

RADIOLOGY RESEARCH UPDATE

January 2017 Issue 3

Department of Diagnostic Radiology and Nuclear Medicine

FACULTY SPOTLIGHT

David Dreizin, MD



Dr. Dreizin joined the department in 2013 as an Assistant Professor in the trauma and emergency radiology section.

In 2016, he was awarded a two-year RSNA R&E Foundation Research Scholar grant totaling \$152,000, intended for radiologists dedicated to pursuing research from early on in their careers. One hundred sixty radiologists have received this award over the past 30 years.

His project is titled "Development and validation of an MDCT-based decision support and outcome prediction tool for bleeding pelvic fractures using semi-automated volumetric hematoma analysis and probabilistic modeling."

Although volumetric analysis has been increasingly incorporated in pre-transplant evaluation and assessment of tumor response to therapy, it hasn't received much attention in trauma. Given that technology now allows for volumetric analysis in a rapid manner, it can be applied at the point of care.

Angioembolization can play an important role in treating arterial injury in pelvic trauma, however, it is not without risk, and requires allocation of limited resources and personnel, often in the middle of the night.

Controversy regarding the triage of pelvic trauma patients who may have major arterial injury has been tackled by identifying a variety of univariate predictors. However, synthesizing all of the potentially important imaging signs is difficult and accurate human prediction remains a challenge.

When CTA became a hot topic at the turn of the century, radiologists aimed their focus on the presence and characteristics of contrast blush, but many patients do not show this sign on CT for a variety of reasons including tamponade, tenuous hemodynamics, vasospasm, and transient thrombosis. Dr. Dreizin and his team, with Dr. Edward Herskovits serving as his scientific advisor, have created a CT-based predictive tool that combines rapid hematoma segmentation with direct evidence of arterial injury and a variety of bony injury patterns. Dr. Herskovits is enthusiastic about the research, "Dr. Dreizin's quantitative approach to traumatic pelvic-hematoma assessment augurs a future in which real-time quantitative image analysis complements the radiologist's clinical expertise, thereby increasing triage efficiency and improving patient outcomes." Dr. Dreizin presented his early results at RSNA in November.

"Prospective evaluation is now well underway, and we are beginning to collaborate with other centers to test the portability of the model across institutions with different patient populations, triage algorithms, and trauma CT protocols." Dr. Dreizin reports. "Since volumetric analysis is proving to be a highly

predictive tool, we are starting to evaluate its utility for other abdominopelvic injuries, predicting the need for urgent decompressive laparotomy in the setting of traumatic abdominal compartment syndrome, and assessing the effects of pelvic binders, among other applications."

Dr. Dreizin's other research interests over the years have resulted in his being an author on 31 articles published in peer reviewed journals, presenting 43 abstracts, and receiving 9 awards for his educational presentations at national meetings. He has served as a reviewer for *AJR* since residency, and also reviews manuscripts for *RadioGraphics*. Additionally, he is actively mentoring medical students and residents.

RSNA RECAP

As usual the department displayed a strong presence at RSNA in November, with **Drs. Daly, Mayer, Melhem, Siegel, Sliker and White** presenting educational courses; **Drs. Dreizin, Khan, White and Zhuo** presenting scientific papers; **Drs. Archer-Arroyo, Campassi and Dreizin** presenting education exhibits; and **Drs. Campassi, Gupta and Rothenberg** presenting scientific posters.

Kudos to 3 of our residents who received RSNA's Travel Award: **Vikash Gupta, MD, Sonya Khan, MD, and Steven Rothenberg, MD!**

(Information provided by RSNA.)

