TEST

Echocardiogram

An echocardiogram uses sound waves to create moving pictures of your heart.

WHAT IT MEASURES
Heart structure, movement, pumping, valves, and blood flow

SAMPLE
None; ultrasound imaging

FASTING NEEDED?
No, unless having transesophageal or stress echocardiography

HOW LONG IT TAKES
Usually 30 to 60 minutes

RESULTS IN
Same day to several days; varies by laboratory

USED FOR
Diagnosis and monitoring

MAIN LIMITATION
Poor sound-wave views can hide or distort heart structures

Overview

An echocardiogram, often called an "echo," uses high-frequency sound waves to produce moving pictures of your heart. It can show the heart's chambers, walls and valves while they are working. It can also estimate how blood flows through the heart.

A standard echocardiogram is performed from the outside of the chest. This is called a transthoracic echocardiogram, or TTE. It does not use X-rays or radiation.

Other types are used for specific questions:

This article mainly describes a standard transthoracic echocardiogram.

- A Doppler echocardiogram measures the direction and speed of blood flow
- A stress echocardiogram compares the heart at rest and during exercise or after medicine makes it work harder
- A transesophageal echocardiogram , or TEE, uses a probe passed into the swallowing tube behind the heart

- A contrast echocardiogram uses an injected ultrasound-enhancing agent to make certain structures easier to see

Why the test is ordered

An echocardiogram may be ordered when symptoms, examination findings or another test suggest that more information about the heart is needed. Possible reasons include breathlessness, chest discomfort, fainting, swelling, an unusual heart sound or an abnormal electrocardiogram.

The test can help assess:

Echo is also used to monitor a known heart or valve condition. It may be repeated during some cancer treatments that can affect heart function, or before certain operations and procedures.

- How strongly the heart muscle contracts and relaxes
- Whether heart chambers are enlarged or their walls are thickened
- Whether heart valves are narrowed or leaking
- Heart conditions present from birth
- Fluid around the heart
- Pressure and blood-flow patterns within the heart
- Damage associated with a heart attack or other heart disease

Who should have the test

You may be offered an echocardiogram if the result is likely to explain symptoms, assess a suspected condition or guide your care. A referral may come from primary care, cardiology, emergency care or another specialty.

People with a known valve problem, weakened heart muscle, congenital heart condition or enlarged main artery may have planned follow-up scans. The timing is based on the condition, previous findings, symptoms and treatment.

A routine echocardiogram is not generally a complete screening test for every possible heart condition. A normal result does not rule out all causes of chest pain, palpitations, fainting or breathlessness.

Ultrasound does not use radiation, so standard echocardiography can be performed during pregnancy when clinically needed. Pregnancy itself changes how hard the heart works, and this

is considered when interpreting the images.

How to prepare

A standard transthoracic echocardiogram usually needs no special preparation. You can normally eat, drink and take your usual medicines. Wear clothing that is easy to remove from the upper body.

Tell the testing team about any chest wounds, recent surgery, mobility needs or difficulty lying flat or on your left side. They can adjust your position where possible.

Preparation is different for other types of echo. Before a transesophageal echocardiogram, you will usually be told not to eat or drink for several hours. Sedation may be used, so you may need someone to take you home.

Before a stress echocardiogram, follow the instructions about food, caffeine, exercise and medicines. Do not stop heart or blood-pressure medicine unless the team arranging the test specifically tells you to do so.

What happens during the test

For a standard echo, you undress from the waist up and are offered a gown or covering. Small sticky patches may be placed on your chest to record your heart rhythm.

You usually lie on your left side. The sonographer applies gel to your skin and moves a handheld device called a transducer over different areas of your chest. The device sends out sound waves and records their echoes as they return from the heart.

The sonographer may press firmly to obtain a clear view. You may be asked to change position, briefly hold your breath or breathe in a particular way. You might hear pulsing or swishing sounds when Doppler measurements are recorded.

The scan usually takes 30 to 60 minutes. Difficult-to-see structures or detailed valve measurements can take longer. If the pictures are unclear, an ultrasound-enhancing agent may be injected through a small tube in a vein.

Understanding your results

A specialist reviews the images and measurements. The report usually describes the heart chambers, wall movement, pumping function, valves, major nearby blood vessels and the sac

around the heart.

You may see an ejection fraction in the report. This estimates the percentage of blood pumped out of the main left heart chamber with each beat. It is only one measure of heart function. A person can have important heart disease even when this number is within the expected range.

Valve findings may describe narrowing, called stenosis , or backward leakage, called regurgitation . Small amounts of leakage can be seen in people without significant valve disease, so the degree and overall context matter.

There is no single set of measurements that applies to everyone. Reference ranges and interpretation vary by laboratory or imaging service, age, sex, body size, pregnancy status, medicines and clinical context. Results are considered alongside your symptoms, examination and other tests.

What affects the results

Some factors can change the measurements or make the pictures difficult to interpret even when the equipment is working correctly.

