

Fatty liver and NASH



Fighting liver disease

Fatty liver and NASH

The British Liver Trust works to:

- support people with all kinds of liver disease
- improve knowledge and understanding of the liver and related health issues
- encourage and fund research into new treatments
- lobby for better services.

All our publications are reviewed by medical specialists and people living with liver disease. Our website provides information on all forms of adult liver disease and our Helpline gives advice and support on general and medical enquiries. Call us on **0800 652 7330** or visit **www.britishlivertrust.org.uk**

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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.

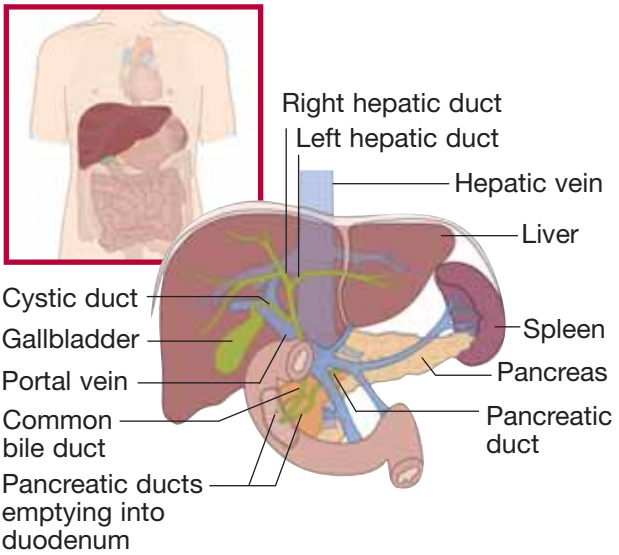
Your liver has around 500 different functions. Importantly it:

- fights infections and disease
- destroys and deals with poisons and drugs
- filters and cleans the blood
- controls the amount of cholesterol
- produces and maintains the balance of hormones
- produces chemicals – enzymes and other proteins – responsible for most of the chemical reactions in the body, for example, blood clotting and repairing tissue
- 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

Liver damage develops over time. Any inflammation of the liver is known as hepatitis, whether its cause is viral 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.

Fibrosis is where scar tissue is formed in the inflamed liver. Fibrosis can take a variable time to develop. Although scar tissue is present the liver keeps on functioning quite well. Treating the cause of the inflammation may prevent the formation of further liver damage and may reverse some or all of the scarring.



Cirrhosis is where inflammation and fibrosis has spread throughout the liver and disrupts the shape and function of the liver. With cirrhosis, the scarring is more widespread and can show up on an ultrasound scan. Even at this stage, people can have no signs or symptoms of liver disease. Where the working capacity of liver cells has been badly impaired and they are unable to repair or renew the liver, permanent damage occurs.

This permanent cell damage can lead to liver failure or liver cancer. All the chemicals and waste products that the liver has to deal with build up in the body. The liver is now so damaged that the whole body becomes poisoned by the waste products and this stage is known as end stage liver disease. In the final stages of liver disease the building up of waste products affects many organs. This is known as multiple organ failure. Where many organs are affected, death is likely to follow.

What is fatty liver disease?

There should be little or no fat in a healthy liver. For most people, carrying a little fat in the liver causes no problems. Fatty liver is the name given to a condition in which you have too much fat in your liver. This is caused by the build-up of fats called triglycerides. These are the most common fats in our bodies. They belong to a group of fatty, waxy substances called lipids that your body needs for energy and cell growth.

We get triglycerides from our diet and they are also made in the liver. The liver processes triglycerides and controls their release. It combines them with special proteins to form tiny spheres called lipoproteins which it sends into the bloodstream to circulate among the cells of your body. When this process is interrupted and the flow of triglycerides to the liver is increased, their release, or 'secretion', from the liver is slowed down. This is what leads to the build-up of fat in your liver cells.

Until recently fatty liver was considered rare and relatively harmless. It was not thought to progress to chronic (long-term) or serious liver disease.

