With summer upon us, COVID-19 restrictions lifting, and vaccinations rising, there is much to celebrate. I am grateful to my team for their persistence and strength throughout the uncertainty of the last sixteen months. While we all take time to enjoy the summer sunshine and re-opening of borders, we will not relent in our efforts to understand this disease and its long-term effects, alongside collaborators across the health system.

BMEII is full of so many talented and dedicated people, and it is a joy to see several faculty, staff, and post-docs recognized for their service and innovation through recent awards. We continue to expand and hire across our research programs and welcome applications from under-represented groups. I hope you enjoy this edition of the BMEII newsletter, and I wish you all an enjoyable and healthy summer. Thank you for your support.

COVID-19 research conducted at BMEII has gained national attention in recent months. Both NBC Today and NBC News covered our imaging research investigating cardiac inflammation in post-acute sequelae of SARS Co-V-2 (PASC) patients. These features follow patients who have experienced persisting symptoms of COVID and important research happening across the country and here at Mount Sinai to understand what the long-term effects of COVID are and why some patients experience extended illness.

Yael Jacob, PhD, a postdoctoral fellow in the Balchandani Lab, is a recipient of the inaugural Friedman Brain Institute Postdoc Innovator Award. The award will provide $25,000 to support innovative research by a postdoctoral fellow in any laboratory affiliated with the Friedman Brain Institute. Dr. Jacob will apply the funding towards her project entitled “Network based real-time neurofeedback using ultra-high field MRI to reduce rumination levels in depression.”

ImagingNation Podcast

Join us on ImagingNation, a podcast where we discuss all things imaging science, research, innovation, and society. Listen to our latest episodes on Apple and Spotify.

BMEII is hiring!

We are looking for innovative, motivated faculty, postdocs, researchers, and support staff to join our team. Visit our website for all open positions and instructions on how to apply.
Two of our clinical research staff were recently honored by Dr. David Reich, President of The Mount Sinai Hospital with the STAR Award for the exceptional compassion and care they have shown throughout the COVID-19 pandemic. These awards are given to employees who exemplify the Mount Sinai values and service standards of empathy, equity, teamwork, creativity, agility, safety, compassion, and excellence.

Renata Pyzik, MS, MA, is a Project Manager who has worked on cardiovascular imaging studies at BMEII for six years. Renata plays an instrumental role in managing Dr. Fayad’s clinical research studies, including maintaining local and FDA/NIH compliance, establishing new projects, managing databases, analyzing data, and coordinating recruitment. Renata says, “Improving diagnostics and searching for new technologies, like imaging techniques, has always been a driving force for me. I am inspired by Dr. Zahi Fayad and the BMEII staff to advance educationally and professionally.” One memorable experience from the last year involved the early detection of lung cancer in a patient participating in COVID-19 imaging research. Catching the disease early is potentially lifesaving, and the patient was extremely grateful for the discovery. Beyond BMEII, Renata is very active and enjoys competitive skating, tour guiding, crocheting and needlepoint. She is also passionate about fundraising for families with children with special needs.

Rima Fayad, MPH, is a Clinical Research Manager and has been with BMEII for 14 years. She recruits and consents patients participating in cardiac imaging studies and ensures adherence to safety measures, regulatory compliance, and study protocols. Despite the challenges of maintaining a safe environment for patients and staff during the pandemic, Rima loves being able to meet and form relationships with research participants, and always keeps safety in mind. Recently, a patient wrote a letter in gratitude for Rima’s courteous and professional attitude and for how well she and our research techs were able to put him at ease. For Rima, the STAR award inspires her to keep doing better. She emphasizes the importance of teamwork and is grateful to be part of BMEII. Outside of work, Rima enjoys running, traveling, hosting friends, and spending time with family.
Dr. Li Feng is an Assistant Professor of Radiology at the Icahn School of Medicine at Mount Sinai. Dr. Feng obtained his PhD in Biomedical Imaging from NYU School of Medicine in 2015. His research has primarily focused on development of novel rapid motion-robust and quantitative MRI techniques combining advanced acquisition schemes (e.g. golden-angle radial sampling) and image reconstruction strategies (e.g. compressed sensing and deep learning). These new methods can enable acquisition of diverse and comprehensive information in a single, rapid and continuous stream. Over the last decade, Dr. Feng has led the development of several fast and ultrafast MRI techniques. One of them, called Golden-angle RA dial Sparse Parallel (GRASP) MRI, has been successfully translated into the clinic for a broad spectrum of applications and has resulted in increase of the utility, the simplicity, and the cost-effectiveness of MRI. Dr. Feng was named as a Junior Fellow of the International Society for Magnetic Resonance in Medicine (ISMRM) in 2015 and was a winner of the Early Career Award in Basic Science from the Society for Cardiovascular Magnetic Resonance (SCMR) in 2014. Dr. Feng is also a recipient of the 2021 Junior Faculty Council Award for Academic Excellence at Mount Sinai. Dr. Feng was recently awarded a 4-year R01 grant by the NIH/NIBIB to develop and optimize new dynamic MRI techniques based on GRASP MRI for rapid free-breathing and easy-to-use perfusion quantification in the liver. The proposed new methods are expected to achieve improved imaging performance, reduced reconstruction time and substantially simplified perfusion analysis compared to existing MRI methods. These new technical developments will be integrated into the clinical setting to generate a new liver MR perfusion framework, which would enable significant progress towards improved characterization and management of many liver diseases with high clinical impact, such as hepatocellular carcinoma (HCC). It could also change the entire experience of MR imaging for physicians, for patients and for technologists.

