

MRI
Patient Prep
Information



Cannon Memorial Hospital
Watauga Medical Center

| Table Weight Limits for each facility | | |
|--|---------------------------------|-------------------------------|
| | Cannon Memorial Hospital | Watauga Medical Center |
| MRI 1 (High Field) | 350 lbs. | 440 lbs. |
| MRI 2 (Open) | | 490 lbs. |
| CT 1 (VCTXT) | | 500 lbs. |
| CT 2 | | 450 lbs. |
| CT Scan Table | 450 lbs. | |
| Diagnostic x-ray room 1 | 300 lbs. | 300 lbs. |
| Diagnostic x-ray room 2 | | 300 lbs. |
| Diagnostic x-ray room 3 | | 300 lbs. |
| Diagnostic ER x-ray | | 460 lbs. |
| Nuclear Medicine | 400 lbs. | 440 lbs. |
| Ultrasound | | 500 lbs. |
| Ultrasound Stretcher | 500 lbs. | |
| Outpatient/Lab Center X-ray | | 460 lbs. |
| Dexa scan | | 350 lbs. |
| Dexa table | 300 lbs. | |

Scheduling / General information

- All Imaging exams must be scheduled with the scheduling department with exception to some diagnostic radiology exams.
- To schedule an appointment please contact our scheduling department at 828-268-9037 between the hours of 8:00am-5:00pm. If you reach the voicemail please leave a detailed message and someone will answer your call as soon as possible.
- On the day of your exam please arrive 15 minutes prior to your exam time to register at outpatient registration.
- To have an imaging exam done there must be a physicians order.
- According to the patient preps for certain exams, lab results should be available prior to the exam.

If you have any questions about your exam please call the Imaging Department

Watauga Medical Center: (828) 262-4153

Watauga Medical Outpatient Imaging/Lab Center:
(828) 266-2498

Cannon Memorial Hospital: (828) 737-7620

General description of each Imaging department

- **Radiography (“X-Ray”)** – Uses x-rays to create images.

X-rays created in an x-ray tube pass through a patient to reach the ‘image receptor’ (‘cassette’). The cassette is then inserted into a computed radiography ‘reader’ that converts the energy absorbed by that cassette into a visible image seen on a computer. Radiography best visualizes bones, lungs, and contrast-filled organs (i.e. GI tract, kidneys). Radiography can be used in conjunction with or to enhance another modality, i.e. injecting a joint with contrast before an MRI is obtained or injecting contrast into the spinal canal before a CT is obtained. The contrast media used is usually barium, iodine, or air, depending on the study being performed.

- **Computed Tomography (“CT”)** – Uses x-rays to create images.

Multiple x-rays of ‘slices’ or planes of the body are obtained and reconstructed by a computer to form an image. CT is frequently performed for patients with trauma, kidney stones, cardiac issues, suspected stroke or pulmonary embolism, or abdominal pain. Biopsies are also frequently performed using CT to guide the radiologist. The contrast media used can be orally-ingested barium, IV iodine, or rectally-induced air, depending on the area to be imaged. CT can be used to visualize bone or soft tissue.

- **Magnetic Resonance Imaging (“MRI”)** – Uses a strong magnetic field and radio waves to create images. The patient lies on a table within a strong magnetic field with a ‘coil’ placed over the body part of interest. The body emits ‘signals’ in response to changes in the magnetic fields, which are transmitted by the coil to a computer. The computer converts these signals to images of planes (‘slices’) of the body. Gadolinium is the most frequently used contrast agent used. MRI is best for visualization of soft tissues.

- **Ultrasound (“Sonography”)** – Uses sound waves to create images. High-frequency sound waves are sent through the patient’s body and the ‘echoes’ are converted by a computer into images. The patient may be asked to be NPO or have a full bladder so that these ‘echoes’ may be enhanced. Ultrasound is often used to guide biopsies of soft tissue organs. Ultrasound is used to visualize soft tissue structures.

- **Nuclear Medicine** – Uses ingested or injected radioactive materials to create images. The patient is given either an orally or intravenously administered radioisotope that targets a specific part of the body. The patient is then (after a specified period of time) placed under a ‘camera’ which detects the radiation emitted by the patient’s body. A computer then converts those detections to an image. Nuclear medicine is used to assess a specific system function and is not used to image anatomy.

