

Hormone Disorders

Puberty and the Growth Hormone Deficient Child

Patient's Guide



Average readability

Introduction

The aim of this leaflet is to provide information on the development of puberty in children with Growth Hormone Deficiency (GHD). It has been written in general terms and not all of the information provided will apply to you. Hopefully, this leaflet will help you to understand this condition and give you a basis for discussions with your GP or specialist team.



What is puberty?

Puberty is defined as the process of changing from a child into an adult. This includes the development of sexual characteristics, the growth spurt and the capacity for reproduction. This process is initiated by changes in circulating hormones released by the brain at an average age of 10–11 years in girls and 12 years in boys.



In children with 'isolated' growth hormone deficiency (GHD) or multiple pituitary hormone deficiencies (MPHD), there can be a delay or absence of pubertal development. These children will require specialised treatment to initiate puberty.

What is the link between GHD and delayed puberty?

About half of children with 'isolated' GHD also have some deficiency of the hormones affecting pubertal development. This remains difficult to diagnose because children with GHD tend to go into puberty later. Nevertheless, it is now recommended that a child should start puberty within the same age range as his or her peer group. As a result, puberty should be induced if it does not occur at the normal time. Your doctor will check how your body is progressing and developing in puberty each time in the clinic.

What about children with MPHD in puberty?

As well as being growth hormone deficient, children with MPHD will almost always require treatment to start puberty off. As with isolated GHD, puberty should be induced near to the time that this would occur naturally. The aim is to imitate the natural process with a gradual build-up of oestrogen hormone (girls) and testosterone hormone (boys). Treatment can often bring the normal changes of puberty but fertility may be more difficult to achieve. For fertility to occur a more specialised treatment will be needed.

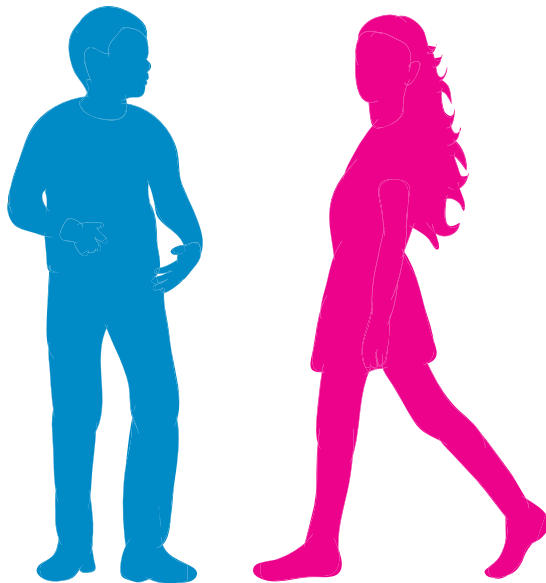


Which hormones affect puberty?

The brain contains two areas responsible for the onset of puberty. One of these is the **Hypothalamus** and the other is the **Pituitary gland**. Puberty begins the **Pituitary gland** produces a class of hormones known as the **Gonadotrophins**.

The **Gonadotrophins** initiate sperm production in the testes of a boy and egg production in the ovaries of a girl. The testes and ovaries then start to produce high levels of their own hormones. These are the sex hormones which are responsible for male and female sexual changes.

The most important male sex hormone is **Testosterone** which causes the growth of facial and body hair, muscular development and an increase in penis size. The most important female sex hormone is **Oestrogen** which brings about breast development, uterine enlargement and initiation of menstrual cycle.



What is the treatment for delayed or absent puberty?

It is important that the changes of puberty should be brought about at the normal age. In normal puberty, the changes take place gradually over a period of time. It usually is 2–3 years for girls and 3–4 years for boys. Thus, treatment will imitate the natural process and timing of puberty. There are two aspects of delayed or absent puberty which are treated separately but in the following order:

- **Development of sexual characteristics:** Breasts, menstrual cycle and pubic hair in girls. Enlarged penis, deeper voice, facial and body hair and increased muscular development in boys.
- **Fertility:** Usually to be treated at a later age and only after the induction of sexual characteristics has been completed.

