Magnetic Resonance Research Facility (MRRF) Major Equipment

MR Research Scanners

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

Description: This scanner offers a 70cm bore and is equipped with parallel RF Transmit (MultiDrive), Total Digital Imaging (TDI), and AIR Coils for neuro and body imaging. TDI is composed of three advancements in RF technology: 1) Direct Digital Interface (DDI), 2) Digital Surround Technology (DST), and 3) Digital Micro Switching (DMS). The scanner is equipped with gradient coils of strength of 100 mT/m and a maximum slew rate of 200 T/m/s. The scanner also has multi band echo-planar imaging, spectroscopic imaging, and multi-nuclear imaging capabilities. The scanner is located in the Iowa Institute for Biomedical Imaging (IIBI) within the Pappajohn Biomedical Discovery Building (PBDB). The IIBI has 20,081 square feet 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. Additionally, 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)
- Cardiac Expert
- MERGE (Multi-echo GRE)
- T1ρ
- 2D COSY
- Elastography
- Propeller
- HARDI DTI
- MAVRIC (Metal Reduction)
- Silent
- LAVA (T1 DCE)
- Single Voxel Spectroscopy
- EPSI
- ZTE
- 3D CUBE
- Multi-band (SMS) echo-planar
- Parametric Mapping (T2, T2*)
- 2D/3D SSFP
- PROMO (Motion Correction)
- Chemical Shift Imaging
- CEST

Coils:

- 48-Channel Head Coil
- 21-Channel Head/Neck Array
- TR Head Coil
- 16-Channel Shoulder Array
- 60-Channel Posterior Array
- 32-Channel Head Coil
- 16-Channel Flex Coils (Md, Lg)
- TR ^{129}Xe Body Coil
- 30-Channel Anterior Array
- 16-Channel Hand/Wrist Array
- 18-Channel Knee Coil
- 16-Channel ^{129}Xe Body Array

fMRI Equipment:

- Avotec Silent Scan
- Stimulus computer
- OptoActive Active Noise Cancelling Headphones and FOMRI III Dual-channel MRI microphone
- 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

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: This actively shielded scanner was brought on line in March 2015 and was acquired from an NIH ARRA grant. 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
- T1ρ
- 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 Channel Body Coil
- $^{1}H/^{23}Na$ Dual Tune Flex Coil
- 8Tx/32Rx Channel Head Coil
- $^{1}H/^{31}P$ Dual Tune Head Coil
- 2Tx/28Rx Extremity Coil
- $^{1}H/^{23}Na$ 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

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
- Rear-facing mirror for fMRI studies
- Software: E-prime, Presentation, & Matlab
- Microphone system