- **Mammography** – Uses x-rays to create images of the breast. X-rays are produced in an x-ray tube, which pass through a patient’s breast to a detector. The detector absorbs the x-rays and converts them to an electrical signal which is then converted by a computer into an image. It is used as a screening exam for detection of breast cancer and also for diagnosis of breast lumps, microcalcifications, etc. It may also be used to guide placement of localization devices such as wires or needles in a breast prior to surgery, as well as to image breast tissue removed during surgery. Watauga Medical Center only offers mammography at Outpatient Imaging/Lab Center. Cannon Memorial does mammography at the hospital.

- **Bone Densitometry (“Dexa”)** – Uses x-rays to measure bone density. A ‘pencil-beam’ (tightly restricted x-ray beam) is used to scan the lower back and the hip. The beam passes through the body and a detector absorbs the energy of the x-ray beam. That energy is then converted to a non-diagnostic image and a numerical value, providing a calculation of bone density. That calculation is also compared to other age groups and to previous scans a patient may have had. This modality is only used to diagnose osteoporosis or osteopenia. There is not a preparation prior to this exam. Watauga Medical Center only offers Dexa scans at the Outpatient Imaging/Lab Center. Cannon Memorial offers Dexa scans at the hospital.

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Steps to help during your visit for your MRI

1. Know where your MRI is scheduled.
2. Arrive 20 minutes prior to your appointment time. You will be required to check in through our admissions department. There you will need your insurance information and your ordering doctors MRI orders for the exam to be performed.
3. If you have had a prior MRI done at another facility on the same part of the body, please bring those with you at the time of your appointment. Our radiologist will make a comparison to them and your new study.
4. You will then report to the x-ray department, where you will be asked to fill out a MRI screening form. This form includes questions about surgical history and reasons for having the MRI.
5. The MRI technologist will call you from the waiting room and will go over with you the MRI screening form. If you have a friend or family member that will be going into the scan room with you, they may be asked to fill out a screening form as well. Then the technologist will answer any questions and concerns that you may have.
6. Then your MRI will be performed. Most common MRI exams are approximately 45 minutes. Certain exam times vary. The technologist will tell you the approximate time during the interview process. During your MRI you will need to lie completely still. Any movement can and will cause motion on your images. This can add additional time to your exam by having to repeat the motion scans. The MRI machine makes loud noises that start and stop at different times. This is completely normal and is not the indication of a problem.
7. Once your MRI is completed you will then be free to go.
8. The radiologist will read your MRI and send a report to your ordering physician. Your physician will then give you the results at your appointment with him/her. This process usually takes 24-48 hrs. Some delays may occur if outside films are requested for comparison. This is why it is important to bring any prior exams on the same body part with you when you come.

Contraindications for MRI include but are not limited to:

Pacemaker and/or internal implanted defibrillator, aneurysm clips and surgery within the last 6-8 weeks.

Important information to remember:

If you have anything implanted into your body, please have an implant card with you or know as much about the implant as possible prior to your MRI. This will help the technologist and will keep delays for your study to a minimum.

- If your doctor ordered your MRI with an IV contrast and you are 60 yrs of age or older, or a diabetic, you will be required to have lab work

drawn to check kidney function, please come at least 1 hour ahead of MRI appointment time to do this. The lab work also requires a doctor's order and you will go to the lab to have this done unless you have had this already done within the last 30days of your MRI appt.

- MRI scans are very sensitive to motion. You must lie completely still during your procedure.
- The only two MRI exams that require eating restrictions are exams that are scheduled with anesthesia sedation (the OR will notify you of the time to stop eating or drinking and the **MRCP (gallbladder) exam please do not eat or drink anything 6 hrs prior to your MRI.** If you are having any other MRI exam (with or without the IV injection) it is okay to eat, drink and follow normal activity.
- In some cases a doctor will order an arthrogram of the shoulder. This is an x-ray procedure done in the x-ray department. This includes an injection of contrast that is put into the joint space by the radiologist prior to an MRI of the shoulder. These are two separate appointments. **There is no prep for the MRI exam but please see arthrogram preparation under the x-ray section.**
- The CLOSED MRI scanner is located at the hospital and the OPEN MRI scanner is located at the Outpatient Imaging Center, located on State Farm Road. A mobile service comes to Cannon Memorial Hospital two days each week.

This is a limited example of the MRI questionnaire that you will be asked to complete prior to your MRI exam.

Mini MRI/MRA Questionnaire

Please use back of sheet if you need to.

