

CT SCAN

How does a CT or CAT scan work?

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A computerized tomography (CT) or computerized axial tomography (CAT) scan combines data from several X-rays to produce a detailed image of structures inside the body.

CT scans produce 2-dimensional images of a “slice” or section of the body, but the data can also be used to construct 3-dimensional images. A CT scan can be compared to looking at one slice of bread within a whole loaf.

What is a CT scan?



...A CT scan can help diagnose many types of cancer.

A CT scanner emits a series of narrow beams through the human body as it moves through an arc.

This is different from an X-ray machine, which sends just one radiation beam. The CT scan produces a more detailed final picture than an X-ray image.

The CT scanner's X-ray detector can see hundreds of different levels of density. It can see tissues within a solid organ.

This data is transmitted to a computer, which builds up a 3-D cross-sectional picture of the part of the body and displays it on the screen.

Sometimes, a contrast dye is used because it can help show certain structures more clearly.

For instance, if a 3-D image of the abdomen is required, the patient may have to drink a barium meal. The barium appears white on the scan as it travels through the digestive system.

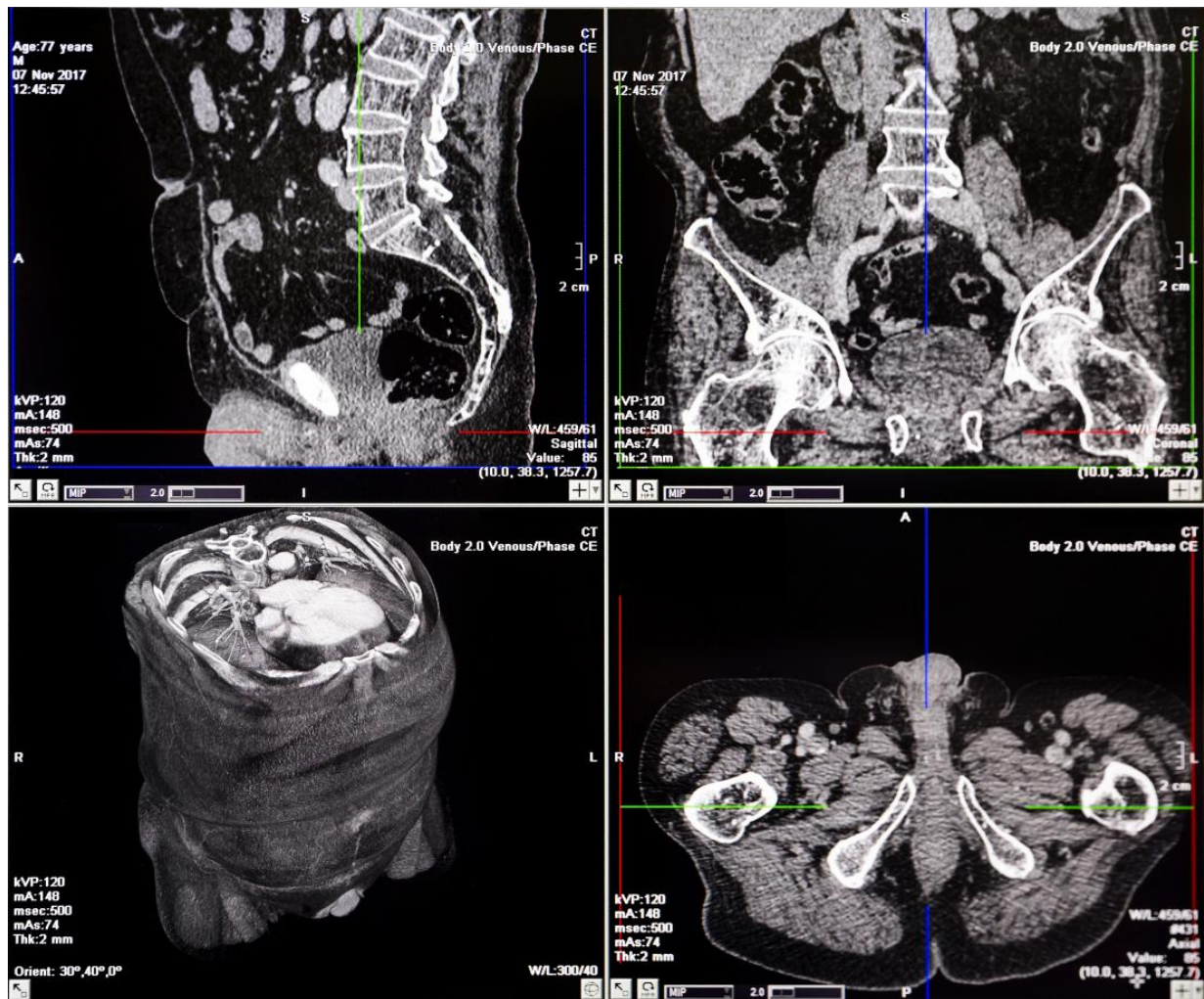
If images lower down the body are required, such as the rectum, the patient may be given a barium enema. If blood vessel images are the target, a contrast agent will be injected into the veins.

