Patient Prep Booklet for Imaging Services

Cannon Memorial Hospital
Watauga Medical Center
Patient Preps

General Information

CT
Fluoroscopy
  Upper GI
  Lower GI
  Intravenous Pyleogram (IVP)
  Voiding Cystourethrogram
Arthrography
Hysterosalpingography
Myelography

Pediatric

Mammogram

MRI

Nuclear Medicine
  Radioactive Iodine Therapy
  Thyroid Ablation
  HIDA (Gallbladder Scan)
  Bone Scan
  Gastric Intestinal Bleed Scan
  White Blood Cell Imaging
  Cisternography
  Cystogram
  Gallium Scan
  Gastric Emptying
  Lung Scan
  Meckel’s Diverticulum Scan
  Multigated Acquisition Scan
    (MUGA Scan, Nuclear Ventriculogram, Radionuclide Scan)
  Cardiolite Stress Test
  Parathyroid
  Renogram
  Testicular Scan
  Thyroid Scan
  Lymphoscintigraphy
  Dacrocystogram

PET

Ultrasound
  Abdominal Ultrasound
  Aorta Ultrasound
  Gallbladder
  Biliary Ultrasound
  Liver Ultrasound
  Spleen Ultrasound
  Breast
  Kidney (Renal) Ultrasound
  Obstetrical Ultrasound
  Pelvic Ultrasound
  Transvaginal Pelvic Ultrasound
  Scrotal Ultrasound
  Thyroid Ultrasound
  Biopsies
  Breast Needle Localization
  Mammotome Breast Biopsy
  Fine Needle Aspiration (FNA)
  Paracentesis
  Thoracentesis
  Peripheral Vascular Ultrasound

DXA Bone Density Test

Stereotactic Breast Biopsy
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.

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<thead>
<tr>
<th>Table Weight Limits for each facility</th>
<th>Cannon Memorial Hospital</th>
<th>Watauga Medical Center</th>
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<td>MRI 1 (High Field)</td>
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<td>MRI 2 (Open)</td>
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<td>CT Scan Table</td>
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<td>Diagnostic ER x-ray</td>
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<td>Dexa table</td>
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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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What is CT Scanning?

CT scanning—sometimes called CAT scanning—is a noninvasive, painless medical test that helps physicians diagnose and treat medical conditions.

CT imaging uses special x-ray equipment to produce multiple images or pictures of the inside of the body and a computer to join them together in cross-sectional views of the area being studied. The images can then be examined on a computer monitor or printed.

CT scans of internal organs, bone, soft tissue and blood vessels provide greater clarity than conventional x-ray exams

What does the equipment look like?

The CT scanner is typically a large machine with a hole in the center. You will lie on a table which slides into and out of this hole. The x-ray tube and electronic x-ray detectors rotate around you. They are opposite each other in a ring, called a gantry. The computer workstation that processes the imaging information is located in a separate room.

How does the procedure work?

In many ways CT scanning works very much like other x-ray examinations. X-rays are a form of radiation—like light or radio waves—that can be directed at the body. Different body parts absorb the x-rays in varying degrees.

With CT scanning, numerous x-ray beams and a set of electronic x-ray detectors rotate around you, measuring the amount of radiation being absorbed throughout your body. At the same time, the examination table is moving through the scanner, so that the x-ray beam follows a spiral path. A special computer program processes this series of pictures, or slices of your body, to create two-dimensional cross-sectional images, which are then displayed on a monitor.

CT imaging is sometimes compared to looking into a loaf of bread by cutting the loaf into thin slices. When the image slices are reassembled by computer software, the result is a very detailed multidimensional view of the body’s interior.

Refinements in detector technology allow new CT scanners to obtain multiple slices in a single rotation. These scanners, called “multislice CT” or “multidetector CT,” allow thinner slices to be obtained in a shorter period of time, resulting in more detail and additional view capability. Watauga Medical Center has two scanners, a 4 “slice” scanner and a 64 “slice” scanner. Cannon Memorial Hospital has one scanner, which is a 16 “slice” scanner.

Modern CT scanners are so fast that they can scan through large sections of the body in just a few seconds. Such speed is beneficial for all patients but especially children, the elderly and critically ill.

For some CT exams, a contrast material is used to enhance visibility in the area of the body being studied.

How should I prepare for the CT scan?

You should wear comfortable, loose-fitting clothing to your exam. You may be given a gown to wear during the procedure.

Metal objects including jewelry, eyeglasses, dentures and hairpins may affect the CT images and should be left at home or removed prior to your exam. You may also be asked to remove hearing aids and removable dental work.

You may be asked not to eat or drink anything for several hours beforehand, especially if a contrast material will be used in your exam. You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast materials.

Also inform your doctor of any recent illnesses or other medical conditions, and if you have a history of heart disease, asthma, diabetes, kidney disease or thyroid problems. Any of these conditions may increase the risk of an unusual adverse effect.

Women should always inform their physician or technologist if there is any possibility that they are pregnant.

Please arrive 15 minutes prior to your appointment time and register in the Admissions Department. If you need to reschedule your appointment please call (828)268-9037.

The need for CT is in high demand. CT is a high volume department, providing outpatient, inpatient, and emergency services. We strive to provide the best possible care for all of our patients and will notify you of any delays in your appointment time.
How is the CT scan performed?

The technologist begins by positioning you on the CT examination table, usually lying flat on your back or possibly on your side or on your stomach. Straps and pillows may be used to help you maintain the correct position and to hold still during the exam.

If a contrast material is used, it will be swallowed, injected through an intravenous line (IV) or administered by enema, depending on the type of examination.

Next, the table will move quickly through the scanner to determine the correct starting position for the scans. Then, the table will move slowly through the machine as the actual CT scanning is performed.

You may be asked to hold your breath during the scanning.

What will I experience during and after the procedure?

Most CT exams are painless, fast and easy.

If the contrast material is swallowed, you may find the taste mildly unpleasant; however, most patients can easily tolerate it. This oral contrast material allows the radiologist to visualize your GI tract.

Many patients also receive iodinated contrast material intravenously (injected into a vein) to help evaluate blood vessels and organs such as the liver, kidneys and pancreas. If an intravenous contrast material is used, you will feel a slight pin prick when the needle is inserted into your vein. You may have a warm, flushed sensation during the injection of the contrast materials and a metallic taste in your mouth that lasts for a few minutes. Occasionally, a patient will develop itching and hives, which can be relieved with medication. If you become light-headed or experience difficulty breathing, you should notify the technologist or nurse, as it may indicate a more severe allergic reaction. After the intravenous contrast injection you will be asked to remain in the Imaging Department for 30 minutes so you can be monitored for any signs of an allergic reaction.

When you enter the CT scanner, special lights may be used to ensure that you are properly positioned. With modern CT scanners, you will hear only slight buzzing, clicking and whirring sounds as the CT scanner revolves around you during the imaging process. During the scan you will be given special breathing instructions to limit motion on the CT images.

You will be alone in the exam room during the CT scan, however, the technologist will be able to see, hear and speak with you at all times.

With pediatric patients, a parent may be allowed in the room but will be required to wear a lead apron to prevent radiation exposure.

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. This process usually takes 48 hours.

How to prepare for specific exams...

CT oral contrast material should not be altered in any way. (Do not mix it with any other liquid or pour it over ice.)

If your CT scan is ordered “with contrast” or “with and without contrast,” you should not have anything to eat 4 hours prior to your exam. You may have clear liquids until exam time. If you are over 60 years of age or are diabetic, you will need lab work done to test your kidney function prior to receiving intravenous contrast material. This lab work needs to be done within 4 weeks of your exam. If you have not had any lab work done within this timeframe, contact your physician’s office for the appropriate lab orders.

If your physician has ordered a CTA, this refers to CT Angiography. This exam allows the radiologist to examine specific arteries. You should not have anything to eat for 4 hours prior to your exam. You may have clear liquids until exam time. You should not drink oral contrast material.

If you are having……

CT Abdomen “without contrast”- Drink 1/2 bottle of oral contrast material 1 hour prior to your exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Abdomen “with contrast”- Drink 1/2 bottle of oral contrast material 1 hour prior to your exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.
CT Abdomen "with and without contrast" - Drink 1/2 bottle of oral contrast material 1 hour prior to your exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Appendix - No prep or diet restrictions.

CT Brain "without contrast" (also called CT Head) - No prep or diet restrictions.

CT Brain "with contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Brain "with and without contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Cervical Spine - No prep or diet restrictions.

CT Chest Limited - No prep or diet restrictions.

CT Chest High Resolution - No prep or diet restrictions.

CT Chest "without contrast" - No prep or diet restrictions.

CT Chest "with contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Chest "with and without contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Head - see "CT Brain"

CT Lower Extremity (includes ankle, foot, lower leg, etc.) - No prep or diet restrictions.

CT Lumbar Spine "without contrast" - No prep or diet restrictions.

CT Lumbar Spine post Lumbar Myelogram - Refer to Myelogram Protocol.

CT Maxillofacial Bones "without contrast" - No prep or diet restrictions.

CT Maxillofacial Bones "with contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Maxillofacial Bones with and without contrast - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Mini Sinus (also called CT Sinuses Limited) - No prep or diet restrictions.

CT Orbits "without contrast" - No prep or diet restrictions.

CT Orbits with contrast - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Orbits "with and without contrast" - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Pelvis for Bone Detail - No prep or diet restrictions.

CT Pelvis "without contrast" - If your appointment is prior to 2:30 p.m: Drink 1 bottle of oral contrast material at bedtime the night before the exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time. If your appointment is after 2:30 p.m.: Drink 1 bottle of oral contrast material at 8:00 the morning of your exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Pelvis "with contrast" - If your appointment is prior to 2:30 p.m: Drink 1 bottle of oral contrast material at bedtime the night before the exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time. If your appointment is after 2:30 p.m.: Drink 1 bottle of oral contrast material at 8:00 the morning of your exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Pelvis "with and without contrast" - If your appointment is prior to 2:30 p.m: Drink 1 bottle of oral contrast material at bedtime the night before the exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time. If your appointment is after 2:30 p.m.: Drink 1 bottle of oral contrast material at 8:00 the morning of your exam and 1/2 bottle of oral contrast material 1 hour prior to the exam. Bring the remaining oral contrast material with you to the hospital. You will be asked to drink this once you are in the CT suite. Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.
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CT Pulmonary Embolus- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Renal Calculus (also called CT Stone Study)- No prep or diet restrictions.

CT Sinuses with Contrast - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Sinuses “without contrast”- No prep or diet restrictions.

CT Sinuses “with and without contrast”- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Sinuses Limited- see CT Mini Sinus

CT Soft Tissue Neck “without contrast”- No prep or diet restrictions.

CT Soft Tissue Neck with contrast - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Soft Tissue Neck “with and without contrast”- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Stone Study- see CT Renal Calculus

CT Temporal Bones “without contrast”- No prep or diet restrictions.

CT Temporal Bones with contrast - Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Temporal Bones “with and without contrast”- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Upper Extremity (includes shoulder, clavicle, wrist, hand, etc.)- No prep or diet restrictions.

CTA Abdomen (includes renal arteries, mesenteric arteries, etc.)- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Abdominal Aorta with Runoff- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Chest- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Coronary Arteries (also called CT Cardiac)- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time. Do not consume any form of caffeine for 12 hours prior to the exam. Do not take any erectile dysfunction medication for 72 hours prior to the exam. Patient will need to be premedicated with Metoprolol. Please contact CT Department for further instructions at (828) 262-4290. CT Coronary Angiogram scans are performed at Watauga Medical Center.

CTA Head (also called CTA Circle of Willis)- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Neck (also called CTA Carotids)- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Pelvis- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CTA Upper Extremity- Do not eat anything for 4 hours prior to your exam. You may have clear liquids until exam time.

CT Virtual Colongraphy - Eat a low residue diet for 2 days prior to the exam (See Suggested Menu). On the day before the exam, take Tagitol, Magnesium Citrate, and fluids as directed. Do not eat or drink on the day of exam. CT Virtual Colonography scans are performed at Cannon Memorial Hospital.
Coronary CT Angiogram Patient Information Sheet

Before the Study:
Please follow these instructions in preparation for your exam:

• Inform RN/RT if you have a pacemaker or defibrillator.

• Do not take any erectile dysfunction medication (Viagra, Cialis, Levitra, etc.) for 72 hours prior to your CT scan.

• Do not consume any form of caffeine (coffee, tea, soda, etc.) 12 hours prior to your study.

• Do not take any decongestants 8 hours prior to your study.

• Take the prescribed Metoprolol (Lopressor) pill with 16 ounces of water at bedtime the night prior to your exam and in the morning of your exam. (Inform your physician if you have COPD or asthma prior to taking any beta blockers, such as Metoprolol)

• Do not eat for 4 hours prior to your exam, but you may drink clear liquids.

• Arrive at Watauga Medical Center at time instructed by nurse/Physician's office.

During the Study:

• You will have your blood pressure, heart rate, and oxygen level checked before the CT.

• A nurse may give you an additional dose of Metoprolol (Lopressor) prior to the scan.

• To ensure a high quality exam you will need to be perfectly still and hold your breath a few times for a short time (up to 20 seconds).

• You will have EKG leads attached to your chest to monitor your heart rate.

• You may have oxygen (via small tubing placed in your nostrils) to help you hold your breath.

• You may receive one small dissolving nitroglycerine pill or spray under your tongue during the study. This dilates (enlarges) your arteries for a better study.

• You will have contrast (x-ray dye) injected. A needle will be placed in your right arm inside the elbow area. If you have been told not to have an IV in your right arm (ex. You have had a right mastectomy), inform the technologist and the left arm will be used.

After the study:

• The radiologist will evaluate your study and issue a report to your doctor.

• Drink plenty of fluids, and resume your normal diet.

• Do not take the following diabetic medications for 48 hours after your CT exam: Glucophage, Glucovance, Avandamet, Metaglip, Actoplus Met, Metformin, Fortamet, Diofen, Riomet, and Glumetza.

• Metoprolol slows your heart rate and possibly lowers your blood pressure. It is advisable to rest for the remainder of the day, or until your heart rate returns to its normal level.

• If you feel dizzy or light-headed, lie down and drink plenty of fluids.

• If you feel like you will pass out, or you pass out, medical attention will be given if you are still at Watauga Medical Center. If not you will need to get medical attention at the nearest facility available.

• If you have trouble breathing, swelling of your tongue, itching, or hives this is most likely related to the contrast dye used for the scan. You will need to be evaluated and treated for allergic reaction.

• If you are given nitroglycerin, you may experience a temporary headache. This will go away on its own, but if you wish you may take whatever you normally take for a headache.

• A driver is recommended but not required.
Patient Instructions for Virtual Colonography

The quality of your virtual colonography examination is dependent in part on your bowel preparation. To assure the best possible outcome, this preparation should be taken exactly as directed by your physician. Do not make any substitutions or changes without prior consultation with your doctor. In addition to the instructions contained herein, you should read all product literature accompanying each product. Ask your doctor if you have any questions.

Two Days before your Virtual Colonoscopy
Eat a low residue diet. You may also refer to the attached Suggested Menu sheet.

One Day before your Virtual Colonoscopy
Eat a low residue diet. You may also refer to the attached Suggested Menu sheet.

***Be sure to drink all water/fluids as directed***

Breakfast: One bottle of Tagitol V
Lunch: One bottle of Tagitol V
1:00 p.m.: 8 oz. glass water
2:00 p.m.: 8 oz. glass water
3:00 p.m.: 8 oz. glass water
4:00 p.m.: 8 oz glass water
Dinner (5:00 p.m.): One bottle Tagitol V
5:30 p.m.: Magnesium Citrate
6:00 p.m.: 8 oz glass water
7:00 p.m.: 8 oz glass water
7:30 p.m.: Bisacodyl Tablets
8:00 p.m.: 8 oz glass water
9:00 p.m.: 8 oz glass water
9:30 p.m.: Nothing to eat or drink

The Day of your Virtual Colonoscopy
Do not eat or drink anything.

Suggested Menu

Dairy:
You may have milk or plain yogurt. Avoid yogurt containing fruit skins/seeds.

Meats:
You may have plainly prepared fish, poultry, and eggs. Avoid added fats, gravies, and heavy seasonings.

Potato / Starch:
You may have white rice, spaghetti, noodle/macaroni, and potatoes with no skin. Avoid potato skin and brown rice.

Bread / Cereal:
You may have white (refined) breads and saltine crackers. Avoid whole grain (graham, cornmeal, bran) breads, corn crackers, cereals and popcorn.

Fruit / Juices:
You may have clear fruit juices and canned fruit (with no skin, seeds or membranes). Avoid fresh fruit, raisins, dried fruits, prunes / prune juice and fruit skins/seeds.

Beverages:
You may drink water, fruit flavored drinks, decaffeinated coffee, tea and carbonated drinks. Avoid caffeinated drinks.

Soups:
You may have bouillon / broth, strained soups, soups made with allowed vegetables and meats.

Desserts:
You may have gelatin, fruit ice, and Popsicles (no red colors). Avoid coconut, nuts, seeds and hard clear candies.

Miscellaneous:
You may use salt, pepper, jelly, sugar, honey and syrup. Avoid cloves, garlic, seed spices, barbecue sauce, mustard, jam, peanut butter, mayonnaise and marmalade.
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Lower Gastrointestinal (GI) Tract X-ray (Barium Enema “BE”)

- What is Lower GI Tract X-ray (Radiography)?
- How should I prepare for the procedure?
- How does the procedure work?
- How is the procedure performed?
- What will I experience during and after the procedure?
- Who interprets the results and how do I get them?
- What are the limitations of a Lower GI Tract X-ray?

