

# Liver disease tests explained



**BRITISH  
LIVER  
TRUST**

*Pioneering Liver Health*

# Liver disease tests explained

The British Liver Trust works to:

- support people with, and affected by, liver disease
- improve knowledge and understanding of the liver and related health issues
- encourage and fund research into new treatments
- campaign for greater awareness around liver disease, leading to swifter diagnosis and treatment.

All our publications are reviewed by medical specialists and people living with liver disease. Our website provides information and our Helpline gives advice and support on enquiries about liver health. Call the Helpline on **0800 652 7330**, general enquires on **01425 481320**, or visit **[britishlivertrust.org.uk](http://britishlivertrust.org.uk)**

For the latest updates to this information, please refer to our website **[britishlivertrust.org.uk](http://britishlivertrust.org.uk)**

**This publication explains the different tests you may have and how they are used in the diagnosis and treatment of liver disease.**

## Contents

<b>3</b>	The liver
<b>4</b>	How liver disease develops
<b>6</b>	Liver disease tests
<b>7</b>	Liver blood tests
<b>10</b>	Liver blood tests FAQ
<b>12</b>	Blood clotting tests
<b>13</b>	Other types of liver disease tests
<b>14</b>	Immunology/autoimmune profile tests
<b>15</b>	Imaging tests
<b>22</b>	Other diagnostic procedures
<b>23</b>	Endoscopic procedures
<b>26</b>	Emergency procedures
<b>27</b>	Keeping up to date with your tests
<b>28</b>	Useful words
<b>30</b>	Useful websites
<b>30</b>	Further information

# The liver

Your liver is your body's 'factory', carrying out hundreds of jobs that are vital to life. It is very tough and able to continue to function when most of it is damaged. It can also repair itself, even renewing large sections.

Your liver has around 500 different functions.

Importantly it:

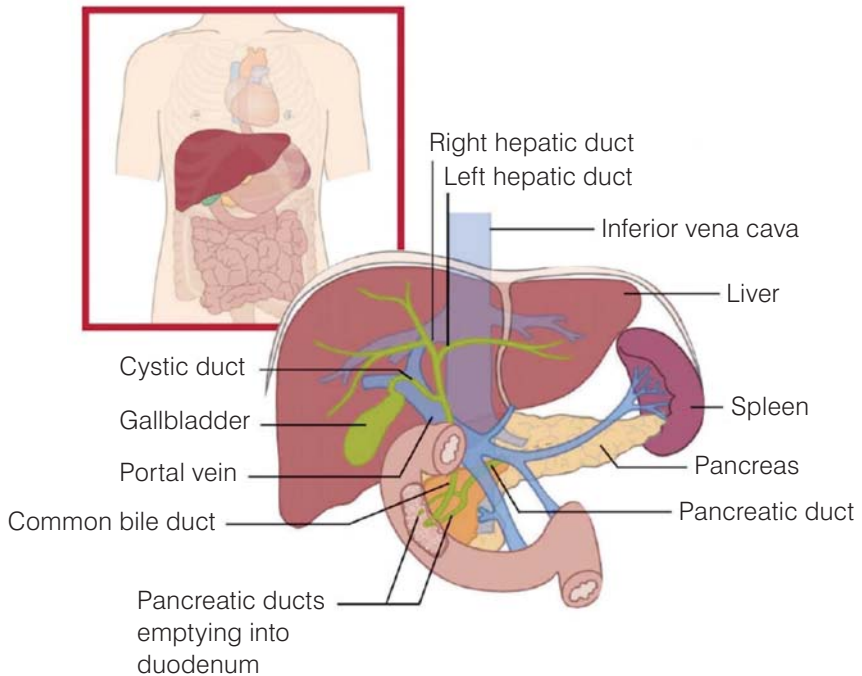
- **fights infections and disease**
- **destroys and deals with poisons and drugs**
- **filters and cleans the blood**
- **controls levels of cholesterol**
- **produces and maintains the balance of hormones**
- **produces enzymes and other proteins**
- **is responsible for many chemical reactions in the body, such as blood clotting and tissue repair**
- **processes food once it has been digested**
- **produces bile to help break down food in the gut**
- **stores energy that can be used rapidly when the body needs it most**
- **stores sugars, vitamins and minerals, including iron**
- **repairs damage and renews itself.**

# How liver disease develops

Your liver responds to harm by becoming inflamed. Any inflammation of the liver is known as hepatitis, whatever its cause. Sudden inflammation of the liver is known as acute hepatitis. When inflammation of the liver lasts longer than six months, it is known as chronic hepatitis.

Inflammation is part of the process of repairing damaged tissue. In a similar way to a scab forming over a skin wound, a temporary fibrous 'scaffold' forms while new liver cells regenerate. If your liver is repeatedly harmed, new liver cells cannot regenerate fast enough and the fibrous scaffold remains as a scar. This is called fibrosis, and can take a variable amount of time to develop.

When fibrosis is present, your liver may be able to keep functioning quite well. Removing or treating the cause of the inflammation may reverse some, or all, of the fibrosis and prevent further liver damage.

