CONDITION

Precocious puberty

Precocious puberty is puberty that begins earlier than expected, before age 8 in girls or age 9 in boys.

WHAT IT IS
Puberty beginning before age 8 in girls or 9 in boys

BODY SYSTEM
Hormones, reproductive development, and growth

MAIN SYMPTOMS
Early breast or testicle growth, pubic hair, growth spurt

WHAT CAUSES IT
Usually unknown; sometimes brain, ovarian, testicular, or adrenal causes

HOW IT IS DIAGNOSED
Examination, hormone tests, bone-age X-ray, sometimes MRI

MAIN TREATMENT
Puberty-pausing therapy or treatment of the underlying cause

CAN IT BE CURED?
Sometimes - treatable causes can be removed

IS IT AN EMERGENCY?
Sometimes - sudden severe headache or new weakness

LONG-TERM OUTLOOK
Usually healthy adulthood with timely assessment and support

Overview

Precocious puberty means that a child's body starts changing into an adult body earlier than expected. It is usually defined as signs of puberty before age 8 in girls or before age 9 in boys.

Puberty is controlled by hormones, which are chemical messengers carried in the blood. In most cases of precocious puberty, the brain activates the usual puberty process too soon. This is called central precocious puberty .

Less often, sex hormones come from another source, such as the ovaries, testicles or adrenal glands. This is called peripheral precocious puberty . The adrenal glands are small organs above the kidneys that make several hormones.

Not every early change means that full puberty has started. Some children develop breast

tissue without other changes, known as premature thelarche. Others develop pubic hair, body odour or mild acne because of early adrenal hormone activity, called premature adrenarche. These patterns are often harmless, but a clinician may monitor them to make sure they are not progressing.

Early puberty matters because it can speed up bone development. A child may initially be taller than classmates but stop growing earlier, which can reduce adult height. Early physical changes may also be confusing or upsetting. Assessment helps separate normal variations from progressing puberty and identifies the smaller number of children with an underlying medical cause.

Symptoms

The first sign in girls is usually breast development. One breast may begin developing before the other. Menstrual bleeding can occur later if puberty continues.

In boys, the first sign is usually enlargement of the testicles. The penis may then grow, and erections may become more frequent.

Other changes can occur in any child:

Pubic hair or body odour alone does not prove that central puberty has started. These signs may come from adrenal hormones rather than activation of the full puberty process.

The speed and order of changes are important. A small amount of breast tissue that remains unchanged for many months is different from breast development followed quickly by a growth spurt and menstruation.

- A rapid increase in height
- Pubic or underarm hair
- Stronger body odour
- Oilier skin or acne
- Changes in body shape
- Mood or behaviour changes

Causes and risk factors

Central precocious puberty happens when the brain begins sending the usual puberty signals earlier than expected. The hypothalamus and pituitary gland, two hormone-control areas in the

brain, signal the ovaries or testicles to produce sex hormones.

In many girls, no specific cause is found. This is called idiopathic central precocious puberty. It is still a real condition even when scans and tests do not find an underlying problem.

A brain or nervous-system cause is less common but is considered more carefully in boys, very young children and children with neurological symptoms. Possible causes include a structural difference present from birth, a previous brain injury or infection, radiation treatment, or, rarely, a growth affecting the brain.

Peripheral precocious puberty does not begin with the brain's usual puberty signal. Possible causes include:

A family pattern of earlier puberty can affect timing. Higher body weight is associated with earlier breast development and menstruation in some girls, but it does not by itself confirm precocious puberty. Parents and children have not caused the condition through ordinary diet, behaviour or parenting.

- An ovarian cyst or, rarely, an ovarian or testicular tumour
- An adrenal gland condition, including congenital adrenal hyperplasia
- McCune-Albright syndrome, a rare genetic condition affecting bones, skin and hormones
- Severe untreated low thyroid hormone in rare cases
- Contact with oestrogen or testosterone medicines, gels or creams
- Rare inherited changes that cause early hormone production

Diagnosis

A clinician will ask when the changes began, how quickly they are progressing and whether there have been headaches, vision changes, seizures or previous medical treatments. Family patterns of puberty and possible contact with hormone medicines are also relevant.

The physical examination checks height, weight, growth rate and the stage of sexual development. Previous growth measurements are especially useful because a sudden increase in growth speed can support the diagnosis.

A left hand and wrist X-ray can estimate bone age , meaning how mature the bones look compared with the child's actual age. An advanced bone age suggests that sex hormones have been affecting growth, although it does not identify the cause by itself.

Blood tests may measure luteinising hormone, follicle-stimulating hormone, oestrogen or testosterone. Thyroid and adrenal hormone tests may also be needed. Because hormone

levels can be low early in the process, a stimulation test is sometimes used to see how the pituitary gland responds to a hormone signal.

A brain MRI may be recommended based on the child's age, sex, examination findings and symptoms. MRI uses a magnetic field rather than X-rays to create detailed images. Ultrasound may be used to examine the ovaries, uterus or testicles when a peripheral source is suspected. Genetic testing is useful only in selected cases.

Treatment and management

Treatment is based on the type of precocious puberty, the child's age, how quickly changes are progressing, bone maturity and the likely effect on adult height and well-being. Some children with mild, nonprogressive changes need monitoring rather than immediate treatment.

Central precocious puberty can be treated with a gonadotropin-releasing hormone agonist , often shortened to GnRH agonist. This medicine temporarily pauses the pituitary signals that drive puberty. It may be given as scheduled injections or through a small implant, depending on the medicine and local practice.

