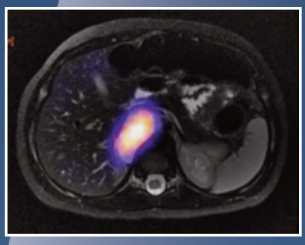
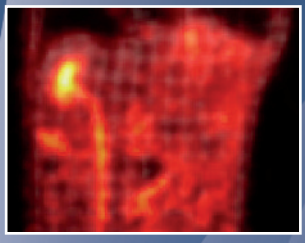
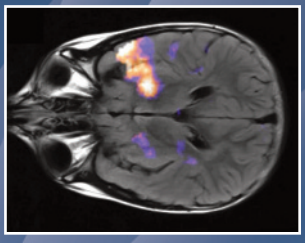
HARVARD MEDICAL SCHOOL
Department of Continuing Education
Departments of Radiology and Medicine

MOLECULAR IMAGING:
Preclinical and Clinical Advances



October 16–19, 2012

Fairmont Copley Plaza
Boston, Massachusetts
USA

COURSE DIRECTORS
John V. Frangioni, MD, PhD • Ralph Weissleder, MD, PhD

PROGRAM COMMITTEE
Georges El Fakhri, PhD • Amin I. Kassis, PhD
Bruce R. Rosen, MD, PhD • S. Ted Treves, MD, FACNP

COURSE DESCRIPTION

Molecular imaging holds promise for improved patient management in medicine and surgery. To realize this goal, a thorough understanding of the instrumentation and diagnostic agents that comprise the field is necessary. *Molecular Imaging: Preclinical and Clinical Advances* will provide a comprehensive educational experience in the physics, chemistry, engineering, and physiology that are the foundation of molecular imaging. Faculty specializing in basic science, clinical translation, and clinical applications have been carefully chosen to bring course attendees to the state-of-the-art in the field.

The course is designed to encourage interactive audience participation via case-based discussions, often with with clinical examples. Upon successful completion of the course, physicians will receive CME credit (USA) and EACCME credit (Europe). In addition, physicians will be given an opportunity to work towards their Maintenance of Certification (MOC) by taking Self-Assessment Modules (SAMs).

The course will cover most aspects of molecular imaging including optical imaging, SPECT, PET, CT, MRI, ultrasound, combinations thereof, contrast agent chemistry, radiotracer development, preclinical imaging, regulatory, statistical, and logistical issues surrounding clinical translation, and state-of-the-art clinical imaging in cancer, heart disease, and other human conditions.

Distinguished guest faculty, including members of the faculty of the Harvard Medical School will update physicians, scientists, and trainees on the latest techniques in molecular imaging as well as those under development and slated for clinical implementation in the future. Faculty will also offer a glimpse into new and emerging methodologies in molecular imaging that could become part of clinical practice within the next decade.

LEARNING OBJECTIVES

Upon completion of this course, participants will be able to:

- explain the basic physics underlying molecular imaging instrumentation;
- utilize the basic chemistry underlying molecular imaging contrast agents and radiotracers for particular applications;
- define the physiology that mediates diagnostic agent performance *in vivo*;
- integrate the basics of clinical translation into their research; and
- improve disease management and patient outcomes by introducing state-of-the art techniques into clinical investigation and/or clinical practice.

TARGET AUDIENCE

Clinicians, researchers, and trainees interested in an intense learning experience. This course will introduce the fundamental physics, chemistry, and engineering that serves as the foundation for molecular imaging, as well as present the state-of-the-art in preclinical imaging, clinical translation, and clinical utilization in the following areas:

- Optical imaging using endogenous contrast
- Optical imaging using exogenous contrast
- Near-infrared fluorescence-guided surgery
- Advanced ultrasound methods including elastrography, 3-D, and 4-D
- Multimodality imaging
- Cell- and organism-level barriers to a high SBR
- SPECT/CT and SPECT/MRI
- PET/CT and PET/MRI
- The SPECT and PET radiopharmacies
- Hyperpolarization, CEST, and PARACEST MRI
- High-field MRI and MR spectroscopy
- Multidetector and spectral CT
- Clinical translation of medical devices
- Clinical translation of diagnostic agents
- Intellectual property, statistics, and logistics in clinical translation