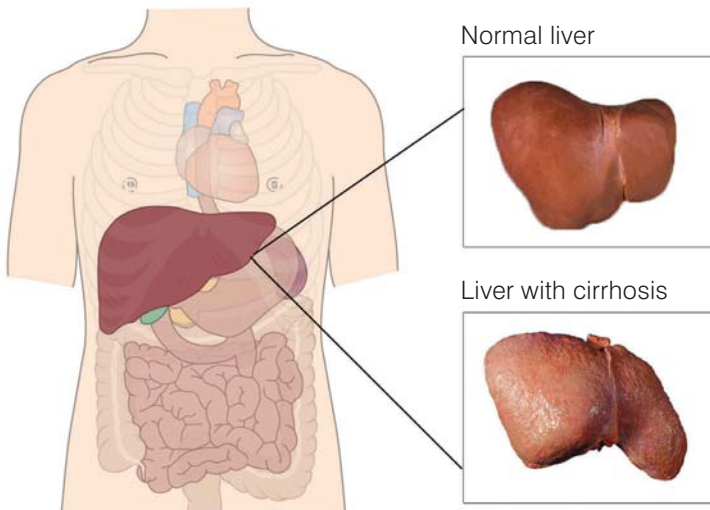


Source: British Liver Trust

If the harm to your liver continues, the inflammation and fibrosis can spread throughout your liver, changing its shape and affecting how well your liver cells work. This is known as **compensated** cirrhosis. Even at this stage, people can have no obvious signs or symptoms.

The scar tissue in cirrhosis interrupts the blood flow through the liver. As a result, the blood pressure in the veins in your abdomen is increased and may result in bleeding. Scar tissue in cirrhosis is difficult to remove and may be permanent. However, further progression can be halted and your cirrhosis stabilised, if the cause of the liver damage is removed.

Cirrhosis increases your risk of liver cancer and can lead to liver failure. If damage to your liver continues, it will become unable to function sufficiently (**decompensated** cirrhosis) and start to fail; this is sometimes referred to as 'end-stage liver disease'. At this stage chemicals and waste products can build up in the body, commonly causing jaundice, ascites (a build-up of fluid in the abdomen) and hepatic encephalopathy (confusion and memory loss). In the final stages of liver disease the build-up of waste products may lead to multiple organ failure and loss of life.



Source: British Liver Trust

# Liver disease tests

There are over 100 types of liver disease, which affect around two million people in the UK. The actual figure may be much higher, as many cases of liver disease go undiagnosed.

The liver is extremely good at repairing itself and can often function well despite being damaged. This means there are often no symptoms during the early stages of liver disease. However, if your GP suspects you have a liver problem you will be asked to take a number of tests which will provide detailed information about your overall health and in particular, the health of your liver.

To help you understand this information and manage your condition, this leaflet looks at the different tests you may have and explains how they are used in the diagnosis and treatment of liver disease. It describes the various health professionals that you will come into contact with and what kind of information you can expect from them, with explanations of some of the medical terms used most frequently by hospital staff about the tests themselves.

To help get an accurate diagnosis, your GP may first suggest a routine blood test that looks at how well your kidneys and liver are working, as well as your haemoglobin levels (to see how much oxygen is being transported around the body by your red blood cells) and white cell count (to check how well your immune system is working). This helps to give a better idea of your general physical health. The results of these blood tests may take a week or two.

If liver disease is suspected, more specific blood samples may be taken to identify the cause of the liver damage. This can include testing for viruses and particular antibodies that may indicate your body is fighting disease. Sometimes tests may also be requested to check for genetic or hereditary conditions that can be passed down the family line. These may include tests to see whether 'markers' that might indicate fibrosis are present in the blood – one test you might hear talked about is a 'serum ELF test' (ELF stands for enhanced liver fibrosis).

## TESTING FOR VIRAL HEPATITIS

**Please note that this publication DOES NOT cover testing for viral hepatitis. For more information on viral hepatitis, hepatitis A, B, C, D and E, visit our website to download the 'Testing for viral hepatitis' fact sheet.**

## Liver blood tests (previously called liver function tests or LFTs)

What doctors call a 'panel' of blood tests, taken specially to assess the health of the liver, actually consists of several different tests (done from the same blood sample). These look at the function of the liver and whether there is any injury or inflammation inside the liver. Until recently, liver blood tests were more commonly referred to as liver function tests, or LFTs. As most patients with abnormal liver blood tests actually have normal function of the liver, this term was felt to be unhelpful and often led to unnecessary concern.

Therefore the term liver function tests, or LFTs, has been replaced by liver blood tests. **This is a very important change, and the medical profession is working hard to ensure the new term is widely accepted and used.**

Calling these tests liver blood tests is a more accurate way of describing what the test actually does and uses less frightening language.



## What happens when I have a liver blood test?

When you have a liver blood test, a syringe with a fine needle is used to remove a small amount of blood from a vein in your arm. You should only feel a tiny pinprick as this is done. The sample can be taken by your GP or a nurse at your local clinic, or by hospital staff (a person who is specially trained to take blood is called a phlebotomist). It will then be sent to a laboratory to be tested.

## What is a liver blood test looking for?

A liver blood test looks at the chemicals (enzymes), proteins and other substances made by the liver to assess whether levels of any of these are abnormal. The main ones are:

### **Alanine aminotransferase (ALT) and aspartate aminotransferase (AST)**

ALT and AST are enzymes found in the liver cells (hepatocytes) which leak into the blood stream when the liver cells are damaged. They indicate the degree of inflammation present in the liver. Levels of ALT and AST are usually high in conditions such as hepatitis – possibly twenty to fifty times higher than normal. **The ALT 'value', or level, is more specific to the liver than the AST value because the AST value may also be high if there is muscle damage elsewhere in the body.** Monitoring levels of these enzymes can help doctors assess how much liver scarring (fibrosis) there is in conditions such as non-alcohol related fatty liver disease (NAFLD) and alcohol-related liver disease.

