Icahn School of Medicine a Mount Sinai

Translational & Molecular Imaging Institute

Spring 2016
Issue 10
tmii.mssm.edu

Message from the Director

This has been a very exciting couple of months. We just concluded our 6th Annual TMII Symposium with again excellent invited external and internal speakers that featured and captured the best science from our imaging and nanomedicine research community. Don't miss reading about our selected abstract and poster winners. We have already started planning the TMII 2017 meeting. Please feel free to email me any feedback and suggestions.

That excitement continued with the TMII external advisory board strategic planning (SP) meeting where we received very strong feedback. Thanks for the wonderful input and suggestions as we continue to put together our TMII SP to submit to the Dean's office. I can't thank enough TMII, the Department of Radiology faculty and all other committee members and stakeholders for their hard work and suggestions.

More excitement is apparent by the several stories in this issue celebrating the success of our TMII members such as Dr. Priti Balchandani who secured her first NIH R01 and was bestowed this year with the Harold and Golden Lamppost Research Award. We are also featuring Dr. Claudia Calcagno-Mani for her Scientist Development Grant from the American Heart Association. Just to mention one more, I am proud of my Master's student Chloe Solomon for her Community Service that was Recognized by Mount Sinai Graduate School. Finally, remember to participate in the October 19, 2016 3rd Annual Brain Imaging Center Symposium where Dr. Rita Goldstein (whom we will feature in the upcoming issue) and this year annual meeting committee have organized a very exciting meeting on brain imaging research.

I wish you all a great read of the TMII Newsletter and a great start of the Summer!

Zahi Fayad, PhD
Director, Translational & Molecular Imaging Institute
Professor of Radiology and Medicine
zahi.fayad@mssm.edu

WHAT'S NEW?

TMII News & Updates

The 6th Annual TMII Symposium was again a resounding success. The invited speakers gave visionary talks and the quality (and number) of the abstracts submitted were outstanding. See the special feature inside for more information.

TMII would like to welcome a few new members to the team. Paul Kennedy has joined us from the University of Edinburgh where he completed his PhD on the topic of Magnetic Resonance Elastography (MRE) in skeletal muscle. He will continue his work on MRE with Dr. Taouli's group with particular focus on improving MRE markers of liver, kidney and spleen diseases.

Additionally, the Imaging Core has hired a new full time and part time technologist, Emily Wu and Bill Fazio (respectively) allowing the Core to better address the increase in usage of our systems.

Some of you may have attended the Brainhack Americas event TMII & BIC jointly co-hosted with NYU & The Child Mind Institute. The organizers of this and other Brainhack events have published a great new article in GigaScience, check it out: http://www.gigasciencejournal.com/content/5/1/16/email?from=email

UPCOMING EVENTS

TMII Frontiers of Imaging Seminar Series

> May 26, 2016 1pm - 2pm: James Rudd, PhD - Senior Lecturer, University of Cambridge *TBD* Hess Center - Seminar Room B

> June 23, 2016 1pm - 2pm: Hersh Chandarana, MD - Associate Professor, NYU School of Medicine *TBD* Hess Center - Seminar Room B

> July 27, 2016 1pm - 2pm: Thomas Hope, MD - Assistant Professor, University of California, San Francisco *"Current and future applications of PET/MRI in abdominopelvic malignancies"* Hess Center - Seminar Room B

> July 28, 2016 1pm - 2pm: Michael Hope, MD - Associate Professor, University of California, San Francisco *"Advanced Cardiovascular Imaging Techniques"* Hess Center - Seminar Room B

> August 25, 2016 1pm - 2pm: Aytekin Oto, MD - Professor, University of Chicago *TBD* Hess Center - Seminar Room B

TMII Seminar Series

> May 23, 2016 3pm - 4pm: Sonia Nielles-Vallespin, PhD - Staff Scientist, National Heart, Lung and Blood Institute *"The micro-structural dynamics of myocardial wall thickening. An in vivo cardiac diffusion tensor magnetic resonance imaging study"* Hess Center - TMII Large Conference Room s1-117

