**Lucas Center Facilities and Resources**

Stanford Radiology is fortunate to have abundant MRI research facilities including 4 whole body MRI scanners (see Equipment) and the expertise and support to offer an excellent environment for successful research studies.

The **Richard M. Lucas Center for Imaging** is the home for the *Center for Advanced MR Technology (NIH P41)* as well as the Radiological Sciences Laboratory (RSL). Since 1992, the Lucas Center is one of the few centers in the world with major centralized resources devoted to research in radiological sciences where both basic and clinical scientists are housed. The center provides office and laboratory facilities for full-time faculty members and their complement of scientific staff, postdoctoral fellows and students. The Center supports collaborative and original research using volunteers and patients. The Lucas Center builds on a long-standing and very close working relationship between faculty and students of RSL, clinical Radiology Department and members of the Electrical Engineering Department. The groups have common seminars, journal clubs and study groups. Faculty members from all groups are joint advisors to many students, and have many federally funded and industry-funded collaborative research programs in place.

The Lucas Center has 37,000 square feet of space, dedicated to imaging research, and is located on the Stanford campus, one block from the School of Medicine and Stanford University Hospital. There are four GE whole-body MRI systems, specifically three 3T, and one 7T (see Equipment for details). In addition, the Lucas Center has data analysis laboratories, an electronics laboratory/machine shop, and office space, and is well suited for handling the scanning of patients and normal volunteers comfortably and safely.

All computers in the Lucas Center are networked with all scanners, including all clinical scanners, and the PACS system. Adequate electronics, mechanical laboratory facilities, and machine shops and support personnel are situated at the Lucas Center and elsewhere at Stanford.

The **Radiological Sciences Coil Laboratory** at the Lucas Center has the latest equipment for fabrication, testing, and repair of high-field MRI coils. While no coil development is envisioned in this project, this lab can be used for making phantoms for use during MR sequence testing, and optimization.

The **Radiological Sciences Statistics Group** at the Lucas Center has the latest software for analysis for the project. Jarrett Rosenberg, Ph.D., who has over 15 years of experience in statistical analysis for medical and imaging applications, runs this division. Dr. Rosenberg’s services to assist with statistical comparisons are included in our budget.

The **Magnetic Resonance Systems Research Laboratory** (MRSRL), is centrally located on campus and co-directed by Dr. John Pauly. It contains another whole-body 1.5T MR scanner, which is configured as a research system. In addition, numerous workstations, laboratory supplies, electronics, and office facilities are located in this building. Some twenty students and fellows, including staff members, are supported by this facility. All investigators have access to MRSRL for developing and testing MRI pulse sequences.

The **General Electric Applied Science Laboratory** (ASL) West is located in Menlo Park, CA, just ten minutes from Stanford University. GE ASL-West houses an MR750 3T whole body MRI scanner that is used for product development, pulse sequence development, and human studies. GE ASL-West personnel work directly with Dr. Hargreaves’ group to advance newly developed imaging methods for product testing. It is likely that the ongoing collaborative work with ASL will interact with this project.

**Equipment**

All equipment listed is available at no cost to the sponsor beyond those included in our budget. Usage costs for research scanning at the Lucas Center are included in our budget justification, and research usage of clinical systems is at similar rates. All of these costs cover maintenance of the research MRI equipment.

**MRI Scanners**

The Radiology Department at Stanford currently operates a total of 4 MRI scanners as follows:

* Two 3T GE MR 750 systems at Lucas Center (research only)
* One 3T GE MR 750 PET-MR at Lucas Center (research only)
* One 7T GE MR 950 whole-body scanner at Lucas Center (research only)

Research scanners are available for all proposed human scans. All scanners run compatible software so pulse sequences and reconstructions can easily be supported on all systems. Reconstruction servers are networked to all scanners for reconstruction and data archiving.

All 3T scanners are equipped with state-of-the-art gradient systems (at least 40 mT/m Gradients / 150 mT/m/ms slew rates) and 16 or more receive channels. All 3T scanners include an assortment of RF coils including quadrature and phased-array coils designed to image brain, spine, neurovascular, torso, pelvis, cardiac, knee, foot/ankle, and hand/wrist. All 3T systems all have several sizes of 16-channel “wrap” coils that are excellent for hip and knee scans using parallel imaging.

**Computer Equipment**

The Lucas Center also maintains appropriate computer systems for pulse sequence programming including the GE EPIC pulse sequence programming environment, Matlab, and other statistical and analytic tools.

High-performance computers are available for more advanced imaging reconstruction. A substantial infrastructure of software tools exists to help manipulate data between all MRI scanners and reconstruction servers on different local networks, with careful support for data protection.