### **Alkaline phosphatase (ALP) and $\gamma$ -Glutamyltransferase (GGT)**

These are enzymes found mainly in the bile ducts of the liver. Increases in ALP and another liver enzyme called  $\gamma$ -Glutamyltransferase (GGT) can indicate obstructive or cholestatic liver disease, where the flow of bile from the liver is blocked because of an obstruction of the bile duct.

GGT levels are also a potential indicator of how much alcohol a patient drinks and can also be higher in those with non-alcohol related fatty liver disease (NAFLD).



## **Bilirubin**

Bilirubin is produced when red blood cells break down, and is the main pigment in bile (a yellow/green substance made by your liver that aids digestion). An increase of bilirubin causes jaundice, characterised by a yellowing of the eyes and skin in liver disease.

## **Albumin**

This is a protein made by the liver that makes up about 60 per cent of total protein in the blood, helping to maintain tissue growth and repair. It stops fluids from leaking out of blood vessels and carries nutrients and hormones around the body. Albumin levels may decrease if the liver is damaged.

The levels of each of these will be given in numbers and values. The laboratory where the blood is being tested provides a 'normal value' or 'reference value' against which your test results are measured. This is a broad range into which people without liver disease will fall. An abnormal liver blood test result is defined as being below or above the normal range.

It's important that you talk to your doctor or specialist nurse about what your test results mean, rather than compare results with other people undergoing diagnosis (via online forums, for example). Test results depend on the overall health of the individual, and each testing laboratory will produce a set of slightly different results, which is why it's important your doctor explains them to you.

Different diseases of the liver will cause different types of damage and will affect liver blood tests accordingly.

Further investigation should be considered if any of your results are found to be outside of the normal range. A liver blood test helps give an indication of how much your liver is inflamed, damaged or changed in its ability to work properly. It's important to remember that liver blood tests can help to indicate which disease a patient may have but they can't give an actual diagnosis.

## Liver blood tests FAQ

### **Q. *If I have concerns about my liver what initial tests should I request?***

**A.** The first thing to do is discuss with your GP why you have concerns – are you worried about past or present lifestyle risk factors, such as drinking too much alcohol, being overweight or a risk of viral hepatitis? Do you have a family history of liver disease or symptoms you're worried about? If your GP thinks it's appropriate, they will perform a panel of routine liver blood tests (see page 7) and relevant care or treatment can be discussed from there. If there is an additional family history for a condition such as haemochromatosis, in which the body stores too much iron, your doctor will organise additional specialist tests.

### **Q. *If I receive 'abnormal' blood test results, what should happen next?***

**A.** Abnormal liver blood test results are relatively common and most people with these results have normal liver function. An infection or a reaction to medication might affect your blood test results and sometimes a repeat liver blood test is all that's needed. However, any abnormality does need to be investigated to find out what the cause is.

Scans may be performed to help understand the cause of the abnormality and also to assess how significant any damage is. These may include imaging scans such as ultrasound, elastography scans such as FibroScan, CT or MRI scans (see pages 15–18), which help doctors get a better picture of the extent of any damage to the liver. In certain cases a liver biopsy (where a tiny piece of tissue is taken from the liver for examination) may be considered to specifically diagnose a condition or provide information on the extent of scarring inside the liver – see page 19 for a detailed explanation. If you are very unwell, you may be referred or admitted to hospital, although this is unusual – only a very small number of people with abnormal liver blood tests require admission.

### **Q. *How do I work out what my liver blood test results mean?***

**A.** Your doctor will explain your test results to you. If they are abnormal, your doctor will also explain the most likely cause, and how severely affected your liver may be.

### **Q. *I've heard doctors talk about a 'standard liver screen'. What tests are involved in this?***

**A.** When a patient has been found to have an abnormal liver blood test, the next step is to establish the cause. This requires a second panel (set) of blood tests that look for potential causes such as viruses, problems with the immune system and rarer inherited conditions.

**Q. *If I am found to have non-alcohol related fatty liver disease (NAFLD), what tests should I have next?***

**A.** NAFLD is very common and 30-40% of the population have it.<sup>1</sup> If you have NAFLD, the next step is to investigate the extent of the condition and if the liver is scarred or damaged. The level of scarring can be assessed using specialist scans or blood tests (see pages 7 and 15) and your doctor can explain these to you. If these tests are not able to assess any damage accurately, a liver biopsy may be considered to provide more detailed information.

**Q. *What can I do about my NAFLD?***

**A.** Because NAFLD is commonly associated with being overweight, there is evidence to suggest that losing weight through diet and exercise helps reduce the amount of fat in the liver and damage done to it.<sup>2</sup>

**Q. *How do I know if I'm drinking too much alcohol and it's affecting my liver?***

**A.** The Government advises that both men and women should not regularly drink more than 14 units in a week.<sup>3</sup> It is also important to have 2-3 consecutive days off drinking a week to allow your liver to recover.<sup>4</sup> However, the National Institute for Clinical Excellence (NICE) guidelines recommend that if you drink alcohol in a harmful way, defined as more than 50 units of alcohol per week for men (around 15 pints of beer) and 35 units for women (about 3.5 bottles of wine), and have done so for several months, you should have a non-invasive test for cirrhosis.<sup>5</sup> See the section on transient elastography, page 16.

