CONDITION

Familial lipoprotein lipase deficiency

An inherited condition that causes extremely high blood triglycerides because the body cannot break down certain fat particles.

WHAT IT IS
Inherited inability to clear chylomicrons from blood

BODY SYSTEM
Heart and circulation, digestive system

MAIN SYMPTOMS
Abdominal pain, pancreatitis, eruptive xanthomas, enlarged liver or spleen

WHAT CAUSES IT
Inherited changes affecting lipoprotein lipase

HOW IT IS DIAGNOSED
Fasting triglycerides plus genetic or enzyme testing

MAIN TREATMENT
Lifelong very-low-fat diet and specialist medicines

CAN IT BE CURED?
No - the inherited enzyme deficiency remains

IS IT AN EMERGENCY?
Sometimes - severe abdominal pain may mean pancreatitis

LONG-TERM OUTLOOK
Good control is possible, but pancreatitis risk remains

Overview

Familial lipoprotein lipase deficiency is a rare inherited condition that prevents the body from processing certain fats normally. It is a form of familial chylomicronemia syndrome, or FCS.

After you eat fat, the intestine packages it into particles called chylomicrons. An enzyme called lipoprotein lipase, or LPL, normally breaks down the triglycerides carried in these particles. Triglycerides are a type of fat used for energy.

In this condition, there is little or no working LPL. Chylomicrons therefore remain in the bloodstream, causing triglyceride levels to become extremely high. A blood sample may look cloudy or milky because of the amount of fat it contains.

The main health concern is pancreatitis, which is inflammation of the pancreas. The pancreas is

an organ behind the stomach that helps digest food and control blood sugar. Pancreatitis can cause severe pain and may need hospital treatment.

Symptoms often begin in childhood, but some people are not identified until adolescence or adulthood. The timing and severity are not the same for everyone.

Symptoms

Some people have ongoing symptoms, while others have episodes separated by periods when they feel well. Symptoms may become more noticeable after a high-fat meal, during an illness, or when another factor raises triglycerides.

Possible symptoms and signs include:

Eruptive xanthomas commonly appear on the buttocks, knees, elbows, back or arms. They are deposits of fat in the skin and may improve when triglycerides fall.

The eye finding is called lipemia retinalis. It is usually noticed during an eye examination and does not always affect vision.

Babies and children may have abdominal pain, poor appetite, slow growth or repeated pancreatitis. Because young children may struggle to describe pain, symptoms can sometimes be mistaken for a stomach infection or food intolerance.

- Repeated or unexplained pain in the upper abdomen
- Nausea and vomiting
- Episodes of acute pancreatitis
- Small yellow, red or skin-coloured bumps called eruptive xanthomas
- An enlarged liver or spleen
- Creamy or pale-looking blood vessels at the back of the eye
- Tiredness, poor concentration or a general feeling of being unwell

Causes and risk factors

Familial lipoprotein lipase deficiency is caused by harmful changes in the LPL gene. This gene provides instructions for making the lipoprotein lipase enzyme.

The condition follows an autosomal recessive inheritance pattern. This means a person usually inherits one altered copy of the gene from each parent. The parents are generally healthy carriers because they still have one working copy.

When both parents are carriers, each pregnancy has:

These chances apply separately to every pregnancy. They do not predict what will happen in one particular family.

A family history may not be obvious. The condition can appear unexpectedly when two carriers have a child, and relatives with only one altered gene usually do not have the same severe triglyceride problem.

Factors that can further raise triglycerides or trigger symptoms include alcohol, high-fat meals, poorly controlled diabetes, pregnancy, estrogen-containing medicines and some other medications. These factors do not cause the inherited condition.

- A 1 in 4 chance that the child will have the condition
- A 1 in 2 chance that the child will be a carrier
- A 1 in 4 chance that the child will inherit neither altered copy

Diagnosis

Diagnosis usually begins with blood tests showing persistently extreme fasting triglyceride levels. Chylomicrons may remain in the blood even after an overnight fast.