Dr. Feng has received a fundable score on another recent NIH R01 submission, which is now being considered for funding. Building on Dr. Feng’s expertise in GRASP MRI and its variant, called XD-GRASP (GRASP with eXtra Dimensions) MRI, this grant proposal aims to evaluate the long-term consequences of COVID-19 on the lungs. Tracking damage in the lungs is important for early identification of COVID-19-induced pulmonary diseases such as lung fibrosis or lung function reduction. However, existing clinical methods are insufficient for simultaneous structure and regional function evaluation of the lung, and therefore there is a pressing clinical need to develop new imaging methods for this purpose. This project aims to develop a novel MRI technique for non-invasive and radiation-free imaging of pulmonary anatomy and function with improved motion robustness, which will enable a 10-minute free-breathing “one-stop-shop” examination of the lung. As a scientific community, we are still learning the long-term effects of COVID-19. Thus, this new method proposed by Dr. Feng holds great potential to improve management of any lingering effects of this disease, and it can also be applied to evaluate other pulmonary diseases.

In addition, together with Mingqian Huang, MD, Musculoskeletal Chief, Dr. Feng recently initiated a project in collaboration with a company called Hyperfine, which develops and builds bedside portable low-field MRI scanners with a mission of making MRI machines for every place and everyone. The main purpose of this project is to investigate the performance of the Hyperfine MRI scanner in musculoskeletal applications and to evaluate whether a low-field portable MRI scanner could achieve sufficient diagnostic image quality in assessing different diseases in the knee joint compared to routine clinical MRI scanner.

Conflict of interest disclosure: Dr. Feng is one of the named inventors in a patent on the GRASP and XD-GRASP MRI techniques.

Figure 1: Fast free-breathing 3D dynamic contrast-enhanced MRI (DCE-MRI) of the liver using the GRASP technique. High resolution contrast-enhanced liver images at multiple time points can be obtained for clinical use.

Figure 2: Fast free-breathing 3D non-contrast MRI of the lung with submillimeter isotropic spatial resolution using the XD-GRASP technique. Good delineation of lung structure can be obtained without radiation exposure and without the need for breath holding.
### Meeting Spotlight

**International Society for Magnetic Resonance in Medicine (ISMRM) Presented Abstracts**

Several BMEII and Radiology faculty presented scientific and educational talks and posters at the May 2021 ISMRM virtual conference. The sessions are available [here](login_required).