**Q. *Should I see a specialist if I have abnormal liver blood tests?***

**A.** Not necessarily. If your results are abnormal your GP can advise you on the next steps to determine the cause and assess how serious the problem and any associated damage is.

**Q. *If I am found to have evidence of advanced liver disease what should my doctors be doing next?***

**A.** You need to see specialists at this point, which your doctor will arrange. A specialist team will then do more tests to get a better idea of what's wrong with your liver, and how best to treat it.

# Blood clotting tests

## Why would I have these?

The liver produces proteins that help your blood to clot. If your liver isn't working well, your blood won't clot as efficiently. It is therefore a standard test when assessing liver function.

A 'clotting profile' is made to assess your risk of bleeding, and if your risk for bleeding is very high, a planned procedure/surgery may be postponed until a later date.

Below are some specific terms you might hear when doctors talk about assessing your clotting level.

*These include:*

### **Prothrombin time (PT)**

This is the time it takes for your blood to clot. You'll be required to give a blood sample, and from this, the time taken for your blood to clot will be measured against 'normal' clotting ability range. The prothrombin time will take longer if you are deficient in vitamin K.

### **International normalised ratio (INR)**

As the chemicals used to perform the PT test may vary between laboratories, the INR is a calculation doctors use to allow for any differences found when results from different laboratories are compared. This is important because levels of certain medications, such as warfarin, will be prescribed based on the results of the PT test.

### **Activated partial thromboplastin time ratio (APTR)**

APTR is the time taken for thromboplastin to convert into thrombin, an enzyme which causes clotting by turning fibrinogen into fibrin (see below).

### **Fibrinogen**

This is another substance in the blood that helps clotting by producing fibrin strands. Platelets stick to the fibrin strands to form a plug that prevents bleeding.

The presence of drugs and toxins in your body can also affect the clotting ability of the liver. This may be the case if you are receiving medication such as aspirin, clopidogrel or warfarin.

## Other types of liver disease tests

### **Full blood count (FBC)**

#### **What is this test and why would I have it?**

The full blood count measures levels of the different types of cells in the blood: red blood cells (RBC), white blood cells (WBC) and platelets. Abnormalities in any of these types of cells can indicate a medical condition that needs further investigation.

If there is a rise in the number of white blood cells, it can indicate an infection. The white cell count can further be broken down into different subtypes. This is called a differential count. Types of cells looked at here are neutrophils, lymphocytes, basophils and eosinophils.

These types of white blood cells help your immune system (your body's defence) to fight off infections.

Sometimes, the numbers of red blood cells and levels of haemoglobin (the protein molecule in the blood that carries oxygen around the body) are too low. A low red blood cell count is referred to as anaemia and is a common reason someone might feel tired all the time.

Liver disease may be suspected when your platelets are low. Platelets are cell fragments that play an important part in clotting by plugging or covering a broken blood vessel.

Many different conditions can result in increases or decreases in particular cells. This test is just one which will help your doctors diagnose your condition.

## Immunology/autoimmune profile tests

As part of the second round of tests to establish the cause for abnormal liver blood test results, your doctor will look for liver damage caused by your immune system.

*These include:*

### **AMA (anti-mitochondrial antibody)**

This test is used when doctors are looking for evidence of primary biliary cholangitis (PBC), a condition in which the bile ducts become damaged, causing bile and harmful toxins to build up in the liver. This is because anti-mitochondrial antibodies are found in more than 90% of patients with this disease.

### **SMA (smooth muscle antibody)**

This is a test used to detect autoimmune diseases such as autoimmune hepatitis (AIH), which is inflammation of the liver that occurs when the immune system attacks your liver cells. A liver biopsy is usually necessary to confirm the diagnosis and stage of the disease.

### **LKM (liver/kidney/microsomal antibody)**

This test can be positive in another type of autoimmune hepatitis.

## Imaging tests

Imaging tests allow doctors to take detailed still and moving images of your internal organs and tissue. The consultant who will arrange and supervise your test is a radiologist. The medical staff who operate the imaging equipment are called radiographers.

### **Ultrasound**

If you are required to undergo a liver biopsy you may need to have an ultrasound scan first.

Ultrasound is a routine procedure which can provide very useful information. It is usually performed in the X-ray department of the hospital or in an outpatient's clinic, day care department or on a ward. Unlike an X-ray (see 'X-rays' on page 18), ultrasound does not use radioactive waves. The procedure is very safe and should not be painful, and takes around 10 to 15 minutes to complete.

Before the scan you will be asked to uncover the top of the right half of your tummy (below your ribs, which is where your liver is) and lie on your back. Gel will be applied to your skin which may feel slightly cold. A probe shaped like a microphone will be moved across the surface of your skin. The gel helps to make this movement easier and makes sure that sound waves can be directed through your skin as the probe passes over your liver area. Anything solid will bounce back as a reflected sound wave via the probe and will be turned into an image that can be seen on a screen.

Once the procedure is finished and the probe removed, the gel is wiped off your skin. You will then be able to go home or on to an appointment if one is scheduled. If you are a hospital patient you will be advised whether you are to stay or go home.

