CONDITION

Growth hormone deficiency

Growth hormone deficiency means the pituitary gland does not make enough hormone for normal growth, body composition, and metabolism.

WHAT IT IS
Too little growth hormone from the pituitary gland

BODY SYSTEM
Hormone system, growth, bones, muscles, and metabolism

MAIN SYMPTOMS
Slow childhood growth, low energy, reduced muscle, increased body fat

WHAT CAUSES IT
Pituitary problems, genetic changes, brain injury, or unknown causes

HOW IT IS DIAGNOSED
Growth assessment, blood tests, and usually stimulation testing

MAIN TREATMENT
Growth hormone replacement injections

CAN IT BE CURED?
Sometimes - temporary deficiency may resolve

IS IT AN EMERGENCY?
No - unless sudden headache or vision loss develops

LONG-TERM OUTLOOK
Usually manageable with specialist monitoring and hormone replacement

Overview

Growth hormone deficiency, often shortened to GHD, means the body does not make enough growth hormone. This hormone is produced by the pituitary, a small gland at the base of the brain.

Growth hormone is important for childhood growth. It also helps regulate muscle, body fat, bones, blood fats, and how the body uses energy. Adults need much less than growing children, but the hormone still has important effects.

GHD can begin before birth, appear during childhood, or develop in adult life. It may occur by itself or alongside deficiencies of other pituitary hormones.

In children, the main concern is usually slow growth. In adults, the effects are less specific and

may include reduced strength, low energy, and changes in body composition. These symptoms have many possible causes, so they do not confirm GHD on their own.

Symptoms

In children, the clearest sign is usually growth that is slower than expected. A child may grow less each year than other children of a similar age, or drop across the height lines on a growth chart. Short height alone does not necessarily mean GHD; many healthy children are short because of family growth patterns.

Children with GHD often have normal body proportions. They may look younger than their age, have less muscle, or carry more fat around the waist. Tooth development and puberty may be delayed.

Severe GHD present from birth can cause low blood sugar in a newborn. Some boys may have a very small penis. These signs often occur when other pituitary hormones are also missing.

Adults may notice reduced exercise capacity, less muscle strength, increased fat around the abdomen, tiredness, or a lower sense of wellbeing. Bone density may decrease over time, and cholesterol or other blood fats may become less healthy.

Adult symptoms tend to develop gradually and overlap with sleep problems, depression, menopause, thyroid conditions, medication effects, and other common health issues.

Causes and risk factors

Some people are born with GHD. It can result from genetic changes or from differences in how the pituitary gland, nearby brain structures, or the nerve connections controlling the gland developed.

GHD can also be acquired later. Possible causes include:

Not every pituitary tumour causes GHD, and most head injuries do not lead to it. Risk is influenced by the location and extent of the injury or treatment.

Sometimes testing does not identify a cause. This is called idiopathic GHD, meaning the cause is unknown.

People with deficiencies of several pituitary hormones are more likely to have GHD than people with an isolated, non-specific symptom such as tiredness.

- A tumour in or near the pituitary gland

- Surgery or radiotherapy involving the pituitary or brain
- A significant head injury
- Inflammation, infection, or bleeding affecting the pituitary
- Conditions that damage or press on the pituitary gland

Diagnosis

Diagnosis is usually led by an endocrinologist, a specialist in hormone conditions. The process differs between children and adults.

For a child, the assessment begins with accurate height and weight measurements over time. Growth speed is often more useful than one height measurement. The clinician may also consider birth history, family heights, nutrition, puberty, medicines, and symptoms of long-term illness.

Blood tests may measure insulin-like growth factor 1, or IGF-1. Growth hormone causes the body to make IGF-1, so its level can provide indirect information. However, a low IGF-1 does not confirm GHD. Poor nutrition, liver conditions, untreated thyroid deficiency, age, and stage of puberty can affect the result.

Other tests may look for thyroid problems, coeliac disease, inflammation, or other causes of slow growth. A hand and wrist X-ray may be used to assess bone age, which shows how mature the skeleton is.

Growth hormone is released in pulses, mainly during sleep. A random blood level can therefore be low in someone without GHD and is not a reliable diagnostic test.

Most people need a growth hormone stimulation test. During this supervised test, medicine is used to encourage the pituitary to release growth hormone. Several blood samples are then taken. The result must be interpreted using the specific test method and the person's clinical circumstances.

Adults usually need stimulation testing as well. Testing may not be required in some people who have a clearly documented genetic or structural pituitary condition and deficiencies of several other pituitary hormones.

An MRI scan may be used to examine the pituitary gland and surrounding area. MRI can help identify a structural cause, but a normal scan does not rule out GHD.

Treatment and management

The main treatment is laboratory-made human growth hormone, also called somatropin. It is given by an injection under the skin. Daily products are widely used, and longer-acting products are available for some age groups and circumstances.

Treatment is individualised according to age, growth, symptoms, test results, and side effects. Children and adults do not receive the same approach. A specialist adjusts treatment rather than using one fixed amount for everyone.

In children with confirmed GHD, treatment can improve growth speed and help the child move toward their expected adult height. Response is often strongest during the first year, but no exact height can be promised.

In adults, treatment may improve body composition, exercise capacity, bone health, or quality of life. Benefits differ between people and may take time to assess.