Triglyceride levels alone do not prove familial lipoprotein lipase deficiency. More common conditions can also cause very high triglycerides, especially when several factors occur together. These include diabetes, obesity, alcohol use, kidney problems and certain medications.

Your clinical history can provide important clues. These include symptoms beginning early in life, repeated pancreatitis, little response to standard triglyceride medicines and the absence of common secondary causes.

Genetic testing can confirm harmful changes in both copies of the LPL gene. Testing may also look at other genes involved in breaking down chylomicrons because changes in those genes can cause a similar form of FCS.

Specialist centres can measure LPL enzyme activity, usually after giving a medicine that releases the enzyme into the blood. This test is less widely available and is now often replaced by genetic testing.

Genetic counselling can help you understand the result, what it means for relatives and whether carrier testing may be useful.

Treatment and management

Treatment aims to keep triglycerides lower, prevent pancreatitis and provide enough nutrition for long-term health. Management is usually coordinated by a lipid specialist and a dietitian familiar with FCS.

A lifelong very-low-fat eating plan is central to treatment. It limits the amount of chylomicrons made after meals. This is more restrictive than an ordinary heart-healthy diet and should be designed around your age, growth, nutritional needs and daily routine.

The goal is not to remove every source of fat without guidance. The body still needs essential fatty acids and fat-soluble vitamins. A dietitian can help prevent deficiencies and advise on food labels, eating out and suitable alternatives. Some people use medium-chain triglycerides because they are absorbed differently, but these should be introduced with professional guidance.

Other practical measures may include avoiding alcohol, managing diabetes if present and reviewing medicines that could raise triglycerides. Do not stop a prescribed medicine without discussing it with the prescriber.

Standard medicines such as fibrates, prescription omega-3 products and statins like atorvastatin or simvastatin often have limited effect on chylomicrons when LPL activity is absent. They may still be used if there are additional lipid problems or another reason to take them.

Targeted medicines that reduce apolipoprotein C-III, a protein involved in triglyceride metabolism, are available for some adults with FCS. Olezarsen is one example. Volanesorsen is available in certain countries. Eligibility and access differ by location, and some treatments require regular blood tests to check for effects such as a reduced platelet count. Platelets help blood clot.

Acute pancreatitis needs hospital care. Treatment may include fluids, pain relief, treatment of nausea and careful nutritional support. Additional triglyceride-lowering procedures are considered only in selected situations.

Complications

The main complication is acute pancreatitis. Attacks can happen more than once, and the risk generally rises when triglycerides remain extremely high. However, an exact triglyceride result cannot predict when an attack will occur.

Repeated inflammation may eventually cause chronic pancreatitis. This can lead to continuing pain, difficulty digesting food or diabetes if the pancreas can no longer make enough digestive

enzymes or insulin.

Severe pancreatitis can occasionally affect other organs. Prompt assessment of significant abdominal pain helps ensure that supportive treatment starts early.

A restrictive diet can also create nutritional or emotional challenges. Children need monitoring to make sure they are growing well. Adults may find eating at work, travelling and social events difficult. Dietitian support and contact with others living with FCS may help.

Familial lipoprotein lipase deficiency does not carry the same straightforward artery-disease risk as more common forms of high triglycerides. Chylomicrons are large particles that do not easily enter artery walls. Your overall heart and circulation risk still needs separate assessment based on blood pressure, smoking, diabetes and other cholesterol particles.

Prevention

The condition itself cannot be prevented because it is inherited.

Pancreatitis and other complications may sometimes be prevented or reduced by following the recommended very-low-fat eating plan, avoiding alcohol, taking prescribed treatment and addressing additional causes of high triglycerides.

Genetic counselling cannot prevent the gene change, but it can explain reproductive options and testing before or during pregnancy. The choice to use any form of genetic testing is personal.

