



Premature Sexual Maturation

(Including precocious puberty)



SERIES 1



SERIES 2



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PREMATURE SEXUAL MATURATION

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About this Booklet

This booklet, updated in 2003, is intended to provide help when dealing with problems or difficulties associated with the physical signs of puberty that have appeared at an earlier age than expected and to provide information on any intervention that may be considered. Giving you a basis for discussions with your child's specialist when necessary.

If you require further general information about premature sexual maturation or precocious puberty, the Child Growth Foundation's Premature Sexual Maturation group are there to help you.

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Additional advice concerning the psychological aspects of premature sexual maturation - was kindly given by Ms Sandra Ramsden (Middlesex Hospital, London) and Polly Carmichael (Great Ormond Street).



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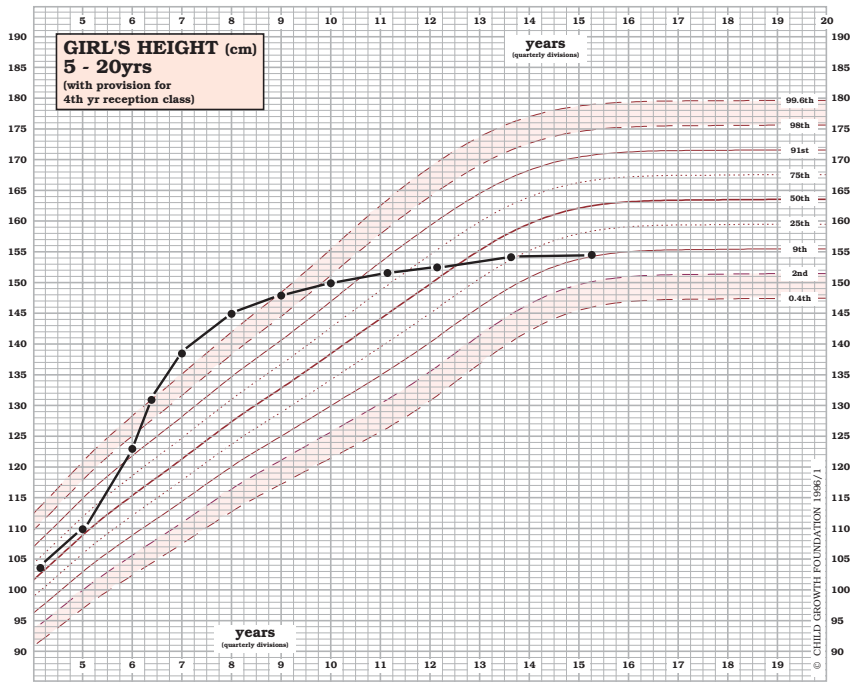
Premature Sexual Maturation

The Child Growth Foundation Booklets

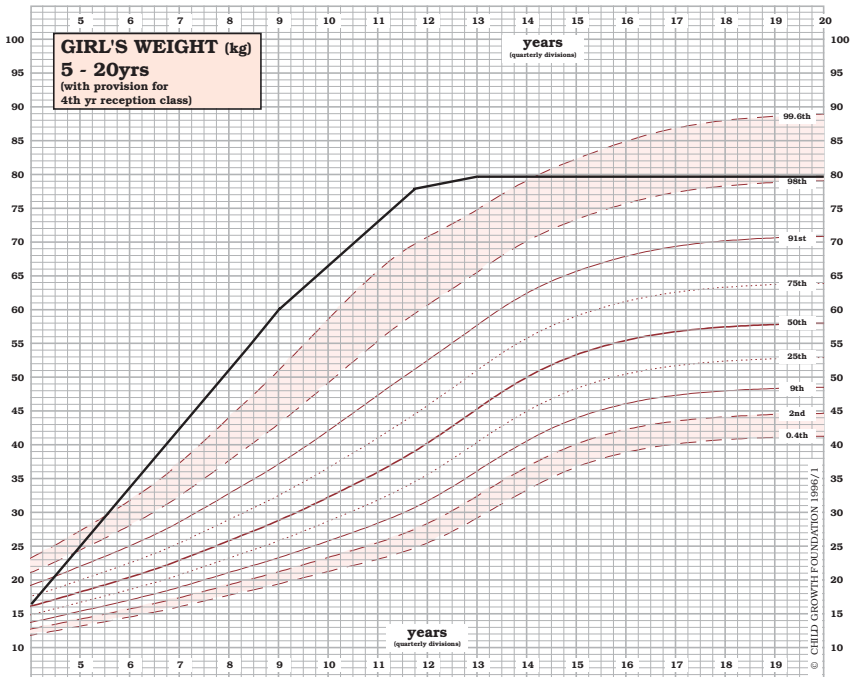
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Central precocious puberty: Height



Central precocious puberty: Weight



PREMATURE SEXUAL MATURATION *(including precocious puberty)*

INTRODUCTION

Puberty is a time of great physical and emotional change even when it occurs within an age range that is expected.