Sound waves may not travel clearly through the chest because of lung disease, air between the probe and heart, body shape, obesity, breast tissue, ribs, dressings or recent chest surgery. In these situations, some structures may be partly hidden.

Results can also be affected by:

Measurements may differ slightly between scans because the probe angle, image quality and person taking the measurements are not identical. Comparing serial scans is often easier when the same method and imaging service are used.

- A fast, slow or irregular heartbeat during the scan
- High or low blood pressure at the time
- Recent vigorous exercise
- Dehydration or fluid overload
- Fever, severe pain, anxiety or acute illness
- Pregnancy and other states that increase blood flow
- Medicines that alter heart rate, blood pressure or pumping strength
- Difficulty holding the required position or following breathing instructions

Accuracy and limitations

An echocardiogram is good at showing heart structure, valve movement and overall pumping. However, it can miss abnormalities when the relevant area cannot be seen clearly. Small blood clots, minor wall-motion changes or subtle valve problems may not be visible on a routine chest echo.

It can also suggest a problem that is not confirmed by further testing. This may happen because of image artefacts, borderline measurements or temporary changes in heart rate, blood pressure or fluid balance. Findings are therefore interpreted as a pattern rather than from one number alone.

A standard echo does not show the coronary arteries well and cannot by itself rule out narrowed heart arteries. Depending on the question, a stress test, CT coronary angiogram or invasive coronary angiogram may be more useful.

Transesophageal echo can provide clearer pictures of certain valves, the upper heart chambers and possible blood clots. Cardiac MRI may be better for detailed heart-muscle assessment. These tests have different burdens and risks, so they are used when their additional information is likely to matter.

Risks and complications

A transthoracic echocardiogram is non-invasive and has no known risk from the ultrasound itself. You may feel temporary pressure from the probe or have mild skin irritation from the gel or sticky patches.

If an intravenous ultrasound-enhancing agent is used, the needle can cause brief discomfort or bruising. Reactions to these agents are uncommon, and the testing team monitors you.

Stress echocardiography can cause symptoms such as breathlessness, dizziness, palpitations or chest discomfort because the heart is made to work harder. You are monitored during the test, and it can be stopped if needed.

Transesophageal echo has additional risks from sedation and passing the probe through the throat. A sore throat is common afterward; injury to the mouth, swallowing tube or teeth is less common.

What happens next

Your results may be discussed immediately, but often the images need to be reviewed before

a final report is issued. The professional who requested the test will explain whether the findings need routine monitoring, another test or a change in care.

A repeat echocardiogram is not automatically needed after every abnormality. Follow-up timing is based on the type and severity of the finding, whether symptoms have changed and whether treatment could affect the heart.

Contact your healthcare team through the usual route if you are waiting for results and your symptoms are gradually changing.

Seek urgent or emergency care for new severe chest pain, severe difficulty breathing, fainting, or stroke-like symptoms such as facial weakness, arm weakness or difficulty speaking. After a transesophageal echo, seek urgent help for vomiting blood, severe chest or throat pain, marked trouble swallowing or breathing, or heavy bleeding.

Common questions

Can I eat or drink coffee before an echocardiogram?

Yes, before a routine transthoracic echo. A stress or transesophageal echo may require restrictions, so follow the instructions provided for your appointment.

Does the time of day matter?

Usually not for a standard echo. If you are having repeat scans for monitoring, similar conditions may make small changes easier to compare.

Can I exercise beforehand?

Light normal activity is usually fine. Vigorous exercise can temporarily change your heart rate, blood pressure and heart function, so avoid it if your appointment instructions request a resting measurement.

Should I take my medicines?

Take your usual medicines unless the testing team tells you otherwise. Some heart medicines may be adjusted before a stress echo, but they should not be stopped without specific instructions.

Will I need an injection?

Most standard echocardiograms do not require one. An intravenous ultrasound-enhancing agent may be offered if the heart's borders cannot be seen clearly.

Can I drive home afterward?

You can usually drive after a standard transthoracic echo. You should not drive after sedation

for a transesophageal echo; arrange transport and follow the service's instructions.

Sources

- National Health Service. "Echocardiogram." NHS Tests and Treatments.
- MedlinePlus. "Echocardiography." U.S. National Library of Medicine.
- Mitchell C, Rahko PS, Blauwet LA, et al. "Guidelines for Performing a Comprehensive Transthoracic Echocardiographic Examination in Adults." Journal of the American Society of Echocardiography . 2019;32(1):1-64.
- Lang RM, Badano LP, Mor-Avi V, et al. "Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults." Journal of the American Society of Echocardiography . 2015;28(1):1-39.e14.
- British Society of Echocardiography. "Clinical Indications and Triaging for Adult Transthoracic Echocardiography: A Consensus Statement." Echo Research and Practice . 2022.
- Hahn RT, Abraham T, Adams MS, et al. "Guidelines for Performing a Comprehensive Transesophageal Echocardiographic Examination." Journal of the American Society of Echocardiography . 2013;26(9):921-964.