Today it is one of the most common forms of liver disease and is known to lead to advanced conditions. In the majority of cases fatty liver does not cause any harm but for an increasing number of people the effects of having fat in their liver over

a long period may lead to inflammation causing swelling and tenderness (hepatitis) and then to scarring (fibrosis).

In some people, this can progress to a condition known as cirrhosis, which can be life-threatening.

Clinical knowledge about fatty liver is still coming together but common risk factors are obesity, diabetes and drinking too much alcohol. While the relationship between these factors is not fully known, they can be considered triggers for progression to other types of liver disease.

If alcohol is the cause of fatty liver it is called alcoholic liver disease (ALD). This leaflet is for people worried about fatty liver that is not caused by alcohol. This is known as non alcoholic fatty liver disease (NAFLD).

What is the difference between NAFLD and NASH?

Non alcoholic fatty liver disease (NAFLD)

NAFLD is actually a term for a wide range of conditions characterised by the build-up of fat in the liver cells of people who do not drink alcohol excessively.

At one end of this range is simple fatty liver, or steatosis. This is the stage where fat is first detected in the liver cells and is generally regarded as benign (harmless).

Non alcoholic steatohepatitis (NASH) is a significant development in NAFLD. This is a more

aggressive condition that may cause scarring to the liver and can progress to cirrhosis. Cirrhosis causes irreversible damage to the liver and is the most severe stage in NAFLD.

In simple terms it may be easiest to think of NAFLD as having the following stages:

1. fatty liver
2. a form of hepatitis known as non alcoholicsteatohepatitis (NASH)
3. fibrosis
4. cirrhosis

Alcohol

NAFLD is almost the same as alcoholic liver disease (ALD) and shares the same stages, with alcoholic hepatitis occurring in place of steatohepatitis (NASH).

In practical terms the only difference between the two conditions – NAFLD and ALD – is that the latter is caused by drinking too much and the former by all other causes.

NAFLD can affect a wide range of people. In general, the older you are the more chance there is that you may have the condition. NAFLD is typically seen in people aged around 50 and more commonly in men than women.

It is hard to be precise about how many people have some form of NAFLD but it is estimated that

one in five people (20%) in the UK have the earliest stages of NALFD, or steatosis.

People most at risk of NAFLD are those who:

- are obese
- have insulin resistance, associated with diabetes
- have hypertension (high blood pressure)
- have hyperlipidaemia (too much cholesterol and triglyceride in their blood)
- are taking certain drugs prescribed for other conditions.
- have been malnourished, starved or given food intravenously.

Jez's story

Jez is a 35 year old marketing exec. He isn't much of a drinker and plays football on weekends – or did, until he injured his knee a while ago. He now watches DVDs instead. Jez has started to feel exhausted even though he spends the day sitting behind a desk. He knows he's packing some extra weight and puts this down to stopping the football.

On seeing his GP Jez learns he has high blood pressure, but the big news is that he is actually three stone overweight. With a BMI of 29, Jez is almost obese. The doctor runs a blood test that shows abnormal results. Jez is sent for an ultrasound scan at his local hospital which reveals that he has the first stage of NAFLD – fatty liver.

The GP explains to Jez that he needs to make some lifestyle changes.

Because of the bad knee Jez has taken up swimming and something completely new to him, yoga. He cuts down on the fatty foods he likes and even takes his own lunch to work.

After six months, Jez has lost the three stone and his blood tests have returned to close to normal. The doctor warns Jez that he has some way to go but that this change in lifestyle has stopped him from progressing to more serious liver disease.

Non alcoholic steatohepatitis (NASH)

Non alcoholic steatohepatitis (NASH) is a more advanced form of NAFLD in which there is inflammation in and around the fatty liver cells. This may cause swelling of your liver and discomfort or pain around it. If you place your right hand over the lower right hand side of your ribs it will cover the area of your liver.

With intense, on-going inflammation a build up of scar tissue may form in your liver. This process is known as fibrosis, and can lead to cirrhosis. NASH is now considered to be one of the main causes of cirrhosis.