(Shaded areas for use by the ordering physician or his/her designee)

Patient Name _____
Date of Birth _____
Ordered Exam _____

1. Please list all surgeries you have in the past with approximate dates.

2. Was any surgical hardware left inside of you? (This includes but is not limited to joint replacements, stents, instruments, aneurysm clips.) If so, please list what and where.

Yes No

3. Do you have any medical devices either inside of you or that you wear on your body which operate off of battery, electronics or pump? (Example, Pacemakers, Insulin Pump, Baclofen Pumps). If so, please list what.

Yes No

4. Do you have any foreign metal inside of you such as metal from welding or shrapnel? If yes, please describe what, where and list approximate date obtained.

Yes No

5. Do you have a history of renal disease?

Yes No

6. Do you have diabetes?

Yes No

7. Have you ever been diagnosed with cancer? If so, what body part(s) and how long ago?

Yes No

unless the patient has a written information regarding the MRI/MRA compatibility of the device.

3. Patients who have pacemakers or devices which cannot be removed from their body cannot receive a MRI/MRA at this facility due to the possibility ability of damaging the devices.

4. Foreign metal inside the body may warrant screening x-rays which will be done prior to the MRI/MRA. There will not be an additional fee for these x-rays.

5. If the patient has renal disease and/or diabetes or is over the age of 60, the patient must have a BUN and creatinine performed within 4 weeks of the MRI/MRA if the exam is being done with contrast.

6. If the patient has had back surgery and/or has a history of cancer and you are ordering a MRI/MRA of the spinal column, this should be ordered with contrast.

For Office Use Only

1. MRI's/MRA's should be scheduled no less than eight (8) weeks after the surgery date unless approved by the MRI department or radiologist.

2. Most surgical hardware is MRI/MRA compatible if the patient has had the prosthesis in for awhile. If you have any questions, please contact the MRI department. Exceptions would be surgical hardware of the brain. Please contact the MRI department for clarification prior to scheduling

Watauga Medical Center

MRI Preps

What is Magnetic Resonance Imaging (MRI)?

MRI is a painless and safe diagnostic procedure. Unlike CT, or computed tomography, MRI uses no radiation. MRI uses a powerful magnet and radio waves to produce high-quality, cross-sectional pictures of the part of the body being studied. Each picture represents a virtual slice through the part of the body being imaged.

How do you prepare for a MRI?

You may be asked to wear a gown and pants provided by the facilities during your exam.

There is a locker that is available to hold your belongings and clothes. We ask that you leave all valuables at home if possible.

Guidelines about eating and drinking before an MRI exam vary at different facilities. Unless you are told otherwise, you may follow your regular daily routine and take medications as usual.

Some MRI examinations may require an injection of contrast into the bloodstream. The technologist may ask if you have allergies of any kind such as hay fever, hives, allergic asthma, food or drugs. However, the contrast material used for an MRI exam, called gadolinium, does not contain iodine like CT and is less likely to cause an allergic reaction.

The technologist should also know if you have any serious health problems and what surgeries you have undergone. Some conditions, such as kidney disease may prevent you from having an MRI with contrast material. If you are 60 years of age or older, or a diabetic, you will be required to have lab work drawn prior to the MRI to check BUN and creatine levels, this checks your kidney function.

Women should always inform their physician or technologist if there is any possibility that they are pregnant. Because the risks of an MRI exam to the baby are unknown, pregnant women should not have this exam unless the potential benefit from the MRI is assumed to outweigh the potential risks.

If you have claustrophobia (fear of enclosed spaces) or anxiety, you may want to ask your physician for a prescription for a mild sedative or to order anesthesia. Sedatives or anesthesia must be prescribed and scheduled by your doctor prior to your appointment. The technologist cannot order or administer any medication to the patient at the time of your appointment. The technologist cannot give any advice on the medication; follow your doctor's orders.

Jewelry and other accessories should be left at home if possible, or removed prior to the MRI scan. Because they can interfere with the magnetic field of the MRI unit, metal and electronic objects are not allowed in the exam room. These items include:

1. Jewelry, watches, credit cards, cell phones, and hearing aids, all of which can be damaged.
1. pins, hairpins, metal zippers and similar metallic items, which can distort MRI images.
1. removable dental work.
1. pens, pocketknives and eyeglasses.

