



Children's Liver
Disease Foundation

fighting childhood
liver disease

Guide to the Liver

Medical Information Series



Welcome

This leaflet has been written specifically for:

- Parents/carers of a child with a liver condition
- Young people with a liver condition

Others who may find this leaflet helpful are:

- Relatives and friends
- Healthcare and allied professionals, school, college, university and nursery teams

This leaflet aims to:

- Explain where the liver is located and what it looks like
- Explain the functions of the liver, how it can go wrong
- Explain signs and symptoms
- Provide brief information on treatment

Children's Liver Disease Foundation has animations on the following websites which show how the liver works and how it can go wrong:

- childliverdisease.org
- cldf-focus.org

Children's Liver Disease Foundation (CLDF) also has leaflets in its support series which are available to download from our website – childliverdisease.org. Leaflets can be mailed to UK patients free of charge, our contact details are on this leaflet. You may find it helpful to have a copy of CLDF's **making the most of an appointment** leaflet which will help you prepare for appointments and meetings following discharge.

If you have been given this leaflet at a UK hospital you should have received a CLDF Introduction Pack, supplied, free of charge, to UK hospitals. We are happy to send you an Introduction Pack as well as a CLDF Pack if you live in the UK. Our contact details are on this leaflet.

We also have the following information packs available, free of charge:

- Nurseries, schools and colleges
- GP Practices
- Friends and Families

All are available on request to UK families and young people.

Overseas families should contact CLDF to discuss their literature needs.

? Where is the liver?

The liver is located behind the lower ribs on the right side of the abdomen.

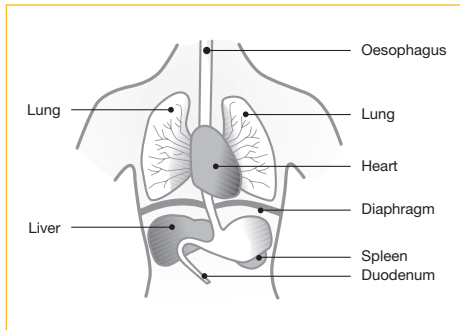


Diagram 1 Location of the liver in the abdomen

? What does the liver look like?

The liver is reddish brown in colour. It has the consistency of foam rubber when healthy. In a child with a liver disease it is often firmer. In an adult it is roughly the size of a rugby ball.

The liver has two main parts called the right and left lobes. There are over 300 billion specialised cells in the liver. These cells are served by a well-organised intricate system of bile ducts and blood vessels.

The little bile ducts, which drain every liver cell, join together like tributaries entering a

stream, to form one main duct from each lobe. These two ducts join to form the common hepatic duct.

The common hepatic duct in turn joins

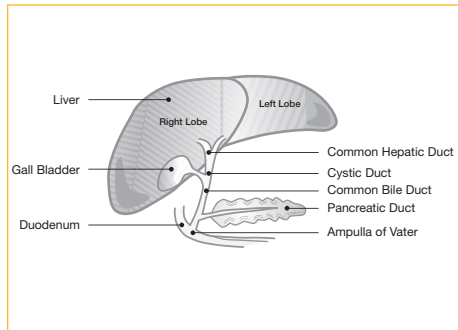


Diagram 2 The liver

with the duct from the gall bladder (called the cystic duct) to form the common bile duct. The common bile duct leads into the duodenum through the ampulla of vater in the first part of the small intestine.

The gall bladder is a pear-shaped organ which rests in a shallow furrow in the right lobe of the liver. The narrow end of the gall bladder, called the neck, opens into the cystic duct. The gall bladder collects the bile, concentrates it and passes it into the duodenum following a meal. This concentration process is not essential and digestion is rarely affected by removal of the gall bladder.

? The blood supply to and from the liver

Blood enters the liver by two separate routes:

1. The hepatic artery which brings freshly oxygenated blood to the liver. Within the liver the artery divides into fine branches which supply blood to the fine bile ducts. This blood passes on to special capillaries, called sinusoids, which take blood to every cell.
2. The portal vein which carries blood containing nutrients from the stomach and intestine to the liver. The portal vein also carries blood from the spleen.

The portal vein divides into very fine branches which drain into the sinusoids.

The blood leaves the sinusoids by the hepatic vein and returns to the heart.

The spleen

The spleen, along with other tissues, plays a useful role in helping to fight infection. It destroys bacteria and old worn-out blood cells. Removal of the spleen can make a child more susceptible to sudden severe infection.

? How does the liver develop?

The liver is first seen in the developing embryo at four weeks of pregnancy. As the foetus develops, the liver divides in two, called the right and left lobes. The right lobe is 6 times bigger than the left. By the time the baby is born, the liver constitutes about 5% of the baby's body weight and grows with the baby. In the adult it weighs about 1.5kg (3lbs).

? How important is the liver?