Cirrhosis is usually the result of long-term, continuous damage to the liver. This is where irregular bumps, known as nodules, replace the smooth liver tissue and the liver becomes harder. The effect of this, together with continued scarring from fibrosis, means that the liver will run out of healthy cells to support normal functions. This can lead to complete liver failure.

NASH should be distinguished from acute fatty liver disease, which may occur during pregnancy or with certain drugs or toxins (poisons). This condition is very rare and may lead rapidly to liver failure.

What are the causes of fatty liver?

In the UK most people with a fatty liver are overweight or obese. The condition is linked to problems such as diabetes, high blood pressure (a longstanding complication of diabetes) and high cholesterol. When all these factors are present they are known medically as metabolic syndrome, or syndrome X.

More rarely, people can get a fatty liver because of some drug treatments and intravenous feeding.

Very rapid weight loss can also lead to fat building up in the liver. It is thought this may result from a sudden, massive release of free fatty acids into the bloodstream following the breakdown of fat stored in fat cells. This can sometimes follow surgery to reduce obesity, such as a gastric bypass.

Fatty liver and obesity

Not everyone who is overweight or obese will develop a fatty liver and not everyone who has a fatty liver is overweight. However, the majority of people with non alcoholic fatty liver disease are overweight.

The terms 'overweight' and 'obese' describe two different categories above what is considered a healthy body size.

As tall people are generally heavier than short people, a person's weight is not particularly useful in assessing their risk of fatty liver disease or metabolic syndrome. The ratio between height and weight, known as the body mass index (BMI), is a more useful measurement. Calculating body mass index (BMI) is now the accepted method for working out whether you are normal, overweight or obese.

A healthy BMI is regarded as being between 18.5 and 25kg/m². A BMI between 25 and 30kg/m² is defined as overweight. If your BMI is over 30kg/m² then you qualify as obese.

Obesity can also be defined according to the distribution of fat on your body. Fat that gathers on your hips can make you look pear-shaped (known as 'gynoid') while having fat around your abdomen will give you an apple-shaped appearance ('android'). It is known, for example, that obese people with insulin resistance most commonly have abdominal fat.

In men, abdominal obesity is defined in a waist circumference greater than 40 inches or 102 cm. In women, this is a waist circumference greater than 35 inches or 88 cm.

However, the normal range for BMI and waist circumference is not based on how people look. It is based on their likely risk of developing health problems according to how much they are overweight or obese (BMI-related morbidity).

Risk of associated disease according to BMI and waist size

BMI	Weight Category	Waist less than or equal to 40in/102cm (men) 35in/89cm (women)	Waist greater than 40in/102cm (men) 35in/89cm (women)
18.5 or less	Underweight	–	N/A
18.5 – 24.9	Normal	–	N/A
25.0 – 29.9	Overweight	Increased	High
30.0 – 34.9	Obese	High	Very High
35.0 – 39.9	Obese	Very High	Very High
40 or greater	Extremely Obese	Extremely High	Extremely High

There are more overweight and obese people in the UK than any other country in Europe but not as many as there are in the US. For the majority, the root causes of becoming overweight or obese are down to:

- eating too much (and too much fatty food in particular)
- drinking too much alcohol
- not doing enough exercise.

In England alone, more than one in five people (20%) are now defined as obese. A similar ratio is now emerging among boys and girls aged between 2 and 15 years.

As more and more people in the UK lead inactive lives and carry extra weight around with them, so the number of cases of fatty liver, in particular NASH, is rising.

Fatty liver and diabetes

Diabetes mellitus, or type 2 diabetes, usually develops in men or women over 40 years of age although it is now being seen in overweight children.

It is a condition that occurs when your body cannot regulate the amount of glucose in your blood. Glucose is a sugar produced when you digest your food. It is also produced and stored by your liver.

Blood glucose levels are regulated by insulin, a hormone produced by your pancreas. Problems start when your body either does not produce enough insulin (as in type 1 diabetes) or if the muscle, liver and fat cells do not respond normally to insulin. This latter situation is called insulin resistance and leads to a high level of glucose in the blood (hyperglycemia), which is harmful.