In most cases, an MRI exam is safe for patients with metal implants, except for a few types. People with the following implants cannot be scanned and should not enter the MRI area:

1. internal (implanted) defibrillator and/or pacemaker
1. cochlear (ear) implant
1. clips used on brain aneurysms

You should tell the technologist if you have medical or electronic devices in your body, because they may interfere with the exam or potentially pose a risk. Examples include:

1. artificial heart valves
1. implanted drug infusion ports
1. infusion catheter
1. implanted electronic device
1. artificial limbs or metallic joint prostheses
1. implanted nerve stimulators
1. metal pins, screws, plates or surgical staples.

Most of the time when an implant has been put into the body, an implant card is provided to the patient. You should always bring it with you so that the technologist can check for MRI compatibility.

In general, metal objects used in orthopedic surgery pose no risk during MRI. However, a recently placed artificial joint may require the use of another imaging procedure. If there is any question of their presence, an x-ray may be taken to detect the presence of any metal objects.

Sheet metal workers and others who might have metal objects such as shrapnel in their bodies may also require an

x-ray prior to an MRI. Dyes used in tattoos may contain iron and could heat up during MRI, but this is rarely a problem. Tooth fillings and braces usually are not affected by the magnetic field but they may distort images of the facial area or brain, so the technologist should be aware of them.

What does the equipment look like?

The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a moveable examination table that slides into the center of the magnet. The machine produces loud, repetitive noises, like banging, during the procedure. But these noises, while unpleasant at times, aren't dangerous or indicative of a problem.

Some MRI units, called short-bore systems, are designed so that the magnet does not completely surround you; others are open on all sides (open MRI). These units are especially helpful for examining patients who are fearful of being in a closed space and for those who are very obese.

The computer workstation that processes the imaging information is located in a separate room.

How does the procedure work?

Unlike conventional x-ray examinations and computed tomography (CT) scans, MRI does not depend on radiation. Instead, radio waves are directed at protons, the nuclei of hydrogen atoms, in a strong magnetic field.

The magnetic field is produced by passing an electric current through wire coils in most MRI units. Other coils, located in the machine and in some cases, placed around the part of the body being imaged, send and receive radio waves. As you lie inside the MRI unit, radio waves are directed

at the protons in the area of your body being studied. In the magnetic field, these protons change their position, producing signals that are detected by the coils.

A computer then processes the signals and generates a series of images each of which shows a thin slice of the body. The computer compiles the images into a three-dimensional representation of the body, which can be studied from many different angles on a computer monitor.

Because protons are most abundant in water molecules, MR images show differences in water content between various body tissues. As a result, MRI is especially suited to detecting disorders that increase fluid in diseased areas of the body, for example, areas affected by tumors, infection and inflammation. Overall, the differentiation of abnormal (diseased) tissue from normal tissues is significantly easier with MRI than with other imaging modalities such as x-ray, CT and ultrasound.

How is the procedure performed?

MRI examinations are usually done on an outpatient basis.

You will be positioned on the moveable examination table. Straps may be used to help you stay still and maintain the correct position during imaging.

Small devices that contain coils capable of sending and receiving radio waves may be placed around or adjacent to the area of the body being studied.

If a contrast material will be used in the MRI exam, the technologist will insert an intravenous (IV) line into a vein in your hand or arm.

You will be moved into the magnet of the MRI unit and the technologist will return to the workstation room while the MRI examination is performed.

If a contrast material is used during the examination, it will be injected into the intravenous line (IV) after an initial series of scans. Additional series of images will be taken following the injection.

When the examination is completed, you may be asked to wait until the technologist checks the images in case additional images are needed.

MRI exams generally include multiple runs (sequences), some of which may last several minutes.

The entire examination is usually completed within 45 minutes. In some cases exam times may vary.

What are some common uses of the procedure?

MR imaging is performed to evaluate:

1. organs of the abdomen and pelvis—including the liver, biliary tract, kidney, spleen and pancreas.
1. pelvic organs including the reproductive organs.
1. brain
1. pelvic and hip bones.
1. cervical, thoracic and lumbar spines
1. hand, wrist, forearm, humerus, shoulder,
1. femur, knee, tib/fib, ankle, and foot
1. blood vessels (MR Angiography) carotids (neck), renal arteries (kidneys) which require the contrast injection, circle of willis (brain) does not require the IV injection.