Treatment aims to slow sexual development, delay menstruation when appropriate and protect remaining growth time. Growth usually slows to a rate more typical for the child's age. Puberty generally restarts after treatment is stopped, but the timing is not identical for every child.

A brief increase in pubertal signs or light vaginal bleeding can occur soon after starting some forms of treatment. Families should receive advice about expected effects and when to report symptoms. Follow-up usually includes growth measurements, examination and sometimes blood tests or bone-age X-rays.

GnRH treatment does not correct peripheral precocious puberty because the hormones are coming from another source. Management may involve treating an adrenal or thyroid condition, removing a hormone-producing growth, or using medicine to reduce hormone production or block its effects. The plan depends on the specific cause.

Emotional support is also part of care. Children usually benefit from simple, age-appropriate explanations that their body is changing early and that it is not their fault. Practical preparation for periods, body odour and questions from classmates may reduce stress.

Complications

Rapidly progressing puberty can cause the bones' growth plates to mature and close earlier.

Without treatment when it is needed, the child may not reach the adult height expected from their family pattern. The effect is influenced by age at onset, bone age and the speed of progression.

Early menstruation, visible body changes or sexual development may cause embarrassment or unwanted attention. A child's physical appearance can seem older even though their emotional development still matches their actual age. Adults should keep expectations appropriate for the child's age.

Some studies link earlier puberty with later health differences, but these relationships are affected by genetics, body weight and social factors. Early puberty does not mean that a child will inevitably develop future health problems.

When an underlying brain, ovarian, testicular or adrenal condition is present, complications depend mainly on that condition. This is why progressing puberty should be assessed rather than assumed to be only an early version of normal development.

Prevention

Most cases of precocious puberty cannot be prevented. Central precocious puberty often has no identifiable cause, and inherited or congenital causes cannot be avoided through lifestyle changes.

Accidental exposure to hormone products can sometimes be prevented. Oestrogen or testosterone gels, creams, medicines and supplements should be stored securely. Adults using a hormone gel should follow the product instructions for handwashing, covering the application site and avoiding skin contact with children.

Children at increased risk because of a previous brain condition, radiation treatment or certain genetic conditions may have planned growth and puberty checks. Monitoring does not prevent puberty from starting, but it can identify changes early.

No particular food has been shown to prevent or cause precocious puberty. A balanced diet and regular activity support general health but are not substitutes for assessment of early or rapidly progressing changes.

Living with it and what to expect

Some children have early changes that remain mild and do not develop into full, progressing puberty. They may only need follow-up visits over several months to track growth and development.

For children receiving treatment for central precocious puberty, physical changes usually slow or pause. Existing breast tissue or pubic hair may not disappear completely. Height continues to increase, but the very rapid growth rate associated with puberty often settles.

Treatment may continue for several years, with decisions reviewed as the child approaches a more typical age for puberty. After treatment stops, puberty usually resumes over time. Menstrual periods do not necessarily begin immediately.

Most children continue with school, sports and usual activities. Injections, implants and appointments can be inconvenient, and some children feel self-conscious about their development. Clear explanations, privacy and involvement in age-appropriate decisions can help.

Long-term reproductive development is generally expected to proceed after treatment for central precocious puberty. An underlying ovarian, testicular, adrenal or brain condition may change the outlook, so follow-up is tailored to the cause.

When to get medical help

Arrange a routine medical appointment if a girl develops breast tissue before age 8 or a boy has testicle or penis growth before age 9. An appointment is also appropriate for rapid growth, fast progression of pubertal changes, or menstruation at an unusually young age.

Pubic hair, acne or body odour without breast or testicle development is usually not an emergency. It should still be discussed at a routine appointment, especially if it begins very early or progresses quickly.

Seek prompt medical advice for unexplained vaginal bleeding, particularly when there are no other signs of puberty, or for new breast or genital changes associated with pain or a lump.

Seek urgent medical care if early puberty occurs with a severe or worsening headache, repeated vomiting, new vision changes, unusual thirst or urination, weakness, problems with balance, or a major change in behaviour.

Call emergency services for a seizure, loss of consciousness, sudden severe weakness or another sudden neurological symptom. These symptoms are not typical features of uncomplicated precocious puberty.

Common questions

Is early pubic hair always precocious puberty?

No. Pubic hair and body odour can result from early adrenal hormone activity without activation of full puberty. Breast development in girls or testicle enlargement in boys is more suggestive of central puberty. Growth measurements and hormone tests can help distinguish them.

Can precocious puberty stop on its own?

Some early changes remain stable or fade, especially isolated breast development in a young child. Progressing central precocious puberty usually continues without treatment. Monitoring over time helps show which pattern is present.

Will my child still grow normally?

Many children continue to grow well, but rapidly progressing puberty can shorten the remaining growth period. Bone age, current height, growth speed and family height patterns help estimate the possible effect. Treatment may protect adult height in children most likely to benefit, but results cannot be guaranteed.

Does treatment cause infertility?

GnRH agonist treatment temporarily pauses puberty rather than permanently switching it off. Puberty generally resumes after treatment ends, and the treatment is not expected to cause infertility. Fertility may be affected by certain underlying ovarian, testicular, adrenal or genetic conditions.

Is precocious puberty caused by food or something we did?

Usually not. Most central cases have no preventable cause. Ordinary foods and parenting choices do not cause the condition. Accidental exposure to an adult's oestrogen or testosterone product is a less common possible cause.

Does every child need puberty-pausing medicine?

No. Treatment is more likely to be considered when puberty is clearly progressing, bone age is advancing, expected adult height may be affected, or early development is causing significant difficulty. Stable or slowly progressing changes may only need observation.

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