Magnetic Resonance Research Facility (MRRF) Major Equipment

MR RESEARCH SCANNERS

3.0T Siemens TIM Trio MRI Scanner (100% Research Dedicated)
Description: This scanner is equipped with the TIM receiver technology and resides in the 1,500 square feet of space within the College of Medicine’s Medical Education Research Facility. It is capable of performing echo-planar imaging, spectroscopic imaging, and is equipped with an 18-channel broadband receivers allowing nuclei other than hydrogen to be imaged. The scanner is equipped with gradient coils of strength of 45 mT/m and a maximum slew rate of 200 T/m/s. Additionally, the Department of Radiology has research agreements in place with Siemens Medical Solutions to acquire preview and works-in-progress releases that are of mutual interest.

Specialized Sequences:
- Advanced 3D
- CARE Bolus Imaging
- BOLD Imaging
- EPSI
- HARDI Diffusion
- Advanced Turbo
- Echo-planar
- Single voxel Spectroscopy
- Arterial spin labeling
- Multiband echo-planar imaging

RF Coils:
- 12-channel Head Coil
- 8-channel Head coil
- 2x 8-Channel Body Array Coil
- 12-channel Spine Array Coil
- 8-channel wrist coil
- 15-channel Knee coil
- 8-channel Foot/Ankle coil
- 4-channel bilateral breast coil
- Endorectal coil
- 1 inch Small Loop Coil
- Rapid 19F Body Coil
- Peripheral Angio Array Coil
- 3T Compatibility Plug
- T/R CP Head Coil
- T/R CP Extremity Coil
- Dual Tuned Rapid MRI 1H/31P Coil
- Neck Array

fMRI Equipment:
- Scan trigger optical to TTL converter
- Avotec Silent Scan Audio equipment
- DLP projector - Panasonic 3500 with rear projection screen
- Stimulus computer with E-prime, Presentation, & Matlab
- Psychology Software Tools (PST) fiber optic manipulandums – left and right hand
- Lumina Response Pad
- Avotec RE-5701 Real Eye Tracker
- FOMRI II Dual-channel MRI microphone system
- MediGoggles interchangeable prescriptive glasses

Other Equipment:
- BIOPAC physiological monitoring system - including photoplethysmograph (PPG), respiratory, galvanic skin response (GSR), pulse ox, air flow and expired gas analysis.
- JD-Medical Small Animal Anesthesia Machine (VT-110-MRI)
- Metrasens FerroGuard metal detector
- Internet radio
- DVD player for subjects to watch movies

7.0T GE 950 Whole Body MRI Scanner (100% Research Dedicated)
Description: This actively shielded scanner was just purchased through an ARRA grant. This instrument will be housed in the 200,000 square foot John and Iowa Institute for Biomedical Discovery. It will capable of performing echo-planar imaging, spectroscopic imaging, and is equipped with 8-channel transmit and 64-channel broadband receivers allowing nuclei other than hydrogen to be imaged. The scanner is equipped with
gradient coils of strength of 50 mT/m and a maximum slew rate of 200 T/m/s. The scanner will include all
sequences available. Additionally, the Department of Radiology is establishing a collaborative research
agreement with GE to acquire preview and works-in-progress releases that are of mutual interest.

**Specialized Sequences:**
- Advanced 3D (CUBE, LAVA-Flex)
- Echo Planar Imaging
- BOLD Imaging
- TRICKS
- Multi-band echo-planar imaging
- Propeller 2.0
- HARDI Diffusion Imaging
- Single Voxel Spectroscopy
- Silent Scan
- IDEAL
- 2D+3D Arterial Spin Labeling
- SWAN
- Chemical Shift Imaging

**Coils:**
- 32-channel receive / quadrature transmit head array
- 32-channel receive / 8-channel transmit head array
- 32-channel receive / 6-channel transmit body array
- 28-channel receive / quadrature transmit extremity array
- Quadrature transmit general purpose loop coil
- Rapid MRI $^1$H/$^{23}$Na brain coil

**fMRI Equipment:**
- Nordic NeuroLab auditory and visual presentation systems
- Stimulus computer with E-prime, Presentation & Matlab
- Psychology Software Tools (PST) fiber optic manipulandums – left and right hand

**3.0T Siemens Skyra MRI Scanner (20% Research Time)**
Description: The scanner is located within the clinical MR Imaging Center. The scanner supports echo-planar
imaging, spectroscopic and chemical shift imaging. The scanner is equipped with XQ-gradient coils of strength
of 45 mT/m and a maximum slew rate of 200 T/m/s. The scanner has a 48-channel receiver system.