The liver is a vital organ. Without it we would not be able to live. Apart from the brain, it is the most complex organ in the body.

It has a wide range of functions and acts very much like a factory. One of its most amazing features is its regenerative power. Some 9/10ths of the liver can be cut away and provided the remaining 1/10th is healthy and has an adequate blood supply, the liver will grow back to its original size.

The liver is a processor

The food that we eat passes into the stomach via the oesophagus (gullet). See diagram 1. The food is broken down by the action of the stomach and the small intestine.

The nutrients from the food are then absorbed into the blood via the vessels in the walls of the intestines. These drain to veins which lead into the portal vein which carries the blood into the liver. The nutrients are processed in many different ways in the liver. This processing of the food is known as metabolism. The final products made are used by the body for energy and growth.

The liver is a manufacturer

The liver produces a number of different substances which are vital in order for healthy growth and development. For example:

1. The liver cells produce substances which assist with the clotting of the blood, e.g. Prothrombin.
2. The liver cells make proteins which are carried in the blood. These have many functions. Albumin, for example, helps to control the distribution of fluid in all parts of the body and transports many substances to and from the liver and kidneys to other parts of the body.

The liver is a storage depot

The liver stores energy in the form of glycogen (sugar). It also stores a number of other substances, e.g. copper, iron and vitamins.

The liver is a controller

The liver plays an important part in controlling:

1. The correct level of many hormones within the body.
2. The blood sugar (glucose) levels.
The liver stores glucose in the form of glycogen when there is too much glucose in the blood and releases it when the blood sugar level falls.
3. The amount of fluid the body retains and its distribution throughout the body.
4. The concentration of cholesterol which it converts into bile salts.
5. The action of many medicines by chemically changing them.

The liver is a filter

The liver removes many unwanted substances from the body. It plays an important role in controlling the harmful effects of some drugs and products of metabolism by changing them chemically before excreting them into the bile.

Bilirubin (unconjugated or indirect) is produced when old red blood cells break down. The average life of a healthy red blood cell is 120 days.

This bilirubin is carried in the blood stream, attached to albumin, to the liver where it is altered into a different form (called conjugated or direct bilirubin) which is then:

1. Excreted in the bile.
2. Transferred into the bile which passes via the bile ducts into the intestine and appears as brown pigment in the stool.

Bile is continuously produced by the liver cells mainly by the action of bile salts. It collects in and passes out through the network of bile ducts into the intestine. Bile salts play an important role in the digestion of fats.

The liver is a defender

The liver plays an important role in fighting many types of infection. It particularly protects the body against infection which arises in the gut. With so many different and complex functions, it is not surprising that more than 100 types of liver diseases have been identified in babies and children.

What kind of things can go wrong in babies and children?

If the liver cells are damaged, this causes inflammation, known as hepatitis. Depending on the cause, some or all of the functions of the liver may be disrupted to varying degrees.

There are six main causes of liver damage.

1. An obstruction of the flow of bile out of the liver.
2. An infection acquired before the baby was born, during delivery or caught at an early age after birth.
3. Problems with substances passing across/through the cellular membranes.
4. Metabolic disease. If one of the many chemical processes occurring in the liver is faulty, liver damage may occur. The cause is usually genetic. This usually means that it is passed from both parents each carrying the faulty gene to the child at conception, but usually perfectly well themselves.
5. Certain drugs or poisons will damage the liver.
6. Poor blood supply.

Sometimes it may not be possible to identify the cause of the hepatitis, despite extensive screening in a specialist unit. Idiopathic is a medical term meaning “no known cause”. The number of idiopathic cases is decreasing as medical knowledge increases. But too many cases still remain unexplained, highlighting the need for continued research.



What are the signs and symptoms of childhood liver disease?

- Jaundice (yellowing of the skin and the whites of the eyes)
- Nausea, vomiting and/or loss of appetite
- Yellow urine or dark urine in the older patient
- Pale coloured stools
- Change of sleep patterns
- Vomiting of blood or the passing of blood in the stools
- Tiredness or loss of stamina
- Abdominal swelling caused by:
 - A large liver or
 - A large spleen or
 - Excess fluid in the abdomen (ascites)
- Itch
- Poor weight gain
- Abdominal pain

It is rare for all these signs and symptoms to be present. Often only a few of the symptoms and signs will be noticed. Also the degree of severity will greatly vary depending upon the cause.

A previously undetected liver problem may be picked up during a routine medical check, e.g. 6 week baby check or school medical, or at a consultation for another reason. The doctor may find a previously unsuspected large liver or spleen.



What treatment is available?

Some conditions need no treatment and will resolve themselves.

There are treatments available and they include:

- Medicines
- Special diets
- Surgical operations
- Exercise and/or life style change may be advised in some cases e.g. fatty liver disease.

These treatments often do not cure the condition but control it.