ACCREDITATION

The Harvard Medical School is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The Harvard Medical School designates this live activity for a maximum of 30.5 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

AMA PRA Category 1 Credits™ claimed by physicians attending live events certified and organized in the United States for *AMA PRA Category 1 Credits*™ can be claimed through the agreement on mutual recognition of credits between UEMS and AMA, considered as being equal to the European Continuous Medical Education Credits (ECMEC©) granted by the UEMS. One *AMA PRA Category 1 Credit*™ is equivalent to one (1) hour of European EACCME Credit (ECMEC©), therefore up to 30.5 ECMEC© Credits are available. Each medical specialist should claim only those hours of credit that he/she actually spent in the educational activity.

The Royal College of Physicians and Surgeons of Canada recognizes conferences and workshops held outside of Canada that are developed by a university, academy, hospital, specialty society or college as accredited group learning activities.

This course is pending approval by the American Board of Radiology (ABR) and American Board of Nuclear Medicine (ABNM) for 9 Self-Assessment Module (SAM) credits. As of this printing, we have not received approval. Harvard Medical School has been asked to submit the presentation to the ABR and ABNM for SAM qualification.

ACGME COMPETENCIES

This course is designed to meet one or more of the following Accreditation Council of Graduate Medical Education competencies:

- Medical knowledge

FACULTY

HARVARD MEDICAL SCHOOL FACULTY

David Boas, PhD: Professor of Radiology, Massachusetts General Hospital, Boston, MA

Ciprian Catana, MD, PhD: Assistant Professor of Radiology; Director of Integrated MR-PET, Massachusetts General Hospital, Boston, MA

Marcelo F. Di Carli, MD, FACC: Associate Professor of Radiology; Associate Professor of Medicine; Chief, Division of Nuclear Medicine and Molecular Imaging; Director, Noninvasive Cardiovascular Imaging Program, Brigham and Women's Hospital, Boston, MA

Hak Soo Choi, PhD: Assistant Professor of Medicine, Center for Molecular Imaging, Beth Israel Deaconess Medical Center, Boston, MA

Georges El Fakhri, PhD: Associate Professor of Radiology; Director, MGH PET Core; Co-Director, Division of Nuclear Medicine & Molecular Imaging (Research), Massachusetts General Hospital, Boston, MA

John V. Frangioni, MD, PhD: Professor of Medicine and Professor of Radiology; Director, Center for Molecular Imaging, Beth Israel Deaconess Medical Center, Boston, MA

Jason Gaglia, MD, MMSc: Instructor in Medicine, Joslin Diabetes Center, Boston, MA

Rajiv Gupta, MD, PhD: Instructor in Radiology, Massachusetts General Hospital, Boston, MA

Mukesh Harisinghani, MD: Associate Professor of Radiology, Massachusetts General Hospital, Boston, MA

Jacob Hooker, PhD: Assistant Professor of Radiology, Massachusetts General Hospital, Boston, MA

Amin I. Kassis, PhD: Professor of Radiology; Director, Radiobiology & Experimental Radionuclide Therapy, Harvard Medical School, Boston, MA

Charles Lin, PhD: Associate Professor of Dermatology, Massachusetts General Hospital, Boston, MA

Ashfaq Mahmood, PhD: Assistant Professor of Radiology, Harvard Medical School and Brigham and Women's Hospital, Boston, MA

Warren J. Manning, MD: Professor of Medicine; Professor of Radiology; Beth Israel Deaconess Medical Center, Boston, MA

Jason McCarthy, PhD: Assistant Professor of Radiology, Massachusetts General Hospital, Boston, MA

Long Ngo, PhD: Assistant Professor of Medicine in Biostatistics, Beth Israel Deaconess Medical Center, Boston, MA