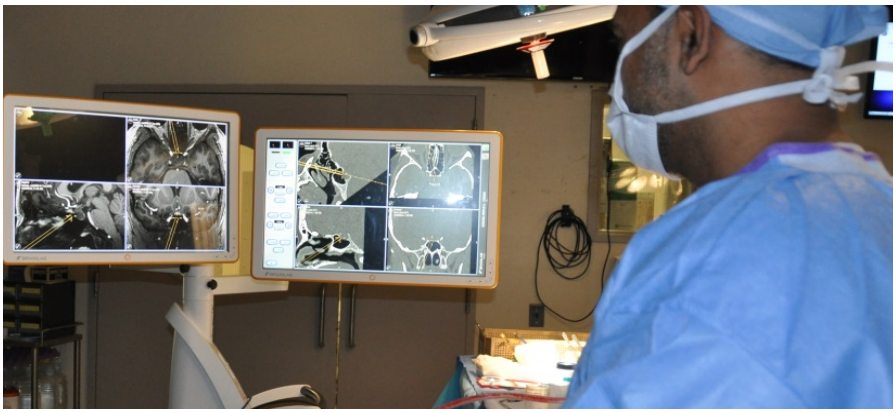
For more information on these and other events go to: http://tmii.mssm.edu/events

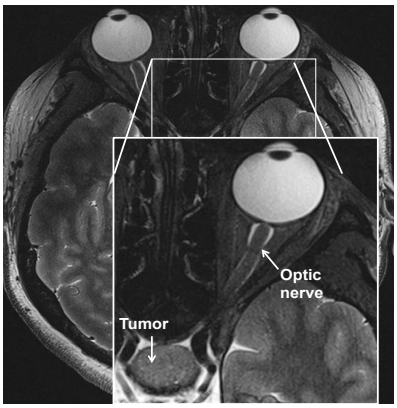
FACULTY SPOTLIGHT

Ultra High Field 7 Tesla MRI used for Cutting Edge Surgical Treatment

Priti Balchandani, PhD

As the Director of the High Field MRI program at TMII, Dr. Balchandani focuses on developing novel techniques to exploit the power of high-field MR magnets to visualize the brain in unprecedented detail. She leads a team of 7T scientists to devise creative engineering methods to overcome some of the main limitations of operating at high magnetic fields, thereby enabling high-resolution whole-brain anatomical, spectroscopic and diffusion imaging as well as unlocking new contrast mechanisms and sources of signal. In order to achieve these goals, Dr. Balchandani's team focuses on novel radio frequency (RF) pulse and pulse sequence design as well as specialized hardware solutions such as parallel transmission. These techniques are ultimately applied to improve diagnosis, treatment and surgical planning for a wide range of neurological diseases and disorders. Some clinical areas of focus for Dr. Balchandani's team are: improved localization of epileptogenic foci; imaging to reveal the neurobiology of depression; and development of imaging methods to better guide neurosurgical resection of brain tumors.

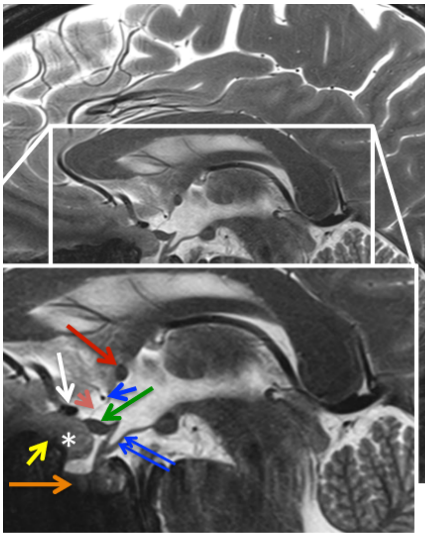




High resolution depiction of optic nerve in relation to pituitary tumor.

In 2016, Dr. Balchandani was awarded an R01 grant from the National Cancer Institute entitled "7T Neurosurgical Mapping Protocol for Endoscopic Resection of Skull Base Tumors" with her Co-Investigator, Dr. Raj Shrivastava, Associate Professor of Neurosurgery. Recently, Priti was named the recipient of The Dr. Harold and Golden Lamport Research Award given to Assistant Professors who show exceptional potential for making significant contributions over an extended period of time. She has also been awarded the NARSAD Young Investigator Grant for her work in imaging depression. Dr. Balchandani is also forging collaborative relationships with institutions such University of Pennsylvania as well as industry partners. As a result of these collaborations, she is acting as PI of the academic sub-award of an upcoming transfer of a NIH Small Business Technology Transfer grant.