We welcome your contributions!
 Please email Brigitte Pocta:
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TECHNIQUE HIGHLIGHT: MARKERLESS MOTION HEAD TRACKING SYSTEM

By: **Mark Smith, PhD, Associate Professor and Director of Radiation Physics**

My research emphases are quantitative cardiovascular imaging and, more recently, motion correction techniques for brain PET. Head motion during a PET brain scan will blur the reconstructed image and may hinder interpretation, especially of fine



Figure 1. Dr. Smith in a mockup of the portable brain PET scanner with attached cameras for tracking head motion.

functional features. This motion can be inadvertent or due to factors such as coughing or tremor. With funding from the Maryland Industrial Partnerships (MIPS) program [P.I. Smith] and the National Institutes of Health through a Small Business Innovation Research grant (R44) [P.I. Beylin], I am collaborating with Brain Biosciences, Inc. of Rockville, Maryland to develop a markerless motion tracking system for a portable dedicated brain PET scanner. This high performance scanner is being developed as a lower cost alternative to a whole body PET scanner for clinical evaluation of Alzheimer's disease and other neurodegenerative disorders, clinical trials of new PET biomarkers and clinical neuroscience research. The motion correction capability will enable imaging of pediatric and adult patients who are unable to remain still during a PET brain study and will be of particular importance for patients with neurodegenerative diseases and associated head tremor. The system currently uses off-the-shelf webcams to record head motion. Postdoctoral Fellow Sergej Anishchenko,

PhD has developed methods for tracking intrinsic facial features and extracting six degree of freedom head pose information from the video images. The technique has been validated with human subjects against a

magnetic tracking system that uses sensors attached to the head. Application of the method for human PET studies is expected to begin in 2017. The Brain Biosciences team is led by David Beylin, MS (CEO) and includes Pavel Stepanov, MS (Vice President of Engineering).

NEW CLINICAL RESEARCH SPECIALISTS

Please welcome two new Clinical Research Specialists who came on board this past quarter, **Tirtha R. Koirala** and **Lauren Spiller**. Together with **Ranyah Almardawi**, we now have a very dynamic team of research specialists to assist you.

Born and raised in Nepal, **Tirtha Koirala** is a certified clinical researcher. He holds an MBBS from Rajshahi Medical College of Bangladesh. Before joining UMB, he worked at the DoD and the Virginia Medical School. In addition to clinical research, he has experience in the development of animal models to better understand the pathophysiology of cerebrovascular and neurodegenerative diseases. Tirtha is a member of numerous professional associations and speaks five languages. He lives with his family in Ellicott City, MD.

Lauren Spiller is certified in clinical exercise physiology by the American College of Sports Medicine. Lauren began working at UMB in 1998 with Jay Magaziner, PhD in the

Department of Epidemiology. While there, she was able to use her skills in rehabilitation and exercise science, acting as an exercise trainer and radiation QA manager for the Baltimore Hip Studies. Lauren moved to the SON five years ago to manage research studies in the Department of Adult Health and Organization Systems for Barbara Resnick, PhD, RN, CRNP, FAAN, FAANP, Professor, Sonya Ziporkin Gershowitz Chair in Gerontology. Lauren was appointed to the IRB as a scientific member two years ago due to her expertise in exercise science, geriatrics and cognitively impaired individuals. Tirtha.Koirala@umm.edu, Lauren.Spiller-Holtzman@umm.edu

SELECTED PUBLICATIONS

Barbera G... **Chen R**, et al. Spatially Compact Neural Clusters in the Dorsal Striatum Encode Locomotion Relevant Information. *Neuron*. 2016 Oct 5;92(1):202-213. Epub 2016 Sep 22.

White C. et al. The Vancouver Lung Cancer Risk Prediction Model: Assessment by Using a Subset of the National Lung Screening Trial Cohort. *Radiology*. 2016 Oct 13 [Epub].

For more publications see, <http://department.radiology.umm.edu/?q=node/1151>

ANOTHER GRANT FOR MAYER

Congratulations to **Dirk Mayer, Dr. rer. nat**, Associate Professor, Department of Diagnostic Radiology and Nuclear Medicine, for receiving yet another R21 grant from the National Cancer Institute for \$369,325 to study "Hyperpolarized ¹³C Imaging of Mitochondrial Metabolism for Improved Characterization of Prostate Cancer." The research will address the current need for improved risk-stratification of prostate cancer by developing a noninvasive imaging method to monitor and characterize tumor-specific metabolic differences and changes in response to therapies. This type of innovative imaging will provide an exciting new tool to aid in diagnosis, evaluation and optimization of therapeutic regimens, and result in more personalized, disease-specific care for prostate cancer patients.