When puberty occurs at a younger age than expected it can be a stressful and emotional experience for the parents as well as the child.

Premature sexual maturation is a general term (which includes precocious puberty and other disorders) and implies the onset of sexual characteristics (eg breast development or pubic hair) below the age of 8 years in girls and 9 years in boys.

This booklet has been written to help you understand more about puberty, as well as precocious, puberty and its variants. It will help you become familiar with some of the medical terms you may hear, possible treatment and concerns shared by parents.

HORMONES

Hormones are chemicals, which are carried throughout the body by the blood. The body makes many hormones (eg thyroid, growth, sex and adrenal) that work together to maintain normal bodily functions.

The Control of Hormone Secretion

The hypothalamus is located in the brain above the pituitary gland and regulates the release of hormones from the pituitary. The pituitary gland, which is often referred to as the “master gland”, regulates the release of most of the body’s hormones (chemical messengers that send information to different parts of the body). It is a pea-sized gland that is located underneath the brain. The pituitary gland secretes growth hormone and numerous other hormones that control the function of the thyroid and adrenal gland as well as the ovaries and testes.



Hormones Affecting Puberty

There are a number of hormones that directly affect the course of puberty.

Gonadotrophin Releasing Hormone

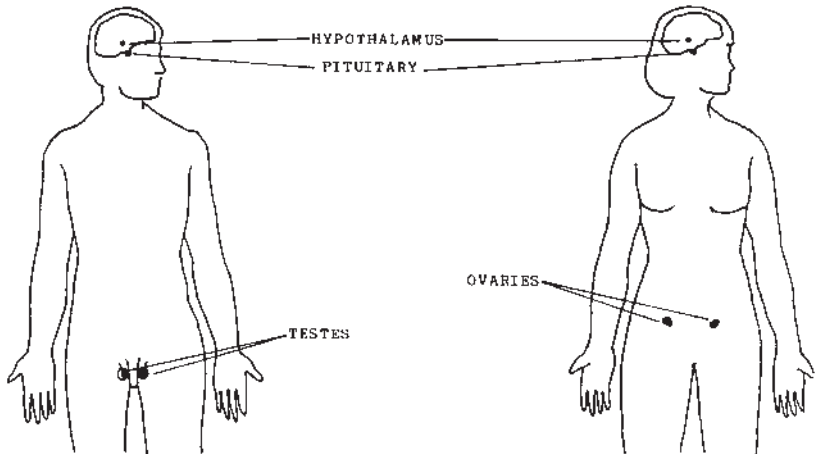
Referred to as GnRH, which is produced by the hypothalamus and controls the release of other sex hormones Luteinising hormone (LH) and Follicle stimulating hormone (FSH) secreted from the pituitary gland.

The release of GnRH from the hypothalamus is the most important control mechanism regulating sexual maturation and fertility.

Gonadotrophins:

- FSH:** Follicle stimulating hormone, a pituitary hormone that stimulates the testes and ovaries to produce sperm and eggs respectively.
- LH:** Luteinising hormone, a pituitary hormone that releases male and female sex hormones from the testes and ovaries.
- Sex Hormones:** Testosterone in males and oestrogen in females are responsible for the development of pubertal characteristics as well as changes in behaviour.
- Testosterone:** A male sex hormone (an androgen) which is secreted by the testes in boys and men. It is also present in much smaller amounts in women. Other milder androgens from the adrenal glands (located near the kidneys) stimulate pubic and axillary hair growth at the time of puberty in both boys and girls.
- Oestrogen:** A female sex hormone, which is responsible for breast development in girls, secreted by the ovaries. Smaller amounts of oestrogen are produced in boys and though this may sometimes be sufficient to cause adolescent breast development it will usually regress spontaneously, and reassurance is sufficient.

