

## Carotid Intima-Media Thickness Test

A carotid intima-media thickness test (CIMT) is used to determine the extent of plaque buildup in the walls of the arteries supplying blood to the head. If a CIMT shows increased thickness in the inner layers of the carotid artery, you may be at risk for cardiovascular disease. CIMT uses ultrasound imaging to measure the thickness of the two inner layers of the carotid artery—called the intima and media.

Little or no special preparation is required for this procedure. Leave jewelry at home and wear loose, comfortable clothing. A loose-fitting, open-necked shirt or blouse is ideal.



### What is a Carotid Intima-Media Thickness Test?

A carotid intima-media thickness test (CIMT), also known as a carotid artery IMT ultrasound scan, uses ultrasound to measure the thickness of the intima and media, the two inner layers of the carotid artery. These measurements can help physicians assess the health of the carotid arteries and the risk of cardiovascular disease-related events like heart attacks and strokes, even in asymptomatic patients. Risk factors for increased carotid intima-media thickness include:

- aging
- high cholesterol
- high blood pressure
- smoking
- diabetes
- obesity
- an inactive lifestyle

### What are some common uses of the procedure?

CIMT is used to diagnose and determine the extent of plaque buildup in the walls of the vessels supplying oxygenated blood to the head. Increased thickness in the intima and media is associated with an increasingly diseased artery. Because there is a link between intimal medial thickness and cardiovascular events, CIMT is an important test for detecting disease in its earliest stage, when interventions such as diet, lifestyle, and medications can have the greatest impact.

### How should I prepare for a CIMT?

Wear comfortable, loose-fitting clothing. You may need to remove all clothing and jewelry in the area to be examined.

A loose-fitting, open-necked shirt or blouse is ideal.

No other preparation is required.

## What does the ultrasound equipment look like?

Ultrasound machines consist of a computer console, video monitor and an attached transducer. The transducer is a small hand-held device that resembles a microphone. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out inaudible, high-frequency sound waves into the body and listens for the returning echoes. The same principles apply to sonar used by boats and submarines.

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency), and time it takes for the ultrasound signal to return to the transducer. It also considers what type of body structure and/or tissue the sound is traveling through.

## How does the procedure work?

Ultrasound imaging uses the same principles as the sonar that bats, ships, and fishermen use. When a sound wave strikes an object, it bounces back or echoes. By measuring these echo waves, it is possible to determine how far away the object is as well as its size, shape, and consistency. This includes whether the object is solid or filled with fluid.

Doctors use ultrasound to detect changes in the appearance of organs, tissues, and vessels and to detect abnormal masses, such as tumors.

In an ultrasound exam, a transducer both sends the sound waves and records the echoing (returning) waves. When the transducer is pressed against the skin, it sends small pulses of inaudible, high-frequency sound waves into the body. As the sound waves bounce off internal organs, fluids and tissues, the sensitive receiver in the transducer records tiny changes in the sound's pitch and direction. A computer instantly measures these signature waves and displays them as real-time pictures on a monitor. The technologist typically captures one or more frames of the moving pictures as still images. They may also save short video loops of the images.

The ultrasound device utilizes sophisticated digital imaging and special software to accurately measure the thickness of the inner two layers of the carotid artery and detect plaque, if present.

## How is the procedure performed?

For most ultrasound exams, you will lie face-up on an exam table that can be tilted or moved. Patients may turn to either side to improve the quality of the images.

The technologist applies a clear water-based gel to the body area under examination. This helps the transducer make secure contact with the body. It also helps eliminate air pockets between the transducer and the skin that can block the sound waves from passing into your body. The technologist or radiologist places the transducer on the skin in various locations, sweeping over the area of interest. They may also angle the sound beam from a different location to better see an area of concern.

A CIMT examination is usually completed in approximately 30 to 45 minutes. The test generates a CIMT measurement and a report identifying your risk profile.

When the exam is complete, the technologist may ask you to dress and wait while they review the ultrasound images.

## What will I experience during and after the procedure?

Most ultrasound exams are painless, fast, and easily tolerated.

After you lie on the exam table, the radiologist or sonographer will apply some warm, water-based gel on your skin and then place the transducer firmly against your body. They will move it back and forth over the area of interest to capture the desired images. There is usually no discomfort from pressure as they press the transducer against the area under examination.

If scanning is performed over an area of tenderness, you may feel pressure or minor pain from the transducer.

Your head will be supported to keep it still, but it may be necessary to tilt or rotate your head for the best exposure as the transducer is swept over the entire length of your neck on both sides to obtain views of the artery from different perspectives. It also helps to keep your arm and shoulder down.

Once the imaging is complete, the technologist will wipe off the clear ultrasound gel from your skin. Any portions that remain will dry quickly. The ultrasound gel does not usually stain or discolor clothing.

After an ultrasound exam, you should be able to resume your normal activities immediately.

## Who interprets the results and how do I get them?

A radiologist, a doctor trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send a signed report to the doctor who requested the exam. Your doctor will then share the results with you. In some cases, the radiologist may discuss results with you after the exam.

Follow-up examinations may be necessary, and your doctor will explain the exact reason why another exam is requested. Sometimes a follow-up exam is done because a suspicious or questionable finding needs clarification with additional views or a special imaging technique. A follow-up examination may also be necessary so that any change in a known abnormality can be monitored over time. Follow-up examinations are sometimes the best way to see if treatment is working or if an abnormality is stable or changes over time.

## What are the benefits vs. risks?

### Benefits

- Most ultrasound scanning is noninvasive (no needles or injections).
- Occasionally, an ultrasound exam may be temporarily uncomfortable, but it should not be painful.
- Ultrasound is widely available, easy to use, and less expensive than most other imaging methods.
- Ultrasound imaging is extremely safe and does not use radiation.
- Ultrasound scanning gives a clear picture of soft tissues that do not show up well on x-ray images.
- If CIMT shows thickening in the carotid artery, treatment can be initiated to reduce the risks associated with the development of atherosclerosis.
- CIMT can be used repeatedly with no adverse effects.
- CIMT scanning protocol can detect atherosclerotic diseases in their early stage, before symptoms appear.
- CIMT allows for observation of the arterial wall, the actual site of the atherosclerotic disease, rather than the lumen.
- CIMT is not dependent on calcification of the plaque like other assessment tools such as cardiac CT for calcium scoring ([https://www.radiologyinfo.org/en/info/ct\\_calscoring](https://www.radiologyinfo.org/en/info/ct_calscoring)) .

### Risks

- Standard diagnostic ultrasound has no known harmful effects on humans.

## What are the limitations of a Carotid Intima-Media Thickness Test?

- Occasionally, imaging a patient is difficult because of the size or contour of the neck.
- Calcium deposits in the wall of the carotid artery may make it difficult to evaluate the vessel.
- CIMT is only an indirect assessment of the possible atherosclerotic burden in the coronary arteries.

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