J. Anthony Parker, MD, PhD: Associate Professor of Radiology; Division of Nuclear Medicine, Department of Radiology, Beth Israel Deaconess Medical Center, Boston, MA

Bruce R. Rosen, MD, PhD: Professor of Radiology; Director, Martinos Center for Biomedical Imaging, Massachusetts General Hospital and Professor of Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, MA

Mireille Rosenberg, PhD: Instructor in Dermatology, Massachusetts General Hospital; Regulatory Consultant, Gumiane Associates, Boston, MA

Frank Rybicki, MD, PhD, FAHA: Associate Professor of Radiology; Director, Cardiac CT & Vascular CT/MRI; Director, Applied Imaging Sciences Laboratory, Brigham and Women's Hospital, Boston, MA

Guillermo J. Tearney, MD, PhD: Professor of Pathology, Harvard Medical School; Associate Director, Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, MA

Mehmet Toner, PhD: Helen Andrus Benedict Professor of Surgery, Massachusetts General Hospital, Boston, MA

S. Ted Treves, MD, FACNP: Professor of Radiology and Director, Joint Program in Nuclear Medicine, Harvard Medical School; Nuclear Medicine and Molecular Imaging, Children's Hospital Boston, Boston, MA

Annick D. Van den Abbeele, MD: Chief, Department of Imaging and Founding Director, Center for Biomedical Imaging in Oncology, Dana-Farber Cancer Institute; Co-Director, Tumor Imaging Metrics Core, Dana-Farber/Harvard Cancer Center, Boston, MA

Neil Vasdev, PhD: Director of Radiochemistry, Massachusetts General Hospital, Boston, MA

Ralph Weissleder, MD, PhD: Professor of Radiology, Professor of Systems Biology; Massachusetts General Hospital, Boston, MA

GUEST FACULTY

Paula M. Jacobs, PhD: Associate Director, Division of Cancer Treatment and Diagnosis, Cancer Imaging Program, National Cancer Institute, Bethesda, MD

Norbert Lange, PhD: Professor of Pharmaceutical Sciences, University of Geneva, Switzerland

Robert E. Lenkinski, PhD: Professor of Radiology; Director of Radiology Research, University of Texas Southwestern Medical Center, Dallas, TX

Jason S. Lewis, PhD: Vice Chair for Research, Chief of the Radiochemistry Service, Director of the Cyclotron-Radiochemistry Core Facility, Memorial Sloan Kettering Cancer Center, New York, NY

Kathryn R. Nightingale, PhD: James L. Vincent Associate Professor of Biomedical Engineering, Duke University, Durham, NC

Jaap Oostendorp, PhD, PharmD: Director, GMP Core Facility, Leiden University Medical Center, Leiden, The Netherlands

Brian W. Pogue, PhD: Professor of Engineering Sciences, Dartmouth Medical School, Hanover, NH

Gregory Sorensen, MD: Chief Executive Officer, Siemens Healthcare, Malvern, PA

Bruce J. Tromberg, PhD: Professor of Biomedical Engineering; Professor of Surgery; Director, Beckman Laser Institute; Director, Laser Microbeam and Medical Program; University of California, Irvine, CA

Alexander L. Vahrmeijer, MD, PhD: Attending Surgeon, Leiden University Medical Center, Leiden, The Netherlands

Lihong Wang, PhD: Gene K. Beare Distinguished Professor, Departments of Biomedical Engineering and Radiology, Washington University, St. Louis, MO

