

Computed Tomography (CT) - Spine

Computed tomography (CT) of the spine is a diagnostic imaging test used to help diagnose—or rule out—spinal column damage in injured patients. CT scanning is fast, painless, noninvasive and accurate. In emergency cases, it can reveal internal injuries and bleeding quickly enough to help save lives.

Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking, and allergies. You will be instructed not to eat or drink anything for a few hours beforehand if the exam requires contrast material. If you have a known allergy to contrast material, your doctor may prescribe medications to reduce the risk of an allergic reaction. These medications must be taken 12 hours prior to your exam. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

What is CT Scanning of the Spine?

Computed tomography, more commonly known as a CT or CAT scan, is a diagnostic medical imaging test. Like traditional x-rays, it produces multiple images or pictures of the inside of the body.

The cross-sectional images generated during a CT scan can be reformatted in multiple planes. They can even generate three-dimensional images. These images can be viewed on a computer monitor, printed on film or by a 3D printer, or transferred to a CD or DVD.

CT images of internal organs, bones, soft tissue and blood vessels provide greater detail than traditional x-rays, particularly of soft tissues and blood vessels.

Using CT, the bony structure of the spine vertebrae is clearly and accurately shown, as are intervertebral disks and, to some degree, the spinal cord soft tissues.

What are some common uses of the procedure?

Perhaps, the most frequent use of spinal CT is to detect—or to rule out—spinal column damage in patients who have been injured.

CT scanning of the spine is also performed to:

- assess spine fractures due to injury.
- evaluate the spine before and after surgery.
- help diagnose spinal pain. One of the most common causes of spinal pain that may be diagnosed by CT is a herniated intervertebral disk. Occasionally, this diagnosis is made using CT myelography.
- accurately measure bone density in the spine and predict whether vertebral fractures are likely to occur in patients who are at risk of osteoporosis.
- assess for congenital anomalies of the spine or scoliosis.
- detect various types of tumors in the vertebral column, including those that have spread there from another area of the body. Some tumors that arise elsewhere are first identified by finding deposits of malignant cells (metastases) in the vertebrae; prostate cancer is an example.

To help offer the best experience possible, cookies are used on this website. By

- browsing here, you acknowledge our terms of use. To find more information about our cookie policy, visit [here](#).
- [Find out more](#)

In patients with narrowing (stenosis) of the spine canal, vertebral fracture, infection or degenerative disease such as arthritis, CT of the spine may provide important information when performed alone or in addition to magnetic resonance imaging (MRI).

How should I prepare?

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

Metal objects, including jewelry, eyeglasses, dentures and hairpins, may affect the CT images. Leave them at home or remove them prior to your exam. You may also be asked to remove hearing aids and removable dental work. Women will be asked to remove bras containing metal underwire. You may be asked to remove any piercings, if possible.

You will be asked not to eat or drink anything for a few hours beforehand, if contrast material will be used in your exam. You should inform your physician of all medications you are taking and if you have any allergies. If you have a known allergy to contrast material, your doctor may prescribe medications (usually a steroid) to reduce the risk of an allergic reaction. To avoid unnecessary delays, contact your doctor before the exact time of your exam.

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

Women should always inform their physician and the CT technologist if there is any possibility that they may be pregnant. *See the CT Safety During Pregnancy (www.RadiologyInfo.org/en/info.cfm?pg=safety-ct-pregnancy) page for more information.*

If your infant or young child is having a spinal CT, there are measures that can be taken to ensure that the test will not be a cause of anxiety for either the child or parent.

What does the equipment look like?

The CT scanner is typically a large, donut-shaped machine with a short tunnel in the center. You will lie on a narrow examination table that slides in and out of this short tunnel. Rotating around you, the x-ray tube and electronic x-ray detectors are located opposite each other in a ring, called a gantry. The computer workstation that processes the imaging information is located in a separate control room. This is where the technologist operates the scanner and monitors your exam in direct visual contact. The technologist will be able to hear and talk to you using a speaker and microphone.

How does the procedure work?

In many ways, a CT scan works like other x-ray exams. Different body parts absorb x-rays in different amounts. This difference allows the doctor to distinguish body parts from one another on an x-ray or CT image.

In a conventional x-ray exam, a small amount of radiation is directed through the part of the body being examined. A special electronic image recording plate captures the image. Bones appear white on the x-ray. Soft tissue, such as the heart or liver, shows up in shades of gray. Air appears black.