Dr. Balchandani has launched the ultra-high field MRI program at TMII and has successfully translated 7T MRI to clinical use. She has already recruited and trained a strong team of scientists and engineers for her research lab and initiated collaborative relationships with clinicians and researchers in Neurosurgery, Neurology, Neuroradiology and Psychiatry. These collaborative relationships have resulted in translational work which has directly benefitted patients and already resulted in several publications and funded grants, including her recent R01.



The Balchandani lab has been highly productive over the last year. All lab members, including graduate student Judy Alper, postdoctoral scholar Rebecca Feldman, and former instructor Hadrien Dyvorne, have obtained several talks and posters for the upcoming International Society for Magnetic Resonance in Medicine (ISMRM) meeting in Singapore. Recently, Rebecca Feldman was named junior fellow of ISMRM, a prestigious designation which was also awarded to Dr. Balchandani earlier in her career.

Congratulations to the Balchandani Lab!

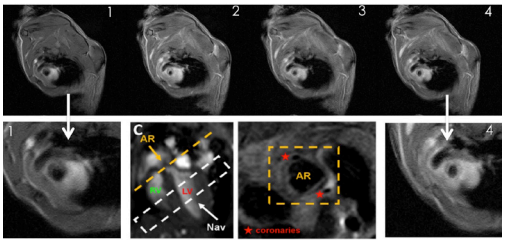
Priti Balchandani PhD
Director, TMII High-field MRI
Assistant Professor of Radiology and Psychiatry
priti.balchanani@mssm.edu

SCIENCE SPOTLIGHT

New AHA Funding to Develop Advanced Methods in Cardiovascular Mouse MRI

Claudia Calcagno, MD, PhD

Dr. Calcagno, MD, PhD, is an Instructor of Radiology at the Icahn School of Medicine at Mount Sinai. Her research focuses on the development of non-invasive quantitative imaging to cardiovascular disease, with specific focus on the measurement of atherosclerotic plaque permeability and inflammation with MRI and PET. She has been extensively involved in applying these techniques in pre-clinical drug trials in atherosclerotic rabbits, and clinical trials in humans.



Self-gated dynamic and ECG triggered images of the mouse aortic root are shown before and after contrast agent injection.

Dr. Calcagno was recently awarded a highly competitive Scientist Development Grant from the American Heart Association entitled "Quantitative permeability imaging of the mouse atherosclerotic vessel wall by self-gated DCE-MRI with compressed sensing". This work will develop an optimized self-gated acquisition and compressed sensing reconstruction to develop high temporal and spatial resolution DCE-MRI to quantify endothelial permeability in the aortic root of atherosclerotic mice. By investigating the relationship between imaging, and genetics, cellular and molecular assays in the arterial wall, the application also aims to take the first step in integrating quantitative, non-invasive imaging with -omics in this important animal model of cardiovascular disease.

Claudia Calcagno, MD, PhD
Fayad Lab (Cardiovascular Imaging)
Instructor of Radiology
claudia.calcagno@mssm.edu

IMAGING SPOTLIGHT

Community Service Recognized by Graduate School

Chloe Solomon, BS

Chloe Solomon is first year graduate student in the Masters of Science in Biomedical Sciences (MSBS) who, under the supervision of TMII Director Dr. Zahi Fayad, is examining the relationship between chronic psychological stress and cardiovascular inflammation in patients diagnosed with post-traumatic stress disorder using PET/MR imaging. Chloe was recently recognized for her extensive work in the community when she received the graduate student award for Outstanding Community Service.

As a part of the East Harlem Health Outreach Partnership (EHHOP) http://icahn.mssm.edu/education/medical/clinical/ehhop, a student run clinic at Mount Sinai, Chloe is the Radiology Referrals Manager coordinating all radiology scans for the clinic and helps to resolve patients' outstanding radiology bills.