SCHEDULE

TUESDAY, OCTOBER 16, 2012

7:00–7:45 AM	Registration and continental breakfast	
7:45–8:00	Welcome and introduction	*Frangioni*
8:00–8:45	Multimodality molecular imaging and systems biology	*Weissleder*
8:45–9:30	Medical imaging using spatially & temporally modulated light	*Tromberg*
9:30–10:15	Human neurological PET/MR	*Catana*
10:15–10:30	Break	
10:30–11:15	High-field MRI and MR spectroscopy	*Rosen*
11:15–12:00	Principles and evolution of SPECT/CT and SPECT/MRI	*El Fakhri*
12:00–1:05	Lunch Recess	
1:05–1:15	Post-prandial stretching and exercise	
1:15–2:00	PET radiochemistry/pharmacy: oncology and cardiology	*Lewis*
2:00–2:45	Elastography, harmonic, 3-D, and 4-D ultrasound	*Nightingale*
2:45–3:00	Break	
3:00–3:45	Bench to bedside translation of porphyrins	*Lange*
3:45–4:30	Intravital Microscopy	*Lin*
4:30–5:15	Clinical translation: new diagnostic medical devices	*Rosenberg*

WEDNESDAY, OCTOBER 17, 2012

7:00–8:00 AM	Continental breakfast	
8:00–8:45	Whole body PET/CT and PET/MR	*El Fakhri*
8:45–9:30	Barriers to molecular imaging & SBR optimization	*Frangioni*
9:30–10:15	SPECT radiopharmacy & radiotracer development	*Mahmood*
10:15–10:30	Break	
10:30–11:15	Interrogation of the brain using NIR light	*Boas*
11:15–12:00	Advances in MR imaging agents	*McCarthy*
12:00–1:05	Lunch Recess	
1:05–1:15	Post-prandial stretching and exercise	
1:15–2:00	PET radiochemistry/pharmacy: neurology & other dzs	*Vasdev*
2:00–2:45	Clinical translation: statistical and logistical	*Ngo*
2:45–3:00	Break	
3:00–3:45	Optical contrast agents	*Choi*
3:45–4:30	Multi-detector CT and perfusion CT for CAD	*Rybicki*
4:30–5:15	The National Cancer Institute's NExT Program	*Jacobs*
5:15–6:15	Course reception for all participants	

Color Coding	MRI	Optical	PET	SPECT
CT	Ultrasound	Clinical Translation	Cells	Overview

THURSDAY, OCTOBER 18, 2012

7:00–8:00 AM	Continental breakfast	
8:00–8:45	New approaches to PET radiotracer development	*Hooker*
8:45–9:30	Hyperpolarization, CEST, PARACEST, and MRS	*Lenkinski*
9:30–10:15	Quantitation of circulating tumor cells	*Toner*
10:15–10:30	Break	
10:30–11:15	Radioisotope matchmaking for disease Dx & Tx	*Kassis*
11:15–12:00	Clinical translation: IP & industry considerations	*Sorensen*
12:00–1:05	Lunch Recess	
1:05–1:15	Post-prandial stretching and exercise	
1:15–2:00	State-of-the-art: PET/CT imaging of cancer	*Van den Abbeele*
2:00–2:45	State-of-the-art: MRI and PET imaging in diabetes	*Gaglia*
2:45–3:00	Break	
3:00–3:45	Optical/MRI imaging of normal and diseased states	*Pogue*
3:45–4:30	Clinical translation: new diagnostic agents	*Oostendorp*
4:30–5:15	Role of PET in proton therapy	*El Fakhri*

FRIDAY, OCTOBER 19, 2012

7:00–8:00 AM	Continental breakfast	
8:00–8:45	State-of-the-art: Pediatric PET/CT	*Treves*
8:45–9:30	Dual-beam and spectral CT for disease detection	*Gupta*
9:30–10:15	Image-guided surgery using NIR fluorescent light	*Vahrmeijer*
10:15–10:30	Break	
10:30–11:15	State-of-the-art: MRI imaging of heart disease	*Manning*
11:15–12:00	State-of-the-art: SPECT/CT imaging of human disease	*Parker*
12:00–1:05	Lunch Recess	
1:05–1:15	Post-prandial stretching and exercise	
1:15–2:00	State-of-the-art: MRI imaging of cancer	*Harisinghani*
2:00–2:45	Photoacoustic & acoustooptic imaging	*Wang*
2:45–3:00	Break	
3:00–3:45	State-of-the-art: PET/CT imaging of heart disease	*Di Carli*
3:45–4:30	Clinical Translation: Standardization and quality control	*El Fakhri*
4:30–5:15	Optical coherence tomography in disease detection	*Tearney*
5:15–5:30	Concluding remarks	*Frangioni*

Program changes/substitutions may be made without notice.