The accuracy and speed of CT scans may be improved with the application of spiral CT, a relatively new technology. The beam takes a spiral path during the scanning, so it gathers continuous data with no gaps between images.

CT is a useful tool for assisting diagnosis in medicine, but it is a source of ionizing radiation, and it can potentially cause cancer.

The National Cancer Institute advise patients to discuss the risks and benefits of CT scans with their doctors.

Uses



—A CT scan can detect abnormalities in the soft tissue.

It is useful for obtaining images of:

- soft tissues
- the pelvis
- blood vessels
- lungs
- brain
- abdomen
- bones

CT is often the preferred way of diagnosing many cancers, such as liver, lung, and pancreatic cancers.

The image allows a doctor to confirm the presence and location of a tumor, its size, and how much it has affected nearby tissue.

A scan of the head can provide important information about the brain, for instance, if there is any bleeding, swelling of the arteries, or a tumor.

A CT scan can reveal a tumor in the abdomen, and any swelling or inflammation in nearby internal organs. It can show any lacerations of the spleen, kidneys, or liver.

As a CT scan detects abnormal tissue, it is useful for planning areas for radiotherapy and biopsies, and it can provide valuable data on blood flow and other vascular conditions.

It can help a doctor assess bone diseases, bone density, and the state of the patient's spine.

It can also provide vital data about injuries to a patient's hands, feet, and other skeletal structures. Even small bones are clearly visible, as well as their surrounding tissue.

CT versus MRI

The main differences between CT and MRI are:

- A CT scan uses X-rays, but an MRI uses magnets and radio waves.
- Unlike an MRI, a CT scan does not show tendons and ligaments.
- MRI is better for examining the spinal cord.
- A CT scan is better suited to cancer, pneumonia, abnormal chest x-rays, bleeding in the brain, especially after an injury.
- A brain tumor is more clearly visible on MRI.
- A CT scan shows organ tear and organ injury more quickly, so it may be more suitable for trauma cases.
- Broken bones and vertebrae are more clearly visible on a CT scan.
- CT scans provide a better image of the lungs and organs in the chest cavity between the lungs.

Procedure

The patient may need to abstain from food, and possibly drink, for a specific period before the scan.

On the day

In most places, the patient will need to undress, usually down to their underwear, and put on a gown that the health center will provide. Avoid wearing jewelry.

If the hospital does not provide a gown, the patient should wear loose-fitting clothes free of metal buttons and zippers.

Some patients may have to drink a contrast dye, or the dye may be given as an enema, or injected. This improves the picture of some blood vessels or tissues.

Any patient who has an allergy to contrast material should tell the doctor beforehand. Some medications can reduce allergic reactions to contrast materials.

As metal interferes with the workings of the CT scanner, the patient will need to remove all jewelry and metal fastenings.

During the scan

The patient will need to lie down on a motorized examination table that slides into a doughnut-shaped CT scanner machine.

In most cases, the patient will lie on their back, facing up. But, sometimes, they may need to lie facedown or sideways.

After one x-ray picture, the couch will move slightly, and then the machine will take another image, and so on. The patient needs to lie very still for the best results.

During the scan, everybody except for the patient will leave the room. An intercom will enable two-way communication between the radiographer and the patient.

If the patient is a child, a parent or adult might be allowed to stand or sit nearby, but they will have to wear a lead apron to prevent radiation exposure.

Risks



The doctor should explain why the scan is needed, any other options available, and the pros and cons of having a CT scan.

A CT scan involves a small, targeted dose of radiation.

These levels of radiation, even in people who have undergone several scans, has not proven to be harmful.

The chance of developing cancer as the result of a CT scan is thought to be less than 1 in 2,000.

The amount of radiation involved is estimated to be around the same as a person would be exposed to in a space of between several months and several years of natural exposure in the environment.

A scan is only given if there is a clear medical reason to do so. The results can lead to treatment for conditions that could otherwise be serious. When the decision is taken to perform a scan, doctors will ensure that the benefits outweigh any risk.

Problems that could possibly arise from radiation exposure include cancer and thyroid issues.

This is extremely unlikely in adults, and also unlikely in children. However, are more susceptible to the effects of radiation. This does not mean that health issues will result, but any CT scans should be noted on the child's medical record.

In some cases, only a CT scan can show the required results. For some conditions, an ultrasound or MRI might be possible.