

# Magnetic Resonance Research Facility Major Equipment

## MR Research Scanners

### 3.0T GE Premier MRI Scanner (100% Research Dedicated)

Description: The MR Research Facility currently has a GE 3T 750W scanner and was funded by a High End Instrumentation Grant (S10OD025025) from NIH to upgrade the scanner to the Premier platform. The Premier scanner offers a 70cm bore and is equipped with parallel RF Transmit (MultiDrive), Total Digital Imaging (TDI) RF chain, and AIR coil technology. The scanner is located in the Iowa Institute for Biomedical Imaging (IIBI) within the Pappajohn Biomedical Discovery Building (PBDB). The IIBI has 20,081 sq.ft allocated to human imaging and the scanner is sited in one of the four whole body scanner bays within the facility. A waiting room and three subject preparation rooms are also part of the facility. The scanner is equipped with multi band echo-planar imaging, spectroscopic imaging, and multi-nuclear imaging capabilities. The scanner is equipped with gradient coils of strength of 80 mT/ m and a maximum slew rate of 200 T/m/s. Finally, the scanner is equipped with 3<sup>rd</sup> order shim coils. Additionally, the Department of Radiology has a research agreement in place with GE Healthcare to support pulse programming efforts and sharing of state-of-the-art pre-release pulse sequences.

#### Specialized Sequences:

- IDEAL (Fat/Water Imaging)
- 3D ASL
- SWAN (QSM)
- Cardiac Expert
- MERGE (Multi-echo GRE)
- T1 $\rho$
- 2D COSY
- MP-RAGE/MP2RAGE
- Propeller
- HARDI DTI
- MAVRIC (Metal Reduction)
- Silent
- LAVA (T1 DCE)
- Single Voxel Spectroscopy
- EPSI
- 4D Flow
- 3D CUBE
- Multi-band (SMS) echo-planar
- Parametric Mapping (T2, T2\*)
- 2D/3D SSFP
- PROMO (Motion Correction)
- Chemical Shift Imaging
- CEST

#### Coils:

- 48-Channel AIR Head Coil
- 32-Channel Head Coil
- 8-Channel Body Array
- Dual Tuned <sup>1</sup>H/<sup>31</sup>P Head Coil
- 16-Channel Neonate Coil Set
- 16-Channel Head/Neck Coil
- 16-Channel Flex Coils (Md, Lg)
- <sup>19</sup>F Body Coil
- 60-Channel Spine Posterior Array
- 16-Channel Upper Airway Array
- TR Head Coil
- 8-Channel Should Coil
- 15-Channel Knee Coil
- 30-Channel AIR Anterior Array

#### fMRI Equipment:

- Avotec Silent Scan
- OptoAcoustics II active noise cancelling headphones
- FOMRI II Dual-channel MRI microphone
- MR Elastography
- Avotec Silent Vision (SV 6060)
- Software: E-prime, Presentation, & Matlab
- Response Pads: Lumina Response Pad, Psychology Software Tools (PST) fiber optic manipulandums
- Avotec Real Eye Tracker
- MediGlasses corrective lenses
- Stimulus computer

#### Other Equipment:

- BIOPAC Physiological Monitor: photoplethysmograph (PPG), respiratory, galvanic skin response (GSR), pulse ox, air flow, and expired gas analysis.
- Metrasens FerroGuard metal detector

## 7.0T GE 950 Whole Body MRI Scanner (100% Research Dedicated)

Description: The scanner is located in the Iowa Institute for Biomedical Imaging (IIBI) within the Pappajohn Biomedical Discovery Building (PBDB). The IIBI has 20,081 sq.ft allocated to human imaging and the scanner is sited in one of the four whole body scanner bays within the facility. A waiting room and three subject preparation rooms are also part of the facility. It is capable of performing echo-planar imaging, spectroscopic imaging, and is equipped with 8-channel transmit and 32-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 Department of Radiology has research agreements in place with GE Healthcare to support pulse programming efforts and sharing of state-of-the-art pre-release pulse sequences.

### Specialized Sequences:

- IDEAL (Fat/Water Imaging)
- 3D ASL
- SWAN (QSM)
- LAVA
- T1 $\rho$
- 2D COSY
- Propeller
- HARDI DTI
- FLEX
- Silent
- Single Voxel Spectroscopy
- EPSI
- 3D CUBE
- Multi-band (SMS) echo-planar
- Parametric Mapping (T2, T2\*)
- TRICKS
- Chemical Shift Imaging
- CEST

### Coils:

- 2Tx/32Rx Channel Head Coil
- 8Tx/32Rx MRCoils Body Coil
- $^1\text{H}/^{23}\text{Na}$  Dual Tune Flex Coil
- 8Tx/32Rx Channel Head Coil
- $^1\text{H}/^{31}\text{P}$  Dual Tune Head Coil
- 2Tx/28Rx Extremity Coil
- $^1\text{H}/^{23}\text{Na}$  Dual Tune Head Coil

### fMRI Equipment:

- Avotec Silent Scan
- Stimulus computer
- Avotec Silent Vision
- Software: E-prime, Presentation, & Matlab
- MediGlasses prescriptive lenses
- Lumina Response Pad

### Other Equipment:

- BIOPAC Physiological Monitor: photoplethysmograph (PPG), respiratory, galvanic skin response (GSR), pulse ox, ECG
- Metrasens FerroGuard metal detector

## 7.0T GE 901 Discovery MRI Small Animal Scanner

Description: This scanner is an actively shielded small animal 7T scanner housed in the 200,000 square foot John and Iowa Institute for Biomedical Discovery. It is capable of performing echo-planar imaging, spectroscopic imaging, and is equipped with 2-channel transmit and 8-channel broadband receivers allowing nuclei other than hydrogen to be imaged. The scanner is equipped with gradient coils of strength of 600 mT/m, slew rate of 6000T/m/s, and third order shims.

### Specialized Sequences:

- Advanced 3D
- SWAN (QSM)
- TRICKS
- Chemical Shift Imaging
- BOLD Imaging
- Chemical Shift Imaging
- HARDI Diffusion Imaging
- IDEAL
- 2D COSY
- Echo Planar Imaging
- 3D ASL
- Single Voxel Spectroscopy
- T1 $\rho$

### Coils:

- 2-Channel Mouse Head Coil
- 4-Channel Rat Brain Coil
- 8-Channel mouse Body Coil
- TR Body Coil

### Ancillary Equipment:

- SAll monitoring and gating
- Small animal heating/comfort system
- Isoflurane anesthesia

## **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
- Lights, fan, speakers and subwoofer
- Table and head coil pads
- Psychology Software Tools MoTrak head motion tracking system
- Integrated control panel
- Motorized participant table with remote control and drag sensing safety stop
- Mock head coil
- SimFx (Authentic MRI sounds)

### **fMRI Equipment:**

- 15" high-definition LCD monitor
- Stimulus computer with DVD player
- Sennheiser HD 280 professional headphones
- Response Pads: Lumina Response Pad, Psychology Software Tools (PST) fiber optic manipulandums
- Rear-facing mirror for fMRI studies
- Software: E-prime, Presentation, & Matlab
- Microphone system