AND CLINICAL ADVANCES

REGISTRATION INFORMATION

Physicians/Scientists:	$995 (USD)
Reduced Fee for Trainees/Technologists/Others:	$895 (USD)

Registration by credit card (VISA or MasterCard) can be made at: **www.cme.hms.harvard.edu/courses/molecularimaging.** Registration by check (draft on a United States bank), please make payable to Harvard Medical School and mail with registration form to **Harvard Medical School–Department of Continuing Education, PO Box 417476, Boston, MA 02241-7476**. Telephone or fax registration is not accepted. Registration with cash payment is not permitted. Upon receipt of your paid registration an email confirmation from the HMS-DCE office will be sent to you. Be sure to include an email address that you check frequently. Your email address is used for critical information, including registration confirmation, evaluation, and certificate.

INQUIRIES

By phone 617-384-8600, Monday–Friday, 10 AM to 4 PM (EST) or by email at: hms-cme@hms.harvard.edu.

ONLINE INFORMATION

To register or view activity information online, visit: www.cme.hms.harvard.edu/courses/molecularimaging.

To ensure proper registration, please add the **first three characters** of the source code found at the bottom of the registration form.

DISCLOSURE POLICY

Harvard Medical School (HMS) adheres to all ACCME Essential Areas, Standards and Policies. It is HMS's policy that those who have influenced the content of a CME activity (e.g., planners, faculty, authors, reviewers and others) disclose all relevant financial relationships with commercial entities so that HMS may identify and resolve any conflicts of interest prior to the activity. These disclosures will be provided in the activity materials along with disclosure of any commercial support received for the activity. Additionally, faculty members have been instructed to disclose any limitations of data and unlabeled or investigational uses of products during their presentations.

REFUND POLICY

A handling fee of $60 is deducted for cancellation. Refund requests must be received by postal mail, email, or fax one week prior to this activity. No refunds will be made thereafter.

COURSE LOCATION

All sessions for this course will be held at the Fairmont Copley Plaza, 138 St. James Ave., Boston, Massachusetts, USA (Telephone: 617-267-5300; Fax: 617-267-7668).

ACCOMMODATIONS/TRAVEL

A limited number of rooms have been reserved at the Fairmont Copley Plaza (Telephone: 617-267-5300 or 800-441-1414) until **September 24, 2012**. Please specify that you are enrolled in this course to receive a reduced room rate of $299 per night Single/Double plus 14.45% tax. Hotel arrangements can also be made online at https://resweb.passkey.com/go/molecularimaging. Please do not purchase non-refundable airline ticket(s) until you have received an email from our office confirming your paid registration. For airline reservations contact the HMS Travel Desk toll free 1-877-4-HARVMD (1-877-442-7863) Monday–Friday 9 AM–8 PM (EST). From outside the U.S., Canada and Virgin Islands, please call 617-559-3764.

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COURSE # 3214503

Tuition Fee

Physicians/Scientists: $995 (USD) **Reduced Fee for Trainees/Technologists/Others: $895** (USD)

Print Name Clearly. All Fields Required.

Full Name _____
First Middle Initial Last

Mailing Address _____
Street City State Zip Code

Daytime Phone (_____)_____ Fax Number (_____)_____

Please note: Your email address is used for critical information about the course including: registration confirmation, evaluation, and certificate. Please be sure to include an email address you check daily or frequently.

E-Mail Address _____ ❑ Please check if you wish to be **excluded** from receiving email notices of future Harvard Medical School – Department of Continuing Education programs.

Primary Specialty *(Physicians Only)* _____ Board Certified: ❑ Yes ❑ No Profession _____ Degree _____

Professional School Attended *(Physicians Only)* ❑ Harvard Medical School ❑ U.S. Medical School ❑ International Year of Graduation _____

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