The hormone producing glands and their hormones



GLAND	HYPOTHALAMUS	PITUITARY	TESTES	OVARIES
HORMONES:	Gonadotrophin Releasing Hormone (GnRH)	Gonadotrophins Lutenising hormone Follicle stimulating Hormone LH & FSH)	Testosterone	Progesterone Oestrogen
ACTIONS:	Stimulates the pituitary gland to produce the gonadotrophins LH & FSH	LH: controls the production of testosterone from testes in boys. Triggers ovulation & controls the menstrual cycle in girls. FSH: controls sperm production in boys. Starts the ova ripening & helps control the menstrual cycle in girls.	Controls male sexual development. Helps control sperm growth & function.	Acts with LH & FSH to control the menstrual cycle. Oestrogen also controls female sexual development.



PUBERTY

As parents we are normally aware of the physical changes that are taking place in our children as they enter puberty. These changes usually occur between the ages of 10 to 13 years. They are noticeable in girls by the budding of breasts and then pubic hair, with menstrual periods starting between 11 to 14 years of age. Boys normally develop testicular enlargement and then pubic hair (9 to 14 years). Underarm and facial hair and deepening of the voice occur typically between 13 to 16 years.

All the physical changes that occur at puberty are termed 'secondary sexual characteristics'. The order in which these physical changes of sexual maturation occur should be identical between individual children, but the time each child takes to become fully mature may vary between 18 months and 5 years.

In girls, the growth spurt occurs early in puberty and commences at the same time as the beginning of breast development, and growth has almost ceased by the onset of the first period. In contrast, boys have a growth spurt, which occurs as a late event, commencing halfway through puberty.

The difference between the average age of onset of puberty between girls and boys is only 6 months, although it is often thought to be several years! This is probably because the early events of puberty in boys are hidden whereas breast development in girls is much more socially obvious. In addition, the growth spurt occurring later in boys only helps to maintain this common misconception.

The growth spurt of puberty depends on both growth hormone and sex hormone secretion; one without the other leads to a reduced growth spurt. A baby is born with high levels of sex hormones (gonadotrophins) which often last up to 6 months after birth. Sometimes, testosterone levels in baby boys can be half the level of an adult man. During mid-childhood (4 to 6 years), gonadotrophin secretion decreases and then gradually increases again at 7 to 8 years.

The hormonal changes at puberty start very gradually and it is only when the level of sex hormones reaches a threshold that the development of sexual characteristics is stimulated and puberty is described as having commenced.

However, the hormonal events of puberty have usually started several years prior to the first appearance of secondary sexual characteristics as described above.

Weight

Girls with PSM and their parents are often concerned about weight. The girls appear "heavy" but in the majority of cases it is not overweight with excess fat but a physical solidarity characteristic of the condition. As they get older, and ultimately taller, the solidness becomes less compact and redistributes as maturity changes the body's shape. Healthy eating habits and plenty of exercise will help prevent any obesity.

It is when physical changes begin earlier than 8 years in a girl and 9 years in a boy that an assessment needs to be made by a specialist to determine what is the cause of the Premature Sexual Development.



PREMATURE SEXUAL MATURATION TRUE PRECOCIOUS PUBERTY

True precocious puberty may be called gonadotrophin dependent precocious puberty, central precocious puberty or idiopathic precocious puberty - they all mean the same. Precocious puberty means that the physical signs of puberty, i.e. breast development in girls, genital enlargement in boys, and the appearance of pubic hair, occur at an earlier age than is usual. In true precocious puberty the appearances of physical changes are identical to puberty occurring at the expected age, it is just that they occur earlier. In contrast Pseudopuberty is significantly different as there is a disordered sequence of physical changes occurring (see next page).

Your child may be taller than other children in the class and more solid in their build. The increase in height is due to a premature pubertal growth spurt and the bone age will also be advanced. An x-ray of the left hand and wrist will determine this and reflect the developmental bone age of the child. It also indicates how much time still remains for growth and allows an approximate prediction of final adult height. Although the child may be tall now, if they are very young and the problem is not addressed, they may end up shorter than expected because of premature fusion of the long bones i.e. the end of the growing period. This is a very important consideration when deciding whether treatment is required. Should the specialist decide that your child would benefit from treatment it would be to stop any further development of breasts, pubic hair, periods etc, and hopefully to decrease the rate of bone maturation.