Insulin also helps your liver to metabolise (process) fats and to release them into the blood. While fats are a necessary source of energy, too much fat in the blood is bad for you. It is now thought that insulin resistance interferes with this process and causes an accumulation of triglyceride fats in the liver cells.

Having too much triglyceride and another lipid that may be better known, cholesterol, in the

bloodstream is known as hyperlipidaemia. Cholesterol is also taken in from our diet and produced by the liver.

High levels of a so-called 'bad' cholesterol known as LDL cholesterol (low density lipoprotein cholesterol) can lead to heart disease. Counter to this, there is a 'good' cholesterol (HDL, high density lipoprotein cholesterol) that removes the LDL cholesterol and gets rid of it through the liver.

Thus, having a ratio of high LDL to low HDL in the blood is not desirable.

Measuring blood lipids

Cholesterol levels in your blood are most accurately measured by taking a blood sample after you have fasted for nine to twelve hours. This may be done as part of a 'lipid profile' which will measure levels of total cholesterol, LDL cholesterol, HDL cholesterol and tryglycerides.

Levels are recorded in millimoles per litre (mmol/L).

The target levels your doctor may recommend for you will be based on the risk to your health from factors such as age, weight, family history, lifestyle or any existing medical condition(s).

Below are guidelines to what your results or 'numbers' may mean.

Total cholesterol	
Less than 5 mmol/L	Normal
5 mmol/L to 6.5 mmol/L	Borderline high
More than 6.5 mmol/L	High
LDL (bad) cholesterol	
Less than 3.5 mmol/L	Normal
3.5 mmol/L to 4 mmol/L	Borderline
4 mmol/L and higher	High
HDL (good) cholesterol	
Less than 1.1 mmol/L	Increased risk
1.1 mmol/L to 1.2 mmol/L	Borderline
1.3 mmol/L or higher	Healthy
Tryglycerides	
Less than 2.2 mmol/L	Healthy
2.2 mmol/L to 4.4 mmol/L	Increased risk
4.4 mmol/L and higher	High

Medications associated with fatty liver

A number of drugs prescribed for other conditions have been linked with fatty liver. In some cases this liver damage is related to high doses of the drug. With other drugs the fatty liver only occurs in a small minority of people. This is known as 'idiosyncratic drug reaction.'

The drugs most commonly associated with causing fatty liver in this way are:

- prednisolone and hydrocortisone, used to treat inflammation

- premarin and ortho-est (synthetic estrogen), for menopause
- amiodarone, used to treat heart arrhythmia
- tamoxifen, used to treat breast cancer
- diltiazem, used to treat high blood pressure
- methotrexate, used to treat rheumatoid arthritis

Acute fatty liver in pregnancy

Very rarely, some women in the last three months of their pregnancy can develop a fatty liver.

Acute fatty liver in pregnancy (AFLP) is more common in first pregnancies and with male babies – especially twins.

AFLP is a very serious condition that can cause rapid liver and kidney failure and can be fatal for both mother and baby if not diagnosed.

Hospitalisation and immediate delivery of the baby is usually required.

Provided there has been no permanent damage, the liver returns to normal after the baby has been born.

It is not known what causes this type of fatty liver and, due to the rarity of AFLP, it is unclear whether the problem will happen in any future pregnancies as not enough data is available for study.

What are the symptoms?

Most people who have mild NAFLD will not notice any symptoms because the fat build-up is not enough to damage the liver.

A few people complain of tiredness and may feel some pain in the area around the liver (on the right side of the body, under the ribs). The pain may be a sign that the extra fat has made the liver expand. This stretches the liver's outer covering and may cause you discomfort.

Even people who go on to develop inflammation (NASH), scarring (fibrosis) and cirrhosis may undergo liver damage for many years before symptoms become apparent.

