

# Fibrinogen (factor I) deficiency

A close-up photograph of a young child with dark skin and curly hair, smiling warmly. The child's face is the central focus of the image. The background is a soft, out-of-focus light color. The text is overlaid on the image in white and light purple backgrounds.

Information for families

**Great Ormond Street Hospital  
for Children NHS Foundation Trust**

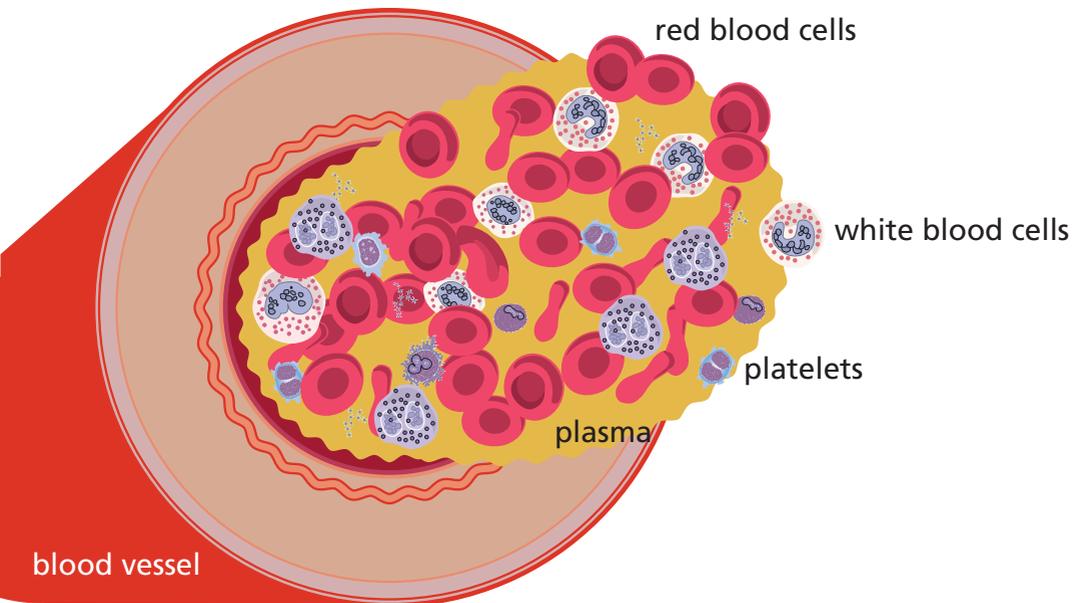
**Fibrinogen (factor I) deficiency is a type of clotting disorder. A specific protein is missing from the blood so that injured blood vessels cannot heal in the usual way. This information from Great Ormond Street Hospital (GOSH) explains the causes, symptoms and treatment of fibrinogen deficiency and where to get help.**

## **What is a clotting disorder?**

A clotting (or coagulation) disorder is a medical condition where a specific protein is missing from the blood.

Blood is made up of different types of cells (red blood cells, white blood cells and platelets) all suspended in a straw-coloured liquid called plasma. Platelets are the cells responsible for making blood clot. When a blood vessel is injured, platelets clump together to block the injury site. They also start off a complicated chemical reaction to form a mesh made of a substance called fibrin. This complicated chemical reaction always follows a strict pattern – with each clotting protein (known as a coagulation factor) turned on in order. When all of the factors are turned on, the blood forms a clot which stops the injury site bleeding any further.

There are a number of coagulation factors circulating in the blood, lying in wait to be turned on when an injury occurs. If any one of the factors is missing from the body, the complicated chemical reaction described above will not happen as it should. This can lead to blood loss, which can be severe and life-threatening. Each coagulation factor is given a number from I to XIII – they are always written as Roman numerals – and the effects of the missing factor will vary.



## What is fibrinogen deficiency?

Fibrinogen deficiency affects only one or two people in every million. The specific coagulation factor that is missing or reduced in people with fibrinogen deficiency is Factor I. This plays an important role in clotting as it is responsible for making fibrin, which forms the mesh stopping bleeding.