What is Lower GI Tract X-ray - Barium enema (Radiography)?

Lower gastrointestinal (GI) tract radiography, also called a lower GI, is an x-ray examination of the large intestine, also known as the colon.

The lower GI uses a special form of x-ray called fluoroscopy and a contrast material called barium.

Fluoroscopy makes it possible to see internal organs in motion. When the lower gastrointestinal tract is filled with barium, the radiologist is able to view and assess the anatomy and function of the rectum, colon and part of the lower small intestine.

How should I prepare for the procedure?

Your physician will give you detailed instructions on how to prepare for your lower GI imaging.

The patient must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.

On the day before the procedure you will likely be asked not to eat, and to drink only clear liquids like juice, tea, black coffee, cola or broth, and to avoid dairy products. After midnight, you should not eat or drink anything. You may also be instructed to take a laxative and tablets the day before your exam. Just follow your doctor’s instructions. You can take your usual prescribed oral medications with limited amounts of water.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

How is the procedure performed?

The lower GI exam is usually done on an outpatient basis and is often scheduled in the morning to reduce the patient’s fasting time.

A radiology technologist and a radiologist, a physician specifically trained to supervise and interpret radiology examinations, guide the patient through the lower GI series.

The patient is positioned on the examination table and an x-ray film is taken to ensure the bowel is clean. The radiologist or technologist will then insert a small tube into the rectum and inflate a small balloon to hold the tube in place and begin to pump a mixture of barium and water into the colon. In some cases if the patient has a colostomy, the tube will be placed through the colostomy, so the patient may want to bring a replacement colostomy bag. Air may also be injected through the tube to help the barium thoroughly coat the lining of the colon. In some circumstances, the radiologist or referring physician may prefer a water and iodine solution rather than barium. Next, a series of x-ray images is taken.
The patient may be repositioned frequently on order to image the colon from several angles. Some equipment will allow patients to remain in the same position throughout the exam.

When the examination is complete, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

Once the x-ray images are completed, most of the barium will be withdrawn through the tube. The patient will then expel the remaining barium and air in the restroom. In some cases, the additional x-ray images will be taken.

A lower GI study is usually completed within 30 to 60 minutes.

**What will I experience during and after the procedure?**

As the barium fills your colon, you will feel the need to move your bowel. You may feel abdominal pressure or even minor cramping. Most people tolerate the mild discomfort easily. The tip of the enema tube is specially designed to help you hold in the barium. If you are having trouble, let the technologist know.

During the imaging process, you will be asked to turn from side to side and to hold several different positions. At times, pressure may be applied to your abdomen. With air contrast studies of the bowel, the table may be turned into an upright position.

After the examination, you may take a laxative or enema to wash the barium out of your system if you choose. You can resume a regular diet and take orally administered medications unless told otherwise by your doctor. You may be able to return to a normal diet and activities immediately after the exam. You will be encouraged to drink additional water for 24 hours after the examination.

Your stools may appear white for a day or so as your body clears the metallic liquid from your system. Some people experience constipation after a barium enema. If you do not have a bowel movement for more than two days after your exam or are unable to pass gas rectally, call your physician promptly. You may need an enema or laxative to assist in eliminating the barium.

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.

What are the limitations of a Lower GI Tract X-ray?

A barium enema is usually not indicated for someone who is in extreme abdominal pain or who has had a recent colonic biopsy. If perforation of the colon is suspected, the enema should be performed with iodinated solution or as policy states a two week interval should be observed before performing a barium enema in order to avoid complications related to potential perforation.

X-ray imaging is not usually indicated for pregnant women.
Upper Gastrointestinal (GI) Tract X-ray (Radiography)

- What is Upper GI Tract X-ray (Radiography)?
- How should I prepare for the procedure?
- How does the procedure work?
- How is the procedure performed?
- What will I experience during and after the procedure?
- Who interprets the results and how do I get them?

What is Upper GI Tract X-ray (Radiography)?

Upper gastrointestinal tract radiography, also called an upper GI, is an x-ray examination of the pharynx, esophagus, stomach and first part of the small intestine (also known as the duodenum) that uses a special form of x-ray called fluroscopy and a contrast material called barium.

An x-ray examination that evaluates only the pharynx and esophagus is called a barium swallow. In some cases if aspiration into the lungs is suspected a video barium swallow will be scheduled. In these cases speech pathology will be present to watch and record the patient eating food and thick liquids mixed with barium. Unlike the other barium studies there is not a preparation for this study.

If there are symptoms in the lower abdomen sometimes a small bowel follow thru will be ordered. To coat the lining of the entire small bowel will usually take about 32 ounces of barium. This study takes 1-3 hours depending on how fast the barium can be digested.

In addition to drinking barium, some patients are also given crystals to further improve the images. This procedure is called an air-contrast or double-contrast upper GI.

How should I prepare for the procedure?

Your physician will give you detailed instructions on how to prepare for your upper GI.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

To ensure the best possible image quality, your stomach must be empty of food. Therefore, you will likely be asked not to eat or drink anything (including any medications taken by mouth, especially antacids) and to refrain from chewing gum and smoking after midnight on the day of the examination.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

How is the procedure performed?

This examination is usually performed on an outpatient basis and is often scheduled in the morning to reduce the patient’s fasting time.

A radiologic technologist and a radiologist, a physician specifically trained to supervise and interpret radiology examinations, guide the patient through the upper GI series.
As the patient drinks the liquid barium, which resembles a light-colored milkshake, the radiologist will watch the barium pass through the patient’s digestive tract on a fluoroscope, a device that projects radiographic images in a movie-like sequence onto a monitor. The exam table will be positioned at different angles and the patient’s abdomen may be compressed to help spread the barium. Once the upper gastrointestinal tract is adequately coated with the barium, still x-ray images will be taken and stored for further review.

The patient must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

For a double-contrast upper GI, the patient will swallow baking soda crystals that create gas in the stomach while additional x-rays are taken.

When the examination is complete, the patient will be asked to wait until the technologist determines that images are of high enough quality for the radiologist to read.

This exam usually is completed within 20 minutes.

**What will I experience during and after the procedure?**

Some patients find the thick and chalky consistency of the barium unpleasant and difficult to swallow. The liquid barium has a chalky taste that may be masked somewhat by added flavors such as strawberry or chocolate.

Being tilted on the examination table and having pressure applied to the abdomen can be unpleasant. The examination may make you feel bloated and nauseated.

If you receive gas producing crystals you may feel the need to belch. However, the radiologist or technologist will tell you to try to hold the gas in (by swallowing your saliva if necessary) to enhance the detail in the x-ray images.

After the examination, you can resume a regular diet and take orally administered medications unless told otherwise by your doctor.
How should I prepare for the procedure?
Your doctor will give you detailed instructions on how to prepare for your IVP study.

You will likely be instructed not to eat or drink after midnight on the night before your exam. You may also be asked to take a mild laxative the evening before the procedure.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to patients the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

How does the procedure work?
In the IVP exam, iodine injected through a vein in the arm collects in the kidneys, ureters and bladder, giving these areas a bright white and sharply defined appearance on the x-ray images.

How is the procedure performed?
This examination is usually done on an outpatient basis.

The patient is positioned on the table and still x-ray images are taken. The contrast material is then injected, usually in a vein in the patient’s arm, followed by additional still images.

The patient must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

As the contrast material is processed by the kidneys a series of images is taken to determine the actual size of the kidneys and to capture the urinary tract in action as it begins to empty. The technologist may apply a compression band around the body to better visualize the urinary structures leading from the kidney.

When the examination is complete, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

An IVP study is usually completed within an hour. However, because some kidneys empty at a slower rate the exam may last up to four hours.

What will I experience during and after the procedure?
The IVP is a painless procedure.

You will feel a minor sting as the iodine is injected into your arm. Some experience a flush of warmth, a mild itching sensation and a metallic taste in their mouth as the iodine begins to circulate throughout their body. These common side effects usually disappear within a minute or two and are harmless. Itching that persists or is accompanied by hives, can be easily treated with medication. In rare cases, a patient may become short of breath or experience swelling in the throat or other parts of the body. These can be indications of a more serious reaction to the contrast material that should be treated promptly. Tell the radiologist immediately if you experience these symptoms.

During the imaging process, you may be asked to turn from side to side and to hold several different positions to enable the radiologist to capture views from several angles. Near the end of the exam, you may be asked to empty your bladder so that an additional x-ray can be taken of your urinary bladder after it empties.

The contrast material used for IVP studies will not discolor your urine or cause any discomfort when you urinate. If you experience such symptoms after your IVP exam, you should let your doctor know immediately.

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.
**Pediatric Voiding Cystourethrogram**

- What is a Voiding Cystourethrogram?
- How should I prepare my child for the procedure?
- How is the procedure performed?
- What will my child experience during and after the procedure?
- Who interprets the results and how do I get them?

**What is a Voiding Cystourethrogram?**

A pediatric voiding cystourethrogram (VCUG) is an x-ray examination of a child’s bladder and lower urinary tract that uses a special form of x-ray called fluoroscopy and a contrast material.

**How should I prepare my child for the procedure?**

You should inform your physician of any medications your child is taking and if he or she has any allergies, especially to contrast materials. Also inform your doctor about recent illnesses or other medical conditions.

Because a voiding cystourethrogram (VCUG) is an x-ray procedure, metal objects can affect the image, so avoid dressing your child in clothing with snaps or zippers. Replace metal diaper pins with adhesive tape. No other special preparation is required. An older child may be asked to wear a gown during the exam and to remove jewelry and eye glasses.

Sedation is rarely needed.

**How is the procedure performed?**

This examination is usually done on an outpatient basis.

The technologist begins by positioning the child on the table. Infants and young children may be wrapped tightly in a blanket or other restraint to help them lie still during the imaging.

Several x-rays are taken of the bladder. Then, after cleaning the genital area, a catheter is inserted through the urethra, a tube that carries urine from the bladder out of the body, into the bladder, which is filled with a water-soluble contrast material. The catheter is then withdrawn.

The radiologist and/or the technologist will watch the fluoroscopic monitor while the bladder is filling to see if any of the liquid goes backward into one or both ureters. Several x-ray images of the bladder and urethra are then taken as the child empties his or her bladder. A final x-ray is taken when the child has voided completely.

The patient must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

When the examination is complete, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

A voiding cystourethrogram is usually completed within 30 minutes.

**What will my child experience during and after the procedure?**

A voiding cystourethrogram is painless, though young children can be frightened when they are tightly wrapped and unable to move. The antiseptic used to clean and prepare for the insertion of the catheter may feel cold. Some children may experience mild discomfort when the catheter is inserted and the bladder is filled with the liquid contrast material.

A parent is sometimes allowed to stay in the room to comfort the child but will be required to wear a lead apron to prevent radiation exposure.
Who interprets the results and how do we 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.

Arthrography (Joint x-ray)

- What is Arthrography?
- What are some common uses of the procedure?
- How should I prepare for the procedure?
- How is the procedure performed?
- What will I experience during and after the procedure?
- Who interprets the results and how do we get them?
- What are the limitations of Arthrography?

What is a Arthrography?
Arthrography is the x-ray examination of a joint that uses a special form of x-ray called fluoroscopy and a contrast material containing iodine. In most cases, the arthrogram is followed by a magnetic resonance imaging (MRI) scan to better define abnormalities.

How should I prepare for the procedure?
No special preparation is necessary before arthrography. Food and fluid intake do not need to be restricted.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

How is the procedure performed?
This examination is usually done on an outpatient basis.

The patient is positioned on the examination table and x-rays are taken of the joint to be compared later with the arthrograms.

Next, the skin around the joint is cleansed with antiseptic and a local anesthetic is injected into the area. A needle with an aspiration syringe is then inserted into the joint space. The radiologist, a physician specifically trained to supervise and interpret radiology examinations, will use the syringe to drain the joint fluid, which may be sent to a laboratory for analysis. Next, the contrast material and—sometimes—air are injected into the joint space and the needle is removed to prevent the contrast material and/or air from escaping. The patient will be asked to move the affected joint to distribute the contrast material throughout the space. Still images are then obtained with the joint in various positions.

The examination is usually completed within 30 minutes.
What will I experience during and after the procedure?

Your joint area will be numbed so you do not feel anything related to the arthrographic procedure. Initially, you may experience a slight pinprick and momentary burning as the anesthesia is injected into the joint area. You may feel a fullness as the joint is filled and hear gurgling when the joint is moved.

After the examination, you may experience swelling and discomfort or hear a crackling noise in the joint. You may apply ice to the joint to reduce swelling if it is bothersome. A mild over-the-counter analgesic can be taken for pain. These symptoms usually disappear after 48 hours. Contact your doctor if they persist after two days.

Vigorous exercise is not recommended for 12 hours after the exam.

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.

What are the limitations of Arthrography?

The limitations of conventional arthrography include:
• Partial tears of the rotator cuff may not be detected.
• Although tears of the ligaments and menisci will be detected within the joint, other injuries will not be detected including bruising of the bone and ligaments outside the joint. MRI may be obtained after arthrography to better evaluate these types of injuries.

Hysterosalpingography

What is Hysterosalpingography?

Hysterosalpingography, also called uterosalpingography, is an x-ray examination of a woman’s uterus and fallopian tubes that uses a special form of x-ray called fluoroscopy and a contrast material.

How should I prepare for the procedure?

The hysterosalpingography procedure is best performed one week after menstruation but before ovulation to make certain that you are not pregnant during the exam.

This procedure should not be performed if you have an active inflammatory condition. You should notify your physician or technologist if you have a chronic pelvic infection or an untreated sexually transmitted disease at the time of the procedure.

Prior to the procedure, you may be given a mild sedative or over-the-counter medication to minimize any potential discomfort. Some physicians prescribe an antibiotic prior to and/or after the procedure.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.
You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

How is the procedure performed?

This examination is usually done on an outpatient basis.

The patient is positioned on her back on the exam table, with her knees pulled to her chest or her feet held up with stirrups. A speculum is inserted into the vagina and the catheter is then inserted into the cervix. The speculum is removed and the patient is carefully situated underneath the fluoroscopy device. The contrast material then begins to fill the uterine cavity through the catheter and fluoroscopic images are taken.

In some cases, if certain abnormalities are encountered, the patient will be asked to rest and wait up to 30 minutes so that a delayed image can be obtained. This delayed image may provide clues to a patient’s condition that the original images with contrast material do not. When the procedure is complete, the catheter will be removed and the patient will be allowed to sit up.

When the examination is complete, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

The hysterosalpingogram is usually completed within 30 minutes.

What will I experience during and after the procedure?

This exam should cause only minor discomfort.

There may be slight discomfort when the catheter is placed and the contrast material is injected, but it should not last long. There may also be slight irritation of the peritoneum, causing generalized lower abdominal pain, but this should also be minimal and not long lasting.

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.
Myelography

What is Myelography?

• How should I prepare for the procedure?
• How is the procedure performed?
• What will I experience during and after the procedure?
• Who interprets the results and how do I get them?

What is Myelography?

Myelography is an imaging examination that shows the passage of contrast material in the space around the spinal cord (the subarachnoid space) using a real-time form of x-ray (radiography) called fluoroscopy, in which organs can be seen over many seconds (rather than in the static image called an x-ray or radiograph).

In most cases, the myelogram is followed by a computed tomography (CT) scan to better define abnormalities.

How should I prepare for the procedure?

Your physician will give you detailed instructions on how to prepare for your myelogram.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast material. Also inform your doctor about recent illnesses or other medical conditions.

Specifically, the physician needs to know if (1) you are taking medications that need to be stopped a few days before the procedure and (2) if you have a history of contrast reaction to the contrast material used for the myelogram.

Some drugs should be stopped one or two days before myelography. They include certain antipsychotic medications, antidepressants, blood thinners, and drugs - especially metformin - that are used to treat diabetes. However, the most important medication that must be stopped is blood thinners (anticoagulants). If you are taking blood thinners, you should speak with your physician about alternative methods of maintaining anticoagulation while you are undergoing a myelogram. Blood work will be needed if the patient is on blood thinners. You also need to fast after midnight until your exam is complete.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eyeglasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

Unless you are to spend the night in the hospital, you should arrange to have a relative or friend take you home.

How is the procedure performed?

This examination is usually done on an outpatient basis.

As the patient lies face-down on the examination table, the radiologist will use the fluoroscope, which projects radiographic images in a movie-like sequence onto a monitor to visualize the spine and determine the best place to inject the contrast material.

The contrast material is usually injected into the lower lumbar spine, because it is considered easier and safer. Occasionally, if it is deemed safer or more useful, the contrast material will be injected into the upper cervical spine.

At the site of the injection, the skin will be cleaned and numbed with a local anesthetic. Depending on the location of the puncture, the patient will be positioned on their side, on their abdomen, or in a sitting position as the needle is inserted. In some cases, patients will be placed in a sitting position. If needed, a small amount of cerebrospinal fluid will be withdrawn for laboratory studies. The contrast material is then injected and withdrawn for laboratory studies. The contrast material is then
injected and the x-ray table is slowly tilted so that contrast material will run up and down the spine and surround the nerve roots that are next to the spinal cord.

The radiologist will monitor the flow of contrast with fluoroscopy, focusing on the area of the patient’s symptoms. At this point, additional x-ray images will be taken by the technologist; it is important to remain still to reduce the possibility of blurred images.

A computed tomography (CT) scan is frequently performed immediately after myelography while contrast material is still present in the spinal canal. This combination of imaging studies is known as CT myelography.

A myelography examination is usually completed within 30 to 60 minutes. A CT scan will add another 30-60 minutes to the total examination time.

What will I experience during and after the procedure?