Physicians use the MR examination to help diagnose or monitor treatment for conditions such as:

1. tumors of the chest, abdomen or pelvis.
1. tumors and other abnormalities of the reproductive organs (e.g., uterus, ovaries, testicles, prostate).
1. lesions of the liver and other organs (when a complete diagnostic assessment can not be done with other techniques).
1. congenital arterial and venous vascular anomalies and diseases (e.g., atherosclerosis) of the chest, abdomen and pelvis (MR Angiography).
1. biliary system conditions (MRCP), which does require you to be NPO (nothing by mouth) 6 hours prior to the exam.

What will I experience during and after the procedure?

Most MRI exams are painless.

Some patients, however, find it uncomfortable to remain still during MR imaging. Others experience a sense of being closed-in (claustrophobia). Therefore, sedation can be arranged by your doctor prior to your MRI for those patients who anticipate anxiety.

It is important that you remain perfectly still while the images are being recorded. MRI is very motion sensitive

and motion on the images will result in repeated scans which will add additional time to your exam.

You will be alone in the exam room during the MR imaging, however, the technologist will be able to see, hear and speak with you at all times using a two-way intercom. You may also bring a friend or parent to stay in the room with you during your study. They too will be asked a list of questions about

surgical history in order to screen and clear them to enter the MRI room.

You may request earplugs to reduce the noise of the MRI scanner, which produces loud thumping and humming noises during imaging. MRI scanners are air-conditioned and well-lit. Some scanners have music to help you pass the time. We have a limited selection of music CDs to choose from. You may also bring a CD from home and we will be glad to play it for you.

When the contrast material is injected, it is normal to feel coolness and a flushing for a minute or two. The intravenous needle may cause you some discomfort when it is inserted and once it is removed, you may experience some bruising. There is also a very small chance of irritation or infection of your skin at the site of the IV tube insertion. A few patients experience side effects from the contrast material, including nausea and local pain. Very rarely, patients are allergic to the contrast material and experience hives and itchy eyes.

If you have not been sedated, no recovery period is necessary. You may resume your usual activities and normal diet immediately after the exam. If you have been sedated with anesthesia, you will have a recovery time in outpatient surgery. This information is provided more thoroughly during the outpatient surgery registration.

It is recommended that nursing mothers not breastfeed for 36 to 48 hours after an MRI with a contrast material.

Who interprets the results and how do I get them?

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will share the results with you.

Your ordering physician may request a CD that will contain all of the images of your exam. After it has been read and released by the radiologist, you can call the x-ray department and request a copy. This will require a release form signed by you.

It is also important to have your ordering physician's information with you, such as phone, fax numbers and the address.

What are the benefits vs. risks?

Benefits

1. MRI is a noninvasive imaging technique that does not involve exposure to radiation.
1. MR images of the soft-tissue structures of the body—such as the brain, liver and many other organs—has a higher sensitivity to identify and characterize abnormalities and focal lesions than other imaging methods. This detail makes MRI an invaluable tool in early diagnosis and evaluation of many focal lesions and tumors.
1. MRI has proven valuable in diagnosing a broad range of conditions, including cancer, heart and vascular disease, and muscular and bone abnormalities.
1. MRI can help physicians evaluate the structure of an organ.
1. MRI enables the detection of abnormalities that might be obscured by bone with other imaging methods.
1. MRI allows physicians to assess the biliary system noninvasively and without contrast injection.
1. The contrast material used in MRI exams is less likely to produce an allergic reaction than the iodine-

based materials used for conventional x-rays and CT scanning.

1. MRI provides a fast, noninvasive alternative to x-ray angiography for diagnosing problems of the cardiovascular system.

Risks

1. The MRI examination poses almost no risk to the average patient when appropriate safety guidelines are followed.
1. If sedation is used there are risks of excessive sedation. The technologist or nurse monitors your vital signs to minimize this risk.
1. Although the strong magnetic field is not harmful in itself, medical devices that contain metal may malfunction or cause problems during an MRI exam.
1. There is a very slight risk of an allergic reaction if contrast material is injected. Such reactions usually are mild and easily controlled by medication. There also is a very small risk of skin infection at the site of injection. Nephrogenic systemic fibrosis is currently a recognized, but rare, complication of MRI believed to be caused by the injection of certain (but not all) MRI contrast material in patients with poor kidney function.

If you are 60 years of age or older, you will be required to have lab work drawn to check BUN and creatine levels (kidney function) at least 1 hour prior to your MRI exam.