

What is a CT scan?

A computed tomography (CT) scan is a test that uses X-rays to produce an image of body tissue. The test does not require entering the body (it is noninvasive). A CT scan of the head is usually one of the first tests used to evaluate someone who may have had a [stroke](#) or [transient ischemic attack](#) (TIA), especially in the emergency room, because it is fast, easy to perform and interpret, and uses equipment that is available at all hospitals.

A CT scan can diagnose a blocked-vessel (ischemic) stroke or a bleeding (hemorrhagic) stroke, and is the primary way of telling the two types of stroke apart. The CT scan can also help rule out other problems that can cause [stroke symptoms](#), such as brain tumors, aneurysms, or abnormally formed blood vessels.

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The basic CT scan is also called *noncontrast* CT because, unlike other versions of the test, it does not require that a special dye be injected into your bloodstream.

How does a CT scan work?

A CT scan works like a regular X-ray. A beam of x-rays is sent to the skull, and the scanner picks up the x-rays after they pass through. The x-rays are passed through your head in a 360-degree circle, creating an image of a "slice" of your head. The table is then moved a few millimeters and the process is repeated, until a complete set of slices is made. A computer assembles these slices into a complete 3-D representation of your head.

Different tissues absorb X-rays differently: the more the x-ray is absorbed, the lighter the tissue appears on the final image. Bone absorbs most x-rays, so it appears white on the final image. Air and water appear black, and brain tissue is an in-between gray. Blocked-vessel strokes appear darker than normal brain on a CT image, and bleeding strokes appear lighter. In some special CT scan tests, a contrast dye is used that makes your blood vessels stand out from the rest of the brain, producing a more detailed picture of any blockages or narrowing.

What are CT angiography and perfusion CT?

These specialized tests use the CT scanner to take pictures of the brain as a contrast dye is injected into your bloodstream. The dye helps to produce a more detailed image of the blood vessels in the brain.

CT angiography is a less invasive alternative to conventional [angiography](#) because the dye is injected through a needle into a vein in your arm or hand. Conventional angiography requires a long, thin tube called a catheter be inserted through an incision in your groin or arm and guided through your arteries to the head.

CT angiography is more accurate than normal CT at determining where the blockage is, how much brain tissue is permanently damaged, and how well smaller vessels are routing blood flow around the blockage.²

A perfusion CT scan uses the dye to produce a map of all the blood in your brain. This can help doctors identify the location of reduced blood flow that is responsible for stroke symptoms. Certain types of perfusion CT can also measure how quickly your blood is moving in different parts of your brain, and how long it takes the blood to circulate. Perfusion CT is more accurate than normal CT at determining where the blockage is, how much brain tissue is permanently damaged, and how well smaller vessels are routing blood flow around the blockage.²

Both CT angiography and perfusion CT take at least 15 minutes longer than a regular CT scan. In an emergency where quick treatment is crucial, the added detail is not worth the extra time. Research on these tests is still in the early stages. It is hoped that one day they will be used to predict who will benefit most from certain medications and treatments for stroke and help doctors make a more accurate prognosis. For now, their role in making treatment decisions in emergency stroke situations is not established.³

[Next: Who might have a CT Scan?](#)

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