As well as growth, there may be other reasons to treat early puberty. It is important to arrest or regress the signs of puberty as the individual child may be extremely distressed that they are different from their peer group. There are numerous psychological reasons why therapeutic options should be discussed. Going through puberty is often difficult enough when it occurs during the usual age range (which many of us can remember). However, puberty that commences too early (and the same applies if puberty is very late) can be associated with behavioural difficulties in both girls and boys. Problems in the very young children may include masturbation at socially inappropriate times and need to be dealt with sensitively. Concentration in school and social integration is usually affected in precocious puberty and needs careful assessment and management.

The reason precocious puberty occurs is that the hypothalamus/pituitary signals the ovaries or testes to make female or male hormones at an earlier than usual time and in the majority of cases the cause of this is unknown.

Rarely, cysts or tumours at the base of the brain are present with true precocious puberty. Your specialist will probably advise that some special x-rays or MRI scans of the brain be taken in order to exclude this possibility. Brain cysts and tumours causing true precocious puberty are much more common in boys than girls but *brain scans for both sexes are an essential requirement*. There is now an indication that it is good practice for all girls with central precocious puberty to have an MRI scan; especially young girls under 4 years of age.

True precocious puberty is about 10 times more common in girls than in boys which is the opposite to the incidence of delayed puberty, where it is much more common in boys.

Central precocious puberty is rare. However some forms of premature sexual maturation e.g. Isolated premature thelarche and premature adrenarche, are common.

Premature Sexual Maturation can be a symptom of a serious condition for both sexes.



PROCEDURE OF GOOD PRACTICE FOR THE ASSESSMENT OF PSM.

EARLY SIGNS WHAT HAPPENS NEXT?

Puberty is the process of maturing physically from a child to an adult.

In girls the physical changes of puberty generally occurs between the ages of 8 years to 14. The first principal signs of puberty are either pubic hair or budding of the breasts. The growth spurt occurs early in puberty at the same time as the breast development. Sometimes girls can experience a vaginal discharge, spotting and urinary infections.

In boys the start of physical changes is between the ages of 9 years to 14 years. The first signs of puberty are the increase in size of the testes and then pubic hair. Underarm and facial hair along with the deepening of the voice is a late event in puberty as is the growth spurt.

Other Signs of Puberty Often Noticed

- Body odour
- Spots and acne
- Change in body shape

The final stages of puberty will be marked by menstruation in girls and the production of sperm in boys.

The range of physical changes will normally show themselves in a predictable patterns to which a doctor can refer.

As well as the physical features of puberty there are associated emotional changes involving moodiness and mood swings, aggression, sensitivity, anxiety and lack of concentration. To cope with puberty at the "normal" age is recognised as difficult, but when it occurs inappropriately early there needs to be sensitivity, support and understanding readily available.

General Practitioner

Where there are signs of puberty before the age of 8 years in a girl and 9 years in a boy, parents should first consult their General Practitioner. Make notes of what physical signs have been noticed. Take with you any growth measurements of your child you may have. The General Practitioner should listen to your concerns. Any examination should be done with sensitivity and care. Your GP may confirm the inappropriately early pubertal development by comparing the physical signs to a chart demonstrating the various stages of puberty. A specialist medical assessment is required if the child is outside the expected age range for the onset of puberty. Your GP will not have sufficient information to be able to give a formal diagnosis, but will look for diagnostic signals and listen to your concerns bearing in mind the potential seriousness of the condition.

General Practitioners should be aware of diagnostic signals and listen to the concerns of the parents without being dismissive.

Dependant on whether puberty is proceeding slowly or aggressively the speed of the referral process should reflect this.



GONADOTROPHIN INDEPENDENT PRECOCIOUS PUBERTY

Gonadotrophin independent precocious puberty is more common in boys than girls and in boys is also known as testotoxicosis. The testes develop, in this instance, and mature on their own without stimulation from the pituitary gland. The cause of the condition is unknown. It tends to run in families and it is important to recognise because the treatment differs from true or gonadotrophin **dependent**, precocious puberty. The pattern or sequence of pubertal development is identical to that of true precocious or normal puberty occurring within the usual age range.

Gonadotrophin independent precocious puberty does occur in girls but only in association with the rare syndrome of abnormal bone development and skin pigmentation call McCune Albright Syndrome.



PRECOCIOUS PSEUDOPUBERTY

This is when signs of sexual maturation occur due to sex steroid secretion which has a different mechanism from normal puberty e.g. cysts or tumours of the adrenal gland or gonads secreting high levels of sex steroids. The condition is usually recognisable because there is a disordered sequence of pubertal events, i.e. pubic hair and no breast development. Treatment is usually directed to the underlying cause which then depletes the abnormal source of sex steroid secretion, e.g. if the adrenal gland is oversecreting, then a drug is administered which prevents abnormal adrenal hormone secretion.



