TEST

Stress echocardiography

A stress echocardiogram uses ultrasound to assess how your heart works during exercise or heart-stimulating medicine.

WHAT IT MEASURES
Heart muscle movement and pumping response during stress

SAMPLE
None; ultrasound images and heart recordings

FASTING NEEDED?
Sometimes, usually several hours before medicine-induced stress

HOW LONG IT TAKES
About 45 to 90 minutes

RESULTS IN
Same day to several days, varying by laboratory or service

USED FOR
Diagnosis and monitoring of heart disease

MAIN LIMITATION
Reduced accuracy with poor images or inadequate stress

Overview

Stress echocardiography, often called a stress echo, shows how your heart works when it has to pump harder. It combines an echocardiogram, which uses sound waves to make moving pictures of the heart, with exercise or a medicine that increases the heart's workload.

Exercise is usually done on a treadmill or stationary bicycle. If you cannot exercise enough, a medicine such as dobutamine may be given through a vein. Dobutamine makes the heart beat faster and more strongly.

The test looks for changes in how sections of heart muscle move. A section that moves normally at rest but less well during stress may not be receiving enough oxygen-rich blood. This is called inducible ischaemia.

A stress echo does not use X-rays or ionising radiation. It may also assess heart valves, pumping strength and pressure changes during exercise.

Why the test is ordered

A stress echo may help investigate symptoms that could be related to reduced blood flow to the heart, including chest discomfort or unusual breathlessness. These symptoms have many possible causes, so the result is considered alongside your history, examination and other tests.

It may be ordered to:

The test is not normally used as a general screening test for everyone without symptoms or risk factors.

- Look for evidence of coronary artery disease
- Assess known coronary artery disease or previous treatment
- Investigate symptoms when a resting ECG is unclear
- Check how heart valves behave during exertion
- Assess exercise capacity and heart pumping
- Help estimate heart-related risk before selected operations
- Clarify an uncertain result from another heart test

Who should have the test

A stress echo may be suitable if information about your heart under workload would change your care. Exercise stress is often preferred when you can exercise safely and reach an adequate workload.

Medicine-induced stress may be considered if arthritis, lung disease, weakness, balance problems or another condition prevents sufficient exercise. The team will review whether the medicine is appropriate for you.

Tell the testing service beforehand if you are pregnant or may be pregnant, have severe valve disease, have had a recent serious heart problem, or have an implanted heart device. Also report wheezing, significant rhythm problems and all medicines you take.

New or worsening chest pain at rest, severe shortness of breath, fainting or other acute symptoms need prompt assessment. Do not wait for a routine outpatient stress test if you have been advised to seek urgent care.

How to prepare

Follow the instructions from your testing service because exercise and medicine-induced protocols differ.

You may be asked not to eat for several hours beforehand, particularly for a dobutamine stress echo. Small amounts of water may be allowed. If you have diabetes, ask for specific instructions about fasting and diabetes medicines.

Wear comfortable clothing and shoes if you will exercise. Avoid applying creams or oils to your chest because they can stop ECG stickers from attaching properly.

Provide a current list of medicines. Beta blockers and some other heart medicines can prevent your heart rate from rising enough. You may be told to pause them, but do not stop any prescribed medicine unless the testing service specifically instructs you to do so.

Ask about caffeine, nicotine and strenuous exercise. Local instructions differ according to the stress method and your health.

What happens during the test

Small sticky patches called electrodes are placed on your chest to record an ECG. A blood pressure cuff is fitted, and a baseline echocardiogram is taken while you lie on an examination couch.

For an exercise stress echo, you walk on a treadmill or pedal a bicycle. The workload increases in stages. Your heart rhythm, blood pressure and symptoms are monitored. Images are taken during exercise or immediately afterwards, while your heart is still working hard.

For a medicine-induced test, a small tube called a cannula is placed in a vein. Dobutamine is given in increasing amounts while ultrasound images are recorded. Another medicine may occasionally be used to raise the heart rate further.

An ultrasound contrast agent may be injected if the heart borders are difficult to see. This is not the iodine-containing contrast used for many CT scans.

Tell the team immediately if you develop chest discomfort, marked breathlessness, dizziness or another concerning symptom. The test can be stopped when enough information has been collected or if continuing would be unsafe.

You will be monitored during recovery until your heart rate and blood pressure are settling.

Understanding your results

A normal result means the visible heart muscle continued to contract as expected under the

level of stress achieved. This makes a major blood-flow problem less likely, but it does not exclude every form of coronary disease.