You will feel a brief sting when local anesthetic is injected, and slight pressure as the spinal needle is inserted. Positioning the needle can occasionally cause a sharp pain.

During the exam, you will be asked to lay as still as possible while the table is tilted at different angles. A foot rest and straps or supports will keep you from sliding out of position. You may find the face-down position uncomfortable or that it causes you difficulty breathing deeply or swallowing. However, you should not have to maintain this position for very long.

Rarely, headache, flushing, or nausea may follow contrast injection. Seizures are possible, but also are rare.

We will have patients stay in a recovery area resting with the head elevated at a 30° to 45° angle for as long as four hours. You may be encouraged to take fluids at this time to help eliminate contrast material from your body and to prevent headache.

Following your myelogram, you should refrain from strenuous physical activity and from bending over for one to two days.

You should notify your health professional if you experience fever higher than 100.4° F, excessive nausea or vomiting, severe headache for more than 24 hours, neck stiffness, or numbness in your legs. You should also report if you have trouble urinating or moving your bowels.

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.
Children’s Prep IVU or Barium Enema

For IVU (an x-ray of the kidneys and bladder) or Barium Enema (an x-ray of the large bowel)

Please follow these instructions:

Under 1 year no prep

Ages 1 to 3 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 1.5 oz. of Magnesium Citrate at 4 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.
** Babies accustomed to night feedings may have a bottle as late as 4:00 a.m. Nothing to eat or drink after 4:00 a.m. until x-rays are completed.

Ages 3-5 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 2.5 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

Ages 6-8 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 3 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

Ages 9-12 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 4 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

In addition to these preps if the child weighs:
40-60 lbs. Give 1 bisacodyl tab at 10:00 p.m. the night prior to exam.
60-90 lbs. Give 2 bisacodyl tabs at 10:00 p.m. the night prior to exam.
90 + lbs. Give 3 bisacodyl tabs at 10:00 p.m. the night prior to exam.
Pediatric Prep for UGI
(x-ray for the stomach)

1. Nothing to eat or drink after midnight until x-rays are completed.

**Babies accustomed to night feedings may have a bottle as late as 4:00 a.m. Nothing to eat or drink after 4:00 a.m. until x-rays are completed.

Fasting protocol for infants and pediatric patients under the age of two

Consult imaging department if there are questions concerning prep or special patient needs, 828-262-4151.

Schedule patient for early morning appointment whenever possible.

<table>
<thead>
<tr>
<th>Ingested Material</th>
<th>Minimum fasting period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquids (water, fruit, juice w/o pulp)</td>
<td>2 hours</td>
</tr>
<tr>
<td>Breast milk</td>
<td>4 hours</td>
</tr>
<tr>
<td>Infant formula</td>
<td>6 hours</td>
</tr>
<tr>
<td>Non-human milk</td>
<td>6 hours</td>
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</tbody>
</table>
**Mammograms:**
**Difference between Screening and Diagnostic**

**Screening Mammograms:**
Screening Mammograms are performed at Watauga Medical Center’s Outpatient Imaging Center, located on State Farm Road, and at Cannon Memorial Hospital. Screening Mammograms are for patients that are not experiencing any breast complaints or problems, never had previous breast cancer, who are over the age of 35, and who have had a negative biopsy greater than one year ago. The name and address of a licensed physician must be provided at the time of the mammogram.

**Diagnostic Mammograms:**
Diagnostic Mammograms including Additional Mammography Views and Follow Up Mammograms are performed at Watauga Medical Center’s Outpatient Imaging Center, located on State Farm Road, and at Cannon Memorial Hospital.
Diagnostic Mammograms are for patients needing additional views as a follow up to a screening or diagnostic mammogram, patients requiring a short-term follow up mammogram, patients that are having problems or complaints with their breast, patients with a previous history of breast cancer, and patients that have had surgery on the breast less than one year.
Instructions for Needle Localization at Watauga Medical Center

You have been scheduled for a Breast Needle Localization prior to your Breast Biopsy / Surgery.
If your needle localization procedure is done at the Outpatient Imaging Lab Center, your Breast Biopsy/Surgery will be at Watauga Medical Center. If your needle / localization procedure is done at Cannon Memorial Hospital, it will take place in the mammography department, and your surgery will follow in the OR department.
It is IMPERATIVE that you have a driver the day of your exam. You will be traveling from the Outpatient Imaging and Lab Center to the hospital after your needle localization.
You will need to arrive at the Outpatient Imaging and Lab Center located on State Farm Road 15 minutes prior to your appointment time.
Example: Appointment time: 8:00 a.m. - Arrive at 7:45 a.m.

What to Expect:
• You will be having mammogram films similar to the images you had the day of your mammogram.
• The Radiologist will inject Lidocaine into the breast area, which will numb the breast.
• A needle will be inserted and mammogram images will be taken to verify the position of the needle.
• Once the needle is in the correct position, the needle will be removed and a thin wire will be left in your breast.
• The wire will be securely taped to your skin and a bandage will cover the wire.
• You will dress and proceed to Watauga Medical Center with your driver.
• Someone will meet you in the front lobby at Watauga Medical Center and escort you to either the Outpatient Surgery Department or the Imaging Department.

“I have read the instructions and agree to go directly to Watauga Medical Center upon leaving the Outpatient Imaging and Lab Center.”

Signature: _____________________________ Date: ______________

Mammogram 2
Children’s Prep IVU or Barium Enema

For IVU (an x-ray of the kidneys and bladder) or Barium Enema (an x-ray of the large bowel)

Please follow these instructions:

Under 1 year no prep

Ages 1 to 3 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 1.5 oz. of Magnesium Citrate at 4 p.m. the day before x-rays.
3- Nothing to eat or drink after midnight until x-rays are completed.
** Babies accustomed to night feedings may have a bottle as late as 4:00 a.m. Nothing to eat or drink after 4:00 a.m. until x-rays are completed.

Ages 3-5 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 2.5 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

Ages 6-8 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 3 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

Ages 9-12 years:
1 - Liquids for supper: juices, soup, milk, jello.
2 - Take 4 oz. of Magnesium Citrate at 4:00 p.m. the day before x-rays.
3 - Nothing to eat or drink after midnight until x-rays are completed.

In addition to these preps if the child weighs:
40-60 lbs. Give 1 bisacodyl tab at 10:00 p.m. the night prior to exam.
60-90 lbs. Give 2 bisacodyl tabs at 10:00 p.m. the night prior to exam.
90 + lbs. Give 3 bisacodyl tabs at 10:00 p.m. the night prior to exam.
Pediatric Prep for UGI
(x-ray for the stomach)

1. Nothing to eat or drink after midnight until x-rays are completed.

**Babies accustomed to night feedings may have a bottle as late as 4:00 a.m. Nothing to eat or drink after 4:00 a.m. until x-rays are completed.

Fasting protocol for infants and pediatric patients under the age of two

Consult imaging department if there are questions concerning prep or special patient needs, 828-262-4151.

Schedule patient for early morning appointment whenever possible.

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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 30 days 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 had 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

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.
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.
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.
2. Pins, hairpins, metal zippers and similar metallic items, which can distort MRI images.
3. Removable dental work.
4. 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 cannot 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.
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Radioactive Iodine Therapy - THYROID CANCER
(Performed only at Watauga Medical Center)

Radioactive iodine (I-131) therapy is a treatment for papillary or follicular thyroid cancer. It kills thyroid cancer cells and normal thyroid cells that remain in the body after surgery.

People with medullary thyroid cancer or anaplastic thyroid cancer usually do not receive I-131 therapy. These types of thyroid cancer rarely respond to I-131 therapy.

Even people who are allergic to iodine can take I-131 therapy safely. The therapy is given as a liquid or capsule that you swallow. I-131 goes into the bloodstream and travels to thyroid cancer cells throughout the body. When thyroid cancer cells take in enough I-131, they die.

Many people get I-131 therapy in a clinic or in the outpatient area of a hospital and can go home afterward. Some people have to stay in the hospital for one day or longer. Ask your health care team to explain how to protect family members and coworkers from being exposed to the radiation.

Most radiation from I-131 is gone in about one week. Within three weeks, only traces of I-131 remain in the body.

During treatment, you can help protect your bladder and other healthy tissues by drinking a lot of fluids. Drinking fluids helps I-131 pass out of the body faster.

Some people have mild nausea the first day of I-131 therapy. A few people have swelling and pain in the neck where thyroid cells remain. If thyroid cancer cells have spread outside the neck, those areas may be painful too.

You may have a dry mouth or lose your sense of taste or smell for a short time after I-131 therapy. Chewing sugar-free gum or sucking on sugar-free hard candy may help.

A rare side effect in men who receive a high dose of I-131 is loss of fertility. In women, I-131 may not cause loss of fertility, but some doctors advise women to avoid getting pregnant for one year after a high dose of I-131.
Researchers have reported that a very small number of patients may develop a second cancer years after treatment with a high dose of I-131.

A high dose of I-131 also kills normal thyroid cells, which make thyroid hormone. After radioactive iodine therapy, you need to take thyroid hormone pills to replace the natural hormone.

Thyroid Ablation - Hyperthyroidism

(Performed only at Watauga Medical Center)

Radioactive Iodine I-131 (also called Radioiodine I-131) therapy is a treatment for an overactive thyroid, a condition called hyperthyroidism.

The thyroid is a gland in the neck that produces two hormones that regulate all aspects of the body’s metabolism, the process of converting food into energy. When a thyroid gland is overactive, it produces too much of these hormones, accelerating the body’s metabolism. Symptoms of this condition include an enlarged thyroid gland, rapid heart rate, high blood pressure, weight loss in spite of increased appetite and less tolerance for a warm environment.

Radioactive iodine (I-131) is an isotope created from iodine to emit radiation for medical use. When a small dose of I-131 is swallowed, it is absorbed into the bloodstream in the gastrointestinal (GI) tract and concentrated from the blood by the thyroid gland, where it begins destroying the gland’s cells. This treatment causes thyroid activity to slow considerably and in some cases, may turn an overactive thyroid into an underactive thyroid requiring additional treatment.

Radioactive iodine I-131 may also be used to treat Graves’ disease, goiter, thyroid nodules, and thyroid cancer.

Who will be involved in this procedure?

A radiologist who has specialized training in nuclear medicine and others, possibly including an endocrinologist, oncologist, thyroid surgeon and radiation safety officer, will be part of your treatment team.

What equipment is used?

There is no equipment used during radioactive iodine therapy.

Who operates the equipment?

There is no equipment used during radioactive iodine therapy, the patient simply swallows a prepared dose.
Is there any special preparation needed for the procedure?

You will be able to return home following radioactive iodine treatment, but you should avoid prolonged, close contact with other people for several days, particularly pregnant women and small children. Nearly all the radioactive iodine leaves the body during the first two days following the treatment, primarily through the urine. Small amounts will also be excreted in saliva, sweat, tears, vaginal secretions, and feces.

If your work or daily activities involve prolonged contact with small children or pregnant women, you will want to wait several days after your treatment to resume these activities. Patients with infants at home should arrange for care to be provided by another person for the first several days after treatment.

Your treatment team will give you a list of other precautions to take following your treatment with I-131. These guidelines comply with the Nuclear Regulatory Commission. Patients who need to travel immediately after radioactive iodine treatment are advised to carry a letter of explanation from their physician. Radiation detection devices used at airports and federal buildings may be sensitive to the radiation levels present in patients up to three months following treatment with I-131.

The guidelines include these recommendations:

- Use private toilet facilities, if possible; and flush twice after each use.
- Bathe daily and wash hands frequently.
- Drink normal amount of fluids.
- Use disposable eating utensils or wash your utensils separately from others.
- Sleep alone and avoid prolonged intimate contact. Brief periods of close contact, such as handshaking and hugging, are permitted.
- Launder your linens, towels, and clothes daily at home, separately. No special cleaning of the washing machine is required between loads.
- Do not prepare food for others that requires prolonged handling with bare hands.

Depending on the amount of radioactivity administered during your treatment, your endocrinologist or radiation safety officer may recommend continued precautions for up to several weeks after treatment.

Radioiodine should never be used in a patient who is pregnant or nursing. I-131 given during pregnancy can damage the baby’s thyroid gland. When given to a nursing mother, radioactive iodine can reach a baby through her breast milk. Most physicians feel that this procedure should not be used in women who are breast feeding who are unwilling to cease breast feeding their newborn completely. Also, pregnancy should be put off until at least six to 12 months after I-131 treatment, since the treatment exposes the ovaries to radiation.

Women who have not yet reached menopause should fully discuss the use of I-131 with their physician.

How is the procedure performed?

Treatment for hyperthyroidism is almost always done on an outpatient basis because the dose required is relatively small.

The radioiodine I-131 is swallowed in a single dose, in capsule or liquid form, and is quickly absorbed into the bloodstream in the gastrointestinal (GI) tract and concentrated from the blood by the thyroid gland, where it begins destroying the gland’s cells. Although the radioactivity from this treatment remains in the thyroid for sometime, it is greatly diminished within a few days.

Its effect on the thyroid gland usually takes between one and three
months to develop, with maximum benefit occurring three to six months after treatment.

What will I feel during this procedure?
It is common for patients to experience some pain in the thyroid after I-131 treatment for hyperthyroidism. You should ask your physician to recommend an over-the-counter pain reliever to treat this pain.

Are there permanent side effects from the procedure?
It is highly likely that the entire thyroid gland will be destroyed with this procedure. Since hormones produced by the thyroid are essential for metabolism, most patients will need to take thyroid pills for the rest of their life following the procedure. There are essentially no other permanent side effects from the procedure.

HIDA
(Gallbladder Scan)
A gallbladder scan is a nuclear scanning test that is done to evaluate gallbladder function. It can detect blockage in the tubes (bile ducts) that lead from the liver to the gallbladder and small intestine (duodenum).

During a gallbladder scan, a radioactive tracer substance is injected into a vein in the arm. The liver removes the tracer from the bloodstream and adds it to the bile that normally flows through the bile ducts to the gallbladder. The gallbladder then releases the tracer into the beginning of the small intestine. A special camera (gamma) takes pictures of the tracer as it moves through the liver, bile ducts, gallbladder, and small intestine.
A gallbladder scan is done to:

• **Help determine the cause of pain in the upper right side of the abdomen.**

• **Evaluate the function of the gallbladder.** A gallbladder ultrasound may be done before a gallbladder scan to help detect structural problems in the gallbladder. If the ultrasound is normal, a gallbladder scan often is done to evaluate gallbladder function.

• **Help determine the cause of jaundice.**

• **Detect blockage of the tubes (bile ducts) leading from the liver to the gallbladder and small intestine (duodenum).**

**How To Prepare**

**Before your gallbladder scan, tell your doctor if:**

• You are or might be pregnant.

• You are breast-feeding. Use formula (discard your breast milk) for 1 to 2 days after the scan until the radioactive tracer has been eliminated from your body.

• **Within the past 4 days, you have had an X-ray test using barium contrast material (such as a barium enema) or have taken a medication (such as Pepto-Bismol) that contains bismuth. Barium and bismuth can interfere with test results.**

Do not eat or drink for 4 to 12 hours before a gallbladder scan. Your doctor will tell you how long depending on what the test is being done for.

You may be asked to sign a consent form before the test. Talk to your doctor about any concerns you have regarding the need for the test, its risks, how it will be done, or what the results will mean.

**How It Is Done**

A gallbladder scan is usually done by a nuclear medicine technologist. The scan pictures are usually interpreted by a radiologist or nuclear medicine specialist.

You will need to remove any jewelry that might interfere with the scan. You may need to take off all or most of your clothes, depending on which area is being examined (you may be allowed to keep on your underwear if it does not interfere with the test).

You will be given a cloth or paper covering to use during the test.

The technologist cleans the site on your arm where the radioactive tracer will be injected. A small amount of the radioactive tracer is then injected.

You will lie on your back on a table and a large scanning camera will be positioned closely above your abdomen. After the radioactive tracer is injected, the camera will scan for radiation released by the tracer and produce pictures as the tracer passes through your liver and into your gallbladder and small intestine. The first pictures will be taken immediately after the injection, and then about every 5 to 10 minutes for up to the next 1½ hours. Each scan takes only a few minutes. You need to lie very still during each scan to avoid blurring the pictures. The camera does not produce any radiation, so you are not exposed to any additional radiation while the scan is being done.

A substance (cholecystokinin) that stimulates the gallbladder may also be injected into your vein during the scans. The pictures taken after this injection can help determine whether the gallbladder is functioning normally. Computer analysis of the data may be used to evaluate gallbladder function. You may be asked to answer questions about your reaction to the cholecystokinin.

Occasionally medication (morphine sulfate) is given to help diagnose inflammation of the gallbladder.

Depending upon your results, additional scans may be taken up to a day later. If you need to return for another gallbladder scan, you should not eat any fatty foods before you return.

The gallbladder scan takes about 1 to 2 hours.

**How It Feels**

You may feel nothing at all from the needle puncture when the tracer is injected, or you may feel a brief sting or pinch as the needle goes through the skin. Otherwise, a gallbladder scan is usually painless. You may find it difficult to remain still during the scan. Ask for a pillow or blanket to make yourself as comfortable as possible before the scan begins.

The test may be uncomfortable if you are having abdominal pain. Try to relax by breathing slowly and deeply.

If cholecystokinin is used during the test, it may cause nausea or abdominal pain. The development of these symptoms during the test may indicate a problem with your gallbladder. The technologist may ask you about changes in your pain during the test.
Risks

Allergic reactions to the radioactive tracer are rare. Most of the tracer will be eliminated from your body (through your urine or stool) within a day, so be sure to promptly flush the toilet and thoroughly wash your hands with soap and water. The amount of radiation is so small that it is not a risk for people to come in contact with you following the test.