If you have any of these symptoms, see a doctor immediately:

- yellowness of the eyes and skin (jaundice)
- bruising easily
- swelling of the lower tummy area (ascites)
- vomiting blood (hematemesis)
- dark black, tarry, faeces (melena)
- periods of confusion or poor memory (encephalopathy)
- itching skin (pruritus)

In acute fatty liver of pregnancy women may experience nausea, vomiting, abdominal pain and jaundice.

Diagnosis

In most cases, people only find out they have fatty liver when a routine blood sample shows there may be a problem. If this happens to you, your doctor may ask a lot of questions about your life-style, such any drugs you are taking (including over the counter medication and nutritional supplements) and the amount of alcohol you drink.

Helping the doctors to help you

There is no specific laboratory test for NAFLD, making it difficult to diagnose. It is important that you answer questions about your lifestyle as accurately as you can. It is not easy for doctors to tell the difference between alcoholic liver disease and NAFLD so you will need to be honest about the amount of alcohol you drink.

Liver disease often shows few symptoms and doctors have to consider a number of conditions that could be affecting you. The better the picture of your general health you can provide, the better the chances will be that the doctors can pin down your illness.

You may then be sent to see a liver specialist (hepatologist) or a digestive disease specialist (gastroenterologist) for further tests. Many of these tests will be used to rule out alcoholic liver disease, hepatitis B, hepatitis C, autoimmune hepatitis and other causes of liver disease.

Do not be alarmed by an 'abnormal' liver function test result. Strange as it sounds, abnormal LFTs are not uncommon. In some people results may often fall out outside normal range and doctors may consider that increases or decreases of certain substances in your blood are not an indication of serious liver disease.

However, the British Liver Trust encourages all people with any form of liver disease to take an active interest in their health care. The need to reduce unnecessary testing for those at low risk of disease should not restrict you from asking for further information from medical staff if you feel there is no follow-up to your abnormal LFT results.

Liver function tests

Tests should include liver function tests (LFTs) which are used to gain an idea of how the different parts of your liver are functioning. The liver function test is made up of a number of separate examinations, each looking at different properties of your blood. It is used to gain an indication of how much your liver is inflamed or damaged in its ability to work properly.

The test will measure levels of the liver enzymes ALT and AST which are increased during inflammation (hepatitis). In NAFLD, the doctors will expect to find ALT is higher than AST.

Test results are given in numbers and values. A laboratory provides a 'normal value' or 'reference value' to the test, which shows the doctor, nurse or specialist whether your test is within the normal range. 'Abnormal' functions are shown by how much they are below or above the normal range. In biochemical tests associated with insulin resistance, abnormal results will include raised cholesterol, triglycerides and blood sugar (glucose).

Scanning your liver with imaging equipment such as ultrasound, computerised tomography (CT) or magnetic resonance imaging (MRI) may reveal significant deposits of fat in your liver.

Doctors may use a liver biopsy to assist or confirm their diagnosis. During a liver biopsy a tiny piece of the liver is taken for study. To do this, a fine hollow needle is passed through the skin into the liver and a small sample of tissue is withdrawn.

Prevention

Weight problems are best dealt with by prevention and without the need for professional medical intervention. Although it is not always possible to avoid NAFLD, you can significantly reduce your risk by exercising as much as you are able and eating healthily to control your weight.

The health risks from being overweight or obese can impact on your physical, social and emotional well being. People with NAFLD who go on to have

cirrhosis are at higher risk of developing liver failure. If you are obese, your risk of ending up in hospital or even dying from cirrhosis is much higher still.

Treatment

There is no specific treatment for NAFLD that all doctors agree on.

However, there is good evidence that gradual weight loss coupled with increased exercise can reduce the amount of fat in your liver.

In mild cases of fatty liver, most doctors will concentrate on treating conditions such as obesity and diabetes that can cause fat to build up. They will also treat disorders such as high blood pressure and high cholesterol that often go along with fatty liver.

If your NAFLD is linked to being overweight, then you will be advised to lose weight gradually and take sensible exercise. If it is linked to diabetes, high blood pressure or high cholesterol then you will need to watch your diet and your weight, and may also need to take medication.