VARIATIONS OF PREMATURE SEXUAL MATURATION

Premature Thelarche: This is a harmless, self-limiting, condition of unilateral (one) or bilateral (both) breast development. It occurs usually in girls under 3 years of age and may continue from the breast development in the first few months of life which results from oestrogen in the mother's milk. There are no other signs of oestrogen effects and growth is normal. However, increase and decrease of breast size at monthly to six weekly intervals is common in this condition.

This condition does not effect the appropriate timing of the other signs of normal puberty. Asymmetric breast development (one side only) is also common.

Premature thelarche may result from the occasional formation of ovarian cysts and/or increased sensitivity of the breast tissue to oestrogen stimulation from apparently normal levels of oestrogen within the body. The importance of the diagnosis is to separate this harmless condition from precocious puberty. No treatment is necessary. Usually the condition "burns itself out" within a year or two. Growth and final height are unaffected. Puberty occurs at the normal time and fertility is not thought to be affected. The condition is probably common, as many mild cases may never present to a specialist.

Premature Adrenarche: This is a harmless, self-limiting, condition of pubic hair development, usually occurring between the ages of 6 and 9 years in both boys and girls. In girls hair development is usually along the line of the *vulva*, rather than the *mons pubic*, where pubic hair development usually starts in normal puberty. The pubic hair will remain until the rest of pubertal development, such as genital development in boys and breast development in girls, occurs later at the appropriate age. There may be an increase in the rate of growth along with a slight advancement of bone age. This is a normal pattern of adrenal development, which requires no treatment. It is very common in the African and Indian races.

The importance of recognition is to differentiate this from more serious forms of precocious puberty associated with adrenal cysts/tumours or biosynthetic defects of steroid synthesis. Occasionally an overnight admission to hospital is required to enable hormone measurements to be taken to differentiate these conditions.

Isolated Premature Menarche: There have been cases, rare though they are, of girls who being menstruating before the age of 9 years without other signs of sexual development. The bleeding recurs at regular intervals for several years then ceases. Normal pubertal development, including periods, occurs at the usual age of puberty. No cause for this condition has been determined. Before the diagnosis of premature menarche is accepted, all other causes of premature oestrogen secretion, and/or any local cause of vaginal bleeding, must be eliminated by the specialist.

It is important that the medical assessment is done by a doctor who is not only aware of all the different variations and implications of Premature Sexual maturation but also has the experience and knowledge of appropriate management and treatments.

There will of course be considerable concern while waiting for a referral to see a specialist. Your child may either be relieved that someone is going to assess what is happening to them or they may be concerned at your distress over the situation. In whatever way they are reacting, in most cases it is better if you can talk to them about any issues that seem to cause them anxiety. Try to reassure them that puberty and the physical changes do happen to everyone, but their changes have occurred earlier than anticipated.

Great importance must be placed on parents respecting the other partners way of coping with the distressing situation and trying to respond to the others needs.

It is so important to keep communication open even if you are dealing with the situation in totally different ways. There will be decisions that you will both have to be involved in and there needs to be a good and open line of communication, while being sensitive to alternative points of view.

The natural reaction to shock is dealt with in very individual ways. Some partners need to talk about it and discuss options, others need to establish normality and immerse themselves in work or every day issues.



TESTS

It is probable that your specialist will arrange some tests to be able to make an accurate diagnosis and to determine what, if any, treatment will be required. Such tests usually require a hospital visit for a day to have blood tests of gonadotrophin hormones and for girls a pelvic ultrasound which is an external examination performed by a radiologist. Depending on the results of these tests an MRI or CT scan of the brain may need to be performed.

When Treatment is underway, some tests will probably need to be done every few months, especially for the first year. This will help to confirm that your child is responding to treatment appropriately, in addition to the clinical assessments of sexual development and growth rate. These tests will be similar to the ones performed for the diagnosis and involve blood tests of gonadotrophin secretion and a pelvic ultrasound assessment.

If after discussion it is decided that treatment is not thought to be appropriate the child will then need to be reviewed at intervals and the discussion reconsidered in relation to growth, sexual maturation, behaviour and education.