Occasionally, some soreness or swelling may develop at the injection site. These symptoms can usually be relieved by applying moist, warm compresses to your arm.

There is always a slight risk of damage to cells or tissue from being exposed to any radiation, including the low level of radiation released by the radioactive tracer used for this test.

Results

A gallbladder scan is a special nuclear scanning test that is done to evaluate gallbladder function. The results of a gallbladder scan are available in 2 days.

<table>
<thead>
<tr>
<th><strong>Gallbladder Scan</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal:</strong></td>
</tr>
<tr>
<td>The radioactive tracer flows evenly through the liver and then into the gallbladder and the beginning of the small intestine (duodenum).</td>
</tr>
<tr>
<td>The gallbladder is normal in size, shape and location.</td>
</tr>
<tr>
<td><strong>Abnormal:</strong></td>
</tr>
<tr>
<td>The tracer may not be removed normally from the bloodstream by the liver, indicating possible liver disease.</td>
</tr>
<tr>
<td>The tracer may not reach the gallbladder, indicating inflammation or blockage of the duct by a gallstone.</td>
</tr>
<tr>
<td>The tracer may not reach the beginning of the small intestine (duodenum), indicating blockage of a bile duct by a stone, a tumor, or inflammation of the pancreas.</td>
</tr>
<tr>
<td>Pain occurs when the gallbladder empties the tracer.</td>
</tr>
</tbody>
</table>

What Affects the Test

Factors that can interfere with your test and the accuracy of the results include:

- Pregnancy. A gallbladder scan is not usually done during pregnancy because the radiation could damage the developing baby (fetus).
- Barium and bismuth. If a gallbladder scan is needed, it should be done before any tests that use barium (such as a barium enema).
- The inability to remain still during the test.
- Being allergic to morphine.

What To Think About

- A gallbladder ultrasound test may also be done to detect problems of the gallbladder. The ultrasound test provides more information about the shape and size of the gallbladder than a nuclear scan does. However, the nuclear scan can provide information about how well the gallbladder is functioning and whether the bile ducts are blocked. For more information, see the medical test Abdominal Ultrasound.
- The results of a gallbladder scan should be interpreted along with your symptoms and the results of other tests, such as a physical examination and an ultrasound. Abnormal results from a gallbladder scan do not necessarily mean that the gallbladder needs to be removed.
- A test called endoscopic retrograde cholangiopancreatogram (ERCP) can be done to detect blockage of the bile duct. For more information, see the medical test Endoscopic Retrograde Cholangiopancreatogram (ERCP).
- A magnetic resonance imaging (MRI) method called MR cholangiopancreatogram (MRCP) may also be done to detect blockage of the bile duct.
Bone scan

When you think of bones, you may picture dry, brittle structures similar to what you’d find in a museum or what anthropologists find buried in the desert. But the bones inside your body are anything but static — they’re alive and active, providing support for your body and serving as your body’s warehouse for important minerals. Inside some of your bones is a soft core called bone marrow that manufactures blood cells.

This process of bone growth and renewal is part of your body’s metabolism — natural processes that create and use energy. Changes in your bone metabolism can be caused by a number of specific problems. To get a picture of your bone metabolism, your doctor may use a procedure called a bone scan.

What is a bone scan?

Your doctor may order a bone scan to help diagnose subtle or hidden bone fractures that may not show up on a routine X-ray, such as a stress fracture. Bone scans can also help detect:

- Bone cancer
- Bone infections
- Arthritis
- Causes of unexplained bone pain

A bone scan falls under the category of nuclear medicine, which means that it uses tiny amounts of radioactive materials called tracers (radionuclides). These tracers accumulate in certain organs and tissues, such as bones. Once introduced into the body, tracers emit gamma waves of radiation, which are detected by a special camera. This camera produces images that are interpreted by radiologists or nuclear medicine specialists.

In a sense, a nuclear procedure such as a bone scan is the opposite of a standard X-ray examination. An X-ray passes radiation into or through your body to create an image on film placed on the other side of your body. In a nuclear scan, the source of radiation is inside your body and travels to the surface, where a camera detects it.

When is a bone scan ordered?

Your doctor may order a bone scan to determine whether you have any bone abnormalities that may signify one of the following disorders:

- Fractures
- Arthritis
- Paget’s disease of bone
- Bone tumors
- Infection of the bone (osteomyelitis)
Your doctor may order a bone scan to determine whether cancer, such as prostate, lung or breast cancer, has spread (metastasized) to the bone.

**How do you prepare?**

No special preparation is required on your part before a bone scan, though you may be asked to remove jewelry or other metal objects. You can eat or drink anything you like before the test.

As with most tests, tell your doctor if you’re pregnant or think you might be pregnant. Bone scans aren’t performed on pregnant women because of concerns about radiation exposure to the fetus.

**How is a bone scan done?**

A bone scan can be divided into two basic parts:

- **The injection.** You will receive an injection of tracers into a vein in your arm. You’ll then wait about two to four hours to allow the tracers to circulate and be absorbed by your bones. You may be allowed to leave the health care facility during this time. Your doctor will ask you to drink several glasses of water so you’ll urinate frequently to remove unabsorbed radioactive material from your system.

- **The scan.** During the scan, you’ll be asked to lie very still on a table while a machine with an arm-like device supporting the gamma camera passes over your body to record the pattern of tracer absorption by your bones. This is painless. A scan of your entire skeleton takes about 30 minutes. Scanning a limited area of your body takes less time.

In some cases, your doctor might order a three-phase bone scan, which includes a series of images taken at different times. A number of images are taken as the tracer is injected, then again shortly after the injection and two to four hours later.

For certain conditions your doctor might order a single photon emission computerized tomography (SPECT) scan. This can help analyze conditions that are especially deep in your bone or in places that are difficult to see. A SPECT scan takes about 45 minutes to an hour.

**After the test**

Once inside your body, the tracers don’t remain active for long. The radioactivity disappears within one to three days.

You should feel no side effects after the procedure, and no aftercare is necessary. If you’re breast-feeding, your doctor might ask you to stop for 24 hours after the tracer injection.

**Results**

The radiologist looks for evidence of abnormal bone metabolism on the scans. These show up as darker “hot spots” and lighter “cold spots” where the tracers have or haven’t accumulated.

Although a bone scan is very sensitive to abnormalities in bone metabolism, it’s less helpful in determining the cause of the abnormality, such as a fracture, infection or bone tumor.

Other tests are often performed to help establish the diagnosis. In order to rule out bone cancer, for instance, your doctor may need further imaging studies or a biopsy, which is a sample of bone tissue that’s removed for examination.

**Pros and cons**

A bone scan’s sensitivity to variation in bone metabolism and its ability to scan the entire skeleton make it very helpful in diagnosing a wide range of bone disorders. The test poses no greater risk than conventional X-ray procedures. The tracers used in a bone scan produce very little radiation.
You might find the injection and the need to lie still during the scanning procedure unpleasant. Your risk of an allergic reaction to the tracers is rare.

Gastric Intestinal Bleed Scan

A gastric intestinal bleed scan (GI scan) is a nuclear medicine exam using special radioactive material that allows doctors to locate the site of the GI bleed.

What is a GI Bleed scan?

A gastric intestinal bleed scan (GI bleed scan) is a nuclear medicine exam using a radioactive tracer of your blood that allows doctors to locate where the bleeding is from in the stomach or intestine. It is a form of radiology, because radiation is used to...
capture pictures of the human body.

How does the scan work?

A small sample of your blood will be made radioactive. It will then be injected back into you. Your radioactive blood will give off gamma rays. The gamma camera detects the rays and then produces pictures and locates the site of the bleed.

How should I prepare for the scan?

- No preparation is needed.
- Tell the technologist if you have a heparin allergy.
- Please tell the doctor or technologist if there is a chance you may be pregnant.

How is the scan performed?

1. The technologist will draw blood through an intravenous (IV) line and then make your red blood cells radioactive. The technologist will inject your blood with tracer in your IV line.

2. The gamma camera detects the tracer. A computer will then produce pictures of the abdomen based on the detected gamma rays.

3. The imaging involves lying flat on your back while the camera takes pictures over your abdomen.

4. The technologist will help make you comfortable. The imaging will take a minimum of 1 hour, and possibly 2 hours. You must not move during the time the camera is taking pictures. If you move, the pictures will be blurry and may have to be repeated.

What will I feel during the scan?

- Lying still on the exam table may be hard for some patients.
- Some minor discomfort during a nuclear medicine procedure may arise from the IVs.
- Most of the radioactivity passes out of your body in urine or stool. The rest simply goes away over time.

Who interprets the results and how do I get them?

When the test is over, the nuclear medicine doctor will review your images, prepare a written report, and discuss the results with your doctor. Your doctor will then talk with you about the results and discuss your treatment options.

WHITE BLOOD CELL IMAGING

Alternative Names
Leukocyte scan

Definition

A WBC scan is a nuclear scan in which a radioactive material is attached to a sample of white blood cells. It is done to locate areas of infection or inflammation.

How the Test is Performed

Blood will be taken from one of your veins. White blood cells are separated from the rest of the blood sample and then mixed with a small amount of a radioactive material radioisotop called indium-111. The cells with the radioactive material are considered “tagged.”

About 2 or 3 hours later, the tagged white blood cells are returned to your body through injection into a vein. The tagged cells gather
in areas of inflammation or infection.

Approximately 6 to 24 hours later, your body is scanned. You lie on a table. The scanner looks like an x-ray machine. It detects the radiation given off by the radioactive white blood cells. A computer converts the detected radiation into an image that can be viewed on a screen or recorded on film.

The scan takes about 1 or 2 hours. The scanner is usually located in a hospital, but often the test can be performed on an outpatient basis.

After the test is completed, no recovery time or special precautions are necessary. You typically may resume a normal diet, activity, and medications.

How to Prepare for the Test

There is usually no need for fasting, special diets, or preliminary medications. You must sign a consent form. You will wear a hospital gown or be allowed to wear loose fitting clothing without metal fasteners. Remove jewelry, dentures, or metal before the scan.

The health care provider will occasionally request that antibiotics be stopped before this test.

How the Test Will Feel

There is a sharp prick from the needle during blood sampling and again when the blood is returned to you. The scan itself is painless, although the table that you are asked to lie on may be hard or cold. You do not feel the radioactive material.

Why the Test is Performed

WBC scan is most often done when your doctor suspects a hidden infection. It is particularly useful for suspected infection or inflammation within the abdomen.

This test may be recommended if you have suspected pyelonephritis, abscess, osteomyelitis, or unexplained fever, particularly after surgery.

Normal Results

A normal result means there are no accumulations of tagged cells (except for a certain amount in the liver and spleen, which normally accumulate white blood cells).

What Abnormal Results Mean

Abnormal results usually suggest an active inflammation or infection, such as a liver abscess or abdominal abscess.

Risks

There is a very slight exposure to radiation from the radioisotope. The spleen normally receives the highest dose of radiation because white blood cells normally accumulate in the spleen. The radiation from these materials is very slight, and the materials decompose (become no longer radioactive) in a very short time. Virtually all radioactivity is gone within 1 or 2 days. There are no documented cases of injury from exposure to radioisotopes. The scanner only detects radiation -- it does not emit any radiation.

However, because of the slight radiation exposure, most nuclear scans (including WBC scan) are not recommended for women who are pregnant or breastfeeding.

Veins and arteries vary in size from one patient to another and from one side of the body to the other. Obtaining a blood sample from some people may be more difficult than from others.

Other risks associated with having blood drawn are slight but may include:

• Excessive bleeding
• Fainting or feeling light-headed
• Hematoma (blood accumulating under the skin)
- Infection (a slight risk any time the skin is broken)

Extremely rarely, a person may experience an allergic reaction to the radioisotope. This may include anaphylaxis if the person is extremely sensitive to the substance.

Considerations

The long delay before the person can be scanned may be undesirable for critically ill people.

Other tests (such as CT scan or ultrasound) may be required to confirm the presence of inflammation or infection indicated by an abnormal WBC scan.

False-negative results can theoretically occur as a consequence of antibiotic usage or chronic infection. Infection in the liver or spleen can be missed because of normal WBC accumulation in these organs.

False-positive results can occur from many causes, including (but not limited to) bleeding, the presence of tubes or catheters in the body, and skin wounds (such as surgical incisions). WBC accumulations in the lungs does not necessarily indicate an infection in the lungs.

CISTERNOGRAPHY

Alternative Names

Intrathecal scan; Spinal cord scan; CSF flow scan; Cisternogram

Definition

A radionuclide cisternogram is a nuclear scan test used to diagnose spinal fluid circulation problems.

How the Test is Performed

A lumbar puncture (spinal tap) is done first. Small amounts of radioactive material, called a radioisotope, are injected into the fluid in the lower spine.

You will be scanned 4 - 6 hours after receiving this injection. A special camera creates images that show how the radioactive materials travel with the cerebrospinal fluid through the spine and if the fluid leaks outside the spine.

You will be scanned again 24 hours after injection, and possibly at 48 and 72 hours after injection.

How to Prepare for the Test

No preparation is usually necessary. However, if you are very anxious or agitated, sedation may be necessary. You must sign a consent form. You will wear a hospital gown to make the spine more accessible. Remove jewelry or metallic objects before the scan.
How the Test Will Feel

During lumbar puncture, the lower back over the spine is numbed with an anesthetic. However, many people find lumbar puncture somewhat uncomfortable, usually because of the pressure on the spine during insertion of the needle.

The scan is painless, although the table may be cold or hard. No discomfort is produced by the radioisotope or the scanner.

Why the Test is Performed

The test is performed to detect problems with spinal fluid circulation and spinal fluid leaks.

Normal Results

A normal value indicates normal circulation of CSF through all parts of the brain and spinal cord.

What Abnormal Results Mean

An abnormal study indicates disorders of CSF circulation, including: Hydrocephalus

• Hydrocephalus

• CSF leak

• Normal pressure hydrocephalus (NPH)

• Whether or not a CSF shunt is open or blocked

Risks

Risks associated with a lumbar puncture include pain at the injection site, bleeding, and infection. There is also a very rare chance of nerve damage.

The amount of radiation used during the nuclear scan is very small, and virtually all of the radiation is gone within a few days.

There have been no documented cases of injury or damage caused by the radioisotope used with this scan. However, as with any radiation exposure, caution is advised if you are pregnant or breastfeeding.

In extremely rare cases, a person will develop an allergic reaction to the radioisotope used during the scan. This may include a serious anaphylactic reaction.

Considerations

You should lie flat after the lumbar puncture (to help prevent headache from the lumbar puncture). No other special care is usually necessary.
Cystogram

A cystogram is an examination of the urinary bladder, which is located in the lower pelvic area. A cystogram can show the bladder’s position and shape, and the exam often is used to diagnose a condition called reflux. Reflux occurs when urine in the bladder moves back up the ureters, the tubes that transport urine from the kidneys to the bladder. This condition can cause repeated urinary tract infections. A cystogram may be performed after a patient has experienced a pelvic injury to ensure that the bladder has not torn. Cystograms also are used to detect polyps or tumors in the bladder.

If you are a woman of childbearing age, the radiographer will ask the date of your last menstrual period and if there is any possibility you are pregnant. Next, the radiographer will ask if you have any allergies. It is important to list all allergies to food and medicine, as well as to let the radiographer know if you have a history of hay fever or asthma. Some allergies may indicate a possible reaction to the contrast agent that will be used during the examination.

You will be asked to put on a hospital gown and then the radiographer will direct you to the restroom and ask you to completely empty your bladder.

During the Examination

You will be positioned on your back on the x-ray table, with your knees flexed. Your pubic area will be washed, and then the radiographer or a radiology nurse will gently insert a small, flexible catheter into your urethra, the duct from which you urinate. Skin tape may be used to hold the catheter to your inner thigh.

Next, a nurse will slowly fill your bladder with a radioactive contrast agent. The contrast agent is a substance that helps make organs easier to see on radiographs and is administered through the catheter. You will feel pressure and fullness in your bladder and will have an urge to urinate.

After your bladder is full, the images will be taken. You will be asked to lie on your side or to turn slightly from side to side while the technologist watches your bladder on the TV screen. The radiographer also may take a few additional images.

Following this portion of the exam, the catheter will be removed, and you will be allowed to use the restroom. In addition, the contrast agent that you expel is radioactive, clear and odorless, so it will not be visible to you. After you return to the room, an additional image will be taken. This final radiograph will show whether any contrast agent stays in your bladder following urination. Any remaining contrast will be expelled the next time you urinate.

Patient Preparation

Before your examination, a radiographer will explain the procedure to you and answer any questions you might have. A radiographer, also known as a radiologic technologist, is a skilled medical professional who has specialized education in the areas of radiation protection, patient care and radiographic positioning and procedures.

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Voiding Cystourethrogram
Voiding cystourethromgrams follow the same routine as cystograms with one difference. Toward the end of the examination, when the urinary catheter is removed, you will be asked to urinate into a special urinal. Radiographs will be taken while you urinate. These images will show the size and shape of the bladder when it is under stress caused by urination.

Post-examination Information
Your radiographs will be reviewed by the radiologist, and your personal physician will receive a report of the findings. Your physician then will advise you of the results and discuss what further procedures, if any, are needed.

Gallium Scan
A gallium scan is a nuclear medicine test that uses a special camera to take pictures of specific tissues in the body after a radioactive tracer (radionuclide or radioisotope) makes them visible. Each type of tissue that may be scanned (including bones, organs, glands, and blood vessels) uses a different radioactive compound as a tracer. The radioactivity of different tracers decreases over a period of usually hours, days, or weeks. The tracer remains in the body temporarily before it is eliminated as waste, usually in the urine or stool (feces).