With CT scanning, several x-ray beams and electronic x-ray detectors rotate around you. These measure the amount of radiation being absorbed throughout your body. Sometimes, the exam table will move during the scan, so that the x-ray beam follows a spiral path. A special computer program processes this large volume of data to create two-dimensional cross-sectional images of your body. These images 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 nearly all CT scanners to obtain multiple slices in a single rotation. These scanners, called multi-slice or multidetector CT, allow thinner slices to be obtained in a shorter amount of time. This results in more detail and additional view capabilities.

Modern CT scanners can scan through large sections of the body in just a few seconds, and even faster in small children. Such speed is beneficial for all patients. It's especially beneficial for children, the elderly and critically ill – anyone who finds it difficult to stay still, even for the brief time necessary to obtain images.

For children, the CT scanner technique will be adjusted to their size and the area of interest to reduce the radiation dose.

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

To help offer the best experience possible, cookies are used on this website. By clicking on the button below, you agree to our cookie policy. To find more information about our cookie policy visit [here](#).

How is the procedure performed?

OK

Find out more

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

Many scanners are fast enough that children can be scanned without sedation. In special cases, sedation may be needed for children who cannot hold still. Motion will cause blurring of the images and degrade the quality of the examination the same way that it affects photographs.

If a contrast material is used, it will be injected through an intravenous line (IV) into an arm vein during the procedure. A scan of the spine may also be done after injecting contrast material into the spinal canal (usually well below the bottom of the spinal cord) during a lumbar puncture test, also known as a *myelogram* (www.RadiologyInfo.org/en/info.cfm?pg=myelography). This will help to locate areas of inflammation or nerve compression or detect tumors.

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. Depending on the type of CT scan, the machine may make several passes.

You may be asked to hold your breath during the scanning. Any motion, including breathing and body movements, can lead to artifacts on the images. This loss of image quality can resemble the blurring seen on a photograph taken of a moving object.

When the exam is complete, you will be asked to wait until the technologist verifies that the images are of high enough quality for accurate interpretation.

The entire exam is usually completed within 30 minutes.

What will I experience during and after the procedure?

CT exams are generally painless, fast and easy. With multidetector CT, the amount of time that the patient needs to lie still is reduced.

Though the scan is painless, you may have some discomfort from remaining still for several minutes or from placement of an IV. If you have a hard time staying still, are very nervous, anxious or in pain, you may find a CT exam stressful. The technologist or nurse, under the direction of a doctor, may offer you some medication to help you tolerate the CT exam.

If an intravenous contrast material is used, you will feel a pin prick when the needle is inserted into your vein. You may feel warm or flushed while the contrast is injected. You also may have a metallic taste in your mouth. This will pass. You may feel a need to urinate. However, this is a contrast effect and subsides quickly.

When you enter the CT scanner, you may see special light lines projected onto your body. These lines are used to ensure that you are properly positioned. With modern CT scanners, you may hear slight buzzing, clicking and whirring sounds. These occur as the CT scanner's internal parts, not usually visible to you, revolve around you during the imaging process.

You will be alone in the exam room during the CT scan, unless there are special circumstances. For example, sometimes a parent wearing a lead shield may stay in the room with their child. However, the technologist will always be able to see, hear and speak with you through a built-in intercom system.

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

After a CT exam, the technologist will remove the intravenous line used to inject the contrast material. The tiny hole made by the needle will be covered with a small dressing. You can return to your normal activities.

Who interprets the results and how do I get them?

A *radiologist* (www.RadiologyInfo.org/en/info.cfm?pg=article-your-radiologist), a doctor specially trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send an official report to the doctor who ordered the exam.

Follow-up exams may be needed. If so, your doctor will explain why. Sometimes a follow-up exam is done because a potential abnormality needs further evaluation with additional views or a special imaging technique. A follow-up exam may also be done to see if there has been any change in an abnormality over time. Follow-up exams are sometimes the best way to see if treatment is working or if an abnormality is stable or has changed.

What are the benefits vs. risks?

To help offer the best experience possible, cookies are used on this website. By browsing here, you acknowledge our terms of use. To find more information about our cookie policy visit here.