Chloe is also an advocate for the Sexual Assault and Violence Intervention (SAVI) Program at Mount Sinai. There she advocates and provides crisis counseling for survivors of sexual assault and interpersonal partner violence in seven emergency departments across NYC. For more information: http://www.mountsinai.org/patient-care/service-areas/community-medicine/areas-of-care/sexual-assault-and-violence-intervention-program-savi

As a teacher for MedDocs at Mount Sinai, which provides science enrichment classes to inner city high school students, Chloe in taught two semesters on the cardiovascular system the pulmonary system. For more info: http://webcommons.mssm.edu/meddocs/

Lastly, Chloe volunteered last semester with First Generation Scholars at Mount Sinai that provides one-on-one consulting for high school seniors first in their family to apply to college. She helped a student create her college list, fill out college applications and develop/revise a personal statement. For more information: http://icahn.mssm.edu/education/student-resources/student-organizations/community-outreach/first-generation-scholars

Chloe Solomon, BS
Fayad Lab (Cardiovascular Imaging)
Graduate Student - Biomedical Sciences
chloe.solomon@icahn.mssm.edu

CORE SPOTLIGHT

TMII Human Imaging Core

TMII Human Imaging Core is the backbone of the Translational and Molecular Imaging Institute and is responsible for coordinating, supporting and executing imaging research at Mount Sinai including, neuroimaging, cardiovascular imaging, cancer imaging, nanomedicine (molecular imaging and drug delivery), and image processing.

The Core is fully staffed to support all the image acquisition (1.5T, 3T, 7T, PET/MRI, PET/CT, Dual Source CT, Ultrasound), image analysis, scheduling, and performance of the proposed experiments. The Core has an extensive and expanding inventory of research imaging facilities and equipment, including ancillary support which encompasses exam rooms, imaging processing workstations, and laboratories (wet lab space, cell and chemistry preparation and a radionuclear lab). The Core's resources are fully supported by user fees drawn from research grants, instrumentation grants, industry contracts, and agreements. Our core facilities are available for use to all qualified investigators from academic, medical, government, and industry laboratories.

SPECIAL FEATURE

6th TMII Symposium

April 22, 2016

The 6th Annual TMII Symposium was held at the Icahn School of Medicine to nearly 200 attended from departments and campuses across Mount Sinai Health System, including ISMMS, St. Luke's, West and Beth Israel, as well as area institutions such as SUNY Stony Brook, NYU, Rutgers, Columbia, MSKCC, Albert Einstein College of Medicine and NHLBI.

Thank you to all those who attended and who helped organize.

World renowned in their fields, the invited speakers discussed

- Cutting edge methods in connectivity in human brain,

Bruce Fischl, PhD - Harvard/MGH - Keynote speaker

- PET imaging in Alzheimer's disease,

(right) Julie Price, PhD - University of Pittsburgh - Neuroimaging Session - moderated by Priti Balchandani, PhD - ISMMS (left)

- Quantitative imaging using MRI Fingerprinting

Mark Griswold PhD - Case Western Reserve University - Cancer/ Body Session

- Image-guided cancer therapy using nanomedicine and

(left) Anna Moore, PhD - Havard/MGH - Nanomedicine Session moderated by Willem Mulder ISMMS (right)

- The latest advance in vessel wall imaging using MR coronary angiography.

Debiao Li, PhD - Cedars Sinai Medical Center - Cardiovascular Imaging Session

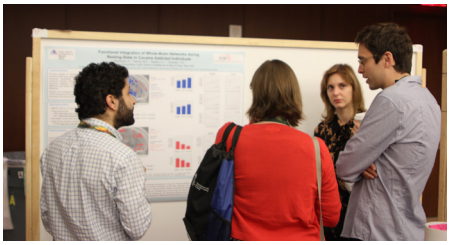
Videos of the talks are available now. You can find them on the TMII YouTube playlist or follow the link: http://tmii.mssm.edu/tmii2016.

