

## **Section I: The Magnetic Environment**

### **1. The Magnetic Field**

It is important to remember when working around a superconducting magnet that the magnetic field is always on. Under normal working conditions the field is never turned off. Therefore, it is important to be aware of safety issues regarding ferrous projectiles and patients who may have contraindicated devices implanted in their bodies.

There are two units used to describe magnetic field strength. They are the Tesla and the Gauss. One Tesla (T) equals 10,000 Gauss. The strength of the magnetic fields of our magnets in the WSU MR Research Facility currently are 1.5 Tesla or 15,000 Gauss, 3.0T or 30,000 Gauss, 4.7T (small bore animal magnet) 47,000 Gauss and 7T or 70,000 Gauss. Our magnets are approximately 30,000 to 140,000 times stronger than the earth's magnetic field.

The five gauss line is the area at which the magnetic field becomes dangerous. For our 1.5T systems the five gauss line is indicated by orange tape on the floor of the magnet room. For our 3T system the five gauss line is located at the control room wall in the scanner room and in the equipment room the wall closest to the scanner room. For our 4.7T system, the five gauss line is at the hallway entrance door to the console room and is larger than five gauss at the entrance to the 4.7T magnet itself.

### **2. Keep Doors Closed!**

The doors leading to the magnet rooms should be closed at all times except when entering or exiting the room. This will prevent people who do not belong in the room from mistakenly wandering into the room.

### **3. Consent and Screening Procedures**

#### **Consent Forms**

Because we are a research facility we have several researchers who perform non-FDA approved MRI sequences on patients and volunteers. These sequences are important to the advancement of the science of MRI. We must, however, inform the patients and volunteers that we are performing these non-approved sequences on them and they must give us their informed consent to do so. In addition, the consent form must be signed by the Principal Investigator or their designee. Only one consent form is needed per exam, but the subject must sign a new consent form every time they return for another exam unless the consent form stipulates more than one exam. The PI or his/her designee is responsible for obtaining the consent. A copy of the signed consent must be signed by the appropriate WSU staff or designee before any subject can be scanned.

#### **Screening Forms**

As stated earlier, the magnets have a very strong magnetic field surrounding them which has the potential to attract certain types of metal. The magnetic field can also interfere with the normal operation of electronic devices. For these reasons, we must have a detailed health history for every person that enters the magnet room. This includes all staff members, investigators, patients, and volunteers. The repercussions associated with a patient, volunteer, or staff member being injured because of negligence on the part of the scanning investigator could be severe and could cause research to be halted at this facility.

Screening forms have been designed and must be completed by every person entering the magnet room. For persons who are employed by this facility, the form only needs to be completed once. In the event that a staff member has an accident or surgery where a metallic foreign object or electronic device is implanted into their body, the staff member would be restricted from going into the magnet room until the metallic/electronic object can be cleared for safety purposes. It is up to the staff member to be aware of such circumstances and to report any such events to their direct supervisor.

**\*\*From this point on patients and volunteers will be referred to as "subjects". However, it should be noted that the word "patient" refers to any person scanned in the research facility who is under a physician's care.**

Subjects who return for another MR exam must fill out a new screening form each time they visit. The screening form must be signed by the subject and the investigator or technologist who is performing the scan (if listed as one able to sign the consent form). The signed screening form will be kept on file in the WSU MR Research Facility Coordinator's office. Blank screening forms can be found in the file drawer in the 1.5T and 3T control room.

Keep in mind that all subjects who are giving information regarding their health history must be conscious and coherent. Any gaps in memory or lack of information about a surgical procedure is grounds for canceling the subject, unless a family member can provide a detailed history. If there is ever any question about a subject's past health history regarding metal in their body, it is required that the MR exam be put on hold until the question can be investigated thoroughly. An in depth explanation of contraindications to MRI will follow in the next section.