

# CORE FOR TRANSLATIONAL RESEARCH IN IMAGING @MARYLAND (C-TRIM)

## HUMAN IMAGING

### CIBR: Center for Innovative Biomedical Resources

#### CORE EQUIPMENT

##### Siemens Prisma 3 Tesla Whole Body MRI System and Siemens PET/MRI 3 Tesla Biograph System

- Siemens Prisma<sup>fit</sup> 3 Tesla whole body MRI System with high-speed gradients (XR 80/200)
- Siemens PET/MRI mMR Biograph system with MQ 44/200 gradients
- High-resolution anatomic imaging (~70- $\mu$ m resolution) for CNS and body applications
- Tumor kinetics
- Metabolomic studies
- Fat/Water imaging and quantification
- High-resolution Diffusion Tensor and Diffusion Kurtosis Imaging for detecting microstructural and cellular changes
- Cardiac Functional Analysis and Vascular studies
- Cerebral blood flow studies using endogenous contrast
- Functional MRI and Resting state brain networks
- Interventional Imaging
- Metabolic studies using long half-life isotopes F-18 such as Fluoro deoxyglucose (FDG)
- Myocardial perfusion imaging using Rubidium-82 PET



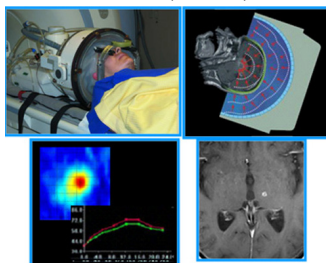
##### GE SpinLab Dynamic Nuclear Polarizer

- Hyperpolarization of C-13 substrates (pyruvate, fumarate, glutamine etc) for detection *in vivo*
- Four sterile sample sizes up to 100 mL of 250 mM C-13 substrates for human applications
- Detection of downstream metabolic products *in vivo* in real-time
- Ability to determine metabolic fluxes, for example to determine aggressiveness of tumor
- Metabolic response to therapeutic drugs



##### MR guided Focused Ultrasound (MRgFUS)

- Insightec Neuro ExAblate system for neuro-interventions
- 1024 element high-intensity focused ultrasound (HIFU) system
- Ability to focus ultrasound beam within 2 mm radius
- MR temperature mapping to facilitate brain interventions
- Neuromodulation Studies
- Blood brain barrier opening for delivery of nanoparticles
- Translational studies



#### MISSION

To provide full-fledged access to research using Magnetic Resonance Imaging for humans and large animals to discover new imaging markers, understand brain function, and to translate basic science to the clinic.

Objective: To provide a collaborative environment to imaging researchers, that leads to innovation that can be rapidly translated to the clinic.

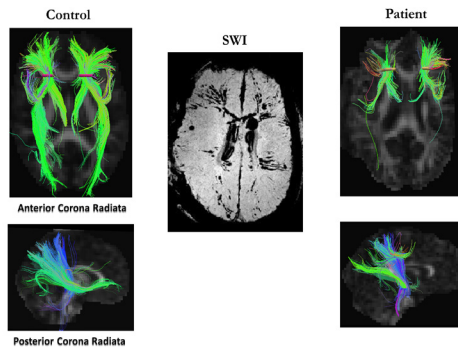
#### CORE SERVICES

The staff of C-TRIM provides consultation on all imaging related research. Assistance is available for the design of experiments and to optimize imaging techniques. The staff also provides assistance in image processing and image analysis. Training is provided to users upon request. The core conducts an annual retreat where specific areas of imaging research are highlighted.

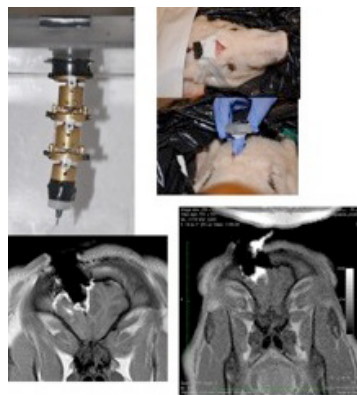
One aspect of the core is to develop new technologies with the goal of making available state-of-the-art techniques to investigators. Through this core, investigators have access to facilities at the Center for Metabolic Imaging & Therapeutics (CMIT).

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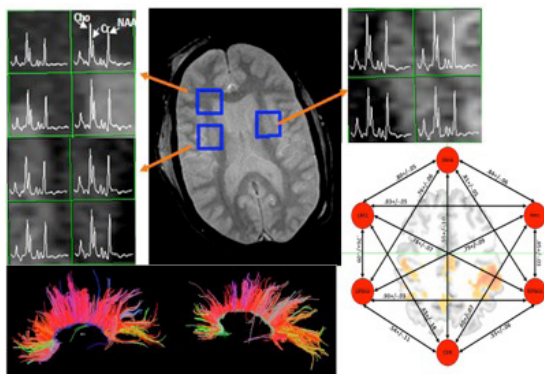


Significant disruption of anterior-posterior white matter tracts due to extensive micro-hemorrhage along the tracts



*Ho et al., IEEE Trans Robot, 2011  
Yang et al., Int J Rob Res, 2014*

Minimally invasive neurosurgical intervention robot performing neurosurgery under image guidance



Anatomic, Biophysical, Biochemical & Functional Changes following TBI

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