<table>
<thead>
<tr>
<th>Section Name</th>
<th>Session Type</th>
<th>Abstract Title</th>
<th>Presenter Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elastography</td>
<td>Scientific Talk</td>
<td>Tumor stiffness and stiffness change using 3D MR elastography are markers of tumor lymphocyte infiltration and immunotherapy response in HCC.</td>
<td>Paul Kennedy, PhD* Lab: Taouli</td>
</tr>
<tr>
<td>Simultaneous Multiparameter &amp; Multidimensional Cardiovascular MRI</td>
<td>Educational Talk</td>
<td>Basics of Multidimensional Imaging</td>
<td>Li Feng, PhD* Lab: Feng</td>
</tr>
<tr>
<td>RF Design I</td>
<td>Scientific Talk</td>
<td>Enhanced Ultra-High Field Brain MRI Using a Wireless Radiofrequency Sheet</td>
<td>Akbar Alipour, PhD* Lab: Balchandani</td>
</tr>
<tr>
<td>Spectroscopy: ACQ/Recon/Analysis</td>
<td>Scientific Poster</td>
<td>Ultrahigh-field echo-planar spectroscopic imaging with semi-adiabatic spatial-spectral pulses</td>
<td>Gaurav Verma, PhD* Lab: Balchandani</td>
</tr>
<tr>
<td>Safety</td>
<td>Scientific Talk</td>
<td>RF safety and image quality testing of deep brain stimulation electrodes with 3T MRI</td>
<td>Gaurav Verma, PhD* Lab: Balchandani</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>Scientific Talk</td>
<td>Prediction of multiple sclerosis clinical progression using whole brain adiabatic T1rho and Relaxation Along a Fictitious Field imaging</td>
<td>Ivan Jambor, MD* Radiology</td>
</tr>
<tr>
<td>Artificial Intelligence (Machine Learning &amp; Deep Learning) Applications to Neuroradiology</td>
<td>Scientific Poster</td>
<td>Classification Between Epilepsy Patients and Healthy Controls Using Multi-Modal Structure-Function Brain Network</td>
<td>Yael Jacob, PhD* Lab: Balchandani</td>
</tr>
<tr>
<td>Fat &amp; Metabolism</td>
<td>Scientific Talk</td>
<td>MP-Dixon-GRASP: Magnetization-Prepared Multiecho GRASP MRI for Free-Breathing Fat/Water-Separated 3D T1 Mapping</td>
<td>Li Feng, PhD* Lab: Feng</td>
</tr>
<tr>
<td>Cancer: Contrast Agents &amp; MRS</td>
<td>Scientific Poster</td>
<td>Estimation of capillary level input function for abbreviated breast Dynamic Contrast-Enhanced MRI using deep learning approach</td>
<td>Li Feng, PhD Lab: Feng</td>
</tr>
<tr>
<td>Imaging of Heart Failure</td>
<td>Scientific Talk</td>
<td>Cardiovascular magnetic resonance T1rho endogenous contrast can detect early myocardial fibrosis in hypertrophic cardiomyopathy</td>
<td>Yang Yang, PhD Lab: Fayad</td>
</tr>
<tr>
<td>CEST, MT &amp; T1P</td>
<td>Scientific Poster</td>
<td>Whole-brain amide CEST at 3T with a steady-state radial MRI acquisition</td>
<td>Xiang Xu, PhD Lab: Xu</td>
</tr>
<tr>
<td>Quantitative Cardiovascular Tissue Characterization</td>
<td>Scientific Talk</td>
<td>Comparison of free-breathing self-gated continuous IR spiral T1 mapping: dual flip angle versus Bloch-Siegert B1-corrected techniques</td>
<td>Yang Yang, PhD Lab: Fayad</td>
</tr>
<tr>
<td>Imaging Metabolites: CEST, MR &amp; MRS</td>
<td>Scientific Talk</td>
<td>A digital human head phantom for validation of retrospective motion correction in glucoCEST MRI</td>
<td>Xiang Xu, PhD Lab: Xu</td>
</tr>
<tr>
<td>Prostate</td>
<td>Scientific Poster</td>
<td>Machine learning challenge using uniform prostate MRI scans from 4 centers (PRORAD)</td>
<td>Ivan Jambor, MD Radiology</td>
</tr>
<tr>
<td>Machine Learning for Quantitative Imaging</td>
<td>Scientific Talk</td>
<td>Self-supervised Deep Learning for Rapid Quantitative Imaging</td>
<td>Li Feng, PhD Lab: Feng</td>
</tr>
</tbody>
</table>

*Indicates presenting author

### Engineering & Medicine Seminar Series

For an updated schedule of lectures, check out our [webpage](webpage). The series will take place on Zoom for the remainder of the year. Interested in presenting? Contact Mallory Stellato at mallory.stellato@mssm.edu.
BMEII Expands Artificial Intelligence Technology

As BMEII continues to increase our artificial intelligence (AI) and deep-learning capabilities, we have acquired an NVIDIA DGX-A100 server, one of the latest instruments developed by NVIDIA to accelerate AI development. From training to inference, this third-generation supercomputer was built to support the largest AI datasets and to optimize and accelerate the computing power of multiple workloads. With six times the training performance of its predecessor and eight GPUs, the DGX-A100 (BMEII-HPC-2) server will boost efficiency and allow for parallel computing. Now, our researchers can train more innovative and comprehensive neural networks within a shorter turnaround time, processing millions of images in one day.

Sara Lewis, MD, Associate Professor, and Octavia Bane, PhD, Instructor of Diagnostic, Molecular and Interventional Radiology, are co-recipients of an R01 award from the NIDDK, for their project proposal "Characterization of Renal Allograft Fibrosis and Prediction of Outcome Using a Quantitative MRI Approach". The purpose of the project is to validate a robust, quantitative multiparametric (mp)MRI approach based on diffusion-weighted and relaxometry (T1 and T1rho) MRI to accurately and non-invasively measure renal transplant fibrosis and clinical outcome. Concomitantly with detecting and staging renal transplant fibrosis, the study aims to detect and stage other histopathological diagnoses of inflammation, and to assess the added values of urinary biomarkers of fibrosis. mpMRI in combination with urinary biomarkers will then be used to predict renal transplant outcome over 2 years. The bi-center, prospective study is based on the collaboration of imaging scientists, transplant nephrologists and renal pathologists at Mount Sinai and Weill Cornell Medical Center (WCMC). The study aims to recruit 120 patients with renal transplant scheduled to undergo indication biopsy at Mount Sinai, and 120 patients scheduled to undergo indication or surveillance biopsy at WCMC. Patients will be imaged at 3T with mpMRI protocols harmonized between the two centers.

Grant Spotlight

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Core Spotlight

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