From the 50 abstracts submitted 4 were and chosen for talks

- Alan Seifert, PhD (ISMMS) "DANTE-EPI for CSF Suppression in Cervical Spinal Cord BOLD fMRI at 7T" - Neuroimaging Session
- Stefanie Hectors, PhD (ISMMS) "Assessment of tumor heterogeneity in hepatocellular carcinoma using combined DCE-MRI and BOLD measurements" - Cancer/Body Imaging Session
- Yiming Zhao, PhD (ISMMS) "Augmenting drug-carrier compatibility improves tumor nanotherapy efficacy" - Nanomedicine Session
- Joseph Lerman (NHLBI) "Lack of improvement in aortic vascular inflammation is associated with an increase in coronary plaque burden in psoriasis" - Cardiovascular Imaging Session

Additionally, one poster from each program was awarded Best Poster:

- Ronan Abgral, (ISMMS/University of Brittany) "Usefulness of Combined FDG-PET/MRI to Diagnose Active Cardiac Sarcoidosis" - Cardiovascular Imaging
- Octavia Bane, (ISMMS) "Assessment of inter platform variability of T1 quantification methods used for DCE-MRI in a multicenter QIN phantom study" - Cancer/ Body Imaging
- Lindsay Hill, (NYU) "Rapid Qualification of Gadolinium in Nanoparticles by Time-Resolved Fluorescence" - Nanomedicine
- Rafael O'Halloran, (ISMMS) "Clustered, Connectivity-Based Surgical Planning for Deep Brain Stimulation" - Neuroimaging



International Society for Magnetic Resonance in Medicine - 24rd Annual Meeting & Exhibition
May 7 - May 13, 2016 - Singapore