What are the long term effects?

What will happen largely depends on what stage of NAFLD you have. Most people will have fatty liver (steatosis) and should not have any long-term ill effects.

Very few people will go on to develop NASH which, in a small number of cases, can lead to cirrhosis. Unfortunately, there is no reliable way to predict who will develop these serious latter stages of NAFLD.

For this reason, if you have been diagnosed with a fatty liver, most doctors recommend some form of monitoring (usually a blood test every six months or so) to make sure the condition is not getting worse.

If you do go on to develop NASH over a ten year period you have a one in five (20%) chance of developing cirrhosis and a little less than a one in ten (10%) chance of dying from a liver-related problem.

Cirrhosis is not in itself fatal. However, when it develops it does signify a high risk of liver cancer or liver failure, both of which are potentially fatal. A liver with cirrhosis rarely (if ever) returns to normal. However, the risk of further damage can be reduced enormously if the disease which caused the cirrhosis is treated.

However, if cirrhosis has become so severe that your liver may fail completely, a liver transplant may be the only option.

A liver transplant is usually only recommended if other treatments are no longer helpful and your life is threatened by end stage liver disease. It is a major operation and you will need to plan it carefully with your medical team, family and friends.

After a successful transplant a person can make a full recovery and lead a normal active life. However, they must be checked regularly and it is not known whether fatty liver may develop in the new organ.

Fiona's story

Weighing 17 stone and standing little over five feet tall, Fiona feels tired all the time and is usually asleep on the sofa by 9pm. Her doctor has classed her as obese and, because she has high blood glucose levels, Fiona has been diagnosed with type 2 diabetes.

Following a series of blood tests Fiona is referred to hospital where doctors diagnose non alcoholic steatohepatitis (NASH). Her liver has become enlarged and unable to function properly, explaining some of her extreme fatigue and exhaustion.

Fiona is put on a diet and is given tablets for her diabetes. Fiona starts going to the gym and takes spinning classes. Unfortunately further tests reveal that Fiona is actually suffering from cirrhosis of the liver, a progression from NASH. Her liver is so badly scarred that her hepatologist suggests she may one day need a transplant for a new liver.

Fiona is distraught but even more determined to lose weight. She has cut alcohol from her diet completely, even though she only drinks three or four glasses a week.

By increasing her visits to the gym Fiona loses two stone within four months.

Within six months she is down to 13 stone, and after a marriage proposal from her boyfriend she works on shedding more weight. In total, Fiona has lost more than five stone.

Two weeks before she is due to get married Fiona visits her specialist again. The news is good – Fiona's weight loss has reduced the fat and inflammation in her liver and the blood tests have returned to normal. For good reasons she is no longer a candidate for a liver transplant.

Treatments under investigation

There are no specific medications available for the prevention and treatment of NAFLD but a number of areas are being explored, principally drugs that reduce appetite, lower blood fats and increase insulin sensitivity. Many of these drugs have been developed to treat other conditions.

These include statins, a class of drug used to treat cardiovascular disease. Statins decrease the production of cholesterol and it is thought that this may have a benefit in treating NASH. In the past there have been concerns about the use of statins in patients with liver disease but it is now clear that patients with fatty liver disease and NASH can take these drugs as safely as any other patients.

As the majority of patients with NASH have insulin resistance, it is thought new medications that make the body more sensitive to insulin may help reduce liver damage in people with NASH – even if they do not have diabetes.

Ursodeoxycholic acid (URSO), a drug used to reduce the production of bile acids, is being looked at as a way of bringing down the liver enzyme levels associated with inflammation.

Dietary supplements too, are being evaluated. These include the role of fat-soluble antioxidants, such as vitamin E. Antioxidants are considered helpful in reducing levels of bad cholesterol (LDL) in the arteries.

Omega-3 fatty acids, extracted from fish oil, may be effective in decreasing triglycerides and raising HDL.

