CONDITION

Hypogonadotropic hypogonadism

Hypogonadotropic hypogonadism is low sex hormone production caused by reduced hormone signals from the brain.

WHAT IT IS
Reduced sex hormones from weak brain hormone signals

BODY SYSTEM
Hormone and reproductive systems

MAIN SYMPTOMS
Delayed puberty, irregular periods, low sex drive, infertility

WHAT CAUSES IT
Inherited changes, pituitary disorders, medicines, low energy availability

HOW IT IS DIAGNOSED
Sex hormone and LH/FSH blood tests, sometimes pituitary MRI

MAIN TREATMENT
Hormone replacement, cause treatment, fertility therapy

CAN IT BE CURED?
Sometimes - reversible causes can recover

IS IT AN EMERGENCY?
Sometimes - sudden severe headache with vision changes

LONG-TERM OUTLOOK
Usually manageable with treatment and long-term monitoring

Overview

Hypogonadotropic hypogonadism is a condition in which the ovaries or testicles do not make enough sex hormones because they are not receiving strong enough signals from the brain.

These signals begin in the hypothalamus, a part of the brain that releases gonadotropin-releasing hormone, or GnRH. GnRH tells the pituitary gland to release two hormones called luteinising hormone, or LH, and follicle-stimulating hormone, or FSH. LH and FSH then stimulate the ovaries or testicles.

When this signalling pathway is disrupted, estrogen or testosterone levels become low. This can affect puberty, menstrual periods, sexual function, fertility, bones, muscles and emotional well-being.

The condition may be present from birth, although it might not become clear until puberty. It can also develop later because of another health condition, a medicine, a pituitary problem or insufficient energy intake.

One inherited form associated with a reduced or absent sense of smell is called Kallmann syndrome. Some people with congenital hypogonadotropic hypogonadism have a normal sense of smell.

Symptoms

Symptoms depend on when the condition begins, which hormones are low and how severe the hormone shortage is.

Before or during puberty, possible signs include:

Some boys born with congenital forms have an undescended testicle or an unusually small penis. These signs are not always present.

After puberty, low estrogen may cause menstrual periods to become irregular or stop. Other possible symptoms include vaginal dryness, discomfort during sex, hot flushes, reduced sexual interest and difficulty becoming pregnant.

Low testosterone may cause reduced sexual interest, fewer spontaneous erections, erection difficulties, lower energy, reduced muscle mass or difficulty producing sperm.

People of any sex may experience tiredness, low mood, poor concentration or reduced bone strength. These symptoms have many possible causes, so they do not confirm hypogonadotropic hypogonadism by themselves.

Some congenital forms can also affect smell. Less commonly, they may occur with hearing loss, cleft lip or palate, unusual hand movements, missing teeth or development of only one kidney.

Symptoms such as headaches, changes in peripheral vision, excessive thirst or unexplained milk production from the breasts may suggest a wider pituitary problem.

- Puberty that does not start or does not progress as expected
- Limited breast development or lack of menstrual periods
- Limited facial and body hair growth
- A voice that does not deepen
- Small testicles or penis

- Slower development of muscle and bone strength

Causes and risk factors

Congenital hypogonadotropic hypogonadism results from differences in the development or function of the cells that make or respond to GnRH. Gene changes have been identified in some people. A change may be inherited from a parent or may arise for the first time in that person. Genetic testing does not find a cause in every case.

Acquired causes can affect the hypothalamus, pituitary gland or both. These include:

The reproductive system can also reduce hormone signalling when the body has too little available energy. This may follow significant weight loss, restrictive eating, undernutrition or intense exercise without enough food to meet the body's needs. Psychological stress can contribute. In people who menstruate, this pattern is often called functional hypothalamic amenorrhea.

Higher body weight, sleep disorders and some chronic health conditions can also be associated with reduced reproductive hormone activity. A low testosterone result in these settings does not automatically mean permanent hypogonadotropic hypogonadism.

- Pituitary or nearby brain tumours
- Brain surgery, radiation treatment or head injury
- High prolactin levels
- Iron overload disorders and some inflammatory conditions
- Long-term use of medicines that suppress hormone signalling, including opioids like oxycodone or morphine
- Severe or ongoing illness

Diagnosis

Diagnosis usually begins with your symptoms, puberty and menstrual history, sexual health, medicines, nutrition, exercise pattern and family history. A physical examination may assess growth, pubertal development, body hair, breast or genital development and sense of smell.

Blood tests measure the relevant sex hormone together with LH and FSH. The typical pattern is a low sex hormone level with LH and FSH that are low or not appropriately raised.

In adult men, testosterone is usually checked on more than one morning because levels

change during the day and can fall temporarily during illness. In women, estradiol results are interpreted alongside menstrual patterns, pregnancy testing and any hormone medicines being used.

Other tests may include prolactin, thyroid hormones, iron studies and tests of the remaining pituitary hormones. This is important because a pituitary condition may affect cortisol, thyroid hormone or growth hormone as well as reproductive hormones.

A pituitary MRI uses a magnetic scanner to look for a tumour or structural problem. It is more likely to be needed when there are headaches, vision changes, several pituitary hormone problems, high prolactin or no clear functional explanation.

Bone density scanning may be advised if sex hormone levels have been low for a long time. Genetic testing can sometimes identify a congenital cause and help with family counselling, but a negative result does not rule it out.

Treatment and management

Treatment is based on your age, the cause, whether puberty is complete, your other hormone levels and whether fertility is a current goal.

If there is a reversible cause, management focuses on that cause. This may include improving nutrition and energy availability, adjusting excessive training, treating another illness or managing a pituitary disorder. Medicines should be reviewed with the prescriber rather than stopped suddenly.