There are three main types of fibrinogen deficiency:

- **Afibrinogenaemia** – the most serious form of fibrinogen deficiency where there is no fibrinogen produced at all.
- **Hypofibrinogenaemia** – where reduced amounts of fibrinogen are produced by the body, which can cause mild, moderate or severe bleeding, depending on the amount of fibrinogen present.
- **Dysfibrinogenaemia** – this is where the amount of fibrinogen produced is normal but it does not work properly. There are many subtypes of dysfibrinogenaemia, each with a slightly different cause. Dysfibrinogenaemia rarely causes bleeding problems but can increase the risks of clots developing inside a blood vessel.

The severity of symptoms ranges from mild to severe depending on the amount of fibrinogen present in the blood and its activity.

# What causes fibrinogen deficiency?

Human beings have about 30,000 to 40,000 different genes, each of which has a function in making an individual person. The genes are arranged in pairs (one of the pair from each parent) on 23 chromosomes – inevitably some of these genes are faulty. Fibrinogen deficiency is caused by a mutation (change) on the FGA, FGB or FGG gene all of which play a role in causing blood to clot. These gene mutations are inherited in a different manner, depending on the specific type of Factor I deficiency.

**Afibrinogenaemia** is inherited in an autosomal recessive manner. Autosomal recessive disorders mean that a person has to inherit the faulty gene from both parents to develop the disease. Autosomal recessive disorders are more common in areas of the world where marriage between close relatives is common.

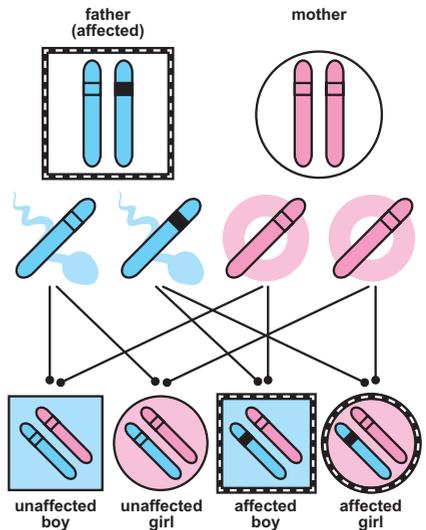
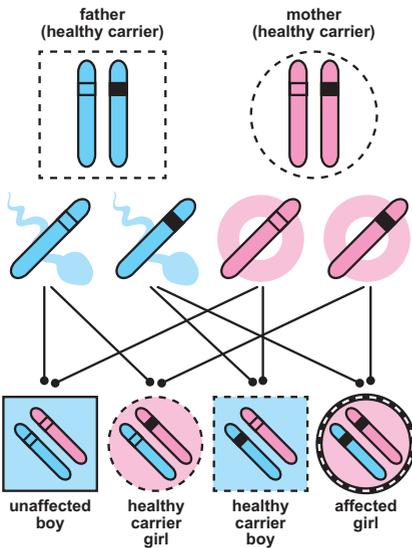
Each pregnancy carries a:

- 75 per cent chance of having an unaffected child
- 25 per chance of having an affected child

**Dysfibrinogenaemia** is inherited in an autosomal dominant manner. Autosomal dominant disorders mean that a person only has to inherit the faulty gene from one parent to develop the disease.

Each pregnancy carries a:

- 50 per cent chance of having an unaffected child
- 50 per chance of having an affected child



**Hypofibrinogenaemia** can be inherited in either a recessive or dominant manner.

People who carry one copy of the faulty gene are said to be a 'carrier'.

The majority of carriers are healthy but occasionally, 'affected carriers' may show mild symptoms of fibrinogen deficiency as their fibrinogen levels can be half that of an unaffected person. This may or may not need treatment.

## What are the signs and symptoms of fibrinogen deficiency?

Symptoms of the afibrinogenaemia form of fibrinogen deficiency often appear soon after birth when the umbilical cord is still present leading to prolonged bleeding. Circumcision or other neonatal surgery can also lead to prolonged bleeding. Other forms of bleeding can also occur, such as nose and mouth bleeds and bleeding into the muscle tissue. Women with fibrinogen deficiency will often have heavy menstrual periods. Pregnancy should be carefully planned as there is an increased risk of early miscarriage or extended bleeding following childbirth.