Clinical trials

Doctors are always trying to find better ways of treating people. Medical staff may talk to you about the possibility of taking part in a clinical trial. This may involve treatment with new drugs or new ways of using drugs.

You do not have to take part in clinical trials and your care will not be affected if you do not. If you do take part, you may receive extra monitoring which may be beneficial to your treatment. The doctor involved in the research will give you specific information about any clinical trials.

Looking after yourself

If you are diagnosed as being in the earliest stage of NAFLD (steatosis) then you may not notice any ill-effects. As mentioned, your doctor may ask you to have regular blood tests to make sure that you are not developing a more serious form of the disease. If you have type 2 diabetes or any other metabolic problem, you will need to work closely with your medical team to keep it well controlled.

For your part, regular exercise and a healthy diet will help you to manage your condition.

As the blood fats associated with NAFLD (triglyceride and cholesterol) are partly absorbed from your food intake, it is essential that you watch what you eat.

This is likely to mean that you should:

- deliberately eat as little saturated fat as you can (these are high in most meats, dairy products and many bakery foods)
- eat plenty of fruit and vegetables (have at least five portions a day)
- eat carbohydrate foods (such as pasta, potatoes, wholemeal bread and rice) rather than fat-rich foods
- avoid crash diets and rapid weight-loss programmes.

Can I drink alcohol if I have NALFD?

Drinking large amounts of alcohol can lead to an increase in fat in your liver. The government has a recommended level for sensible drinking. This is 21 units a week for men and 14 for women.

For most people who do not have any form of hepatitis (NASH) or scarring (fibrosis), drinking occasionally should not be a problem.

However, anyone with a liver condition should approach alcohol with caution. It is a good idea to reduce your consumption to below recommended levels or abstain from drinking if you can.

People who have gone on to develop NASH or cirrhosis will have damaged liver function. They will find that they cannot deal very well with toxins such as alcohol and should abstain from drinking completely.

Complementary and alternative medicines

Many complementary and alternative medicines are available that may ease the symptoms of liver disease. But certain medications used in non-liver related disease can damage the liver. At present, healthcare professionals are not clear on the role and place of some therapies in managing liver disease. More research needs to be done on the use of these therapies. You may wish to discuss the use of these therapies with your doctor.

Useful words

Acute – a short sharp illness that may be severe but from which most people will recover in a few weeks without lasting effects.

ALT – stands for alanine aminotransferase, a liver enzyme that enters the blood following liver damage. An ALT test is used to monitor and assess the degree of damage in patients infected with chronic hepatitis B or C, for example.

AST – stands for aspartate aminotransferase, a liver enzyme but less specific to the liver than ALT. A raised AST level may follow a heart attack, for example.

Autoimmune – a type of disease where the body's defences mistakenly attack another part of the body.

Carbohydrate – a substance that provides energy or fuel for your body. 'Simple' carbohydrates are sugars, as found in fruit, honey and jam. 'Complex' carbohydrates are starches, as found in bread, rice and potatoes.

Cholesterol – a type of fat (lipid) made by the liver from the food you eat. Cholesterol is found in all the cells of your body and is necessary to help them function. However, a high cholesterol level in the blood causes an increased risk of heart disease and stroke.

Chronic – an illness that lasts a long time (more than six months), possibly for the rest of your life.

Enzyme – a substance, usually a protein, produced by the body to help speed up a chemical reaction.

Free fatty acids – by-products created from the breakdown of fat from fat cells that circulate in the bloodstream.

Gastroenterologist – a doctor who specialises in diseases of the gullet, stomach, bowel and their associated organs, the pancreas, liver and spleen.

Glycogen – stored in the liver and muscles, glycogen is the way the body stores carbohydrates. It is easily changed back to glucose when the body needs energy quickly.

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 diseases.

Jaundice – a condition in which the whites of the eyes go yellow and in more severe cases the skin also turns yellow. This is caused by a rise of bilirubin (containing yellow pigment), a waste product which is normally disposed of by the liver.

