Human Magnetic Resonance Center

umass.edu/ials/hmrc

Located on the 2nd floor in the Life Science Laboratories, the Human Magnetic Resonance Center (*h*MRC) provides state-of-the-art, noninvasive neuroimaging, whole body imaging, and spectroscopy technologies for academic and industry-based research in Central and Western Massachusetts. This is the only research-dedicated 3T MRI/MRS system in Western Massachusetts. This system is ideal for investigating questions regarding normal and abnormal changes in human brain and whole body structure and function across the lifespan.

ACCESS

To request access, training, or additional information please contact Jacquie Kurland at jkurland@comdis.umass.edu.

Our rates are competitive and tiered based on needs and usage. Visit our website at *umass.edu/ials/hmrc* for current listing.

TRAINING

Training for new users consists of:

- MRI safety training
- Operation of ancillary instruments and associated software
- Use of data analysis software
- Exporting or presenting data
- Workshops on new techniques

Once training is complete, and the PI has obtained IRB approval, researchers may schedule their experiments through the MR Technician (Elena Bliss at elena.bliss@umass.edu) or on line via a Google Calendar after requesting access to the calendar.

UMassAmherst | Core Facilities

Institute for Applied Life Sciences
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Research and Innovation to Translate Basic Science into Product Candidates

PARTNER WITH US!

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UMassAmherst | Core Facilities

Human Magnetic Resonance Center

Institute for Applied Life Sciences
University of Massachusetts Amherst

State-of-the-Art
Noninvasive Neuro
and Whole-Body Imaging &
Multi-Nuclear Spectroscopy

EQUIPMENT

Siemens 3T Skyra

Siemens 3T Skyra is a 70-cm bore MRI/MRS scanner for acquisition of BOLD, Diffusion, and MR spectroscopy data. The scanner uses state-of-the-art technology for fast and efficient collection of:

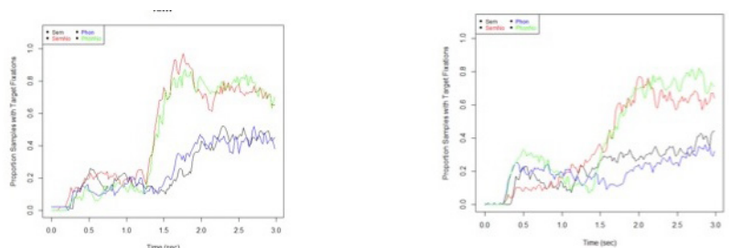
- Structural neuroimaging (white and gray matter and CSF morphology and diffusion tractography),
- Functional neuroimaging (resting state and task-based fMRI),
- Spectroscopy (multi-nuclear and MR elastography) of all body tissues,
- Structural imaging of bone and tissue,

The Skyra provides a wide bore and short length, making it ideal for scanning certain populations, e.g., children and obese persons, who may otherwise feel claustrophobic in a typical 60mm bore.

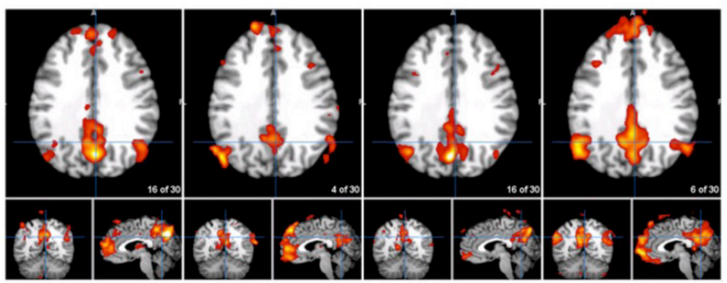
A sagittal plane image slice of the knee with articular cartilage outlined in purple. Three dimensional maps of articular cartilage thickness can be created from these high contrast MR images by combining the segmented the cartilage (as shown) for multiple images slices through the joint.

What Makes Us Unique

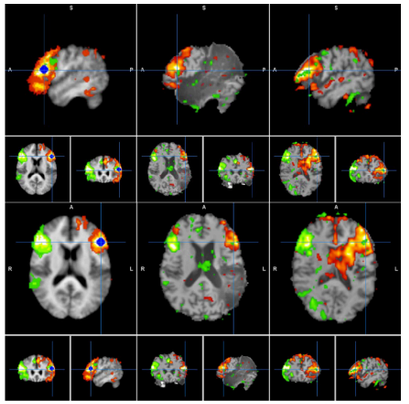
- The *h*MRC houses the only research-dedicated 3T scanner in Western Massachusetts.
- The Siemens 3T Skyra is a state-of-the-art magnet, using the VE11C platform and having access to many of the latest source codes, licenses, and works-in-progress for acquiring BOLD, diffusion, and MR spectroscopy, including simultaneous multi-slice imaging.
- The *h*MRC staff includes:
  - A neuroimaging physicist
  - A whole body/spectroscopy physicist
  - An MR Technician
- An intake room, restroom, and collaborative meeting and training space are available.
- The research physicists are available for consultation and development of MRI and MRS research protocols, to assist with analysis of pilot data, as well as, training and assistance with MR aspects of grant proposals.
- The research physicists also provide workshops and seminars on the latest methods for data acquisition and analysis.
- Housed within the Life Sciences Laboratories building, with extensive state-of-the-art conference room space, and on-campus nearby hotel availability, the *h*MRC is an ideal center for hosting training workshops and educational conferences focused on MR-related issues.



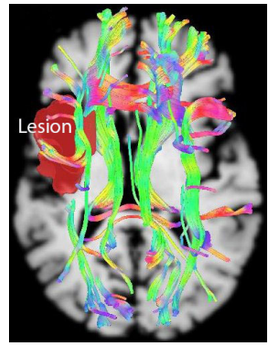
MRI-eyetracking: this image shows off our newest peripheral equipment – an MR-compatible eye tracking system. The figure demonstrates target fixations in four conditions of picture naming for a neurotypical control subject (left) and a person with aphasia (right).



Default mode network in three neurotypical adults and one person with mild anomic aphasia using resting state fMRI.



RS-connectivity-Broca: this is a comparison of a neurotypical control group (13 subjects-left column) with two stroke survivors with aphasia (middle and right columns) that examines functional connectivity using resting state fMRI starting with a seed in left Broca's area. In spite of the stroke-induced lesions, these two individuals have broadly similar connectivity to the healthy group.



DTI images of white matter fiber tracts, which are interrupted in a person with a stroke-induced lesion.

Additional Equipment

- The *h*MRC is equipped with a 3 head coils (20, 32, and 64 channel), and a fully array of body, foot/ankle, knee, breast coils, and a docking exam table.
- Double tuned ^{1}H-^{31}P and ^{1}H-^{13}C surface coils are also available for spectroscopy.
- A variety of MR compatible peripheral equipment is available, such as a 32" high resolution BOLD screen, a 128-channel EEG system, an eye tracking system, an active noise canceling microphone/headphone system, a system for MR elastography, an ergometer, and an array of button box, grip force, and joystick devices for acquiring experimental responses.
- The *h*MRC has a complete mock scanner system, including participant interfaces, and is particularly well suited for training participants to stay still in the scanner.

MASSACHUSETTS LIFE SCIENCES CENTER

A significant portion of core equipment has been purchased through MLSC grant funding support.

TESTIMONIAL

"The human Magnetic Resonance Center at UMass Amherst is a first-rate, state-of-the-art research dedicated MRI/MRS facility. The quality of images acquired on the Siemens 3T scanner is outstanding and the staff are exceptionally knowledgeable and helpful."

– Polly Stokes, BRoCA Lab