk*)	Vessel-specific Quantification of Neonatal Cerebral Venous Oxygenation
12:00-1:00 p.m.	**Lunch**	
1:00-3:00 p.m.	Poster session*	
	Shruti Agarwal	Graph theoretic analysis of language sub-networks in Arabic-English bilingual patients undergoing fMRI for pre-surgical planning
	Xirui Hou	Normal variations in BOLD-based cerebrovascular reactivity (CVR) are partly attributed to differences in end-tidal CO2
	Lisa Krishnamurthy	Not all lesioned tissue is equal: A new look at

		chronic stroke with Tissue Integrity Gradation via T2w T1w Ratio (TIGR)
	Yang Li	Non-contrast vascular compliance mapping using ASL MRA and compressed sensing
	Dapeng Liu	Optimization of Velocity-Selective-Inversion Arterial Spin Labeling with 3D Acquisition
	Hongshuai Liu	Investigating Cerebrovascular Abnormalities in a Full-Length HTT Knock-in Mouse Model of Huntington's Dis-ease Using iVASO MRI
	Adrian Paez	Olfactory functional MRI (fMRI) using T2-prepared BOLD fMRI at ultra-high field (7T)
	Shin-Lei Peng	Assessing the impact of obesity on cerebral blood flow in young adults using arterial spin labeling perfusion
	Stéfanie Tremblay	The influence of vein location and diameter from the Venous Neuroanatomy (VENAT) atlas on fractional anisotropy (FA)
	Kaihua Zhang	Layer specific T2-prepared BOLD fMRI in the entorhinal cortex at 7T: initial results
Session 5: Calibrated fMRI (Claudine Gauthier)		
3:00-3:20 p.m.	Dan Bulte, PhD	Recent Progress in Calibrated fMRI
3:20-3:40 p.m.	Jean Chen, PhD	Physiological Considerations and Normalization of Resting-State fMRI
3:40-4:00 p.m.	Jay Pillai, MD	Neurovascular uncoupling in brain tumors and relevance to presurgical mapping
4:00-4:10 p.m.	Hongli Fan (Proffered Talk*)	Whole-brain hemodynamic mapping in less than 4 minutes using deep-learning-based, multi-band MR fingerprinting (MRF) ASL
4:10-4:20 p.m.	Nirbhay Yadav (Proffered Talk*)	On the pH-dependence of the water Z-spectrum of the brain during acute ischemia
4:20-4:30 p.m.	Paula Croal (Proffered Talk*)	Quantiphyse: Quantitative Analysis of Physiological MRI
4:30-5:00 p.m.	**Award Ceremony (Committee: Nic Blockley, Jean Chen, Dan Bulte, Kevin Murphy, Bruce Pike))**	Best presentation awards

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PROGRAM
Sunday, September 15, 2019

8:00-8:30 a.m.	**Breakfast**	
Session 6: New Contrast Agents (Doris Lin)		
8:30-8:50 a.m.	Jiadi Xu, PhD	Glucose-CEST: potentials and challenges
8:50-9:10 a.m.	Yulin Ge, PhD	USPIO-enhanced MRI: vascular imaging and beyond
9:10-9:30 a.m.	Larry Wald, PhD	Magnetic Particle Imaging (MPI): Potentials for Functional Brain Imaging
9:30-10:00 a.m.	**Refreshment Break**	
Session 7: Frontier Techniques (Joshua Shimony)		
10:00-10:20 a.m.	David Feinberg, PhD	Next-generation MRI Brain Scanner for High Resolution Imaging of Brain Function
10:20-10:40 a.m.	Jack Wells, PhD	Novel and Non-Invasive MRI Techniques to Assess Brain Clearance Pathways: Aquaporin-4 Dependent Water Flux Across the Blood Brain Barrier and CSF-ISF Exchange via Perivascular Fluid Movement
10:40-11:00 a.m.	Ze Wang, PhD	Machine Learning in Physiological MRI
Closing session		
11:00-11:55 a.m.	Panel Discussion (Hanzhang Lu, Molly Bright, Manus Donahue, Claudine Gauthier, John Wood)	Safety, IRB, and pragmatic issues in gas challenge MRI experiments
11:55-12:10 p.m.	Hanzhang Lu, PhD	Closing Remarks
12:10 p.m.	**Adjourn**	

You will receive an email notification to complete the evaluation form and to attest to the number of hours in attendance.

The registration desk will remain open during conference hours.

This schedule is subject to change.

The Johns Hopkins University School of Medicine takes responsibility for the content, quality and scientific integrity of this CME activity.