

What are CT scans and MRIs? ^[1]

Dear Alice,

What is the difference between CT and MRI? And what does with or without dye mean?

Answer

Dear Reader,

These are great questions which can be answered relatively clearly and painlessly. "Clearly" and "painlessly" are actually good adjectives for these tests, which produce *clear* high-resolution images of an area of the body though non-surgical and *painless* means. These two methods of diagnostic testing are conducted by placing the body in a somewhat large machine, running x-rays or radio waves through it, and using computers to compile pictures of the desired areas. Although the tests achieve similar results through seemingly similar means, there are some significant differences.

CT scans were developed in 1972 and used before MRIs. CT, or CAT as they're pronounced, stands for "computerized axial tomography." In a CT scan, the patient lies on a table that slides into a scanning machine. Inside, an x-ray beam rotates around the body while detectors measure how much of the x-rays pass through the tissues and organs, indicating density. From this information a computer creates many images called slices. Slices can be studied individually, or placed together to form a three-dimensional model of the area of the body being studied. A CT scan usually takes just a few minutes, and is painless. A dye, often referred to as contrast, is sometimes given to highlight a desired area, which helps to produce a more distinct image. The ingestion of this dye can cause slight nausea or an allergic reaction in some people, but such symptoms are closely monitored and in many cases no dye is needed.

CT scans are able to provide excellent information about anatomical features and tissue density, allowing for the detection of tumors and the ability to distinguish between malignant and benign tumors. CT scans can also detect calcium deposits, cysts, and abscesses.

CT scanning carries with it some risks due to the use of ionizing radiation from the x-rays. It is believed that prolonged exposure to ionizing radiation can cause cancer or deformity of cells. The risk of developing a cancer due to radiation increases with frequency of the tests. This risk is

small however, and less than that of going un-tested for serious conditions. Pregnant women are advised to avoid abdominal CT scans because of potential harm to the fetus.

The MRI, which stands for "magnetic resonance imaging" was first used in the late 1980s. In an MRI exam, a patient also lies on a table which slides into a machine, but the MRI uses no ionizing radiation. Instead, radio waves and strong magnets relay information to a computer, which creates slices. MRIs are most commonly used to examine the central nervous system (the brain and spinal cord) and to identify tumors, strokes, degenerative diseases, inflammation, infection, and other abnormalities in organs and soft tissues of the body.

The MRI usually takes 15 minutes to an hour, and is painless, although a patient may feel some warming around the area being examined due to the electromagnetic radiation of the radio waves. There are no known health risks associated with the test, except for people with pacemakers, aneurysm clips, or other implants that contain magnetic materials. These people are generally advised not to undergo MRI testing. What can be learned from MRIs is usually more sophisticated and detailed than from CT scanning. So why do we still use CT scans? They are a lot cheaper than MRIs, and in some cases more appropriate.

Similar to CT scans, some MRIs are helped by the administration of a dye, but this is not always necessary. Small coils are sometimes placed around the area to be studied to help send and receive the radio waves and improve image quality. For both the MRI and the CT scan, some people can become anxious when inside the scanner. If a patient suffers from claustrophobia, or has difficulty lying still, he or she may be given a mild sedative.

While not necessarily fun to undergo, these test methodologies provide detailed pictures of body areas that used to be inaccessible by conventional x-rays. Twenty-five years ago exploratory or invasive surgery may have been required to find the same results that MRIs or CT scans can provide today in a fraction of the time with much less stress to the body.

If you are going to have one of these tests you might want to meet with your health care provider or the staff at the imaging center to discuss any additional questions or concerns you have. You can read more about [MRIs](#) [2] and [CT scans](#) [3]. Hope this information is helpful!

Alice!

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