Phil Robson	Motion Averaged MR-Based Attenuation Correction for Coronary 18F-Fluoride Hybrid PET/MR	Poster	CV Novel Techniques	12-May	13:30	Fayad	Cardiovascular
Alison Pruzan	Feasibility of Vessel Wall Imaging of the Superficial Palmar Arch using 7T and 3T MRI	E-Poster	Atheroslerosis Imaging	9-May	10:45	Fayad	Cardiovascular
Claudia Calcagno	Distribution and metabolism of 89Zr-labeled HDL nanoparticles in atherosclerotic rabbits: in vivo, longitudinal imaging with PET/MRI	Oral	Whole Body PET/MRI	12-May	10:30	Fayad	Cardiovascular
Claudia Calcagno	Optimization of 3 dimensional (3D), high resolution T2 weighted SPACE for carotid vessel wall imaging on a 7T whole-body clinical scanner	Oral	Atheroslerosis Imaging	12-May	13:30	Fayad	Cardiovascular
Stefanie Hectors	MR elastography and DCE-MRI of the liver and spleen for non-invasive prediction of portal pressure	Oral	Hepatobiliary I: Liver Perfusion/ Flow & Function	9-May	14:15	Taouli	Cancer/Body
Stefanie Hectors	Intravoxel incoherent motion diffusion-weighted imaging of hepatocellular carcinoma: is there a correlation with flow and perfusion metrics obtained with dynamic contrast-enhanced MRI?	Oral	Abdominal Technique & Pulse Seq	11-May	10:00	Taouli	Cancer/Body
Stefanie Hectors	Prostate DWI: comparison of a shorter diagonal acquisition to standard 3-scan-trace acquisition	E-Poster	Prostate Cancer	9-May	11:45	Taouli	Cancer/Body
Cheuk Tang	Relationship between neuropsychological stress and inflammation: a PET and MRI study.	Oral	Pychiatric Disorders: Translational Approaches	12-May	16:00	Tang	Neuro/ Cardiovasular
Victoria Wang	Functional connectivity and neuroanatomical differences in a stress susceptible and resilient mouse model	E-Poster	Psychiatric Disorders: General	10-Dec	13:30	Tang	Neuro
Cheuk Tang	Transient Changes in White Matter Microstructure during Anesthesia	E-Poster	Microstructure in Health & Disease	10-May	13:30	Tang	Neuro
Lazar Flysher	Diffusion Method to Image Normal Human Optic Nerve	Poster	Head & Neck	9-May	10:45	Tang	Neuro
Judy Alper	Frequency Shift Imaging (FSI) for characterization of cells labeled with superparamagnetic iron-oxide nanoparticles	E-Poster	Pulse Sequences	10-May	10:00	Balchandani	Neuro
Rebecca Feldman	B1-Insensitive Simultaneous Multi-Slice DWI at 7T using SEAMS PINS	Poster	RF Pulses	10-May	16:00	Balchandani	Neuro
Rebecca Feldman	7T MRI detection of epileptogenic foci in previously non-lesional patients with focal epilepsy	Oral	Epilepsy	11-May	16:00	Balchandani	Neuro
Rebecca Feldman	Perivascular Space Analysis in Non-lesional Epilepsy: Exploring a Biomarker for Epilepsy	Oral	Epilepsy	11-May	16:00	Balchandani	Neuro
Hadrien Dyvorne	Evaluation of 7T MRI for endoscopic surgical planning and guidance for skull base tumors - preliminary experience	Poster	Brain Tumors: Pre-Clinical & Clinical Applications	9-May	10:45	Balchandani	Neuro
Rafael O'Halloran	U-fiber Quantification in Non-Lesional Epilepsy	Oral	Diffusion Tractography	9-May	14:15	O'Halloran	Neuro/BIC
Joo-won Kim	Non-linear Distortion Correction in Human Optic Nerve Diffusion Imaging	Poster	Diffusion Analysis and Tractography	11-May	10:00	Xu	Neuro
Alan Seifert	DANTE-EPI for CSF Suppression in Cervical Spinal Cord BOLD fMRI at 7T	E-Poster	Acquisition	11-May	10:00	Xu	Neuro
Joseph Borello	Towards accurate spinal cord morphometry with in situ grid phantom calibrated gradient non-linearity correction	Oral	Spine Imaging: Normal Structure/ Novel Methods	13-May	08:00	Xu	Neuro
Prantik Kundu	High-Frequency and Other Pathological Network Hemodynamics Observed in Epilepsy Patients Imaged With Multi-Band Multi-Echo BOLD Functional MRI at 7T	Oral	fMRI of Disease	9-May	16:30	Kundu	Neuro/BIC
	HONORS, AWARDS & STIPENDS						
Rebecca Feldman	Selected as Junior Fellow to ISMRM					Balchandani	Neuro
Rebecca Feldman	Travel Award					Balchandani	Neuro
Judy Alper	Educational Stipend					Balchandani	Neuro
Priti Balchandani	Distinguished Reviewer for 2015 in the journal Magnetic Resonance in Medicine					Balchandani	Neuro
Joseph Borello	Educational Stipend					Xu	Neuro
Joseph Borello	Waived Registration Cost					Xu	Neuro
Joo-won Kim	Waived Registration Cost					Xu	Neuro
	MODERATORS, EDUCATIONAL TALKS, & Study Groups						
Priti Balchandani	Moderator		Head & Neck	7-May	16:30	Balchandani	Neuro
Priti Balchandani	Moderator		Characterizing Field Environment in the MR Scanner: B0, B1 & Gradients	12-May	13:30	Balchandani	Neuro
Joo-won Kim	Non-linear Distortion Correction in Human Optic Nerve Diffusion Imaging	Poster	Diffusion Study Group	10-May	16:00	Xu	Neuro
Rafael O'Halloran	K-Space	Educational Talk	MR Physics & Techniques for Clinicians	9-May	17:50	O'Halloran	Neuro/BIC
Willem Mulder	Theranostics: Delivering Drug & Contrast Agent Simultaneously	Educational Talk	Imaging Drug Delivery & Drug Function	10-May	13:30	Mulder	Nanomedicine
Willem Mulder	Chair		Molecular Imaging Study Group	TBD	TBD	Mulder	Nanomedicine

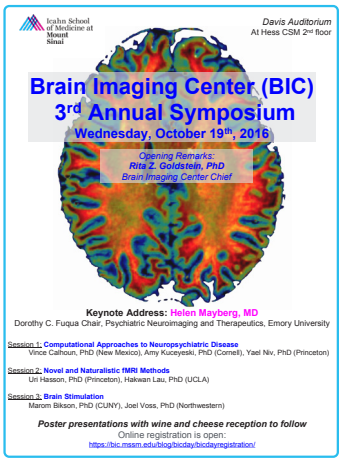
Organization for Human Brain Mapping - 2016 Annual Meeting - June 26-30, 2016 - Geneva, Switzerland

