Translational & Molecular Imaging Institute

April, 2014
Issue 2

Message from the Director

Already three months of the year have passed. Nevertheless we hope you had a great and successful start in 2014 and I would like to introduce our 2nd newsletter for this year. Very exciting events are being planned this Spring at TMII.

Please read below about some of the work being presented at the upcoming premier MRI meeting, the ISMRM in Milano. Very strong showing and Science from TMII members and their collaborators. Moreover, we are very excited to host another TMII symposium on May 29th with a wonderful list of speakers featuring the latest in fast imaging, big data, and novel ways to deliver drugs in the context of neurological, oncological and cardiovascular diseases. As in previous years I encourage you to submit abstracts featuring your work to be presented as a poster and for the selected winners as a short talk.

Finally, on a personal note I want to thank all of you who supported me in the NYC Half Marathon last month. Even with the cold weather this year it was and still is a wonderful event and a great celebration of our beloved New York City. In the spirit of Promoting Health I want to encourage you all to participate in the upcoming 2014 American Heart Association Wall Street Run and Heart Walk (5K) on June 18 (http://alturl.com/pha6d).

This is another great event, great cause and one of the best way to remain healthy, sharp and creative. Speaking of creativity, check out the TMII - Custom Phantom by one of our recent faculty member Rafael O’Halloran.

To all keep up the good work and reach out to me for any ideas or suggestions to continue to build and make TMII strong.

Zahi Fayad, PhD
Director, Translational & Molecular Imaging Institute
Professor of Radiology and Medicine
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WHAT’S NEW?

TMII News & Updates

Save the date

The Translational and Molecular Imaging Institute presents the 4th Annual TMII Symposium. This will be a day-long event on Thursday May 29, 2014 and held at the New York Academy of Medicine. The TMII Symposium offers an opportunity for researchers and medical professionals to gain insight into the current translational imaging research at Mount Sinai and other institutions in and outside the New York metropolitan area. Local and international invited speakers will speak about their work in the fields of big data in imaging, cardiovascular imaging, neuroimaging, cancer & body imaging and nanomedicine. Any research currently involved in these fields are encouraged to submit their work for the accompanying poster sessions.

For more information and registration: http://tmii.mssm.edu/symposium/

WHAT’S NEW

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WHAT’S NEW

FACULTY SPOTLIGHT

SCIENCE SPOTLIGHT

IMAGING SPOTLIGHT

CORE SPOTLIGHT
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.
In combined MR/PET systems, the replacement of CT with MR still allows acquisition of high spatial resolution anatomical images but with superior soft tissue contrast and without delivering additional ionizing radiation. However, there are still unmet challenges to be overcome prior to translating these techniques into clinical practice, such as the development of reliable and accurate attenuation correction methods. In PET imaging, the variable distribution of photon attenuation in different tissues must be corrected for in order to permit accurate quantitative evaluation of the final reconstructed image. CT images are directly related to electron density and can easily be transformed into a linear attenuation map at PET energy levels for use in PET reconstruction algorithms. MRI, in comparison, has no direct information about photon attenuation but rather measures proton densities and magnetic relaxation times. Attenuation correction therefore becomes a non-trivial exercise of deciding how to assign MR signal intensities voxel-by-voxel to empirical photon attenuation coefficients. We have begun validating and exploring improvements for current MR-based attenuation correction (MRAC) methods for MR/PET against the current clinical standard CT-based attenuation correction (CTAC) implemented for PET/CT. In addition, the detailed anatomical information from MR may be used for correction of partial volume effects and improved quantification. We are currently developing post-reconstruction partial volume effect correction methods to improve PET quantification. These methods are typically very challenging since they require accurate coregistration between MR and PET. A combined MR/PET scanner is therefore naturally suited for developing novel PVE correction methods.

**Technical Advances for Improved Quantitative PET in Combined MR/PET systems**

**Fayad Lab - Cardiovascular Imaging**

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**IMAGING SPOTLIGHT**

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### Ways to keep in touch

- **Website:** [tmii.mssm.edu](http://tmii.mssm.edu)
- **Youtube:** [http://www.youtube.com/watch?v=IbVJMsUmin0](http://www.youtube.com/watch?v=IbVJMsUmin0)
- **Numbers:**
  - Tel: (212) 824-8466
  - Fax: (646) 537-9589

### Address:
Leon and Norma Hess Center for Science and Medicine
1470 Madison Avenue (between 101st and 102nd St) - 1st floor
New York, NY 10029

### UPCOMING EVENTS

- **ISMRM** - May 10-16, 2014 Milan, Italy - Registration and Housing Open
- **HBM** - June 8-12 2014 Hamburg, Germany - Early registration rates available until March 13
- **BIC Day** - Tuesday October 28th. More details to follow.

### UPCOMING LECTURES

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

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<tr>
<th>Date</th>
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| **Mon, April 28th** 11:00-12:00pm | Hess Building TMII Large Conf. Room 117 | **Sebastian Furst, PhD**  
Dipl.-Phys., Department of Nuclear Medicine, Technische Universität München  
"Attenuation and Motion Correction in Integrated PET/MR" |
| **Wed, May 28th** 8:00 – 5:00pm | New York Academy of Medicine | **TMII 2014 Annual Symposium** |