In hypofibrinogenaemia, symptoms may or may not be present or severe, depending on the amount of fibrinogen present in the blood. If the levels of fibrinogen are minimally reduced, there is less risk of bleeding but if they are low, the risk of bleeding is increased.

The dysfibrinogenaemia form can be very variable in terms of symptoms present and their severity – some people may not show any symptoms. Where symptoms are present, there is an increased likelihood of bleeding but also a risk of clots forming in blood vessels without injury.

## How is fibrinogen deficiency diagnosed?

Fibrinogen deficiency can be diagnosed before birth (prenatally) if there is a family history. There are several options for this including chorionic villus sampling (CVS) early in pregnancy or amniocentesis around 15 to 20 weeks or so.

After birth, fibrinogen deficiency can be diagnosed using a sample of blood for testing in the laboratory. The level of fibrinogen in the blood will also be checked and doctors will try to identify the gene mutation as well, as this can be helpful for planning future brothers and sisters and for testing other family members.

Imaging scans, such as MRI, CT or ultrasound scans may be used to identify any internal bleeds, for instance, inside a joint.

## How is fibrinogen deficiency treated?

The treatment options for fibrinogen deficiency vary depending on the level of fibrinogen in the blood and its activity. For instance, in hypofibrinogenaemia and dysfibrinogenaemia, treatment may not be needed at all. In many cases, what treatment is needed is on an on demand basis to treat symptoms as they occur rather than preventative (prophylaxis). Fibrinogen replacement has been developed from plasma and is now available as an injection.

If symptoms are severe enough to require preventative (prophylaxis) treatment, a substitute Fibrinogen derived from human plasma may be needed to replace the missing or reduced fibrinogen. Treatment may be required as part of planning for an operation or treating an injury. People with dysfibrinogenaemia may need an infusion of fresh frozen plasma (FFP) during the operation and afterwards rather than the factor concentrate.

It is important that people with fibrinogen deficiency should not use Non-Steroidal Anti-Inflammatory Drugs (NSAIDs such as ibuprofen) as this greatly increases the risk of bleeding. Other methods of pain relief should be used instead. Caution is needed for injections as well – immunisations for instance, should be given subcutaneously (under the skin) rather than intramuscularly (into a muscle) to reduce the risk of a painful bruised swelling (haematoma) developing.