The ultrasound machine will have recorded the pictures of your liver. A report will be made by the radiologist, who is trained to examine the images. This report may be ready soon after your ultrasound or may take one to two weeks. You should have an appointment arranged to discuss the result with your specialist or medical advisor. Sometimes the specialist will describe the type of picture received from your liver ultrasound as being 'echogenic'. This indicates how clear or 'bright' your liver is on the ultrasound, and it usually means the liver is 'fatty' (where there is a build-up of fat in the liver). The report will provide you and your specialist with information about the surface

and the general shape of your liver, as well as any significant changes from its normal appearance. While ultrasound is able to highlight unexpected changes or anything that is not normal, it cannot show these in detail, although developments in ultrasound technology mean that it is now possible to get clear images regardless of the size or shape of the patient.

If you have any concerns about your liver ultrasound, discuss these with your doctor or specialist nurse. Do this either when they are arranging your appointment or while you are having the ultrasound, to make sure you get the answers you need.

## **Elastography**

There is a technique similar to ultrasound, known as elastography, or transient elastography, which doctors can use to measure the stiffness of the liver. Healthy liver tissue is soft, so if stiffness is detected, fibrosis (scar tissue) may be present. The most common name for this kind of test is FibroScan. Tests such as FibroScan can't diagnose specific liver diseases but they can give doctors an idea of how badly the liver is damaged.

## **Sheer wave elastography (SWE)**

This is a more advanced version of the technique described above, which uses a focused ultrasound wave to give radiologists a clearer picture of how 'elastic' (soft) the liver is. The waves travel slowly through healthy liver tissue and faster through scarred areas.

## **Acoustic radiation force impulse imaging (ARFI)**

This is another imaging technique. It works by 'pushing' the tissues in the body to assess their stiffness – softer, healthy tissue is more easily pushed than stiffer tissue, which may indicate fibrosis.

## **CT scan (computed tomography scan)**

This test uses special X-ray equipment to assess the density (thickness) of tissues within your body. It can obtain pictures, called tomograms, from different angles around the body using computer processing and can show cross sections, or 'slices', of your tissue and organs. This scan is useful for showing several types of tissue very clearly, most commonly the lungs, bones, soft tissues and blood vessels. A CT scan is one of the best tools for studying the chest and abdomen (stomach area), and is particularly useful



in detecting excess fat in the liver (fatty liver). Sometimes CT scans are also used to help guide doctors using needles for biopsies.

To prepare for the test you should wear comfortable clothing. You will be asked to remove all metal objects including hairpins, jewellery and hearing aids, removable dental work and glasses. CT scanning is not painful. An iodine dye, usually given as a fluid to swallow, is used to highlight the gullet (oesophagus), stomach and intestines (small bowel and colon). Alternatively, a dye may be injected into a vein to make your blood vessels and kidneys easier to see and to highlight the appearance of normal and abnormal tissue in organs such as the liver and spleen.

The CT scanner itself is a large ring-shaped machine into which you will be moved backwards and forwards.

This is to allow the scanner to send a number of narrow beams across your body in a circular motion to provide very detailed images of the area under examination.

It is possible for the scan to be completed in around 10 minutes, unless many pictures are required, which may take 20 to 30 minutes. There is a slight exposure to radiation, but for the time this test takes the risk is considered minimal.

The risk of allergic reactions to iodine dye material is rare and radiology departments are well equipped to deal with them should they occur.

## **MRI (magnetic resonance imaging)**

MRI uses a type of tube scanner to provide a more detailed view of your organs than a CT scan. It creates powerful magnetic fields by releasing radio frequency energy to act on water molecules in your body. These emissions are a type of radio signal that can be picked up by the MRI equipment and relayed to a computer that is able to generate very detailed views of tissues within your body. For this reason MRI is a very useful tool for investigating tumours both before and after treatment. A type of MRI scan called Liver MultiScan is sometimes used to accurately measure the amount of fat, fibrosis (scarring) and inflammation present in the liver.

You will be required to remain very still. The scan isn't at all painful, although some people may find being inside the scanner claustrophobic. It can take up to one hour but the majority of scans will take between 20 and 30 minutes.

Preparation and guidelines for the scan are similar to those for the CT scan. Although most people with metal in their bodies will be able to have MRI, people with certain implants may not. Your radiologist will advise.

### **MRE (magnetic resonance elastography)**

This is an MRI-based advanced technology that uses imaging with soundwaves to create a detailed picture of the body, and is particularly good at showing hardening and stiffness of liver tissue. However, it is not commonly used outside specialist or research centres and for that reason is rarely used diagnostically. A small pad is placed on the skin, through which low-frequency vibrations are passed into the liver. A computer measures the speed at which tissues in the liver vibrate – the quicker the vibrations, the more fibrosis is present. MRE can detect fibrosis at an earlier stage than other tests, and give an indication of how severe the fibrosis is. It can also help predict the risk of certain liver complications.

### **MRCP (magnetic resonance cholangiopancreatography)**

MRCP is a test using specialised magnetic resonance imaging (MRI, above) to provide doctors with a picture of your biliary (bile-carrying) and pancreatic ducts. In this scan, the fluid in your biliary ducts appears brighter while the surrounding organs and tissues will appear darker.

The procedure can be used to find out whether gallstones are lodged in any of the ducts surrounding your gallbladder.

The scan is painless and takes about ten minutes unless combined with a normal MRI scan (an extra 20 to 30 minutes) and is normally performed as an outpatient appointment. Again, you will be asked to prepare for this examination in very much the same way as for a CT or MRI scan.

### **X-rays**

An X-ray is a common and painless examination in which invisible radioactive waves are passed through your body to record an image of your internal organs.

