

Transcranial Doppler (TCD) and Bubble Studies

This fact sheet explains two tests that can help your doctor assess the blood flow to and in your brain. These tests may also help identify a heart problem that can affect the blood in your brain.

What is a transcranial Doppler study (TCD)?

A transcranial Doppler study (TCD) is a safe, painless test that evaluates the blood flow to and in your brain. This test uses high-frequency sound waves that you can't hear or feel. As the sound waves bounce off blood vessels, information is sent to a computer screen. Analyzing the information helps your doctor look for problems that might keep your brain from getting enough oxygen.

Your doctor might use a TCD study to assess:

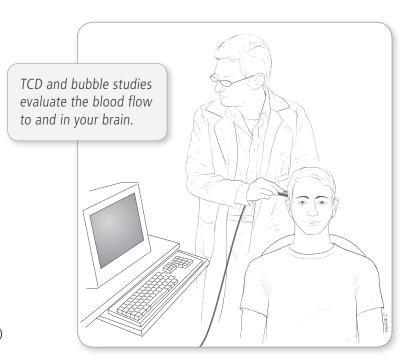
- Whether arteries are narrowed by **plaque** (fatty buildup) or by one or more tiny blood clots.
- Whether anticoagulation medication is working to dissolve blood clots in the arteries
- Whether arteries have gone into spasm (tightened up).
 This can happen after an aneurysm (weakened part) of a blood vessel bursts.

The TCD test is also used to monitor blood flow in the brain during surgery or after a head injury.

What is a bubble study?

A **bubble study** is a TCD that includes injecting tiny bubbles into a blood vessel. The sound waves show whether the bubbles reach your brain.

This test is most often used to find out if you have an abnormal opening between the chambers of your heart. Normally, oxygen-poor blood comes to the right side of your heart, which sends it to the lungs to get oxygen. The oxygen-rich blood returns to the left side of your heart, which pumps it to your body. An abnormal opening can allow oxygen-poor blood to leak over to the left side. This leaked blood misses the trip to the lungs, so it's pumped to your body without picking up the oxygen your body needs.



Because the lungs dissolve bubbles in the blood, we can use injected bubbles to see if any blood is skipping its trip to the lungs. If this happens, it means your brain is getting oxygen-poor blood.

Why might I need a TCD or bubble study?

Your doctor might recommend this test if:

- You have had a stroke or a TIA (mini-stroke), with symptoms such as numbness or weakness, confusion, trouble seeing, headache, or loss of coordination
- You have had a brain aneurysm
- You have frequent migraines (very bad headaches)
- You have unexplained blood clots in your system
- You have unexplained low blood oxygen levels
- You have had a head trauma
- You are having surgery that can affect blood flow to the brain

What happens during a TCD study?

A TCD study takes about an hour. Here's what happens:

- **Getting ready:** You'll either lie down on a padded exam table or sit in a chair. The technician will prepare the area to be tested by putting a small amount of gel on the skin.
- During a TCD study that looks for blood vessel narrowing or spasms, the technician will move a hand-held device called a transducer on your skin. Depending on what the doctor is looking for, the test will include one or more of the areas below.
 - The sides of your head above your ears
 - Under your chin
 - The hollows in the back of your neck (you'll sit or lie on your side and hold your head down)
 - On your closed eyelids (don't worry the gel won't hurt your eyes, and the transducer is moved very lightly over the skin)
- During a TCD study that looks for tiny blood clots, the technician will hold a transducer against your head (or you will wear a headset) and the technician will listen to the arteries inside your brain for up to an hour.

What happens during a bubble study?

A bubble study takes about 20 to 30 minutes. Here's what happens during the test:

- **Getting ready:** You'll lie down on a padded exam table or sit in a chair. An **IV** (intravenous line) will be placed in your wrist or arm. The technician will prepare the area to be tested by putting a small amount of gel on the skin.
- Headset: The technician will fit you with a transducer headset.
- Injection: As you sit or lie still, the technician will inject into your IV a saline (saltwater) solution that contains tiny bubbles. The transducers in the headset will send out sound waves to detect any bubbles that reach your brain.



What happens after the test?

After either type of test, here's what happens:

- **Preparing to leave**. The gel will be wiped off. If you had an IV, it will be removed.
- **Getting the results.** Your doctor will analyze the test. You'll get the results in a later appointment.

Talking with your doctor about the test

The table below lists the most common potential benefits, risks and alternatives for TCD and bubble studies, but other benefits or risks may apply in your unique medical situation. Talking with your doctor is the most important part of learning about the test. If you have questions, be sure to ask.

Potential benefits	Risks and potential complications	Alternatives
 A TCD or bubble study can: Identify whether spasms, clots, or plaque are blocking blood flow to the brain Identify whether you have an abnormal opening inside your heart 	TCDs and bubble studies are very safe. Risks include: Minor pain or infection at the IV site (during a bubble study) Stroke or blood clot in the lungs (extremely rare)	Alternatives to TCD may include: • MRI, CT scan Alternatives to bubble study may include: • Echocardiogram, MRI • Cardiac catheterization