Overview of Anatomy and Physiology

The Pituitary Gland

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 controls the release of thyroid, adrenal, growth and sex hormones. The hypothalamus, located in the brain above the pituitary gland, regulates the release of hormones from the pituitary gland.

Hormones

Chemical messengers that carry information from one cell to another in the body. Hormones are carried throughout the body by the blood and are responsible for regulating many body functions. The body makes many hormones (e.g., thyroid, growth, sex and adrenal hormones) that work together to maintain normal bodily function.

Hormones involved in the control of puberty:

GnRH: Gonadotropin releasing hormone, which comes from the hypothalamus and controls the release of luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the pituitary gland.

LH: Luteinizing hormone, a pituitary hormone that in conjunction with FSH stimulates male/female sex hormone production in the testicles/ovaries.

FSH: Follicle stimulating hormone, a pituitary hormone that in conjunction with LH stimulates sperm/egg development.

Testosterone: A male sex hormone (an androgen), which is made by the testicles in boys. It is also present in smaller amounts in girls. Other androgens from the adrenal glands (located near the kidneys) produce pubic and axillary hair at the time of puberty.

Estrogen: A female sex hormone, which is responsible for breast development in girls. It is made mainly by the ovaries, but is also present in boys in smaller amounts.

Sex Hormones: Responsible for the development of pubertal signs as well as changes in behavior and the ability to have children.

Precocious Puberty

Precocious Puberty means having signs of puberty (e.g., pubic hair or breast/ testicular enlargement) at an earlier age than usual (prior to age 8 in girls and age 9 in boys).

Normal Puberty

There is a wide range of ages at which individuals normally start puberty. Girls usually develop breasts and then pubic hair between the ages of 8 and 13 years. Menstrual periods typically start at 12 to 13 years of age. Girls will often experience moodiness and become more irritable during puberty.

Boys normally develop testicular enlargement and then pubic hair between the ages of 9 and 14 years. Underarm and facial hair, as well as deepening of the voice, typically occurs between the ages of 13 and 16 years.

Your child may be taller than the other children in his/her class. This is because the hormones that increase at the time of puberty also cause a spurt in growth.

Causes of Precocious Puberty

In the majority of cases of precocious puberty, the cause is unknown. In some instances, the pituitary signals the ovaries and testicles to make female and male hormones at an earlier than usual time. In other cases, signs of puberty occur prematurely because of abnormalities in the ovaries, testicles, pituitary, or adrenal glands.

Tests are usually necessary to determine whether the cause of precocious puberty is in the brain or in another area of the body.

Treatment

If your child's doctor determines that treatment is necessary, your child may receive a medication (analog or modified form of GnRH). The goals of treatment with this drug are to temporarily stop puberty and to decrease the rate of bone maturation. Rapid bone maturation will cause your child's adult height to be shorter than his/her potential height. After the first couple of months of treatment, your child's rapid growth should slow, and his or her pubertal stage will remain the same or possibly regress. Many children are too young to deal with the psychological aspects of early puberty, and by stopping further advances, your child may feel more like his or her friends.

GnRH analogs are given by injection every 3 or 4 weeks or as an implant surgically inserted in the inner upper arm every 12 months . If your child receives the medication once a month, your local physician or a visiting nurse will most likely give the injection; in some cases, you may be trained to administer the injection at home if you prefer. Your child will receive medication until it is appropriate for puberty to resume. Research to date indicates that when treatment is stopped, puberty should resume and advance normally.

Possible Treatment Side Effects

During the first 6 weeks of treatment, your child may experience the following side-effects: Girls may have mood changes, acne, an increase in breast size, and menses. Boys may have an increase in pubic hair and testicular development as well as acne. These effects are only temporary and should be controlled by the seventh week of treatment. Other side effects your child may experience include redness and slight pain at the injection site. Rarely, a sterile abscess may occur. Use of a filter needle to reconstitute the depot form of the analog will help prevent this.

Follow-up Clinic Visits

It will be important for your child to be seen every 3 to 6 months. This will allow the doctor ensure that your child's puberty is appropriately suppressed. Your child's height will be measured in order to determine his or her growth rate. If treatment is successful, your child's growth rate should decrease. A physical exam will be done at each visit to evaluate development, and a bone age X-ray will be done at least once a year. Hormone levels occasionally need to be checked.

Social Concerns

Due to early puberty, your child may be taller than other children of his/her age. It is important to treat children according to their actual age rather than their size or apparent age, since children tend to develop self-esteem and behave according to how they are treated. Parents of children with precocious puberty should remind teachers, relatives, and friends about this important relationship.

Your child may feel embarrassed by the physical effects of puberty. All children want to look and act like their friends. It is helpful to emphasize 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 in his/her body are normal. Your child should be allowed to participate in his/her usual activities, which may

include spending the night with a friend, athletics and extracurricular activities. Encourage your child to discuss with you worries that he/she may be having.

Questions Many Parents Have

Q. How should I explain this disorder to my child?
A. 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 happened sooner than usual.

Q. What should we tell friends and relatives?
A. It is not necessary to tell anyone about your child's problem; if, however, they ask about the problem and you wish to discuss this with them, explain that your child is perfectly normal but has started puberty at an earlier than normal age. If your child is receiving injections or the imlant, you can explain that they are given to temporarily stop puberty, which assists these children in achieving an acceptable adult height.

Q. What will my child's final adult height be?
A. Final adult height depends on multiple factors. Parental heights play a significant role in the height of a child. The relationship between bone age and chronological age is also important since excessive skeletal maturation for age provides less time for growth. If puberty was detected at an early stage, then your child will have a better chance of reaching his/her expected height. If, however, puberty was detected at a later stage, then his/her bones will be more advanced, and this will limit the time remaining for growth and, therefore, final adult height.

Precocious Puberty

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REVISED 2.2017

Major
Aspects of
Growth
In
Children

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Precocious Puberty

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