Living with it and what to expect

Familial lipoprotein lipase deficiency is lifelong. The underlying gene changes and lack of working LPL do not go away, even when triglyceride results improve.

Many people can study, work, exercise and have families. Daily life often requires more food planning than it does for other people. Fat intake may need close attention at every meal, including during travel, celebrations and restaurant visits.

Symptoms may change over time. Some people have long periods without pancreatitis, while others continue to have attacks despite careful management. Illness, pregnancy, hormonal changes and difficulty maintaining the diet can alter triglyceride levels.

Regular follow-up usually includes triglyceride testing, a review of abdominal symptoms, nutrition checks and monitoring for treatment side effects. Children also need growth and development checks. If pancreatitis has occurred repeatedly, follow-up may include

assessment for diabetes or poor digestion.

Pregnancy naturally raises triglycerides and can substantially increase pancreatitis risk in someone with this condition. Planning before pregnancy allows lipid, maternity and nutrition specialists to review treatment and arrange closer monitoring.

Newer medicines may reduce triglycerides and pancreatitis risk for some people, but they do not remove the inherited cause. Diet and follow-up usually remain important.

When to get medical help

Seek emergency medical care for severe or persistent upper abdominal pain, especially if it spreads to the back or occurs with repeated vomiting. These symptoms may be caused by acute pancreatitis and should not be managed at home.

Emergency assessment is also appropriate if abdominal pain is accompanied by fainting, confusion, breathing difficulty or an inability to keep fluids down.

Seek urgent same-day advice for new or steadily worsening abdominal pain, repeated vomiting, or symptoms resembling a previous pancreatitis attack. During pregnancy, report abdominal pain or persistent vomiting promptly to your maternity team.

Arrange routine follow-up if:

- Abdominal symptoms are becoming more frequent
- Your prescribed eating plan has become difficult to maintain
- You notice new skin bumps that may be xanthomas
- You have possible medication side effects
- You are planning a pregnancy
- You need help with nutrition, school, work or travel

Common questions

Is familial lipoprotein lipase deficiency the same as high cholesterol?

No. It mainly causes very high triglycerides carried in chylomicrons. Cholesterol and triglycerides are different fats, although both appear on a lipid blood test.

Can I eat any fat if I have this condition?

The body needs some fat, including essential fatty acids, but the total amount usually has to be

very low. Removing all fat without guidance can cause nutritional problems. A specialist dietitian can help identify suitable amounts and food sources.

Why do ordinary triglyceride medicines sometimes not work?

Many standard medicines lower triglycerides partly by increasing LPL activity. If the body has almost no working LPL, these medicines may have little effect on chylomicrons. Targeted treatments work through different pathways.

Can my children inherit it?

A child would usually need to inherit an altered LPL gene from both parents to have the condition. If your partner is not a carrier, your children would generally be carriers rather than having the condition. Genetic counselling can clarify your family's situation.

Does it always cause pancreatitis?

No. Not everyone has the same number or severity of attacks. However, pancreatitis remains the main health risk, even during periods when you feel well.

Can it be cured with a special diet?

No. Diet does not correct the altered gene or restore the missing enzyme. It can reduce chylomicron production, lower triglycerides and help prevent complications.

Sources

- MedlinePlus Genetics: Familial lipoprotein lipase deficiency , US National Library of Medicine
- Moulin P, Dufour R, Averna M, et al. "Identification and diagnosis of patients with familial chylomicronemia syndrome: Expert panel recommendations and proposal of an FCS score." Atherosclerosis . 2018;275:265-272
- Brahm AJ, Hegele RA. "Chylomicronaemia-current diagnosis and future therapies." Nature Reviews Endocrinology . 2015;11:352-362
- Endotext: Pancreatitis Secondary to Hypertriglyceridemia , National Center for Biotechnology Information
- US Food and Drug Administration: Tryngolza prescribing information , olezarsen
- European Medicines Agency: Waylivra , volanesorsen assessment and product information