A special X-ray that studies the veins and arteries that supply blood to the liver is known as hepatic angiography. This X-ray may be needed if your diagnosis is still doubtful after a CT and MRI scan. The procedure uses a catheter (a thin, flexible tube) that is placed into a blood vessel through a

small cut in your groin. A dye, referred to as a 'contrast dye' or 'contrast medium', is then injected through the catheter to light up the blood vessels to make them easier to see.

A hepatic angiogram is usually done under local anaesthetic and you are also likely to be given sedation. Because of this, you may be asked to stay in hospital overnight (the minimum stay is six hours). The test is usually uncomfortable, rather than painful. You should be able to drive the next day.

## **Liver biopsy**

There are many causes of liver disease and it is sometimes difficult to diagnose a condition based on symptoms and blood tests. Often a liver biopsy is the only way to diagnose your liver disease and identify how advanced it has become.

The first liver biopsy was performed in 1922 and since then it has become a standard procedure. It is considered routine by most specialists, but for a patient about to experience their first liver biopsy it can be an anxious and worrying time. A discussion with your specialist or medical advisor prior to the liver biopsy is useful to help you deal with any unnecessary fears.

A liver biopsy is usually performed in one day and only occasionally requires an overnight stay. Usually you can expect to go home later the same day or in the evening. You must, however, make sure that you receive further information about this when talking to the specialist prior to the procedure.

Your liver biopsy will be performed by a doctor who may be a gastroenterologist, hepatologist or a radiologist. There may also be some difference between individual biopsies other than those described here.

You will need to give your consent (permission) to the medical staff to carry out the biopsy.

A blood sample will be taken to check your blood's ability to clot. This is a routine precaution to ensure the liver biopsy can be performed as safely as possible.

A local anaesthetic is given to you prior to the liver biopsy procedure. This may be above the liver area on the right side of your abdomen and below the ribs, or more likely between the lower ribs on your right side. In some cases a light sedative can be given if you require it, but discuss this with your doctor.

Sometimes the liver biopsy will be done under ultrasound guidance so that the liver can be seen and the biopsy directed by the imaging. You may already have had an ultrasound performed prior to the biopsy.

When the local anaesthetic has started to work (the area will feel numb), you will be asked to lie on your back or on your side, depending on where the doctors decide to insert the biopsy needle. This is a long thin tube that is inserted through your anaesthetised skin. You may be asked to take a few deep breaths before the needle or biopsy device is inserted and to hold your breath. Once the needle is inserted it is withdrawn quickly to remove a very small sample of liver tissue.

The term 'biopsy' actually refers to the sample of tissue taken even though you will hear it being used for the procedure itself.

You will then be asked to lie on your right side so that the weight of your body presses on the wound. This is to make sure the wound clots to aid healing. It also means that you will need to remain in bed on your side or on your back for up to six or eight hours so you are advised to go to the toilet before the liver biopsy. It may be an idea to take a book to read or a personal music player to listen to. While you are lying in this way, your pulse and blood pressure will be regularly checked to detect any potential complications.

There is a very small risk of either internal bleeding or bile leaking from the liver, but this is rare. You may experience pain or discomfort during or after the liver biopsy. Not all people do, but varying degrees of pain are not uncommon. You should be provided with adequate pain relief after your biopsy, but discuss this with your doctor and nursing staff.

Once you have completed the recovery stage after the liver biopsy you can usually go home. You should arrange to have someone to accompany you because you should not drive or travel on your own. If you have received sedation during your biopsy you should not drive for 12 to 24 hours. If you have any worries after your return home, contact the hospital or your GP.

Your liver biopsy sample is sent to a pathologist (a doctor who identifies diseases by studying cells and tissues) who will examine it under a microscope and produce a report. This is usually in the form of a description and a number that is a measure of any inflammation and/or fibrosis seen in the sample. This may take about two weeks, but it could be longer as

services will vary across the country. You will have an appointment to discuss your results with your specialist who will explain the findings and any possible consequences they may have on your health and possible treatment.

Occasionally if the blood clotting is too prolonged or in the presence of ascites (an accumulation of fluid in the abdomen) it may not be possible to perform a liver biopsy by the conventional route. In these circumstances the liver biopsy may have to be performed via a vein in the neck. This is called a transjugular liver biopsy. This procedure is usually limited to specialist centres and details would be discussed with you by your consultant or their team.

Liver biopsy is considered the best way for diagnosing liver disease, but it's important to recognise it's not completely foolproof.

**For further information about these tests talk to your specialist or your medical team.**

## Other diagnostic procedures

### **Pathology or histology**

Pathology is the study of diseased tissues. Histology looks at the detailed structure of cells and tissues under the microscope, and this is what is studied on a biopsy. The histology is helpful in working out the cause of the liver disease and how advanced it is.

### **Percutaneous transhepatic cholangiography (PTC) and biliary drainage**

This is a procedure that allows the radiologist to examine the bile duct system of your liver. The procedure is done under local anaesthetic and will require a short stay in hospital.

‘Percutaneous’ means through the skin. In this case a thin needle is passed through your skin and through the liver into a bile duct. A dye is injected so that the bile duct system becomes outlined on X-ray. This picture will show any narrowing or blockages. If the duct is blocked, a flexible tube is inserted and remains in the duct. This will also allow your bile to be drained into a collection bag. Usually, either at the time of the procedure or within a few days, a small wire-mesh or plastic tube called a stent will be placed across the blockage to allow the drain to be removed.