Liver transplantation may be an appropriate treatment in some conditions when other treatment has been unsuccessful. Transplantation has made a huge difference to the outlook for childhood liver disease. There are approximately 100 liver transplant operations on children every year in the UK. This is only possible through the generosity of a donor. Please consider joining the organ donor register. Go to www.organdonation.nhs.uk.

New treatments are being developed all the time as a result of research. CLDF has an active research programme, to find out more, go to childliverdisease.org.

? Is there a charity fighting to stamp out childhood liver disease?

Yes. Started by families in 1980, Children's Liver Disease Foundation (CLDF) leads the way in fighting all childhood liver disease.

CLDF funds vital research, develops information and awareness programmes and supports families, young people and adults diagnosed in childhood who are living day in, day out with a liver condition or transplant. And its work has made a big difference and continues to help save lives.

CLDF has so much to offer you: information, the opportunity to meet other families, events and regular updates. To find out more, call, email or write today:

**Children's Liver Disease Foundation,
36 Great Charles Street, Birmingham,
B3 3JY**

0121 212 3839

Main site: childliverdisease.org

Young people's: cldf-focus.org

info@childliverdisease.org

? What are the roles of CLDF's Family and Young People's teams?

CLDF's Family and Young People's teams are here for you, whether you want to talk about issues affecting you, meet and share with others or just belong to a group which cares, knows what it's like and is fighting to make a difference. You are not alone.

Our parents say . . .

" . . . We don't know how we would have coped without CLDF's care and support. They have been just fantastic from the outset — tremendous people, who are compassionate and so positive. They really care about families and children struggling with liver disease."

"When Emily was very ill we felt we were on the sidelines, knowing we couldn't influence the outcome and not in control. Getting involved in fundraising is something you can control and achieve a positive result. I really took comfort from that."

Our young people say . . .

"Knowing CLDF is there is what I need. I can call whenever I want. Whatever I think and feel is listened to. Even when I called to tell them it was my birthday!"

"I feel really well. It's great that CLDF has given us the chance to meet other young people outside of the hospital and have a fun time. I want them to do more things like this."

Families Team

fso@childliverdisease.org

0121 212 6008

Young People's Team

ypsupport@childliverdisease.org

0121 212 6009

Donation, Regular Gift & Gift Aid Declaration Form

To make a one-off gift or set up a direct debit gift online,
go to childliverdisease.org

I'd like to make a gift to CLDF

How much? £10 £20 Other £

I enclose a cheque made payable to Children's Liver Disease Foundation

I wish to pay by card — **MASTERCARD / VISA / DEBIT CARD** (delete as appropriate)

Card No. Expiry Date /..... /.....

Name on Card Security Number: (back of card)

I'd like to make a regular gift by direct debit to CLDF

How much? £5 £10 £20 £25 £50 other £

How often? monthly quarterly half-yearly annually

My bank details:

Bank name: Branch name:

My bank address:

..... Postcode:

My bank sort code: My bank account number:

Please pay to Children's Liver Disease Foundation, account no. 00181442, sort code: 12-05-65

Starting on /..... /..... until further notice. My signature:

Are you a UK taxpayer? Yes / No If yes, please give your gift under Gift Aid.

This means that CLDF can claim the basic rate of tax you have already paid on the amount you are donating. It will not cost you anything.

In order to qualify you must have paid enough UK income or capital gains tax to cover all your charitable donations. Other taxes such as Council Tax or VAT do not apply. We will confirm all gift aid details in your acknowledgement letter.

Yes, please treat this and any future donations as given under gift aid. Date:

About you:

First name: Surname: Title: Mr / Mrs / Ms / Miss /

My address is:

..... Postcode:

Home telephone: Mobile:

Home email: Work email:

To claim gift aid we are required to have your full name and address including postcode.

Please return your completed form to CLDF, address below. Thank you.

Children's Liver Disease Foundation, 36 Great Charles Street, Birmingham B3 3JY

Children's Liver Disease Foundation is the UK's leading organisation dedicated to fighting all liver diseases of childhood.

It provides free of charge:

- A huge selection of literature and online animations on the working of the liver available in print and online
- Information packs for a wide range of audiences, including young people, parents/carers, GP practices, schools and nurseries, friends and relatives
- Families and young people's teams providing services in person, online, facebook, text and phone
- Developing services for adults diagnosed with a liver disease in childhood
- Website – childliverdisease.org
- Young people's website – cldf-focus.org
- National event programme for families and young people to meet, share and have fun
- Secure online message board – childliverdisease.org/forum

Around 75% of CLDF's annual income is derived from voluntary donations. Please help us to continue to support young people, families and adults diagnosed in childhood by making a donation. You can do this online or by completing the donation form in this leaflet. Even better, a regular direct debit gift will enable us to plan our work more fully.

Thank you.

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info@childliverdisease.org



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website



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smartphone
and visit CLDF's
Young People's
website



Children's Liver
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liver disease

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