During a gallium scan, the tracer (radioactive gallium citrate) is injected into a vein in the arm. It travels through the bloodstream and into the body's tissues, primarily the bones, liver, intestine, and areas of tissue where inflammation or a buildup of white blood cells (WBCs) is present. It usually takes the tracer a few days to accumulate in these areas, so in most cases a scan is done at 2 days and repeated at 3 days after the tracer is injected. Areas where the tracer accumulates in higher-than-normal amounts show up as bright or “hot” spots in the pictures. The problem areas may be caused by infection, certain inflammatory diseases, or a tumor.
**Why It Is Done**

A gallium scan is done to:

- Detect the source of an infection that is causing a fever (called a fever of unknown origin).
- Detect an abscess or certain infections, especially in the bones.
- Monitor the response to antibiotic treatment.
- Diagnose inflammatory conditions such as pulmonary fibrosis or sarcoidosis.
- Detect certain types of cancer (such as lymphoma). A gallium scan also may be done to determine whether cancer has spread (metastasized) to other areas of the body, or to monitor the effectiveness of cancer treatment.

**How To Prepare**

Before the gallium scan, tell your doctor if:

- You are or might be pregnant.

- You are breast-feeding. If you will no longer be breast-feeding after the test, you will be asked to stop breast-feeding 2 weeks before the test so that the radioactive tracer will not accumulate in your breast tissue. If you will continue to breast-feed after the test, it is recommended that you not use your breast milk for 4 weeks after a gallium scan, since the tracer can be passed to your baby. Some doctors may recommend that you stop breast-feeding completely after this scan.

- Within the past 4 days, you have had an X-ray test using barium contrast material (such as a barium enema) or have taken a medicine (such as Pepto-Bismol) that contains bismuth. Barium and bismuth can interfere with test results.

Gallium accumulates in the large intestine (colon) before being eliminated in the stool. You may need to take a laxative the night before the scan and have an enema 1 to 2 hours before the scan to prevent the gallium in your colon from interfering with pictures of the area being studied.

Talk to your doctor about any concerns you have regarding the need for the test, its risks, how it will be done, or what the results will indicate.

**How It Is Done**

A gallium scan is usually done by a nuclear medicine technologist. The scan pictures are usually interpreted by a radiologist or nuclear medicine specialist.

The technologist cleans the site on your arm where the radioactive tracer will be injected. A small amount of the radioactive tracer is then injected. You will need to return between 24 and 96 hours later for the diagnostic scans. Gallium scans are usually done at 48 hours and repeated at 72 hours after the tracer is injected.

When you come in for the scan, you will need to remove any jewelry that might interfere with the scan. You may need to take off all or most of your clothes, depending on which area is being examined (you may be allowed to keep on your underwear if it does not interfere with the test). You will be given a cloth or paper covering to use during the test.

You will lie on your back on a table, and a large scanning camera will be positioned closely above you. After the radioactive tracer is injected, the camera will scan for radiation released by the tracer and produce pictures of the tracer in your tissues. The camera may move slowly above and around your body. The camera does not produce any radiation, so you are not exposed to any additional radiation while the scan is being done.

You may be asked to move into different positions so the area of interest can be viewed from other angles. You need to lie very still during each scan to avoid blurring the pictures. You may be asked to hold your breath briefly during some of the scans.

Each scan may take about 60 to 90 minutes.

**How It Feels**

You may feel nothing at all from the needle puncture when the tracer is injected, or you may feel a brief sting or pinch as the needle goes through the skin. Otherwise, a gallium scan is usually painless. You may find it difficult to remain still during the scan. Ask for a pillow or blanket to make yourself as comfortable as possible before the scan begins.
Risks
There is always a slight risk of damage to cells or tissue from being exposed to any radiation, including the low level of radiation released by the radioactive tracer used for this test.

Allergic reactions to the radioactive tracer are rare. Most of the tracer will be eliminated from your body (through your urine or stool) within 4 days. The amount of radiation is so small that it is not a risk for people to come in contact with you following the test.

Occasionally, some soreness or swelling may develop at the injection site. These symptoms can usually be relieved by applying moist, warm compresses to your arm.

Results
A gallium scan is a nuclear medicine test that uses a special camera to take pictures of certain tissues in the body after a radioactive tracer (radionuclide or radioisotope) makes them visible. The results of a gallium scan are usually available within 2 days after the scans are completed.

<table>
<thead>
<tr>
<th>Gallium scan</th>
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</thead>
<tbody>
<tr>
<td>Normal:</td>
</tr>
<tr>
<td>Abnormal:</td>
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What Affects the Test
Factors that can interfere with your test and the accuracy of the results include:

- Pregnancy. A gallium scan is not usually done during pregnancy because the radiation could damage the developing baby (fetus).

- Barium and bismuth. If a gallium scan is needed, it should be done before any tests that use barium (such as a barium enema).

- The inability to remain still during the test.

What To Think About

- A gallium scan is used for specific types of cancers, mainly of the lymph nodes, bones, or bone marrow. A normal scan does not exclude the possibility of cancer, because some types of cancer do not show up on a gallium scan. A gallium scan also cannot determine whether a tumor is cancerous (malignant) or noncancerous (benign).

- The results of a gallium scan should be interpreted along with the results of other tests, such as a physical examination, blood tests, and X-rays. In many cases, results obtained from a magnetic resonance imaging (MRI) or positron emission tomography (PET) may be as accurate as the results obtained from a gallium scan. For more information, see the medical tests Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET).

- If other nuclear scanning tests need to be done, these tests should be scheduled before a gallium scan because the gallium tracer stays in the body longer than other tracer compounds.
What is a gastric emptying scan?

A gastric emptying scan (GES) is a nuclear medicine exam using a radioactive material in a meal that allows doctors to identify abnormalities related to emptying of the stomach. Diseases that involve changes in the way the stomach contracts (motility disorders) are best diagnosed by this test. It is a form of radiology, because radiation is used to capture pictures of the human body.

How does the scan work?

Pictures are taken over time of the movement of a radioactive meal through your stomach. The gamma camera detects the gamma rays emitting from the radioactive meal and then produces pictures and measurements of the stomach.

How should I prepare for the scan?

- The only preparation involved is to fast 8 hours before the test.
- If you are diabetic, drink a 5-ounce glass of orange juice about 2 hours before your exam.
- The exam should not be performed on pregnant women, but is otherwise quite safe.
- Since oatmeal is usually used to hold the radioactive material, patients should notify their doctor if they are allergic to oatmeal. If needed, other foods can be used.

How is the scan performed?

1. You will be given a bowl of oatmeal that has been injected with a small dose of radioactive material. You will be asked to eat the oatmeal and drink water within 5 minutes. The oatmeal will not taste any different than a non-radioactive bowl of oatmeal.

2. After eating this meal, pictures of your stomach will be taken. The imaging involves lying flat on your back while the camera takes pictures of your stomach for 90 minutes.
The technologist will help make you comfortable. You must not move during the time the camera is taking pictures. If you move, the pictures will be blurry and the exam may have to be repeated.

3. The radioactive meal emits gamma rays. The gamma camera detects the rays. A computer will then produce pictures of the stomach based on the detected gamma rays.

What will I feel during the scan?

- Lying still on the exam table may be hard for some patients.

Who interprets the results and how do I get them?

When the test is over, the nuclear medicine doctor will review your images, prepare a written report, and discuss the results with your doctor. Your doctor will then talk with you about the results and discuss your treatment options.

LUNG SCAN

Alternative Names

V/Q scan; Ventilation/perfusion scan; Lung ventilation/perfusion scan

Definition

A pulmonary ventilation/perfusion scan is a pair of nuclear scan tests. These tests use inhaled and injected radioactive material (radioisotopes) to measure breathing (ventilation) and circulation (perfusion) in all areas of the lungs.
How the Test is Performed

A pulmonary ventilation/perfusion scan is actually two tests. These tests may be performed separately or together.

During the perfusion scan, a health care provider injects radioactive albumin into the patient's vein. The patient is immediately placed on a movable table that is under the arm of a scanner. The machine scans the patient's lungs as blood flows through them to detect the location of the radioactive particles.

The ventilation scan is performed by scanning the lungs while the person inhales radioactive gas. With a mask over the nose and mouth, the patient breathes the gas while sitting or lying on the table beneath the scanner arm.

How to Prepare for the Test

You do not need to fast, eat a special diet, or take any medications before the test.

A chest x-ray is usually performed prior to or following a ventilation and perfusion scan.

You will wear a hospital gown or comfortable clothing that does not have metal fasteners.

How the Test Will Feel

The table may feel hard or cold. You may feel a sharp prick while the material is injected into the vein for the perfusion portion of the scan. The mask used during the ventilation scan may give you a claustrophobic feeling. You must lie still during scanning.

The radioisotope injection usually does not cause discomfort.

Why the Test is Performed

The ventilation scan is used to see how well air reaches all parts of the lungs. The perfusion scan measures the blood supply through the lungs.

A ventilation and perfusion scan is most often performed to detect a pulmonary embolus. It is also used to evaluate lung function in people with advanced pulmonary disease, such as COPD, and to detect abnormal circulation (shunts) in the pulmonary blood vessels.

Normal Results

The health care provider should take a ventilation and perfusion scan and then evaluate it with a chest x-ray. All parts of both lungs should take up the radioisotope uniformly.

What Abnormal Results Mean

A decreased uptake of radioisotope during a perfusion scan indicates a problem with blood flow, including occlusion of the pulmonary arteries. A localized decrease in perfusion scan uptake (particularly when the ventilation scan is normal) may indicate pulmonary embolus. Larger areas of decreased perfusion scan uptake may indicate a condition such as pneumonitis.

A decreased uptake of radioisotope during a ventilation scan may indicate reduced breathing and ventilation ability or airway obstruction. A decreased ventilation uptake (plus x-ray evidence of consolidation) may indicate pneumonia. Larger areas of poor uptake may indicate damage from chronic smoking or COPD.
Risks

Risks are about the same as for x-rays (radiation) and needle pricks.

No radiation is emitted from the scanner. Instead, it detects radiation and converts it to a visible image. There is a small exposure to radiation from the radioisotope. The radioisotopes used during scans are short-lived, with almost all radiation leaving the body in a few days. However, as with any radiation exposure, caution is advised for pregnant or breast-feeding women.

There is a slight risk for infection or bleeding at the site of the needle insertion. The risk with perfusion scan is the same as with inserting an intravenous needle for any other purpose.

In rare cases, a person may develop an allergy to the radioisotope, which may include a serious anaphylactic reaction.

Considerations

A pulmonary ventilation and perfusion scan may be a lower-risk alternative to pulmonary angiography for evaluating disorders of the lung blood supply.

This test may not provide an absolute diagnosis, particularly in people with underlying lung disease. Other tests may be necessary to confirm or rule out the findings of a pulmonary ventilation and perfusion scan.

Meckel’s Diverticulum Scan

Synonyms

Ectopic Gastric Mucosa Scan; Meckel’s Scan; Meckel’s Scintigraphy

Procedure Commonly Includes

The patient receives an intravenous injection of technetium-99m (\(^{99m}\text{Tc}\) pertechnetate) which is quickly secreted by gastric mucosa cells including sites of ectopic tissue, the Meckel’s diverticulum. Sequential images of the abdomen are then acquired. The abnormality usually visualizes early, but delayed images are sometimes necessary.

Indications

The procedure is useful in detecting the presence and location of a Meckel’s diverticulum, a collection of functioning ectopic gastric mucosa usually located in the ileum and in the right lower quadrant of the abdomen. The abnormality usually occurs in young children and 50% of cases that bleed symptomatically will present before the age of 2 years.

Patient Preparation

Patient should have all RIA blood work performed, or at least drawn, prior to injection of any radioactive material. Patient must be fasting at least 4 hours before scan.

Special Instructions

Requisition must state the current patient diagnosis in order to select the most appropriate radiopharmaceutical and/or imaging technique. DURATION OF PROCEDURE: 30 minutes to 1 hour although additional delayed images may be required.

RADIOPHARMACEUTICAL: \(^{99m}\text{Tc} \text{ pertechnetate}\)
Causes for Rejection

Residual barium in GI tract from recent x-rays, other recent Nuclear Medicine procedure may interfere. If uncertain, call the Nuclear Medicine Department.

Turnaround Time

A written report will be sent to the patient’s chart and/or to the referring physician.

Normal Findings

Lack of any focal secreted activity in the abdomen. Patients are often placed in a left lateral decubitus position to slow transit of normal secreted activity from the stomach into the small bowel.

Limitations

A Meckel’s diverticulum without functioning gastric mucosa will not visualize. However, those lacking mucosa are also unlikely to bleed. Some false-positives may result from nondiverticular bleeding, intussusception, duplication cysts, or inflammatory bowel disease.

Multigated Acquisition Scan (MUGA scan, nuclear ventriculogram, radionuclide scan)

Definition:

A nuclear scan that evaluates the pumping function of the ventricles.

Your doctor uses the MUGA to determine the heart’s pumping function.

To prepare, wear comfortable clothes that can be easily removed. You may be asked to wear a hospital gown during the MUGA scan.

What to expect:

- During a MUGA scan, a technician will attach 10 electrodes with adhesive pads to the skin of your chest. Men may have chest hair shaved to allow a better connection. The electrodes are attached to an electrocardiograph monitor (ECG), which charts your heart’s electrical activity during the test.
- An intravenous (IV) line will be inserted into a vein in your arm. The technician will perform a resting ECG, measure your resting heart rate and take your blood pressure.
- The technician will ask you to lie on the exam table under a camera. A small amount of blood is withdrawn and mixed with a radioactive tracer. The radioactive tracer binds to the red blood cells, and the mixture is re-injected into the IV. The tracer stays in the bloodstream for several hours and does not enter your tissue cells.
A large camera, located above the table, is focused on the heart and analyzes the amount of radio-labeled red blood cells pumped out of the heart with each heartbeat. This test calculates the amount of blood pumped out of the heart with each heartbeat, called the ejection fraction. The MUGA scan takes about one to two hours to perform.

Cardiolite Stress Test

A stress test can be used to test for heart disease. Stress tests are tests performed by a doctor and/or trained technician to determine the amount of stress that your heart can manage before developing either an abnormal rhythm or evidence of ischemia (not enough blood flow to the heart muscle). The most commonly performed stress test is the exercise stress test.

What Is an Exercise Stress Test?
The exercise stress test -- also called a stress test, exercise electrocardiogram, treadmill test, graded exercise test or stress ECG -- is a test used to provide information about how the heart responds to exertion. It usually involves walking on a treadmill or pedaling a stationary bike at increasing levels of difficulty, while your electrocardiogram, heart rate and blood pressure are monitored.
Why Do I Need a Stress Test?

Your doctor uses the stress test to:

- Determine if there is adequate blood flow to your heart during increasing levels of activity.
- Evaluate the effectiveness of your heart medications to control angina and ischemia.
- Determine the likelihood of having coronary heart disease and the need for further evaluation.
- Check the effectiveness of procedures done to improve blood flow within the heart vessels in people with coronary heart disease.
- Identify abnormal heart rhythms.
- Help you develop a safe exercise program.

What Types of Stress Tests Are There?

There are many different types of stress tests, including:

- **Dobutamine or Adenosine Stress Test**: This test is used in people who are unable to exercise. A drug is given to make the heart respond as if the person were exercising. This way the doctor can still determine how the heart responds to stress, but no exercise is required.

- **Stress echocardiogram**: An echocardiogram (often called “echo”) is a graphic outline of the heart’s movement. A stress echo can accurately visualize the motion of the heart’s walls and pumping action when the heart is stressed; it may reveal a lack of blood flow that isn’t always apparent on other heart tests.

- **Nuclear stress test**: This test helps to determine which parts of the heart are healthy and function normally and which are not. A very small and harmless amount of radioactive substance is injected into the patient. Then the doctor uses a special camera to identify the rays emitted from the substance within the body; this produces clear pictures of the heart tissue on a monitor. These pictures are done both at rest and after exercise. Using this technique, a less than normal amount of thallium will be seen in those areas of the heart that have a decreased blood supply.

Preparation for these types of stress test will vary from preparation for the exercise stress test. Ask your doctor about any specific instructions.

How Should I Prepare for the Exercise Stress Test?

Before your stress test:

- Do not eat or drink anything except water for four hours before the test.
- Do not drink or eat foods containing caffeine for 12 hours before the test. Caffeine will interfere with the results of your test.
- Do not take the following heart medications on the day of your test unless your doctor tells you otherwise, or if the medication is needed to treat chest discomfort the day of the test: Isosorbide dinitrate (for example, Isordil, Dilatrate SR); Isosorbide mononitrate (for example, ISMO, Imdur, Monoket); Nitroglycerin (for example, Deponit, Nitrostat, Nitro-bid). Your doctor may also ask you to stop taking other heart medications on the day of your test. If you have any questions about your medications, ask your doctor. Do not discontinue any medication without first talking with your doctor.
- If you use an inhaler for your breathing, please bring it to the test.

What If I have Diabetes?

If you have diabetes:

- If you take insulin to control your blood sugar, ask your doctor what amount of your medication you should take the day of the test. Often, you will take only half of your usual morning dose and eat a light meal 4 hours before the test.
- If you take pills to control your blood sugar, do not take your medication until after the test is complete.
- Do not take your diabetes medication and skip a meal before the test.
• If you own a glucose monitor, bring it with you to check your blood sugar levels before and after your exercise stress test. If you think that your blood sugar is low, tell the lab personnel immediately.

• Plan to eat and take your blood sugar medication following your stress test.