TREATMENT

Treatment is aimed at the suppression and slowing down of any additional physical development, arresting any further acceleration of the bone age and providing as much psychological stability for the children concerned. Parents and specialists will need to discuss the options of treatment, set out its aims and the benefits or risks for their individual children. If there are few perceived benefits you need to consider the safest option and not proceed with any treatment. This must take into consideration how well your child is coping psychologically with their acquired physical maturity and if the bone age does not show a marked acceleration leaving the potential for an acceptable adult height. The child who is relatively older may have test results that show pubertal development is significantly advanced that there may be little benefit to treat apart from delaying periods. To the doctor this may appear insignificant but for the child it may be of paramount relief that this last stage of puberty can be delayed for a while.

GnRH analogues (gonadotrophin releasing hormone analogues)

This is a manufactured hormone which is the same as the body produces but has one part of the natural sequence of the GnRH molecule altered to allow it to be given as a medication that will affect the action of naturally occurring GnRH from the hypothalamus. It is a specific drug which prevents the pituitary gland secreting gonadotrophins and thereby in general arrests / reverses the changes of precocious puberty.

There are no known side effects to GnRH analogue treatment, although headaches are common in the first few weeks after the start of treatment.

It is important to give the drug regularly, as prescribed, as intermittent use can stimulate, rather than suppress, puberty. Also, as starting treatment pushes the changes of puberty forward a little before blocking further development, some minor symptoms may be seen. These might include mood changes, acne, a slight increase in breast size and the start of menstrual bleeding (spotting only). Such symptoms should subside within a few weeks.

Treatment with GnRH analogue may initially be accompanied by another medication called cyproterone acetate, this is given in pill form and suppresses any sex steroids produced by the ovaries or testes, so that while the first injection of GnRH analogue may provoke increased secretion from the pituitary gland the cyproterone acetate blunts the body's response.

GnRH analogues can be given INTRANASALLY in liquid form, usually two or three times per day, by SUBCUTANEOUS INJECTION once or twice per day or by MONTHLY or THREE MONTHLY DEPOT INJECTIONS. It is usually more convenient to use these slow release injections, and there are two pharmaceutical products available.

Prostap (leuporelin) (GnRHa) is a viscous depot (slow release) injection, given either as an intra muscular or subcutaneous injection.

Zolodex (GnRHa) is a slow release pellet injected just under the skin in the abdomen or fatty area of the body. These preparations are normally administered on a 28 day interval to avoid the symptoms which may appear at the start of treatment occurring every month.

If the effect of the analogue becomes insufficient to control the pubertal changes, then the frequency of administration is increased, rather than an increased dose.

There are long acting (3 months) preparations available.

Again, your specialist will assess the most appropriate treatment for your child.

Cyproterone Acetate

(or Medroxyprogesterone only occasionally used)

These steroid drugs act directly on the ovaries or testes and prevent oestrogen and testosterone being produced. In addition, they are antiandrogens. They are taken as tablets, usually twice a day.

Their use has now been overtaken by GnRH analogues but they are still necessary for the treatment of **gonadotrophin independent** precocious puberty. Cyproterone acetate is used to suppress the development of the physical signs of puberty and does not improve final height prediction in children with precocious puberty.

Cyproterone Acetate suppresses cortisol secretion from the adrenal gland and additional steroid injection cover for an operation or during a severe illness may therefore be required (see question section for more details).

OTHER TREATMENTS

There are other drugs occasionally used such as SPIRONOLACTONE, KETACONAZOLE and TESTOLACTONE for gonadotrophin independent precocious puberty. If these are to be used then your specialist will explain this in more detail.

It seems likely that children with low predicted heights may benefit from the addition of growth hormone to the GnRH analogue regimen. Research into this is continuing, particularly in children who have a prediction of a very short ultimate adult height.



SOCIAL CONCERNS

As your child will probably be taller than other children of the same age, it will be natural that people respond to this by treating them as older than they actually are. You, your friends, and the child's teachers, will have to remind yourselves repeatedly of the child's age so that you do not demand too much from them. A 2 year old the size of a 5 year old, behaving according to age, with obvious lack of language skills, sucking a dummy and having tantrums is a situation which can be very difficult for parents to deal with. The child may show more awareness of sexual parts and masturbate which can create embarrassment, especially in other adults, and confusion in the child. Antiperspirants, and more frequent baths and hair washing, may be necessary as sweating and body odour can be a problem.

Your child may feel embarrassed by the physical effects of puberty. All children want to look and act like friends of their own age. It is helpful to emphasise to your child that all girls and boys normally experience puberty but in his or her case it has occurred sooner than usual. It is important to tell your child that the changes to his/her body are normal.