OK

Find out more

- Spinal CT scanning is a rapid procedure and offers an accurate evaluation of bone and most soft tissues. Using the latest equipment, the spine may be displayed in multiple planes and three-dimensional imaging may be reconstructed.
- CT scanning is painless, noninvasive and accurate.
- A major advantage of CT is its ability to image bone, soft tissue and blood vessels all at the same time.
- Unlike conventional x-rays, CT scanning provides very detailed images of many types of tissue as well as the lungs, bones, and blood vessels.
- CT examinations are fast and simple; in emergency cases, they can reveal internal injuries and bleeding quickly enough to help save lives.
- CT has been shown to be a cost-effective imaging tool for a wide range of clinical problems.
- CT is less sensitive to patient movement than MRI.
- CT can be performed if you have an implanted medical device of any kind, unlike MRI.
- CT imaging provides real-time imaging, making it a good tool for guiding minimally invasive procedures such as needle biopsies and needle aspirations of many areas of the body, particularly the lungs, abdomen, pelvis and bones.
- A diagnosis determined by CT scanning may eliminate the need for exploratory surgery and surgical biopsy.
- No radiation remains in a patient's body after a CT examination.
- X-rays used in CT scans should have no immediate side effects.

Risks

- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.
- The effective radiation dose for this procedure varies. *See the Radiation Dose in X-Ray and CT Exams (www.RadiologyInfo.org/en/info.cfm?pg=safety-xray) page for more information about radiation dose.*
- Women should always tell their doctor and x-ray or CT technologist if there is any chance they are pregnant. *See the Safety in X-ray, Interventional Radiology and Nuclear Medicine Procedures (www.RadiologyInfo.org/en/info.cfm?pg=safety-radiation) page for more information about pregnancy and x-rays.*
- CT scanning is, in general, not recommended for pregnant women unless medically necessary because of potential risk to the unborn baby.
- IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after contrast material is given. However, the most recent American College of Radiology (ACR) Manual on Contrast Media reports that studies show the amount of contrast absorbed by the infant during breastfeeding is extremely low. For further information please consult the *ACR Manual on Contrast Media* (<https://www.acr.org/Clinical-Resources/Contrast-Manual>) and its references.
- The risk of serious allergic reaction to contrast materials that contain iodine is extremely low, and radiology departments are well-equipped to deal with them. If you had prior allergic reactions to CT contrast materials, it is important to inform your doctor in advance. Medications may be prescribed prior to the CT scan to minimize the risk of allergic reactions.
- Because children are more sensitive to radiation, they should have a CT exam only if it is essential for making a diagnosis and should not have repeated CT exams unless absolutely necessary. CT scans in children should always be done with low-dose technique.

What are the limitations of CT Scanning of the Spine?

A person who is very large may not fit into the opening of a conventional CT scanner or may be over the weight limit—usually 450 pounds—for the moving table.

Spinal CT does not consistently show enough detail to properly assess the spinal cord. If a patient had a previous surgery to place hardware such as rods or a screw, the quality of the CT images may be degraded due to the hardware. MRI may be more suitable than CT for demonstrating injured ligaments, the status of the intervertebral disks, spinal cord abnormalities and hematomas in the area of the spine.

Which test, procedure or treatment is best for me?

By continuing to browse this site, you acknowledge our terms of use. To find more information about our

OK

Find out more

• www.RadiologyInfo.org/en/info.cfm?pg=article-appropriateness-criteria#low-back-pain



Please note

RadiologyInfo.org is not a medical facility. Please contact your physician with specific medical questions or for a referral to a radiologist or other physician. To locate a medical imaging or radiation oncology provider in your community, you can search the ACR-accredited facilities database.

This website does not provide cost information. The costs for specific medical imaging tests, treatments and procedures may vary by geographic region. Discuss the fees associated with your prescribed procedure with your doctor, the medical facility staff and/or your insurance provider to get a better understanding of the possible charges you will incur.

Web page review process: This Web page is reviewed regularly by a physician with expertise in the medical area presented and is further reviewed by committees from the Radiological Society of North America (RSNA) and the American College of Radiology (ACR), comprising physicians with expertise in several radiologic areas.

Outside links: For the convenience of our users, *RadiologyInfo.org* provides links to relevant websites. *RadiologyInfo.org*, RSNA and ACR are not responsible for the content contained on the web pages found at these links.

Copyright © 2020 Radiological Society of North America, Inc. (RSNA).

To help ensure current and accurate information, we do not permit copying but encourage linking to this site.