What Should I Wear the Day of the Test?
Wear soft-soled shoes suitable for walking and comfortable clothes. Do not bring valuables.

What Happens During the Exercise Stress Test?
First, a technician will gently clean 10 small areas on your chest and place electrodes (small, flat, sticky patches) on these areas. The electrodes are attached to an electrocardiograph monitor (ECG or EKG) that charts your heart’s electrical activity during the test.

Before you start exercising, the technician will perform an EKG, to measure your heart rate at rest and will take your blood pressure.

You will begin to exercise by walking on a treadmill or pedaling a stationary bicycle. The rate of exercise, or degree of difficulty will gradually increase. You will be asked to exercise until you feel exhausted.

At regular intervals, the lab personnel will ask how you are feeling. Please tell them if you feel chest, arm or jaw pain or discomfort, short of breath, dizzy, lightheaded or any other unusual symptoms. It is normal for your heart rate, blood pressure, breathing rate and perspiration to increase during the test. The lab personnel will watch for any symptoms or changes on the ECG monitor that suggest the test should be stopped.

After the test you will walk or pedal slowly for a couple of minutes to cool down. Your heart rate, blood pressure and ECG will continue to be monitored until the levels begin returning to normal.

Although the appointment lasts about 60 minutes, the actual exercise time is usually between seven and 12 minutes.

Ask your doctor if you have any questions about the exercise stress test.

PARATHYROID

A parathyroid scan is a diagnostic nuclear medicine procedure used to evaluate abnormalities involving parathyroid, which are located on the back side of the thyroid gland.

What is a parathyroid scan?
A parathyroid scan is a nuclear medicine exam that uses a radioactive compound to diagnose and localize parathyroid adenoma. It is a form of radiology, because radiation is used to capture pictures of the human body.
How does the scan work?

You will be given a small dose of radioactive material through an intravenous (IV) line. This compound, called a tracer, collects in the parathyroid tissue and gives off gamma rays. The gamma camera detects the rays and then produces pictures of parathyroid tissue.

How should I prepare for the scan?

- No preparation is needed.
- A patient who is unable to remain still for an extended period of time may require sedation.
- Women who are pregnant or breastfeeding should not have this test.

How is the scan performed?

1. You will be given a small dose of a radioactive material intravenously (IV). This compound, called a tracer, collects in the parathyroid and will give off gamma rays.

2. The gamma camera detects the rays. A computer will then produce pictures of the parathyroid based on the detected gamma rays.

3. The technologist will take pictures right after the injection, 1 hour and 2 hours later.

4. The imaging involves lying flat while the camera takes pictures of your parathyroid. You must not move during the time the camera is taking pictures. If you move, the pictures will be blurry and may have to be repeated. The technologist will help make you comfortable. You will be able to get up between imaging times.

5. The total time will take about 3 to 4 hours.

What will I feel during the scan?

- Some minor discomfort during a nuclear medicine procedure may arise from the IV.
- Lying still on the exam table may be hard for some patients.
- Most of the radioactivity passes out of your body in urine or stool. The rest simply goes away over time.

Who interprets the results and how do I get them?

When the test is over, the nuclear medicine doctor will review your images, prepare a written report, and discuss the results with your doctor. Your doctor will then talk with you about the results and discuss your treatment options. Talk to your doctor to find out whether or not you will need to restart any medications that you stopped for this exam.
Renogram

**Alternative Names**
Renogram; Kidney scan, Renal scan

**Definition**
A renal scan is a nuclear medicine examination that uses small amounts of radioactive materials (radioisotopes) to measure the function of the kidneys.

**How the Test is Performed**
The process outlined below is a description of how a typical renal scan may go -- but the details may vary from place to place and according to a person’s specific needs. A renal scan is similar to (and in fact, may be a continuation of) a renal perfusion scintiscan.

You will be asked to lie on the scanner table. Pressure (from a tourniquet or blood pressure cuff) is applied to the upper arm, which distends the veins of the arm. The inner elbow is scrubbed with antiseptic, and a small amount of radioisotope is injected into a vein (the radioisotope used may vary depending on the portion of kidney function that is of particular interest in the study).

The pressure on the upper arm is then released, which allows the isotope to travel through the bloodstream as a small, concentrated “package.” A short time later, the kidneys are scanned. Several images are taken, each lasting 1 or 2 seconds, with the total scan time about 30 minutes to 1 hour. The images are analyzed by a computer after the scan is completed and can give detailed information about particular kidney functions (such as glomerular filtration rate, which reflects how much blood the kidney filters over time).

After the scan, no recovery time is required. You may be asked to drink plenty of fluids and urinate frequently to help excrete the radioactive material from the body.

**How to Prepare for the Test**
There is usually no need for fasting, special diets, or preliminary medications. Discuss with your health care professional any nonsteroidal anti-inflammatory drugs (NSAIDs) or blood pressure medications you are currently taking to see if they will interfere with the exam. You may be asked to drink additional fluids before the scan.

You must sign a consent form. You will wear a hospital gown. Remove jewelry, dentures, and metallic objects before the scan.

**How the Test Will Feel**
There is a sharp prick when the isotope is injected into the vein. You do not feel the isotope. You do not feel the scan, although the table may be hard or cold. You will need to lie still during the scan.

**Why the Test is Performed**
The test evaluates the size, position, shape, and function of the kidneys.
kidneys. A renal scan is particularly useful when there is a known sensitivity to the contrast media used in an IVP or other X-rays, or when there is underlying kidney insufficiency (reduced kidney function). Renal scan is commonly used after a kidney transplant to evaluate kidney function and to look for signs of transplant rejection.

A renal scan may be used to evaluate kidney function in people with hypertension.

What Abnormal Results Mean

Abnormal results indicate reduced kidney function(s). This may occur with acute or chronic renal failure, as complications of a kidney transplant (both surgical complications and transplant rejection), glomerulonephritis, or other kidney disorders.

Additional conditions under which the test may be performed:

- Acute arterial occlusion of the kidney
- Acute bilateral obstructive uropathy
- Bilateral hydronephrosis
- Carcinoma of the renal pelvis or ureter
- Chronic bilateral obstructive uropathy
- Complicated UTI (pyelonephritis)
- Injury of the kidney and ureter
- Pyelonephritis; acute
- Renovascular hypertension

Risks

The risks are essentially the same as for X-rays (radiation) and for needle pricks.

There is a slight amount of radiation from the radioisotope. Most of this radiation exposure occurs to the kidneys and bladder as the isotope is excreted. Virtually all radiation is gone from the body in 24 hours. However, because of the slight exposure to radiation, caution is advised if you are pregnant or breastfeeding.

Any time the body is penetrated (such as by a needle prick) there is a risk for infection. Injection into a vein also carries a slight risk for bleeding. The risk is no greater for renal perfusion scan than for intravenous injection of any sort.

Extremely rarely, a person will exhibit an allergic reaction to the radioisotope, which may include severe anaphylaxis.

Considerations

A scan that shows reduced kidney function may be help identify the cause of the problem. Congenital (present from birth) or other abnormalities of kidney shape or size may contribute to an error in interpreting results of the scan because glomerular filtration rate and other functions are calculated based on normal kidney size and shape. Tests of some functions may require delayed images (1 to 4 hours later).

Advantages of the scan are the ability to determine kidney function without exposure to contrast agents and the ability to obtain quantitative information that may not be obtainable by other procedures.

Testicular Scan

A testicular scan uses a camera to take pictures of the testicles after a radioactive tracer accumulates in testicular tissues nuclear medicine test.

During a testicular scan, the tracer substance is injected into a
A vein in the arm. It travels through the bloodstream to the testicles. Areas of the testicles where the tracer accumulates in abnormal amounts may indicate some types of tumors. The tracer may also indicate a pocket of fluid (cyst) or infection (abscess).

A testicular scan may be done in an emergency to evaluate the cause of sudden, painful swelling of a testicle, which can be caused by a twisted spermatic cord inside the testicle. This condition is called testicular torsion and needs immediate medical evaluation and treatment.

Testicular ultrasound has largely replaced testicular scans to investigate possible testicular tumors and testicular torsion.

Why It Is Done
A testicular scan is done to:

• Determine the cause of a painful, swollen testicle.
• Assess the damage to the testicles caused by an injury.
• Assess the flow of blood within the testicles.

How To Prepare
No special preparation is needed for a testicular scan.

You may be asked to sign a consent form before the test. Talk to your doctor about any concerns you have regarding the need for the test, its risks, how it will be done, or what the results will indicate.

How It Is Done
A testicular scan is usually done by a nuclear medicine technologist. The scan pictures are usually interpreted by a radiologist or nuclear medicine specialist.

You will need to remove any jewelry that might interfere with the scan. You may need to take off all or most of your clothes, but you will be given a cloth or paper covering to use during the test.

The technologist cleans the site on your arm where the radioactive tracer will be injected. A small amount of the radioactive tracer is then injected.

You will lie on your back on a table and your penis will be taped to your abdomen to prevent it from interfering with the scan. A sling or towel may be used to support the testicles under the scanner. After the radioactive tracer is injected, the camera will scan for radiation released by the tracer and produce pictures of the tracer in your testicles. Two scans are done about 15 minutes apart. You need to lie very still during each scan to avoid blurring the pictures. The camera does not produce any radiation, so you are not exposed to any additional radiation while the scan is being done.

A testicular scan takes about 45 minutes.

How It Feels
You may feel nothing at all from the needle puncture when the tracer is injected, or you may feel a brief sting or pinch as the needle goes through the skin. Otherwise, a testicular scan is usually painless. You may find it uncomfortable to remain still during the scan, especially if your testicles are sore. Ask for a pillow or blanket to make yourself as comfortable as possible before the scan begins.

Risks
Allergic reactions to the radioactive tracer are rare. Most of the tracer will be eliminated from your body (through your urine or stool) within a day, so be sure to promptly flush the toilet and thoroughly wash your hands with soap and water. The amount of radiation is so small that it is not a risk for people to come in contact with you following the test.

Occasionally, some soreness or swelling may develop at the injection site. These symptoms can usually be relieved by applying moist, warm compresses to your arm.

There is always a very slight risk of damage to cells or tissue from being exposed to any radiation, including the low level of radiation released by the radioactive tracer used for this test.
Results
A testicular scan uses a camera to take pictures of the testicles after a radioactive tracer accumulates in testicular tissues (nuclear medicine test). The results of a testicular scan are usually available within 2 days. In an emergency, results can be available within an hour.

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<th>Testicular scan</th>
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<tr>
<td><strong>Normal:</strong></td>
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<tr>
<td>The radioactive tracer flows evenly through the testicles. No accumulations of the tracer are found in any of the testicles.</td>
</tr>
<tr>
<td><strong>Abnormal:</strong></td>
</tr>
<tr>
<td>The tracer does not flow evenly through the testicles, indicating narrowing of, blockage of, or damage to the blood vessels in the testicles. This could indicate that blood flow has been reduced by a twisted spermatic cord inside the testicle. This is called testicular torsion.</td>
</tr>
<tr>
<td>Areas where the tracer accumulates in an abnormal amount could indicate a condition such as a cyst, tumor, pocket of infection (abscess), a blood clot or inflammation of the tubes (ducts) that carry sperm (epididymis). This is called epididymitis.</td>
</tr>
</tbody>
</table>

What Affects the Test
The results of a testicular scan may not be accurate if you cannot remain still during the test.

What To Think About
- Testicular ultrasound has largely replaced testicular scans to investigate possible testicular torsion or tumors in the testicles.
- Abnormal results from a testicular scan may be further investigated by other tests, such as a testicular biopsy, an ultrasound test, or X-ray tests.

• If a testicular scan is done for a young boy, a parent can accompany him while the test is being done.

THYROID SCAN
Alternative Names
Scan - thyroid; Radioactive iodine screening test - thyroid; RAUI; Nuclear scan - thyroid
Definition
A thyroid scan is a nuclear medicine nuclear medicine examination that uses radioactive iodine to check for hyperthyroidism, thyroid cancer, or other thyroid gland growths.
How the Test is Performed

You will be given a pill that contains radioactive iodine, and then you will wait as the iodine collects in the thyroid. The first scan is usually 4 - 6 hours after the iodine pill is taken. Another scan may be taken 24 hours later. Additional or alternative scans may be done using a compound containing technetium.

After the radioactive iodine has been absorbed by the thyroid, you will lie on your back on a movable table with your neck and chest positioned under the scanner. The scanner detects the location and intensity of the rays given off by the radioactive material. During this part of the procedure, you must lie still to let the scanner get a clear image. A computer displays images of the thyroid.

How to Prepare for the Test

You must sign a consent form. You may be told not to eat after midnight the night before the exam. Consult the health care provider if you are taking any medications that may need to be regulated, such as thyroid medication and anything with iodine in it. Remove jewelry, dentures, or other metals, because they may interfere with the image.

How the Test Will Feel

Some patients find remaining still during the test uncomfortable.

Why the Test is Performed

This test is done if your doctor suspects you may have thyroid cancer or thyroid nodules.

Normal Results

The thyroid appears the correct size, shape, and in the proper location. It appears a even gray color on the computer image.

What Abnormal Results Mean

If the thyroid is enlarged or pushed off to one side, this could indicate a tumor. Nodules will absorb more or less iodine and will appear darker or lighter on the scan (usually lighter if tumor). If part of the thyroid appears lighter, it may indicate there is possible thyroid dysfunction.

Additional conditions under which the test may be performed:

- Anaplastic carcinoma of the thyroid
- Colloid nodular goiter
- Goiter
- Medullary carcinoma of thyroid
- Multiple endocrine neoplasia (MEN) II
- Papillary carcinoma of the thyroid
- Toxic nodular goiter

Risks

All radiation has possible side effects. There is a very small amount of radiation in the radioisotope ingested during this test, but women who are nursing or pregnant should discuss the risks to the fetus or infant with their health care providers before taking this test.

The concerns regarding radiation side effects are taken into consideration when the test is ordered, but the benefits of taking the test usually far outweigh the risks.

Considerations

Thyroid scans using radionuclides are used with other studies, such as blood tests and ultrasound, to evaluate the thyroid. Your doctor may send you for more than one type of test.
Lymphoscintigraphy

What is Lymphoscintigraphy?

Lymphoscintigraphy provides a view of the workings of the lymphatic system, which is a network of small channels, like arteries and veins, that transport the fluid and cells of the immune system through the lymph nodes and throughout the body. This fluid, called lymph, normally flows slowly from the periphery toward the center of the body and into the general circulation. If lymphatic flow is blocked, the areas of drainage that are affected can become swollen.

A scintigram is a type of picture that uses a radiopharmaceutical (a radioactive drug), which is injected or taken orally, that makes the lymphatic system visible to specialized cameras. The study is performed in the Nuclear Medicine section of the hospital, where the radiopharmaceuticals are prepared and the pictures are taken. Lymphoscintigraphy can be helpful for localizing points of blockage and is also important for identifying abnormal lymph nodes and planning a biopsy or surgery for suspicious areas. Generally, the radiation dose is similar to that of a standard x-ray examination.

What are some common uses of the procedure?

Lymphoscintigraphy can assist the physician in diagnosing diseases. It can help detect tumors, infection and other disorders such as the following:

- Lymphoscintigraphy can help diagnose lymphedema, a condition in which lymphatic fluid accumulates in soft tissues and may lead to inflammation and obstruction. This nuclear medicine test has all but replaced lymphangiography, a diagnostic x-ray procedure that used an oil-based contrast material that required surgical incisions on both feet to expose and inject the lymphatics directly.
- Lymph flow in an arm or leg may be evaluated with lymphoscintigraphy by injecting radioactive material into a web space between the fingers or toes and recording images for 60 minutes. Local anesthesia is not necessary.
- When planning surgery for a breast tumor, it is helpful to assess the lymphatic drainage beforehand to identify the sentinel lymph node (the first lymph node that receives lymph drainage from the tumor site) for excisional biopsy. A radiopharmaceutical is injected either just beneath the skin around the areola (nipple); at two to four sites around the tumor; beneath the skin above the tumor; or into the tumor itself on the day of surgery. Imaging usually is completed within 30 minutes, but may take up to one to two hours. Lymphoscintigraphy of the breast is very safe. Side effects are infrequent, and morbidity is much reduced compared with axillary lymph node dissection, which formerly was the routine staging procedure for patients with breast cancer and no obvious spread (metastasis).
- Malignant melanoma is an aggressive form of skin cancer that may spread rapidly to distant body sites. Lymphoscintigraphy may be performed preoperatively in order to identify the sentinel lymph node. A tumor-negative sentinel lymph node is strong evidence that there has not been spread of the tumor. This is important for staging the disease and planning treatment management.
How should I prepare for the procedure?
No special preparation is needed for lymphoscintigraphy.

What does the equipment look like?
During lymphoscintigraphy you will lie down on a scanning table. Consequently, the only piece of equipment you may notice is the specialized nuclear imaging camera used during the procedure. It is a large, round device enclosed in a metallic housing and suspended over the examination table. The camera sometimes is located within a large, doughnut-shaped structure similar in appearance to a computed tomography (CT) scanner. A nearby computer console, often in an adjacent room, processes the data from the procedure.

How does the procedure work?
With regular x-ray examinations, an image of the body is made by passing x-rays through the body part from an outside x-ray source. In contrast, with nuclear medicine a radioactive substance called a radiopharmaceutical or radiotracer localizes in a certain body part (or parts) which emits gamma rays that are detected by a gamma camera. The gamma camera sends the information to a computer that develops the image. Scanning times may vary considerably.

The most commonly used radiopharmaceutical in the United States for lymphoscintigraphy is called technetium-99m sulfur colloid. It typically loses its radioactivity in less than 24 hours.

