TEST

Electrocardiogram

An electrocardiogram records the heart's electrical signals through electrodes placed on the skin.

WHAT IT MEASURES
The heart's electrical activity, rate, and rhythm

SAMPLE
None; skin electrodes record electrical signals

FASTING NEEDED?
No

HOW LONG IT TAKES
Usually 5 to 10 minutes

RESULTS IN
Usually immediately; reporting time varies by laboratory or service

USED FOR
Diagnosis and monitoring

MAIN LIMITATION
Brief or occasional heart problems may not appear

Overview

An electrocardiogram records the electrical signals that make your heart beat. It is often shortened to ECG or EKG.

Small sticky patches called electrodes are placed on your chest and limbs and connected by wires to the ECG machine. The machine detects electrical signals from different directions and displays them as lines.

A standard resting ECG provides a short snapshot. It can show your heart rate, whether the rhythm is regular, and how electrical signals travel through the heart.

An ECG does not send electricity into your body. It also does not show the heart's structure as directly as an echocardiogram, which uses ultrasound.

Why the test is ordered

An ECG may help investigate palpitations, dizziness, fainting, breathlessness, or chest

discomfort. Palpitations can feel like pounding, fluttering, or skipped beats.

The test may identify:

An ECG may also monitor an established heart condition or be performed before some operations. Whether it is needed depends on your health, symptoms, and the planned procedure.

- A fast, slow, or irregular heart rhythm
- Delayed or blocked electrical signals
- Patterns associated with reduced blood flow or heart muscle damage
- Changes linked to enlarged or thickened parts of the heart
- Effects of some medicines or abnormal mineral levels
- How a pacemaker or other implanted heart device is working

Who should have the test

You may be offered an ECG if you have possible heart symptoms, an irregular pulse, or a known condition that needs monitoring. It may also be used before or during treatment with medicines that affect heart rhythm or electrical conduction.

A routine ECG is not useful for everyone without symptoms. It can detect harmless differences that lead to unnecessary testing. The decision should consider your medical history, examination, risk factors, and reason for testing.

How to prepare

You can usually eat and drink normally. Take regular medicines as instructed unless you have been told otherwise.

Wear clothing that makes it easy to uncover your chest, lower arms, and lower legs. You may need to remove necklaces or other items that interfere with the electrodes.

Do not apply oily lotion, cream, or body oil to your chest shortly before the appointment because the patches may not stick properly.

Arrive with enough time to rest. Exercise, rushing, stress, and cold temperatures can temporarily increase your heart rate or cause movement that affects the tracing.

Tell staff if you have skin allergies, dressings, a pacemaker, or another implanted heart device. Exercise ECGs require different preparation, so follow the instructions provided for that test.

What happens during the test

You will usually lie flat or slightly raised on an examination couch and uncover your chest. A gown or covering may be provided.

Electrodes are attached to specific places on your chest, arms, and legs. Small areas of chest hair may be clipped, and the skin may be cleaned or gently rubbed to help the patches stick.

You will be asked to keep still, breathe normally, and avoid talking while the recording is taken. Movement and tense muscles can interfere with the signal.

The recording takes only seconds, but placing and removing the electrodes takes longer. The appointment commonly lasts 5 to 10 minutes. You can usually return to normal activities immediately afterward.

Understanding your results

An ECG report includes measurements and wave patterns. Interpretation considers the complete tracing rather than one number.

The report may describe:

Some machines produce an automatic interpretation. This is a computer-generated suggestion, not a diagnosis. A trained healthcare professional should review the tracing because automated reports can mislabel normal patterns or miss important context.

Results vary with age, sex, pregnancy, medicines, body build, and other conditions. An abnormal result does not always mean you have heart disease.

- Heart rate: How many times the heart beats each minute
- Rhythm: Whether beats begin in the expected area and occur regularly
- Conduction: How quickly electrical signals move through the heart
- Wave patterns: The direction and timing of electrical activity
- ST and T-wave changes: Patterns interpreted alongside symptoms and other tests

What affects the results

Incorrect electrode placement can change the recording and sometimes imitate a heart abnormality. Loose patches, body hair, oily skin, or poor contact may reduce signal quality.

Movement, shivering, talking, hiccups, and tense muscles can create recording disturbances

called artefact.

Recent exercise, pain, anxiety, fever, caffeine, nicotine, dehydration, and some medicines may temporarily affect heart rate or rhythm. Changes in potassium, calcium, or magnesium can also alter the ECG.

Age, pregnancy, body shape, heart position, pacemakers, and other implanted devices may produce recognizable differences. Most importantly, a resting ECG records only a brief period, so an intermittent rhythm problem may not occur during the test.

Accuracy and limitations

An ECG accurately shows electrical activity present during a clear recording. There is no single measure of accuracy because it depends on the condition, whether it occurs during the test, electrode placement, tracing quality, and interpretation.

A normal ECG can miss occasional rhythm problems or conditions that do not cause electrical changes at rest. It cannot rule out every cause of chest pain, fainting, or breathlessness. Normal variation, movement, misplaced electrodes, medicines, or automated interpretation can also suggest a problem when none is present.

A portable monitor may be more useful for occasional symptoms. A Holter monitor records continuously for one or more days, while an event monitor may be worn longer. Exercise testing may help when symptoms occur with activity. An echocardiogram is better for examining the heart's chambers, valves, and pumping action.

Risks and complications

A resting ECG is painless and does not involve radiation or electric shocks. Removing the electrodes may briefly pull the skin or hair. Mild redness can develop where the patches were attached.

What happens next

A clinician may discuss the result immediately, or the tracing may be reviewed later. Timing depends on where and why the test was performed.

If symptoms continue despite a reassuring ECG, follow-up may include another ECG, blood tests, an ambulatory monitor, an echocardiogram, or other testing. An abnormal result may be

compared with an older tracing because some patterns are normal for a particular person.

Do not rely on a previously normal ECG if you develop new or severe symptoms. Seek emergency help for ongoing chest pressure or pain, severe breathing difficulty, fainting with poor recovery, or symptoms with sweating, marked weakness, or pain spreading to the arm, jaw, back, or neck.

Common questions

Can I drink coffee before an ECG?

Usually, yes. However, caffeine can increase your heart rate or trigger palpitations. Avoid unusually large amounts and follow the testing service's instructions.

Do I need to fast?

No fasting is normally needed for a resting ECG. Exercise testing or another procedure at the same appointment may have separate instructions.

Does the time of day matter?

Usually not. Timing may matter if symptoms follow a pattern or the ECG is monitoring the effects of a medicine.

Can I exercise beforehand?

Light activity is generally acceptable. Hard exercise can temporarily change the tracing, so allow time to rest unless the test specifically involves exercise.

Can I keep my bra on?

Electrodes must be placed at precise points across the chest. You may be asked to remove or adjust your bra. A gown or covering should be available.

Will an ECG show a heart attack?

It can show patterns associated with reduced blood flow or heart muscle damage, but one normal ECG does not rule out a heart attack. Symptoms, examination, repeat ECGs, and blood tests such as troponin may also be needed.

Sources

- NHS: Electrocardiogram
- MedlinePlus Medical Test: Electrocardiogram



- National Institute for Health and Care Excellence: Atrial fibrillation-diagnosis and management, NG196
- US Preventive Services Task Force: Screening for Cardiovascular Disease Risk With Electrocardiography
- Kligfield P, Gettes LS, Bailey JJ, et al. Recommendations for the Standardization and Interpretation of the Electrocardiogram. Circulation. 2007