

Puberty and Growth Hormone Deficiency

Series N. 3



Patient's Guide

Average Readability Leaflet

Puberty and Growth Hormone Deficiency - Series 3 (Revised August 2006)

This leaflet was produced by Fernando Vera MSc and Prof Gary Butler at the Institute of Health Sciences, University of Reading, Reading, UK (August, 2006). Some portions of the text were extracted or modified from the Growth and Growth Disorders Booklet Series (Third edition, 2000)* and may be used in conjunction with these as they provide a choice of leaflets providing the same information, but for people of different ages and reading abilities. The numbering sequence in each series is the same for easy cross-reference. The original leaflet series can be also obtained from the links given at the end.

All illustrations were created and produced by Fernando Vera MSc.

This leaflet is part of the Hormone Disorders Leaflet Series. The following are also available:

- Series N 3.** Puberty and the Growth Hormone Deficient Child.
- Series N 4.** Precocious Puberty
- Series N 5.** Emergency Information for Children with Cortisol and GH Deficiencies and those Experiencing Recurrent Hypoglycaemia.
- Series N 6.** Congenital Adrenal Hyperplasia
- Series N 7.** Growth Hormone Deficiency in Young Adults.
- Series N 10.** Constitutional delay of growth and puberty
- Series N 11.** Multiple Pituitary Hormone Deficiency
- Series N 12.** Diabetes Insipidus
- Series N 13.** Craniopharyngioma
- Series N 14.** Intrauterine Growth Retardation or Small Gestational Age
- Series N 15.a.** Hyperthyroidism
- Series N 15.b.** Hypothyroidism
- Series N. 16.** Type 2 Diabetes and Obesity

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Introduction

The aim of this leaflet is to provide information on the development of puberty in children and adolescents 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 11 years in girls and 12 years in boys.



In adolescents with 'isolated' growth hormone deficiency (GHD) or multiple pituitary hormone deficiencies (MPHD), there can be a delay or absence of pubertal development. They 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's now recommended that a child should initiate 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 being puberty. 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 when both of these brain areas produce a class of hormones known as the **Gonadotropins**.

The **Gonadotropins** 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.

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 that may vary from 3 months to 5 years. 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 and pubic hair in girls. Enlarged penis, 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's given as a long acting injection every month to six weeks for 3 to 4 years, or else capsules taken every 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.

One of the main difficulties of testosterone injections is that they cause an increased sex drive and frequency of erections. Such effects can be emotionally difficult to cope with. If such problems occur, these should be discussed with your doctor or nurse.

For fertility treatment, **chorionic gonadotropin** injections will be given in the muscle three times per week. This will stimulate the testes to grow and sperm to be produced. Alternatively, **gonadotropin** releasing hormone treatment 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, treatment to initiate the development of sexual characteristics is **Oestrogen**. It's first given in low doses and gradually increased as puberty progresses. It comes as tablets or patches you stick on your skin and will be given for duration of 3 to 4 years.

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 is given as a daily tablet.



The induction of regular menstrual cycles which are egg producing is more difficult. The ovary needs to be stimulated through gonadotropin therapy in order to cause the ova to develop. However, there are some known side effects of this therapy. These will be discussed with your specialist.

What is the follow-up treatment?

When as a young adult under the care of the paediatric endocrinologist, you will be given advice on fertility and sexual functioning. In boys, a sperm count will need to be performed in the assessment of fertility. This analysis is usually left until assessment in an adult clinic.

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 following websites:

- **European Society for Paediatric Endocrinology**
ESPE Secretariat, BioScientifica
Euro House 22 Apex Court Woodlands, Bristol BS32 4JT - UK
Telephone No: + 44 (0) 01454 642208
Internet: <http://www.eurospe.org/>
- **British Society for Paediatric Endocrinology and Diabetes**
BSPED Secretariat, BioScientifica
Euro House 22 Apex Court Woodlands, Bristol BS32 4JT - UK
Telephone No: + 44 (0) 01454 642208
Internet: <http://www.bsped.org.uk/>
- **Child Growth Foundation**
2 Mayfield Avenue, Chiswick London W4 1PW UK.
Telephone +44 (0) 20 8995 0257
Internet: <http://www.childgrowthfoundation.org/>

You can also consult your doctor or nurse for additional information in your local area.