Your child should be allowed to participate in his/her usual activities, athletics and extracurricular events. Of course, they can be at a distinct advantage in physical activities. Encourage your child to discuss with you worries that he/she may be having. However, if you feel unable to cope alone there are child psychologists experienced in dealing with these problems and you should ask your specialist for a referral. Certainly, an educational assessment at school may be particularly helpful.

In the very young child, the difficulties are mainly for the parents. As the child gets older and becomes more aware of the physical differences between themselves and their friends it can be difficult to know how to help, particularly with the embarrassment of their own bodies; not only of their shape but functions such as frequent erections, feelings and being emotionally unable to cope. Even though reassurance can be given that their friends will, in the future, "catch up" in size and body shape when they reach the normal age range for puberty, self-esteem in a young child can be extremely low and this might be the time to enlist the help of a child psychologist to benefit both the child and the parents. It is important to remember that the timely intervention of psychological support may help prevent real distress as the child gets older.

Parents, relations, and others, also have to cope with their own normal reactions to the precociously mature child which may include alarm, distress, distaste, guilt and confusion. Parents may find support through contact with other parents who have, or had, similar problems to deal with particularly helpful. They are likely to feel isolated in their predicament and unprepared for the early sexual maturation of the child. Such advice and encouragement from other parents, or from professionals experienced in this field, will help parents to help their child as and when they encounter difficulties.

Children with precocious puberty generally demand attention and use their physical strength, height and size to achieve it. This can be confusing and irritating for older siblings and has an effect on the entire family. Again, this is where the help of a child psychologist may be of benefit.



QUESTIONS MANY PARENTS ASK

How should I explain precocious puberty to my child?

Your child may have several questions regarding early puberty and its treatment. It is often helpful to reassure your child that the pubertal changes in his/her body are normal and that most individuals will eventually have these changes but that in his/her body they have happened sooner than usual.

What should we tell friends and relatives and especially teachers?

You may find that the parents of other children can be cautious in encouraging friendships with your child and although it is not necessary to tell anyone about your child's problem, it may be helpful to explain your child's condition and that your child is perfectly normal but has started puberty at an earlier than normal age. If your child is receiving injections, you can explain that they are given to temporarily stop puberty, which slows down or stops sexual maturation. Even with successful treatment, behavioural difficulties may remain and it may be helpful to discuss these individually with your child's teacher. It may help to ask your specialist to write to the school.

What will my child's final adult height be?

Final adult height depends on many factors and, in a condition like precocious puberty, is extremely difficult to predict. Parental heights play a significant role in the height of the child. The relationship between bone age and chronological age is also important as an advanced bone age suggests less time for growth. If premature puberty was detected at an early stage, then your child will have a better chance of reaching close to his/her expected height. If, however, it was detected at a later stage, then his/her bone age will be more advanced and this will limit the time remaining for growth and, therefore, will limit final adult height. Some girls with true precocious puberty have a very mild form of the condition and may reach an entirely normal height when compared to their parents.

Does treatment help in controlling moodiness, tearfulness and irritability?

Generally yes, as successful treatment will be associated with a decrease in sex steroid secretion. Moods may not be entirely due to hormonal changes; they may be linked to the child's reactions to physical changes in his/her body, to their perception of themselves as different from their peers, and to their perception of reactions from peers and adults. There may be a variety of reasons for moods, unexpected behaviours of various types, and irritability or tantrums. Exploration of these reasons is important and it is wise not to conclude that all problems in the child necessarily relate to the growth problem.

Younger children may not be able to respond to direct questioning about their behaviour. Thus, parents may find that the provision of space, time, appropriate play materials, as well as story telling opportunities, may help younger children to communicate their worries. Opportunities for discussion of strategies to deal with problems, consistent handling, and support by parents, can be helpful. Persistent or extreme mood disturbances and behavioural difficulties may suggest that the child has problems that need assistance from professionals outside the family. Parents should ask their paediatric specialist for the help of a child psychologist. Most Growth Centres will have this services available.

How long is treatment continued?

Treatment to suppress the secretion of gonadotrophins usually lasts until the child reaches the appropriate age for puberty when the functions of their own hormones are allowed to recommence. Generally speaking, treatment is stopped when a child enters secondary school, when a girl is more likely to be able to cope with having periods. After stopping treatment, puberty will not suddenly advance but will progress at a normal rate.