How is the procedure performed?
You will be asked to lie face up beneath or next to a gamma camera. When assessing lymph drainage to identify the sentinel lymph node, as in patients with melanoma, three to five injections of radiopharmaceutical are given into the skin surrounding the site of the melanoma. For breast cancer, the injections are given through the skin near the tumor or around the areola. All injections are made using a very small needle.

In lymphoscintigraphy performed for leg or arm edema, the radiopharmaceutical is injected into the skin between the first and second fingers or toes of each hand or foot.

Imaging begins immediately after injection and is repeated at five-minute intervals for 45 to 60 minutes. Often, both sides are studied so that the normal and abnormal sides can be compared. You may also be asked to exercise lightly for about 10 minutes, either by walking for leg exams or by doing handgrip or lifting exercises for arm exams. Images are acquired after exercise and, in some cases, delayed images are needed at one- to two-hour intervals for up to six hours, or even up to 24 hours.

For patients with breast cancer, images will be made of the underarm regions and breast/chest. For melanoma patients, images will be made of the underarms, head, neck and both groins. In most melanoma patients, imaging will take three to four hours. Markings are made on the skin to show where lymph nodes are located.

What will I experience during the procedure?
Lymphoscintigraphy is an outpatient procedure. No anesthesia is needed unless a lymph node biopsy is performed in the operating room immediately following lymphoscintigraphy in order to detect involvement by melanoma or breast cancer. It is important that you avoid moving while the images are recorded.

Most patients can resume regular activities immediately after the procedure. The small amount of radioactivity in your body will decrease due to the natural process of radioactive decay over several hours.

Who interprets the results and how do I get them?
Most patients undergo lymphoscintigraphy because their primary care physician or surgeon has recommended it. A radiologist, a physician who has specialized training in nuclear medicine and other medical imaging procedures, will interpret the images and forward a report to your physician.

What are the benefits vs. risks?

Benefits
- The functional information provided by nuclear medicine examinations such as lymphoscintigraphy is unique and currently unattainable by using other imaging procedures. For many diseases, nuclear medicine studies yield the most useful information needed to make a diagnosis and to
determine appropriate treatment, if any.

- Sentinel lymph node biopsy following lymphoscintigraphy is a useful means of diagnosing and staging melanoma and learning whether the disease has spread from its primary site.

- Lymphoscintigraphy and sentinel lymph node biopsy are less traumatic than the alternatives of staging breast cancer or melanoma by surgical lymph node dissections.

- Computers are involved in the generation of images, making it possible to measure function and quantify it in addition to identifying abnormalities.

- Because lymphoscintigraphy is generally performed according to standardized protocols, the type of examination done at one hospital is likely to be similar to that performed at other hospitals, making the information easy to understand and easy to transfer to all doctors who may be involved in your care.

### Risks

- Because the doses of radiopharmaceutical administered are small, nuclear medicine procedures such as lymphoscintigraphy result in minimal radiation exposure. Nuclear medicine has been used for more than five decades, and there are no known long-term adverse effects from such low-dose exposure.

- As with all radiological procedures, it is important that you inform your physician and the radiological technologist if you are pregnant. In general, exposure to radiation during pregnancy should be kept to a minimum. Allergic reactions to radiopharmaceuticals may occur but are extremely rare.

- Injection of the radiopharmaceutical may cause slight pain and redness.

### What are the limitations of Lymphoscintigraphy?

Nuclear medicine procedures such as lymphoscintigraphy are time-consuming. They involve administration of a radiopharmaceutical, acquisition of images, and interpretation of the results. Imaging can take up to an hour and sometimes longer to perform.

### Dacryocystogram

#### Purpose

A simple noninvasive test for defining the patency of the lacrimal duct is accomplished with the 99mTc pertechnetate dacryocystography. Functional obstruction can be visualized unlike the radiographic contrast study, in which the duct is catheterized.

#### Patient Prep

No special preparation is required.

#### What happens during the study?

Radioactive eyedrops will be administered to the eyeball and pictures are acquired for up to 45 minutes. Patients are encouraged to hold his/her head still during the picture-taking process.

#### Interpretation

Normal images should show activity in the area of the nose in 10 to 15 minutes. The level of obstruction can be well demonstrated on images.
PET Patient Preps 1

Imaging Department

PET PATIENT PREPS
(Done at Watauga Medical Center only)

Non-Diabetic Patients
- NPO for 6 hours, aside from water, which should be encouraged.
- No sugar in any form for 8 hours prior to injection time (candy, gum, breath mints, soda, etc.)
- No strenuous exercise for 12 hours prior to injection time.
- Medications may be taken as long as they may be tolerated with water only.
- Low carbohydrate meal recommended the evening prior to the exam.

Diabetic Patients
- Patients should take their medications up to 4 hours prior to their examination, as normally prescribed by their physician, including with food, if so prescribed. If they are to take their medication with a meal, it should be high protein and low carbohydrate. (The patient must remain without food for 4 hours prior to scanning – very important).
- Water should be encouraged in order to insure hydration.
- No sugar in any form 8 hours prior to injection.
- No strenuous exercise for 12 hours prior to injection.
- Low carbohydrate meal recommended the evening prior to examination.

Please note: the technologist will check the patient’s blood glucose level prior to injection of FDG, the recommended range is 200 mg/dl.
IMPORTANT NOTICE

PET Scans will take up to 3 hours. The patient will be injected with the drug and will have a wait of approximately 60 minutes BEFORE the scan starts. The scan will take approximately one more hour after the delay. Inform patients to allow 2-3 hours for their exam.

Wait Times Following Therapy
- For patients undergoing Chemotherapy, a waiting period of two weeks is recommended before performing a PET study. A PET study may be safely scheduled between courses of chemotherapy (normally between courses 3 and 4) as long as two weeks have elapsed since completion of the previous course.
- For patients undergoing Radiation Therapy, a waiting period of 6-8 weeks is recommended prior to a PET study. If the study is performed between courses of radiation, two weeks must have elapsed since completion of the previous course.

Scheduling PET and Diagnostic CT on Same Day
- All above preparation rules apply to these patients.
- The PET scan must be completed in its’ entirety prior to the patient receiving oral contrast preparation. The patient should not be given oral contrast to take home from the physician’s office – we will provide it to them at WMC after their PET scan is finished.
- It is important to tell the patient they will be at WMC for an extended period of time, depending on the type of diagnostic CT that will follow the PET scan. If for an abdomen/pelvis CT with contrast, the time to drink the contrast will be approximately 1 ½ to 2 hours in addition to the CT scan time.
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Ultrasound imaging, which has many uses in medicine, uses “high-frequency” sound waves. These are sound waves humans are unable to hear. This imaging test is used to “see” inside the body. An easy way to understand how ultrasound works is to relate it to sonar. With sonar, ultrasonic waves are sent out, bounce off an object, and return. The same is true with ultrasound within the human body. It is this principle that creates the images seen on an ultrasound machine. Many times, when people hear the word “ultrasound,” they think of pregnancy. However, ultrasound can be used to evaluate major organs such as the liver, kidneys, gallbladder, and heart.

What makes this kind of test so widely used is the fact that it is very effective and does not use radiation. It is one of the safest tests in the Imaging or Radiology Department. The only thing most patients do not like about the procedure is that ultrasound gel is used. The gel allows the sound waves to enter the body, and it also aids in moving the ultrasound probe over the skin. We try to make our patients more comfortable by warming the gel.

The Imaging Department wants to make your experience as pleasant as possible. The following information may help you avoid delays in your exam. Be sure to arrive 15 minutes before your appointment time because Admissions can be a busy place. After you have checked in with Admissions you will proceed to Radiology or the Imaging Department. Ultrasound exams usually begin on time. However, at times we have emergencies which may delay your exam. Please be patient with us; we strive to provide the best care possible.

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**GENERAL ULTRASOUND:**
These exams include the following ultrasounds:

- Abdominal (Belly)
- Aorta (Main heart vessel)
- Biliary (Bile ducts and gallbladder)
- Breast
- Gallbladder
- Hepatic (Liver)
- Obstetrical (Pregnancy)
- Pelvic (Female Reproductive Organs)
- Renal (Kidney)
- Scrotal (Testicles)
- Spleen
- Thyroid
- Transvaginal (Female Reproductive Organs)

**SPECIAL PROCEDURES, BIOPSY, FINE NEEDLE ASPIRATION (FNA):**

- Biopsy
- Breast Needle Localization
- Fine Needle Aspiration (FNA)
- Paracentesis
- Mammmotome Breast Biopsy
- Thoracentesis
**Abdominal Ultrasound:**

**What is an abdominal ultrasound?**

An abdominal ultrasound looks at many major internal organs. When doing this exam we will look at your aorta, pancreas, liver, gallbladder (if you still have one), kidneys and spleen.

**How do I get ready for an abdominal ultrasound?**

You should not eat or drink after midnight the night before the exam. The exam will take between 45 minutes and 1 hour.

**NOTE:** You may take your morning pills with a sip of water but, **DO NOT** eat breakfast or even have a cup of coffee.

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images you may be instructed to take in a deep breath or to roll up onto your side.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your abdominal ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

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**Aorta Ultrasound:**

**What is an aorta ultrasound?**

The aorta is the blood vessel that comes out of the heart and brings blood to the rest of the body. The portion imaged during this exam lies between the bottom of your rib cage and your belly button. We may also need to look at both of your kidneys during this exam.

**How do I get ready for an aorta ultrasound?**

You should not eat or drink after midnight the night before the exam. The exam will take between 45 minutes and 1 hour.

**NOTE:** You may take your morning pills with a sip of water, **but** **DO NOT** eat breakfast or even have a cup of coffee.

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your aorta ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.
**Gallbladder:**

**What is a gallbladder ultrasound?**

Your gallbladder usually lies on your right side under or just below your rib cage. The gallbladder stores bile that helps you digest food. When doing this exam, we will look at your pancreas, liver, gallbladder, bile ducts, and right kidney.

**How do I get ready for a gallbladder ultrasound?**

You should not eat or drink after midnight the night before the exam. The exam will take between 45 minutes and 1 hour.

*NOTE: You may take your morning pills with a sip of water, but DO NOT eat breakfast or even have a cup of coffee.*

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. In the room, you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images, you may be instructed to take in a deep breath or to roll up onto your side.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your gallbladder ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

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**Biliary Ultrasound:**

**What is a biliary ultrasound?**

A biliary ultrasound is nearly the same as a gallbladder ultrasound. When doing this exam, we will look at your pancreas, liver, gallbladder (if you still have one), bile ducts, and right kidney.

**How do I get ready for a biliary ultrasound?**

You should not eat or drink after midnight the night before the exam. The exam will take between 45 minutes and 1 hour.

*NOTE: You may take your morning pills with a sip of water, but DO NOT eat breakfast or even have a cup of coffee.*

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images, you may be instructed to take in a deep breath or to roll up onto your side.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your biliary ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.
Liver Ultrasound:

What is a liver ultrasound?

Your liver is one of your largest organs. It lies under the rib cage from the middle of your abdomen to the right side. When doing this exam, we will look at your pancreas, liver, gallbladder (if you still have one), right kidney, and spleen.

How do I get ready for a liver ultrasound?

You should not eat or drink after midnight the night before the exam. The exam will take approximately 45 minutes to 1 hour. 
NOTE: You may take your morning pills with a sip of water, but DO NOT eat breakfast or even have a cup of coffee.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images, you may be instructed to take in a deep breath or to roll up onto your side.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your liver ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

Spleen Ultrasound:

What is a spleen ultrasound?

Your spleen lies on the left side of your body usually above your left kidney. When doing a spleen ultrasound, we will focus mostly on your spleen; and we may also look at your liver.

How do I get ready for a spleen ultrasound?

You should not eat or drink after midnight the night before the exam. The exam will take approximately 45 minutes to 1 hour. 
NOTE: You may take your morning pills with a sip of water, but DO NOT eat breakfast or even have a cup of coffee.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images, you may be instructed to take in a deep breath or to roll up onto your side.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your spleen ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.
Breast:

What is a breast ultrasound?

This is an ultrasound that will focus on just one area, the entire breast, or both breasts. This will depend on what your doctor has ordered.

How do I get ready for a breast ultrasound?

You do not have to do anything special to prepare for this exam. The exam will take approximately 45 minutes to 1 hour.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back and a pillow will be placed under the shoulder on the side being scanned. You will be asked to raise your arm up if you are able. Warm gel and the ultrasound probe will be applied to your breast while the technologist obtains images.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your breast ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

Kidney (Renal) Ultrasound:

What is a kidney ultrasound?

You normally have two kidneys, one on each side of your body. The kidneys create urine and send it down to your bladder. When we look at your kidneys, we also look at your bladder. That is why you must come with a full bladder.

How do I get ready for a kidney ultrasound?

For a kidney ultrasound you need to have a full bladder. Drinking several glasses of fluid 1 hour before the exam should be sufficient. Remember not to use the restroom before your test. The exam will take between 45 minutes and 1 hour.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images. To help take better images, you may be instructed to take in a deep breath or to roll up onto your side.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your kidney ultrasound exam will
Obstetrical Ultrasound (Pregnancy):

What is an obstetrical ultrasound?

An obstetrical ultrasound is done on women who are pregnant. This can be done during the first, second, or third trimesters. Ultrasound is used to check the baby’s health and development. Ultrasound is also used to detect multiple babies, certain birth defects, and conditions that could be problems during the pregnancy and/or delivery.

Ultrasound has been determined to be safe for both the mother and the baby. We perform ultrasounds for medical reasons only and do not provide photographs or videos. We also do not allow you to bring in recording devices to use during the exam.

First Trimester
Second Trimester
Third Trimester

First Trimester:

How do I get ready for a first trimester ultrasound?

For a first trimester obstetrical ultrasound you need to have a full bladder. To do this you need to finish drinking 36 ounces (or 4 glasses) of water one hour before the exam time. You should also hold your urine and not use the bathroom.

Example: If your appointment time is 1:00 pm you will need to finish drinking your 36 ounces of water by 12:00 noon.

The exam will take approximately 45 minutes to 1 hour.

Second Trimester:

How do I get ready for a second trimester ultrasound?

You will need to have a full bladder for this exam. Start drinking 32 ounces of water one hour prior to the exam and do not empty your bladder prior to your appointment. The exam will take approximately 1 to 1 ½ hours.

After drinking this much fluid you might be uncomfortable. Fortunately, the exam does not take long, IF YOU HAVE A FULL BLADDER!

NOTE: If you are very early in your pregnancy you may also need a transvaginal pelvic ultrasound.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up. Some women just pull their shirt up and push their pants down a little. You will have a choice. Gowns will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed. You will be able to empty your bladder and then be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.
What will happen in the room?

Our rooms are small, but if you would like you may bring one person with you. In the room you will need to undress from the waist up and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound will be read by a radiologist, and the ordering physician should receive the results in a few days.

Pelvic Ultrasound:

What is a pelvic ultrasound?

A pelvic ultrasound usually looks at your uterus and ovaries. If they have been surgically removed, then we will just be looking at your lower abdomen, which includes your urinary bladder.

How do I get ready for a pelvic ultrasound?

You need to finish drinking 36 ounces (4 glasses) of water one hour before the exam time. You should also hold your urine and not use the bathroom. 

Example: If your appointment time is 1:00 pm you will need to finish drinking your 36 ounces of water by 12:00 noon.

The exam will take between 45 minutes and 1 hour.

After drinking this much fluid, you will be uncomfortable. Fortunately, the exam does not take long, IF YOU HAVE A FULL BLADDER!

NOTE: To ensure that you receive the highest quality of care, there is a good chance that you might need to also have a transvaginal pelvic ultrasound after the regular pelvic ultrasound.

What will happen in the room?

Our rooms are small, but if necessary you may have someone come with you. In the room you will need to undress from the waist up, and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images.

Third Trimester:

How do I get ready for a third trimester ultrasound?

You do not have to do anything special to prepare for this exam. The exam will take approximately 1 to 1 ½ hours.

What will happen in the room?

Our rooms are small, but if you would like you may bring one person with you. In the room you will need to undress from the waist up and a gown will be provided. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your abdomen while the technologist obtains images.
Our rooms are small, but if necessary you may have someone come with you. In the room you will need to pull up your shirt just a little and pull your pants down a little. You will then be instructed to lie on your back. Warm gel and the ultrasound probe will be applied to your lower abdomen while the technologist obtains images.

Are there any special instructions after the test?

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed. You will be able to empty your bladder and then be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

Transvaginal Pelvic Ultrasound:

What is a transvaginal pelvic ultrasound ultrasound?

A transvaginal (sometimes called endovaginal) ultrasound exam is done to get a closer look at the uterus and ovaries. This exam is often done after a transabdominal pelvic ultrasound has been completed or when a patient’s bladder is not full enough to perform a transabdominal pelvic ultrasound. It is also performed on women during their first trimester of pregnancy.

How do I get ready for a transvaginal pelvic ultrasound ultrasound?

Even though your doctor ordered a transvaginal pelvic exam, our radiologists require us to first scan your pelvic transabdominally (probe placed on top of lower abdomen). This requires you to have a full bladder.

You need to finish drinking 36 ounces (4 glasses) of water one hour before the exam time. You should also hold your urine and not use the bathroom.

Example: If your appointment time is 1:00 pm you will need to finish drinking your 36 ounces of water by 12:00 noon. The exam will take between 45 minutes and 1 hour.

After drinking this much fluid, you will be uncomfortable. After the technologist takes some images transabdominally you will be allowed to empty your bladder and the transvaginal part of the exam will be performed

The exam will take approximately 30 to 45 minutes.

