Exercise Tolerance Testing

An exercise tolerance test (ETT) - also known as an exercise electrocardiogram (ECG) - can help to assess the severity of coronary heart disease. In this condition there is narrowing of the blood vessels supplying the heart.

Note: the information below is a general guide only. The arrangements, and the way tests are performed, may vary between different hospitals. Always follow the instructions given by your doctor or local hospital.

What is an electrocardiogram?

An electrocardiogram (ECG) records the electrical activity of the heart. The heart produces tiny electrical impulses which spread through the heart muscle to make the heart contract. These impulses can be detected by the ECG machine. The machine amplifies the electrical impulses that occur at each heartbeat and records them on to a paper or computer.

An ECG recording is painless and harmless. (The ECG machine records electrical impulses coming from your body - it does not put any electricity into your body.)

Examples of ECG patterns in different heart conditions can be found at the ECG Library.

What is an exercise tolerance test?

An exercise tolerance test (ETT) records the electrical activity of your heart whilst you exercise. It is most useful in patients who experience chest pain when they exert themselves. It is also used to detect whether rhythm abnormalities can be brought on by exercise.

Some decades ago this was the routine test of choice to investigate a patient for the presence of narrowing of the arteries to the heart. Nowadays it is common for scans of the heart to be done rather than an ETT. The scans that can be done for the heart include:

- A cardiac magnetic resonance imaging (MRI) scan of the heart.
- A computerised tomography (CT) coronary scan - also called CT coronary angiography.
- A myocardial perfusion scan.

How is an exercise tolerance test done?

Small electrodes are stuck on to your chest. Wires from the electrodes are connected to the ECG machine. You will then be asked to exercise on a treadmill or on an exercise bike. The exercise starts at a very easy pace, and is gradually made more strenuous by increasing the speed and incline of the treadmill, or by putting some resistance on the bike wheel.

Whilst you exercise, ECG tracings are made and you will also have your blood pressure measured from time to time. The test lasts about 15-20 minutes.
Why is an exercise tolerance test done?

The ETT can be used to investigate coronary heart disease (sometimes called coronary artery disease). This disease is due to narrowing of the coronary arteries. It can cause chest pains (angina) and other problems. So, if you develop chest pains you may be advised to have an ETT to help clarify the cause. However, different investigations (eg, coronary angiography or myocardial perfusion scintigraphy) are now preferred to diagnose whether you have coronary heart disease.

Many people with coronary heart disease have a normal ECG at rest. During exercise the heart beats faster and needs more oxygen. If one or more of your coronary arteries are narrowed, part or parts of the heart muscle do not get enough oxygen. This can cause the ECG tracing to become abnormal when you exercise. Therefore, if you have a positive ETT (an abnormal reading) you are likely to have coronary heart disease.

If you already have coronary heart disease, the degree of abnormality on the ECG tracing from the ETT can give a good idea of the severity of the disease.

Will I cope with the exercise required?

Most people manage to do the exercise tolerance test (ETT). It can be hard work, but the level of exercise chosen aims to match your normal capabilities. At any stage you can tell the person doing the test if you feel it is too difficult, and the test will stop. The test will also be stopped if you develop unpleasant pains or if you become very tired, or very short of breath.

What should I do to prepare for the test?

You should not have a heavy meal within one hour of the test. Otherwise, there is no special preparation needed. For the test, wear loose-fitting clothes and shoes that are comfortable to walk in. Continue to take your usual medication unless advised otherwise by a doctor.

Limitations of the exercise tolerance test

An ETT is a valuable investigation but it is not 100% accurate. Sometimes tracings show changes during exercise, even though the person has a completely normal heart. Also, some people with coronary heart disease have a normal ETT with no changes on the tracing. Doctors are aware of this and use the results of the test in conjunction with other information such as your symptoms, results of other tests, etc.

Are there any risks when doing an exercise tolerance test?

An ETT is done without any problems in the vast majority of cases. If you do not have coronary heart disease then complications are rare. However, serious complications occur in a small number of people who have coronary heart disease. The risk is to develop a heart attack (myocardial infarction) or a serious heart irregularity (an arrhythmia) during the test. Medical help is near to hand to deal with possible problems. However, there are reports of, very rarely, some people who have died during an ETT.

You have to weigh up the pros and cons before deciding on having this test. The test can give very valuable information about your condition, but with a small risk of serious problems developing.

Further reading & references

- Chest pain of recent onset; NICE Clinical Guideline (March 2010, updated Nov 2016)

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Author: Dr Gurvinder Rull
Peer Reviewer: Dr Adrian Bonsall
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