# Endoscopic procedures

## **Endoscopic retrograde cholangiopancreatography (ERCP)**

Endoscopic procedures are an established and reliable method of investigating the body's internal organs. An endoscope is a long, flexible fibre optic tube with a tiny camera and a light on the end. ERCP is an endoscopic procedure that is valuable in both examining your biliary and pancreatic structures. It can identify problems with the biliary tree, cystic duct obstruction, gallstones, narrowings and tumours. As a treatment, ERCP can use interventions to drain pus as well as dislodge, break down and remove gallstones.

You should get instructions from the hospital where your ERCP has been scheduled. These will provide you with guidelines on any preparations you need to make before the procedure, such as how long beforehand you'll need to stop eating and drinking, and whether it means any possible changes in your medication.

At the beginning of the procedure, the doctor will spray the back of your throat with a local anaesthetic to make it feel numb. Sometimes a local anaesthetic lozenge is used, or you will be given a sedative injection through the drip (venflon) in your hand or arm. This will make you drowsy so that it lessens the discomfort of having a tube passed into your gullet. You will be positioned on your side to follow the curvature of your gut.

The doctor will ask you to swallow the first section of the endoscope. After this the doctor will push it further down your gullet into your stomach and duodenum. The doctor will look at images on a TV monitor which come from the endoscope's camera which is filming the procedure.

Air is also passed into the tube into your gut to make it easier to see the lining of the gut. This may make you feel bloated.

The endoscope is designed with an attachment down which small instruments and tubes can be passed. This has many uses:

Contrast dye can be placed into the bile and pancreatic ducts. X-ray pictures are taken immediately after the dye has been given to show up narrowings (strictures), gallstones or tumours pressing on the ducts.

A small tissue sample (biopsy) from the lining of the gut can be taken to check for abnormal tissue or cells. The sample is used for two types of test, histology and pathology (see page 22).

If the X-rays show a gallstone obstructing the bile duct, the doctor can widen the duct by making a cut to let the stone into the duodenum. This is called a sphincterotomy.

If there is a narrowing in the bile duct the doctor can place a stent to open it up and keep it from collapsing. The stent can remain in place to help to drain away bile into the duodenum.

The endoscope is gently pulled out when the procedure is completed. It takes around 30 minutes to one hour, depending on what is done.

Your aftercare will depend on the findings of the ERCP. You might be booked in for an overnight stay if you have received a stent or had gallstones removed. You should not drive for 24 hours after receiving a sedative. Ask a friend or relative to drive you home from hospital. Also make sure that someone can stay with you for the first 24 hours after discharge from hospital. The hospital will also provide you with information when you are discharged that will help with any problems that might arise after an ERCP procedure.

Endoscopic techniques are also used to treat bleeding varices (small, protruding veins in the stomach and gullet). The most common technique is variceal banding (see below). Occasionally injection sclerotherapy may be performed, which is when a saline solution is injected into a vein, causing the walls of the injected vein to collapse and seal shut. Blood is directed through other, unaffected veins, and eventually the collapsed vein is reabsorbed into the body.

## **Banding**

After you have been sedated (although some people do have this procedure without sedation) a single vein (varix) is sucked into a small chamber attached at the end of the endoscope. A small band is then placed around the base of the varix (ligation).

Like injection sclerotherapy, banding is usually performed as day surgery. The procedure may cause some mild pain and discomfort.



## **Transjugular intrahepatic portosystemic shunts (TIPSS)**

This technique, which connects two veins to change the direction of blood flow in the liver, is usually done by a radiologist with the help of ultrasound and other imaging technology to guide them. It is not classed as surgery and is commonly used for complications of portal hypertension. Portal hypertension is a complication of cirrhosis where there is too much pressure in your portal vein, which normally carries blood from your bowel and spleen to your liver.

To lower the pressure in your portal vein, a metal stent is passed across your liver to make a shunt, or bypass, causing blood to travel straight into the hepatic vein which carries the blood from your liver. This is done using a needle guided by a catheter inserted through a tiny puncture in your neck. This is not painful and can be performed under a general or local anaesthetic.

The hospital will advise you on how to prepare for this procedure. This will include requiring you not to eat on the day before, what to bring with you etc. You can expect to stay in hospital overnight or perhaps two or three days. You will be given a sedative (in some cases this may be a general anaesthetic) and monitored closely. Possible complications include internal bleeding and encephalopathy (mental confusion and memory loss) resulting from the blood flow to the liver being bypassed. This usually responds to treatment but your specialist will discuss this with you before the procedure.

This procedure is usually the preferred option when bleeding from varices is uncontrolled. It may also be used when ascites (accumulation of fluid) does not respond to treatment with diuretics.

In the following weeks you will be required to have further imaging tests so that doctors can be sure the shunt is working properly.

# Emergency procedures

## **Sengstaken Blakemore tube (aka Linton tube)**

This is an emergency procedure used to stop active bleeding from both the stomach and gullet. It is used to treat those varices where other medications do not have an effect.

A tube will be passed through your mouth (or nose) into your gullet or stomach. You should be given deep sedation before the insertion of the tube, and will be admitted to a high dependency unit (HDU) or an intensive care unit (ITU) where you may be placed on a breathing machine. The breathing machine allows you to remain deeply sedated and prevents your lungs from being filled up with blood. The bleeding is caused by ruptured gastric or oesophageal varices. The tube contains two balloons that are filled with air to compress the bleeding. You will receive blood transfusions and clotting products to control the bleeding as well as drugs to keep your blood pressure within a safe limit.