This exam can be performed during a woman’s menstrual period, but if the patient prefers and the ordering physician approves, it can be rescheduled to a later date.

What will happen in the room?

For this exam you will need to take off all clothing from the waist down, and a gown will be provided. Your privacy will be maintained at all times. During a transvaginal pelvic ultrasound, you will have a tampon shaped ultrasound probe inserted into your vagina approximately 2 inches. With this procedure there may be some discomfort and a feeling of pressure. Communicate any questions or
concerns to your technologist.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

**Scrotal ultrasound:**

**What is a scrotal ultrasound?**

A scrotal ultrasound looks at the male testicles.

**How do I get ready for a scrotal ultrasound?**

You do not have to do anything special to prepare for this exam. The exam will take between 30 and 45 minutes.

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. In the room, you will be asked to undress from the waist down, and a gown will be provided. You will lie on your back for this exam, and towels will be given to you for privacy reasons. Your privacy will be maintained at all times. Warm gel and the ultrasound probe will be placed on the scrotum, and images will be obtained by the technologist.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; and you will be allowed to leave. Please do not ask the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

**Thyroid Ultrasound:**

**What is a thyroid ultrasound?**

The thyroid is a small gland located in the lower portion on the front of the neck.

**How do I get ready for a thyroid ultrasound?**

You do not have to do anything special to prepare for this exam. The exam will take approximately 30 to 45 minutes.

**What will happen in the room?**

Our rooms are small, but if necessary you may have someone come with you. If you are wearing loose clothing around your neck, the technologist may just place a towel around your neckline. If it is necessary, you may have to put on a gown. You will then be instructed to lie on your back with your head tilted back (if you are able). Warm gel and the ultrasound probe will be placed on your neck while images are taken by the technologist.

**Are there any special instructions after the test?**

Once your exam is complete, the technologist will confirm with a radiologist that the images taken are all that are needed; you will be allowed to leave. Please do not ask
the technologist about your exam results. He or she is not allowed to interpret exams. Your ultrasound exam will be read by a radiologist, and the ordering physician should receive the results in a few days.

**Biopsies:**

**What is a Biopsy?**

A biopsy is a special procedure performed by a radiologist in which tissue samples are obtained. The samples are then examined by a pathologist to aid in determining a diagnosis.

**How do I get ready for a biopsy?**

All ultrasound guided biopsies require that you are not taking blood thinners for at least 48 hours prior to the procedure. These include prescription, over the counter, and herbal formulas. Please check with your doctor prior to the biopsy for instructions.

Prior to the biopsy, the technologist will go over the procedure with you. A radiologist will review with you the benefits and risks of having the procedure, and you will be required to sign a consent form. Feel free to ask any questions or express any concerns you may have. Prior to the procedure, please inform the technologist of allergies or other medical conditions you have.

Some biopsies require the patient to be sedated by a nurse before the procedure. You will need to follow the instructions given to you by the doctor who ordered the biopsy for you. If you are to be sedated, you should not eat or drink after midnight the night before the exam. You will receive instructions about your arrival time from your physician. This procedure can last from 30 minutes to 1 ½ hours.

**What will happen in the room?**

You will be lying on a stretcher and monitored by a nurse (if you are being sedated). The technologist and/or radiologist will use the ultrasound machine to locate the area to be biopsied.

The radiologist will clean the area to be biopsied with an alcohol based agent and will inject Lidocaine (numbing medication similar to what dentists use). It is very common to feel a stinging type of pain, which only lasts for a short time, during this injection.

**Are there any special instructions after the procedure?**

You may have to stay longer depending on the type of procedure and any sedation given. Please bring someone with you to drive you home.

The tissue collected will be sent to the laboratory for analysis. The results will be sent to your ordering physician in a few days.

**Breast Needle Localization:**

**What is a breast needle localization?**

It is a procedure done using either ultrasound or mammography to place a wire into a breast mass before going to surgery. This wire is a guide for the surgeon to use in locating the mass being removed from the breast.

**How do I get ready for a breast needle localization?**

You should not eat or drink after midnight the night before the exam. This procedure lasts between 30 and 45 minutes.

**What will happen in the room?**

You will be lying on a stretcher and monitored by a nurse (if you are being sedated). The technologist and/or radiologist will use the ultrasound machine to locate the area to be biopsied.

The radiologist will clean the area to be biopsied with an alcohol based agent and will inject Lidocaine (numbing medication similar to what dentists use). It is very common to feel a stinging type of pain, which only lasts for a short time, during this injection.
You will be lying on your back and an ultrasound machine will be used to locate the breast mass. The radiologist will clean and numb the area where the wire will be inserted. Then the radiologist will place a thin wire into the breast tissue, and it will be secured in place until your surgical time.

**Mammotome Breast Biopsy:**

**What is a mammotome breast biopsy?**

A mammotome breast biopsy is a procedure used to take samples of breast tissue for diagnosis. It is considered as accurate as a surgical biopsy, yet this is less invasive and less costly. This procedure is performed by either a Radiologist or a Surgeon in the Imaging Department using an ultrasound machine for guidance.

**How do I get ready for a mammotome breast biopsy?**

Please check with your doctor for instructions prior to a Mammotome biopsy.

All patients having a Mammotome should not be taking blood thinners prior to the procedure. Please bring a tight fitting bra (such as a sports bra) to wear home after the procedure. Some doctors prefer that you have a mild sedative prior to this procedure. If so, you should not eat or drink after midnight the night before the biopsy.

This procedure lasts approximately 1 hour.

**What will happen in the room?**

You will be lying on a stretcher, and you may be monitored by a nurse. You may also be given some medication to help you relax. The Radiologist or Surgeon will clean and numb the area that is going to be biopsied. The doctor will insert a vacuum assisted biopsy probe through a 1/4 inch incision made in your breast. The doctor will remove tissue samples and place a small marker in your breast for future follow-up exams. The small incision will be closed with an adhesive bandage. Someone will go over aftercare instructions with you.

**Are there any special instructions after the test?**

Please have someone with you who can drive you home. We will supply you with an ice pack to help reduce bruising and swelling of the area biopsied. The tissue collected will be sent to the Pathology Department for analysis. The results will be sent to your ordering physician within 1 week.

**Fine Needle Aspiration (FNA):**

**What is a fine needle aspiration?**

A fine needle aspiration is a type of biopsy in which a very small needle is used to obtain cell samples from an area in your body to aid in a diagnosis.

**How do I get ready for a fine needle aspiration?**

You may eat a light breakfast prior to this procedure. The use of blood thinners should be avoided prior to this procedure. You will need to check in at Admissions and then come to the Radiology Department. A fine needle aspiration usually requires approximately 45 minutes to 1 hour.

**What will happen in the room?**

You will be lying on your back and an ultrasound machine will be used to locate the breast mass. The radiologist will clean and numb the area where the wire will be inserted. Then the radiologist will place a thin wire into the breast tissue, and it will be secured in place until your surgical time.
You will be asked to put on a gown. After the radiologist has gone over the procedure with you, he or she will clean and numb the area. An ultrasound will be performed during the biopsy so that the radiologist can confirm that the samples taken are from the area in question. The radiologist will then insert a small needle to get some cells out.

**Are there any special instructions after the test?**

We will clean your skin, and you will be given a discharge sheet with instructions. You will then be free to go home. The tissue collected will be sent to the Pathology Department for analysis. The results will be sent to your ordering physician within 1 week.

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**Paracentesis:**

**What is a paracentesis?**

A paracentesis is a procedure that is done because your abdomen has accumulated extra fluid. A radiologist will be removing the fluid through a tube-like structure called a catheter.

**How do I get ready for a paracentesis?**

Prior to this procedure you will need to have blood drawn, which your doctor will have to order. The use of blood thinners should be avoided prior to this procedure. Check with your doctor if you are taking any. You may eat a light meal prior to this procedure. You will need to check in at Admissions, and then go to the Radiology or Imaging Department.

**What will happen in the room?**

You will be asked to put on a gown. Before we can begin you must sign a consent form. Ultrasound will be used to help the doctor locate the best area to do the procedure. The radiologist will clean and numb an area on your abdomen. The radiologist will then insert a small needle and place a catheter in your abdomen to drain the fluid. A paracentesis can last approximately 45 minutes to 1 ½ hours.

**Are there any special instructions after the test?**

We will clean your skin and place an adhesive bandage over the area. You will be given a discharge sheet with instructions. You will then be free to go home.

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**Thoracentesis:**

A thoracentesis is a procedure performed because of extra fluid in the space around your lung. A radiologist will be removing the fluid using a tube-like catheter that is inserted into the space around the lung.

**How do I get ready for a thoracentesis?**

Prior to this procedure you will need to have blood drawn, which your doctor will have to order. The use of blood thinners should be avoided prior to this procedure. Check with your doctor if you are taking any. You may eat a light meal prior to the procedure. You will need to check in at Admissions, and then come to Radiology or Imaging Department.

**What will happen in the room?**

You will be asked to put on a gown. Before we can begin you must sign a consent form. Ultrasound will be used to help the doctor locate the best area to do the procedure. The radiologist will clean and numb an area on your abdomen. The radiologist will then insert a small needle and place a catheter in your abdomen to drain the fluid. A thoracentesis can last approximately 45 minutes to 1 ½ hours.

**Are there any special instructions after the test?**

We will clean your skin and place an adhesive bandage over the area. You will be given a discharge sheet with instructions. You will then be free to go home.
You will be asked to put on a gown. Before we can begin you must sign a consent form. Ultrasound will be used to help the doctor locate the best area to do the procedure. The radiologist will clean and numb an area on your upper back. The radiologist will then insert a tube-like structure called a catheter to drain the fluid. The procedure usually takes approximately 1/2 to 1 ½ hours.

**Are there any special instructions after the test?**

We will clean your skin and place an adhesive bandage over the area. You will be given a discharge sheet with instructions, and you will be free to go home.

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**Peripheral Vascular Ultrasound**

**Description of Vascular Ultrasound Procedures**

**What is an Ankle Brachial Index (ABI)?**

This test is done by measuring blood pressure at the ankle and in the arm while a person is at rest. No radiation (x-ray) is involved.

**Why is it done?**

The purpose of the test is to evaluate blood flow into your legs.

**How is it done?**

You do not need to remove your clothes for this exam. You will be asked to take off your socks and shoes. The vascular technician will start by reviewing your medical history. You will be asked to lie on your back while standard blood pressure cuffs are placed around your ankles and arms. The cuffs will be inflated and a small ultrasound probe will be placed against the leg. As the cuffs are deflated, waveforms will be documented assessing blood flow. You will hear sounds during this examination. This will be blood flowing through the vessels. This is normal.

**How long does it take?**

This test takes approximately one hour.

**How do I prepare?**

No preparation is needed for this exam.

**What is an Arterial Duplex?**
An arterial duplex exam is an ultrasound test that looks at the major arteries of the upper extremities (arms) or lower extremities (legs). No radiation (x-ray) is involved in ultrasound imaging.

**Why is it done?**

An arterial duplex is done to identify blockages or a narrowing of your arteries. This test can determine the severity of the blockages, or patency of the vessel.

**How is it done?**

If you are having an arterial duplex of the upper extremities you will be asked to remove your shirt. A gown will be provided.

If you are having an arterial duplex of the lower extremities you will be asked to remove your pants. A cover will be provided.

You will lie flat on your back with your head elevated. Ultrasound gel will be applied to the appropriate extremity. A transducer will be moved around on the extremity being examined. Pictures are taken of the blood vessels and recorded for the physician to interpret.

**How long will it take?**

This test takes approximately one hour.

**How do I prepare?**

No preparation is needed for this exam.

**What is a Carotid Artery Ultrasound?**

Carotid artery ultrasound is also called a carotid duplex scan. This procedure uses sound waves to obtain color images of the arteries in your neck. There are two carotid arteries, one on each side of your neck. These are the main arteries in the neck that supply blood to the head and brain. Usually, both sides will be checked during the procedure. No radiation (x-ray) is involved in ultrasound imaging.

**Why is it done?**

To detect blood clots, plaque (fatty material), or other problems with blood flow in the carotid arteries.

**How is it done?**

You do not need to undress for this exam. You will be asked to lie on your back. A transducer will be placed on your neck with a small amount of ultrasound gel. The transducer sends sound waves through your neck to the carotid arteries and back.

**How long does it take?**

This test takes approximately one hour.

**How do I prepare?**

No preparation is needed for this exam.

**What are Segmental Pressures?**

It is similar to the ankle brachial index (ABI) exam, with the addition of two or three additional blood pressure cuffs. No radiation (x-ray) is involved.

**Why is it done?**

To check the arterial blood flow into your legs.

**How is it done?**

You will be asked to undress from the waist down. You may leave your underwear on. A cover will be provided. You will be asked to lie on your back.
Blood pressure cuffs will be put on both arms, thighs, calves, and ankles. One at a time, the blood pressure cuffs will be inflated, and then slowly deflated. A doppler probe is used to monitor the pulse while a blood pressure cuff is inflated above the artery. When cuff is deflated the pressure at which the pulse returns is recorded. The pressures in the legs will be compared to the arm pressures to assess blood flow.

**How long will it take?**
This test takes approximately one hour.

**How do I prepare?**
No preparation is needed for this exam.

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**What is a Venous Duplex?**
A venous duplex exam is an ultrasound test that looks at the major veins of the upper extremities (arms) or lower extremities (legs). No radiation (x-ray) is involved in ultrasound imaging.

**Why is it done?**
This procedure is performed to evaluate symptoms including leg pain or swelling, varicose veins, shortness of breath, or suspected blood clots in your legs and/or lungs.

**How is it done?**
If you are having a venous duplex of the upper extremities you will be asked to remove your shirt. A gown will be provided.

If you are having a venous duplex of the lower extremities you will be asked to remove your pants. A cover will be provided.

You will lie flat on your back with your head elevated. Ultrasound gel will be applied to the appropriate extremity. A transducer will be moved around on the extremity being examined. You will feel mild pressure from the transducer as the technologist applies pressure to your veins at various locations. Pictures are taken of the blood vessels and recorded for the physician to interpret.

**How long will it take?**
This test takes approximately one hour.

**How do I prepare?**
No preparation is needed for this exam.

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**What is a Venous Mapping Study?**
Venous mapping is an ultrasound test that looks at the major veins of the upper extremities (arms). No radiation (x-ray) is involved in ultrasound imaging.

**Why is it done?**
Upper extremity venous mapping is done to assess the availability of vessels prior to creation of a permanent dialysis access in patients with chronic renal failure (CRF).

**How is it done?**
If you are having a venous mapping of the upper extremities you will be asked to remove your shirt. A gown will be provided.

You will lie flat on your back with your head elevated. Ultrasound gel will be applied to the appropriate extremity.
A transducer will be moved around on the extremity being examined. You will feel mild pressure from the transducer as the technologist applies pressure to your veins at various locations. Pictures are taken of the blood vessels and recorded for the physician to interpret.

**How long will it take?**

This test takes approximately one hour.

**How do I prepare?**

No preparation is needed for this exam.

**What is a Venous Reflux Study?**

A venous reflux study is an ultrasound test that allows your physician to evaluate the venous system in your legs for evidence of valvular incompetence. No radiation (x-ray) is involved in ultrasound imaging.

**Why is it done?**

To evaluate the valves that prevent back-flow of blood in the veins of your legs.

**How is it done?**

You will be asked to undress from the waist down. You may leave your underwear on. A cover will be provided. You will be asked to lie on your back with your head elevated. Ultrasound gel will be applied to the appropriate extremity. A transducer will be moved around on the extremity being examined. You may be asked to hold your breathe for short periods of time. You will feel pressure from the transducer as the technologist applies pressure to your veins at various locations. Pictures are taken of the blood vessels and recorded for the physician to interpret.

**How long will it take?**

This test takes approximately one hour.

**How do I prepare?**

No preparation is needed for this exam.
DXA (Bone density test)

A DXA scan, also known as bone densitometry, 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.

What to Expect:
• At Watauga Medical Center DXA scan services are offered at the Outpatient Imaging/Lab Center. At Cannon Memorial DXA scan services are offered at the hospital.

• There is not a preparation for this exam.

• You will be asked to lie on your back on a padded table. NOTE: It is best if you have no metal on your clothing below the waistline, i.e. zipper, snaps, etc.

• The “arm” of the scanner will move over your back and hip while you lie still.

• The scans are painless and only take 7-10 minutes.

• Your results are sent to your physician within 24 to 48 hours.
Stereotactic Breast Biopsy

A stereotactic breast biopsy is performed by a surgeon and radiologic technologist as a method of obtaining breast tissue samples and, in many cases, can allow the patient to avoid surgery. This outpatient procedure uses x-rays and a computer to determine the exact location of a mass or calcifications within the breast. Small samples of breast tissue within the area of concern are removed through a small incision and sent to the laboratory for analysis and the results are usually available within a week.

What to Expect:
• NOTE: Please inform the surgeon if you have any allergies or are taking any blood thinners. Your surgeon may ask you to withhold your blood thinners for 3-7 days prior to the procedure.

• You will be asked to undress from the waist up and put on a gown that opens in the front. You will lay face-down on a special table with the affected breast through an opening in the table. The breast is then compressed with a small plate (similar to a mammogram). It is very important that you not move during the procedure so that the breast remains immobile.

• Your breast will be numbed with a local anesthetic and a small incision made. Small samples of breast tissue are removed through the incision.

• After the procedure is completed, a small tissue marker will be placed within the breast to identify the location of the biopsy. Steri-strips or stitches are used to close the incision.

• Patients are usually asked to rest for the remainder of the day after the procedure. Bruising, some swelling, and minimal pain are to be expected. Your surgeon and technologist will discuss follow-up care with you.