CONDITION

Inherited lipodystrophy

Inherited lipodystrophy is a group of genetic conditions that cause abnormal body-fat loss and serious metabolic problems.

WHAT IT IS
Inherited conditions causing abnormal loss or distribution of body fat

BODY SYSTEM
Fat tissue, metabolism, liver, heart, and muscles

MAIN SYMPTOMS
Unusual fat loss, muscular appearance, darkened skin, increased hunger

WHAT CAUSES IT
Inherited gene changes affecting fat-cell development or function

HOW IT IS DIAGNOSED
Body-fat assessment, metabolic blood tests, and genetic testing

MAIN TREATMENT
Metabolic care, nutrition support, and sometimes leptin replacement

CAN IT BE CURED?
No - genetic changes cannot be reversed

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

LONG-TERM OUTLOOK
Lifelong metabolic risks, reduced by early specialist care

Overview

Inherited lipodystrophy is a group of rare genetic conditions in which the body cannot develop or maintain fat tissue normally. Despite the name, this is not simply a problem with appearance or body weight.

Healthy fat tissue stores energy and releases hormones that help control hunger, blood sugar, and blood fats. When too little working fat tissue is available, excess energy may collect in the liver, muscles, and bloodstream instead. This can lead to diabetes, very high triglycerides, fatty liver, and other complications.

There are two broad patterns:

The exact pattern and health risks differ between genetic subtypes. Some mainly affect fat

storage, while others may also affect the heart, muscles, bones, or nerves.

- Generalized lipodystrophy affects most of the body. It is often noticeable at birth or during early childhood.
- Partial lipodystrophy affects certain areas, often the arms, legs, hips, or trunk. It may become clearer around puberty or adulthood. Fat can build up in other areas, such as the face, neck, or abdomen.

Symptoms

The most visible feature is an unusual lack of fat under the skin. This can make muscles and veins look prominent. In generalized forms, fat loss may involve nearly the whole body. In partial forms, the contrast between areas of fat loss and fat accumulation can be more noticeable than overall thinness.

Possible signs and symptoms include:

Many symptoms come from insulin resistance. This means the body has difficulty responding to insulin, the hormone that moves glucose from the blood into cells. It may cause tiredness, increased thirst, frequent urination, blurred vision, or recurrent infections if blood sugar becomes high.

Some people have few visible metabolic symptoms at first. Complications may still develop over time, particularly during puberty, pregnancy, illness, or periods of weight gain.

- Very little fat beneath the skin
- A muscular or sharply defined appearance without intensive training
- Fat collecting around the face, neck, or abdomen
- Strong hunger that is difficult to satisfy
- Rapid growth or large hands and feet during childhood
- Dark, thickened, velvety skin, especially around the neck or armpits
- An enlarged abdomen due to a large liver
- Small fatty lumps beneath the skin in some subtypes
- Irregular periods, excess facial or body hair, or reduced fertility
- Muscle weakness, joint stiffness, or abnormal posture in certain subtypes

Causes and risk factors

Inherited lipodystrophy is caused by a change in a gene involved in making, storing, or maintaining fat cells. Several genes can be responsible. Examples include AGPAT2 , BSCL2 , LMNA , PPARG , and PLIN1 , but this is not a complete list.

The pattern of inheritance differs by subtype. Some forms are autosomal recessive , meaning a child usually inherits one changed gene copy from each parent. The parents often do not have the condition themselves. Other forms are autosomal dominant , meaning one changed gene copy can cause the condition.

A person may be the first in their family to have a particular gene change. For this reason, having no known family history does not rule out inherited lipodystrophy.

The condition is not caused by dieting, exercise, an eating disorder, or anything a parent did during pregnancy. It is also different from acquired lipodystrophy, which can develop after an autoimmune condition, infection, or certain medical treatments.

Diagnosis

Diagnosis usually begins with a detailed history and an examination of body-fat distribution. Childhood photographs can sometimes help show when changes began. Family history, growth, muscle strength, skin changes, and signs of liver or heart problems may also be reviewed.

Blood and urine tests check for complications. These may include:

Imaging such as a DXA scan or MRI can measure where fat is present or absent. Liver imaging may look for fat buildup or scarring. Heart tests may be needed when the suspected genetic subtype can affect heart muscle or rhythm.

A blood leptin measurement is sometimes useful. Leptin is a hormone mainly produced by fat cells. However, there is no single leptin level that confirms or excludes lipodystrophy.

Genetic testing can confirm many inherited forms and identify the subtype. A negative genetic result does not always rule out the condition because not every responsible gene or variant is known. Genetic counselling can help you understand what a result means for you and your relatives.

- Fasting glucose and HbA1c, which reflect blood-sugar control
- Triglycerides and cholesterol
- Liver enzymes

- Kidney function and protein in the urine

Treatment and management

There is no treatment that restores normal fat tissue throughout the body or reverses the genetic change. Management focuses on reducing metabolic complications, supporting healthy growth, and addressing the effects on appearance and emotional wellbeing.

Food planning is an important part of care. The aim is balanced nutrition rather than severe calorie restriction. A dietitian familiar with lipodystrophy can help with meals that limit sharp rises in blood sugar and triglycerides while still providing enough energy, protein, vitamins, and minerals.

Regular physical activity can improve insulin sensitivity and cardiovascular health. The type and intensity may need adjustment if a subtype affects the heart, muscles, joints, or bones.

Medicines may be used to manage diabetes, high triglycerides, high cholesterol, blood pressure, or liver complications. Insulin is sometimes required, although severe insulin resistance can make blood-sugar management challenging.

