how kids grow

A parent’s guide to understanding a growth hormone problem in children
A baby arrives in this world ready to begin the vital process of growth. Most babies grow an astounding 10 inches during their first year, and about 5 inches in their second year. The process slows down after that. Most children grow about 2 inches a year from age 3 until puberty, when another growth spurt occurs.

Children don’t grow at exactly the same rate, of course, and even if a child grows faster or slower than average, there is usually nothing to worry about. But if you have concerns about your child’s growth, it makes sense to talk with your healthcare provider and to take a closer look.
could my child have a growth hormone problem?

About Growth Hormone Deficiency (GHD)

Growth problems can be caused by a number of factors, including genetic or hormonal disorders, chronic illnesses that affect the whole body (e.g., kidney, heart or lung disease, diabetes) and poor absorption of nutrients.

Growth hormone deficiency is one of the endocrine (hormonal) disorders that can cause poor growth.

In order for a child to grow properly, an important gland called the pituitary must release enough growth hormone. The pituitary gland is located at the base of the brain. It releases hormones, including growth hormone, which is also called somatropin. When the pituitary does not release enough growth hormone, growth hormone deficiency occurs and a child’s growth is affected.

Signs and Symptoms of Growth Hormone Deficiency

The most noticeable symptom—and the one that causes most parents to seek a doctor’s help—is slow growth (less than 2 inches per year) or no growth. Other signs can include:

• An immature appearance—making the child look younger than he or she really is
• A history of low blood sugar as an infant

Causes of Growth Hormone Deficiency

Sometimes, a child is born with growth hormone deficiency, possibly because of a problem with the pituitary gland. In this case, the disorder is called congenital.

In other cases, the disorder develops later in life and is called acquired. There are many possible reasons for this, some of which may include:

• A tumor in the pituitary gland or a part of the brain called the hypothalamus
• Damage to the pituitary gland or hypothalamus from radiation treatment around the head or neck
• Trauma to the head that caused brain damage

Occasionally, doctors cannot find any reason for a child’s growth hormone deficiency. This is known as idiopathic growth hormone deficiency.
Referral to a Pediatric Endocrinologist

If your child appears to have a growth problem, the pediatrician may refer you to a pediatric endocrinologist—a doctor who specializes in diagnosing, treating and managing disorders involving hormones and the glands that make them.

Patient History

At your first visit, your pediatric endocrinologist will likely be interested in your child’s medical history, including:

- **Birth history:** A traumatic delivery, low blood sugar in an infant or prolonged jaundice may increase the chance of growth hormone deficiency.
- **Medical history:** Certain illnesses, especially those involving the pituitary gland, may signal the possibility of growth hormone deficiency. Head trauma or infections in the central nervous system can also increase the risk.
- **Family history:** Growth hormone deficiency is sometimes inherited, so the doctor may ask you about family history and the adult height of both parents.

Physical Evaluation and Laboratory Tests

In addition to taking a patient history, the doctor will conduct a physical evaluation that may include the following:

- **An examination:** The doctor will check your child’s overall health, including physical development and may observe your child’s growth over a period of time.
- **Laboratory evaluation:** This may include blood tests to help rule out other illnesses.
- **Stimulation (STIM) test:** Testing for growth hormone deficiency requires more than a simple blood test. The growth hormone stimulation test helps the doctor find out if your child’s body is producing enough growth hormone. Two tests are usually needed to confirm the diagnosis. During the test, your child receives a substance, or stimulant. An IV is inserted into a vein, and a small amount of blood is taken, usually 5 times, 30 minutes apart. Several blood samples need to be taken to show how your child’s body responds to the stimulant over time. If the blood samples don’t show an increase in growth hormone, your healthcare team is one step closer to the diagnosis of growth hormone deficiency. Two stimulation tests are required for the diagnosis of GHD in children (Growth Hormone Research Society. JCEM 2000; 85:3990–3).
- **Bone age X-rays:** An X-ray of the left hand and wrist may be taken. The bone images will help determine the maturity of the bone and growth potential.
跟踪孩子的成长

许多医疗保健提供者会使用如图所示的生长图表来跟踪孩子的生长。这些图表允许医生将孩子的身高和体重绘制在时间轴上，并与同龄的孩子进行比较。

图中的蓝线（男孩图表中的蓝线）和红线（女孩图表中的红线）代表百分位数。例如，如果一个孩子的身高在75%的线上，这意味着25%的孩子比他高，75%的孩子比他矮。

百分位数并不意味着随着时间的推移而持续增长。一个孩子如果持续在5%的百分位数上，可能与其他在95%的百分位数上的人一样好地发育。如果有什么担忧，与你的医疗保健提供者讨论。

来源：由国家健康统计中心与国家慢性病预防与卫生促进中心合作开发（2000年）。
The Role of Growth Hormone Therapy
Once your child has been diagnosed with growth hormone deficiency, the pediatric endocrinologist will likely recommend treatment with growth hormone replacement therapy. The major goal of treatment is to achieve an adult height that is as close to normal as possible for your child.

What You Might Expect from Treatment
A growing child: Growth hormone therapy helps bones grow, which causes an increase in height. But the process takes patience. It may take time before you begin to see a distinct change. During the first 2 years of therapy, your child may grow several inches. After that, growth continues until the growth plates close and treatment with Saizen® [somatropin (rDNA origin) for injection] for growth failure should be discontinued.