Researcher	Title	Format	Session	Day	Time	PI	TMII Program
Benjamin Ely	Functional Region of Interest Optimization for Small Structures Like the Habenula	Poster	TBD	TBD	TBD	Xu	Neuro
Joo-won Kim	Repeatability and Reproducibility of Objective Semi-automated Human Habenula Segm	Poster	TBD	TBD	TBD	Xu	Neuro
Rafael O'Halloran	Clustered, Connectivity-Based Surgical Planning for Deep Brain Stimulation	Poster	TBD	TBD	TBD	O'Halloran	Neuro/BIC

BIC CORNER

Congratulations to Dr. Willem Mulder, who placed first among more than 40 participants in the first annual BIC 10k event in Central Park. The drizzling rain cooperated by ending just before the start and seemed to invigorate everyone. Please have a look through pictures of many of the fit and happy participants on the BIC website: https://bic.mssm.edu/about/2016-bic-10k/.

On October 19, 2016, please plan to attend the 3rd Annual BIC Symposium. Advance registration is now open and can be completed online at https://bic.mssm.edu/blog/bicday/bicdayregistration/. The organizing committee has arranged for Helen Mayberg MD to present the keynote address before the series of sessions on computational approaches to neuropsychiatric disease, novel and naturalistic fMRI methods, and brain stimulation. Poster presentations will be followed by time for wine and cheese. The symposium flyer is attached and we look forward to seeing you there!



At the 7T high-field MRI, installation of the video and audio capabilities for presenting and collecting functional data is complete and finishing testing. You can contact the BIC technical group to inform us of your plans for research at 7T (as well as 3T and PET-MR/mMR) and to solicit feedback and advice. A survey to describe planned studies is available at https://www.inchoir.org/redcap/redcap/surveys/?s=yvQFxxdbJV. The BIC website now allows registration using your existing Mount Sinai account for single-sign-on with your familiar account name and password. When you logon, and as NIH submission deadlines approach, please remember the importance of including BIC in applications for funding. A document with reference language for justifications of support is available for use in grant preparations, at https://bic.mssm.edu/blog/including-bic-in-upcoming-nih-grant-submissions/.

CONTACTS

Zahi A. Fayad, PhD
Director, Translational and Molecular Imaging Institute

Director, Cardiovascular Imaging Program

Professor of Radiology and Medicine (Cardiology)
zahi.fayad@mssm.edu

Priti Balchandani, PhD
Director, High-Field MRI Program

Assistant Professor of Radiology and Neuroscience
priti.balchandani@mssm.edu

Prantik Kundu, PhD
Chief, Image Analysis Section & Advanced Functional Neuroimaging Section - BIC Faculty

Assistant Professor of Radiology and Psychiatry
prantik.kundu@mssm.edu

Venkatesh Mani, PhD
Director, Cardiovascular Imaging Clinical Trials Unit

Assistant Professor of Radiology
venkatesh.mani@mssm.edu

Willem J. M. Mulder, PhD
Director, Nanomedicine Program

Professor of Radiology
willem.mulder@mssm.edu

Rafael O'Halloran, PhD
Chief, Imaging Acquisition - BIC Faculty

Assistant Professor of Radiology and Psychiatry
rafael.ohalloran@mssm.edu

Cheuk Y. Tang, PhD
Director, Imaging Core

Associate Professor of Radiology and Psychiatry
cheuk.tang@mssm.edu

Bachir Taouli, MD
Director, Cancer and Body Imaging Program

Professor of Radiology and Medicine
bachir.taouli@mountsinai.org

Junqian Gordon Xu, PhD
Neuroimaging

Assistant Professor of Radiology and Neuroscience
junqian.xu@mssm.edu

Christopher J. Cannistraci, MS
Program Manager

Technical Operations Manager
christopher.cannistraci@mssm.edu

Ways to keep in touch

Twitter: @TMIInyc
Facebook: TMII.SINAI
Youtube: https://www.youtube.com/playlist?list=PLqLDR0CTP9_otAZpwEy3EgOStthPo7V9f
Linkedin: https://www.linkedin.com/groups/Translational-Molecular-Imaging-Institute-TMII-8358896/about

Website: http://tmii.mssm.edu

Mailing Address: One Gustave L. Levy Place, Box 1234
New York, NY 10029
Numbers: Tel: (212) 824-8466 Fax: (646) 537-9589