This procedure has a good success rate but is a temporary procedure until more permanent treatment can be determined for you. This may be endoscopic or radiological (TIPSS) or, rarely, surgery (including transplantation).

## Keeping up to date with your tests

During diagnosis, try to learn as much as you can about liver disease so you can ask questions and express any concerns you have. When treating liver disease, doctors may often have to consider a number of conditions that could be affecting you. They often have to ask very personal questions to exclude possible causes of your disease or reasons for changes in your liver tests. Sometimes, even after having lots of tests, a clear diagnosis can't be made. However, doctors can nearly always provide information on the degree of scarring and can often exclude certain conditions.

It will be useful for you to understand why you are undergoing a particular test and to be aware of any possible side effects. Listen carefully to what the doctors say and don't be afraid to ask again if you don't follow an explanation. The need to reduce unnecessary testing for people at low risk of disease doesn't mean you can't ask further questions of medical staff if you feel an abnormal test result isn't being followed up properly.

Keep a diary or logbook to jot down the names of medical staff and record details of your lab results so you can look at them again in your own time and become more familiar with the terms used. Some understanding of your blood tests and keeping copies of them will help both you and the medical staff when discussing your results. An active involvement in your own care is important and will help you feel more in control.

## Useful words

**AFP** – alpha-fetoprotein, a protein produced by liver cells normally found only in tiny traces in your body. The AFP blood test is a common test for liver cancer.

**Antigen** – a foreign, invading protein. When recognised by the body as foreign, the body's immune defence will react to the antigen by producing antibodies.

**Antibody** – a specific immunoglobulin (protein) produced by your body as part of a defence reaction against an invading substance (antigen).

**Autoantibodies** – abnormal antibodies that attack your own body tissues because it has mistaken them as foreign.

**Blood markers** – substances measured in blood which may increase if infection or disease is present or suspected.

**Blood serum** – the clear, liquid part of your blood. Serum will separate from blood during clotting.

**Cholestasis** – a condition where the flow of bile from the liver is reduced.

**DNA** – deoxyribonucleic acid, the genetic material of cells carrying the instructions for making up our bodies.

**ELISA** – enzyme linked immunosorbent assay, a biochemical test used to detect the presence of an antibody or an antigen in a sample.

**Enzyme** – a substance, usually a protein, produced by the body to help speed up a chemical reaction (which can be measured with liver blood tests).

**GGT** –  $\gamma$ -Glutamyltransferase, a liver enzyme in your blood that is measured to check for liver damage.

**Hepatic** – anything relating to the liver.

**Hepatitis** – any inflammation of the liver is known as hepatitis, whether it is caused by a virus or not. A sudden inflammation of the liver is known as acute hepatitis. Where inflammation of the liver lasts longer than six months the condition is known as chronic hepatitis.

**Hepatocyte** – a liver cell.

**Hepatologist** – a doctor who specialises in liver disease.

**Immunoglobulins** – also known as Ig, these are large proteins that act as antibodies found in body fluids and cell tissues. They will bind to invading organisms, such as bacteria or viruses, to destroy them.

**Inflammation** – the first response of your immune system to infection or injury, usually noticeable by pain, swelling or tenderness.

**Metabolic** – relating to the break down and processing of substances in your body for growth and vitality.

**Pathogenesis** – the development of a disease or illness.

**Pathological** – relating to or caused by a disease.

**Protein** – a large molecule made from amino acids (peptides) required for the structure and working of your body's cells, tissues, and organs. Most proteins are made in the liver.

**RNA** – Ribonucleic acid plays an important role in translating the genetic information (DNA) into protein production (synthesis).

**Seroconversion** – a change in your blood test so that something related to the virus appears. This may be an antigen, an antibody or the virus itself.

**Stent** – a small, thin wire-mesh or plastic tube used when treating obstructions in the bile ducts. Where there is a narrowing (stricture) in the bile duct the doctor will insert a stent to open up the duct to keep it from collapsing.

**Tumour markers** – substances found in blood, urine or body tissues which may increase if cancer is present or suspected. Alpha-fetoprotein (AFP), for example, is a protein that is a tumour marker for liver cancer.

**Virus** – a microscopic particle that infects living cells by getting inside them and reproducing (replicating). Viruses cannot reproduce by themselves and can only multiply from within the cells of their living host.

## Useful websites

### **nhs.uk**

Government website with an A-Z of health conditions and medications, plus how to access NHS services in your area.

### **patient.info**

Health advice on a broad range of conditions, written by doctors and medical experts. Extensive resources section and interactive features, including a symptom checker.

### **labstestsonline.org.uk**

Information to help patients understand the way laboratory tests are used to diagnose, monitor and screen for a broad range of conditions and diseases.

## Further information

The British Liver Trust publishes a large range of leaflets about the liver and liver problems written for the general public.

Leaflets that you may find particularly helpful include:

- Alcohol and liver disease
- Diet and liver disease
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Liver cancer
- Liver transplantation
- Living with liver disease
- Non-alcohol related fatty liver disease (NAFLD)
- Testing for viral hepatitis (fact sheet).

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**Mish Dattani**, lay reviewer.

## We hope you have found this publication helpful

All our publications are reviewed by medical experts and people living with liver disease. If you have any feedback on this publication please email the Trust at [info@britishlivertrust.org.uk](mailto:info@britishlivertrust.org.uk)

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