**Specialized Sequences:**
- Advanced 3D
- CARE Bolus Imaging
- BOLD Imaging
- RESOLVE Diffusion
- HARDI Diffusion
- SWI
- Advanced Turbo
- Echo-planar
- Single voxel Spectroscopy
- 2D and 3D Arterial spin labeling
- Multiband echo-planar imaging
- Time Resolved Angiography
- Advanced Angiographic Imaging
- Neuro perfusion
- Chemical Shift Imaging (CSI)
- Advanced Cardiac Imaging
- T1rho
- BLADE

**RF Coils:**
- 20-channel Head/Neck Coil
- 18-Channel Body Array Coil
- 15-channel Knee Coil
- 16-channel Shoulder Coil
- T/R CP Head Coil
- 36-channel Peripheral Angio Coil
- 16-channel Foot/Ankle coil
- 32-channel Spine Array Coil
- 16-channel Hand/Wrist Coil
- 15-channel Knee Coil

**fMRI Equipment:**
- ESys System
  - MRI Compatible 30” LCD Screen
  - High Performance Audio system
- Stimulus Computer with E-prime and Presentation
- Psychological Systems Serial response box
- Lumina Response Pad
- Left & right hand fiber optic response gloves

**1.5T Siemens Avanto MRI Scanner (10% Research)**
Description: This scanner is located within the clinical MR Imaging Center and is equipped with the total
imaging matrix (TIM) receiver technology, echo-planar imaging capability, multi-nuclear option, spectroscopic
and chemical shift imaging. The scanner is equipped with gradient coils of strength of 45 mT/m and a maximum slew rate of 200 T/m/s and an 18-channel receiver system.

**Specialized Sequences:**
- Echo-planar Imaging
- Chemical Shift Imaging
- T1rho
- SWI
- HARDI Diffusion Imaging
- Advanced Functional Imaging
- 3He Imaging Sequences
- Single Voxel Spectroscopy
- Advanced Cardiac Imaging
- BLADE

**Coils:**
- 12-channel Head Array
- 12-channel Spine Array
- Large Flex Coil
- Endorectal Coil
- T/R CP Head Coil
- 8-channel Body Array Coil
- Small Flex Coil
- 15-channel knee coil
- Neck Array
- Peripheral/Angio Array Coil
- Breast Coil

**fMRI Equipment:**
- LCD Projector - InFocus LP840
- Stimulus Computer with E-prime
- Avotec Silent Scan audio equipment
- Invivo Physiologic Monitoring

**4.7T Varian Unity/INOVA MRI Small Animal Scanner**
**Description:** The College of Medicine also houses a small animal scanner for mouse and tissue studies. This system is a horizontal bore Varian Unity/INOVA 4.7T unit, with a gradient system having 7cm bore and capable of gradient amplitudes of 270 mT/m.

**Sequences:**
- 2D and 3D gradient-echo
- 2D and 3D fast spin-echo
- 1H Spectroscopy
- 2D spin-echo and gradient-echo EPI

**Coils:**
- Quadrature T/R Coil 38 mm diameter (80mm length)
- Quadrature T/R Coil 25 mm (25mm length)
- Quadrature T/R Coil 38 mm diameter (33mm length)

**Ancillary Equipment:**
- SAII monitoring and gating
- Isoflurane anesthesia
- Small animal heating/comfort system

**MRI Simulator**
**Description:** An MRI Simulator is available free of charge for any researcher participating in MR imaging studies. The MRI Simulator was built by Psychology Software Tools (PST) and provides a realistic approximation of an actual MRI scanner to allow acclimatization and fMRI training of participants in an environment less daunting than a real scanner.

**Features:**
- 60 cm bore with tapered entry and flat facade
- Integrated control panel
- Lights, fan, speakers and subwoofer
- Motorized participant table with remote control and drag sensing safety stop
- Table and head coil pads
- Siemens style mock head coil
- Psychology Software Tools MoTrak head motion tracking system
- Authentic MRI sounds
fMRI Equipment:
- 15" high-definition LCD monitor
- Rear-facing mirror for fMRI studies
- Stimulus computer with E-Prime, Presentation, Matlab and DVD player
- Psychology Software Tools (PST) fiber optic manipulandums – left and right hand
- Lumina Response Pad
- Sennheiser HD 280 professional headphones
- Custom-made memory foam head pillow
- Microphone system