1. Neuromodulation Core
Contacts

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Director

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Neuromodulation Research Facility Operations Manager
Specific Aims

• Provide support, training and assistance to COBRE Project Leaders (PLs) and their teams to promote and facilitate the acquisition of high-quality neuroimaging data
• Provide support training and assistance to COBRE PLs and their teams to promote and facilitate the application of high-quality neuromodulation
• Establish core resources with a trajectory toward self-sustaining and enduring status that will serve the larger neuromodulation research community in Rhode Island
Location

Butler Hospital
345 Blackstone Blvd.
Providence, RI 02906

www.butler.org/directions
2. Transcranial Magnetic Stimulation (TMS) Device
Neurostar Advanced Therapy System

- First FDA cleared device to treat depression using repetitive TMS
- **Contact Sensing:** provides real-time feedback with TMS coil contact
- **Motor Threshold assist:** manual and automated software to assist in obtaining individual motor thresholds
- Includes TrakStardatabase for TMS reporting, documentation and obtaining stimulation parameters
Magstim

Magstim Rapid² Plus 1
- Biphasic
- Repetitive, Continuous, and Theta burst TMS protocols
- <100 Hz frequency stimulation

Magstim Bistim2
- Monophasic
- Paired pulse TMS protocols
- Sub-and supra-threshold conditioning
Magstim Compatible Coils

AirFilmCoil (AFC) – 2 active, 2 sham
- Available with active and sham coils
- Delivers repetitive, continuous, and theta burst pulses at high power levels

D702Coil – 1
D50 Flat Coil – 1
MT D70 Remote Coil – 2

Double Cone Coil (DCC)
- Two large cup shaped windings side by side with a flat central section
- Coil geometry allows for better magnetic coupling giving 70% higher induced current
- Useful in stimulating motor cortex areas controlling muscles of lower torso and limbs
Nexstim

- MRI-Navigated Brain Therapy System (NBT)
- TMS combined with 3D brain MRI imaging
- E-field modeling and orientation shown on cortical anatomy
- Capable of delivering repetitive TMS and theta burst protocols
- Includes 6 channels EMG with integrated motor response measurement
- Individual modeling of induced current
- Capable of MRI overlay
Electroencephalography (EEG) ANT North America

- **EEGO MyLab** computer and amplifier
- **EEGO Sports** – computer and amplifier
- Records up to 64 wet channel montages (gel)
- TMS-compatible
- Accessories include up to 24 bipolar channels for EOG, ECG, EMG, and physiological sensors for respiration, temperature, skin conductance, and acceleration
- High temporal resolution data with sampling rate up to 16 kHz*
- Available in multiple cap sizes (2 small, 2 med, 1 large) for use with adults and children

*EEGO sports maximum sample rate 2048 Hz
StarStim (Neuroelectrics)

- Mobile and wireless EEG with option for customized 8 dry channel electrodes with mastoid reference
- tDCS/tACS-capable of closed loop
- NIC software enables time-frequency analysis in real-time with spectrum, spectrogram, and band power visualization
- Sampling rate of 500 Hz
- Timestamp synchronization with external software
Other Physiological Monitoring: ADInstruments

**Powerlab8/35 Data Acquisition Device**
- 8 analog input channels, 8 digital inputs, 8 digital outputs for use of EMG, HRV, GSR data acquisition

**Labchart Software**
- Physiological data analysis software
- HRV analysis module (add on)

**GSR Amplifier**
- A fully isolated galvanic skin response (GSR) amplifier with low voltage, 75 Hz AC excitation and automatic zeroing
Neuronavigation: Rogue Research

Brainsight

- Supports multiple MRI file formats
- MNI/Talairach coordinate registration
- Fits multiple overlays
- Region paint tool for 3D brain reconstruction and automatic curvilinear reconstruction
- Automatic skin and surface to identify region of interest (ROI)
- Drop markers or trajectories based on anatomy, functioning peaks, or using MNI or Talairach coordinates
- Built in EMG for recording motor evoked potential (MEP)
- Neuronavigate with TMS to anatomical targets based on experiment with high precision
- Template Brain Option when no MRI available
3. External User Interfaces: Cambridge Electronic Design (CED)
Each unit with dedicated laptop

**Power 1401 Amplifier**
- High-performance data acquisition interface
- Records waveform data, digital (event) marker information and can generate waveform and digital outputs simultaneously
- 16 channels of 16-bit waveform input
- Supports wide range of research application including TMS

**1902 Isolated Amplifier**
- Versatile modular unit designed to work with modem computer-controlled data acquisition systems through CED software
- Applications for EMG, EEG, ECG, ERG, evoked response, TMS studies, skin conductance GSR, tremor measurement amongst others
Signal Software

- Data acquisition and analysis software for TMS stimulus generation, data capture (EMG), control of external equipment, and custom analysis
- Program customized for ppTMS or other protocols to drive Magstim TMS stimulators
- Use developed scripts to run individual study experiment

*Software requires power 1401 amplifier seen in previous slide to use*
4. Transcranial Direct Current Stimulation (tDCS)
Soterix Medical

1x1 Platform
- Non-invasive electrical brain stimulation to deliver tDCS with impedance monitoring
- Anode and cathode electrodes for precise stimulation
- Active/sham conditions with ramp up/down capabilities with added “tickle” function to produce weak current exposure

4x1 TD-tDCS High Definition Adaptor
- Combined with 1x1 platform
- Focalized tDCS stimulation with sole anode surrounded by 4 cathodes for high definition tDCS
Neurocare: Neuroconn

DC-Stimulator Plus – 2 units

• Anode and cathode placement with sponge electrodes for delivery of 1 channel stimulation with continuous impedance monitoring

• Active/sham conditions available for low-grade tDC Sexperiments
Chattanooga Ionto

- Duelchannel tDCS device to target 2 sites simultaneously
- Ramp up/down functions
- Audible alert notifications for impedance monitoring
- Electrical current can be set in 0.1 mA increments between 0.5 mA and 4 mA
Contact

If interested in learning more about the available equipment, resources, and space the Neuromodulation Core at Butler Hospital has to offer, please contact:

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(401) 455-6633
www.butler.org/services/cobre/
Sources

www.neurostar.com
www.magstim.com
www.magstim.com/product-category/coils/
www.nexstim.com
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