Follow-up can include measurements of height and puberty in children, IGF-1 blood tests, checks of blood sugar, and review of symptoms and side effects. Thyroid and adrenal function may also need monitoring because treatment can reveal or change the management of other pituitary hormone deficiencies.

Possible side effects include swelling, joint or muscle discomfort, headache, and tingling in the hands. These are more common in adults and may improve after the treatment amount is adjusted.

Rare but important problems include increased pressure around the brain, which can cause severe headache or vision symptoms. In growing children, new hip or knee pain or a limp needs prompt assessment because of a possible problem at the hip growth plate.

Growth hormone is not used simply to improve athletic performance or reverse normal ageing. It is also not usually started while someone has active cancer. A specialist considers previous tumours, current health, and the likely benefits and risks.

Complications

Untreated childhood GHD may result in a shorter adult height than the child's underlying growth potential. Delayed puberty may also affect confidence and social wellbeing.

Persistent adult GHD can contribute to reduced muscle, increased abdominal fat, lower bone density, and unfavourable cholesterol levels. These findings are influenced by many other factors, so their presence does not prove GHD.

GHD may occur with low levels of cortisol, thyroid hormone, or sex hormones. Cortisol deficiency is particularly important because severe untreated deficiency can lead to an adrenal

crisis. This risk comes from the wider pituitary problem, not from low growth hormone alone.

Treatment complications are uncommon with careful monitoring, but side effects can occur. New headaches, vision changes, swelling, persistent joint pain, or changes in blood sugar should be reviewed.

Prevention

Congenital or inherited GHD cannot usually be prevented. GHD caused by an unavoidable pituitary condition, tumour, surgery, or necessary radiotherapy may also not be preventable.

When treatment near the pituitary is needed, the medical team plans it to protect healthy tissue as much as possible. This cannot remove all risk.

Regular hormone follow-up after pituitary surgery, brain radiotherapy, or certain significant head injuries may allow GHD to be recognised earlier. Follow-up detects the condition; it does not prevent it.

Living with it and what to expect

Children receiving growth hormone usually need treatment and monitoring over several years. Families may be taught how to give injections and how to store and use the device. Injection routines often become easier with practice, but concerns about discomfort or missed injections should be discussed rather than hidden.

Growth is measured regularly. Puberty, bone development, treatment response, and emotional wellbeing may also be reviewed. Some children remain shorter than average despite treatment, while others make substantial catch-up growth.

Treatment for height usually stops when growth is nearly complete. Childhood GHD is not always permanent, so many young people are retested after reaching adult height. Those with persistent severe GHD may continue or restart treatment using an adult approach.

Adults with confirmed ongoing GHD may use replacement treatment for many years. Reviews focus on whether it provides meaningful benefit, whether side effects are manageable, and whether other pituitary hormones remain properly replaced.

GHD does not usually limit school, work, relationships, travel, or exercise when it is appropriately managed. Living with a pituitary condition may still involve regular appointments, blood tests, and planning for injections.

When to get medical help

Arrange a routine appointment if a child appears to be growing more slowly than expected, is dropping across growth-chart lines, or has delayed puberty. Adults should seek routine assessment for persistent symptoms if they also have a history of pituitary disease, brain surgery, radiotherapy, or a significant head injury.

Contact the treatment team promptly for a new limp, hip or knee pain, persistent swelling, severe or repeated headaches, or changes in vision while using growth hormone.

Seek emergency care for a sudden severe headache with vision loss, confusion, fainting, repeated vomiting, or weakness that develops quickly. These symptoms can point to bleeding or sudden pressure in the pituitary area.

A person with known pituitary-related cortisol deficiency needs emergency help for symptoms of an adrenal crisis, such as severe weakness, collapse, confusion, or persistent vomiting. Follow the emergency steroid plan provided by their clinical team.

Low blood sugar in a newborn or infant, especially with unusual sleepiness, shaking, poor feeding, or seizures, also needs immediate medical care.

Common questions

Is growth hormone deficiency the same as being short?

No. Many short children are healthy and grow at a steady rate that reflects their family pattern. GHD usually causes an unusually slow growth rate, not just a height below average. Growth records and hormone testing help distinguish the causes.

Can growth hormone deficiency be cured?

Some childhood cases are temporary and are no longer present when testing is repeated after growth ends. Genetic or structural pituitary causes are more likely to persist. Replacement treats the hormone shortage but does not repair a permanently damaged pituitary gland.

Will growth hormone make my child reach an average height?

It can improve growth in a child with confirmed GHD, but the final height cannot be guaranteed. The outcome is influenced by age at treatment, severity of deficiency, family height, puberty timing, other health conditions, and treatment response.

Can adults suddenly develop growth hormone deficiency?

Yes. It can develop after pituitary tumours, surgery, radiotherapy, bleeding, or some brain injuries. Symptoms are usually gradual and non-specific. Proper hormone testing is needed

before attributing tiredness or weight changes to GHD.

Are growth hormone injections safe?

They have a well-established role in confirmed GHD and are usually tolerated with specialist monitoring. Side effects can include swelling, joint discomfort, headaches, or changes in blood sugar. Serious complications are uncommon but need prompt assessment.

Do I need growth hormone for life?

Not always. Children are often retested after reaching adult height because the deficiency may not persist. People with permanent pituitary damage or a genetic cause may need long-term treatment, provided it continues to offer benefit and remains appropriate.

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