



Your Health

Different Types of Scans and What They Can Tell Us©

by Jack Grierson

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If you've ever been pregnant, broken a bone or had a bad concussion – you've more than likely had to have one of four possible scans. These are known as an MRI scan, a CT scan, an X-ray or an Ultrasound scan. But what do these scans do? How do they work? What do they show? And how are they different from each other?

Let's start by exploring how an MRI machine works. MRI stands for Magnetic Resonance Imaging. An MRI scan uses large magnets, radio waves, and a computer to create a detailed image of a patient's internal organs and structures. Images produced look like cross-sectional layers across your body. The scanner itself looks like a large tube with a table in the middle which allows the patient to slide into the tunnel.

An MRI scanner contains two powerful magnets, which are the most important part of the equipment. The human body is largely made of water molecules, which are made out of hydrogen and oxygen atoms. At the center of each atom lies an even smaller particle called a proton, which acts as a magnet and is sensitive to magnetic fields.

Normally the water molecules in our bodies are randomly arranged, but when you go into an MRI scanner, the first magnet causes the body's water molecules to all align in one direction. The second magnetic field is then turned on and off in a series of quick pulses, causing each hydrogen atom to move position and then quickly switch back to its original relaxed state when switched off. When the atom moves back to the aligned position, it releases energy which can be detected by the MRI and a picture can be formed digitally. As scary as this may sound, moving water molecules inside your body is completely painless – although make sure you aren't wearing anything metal due to the magnets! An MRI scan differs from CT scans and X-rays because it does not use radiation that can be potentially harmful to a patient. An MRI can image organs, soft tissue and internal structures like the spine. It's particularly good at showing the difference between normal and abnormal tissue.

The X-ray. Perhaps the one scanning technique that most people have heard of, the X-ray consists of using a small amount of radiation to capture a single image of a specific density. Dense objects like bone block the radiation and appear white on X-ray paper. This allows us to clearly visualize bone fractures and dislocations. X-rays can sometimes be used to look for specific diseases or tumors too.

Next up: the CT or CAT scan. This stands for Computed Axial Tomography scan. A CT scan works by combining the power of X-rays with computers to create a 360 degree, cross-sectional view of the body, much like an MRI does. A CT scan can image bone, soft tissue and blood vessels at the same time. It can also evaluate lung and chest issues, detect cancer and

pinpoint any issues with small boney structures. A benefit that the CT has over an MRI is that you can wear metal or have a metal implant and have the scan as a CT doesn't have magnets.

Our last scanning technique is ultrasound. Ultrasound is particularly good at showing organs and movement in real time. These scans can show you babies in the womb, how far an infection has spread, your blood flowing through blood vessels and a lot more. The benefit ultrasound has is that there is no radiation or magnets involved – just sound waves. As the sound waves bounce off internal organs, they produce a pattern for the sensor to turn into an image.

Finally, now that we know how each scan works, how are they different from each other? MRI's are typically used for imaging organs, soft tissue and scanning without radiation. CT's are typically used for imaging patients with metal, evaluating lung and chest issues and looking at bone and blood vessels. X-rays are best at looking at bone and injuries; it's also very cheap to perform. Lastly Ultrasound is the best for 3D visualization in real time.

This week's advice: If you're worried about what's going on inside your body, fear not – the doctor has plenty of scanning methods to choose from!

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