Sex hormone treatment can start puberty, maintain adult hormone levels and protect bone and muscle health. Puberty is generally induced gradually to allow development over time.

Testosterone can support male puberty and maintain testosterone-dependent functions. It does not stimulate sperm production and can suppress sperm while it is being used.

Estrogen can support female puberty and maintain estrogen-dependent functions. If you have a uterus, a form of progesterone is generally added at an appropriate stage to protect its lining. Hormone replacement does not always provide contraception.

People who want to produce eggs or sperm may need fertility-specific treatment. Gonadotropin medicines act like LH and FSH. Pulsed GnRH treatment may be an option in some specialist centres when the pituitary gland can respond. Assisted reproductive treatment, including in vitro fertilisation, may sometimes be considered.

Monitoring may include symptoms, physical development, hormone levels, blood counts and bone health. People with a pituitary disorder may also need replacement of other hormones.

Cortisol deficiency needs particular attention because severe deficiency can become an emergency.

Complications

Without adequate sex hormones, puberty may remain incomplete and peak bone strength may not develop fully. In adults, long-term deficiency can lead to low bone density and a greater risk of fractures.

Fertility may be reduced because the ovaries do not regularly release eggs or the testicles do not produce enough sperm. This does not always mean pregnancy is impossible. Specialist fertility treatment can be effective for many people, although the response and time needed differ.

Other possible effects include reduced muscle mass, sexual difficulties and distress about puberty, body image or fertility. Support from a counsellor or peer group may help if the condition is affecting relationships or emotional health.

Complications caused by an underlying pituitary tumour or by deficiencies of other pituitary hormones are separate from the reproductive hormone problem and may require additional treatment.

Prevention

Congenital hypogonadotropic hypogonadism cannot currently be prevented. Genetic counselling can explain possible inheritance patterns, but it cannot predict every case because many genes may be involved and testing may not identify a cause.

Not every acquired case is preventable. Pituitary tumours, necessary brain treatments and inflammatory conditions may occur without anything you could have done differently.

Functional suppression related to low energy availability may sometimes be avoided by eating enough to support growth, daily activity and exercise. Early help for restrictive eating, rapid weight loss or disrupted periods may reduce the length of hormone suppression.

Do not stop prescribed opioids, steroid medicines or hormone treatments to try to prevent this condition. Changes should be planned with the prescriber.

Living with it and what to expect

The long-term course is linked to the cause. Hormone signalling may recover after nutrition improves, a suppressing medicine is changed safely, a high prolactin level is treated or another illness settles. Recovery is not immediate in every case.

Congenital forms are often long-term. A minority of people later regain reproductive hormone function, but it is not possible to predict this reliably. Ongoing monitoring is still important if hormone levels appear to recover.

With suitable hormone replacement, many people develop or maintain typical adult sexual characteristics, protect their bones and have a satisfying sex life. Treatment may need adjustment as health goals change, particularly when moving between puberty induction, maintenance treatment and fertility care.

Fertility treatment may take months or longer. Testicles that did not fully develop during puberty can need time to increase in size and begin producing sperm. Ovulation treatment also requires close monitoring.

Regular follow-up usually focuses on symptoms, hormone levels, bone health and the safety of treatment. If you have a permanent pituitary condition, follow-up may continue throughout life.

When to get medical help

Arrange a routine medical appointment if puberty has not started within the expected age range, puberty begins and then stops progressing, or menstrual periods are absent or have stopped without a known explanation.

You should also seek assessment for persistent low sexual interest, erection difficulties, infertility, hot flushes at an unusually young age or symptoms of low sex hormones after pituitary surgery, head injury or brain radiation.

Contact your healthcare team promptly if you have new headaches, changes in peripheral vision, unexplained breast milk production, excessive thirst or frequent urination. These may indicate a pituitary problem that needs assessment.

Seek emergency care for a sudden, extremely severe headache accompanied by vision loss, double vision, vomiting, fainting or confusion. Rarely, this pattern can occur when there is sudden bleeding into a pituitary tumour.

If you have diagnosed adrenal insufficiency, follow your emergency plan and seek urgent help for severe weakness, repeated vomiting, collapse or confusion. These symptoms relate to cortisol deficiency rather than hypogonadotropic hypogonadism itself.

Common questions

Is hypogonadotropic hypogonadism permanent?

It can be permanent or reversible. Congenital forms are usually long-term, while hormone suppression caused by low energy availability, some medicines, high prolactin or another illness may improve when the cause is addressed. Follow-up testing is needed to assess recovery.

Is it the same as having low testosterone?

Not exactly. Low testosterone is a laboratory finding with several possible causes. Hypogonadotropic hypogonadism describes low testosterone caused specifically by reduced hypothalamic or pituitary signalling. It can also cause low estrogen in people with ovaries.

Can I get pregnant or father a child?

It may be possible. Standard sex hormone replacement supports health but does not usually restore fertility on its own. Specialist treatments can stimulate ovulation or sperm production. Success is influenced by the underlying cause, previous pubertal development and other fertility factors.

Can puberty still happen with treatment?

Treatment can usually induce the physical changes of puberty. Hormones are introduced gradually and adjusted over time. The pace and degree of development differ between people, especially when treatment begins later.

Does it affect my sense of smell?

Only some congenital forms do. Kallmann syndrome causes a reduced or absent sense of smell along with reproductive hormone deficiency. Many people with congenital hypogonadotropic hypogonadism have a normal sense of smell.

Can stress or exercise cause it?

Severe or prolonged stress can contribute, particularly when combined with undernutrition, weight loss or intensive exercise. Exercise by itself is not usually the issue. The risk is greater when the body does not receive enough energy to support both activity and normal reproductive function.

Sources



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