What is the specific treatment for boys?

In boys, the appropriate treatment to initiate the development of sexual characteristics is testosterone. Treatment begins with a low dose and gradually increases as puberty progresses. It is given as a long acting injection every month to six weeks for 3 to 4 years, or capsules taken every night. Some boys prefer to rub a special gel on their chest each night.

Testosterone treatment will increase the size of the penis and will stimulate the production of body hair but will have no effect on the size of the testes.

Testosterone treatment will increase the sex drive and frequency of erections. The goal is to make all the changes happen at the normal speed. If any problems occur, these should be discussed with the specialist.



For fertility treatment, two types of **gonadotrophin** injections will be given two to three times per week. This will stimulate the testes to grow and sperm to be produced. Alternatively, a pump containing **gonadotrophin** releasing hormone treatment, worn all the time may be given.

Treatment to induce fertility is given only for the period that the individual wants to be fertile. After this, testosterone treatment will be restored to maintain sexual characteristics.

What is the specific treatment for girls?

In girls, the appropriate treatment to initiate the development of sexual characteristics is Oestrogen. It's first given in low doses and gradually increased as puberty progresses. It is delivered in tablets, patches or gels and will be given for the duration of 3 to 4 years. Once menstrual cycles are achieved hormone replacement therapy should continue until the time when natural menopause would occur.

To induce the start of regular menstrual cycles, progesterone therapy is added to the ongoing oestrogen treatment. This is very important for keeping the uterus healthy. Also, there may be an increased risk of osteoporosis if hormone replacement is not established. Combined oestrogen and progesterone therapy **can be given as a daily tablet or patches.**



The induction of regular menstrual cycles which are egg producing is more difficult. The ovary needs to be stimulated through gonadotrophin injection therapy, similar to boys, in order to cause the eggs to develop. However, this can be discussed with your specialist.

What is the follow-up treatment?

Once the young adult leaves the care of the paediatric endocrinologist, he/she will be given advice on fertility and sexual functioning.

Handover to an adult endocrinologist should take place for future advice on possible treatment in adulthood. There is evidence that patients that have been diagnosed with GHD in childhood may benefit from growth hormone treatment in adulthood. Your specialist team should be able to discuss these benefits with you.



What are other sources of useful information?

The goal of this leaflet was to provide a basic overview of the development of puberty in children with growth hormone deficiency (GHD).

Further information, including this and other leaflets can be freely downloaded from the British Society for Paediatric Endocrinology and Diabetes Website at <http://www.bsped.org.uk>.

Educational material can also be found by contacting the following organisations:

- **European Society for Paediatric Endocrinology**
Starling House
1600 Bristol Parkway North
Bristol
BS34 8YU
espe@eurospe.org
Telephone +44 (0) 1454 642246
www.eurospe.org
- **British Society of Paediatric Endocrinology and Diabetes**
bsped@endocrinology.org
<https://www.bsped.org.uk/>
- **Child Growth Foundation**
info@childgrowthfoundation.org
Telephone +44 (0) 208 995 0257
www.childgrowthfoundation.org
- **The Endocrine Society**
www.endo-society.org

You can also consult your specialist team for additional information in your local area.



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This leaflet is part of the **Hormone Disorders Series**

The following are also available:

Growth Hormone Deficiency

Precocious Puberty

Emergency Information for Children with Cortisol and GH Deficiencies and those Experiencing Recurrent Hypoglycaemia

Congenital Adrenal Hyperplasia

Growth Hormone Deficiency in Young Adults

Constitutional Delay of Growth and Puberty

Multiple Pituitary Hormone Deficiency

Diabetes Insipidus

Craniopharyngioma

Intrauterine Growth Retardation or Small for Gestational Age

Hyperthyroidism

Hypothyroidism

Type 2 Diabetes and Obesity

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