Lipid – a group of organic fats or fat-like substances including triglycerides, cholesterol, fatty acids, oils and waxes. Insoluble in water, they are stored by your body for energy.

Lipoprotein – A combination of fat and protein made by the liver and transported around the body in the bloodstream.

Metabolism – the physical and chemical processes by which food is transformed into energy. This occurs by absorbing substances and using them in the body or by removing toxins and disposing them from the body as waste product.

Triglyceride – a type of fat belonging to the lipid group. Found in the blood, it is the most common fat in the body and essential for energy. Its name is made up from its construction: three ('tri') molecules of fatty acid combined with a glycerol ('glyceride') molecule

Who else can help?

British Heart Foundation

Central Office

14 Fitzhardinge St

London W1H 6DH

Tel: 020 7935 0185

Heart information line: 08450 70 80 70

www.bhf.org.uk

A charity focusing on investment in research, supporting and caring for heart patients and providing information to help people reduce their own risk of dying prematurely from a heart or circulatory-related illness.

Diabetes UK

Central Office

Macleod House

10 Parkway

London NW1 7AA

Tel 020 7424 1000

Email: info@diabetes.org.uk

www.diabetes.org.uk

An organisation working for people with diabetes, funding research, campaigning and helping people live with the condition.

National Obesity Forum

PO Box 6625

Nottingham NG2 5PA

Telephone/Fax: 0115 846 2109

Email: info@nationalobesityforum.co.uk

www.nationalobesityforum.co.uk

A charity working to improve the prevention and management of obesity. Although aimed at

healthcare professionals, the website is a useful resource for anyone wanting to find out more about obesity issues in the UK.

Weight Concern

Brook House

2-16 Torrington Place

London WC1E 7HN

Tel: 0207 679 6636

Fax: 020 7813 2848

Email: enquiries@weightconcern.org.uk

www.weightconcern.org.uk

A charity that works to address both the physical and psychological health needs of overweight people.

Weight Wise

www.bdaweightwise.com

A website developed by the British Dietetic Association (BDA) providing dietary information to help people manage their weight.

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*
- *Cirrhosis and liver disease*
- *Diet and liver disease*
- *Hepatitis C*
- *Liver cancer*
- *Liver disease tests explained*
- *Liver transplantation*

Contact us for more information:

Tel: 0800 652 7330

Email: info@britishlivertrust.org.uk

Web: www.britishlivertrust.org.uk

Special thanks

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This leaflet is for information only. Professional, medical or other advice should be obtained before acting on anything contained in the leaflet as no responsibility can be accepted by the British Liver Trust as a result of action taken or not taken because of the contents.

Can you make a difference?

Liver disease is increasing alarmingly and the need to do more is greater than ever before...

For the British Liver Trust to continue its support, information and research programme, we need your help. We raise funds from many sources and a large proportion is donated by voluntary contributions. If you would like to send a donation it will enable us to continue providing the services that people need.

If you can help, please fill in the form on the page opposite.

If you wish to help us further with our work by organising or participating in a fundraising event or becoming a **“Friend of the British Liver Trust”** please:

**Call us on
0800 652 7330**

**Email us at
info@britishlivertrust.org.uk**

**Make a donation via our website at
www.britishlivertrust.org.uk**

**or write to
British Liver Trust
2 Southampton Road
Ringwood, BH24 1HY**



I enclose a cheque/postal order made payable to the British Liver Trust

I wish to pay by credit card:

MasterCard Visa CAF CharityCard

Please debit my card with the sum of £.....

Card No.....

Expiry date.....

Name

Address

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Email.....

Signature.....Date

I am a tax payer and authorise the charity to reclaim the tax on my donation*

Please send me your next newsletter

Please send me a list of information leaflets

I am interested in leaving the Trust a legacy. Please send me more information

* You must pay an amount of income tax and/or capital gains tax equal to the amount the British Liver Trust will reclaim on your donation: which is equal to 28p for every £1 you donate.

Your name and address will be added to our computer database ensuring you are sent the latest information. If you do not wish to receive further information, please tick here.



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