The growth hormone used in treatment is manufactured using biotechnology. The structure of the growth hormone is identical to the growth hormone produced by the pituitary gland.

Treatment Options
Growth hormone is available by prescription only. One brand of growth hormone called Saizen® [somatropin (rDNA origin) for injection] is an option for treatment of growth failure in children who produce low amounts of growth hormone. The medical diagnosis for this condition is called growth hormone deficiency or GHD.

As with any prescription medicine, your doctor will do a complete evaluation of your child’s health. Patients and caregivers should discuss with their doctor the benefits and side effects of using Saizen® [somatropin (rDNA origin) for injection] or any other therapy to treat children with GHD. Your doctor will monitor your child’s growth and possible side effects during the course of treatment.

What is SAIZEN® [somatropin (rDNA origin) for injection] for injection?
Saizen is a prescription medicine that is used to treat growth hormone deficiency (GHD) in:
1. Children with growth failure who produce low amounts of growth hormone.
2. Adults with GHD that started as a child or as an adult.
Saizen is an injectable form of a protein called growth hormone that is produced by your body.

Who should not take SAIZEN®?
Saizen should not be used in children after the growth plates have closed.
Saizen should not be used in children and adults with any of the following medical conditions because serious side effects can occur:
• A critical illness from surgery, serious injuries, or a severe breathing problem
• Prader-Willi syndrome who are severely overweight or have a history of breathing problems including sleep apnea
• Cancer or other tumors
• Allergies to growth hormone
• Eye problems caused by diabetes

Growth hormone therapy helps bones grow, which causes an increase in height. But the process takes patience. It may take time before you begin to see a distinct change.
What should patients tell their doctor before taking SAIZEN®?

- If you have or had cancer as a child. There is an increased risk of getting another tumor if you are a childhood cancer survivor.
- If you have diabetes, are at risk for getting diabetes, or have blood sugar levels that are higher than normal. New cases of type 2 diabetes have been reported in patients taking Saizen.
- If you are allergic to growth hormone, or other ingredients such as benzyl alcohol, sucrose, phosphoric acid, sodium hydroxide, or metacresol.
- If you are taking any other medicines (both prescription or over the counter), vitamins, or supplements because these medicines may affect each other. Your doctor may need to adjust the dose of Saizen or other medicines you are taking.
- If you are nursing, pregnant, or plan to become pregnant. It is not known if Saizen passes into your breast milk or could harm your unborn baby.

Your doctor will perform certain tests before prescribing SAIZEN and will monitor progress during the course of treatment.

What are the most common side effects of SAIZEN reported in clinical trials in patients treated for GHD?

The most common side effects reported are:

- An injection site reaction such as pain, numbness, redness, and swelling
- Muscle and joint pain
- Tingling and numbness
- Unusual skin sensations

- Headache
- Adults also commonly report swelling associated with fluid retention especially in the legs, arms, and face.

Other less common but serious side effects of SAIZEN are:

- Tumors or cancerous growths
- High blood sugar (hyperglycemia/diabetes) which can include symptoms of increased thirst and urination, tiredness, trouble concentrating and weight loss
- Headaches, changes in vision, nausea or vomiting which requires immediate medical attention
- Serious allergic reactions that require immediate medical attention
- Hip and knee pain or a limp in children, which can be a sign that the thigh bone and hip joint may have slipped out of place
- Curvature of the spine or backbone in children (scoliosis)
- Pain and tenderness in the abdomen, which could be a sign of a problem with the pancreas

These are not all of the possible side effects. Let your doctor know about any side effects you may experience.

How should you administer SAIZEN?

Patients and caregivers should be trained by a healthcare professional on how to mix and inject Saizen prior to use. Children should always be supervised.

Please see the Prescribing Information enclosed for a complete list of SAIZEN Risk Information.
Set realistic expectations; your child should know that even with therapy, growth takes time.

Growth Hormone Therapy Is Often Long Term

Just as it takes a child a number of years to naturally grow to his or her adult height, treatment may be recommended for several years. Growth hormone treatment can continue until your child has achieved his or her final height. It is more than likely your child will take growth hormone until bone maturation has occurred.

Long-term commitment to growth hormone therapy can be especially difficult for a child. There may be times when your child/teen wants to discontinue treatment. It’s important to remember that people who take growth hormone as prescribed have better outcomes than those who miss doses or take breaks from treatment. Remind your child that stopping therapy may limit the growth benefit he or she gets.

Things You Can Do as a Parent or Caregiver

To help your child stay committed to therapy, consider these ideas:

- Set realistic expectations; your child should know that even with therapy, growth takes time
- Keep a log so that your child has a written reminder of his or her progress
- Plan a small reward after every week or month your child takes growth hormone as prescribed
- Ask your healthcare provider to review the benefits of growth hormone therapy with your child
- Everyone likes praise; let your child know you appreciate the commitment he or she is making
The Human Growth Foundation (HGF) is a national, nonprofit organization dedicated to helping individuals with growth-related disorders and their families. It provides education and support for the family as well as education for healthcare professionals. HGF also acts as an advocate for those with growth problems.

The MAGIC Foundation is a nonprofit, national organization created to provide support and educational services for the families of children who have a wide variety of chronic and/or critical disorders, syndromes and diseases that affect growth.