An abnormal result may show that part of the heart moves less well during stress. This can suggest reduced blood supply. Reduced movement that is present both at rest and during stress may reflect previous heart muscle damage or another heart condition.

Valve results may describe changes in pressure, leakage or narrowing during exercise. Pumping function and exercise capacity may also be reported.

An inconclusive result means the test could not answer the question reliably. This may happen if your heart rate did not rise enough, you had to stop exercising early, or the images were unclear.

There is no single normal range for the whole test. Interpretation varies with the laboratory, stress method, age, sex, pregnancy status, medicines, previous heart conditions and the clinical reason for testing.

What affects the results

A stress echo can be misleading even when the equipment and laboratory have worked correctly.

Not reaching enough stress is a major issue. Pain, fatigue, breathlessness or beta blockers like metoprolol or propranolol may keep the heart rate and workload too low to reveal a problem.

Image quality can be reduced by body shape, lung disease, movement or difficulty positioning the ultrasound probe. Contrast can sometimes improve the view.

Other influences include:

Kidney function usually affects stress echo less than tests using iodine contrast. However, kidney disease can change overall heart risk and may influence interpretation. A recent blood transfusion generally does not directly alter the images.

- Previous heart attack or heart surgery
- Cardiomyopathy, meaning disease of the heart muscle
- High blood pressure during the test
- Paced rhythms or left bundle branch block
- Heart rhythm changes during stress
- Medicines that affect heart rate, blood pressure or contraction

- Recent strenuous exercise that changes your resting heart rate or fatigue
- Pregnancy-related changes in heart rate and blood flow

Accuracy and limitations

Stress echocardiography is useful but not perfect. In typical research populations, it identifies roughly 8 in 10 people with an important coronary narrowing and correctly gives a negative result to about 8 to 9 in 10 people without one. Performance differs by stress method, image quality, disease pattern and the population being tested.

The test may miss a problem if stress was inadequate, the affected area is small, or reduced blood flow is balanced across several arteries. Disease in the smaller heart vessels may also be present without the usual wall-motion changes.

A result can appear abnormal when there is no major artery narrowing. Possible reasons include a strong blood pressure response, cardiomyopathy, electrical conduction changes or difficulty interpreting the images.

Stress echo mainly shows the effect of blood supply on heart function. It does not directly produce pictures of the coronary arteries. Coronary CT angiography may be better when detailed artery anatomy is needed. Nuclear or cardiac MRI stress imaging may be considered when ultrasound images are poor. Invasive coronary angiography may be needed when concern remains high or treatment during the same procedure may be appropriate.

Risks and complications

Exercise can cause tiredness, breathlessness, dizziness, chest discomfort or changes in heart rhythm. Serious complications, such as a sustained dangerous rhythm or heart attack, are rare, and trained staff monitor you throughout.

Dobutamine commonly causes a noticeable heartbeat, flushing, headache, nausea or trembling. It can also change blood pressure or trigger an abnormal rhythm. The infusion can be stopped, and another medicine may be given to reverse its effects if needed.

An intravenous cannula may cause brief discomfort, bruising or light-headedness. Reactions to ultrasound contrast are uncommon but can occur.

What happens next

You may receive an initial explanation before leaving, or a specialist may review the images first. A report is then sent to the clinician who requested the test.

A normal result may lead to routine follow-up or investigation of another cause for your symptoms. An abnormal or inconclusive result may lead to medicine changes, another imaging test or coronary angiography. The next step depends on your symptoms, overall risk and the specific finding.

Mild fatigue or tenderness from the cannula can usually be monitored at home. Seek emergency help for severe or persistent chest pain, fainting, severe breathing difficulty or other rapidly worsening symptoms after leaving the testing service.

Common questions

Can I drink coffee before a stress echo?

Follow your appointment instructions. Some services allow coffee before exercise testing, while others restrict caffeine because it can affect heart rate or a backup stress-testing method.

Does the time of day matter?

Usually not. The appointment time mainly affects fasting, diabetes medicines and your usual medication schedule.

Can I exercise beforehand?

Avoid unusually strenuous exercise unless your testing service says otherwise. It may leave you fatigued, change your resting heart rate or make it harder to complete the test.

Should I take my usual medicines?

Take them unless you receive different instructions. Beta blockers and certain other medicines may need to be paused, but stopping them without advice can be unsafe.

Can I drive home afterwards?

Most people can drive after an uncomplicated exercise test. Policies after dobutamine vary, so ask whether you need someone to take you home.

Will I be exposed to radiation?

No. Echocardiography uses ultrasound rather than ionising radiation.

Sources

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