Are there any side effects from the treatment?

There are no known serious side effects from GnRH analogue treatment. However, in some cases headaches have been known to occur. The older treatments of cyproterone acetate and medroxyprogesterone are still used and are needed in gonadotrophin independent precocious puberty. They can be associated with fatigue and tiredness as they suppress the secretion of cortisol and sex steroids from the adrenal glands. It is very important that such children carry notification that extra steroids (hydrocortisone by injection) may be needed in situations of severe stress, such as severe infection or hospitalisation/surgery.

Will my child have normal fertility as an adult?

All the available evidence is that the future fertility should be normal, although there are no real comprehensive long-term follow up studies. The available evidence is that treatment with either cyproterone acetate or GnRH analogues does not interfere with long-term fertility.

CGF INFORMATION

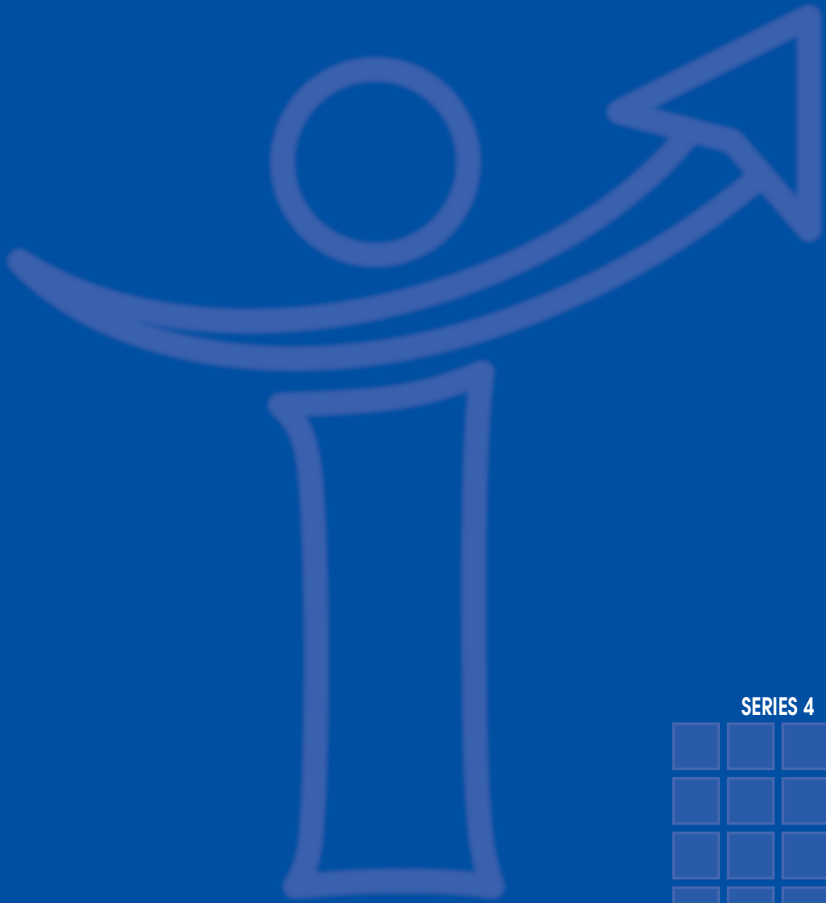
The following booklets are also available:

- Series No. 1: Growth and Growth Disorders
- Series No. 2: Growth Hormone Deficiency
- Series No. 3: Puberty and the Growth Hormone Deficient Child
- Series No. 4: Premature Sexual Maturation
- Series No. 5: Emergency Information Pack for Children with Cortisol and GH Deficiencies and those Experiencing Recurrent Hypoglycaemia
- Series No. 6: Congenital Adrenal Hyperplasia
- Series No. 7: Growth Hormone Deficiency in Adults
- Series No. 8: Turner Syndrome
- Series No. 9: The Turner Woman
- Series No. 10: Constitutional Delay of Growth & Puberty
- Series No. 11: Multiple Pituitary Hormone Deficiency (MPHD)
- Series No. 12: Diabetes Insipidus
- Series No. 13: Craniopharyngioma
- Series No. 14: Intrauterine Growth Retardation
- Series No. 15: Thyroid Disorders

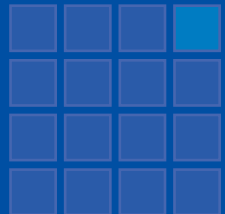
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SERIES 4



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