Metreleptin is a laboratory-made form of leptin. It can improve metabolic complications in some people with generalized lipodystrophy and severe leptin deficiency. Approved uses differ between countries, and access is usually through a specialist service. It is not a cure, and its role in partial lipodystrophy is more limited.

Treatment may also include support for irregular periods or fertility problems. Reconstructive or cosmetic procedures can sometimes alter facial contours or other visible differences, but they do not treat the underlying metabolic risks.

Ongoing monitoring commonly includes blood sugar, triglycerides, liver health, kidney function, blood pressure, and heart health. The tests and their frequency are based on age, subtype, symptoms, and existing complications.

Complications

The main complications occur because excess energy is stored in organs and the bloodstream rather than in healthy fat tissue.

Very high triglycerides can inflame the pancreas, causing pancreatitis . This usually causes severe, persistent upper abdominal pain and often vomiting.

Fat can build up in the liver. Over time, this may cause inflammation, scarring called fibrosis, or

advanced scarring called cirrhosis. An enlarged liver can also cause abdominal fullness.

Severe insulin resistance can lead to diabetes. Long-term high blood sugar may damage the kidneys, eyes, nerves, and blood vessels.

Certain genetic subtypes can cause weakness of the heart muscle or abnormal heart rhythms. Others may be associated with muscle weakness, joint problems, bone cysts, hearing changes, or nerve problems. These complications are subtype-specific and do not affect everyone.

Visible differences and the effort required to manage food, medicines, and monitoring can affect confidence, relationships, and mental health. Psychological support or contact with a patient community may be useful.

Prevention

Inherited lipodystrophy cannot currently be prevented. It results from a genetic change and is not caused by lifestyle choices.

Early recognition and treatment may help prevent or delay some complications. Keeping scheduled monitoring appointments allows changes in blood sugar, triglycerides, liver health, or heart function to be found before they cause major symptoms.

If a specific gene change has been identified, genetic counselling can explain the chance of passing it to a child. It can also discuss testing for relatives and available reproductive options without assuming what choice is right for your family.

Living with it and what to expect

Inherited lipodystrophy is lifelong, but its course is not the same for everyone. The amount and location of fat loss usually remain abnormal. Treatment controls the effects of the condition rather than permanently changing fat distribution.

In congenital generalized forms, the lack of fat is often present from infancy. Metabolic problems may appear during childhood and can become more difficult around puberty. In familial partial forms, a child may initially have a typical fat pattern, with changes becoming clearer during puberty or early adulthood.

Blood sugar, triglycerides, and liver health can change over months or years. Pregnancy, illness, reduced activity, or weight gain may increase metabolic strain. Regular follow-up remains important even when you feel well.

Many people study, work, have relationships, and raise families. Daily life may involve meal

planning, physical activity, medicines, blood tests, and appointments with metabolic or hormone specialists. Some people also need liver, heart, kidney, fertility, or genetics services.

It can help to keep a summary of your genetic diagnosis, medicines, recent laboratory results, and specialist contacts. Because the condition is rare, this information may be useful when attending an unfamiliar clinic or emergency department.

When to get medical help

Seek emergency care for:

Get urgent medical assessment for severe, persistent upper abdominal pain, especially with vomiting. This may be pancreatitis caused by very high triglycerides.

Vomiting, abdominal pain, deep breathing, confusion, or high ketone readings can be signs of a serious diabetes emergency. Follow any emergency plan you have been given and seek urgent care.

Arrange routine medical follow-up if you notice increased thirst or urination, unexplained tiredness, worsening abdominal swelling, new muscle weakness, irregular periods, or changes in body-fat distribution. A family diagnosis of inherited lipodystrophy is also a reason to discuss genetic assessment, even if you have no symptoms.

- Chest pain, severe breathing difficulty, fainting, or a sustained racing heartbeat
- New facial drooping, one-sided weakness, severe confusion, or trouble speaking
- Deep or difficult breathing, marked drowsiness, or loss of consciousness

Common questions

Is inherited lipodystrophy the same as being very thin?

No. A thin person can still have normally functioning fat tissue. In lipodystrophy, fat cells are missing or do not work normally, so energy may collect in the liver, muscles, and blood. Metabolic complications can occur even when body weight is low.

Can I gain the missing fat by eating more?

Usually not. Eating more does not correct the underlying problem with fat cells. Extra energy may instead increase triglycerides, blood sugar, liver fat, or fat deposits in areas that are less affected. Nutrition plans should support health and growth without attempting to "feed back" the missing tissue.

Is inherited lipodystrophy autoimmune?

No. Inherited forms are caused by genetic changes. Some acquired forms of lipodystrophy are linked to autoimmune conditions, in which the immune system mistakenly attacks the body's own tissues.

Will my children inherit it?

The chance depends on the gene and whether the subtype is dominant or recessive. It can range from a low chance to a one-in-two chance in each pregnancy. Genetic counselling can calculate the chance more accurately after reviewing your genetic result and family history.

Does metreleptin work for everyone?

No. Its clearest role is in people with generalized lipodystrophy who have complications related to very low leptin. Response and eligibility differ, and approved uses vary by country. It does not replace routine management of blood sugar, triglycerides, nutrition, and organ health.

Can cosmetic treatment cure lipodystrophy?

No. Procedures such as facial fillers or fat transfer may change appearance in selected areas, but they do not correct the genetic cause or prevent metabolic complications. Results may also be temporary or limited by the amount of usable fat tissue.

Sources

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