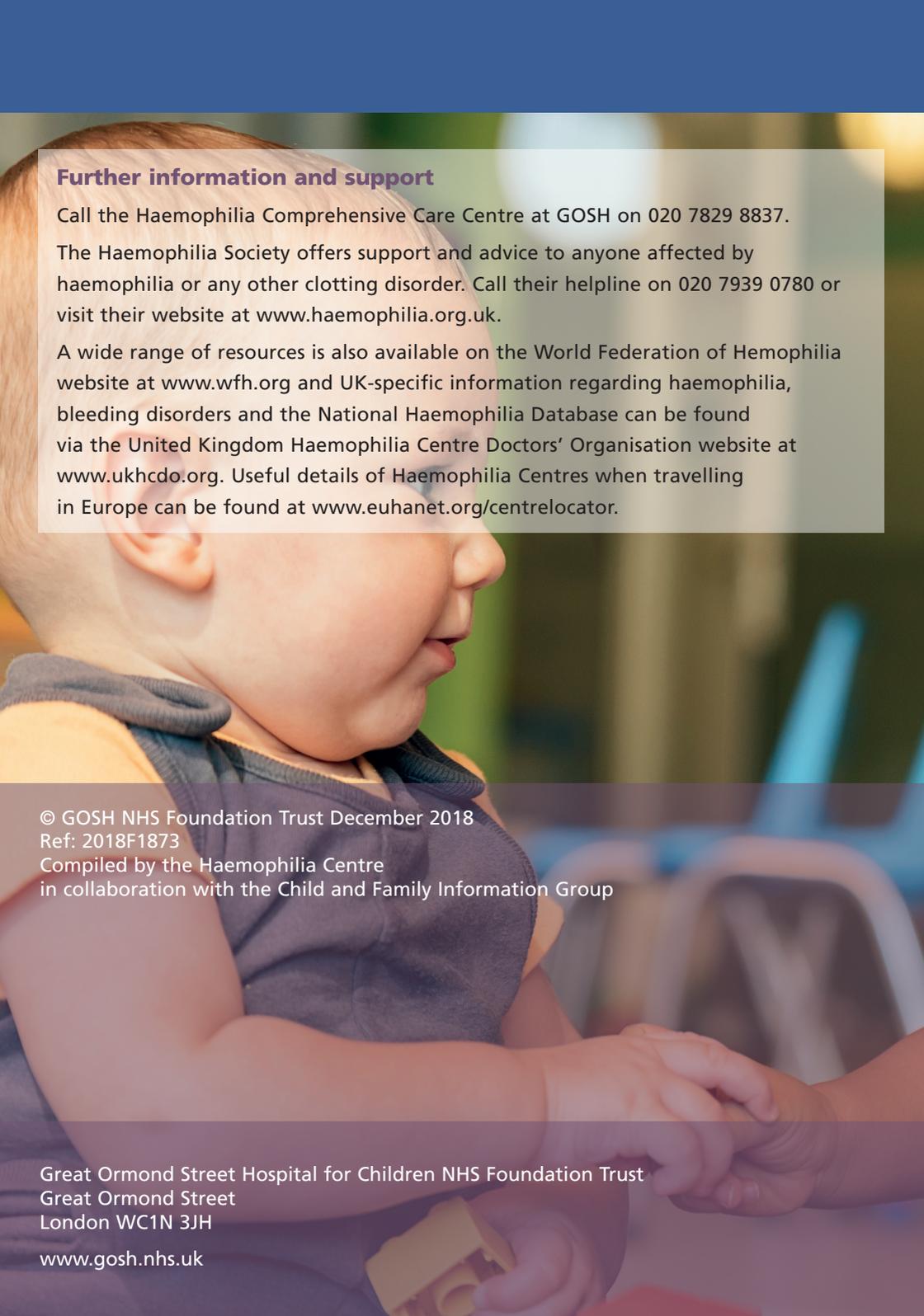
Females may have to take additional measures to make their monthly periods manageable. Options can include taking tranexamic acid before and during her periods, taking the contraceptive pill or having an intra-uterine device (IUD) inserted.

## What happens next?

Children and young people with fibrinogen deficiency have a normal life span. If symptoms are mild or not present, no adjustment to everyday life will be needed, although it is always helpful to be aware of their condition.

If levels of fibrinogen are very low or absent, some activities may need to be avoided, such as contact sports that carry a high risk of head injury for instance, but most day to day activities will cause few problems. It is may be advisable to wear a medical alert identity necklace or bracelet to alert health care professionals about having fibrinogen deficiency – details are available via the support organisation. Any surgery or future pregnancy will need careful planning in advance so it is important that all health care professionals involved are aware.

Children and young people with fibrinogen deficiency may need life-long monitoring and treatment, so as your child approaches their teenage years, we will start to talk to them about getting ready to move on to adult health services. This is a planned process so that they become more independent as they grow older and able to manage their own health.



### Further information and support

Call the Haemophilia Comprehensive Care Centre at GOSH on 020 7829 8837.

The Haemophilia Society offers support and advice to anyone affected by haemophilia or any other clotting disorder. Call their helpline on 020 7939 0780 or visit their website at [www.haemophilia.org.uk](http://www.haemophilia.org.uk).

A wide range of resources is also available on the World Federation of Hemophilia website at [www.wfh.org](http://www.wfh.org) and UK-specific information regarding haemophilia, bleeding disorders and the National Haemophilia Database can be found via the United Kingdom Haemophilia Centre Doctors' Organisation website at [www.ukhcdo.org](http://www.ukhcdo.org). Useful details of Haemophilia Centres when travelling in Europe can be found at [www.euhanet.org/centrelocator](http://www.euhanet.org/centrelocator).

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