

Computed Tomography (CT) Scan basic level

Overview

A Computed Tomography (CT) scan, also called a CAT scan, uses x-rays and a computer to create cross-section images of your spine or brain. It allows your doctor to view your spine or brain in slices, as if it were sliced layer-by-layer and a picture taken of each slice. It may or may not be performed with a "dye" injected into your bloodstream. This test is most often used to help diagnose tumors, hemorrhages, head injuries, and bone abnormalities.

How does a CT scanner work?

A CT scanner works much like an x-ray. The body casts a "shadow" on film when it is exposed to the x-ray, much like when you hold a flashlight up to your hand and cast a shadow on a wall. All of the tissue that the x-ray passes through overlap on the image, making it hard to isolate different elements. A CT scan works around this limitation by capturing only one very narrow "slice" of your body at a time. These "slices" can be viewed two-dimensionally or added back together to create a three-dimensional image of an organ or body structure.

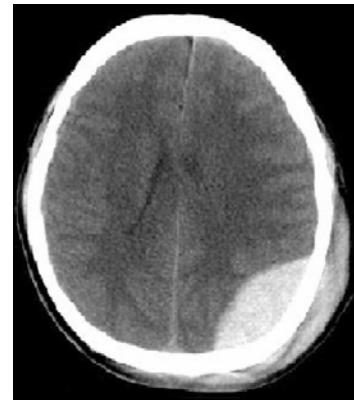
The CT scanner moves around the patient on a circular gantry passing x-ray beams and taking thousands of pictures as it rotates.

CT can also be used to view arteries and veins, called computed tomography angio-graphy (CTA). The CTA uses a contrast dye (iodine) injected into the patient's artery to help the computer "see" the arteries and veins.

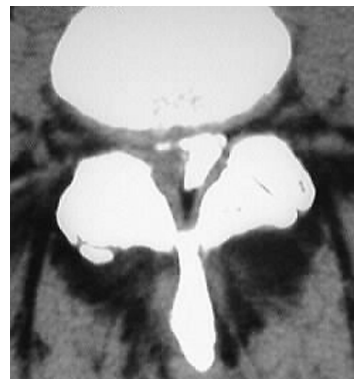
What does a CT scan show?

CT scans are very good at showing bone, soft tissue, and blood vessels. While an MRI takes excellent pictures of soft tissue and blood vessels, a CT scan shows bone much better, so it's often used to image the spine and skull. It's also used to view the inner ear and sinuses because these areas are made up of soft tissue and very fine bones (Fig. 1).

Other detailed cross sections can be taken of the brain, vessels of the brain, neck, shoulders, spine, discs, spinal cord, and vessels of the spine.



Example of a CT scan of the head showing a hematoma caused by an injury to the back of the skull during a car accident.



Example of a CT scan of the spine showing spinal stenosis, and a disc fragment in the spinal canal.



Example of a CTA showing an aneurysm on the basilar artery.

A CT scan can help your doctor diagnose many conditions including:

- brain damage in people who've had a head injury
- brain tumors
- ruptured or leaking aneurysms
- hydrocephalus, or enlarged brain cavities
- spinal stenosis, or narrowing of the spinal canal
- herniated discs
- blood clots or bleeding associated with stroke

Why is a contrast agent used?

A contrast agent is an iodine liquid that makes certain organs and tissues stand out on the CT image. If you are receiving a contrast agent, it will be given through an injection or IV line before or during the exam. The contrast agent contains iodine, a substance that x-rays cannot pass through (radiopaque). It circulates through your blood stream and can be x-rayed as it passes through the neck, brain or spine.

Who performs the test?

A radiology technologist will perform the test in the CT suite of the Radiology department of the hospital, or at an outpatient imaging center. The radiologist will review the images and report their findings.

How should I prepare for the test?

You should wear loose clothing and remove all objects that would get in the way of the scan, such as hairpins. You may need to change into a hospital gown, depending on what part of your body is being imaged. Be sure to tell your doctor if you've ever had an allergic reaction to iodine contrast.

What happens during the test?

You will be asked to lie on your back on a moveable table. If your head is being imaged, the technologist may position your head in a special head-holder that keeps it from moving. When you are comfortably positioned, the table will move into the CT machine that looks like a large square doughnut with a round hole in the middle. You'll be able to keep in contact with the technologist over an intercom. While each picture is being taken, you may be asked to hold your breath and stay perfectly still for a few seconds. The technologist will move your table with a remote control after each picture is taken (Figure 2).

The machine may be quiet or noisy, depending on the brand. The noise you hear is the x-ray tube that is rotating around your body to produce the images. You will not feel any sensation from the scan. The entire process can last from 15 to 45 minutes. After the test, the IV will be removed and you are free to go.

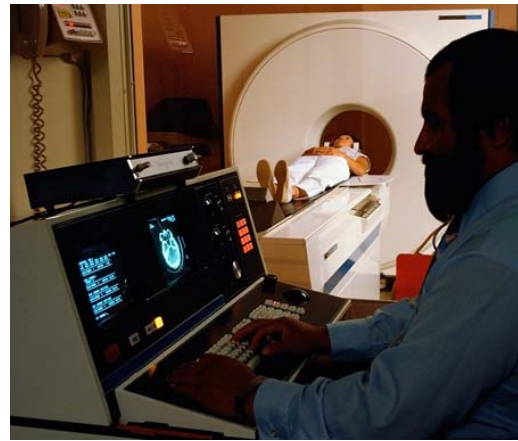


Figure 2. A radiology technician controls the CT scanner table and communicates with you through an intercom. It is important to hold your breath and lie very still when pictures are taken.

What are the risks?

A CT scan is a very safe study, though there is a slight risk from X-ray radiation exposure, and some people are sensitive to the contrast agent. The most common side effects from the iodine contrast are a brief metallic taste in your mouth and a feeling of warmth throughout your body.

An extremely rare reaction occurs when you experience severe hives and have difficulty breathing. Medications such as antihistamines can reverse this reaction. If you have diabetes or kidney problems you may experience kidney failure, but this too is extremely rare.

Be sure to tell your doctor if you are pregnant or have a history of allergies (to medications, previous iodine injections, or shellfish), diabetes, asthma, a heart condition, kidney problems, or thyroid conditions.

How do I get results?

The radiologist will promptly review your images and communicate directly with your referring doctor, who in turn will discuss the results with you. In some locations, test results and imaging studies can be securely transmitted digitally to the referring doctor or hospital.

Sources & Links

If you have further questions about this diagnostic test, contact the doctor that ordered the test or visit:

www.radiologyinfo.org
www.nlm.nih.gov/medlineplus/diagnosticimaging.html

Glossary

contrast agent: a liquid (usually iodine or gadolinium) that is injected into your body to make certain tissues show up clearly during diagnostic imaging (angiography, CT, myelogram, MRI).

MRI (magnetic resonance imaging): a diagnostic test that uses a strong magnet to view tissues in your body and displays them in a series of "slices."

radiologist: a doctor who specializes in reading X-rays and other diagnostic scans.

X-ray: electromagnetic radiation used in diagnostic imaging to view shadows of tissue density in the body, also called roentgenogram.

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