

CT Scan

What is CT Scanning of the Body?

CT (computed tomography), sometimes called CAT scan, uses special x-ray equipment to obtain image data from different angles around the body, and then uses computer processing of the information to show a cross-section of body tissue.

CT imaging is particularly useful because it can show several types of tissue—lung, bone, soft tissue, and blood vessels—with great clarity. Using specialized equipment and expertise to create and interpret CT scans of the body, radiologists can more easily diagnose problems such as cancers, cardiovascular disease, infectious disease, trauma, and musculoskeletal disorders.

What are some common uses of the procedure?

Because it provides detailed, cross-sectional views of all types of tissue, CT is one of the best tools for studying the chest and abdomen. It is often the preferred method for diagnosing many different cancers, including lung, liver, and pancreatic cancer, since the image allows a physician to confirm the presence of a tumor and measure its size, precise location, and the extent of the tumor's involvement with other nearby tissue. CT examinations are often used to plan and properly administer radiation treatments for tumors, to guide biopsies and other minimally invasive procedures, and to plan surgery and determine surgical respectability. CT can clearly show even very small bones, as well as surrounding tissues such as muscle and blood vessels. This makes it invaluable in diagnosing and treating spinal problems and injuries to the hands, feet and other skeletal structures. CT images can also be used to measure bone mineral density for the detection of osteoporosis. In cases of trauma, CT can quickly identify injuries to the liver, spleen, kidneys, or other internal organs. CT can also play a significant role in detection, diagnosis and treatment of vascular diseases that can lead to stroke, kidney failure, or even death.

How should I prepare for the CAT scan?

You should wear comfortable, loose-fitting clothing for your CT exam. Metal objects can affect the image, so avoid clothing with zippers and snaps. You may also be asked to remove hairpins, jewelry, eyeglasses, hearing aids, and any removable dental work, depending on the part of the body that is being scanned. You may be asked not to eat or drink anything for one or more hours before the exam. Women should always inform their doctor or x-ray technologist if there is any possibility that they are pregnant.

How does the procedure work?

In many ways, CT scanning works very much like other x-ray examinations. Very small, controlled amounts of x-ray radiation are passed through the body, and different tissues absorb radiation at different rates. With plain radiology, when special film is exposed to the absorbed x-rays, an image of the inside of the body is captured. With CT, the film is replaced by an array of detectors, which measure the x-ray profile.

Inside the CT scanner is a rotating gantry that has an x-ray tube mounted on one side and an arc-shaped detector mounted on the opposite side. An x-ray beam is emitted in a fan shape as the rotating frame spins the x-ray tube and detector around the patient. Each time the x-ray tube and detector make a 360-degree rotation and the x-ray passes through the patient's body, the image of a thin section is acquired. During each rotation, the detector records about 1,000 images (profiles) of the expanded x-ray beam. Each profile is then reconstructed by a dedicated computer into a two-dimensional image of the section that was scanned. Multiple computers are typically used to control the entire CT system.

You might think of it as looking into a loaf of bread by cutting the bread into thin slices. When the image slices are reassembled by computer, the result is a very detailed, multidimensional view of the body's interior.

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How is the CAT scan performed?

The technologist begins by positioning the patient on the CT table. The patient's body may be supported by pillows to help hold it still and in the proper position during the scan. AS the study proceeds, the table will move slowly into the CT scanner "doughnut". Depending on the area of the body being examined, the increments of movement may be so small that they are almost undetectable, or large enough that the patient feels the sensation of motion.

A CT examination often requires the use of different contrast materials to enhance the visibility of certain tissues or blood vessels. The contrast material may be injected through an IV directly into the blood stream, swallowed, or administered by enema, depending on the type of examination. Before administering the contrast material, the radiologist or technologist will ask whether the patient has any allergies, especially to medications or iodine, and whether the patient has a history of diabetes, asthma, a heart condition, kidney problems, or thyroid conditions. These conditions may indicate a higher risk of reaction to the contrast material or potential problems eliminating the material from the patient's system after the exam.

A CT examination usually takes five minutes to half an hour. When the exam is over, the patient may be asked to wait until the images are examined to determine if more images are needed.

What will I experience during the procedure?

CT scanning causes no pain, and with spiral CT, the need to lie still for any length of time is reduced. For different parts of the body, the patient preparation will be different. You may be asked to swallow either water or a positive contrast material--a liquid that allows the radiologist to better see the stomach, small bowel and intestines. Some patients find the taste of the contrast material mildly unpleasant, but most can easily tolerate it. Your exam may require the administration of the material by enema if the colon is the focus of the study. You will experience a sense of abdominal fullness and may feel an increasing need to expel the liquid. Be patient; the mild discomfort will not last long.

Commonly, a contrast material is injected into a vein to better define the blood vessels, and to better visualize the appearance between normal and abnormal tissue in the organs. Some people report feeling a flush of heat and sometimes a metallic taste in the back of the mouth. These sensations usually disappear within a minute or two.

You will be alone in the room during the scan; however, the technologist can see, hear, and speak with you at all times. In pediatric patients, a parent may be allowed in the room with the patient to alleviate fear, 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, who is a physician experienced in CT and other radiology examinations, will analyze the images and send a signed report with his or her interpretation to the patient's referring physician. The referring physician's office will inform the patient on how to obtain their results. New technology also allows for distribution of diagnostic reports and referral images over the Internet at some facilities.

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