Preclinical Imaging Facilities

The Imaging Crescent:
This facility houses the Bruker 3T, bruker Xtreme, Bruker Skyscan and Sedecal SuperArgus) and is located within the HBTM vivarium. Each system's room is equipped with a biosafety cabinet and prep areas for pre- and post- imaging procedures.

SAIL Satellite:
The Bruker Biospec 7T MRI facility includes a vivarium with veterinary care for longitudinal studies and animal prep areas with biosafety cabinets to permit pre- and post- imaging procedures.

The vivaria are accessible to all researchers using these instruments.

Animal Handling

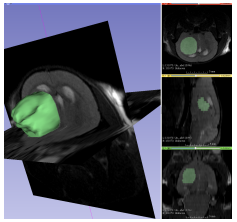
Mouse and rat beds with integrated warming base and anesthesia; Warming blankets; Harvard Apparatus MRI-compatible injection pump; SA Instruments physiological animal monitoring system for respiration, ECG, temperature, as well as cardiac and respiratory triggering; gas anesthesia with O_2 and isoflurane.

Services Include:

- Assistance with study design
- Animal handling
- Scanning and optimization of scanning protocols
- Training for independent scanner operation (MRI, optical),
- Advice on image analysis
- Fee-for-service image analysis.

The core facility is available to all public research institutions and industrial partners.

Image Analysis Service



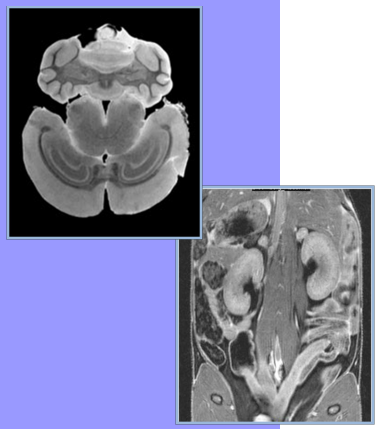
- MRI image segmentation.
- Lesion/tumor volume and dimension measurements.
- MRI-ASL analysis.
- MRI-DCE analysis
- MRI-DTI analysis

For more information:

SAILinfo@partners.org

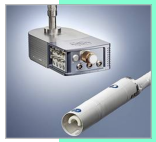
Preclinical Scanners

Bruker 7T MRI
Bruker 3T MRI
Bruker Xtreme II Optical
Bruker Skyscan 1176 uCT
Sedecal SuperArgus PET/CT



BRIGHAM AND WOMEN'S HOSPITAL

MRI Equipment



Hardware

BioSpec 70/20 USR

Gradient: B-GA 12, 660 mT/m, slew rate 4,750 T/m/s;
RF electronics: 2 transmit channels, 1H and X-nuclei, 4 receive channels: 1 wideband and 3 1H-only;
RF coils: 2-channel MRI CryoProbe for mouse brain, 4-channel mouse cardiac/abdomen coil, Tx/Rx 72,, circularly polarized volume coil, 86 mm volume coil, double-tuned 1H/31P and 1H/13C surface coils, 1H receive only surface coils: 10, 20 and 30mm.

BioSpec 3T

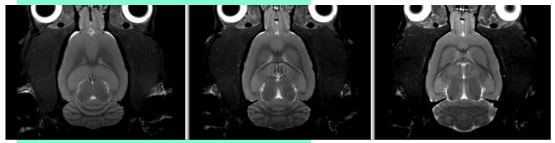
18 cm bore; Gradient: 450 mT/m, slew rate 4,200 T/m/s; motorized animal transport system; multimodal mouse and rat beds; body and head RF coils.

Software

Paravision® version 6.0.1 – Includes: Parallel imaging package (7T), Spectroscopy package, Diffusion tensor imaging license, IntraGate retrospective cardiac gating, Susceptibility-weighted imaging, Arterial Spin Labeling; UTE; fMRI and angiography extension packages.

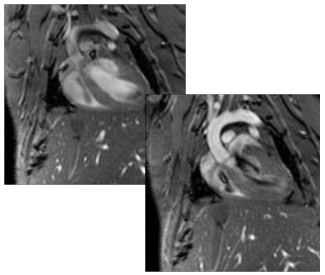
Bruker 7T Examples

Rat whole brain T_2 *in vivo*



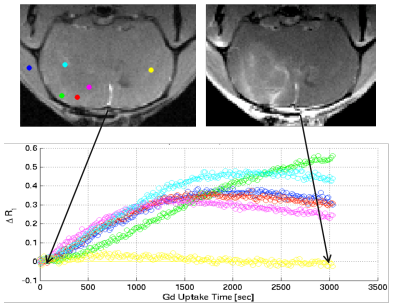
Scan time: 5min, Spatial resolution 167 x 167 µm, slice thickness 0.75mm, 3 of 17 slices

Mouse *in vivo* cardiac MRI using retrospective navigated gating



IntraGate-FLASH
Scan time: 2m 35s
(2 out of 10 cardiac phases shown)
Spatial resolution 117 x 117 µm in-plane, slice thickness 0.75mm

Dynamic contrast-enhanced T_1 in mouse brain *in vivo*

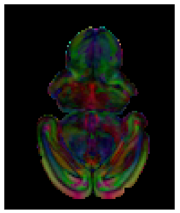


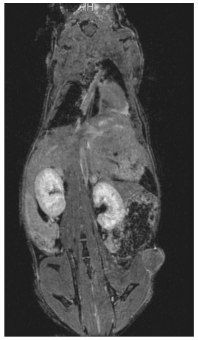
GL261 tumors in C57BL6 mice

FLASH, 5 slices
Scan time: 15s per time point, 220 time points.
Spatial resolution 80 µm in-plane, slice thickness 0.7 mm.

DTI of fixed mouse embryo brain (day 16)

3D DTI-EPI
w/CryoProbe™
b-value: 2000 s/mm², 60 directions.
Scan time: 11h
Spatial resolution 75 µm isotropic





Whole body mouse *in vivo* w/Gd-based nanoparticles

Snap-3D-coronal
Scan time: 8m44s Spatial resolution 175 µm isotropic

Optical Imaging Equipment

Bruker In-Vivo Extreme II

4MP camera for Bioluminescence, Multispectral VIS-NIR Fluorescence, Direct Radioisotope Imaging, and Cherenkov radiation, running Molecular Imaging (MI) software, spectral unmixing, and bone density calculation software; includes a 5 mouse nose cone anesthesia assembly and the Multimodal Animal Rotation System (MARS) for 360° coverage.

µCT Imaging Equipment

Bruker SkyScan 1176

11 MP X-ray CCD camera for high performance, high resolution in-vivo micro-CT scans with a maximum FOV of 68mm x 200mm and ultra-low radiation dose.
Software for 2D/ 3D image analysis, bone morphometry and realistic visualization.

Small Animal PET/CT Equipment

Sedecal SuperArgus PET/CT 4R

LYSO/GSO phoswich detector PET/CT; 8.3% sensitivity, spatial resolution < 1mm across entire FOV; transaxial FOV 120 mm, axial FOV 100/350 mm without/with translation; simultaneous imaging of up to 4 mice; integrated anesthesia, heated bed, gating, monitoring.