

Center for Magnetic Resonance and Optical Imaging (CMROI) P41 EB015893

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This Biomedical Technology Resource Center (BTRC) is focused on the development of quantitative and noninvasive MR and optical imaging based biomarkers for studying metabolism and function and some recent developments are highlighted below.

Glutamate chemical exchange saturation transfer (GluCEST) technique developed by the center was applied to study patients with non-lesional temporal lobe epilepsy. GluCEST correctly lateralized seizure focus in all patients and was corroborated with MR spectroscopy. GluCEST has the potential to identify the epileptic focus in patients previously deemed non-lesional and may lead to improved clinical outcomes for localization-related epilepsies.

CMROI developed another CEST MRI method based on the exchange between lactate hydroxyl and bulk water protons to image lactate *in vivo*. The method was validated by imaging lactate in a mouse model of lymphoma tumors and in skeletal muscle of healthy subjects during exercise. It is anticipated that this technique will have applications in diagnosis and evaluating therapeutic response of cancer and a variety of metabolic disorders.

Technical development of Arterial Spin Labeling (ASL) MRI led to the implementation of a 3D accelerated parallel MRI scheme for RARE-refocused "stack-of-spirals" using background-suppressed pseudo-continuous ASL. Images displayed improved image quality, reduced signal dropout, and less through-slice blurring. This method can be used to obtain high-spatial resolution perfusion images with moderate temporal resolution.

Finally, our Optical Imaging group developed a novel software correlator approach that improved optical blood flow data acquisition rates 100-fold. With this Diffuse Correlation Spectroscopy device, pulsatile heart beat fluctuations in CBF were resolved, and dynamic cerebral auto-regulation was characterized with improved temporal resolution. Ultimately, this speed improvement would help to model/remove motion artifacts, measure arterial compliance, and carry out whole-head flow imaging.

Additional details of these projects as well as opportunities for potential cross-P41 center collaborations will be presented at the Directors' meeting.