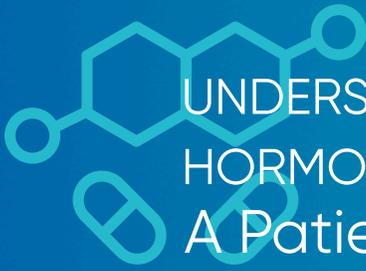


UNDERSTANDING GROWTH HORMONE THERAPY



A Patient Guide





UNDERSTANDING GROWTH HORMONE THERAPY A Patient Guide

This booklet will help you learn about growth hormone deficiency and growth hormone therapy. You will find out what causes growth problems, how they are treated, and what you can expect during treatment.

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WHAT IS GROWTH HORMONE?



Growth hormone (GH) is a natural substance made by the pituitary gland, a small gland at the base of the brain. It plays an important role in how children grow and how the body works throughout life.

What Does Growth Hormone Do?

In Children:

- Helps bones grow longer and stronger
- Helps muscles develop
- Supports overall growth and development

In Children and Adults:

- Helps the body use fat for energy
- Maintains healthy muscles and bones
- Supports heart health
- Helps with energy levels and mood

Key Terms to Know

Growth Hormone (GH): A hormone made by the pituitary gland that helps the body grow and stay healthy.

Pituitary Gland: A small, pea-sized gland at the base of the brain that makes growth hormone and other important hormones.

Hormone: A chemical messenger that travels through the blood and tells organs what to do.

References:

1. Hormone Health Network. "Growth Hormone Deficiency." Endocrine Society. <https://www.hormone.org/diseases-and-conditions/growth-hormone-deficiency>
2. Mayo Clinic. "Growth Hormone Deficiency." MayoClinic.org.
3. National Institute of Child Health and Human Development. NIH. <https://www.nichd.nih.gov/>



GROWTH HORMONE DEFICIENCY



Growth hormone deficiency (GHD) happens when the pituitary gland does not make enough growth hormone. This can happen in children or adults.

GHD in Children

When children don't have enough growth hormone, they may:

- Grow much slower than other children their age
- Be shorter than expected based on their parents' height
- Look younger than their actual age
- Have delayed puberty

GHD in Adults

Adults with GHD may experience:

- Increased body fat, especially around the waist
- Decreased muscle mass and strength
- Low energy and fatigue
- Reduced bone density
- Emotional changes like anxiety or depression

Other Conditions Treated with Growth Hormone

Growth hormone therapy may also be used for:

- Turner syndrome
- Prader-Willi syndrome
- Chronic kidney disease
- Children born small for gestational age (SGA)
- Short stature with no known cause (idiopathic short stature)

References:

1. Hormone Health Network. "Growth Hormone Deficiency in Children." Endocrine Society.
2. MAGIC Foundation. "Growth Hormone Deficiency." magicfoundation.org.



SIGNS & SYMPTOMS



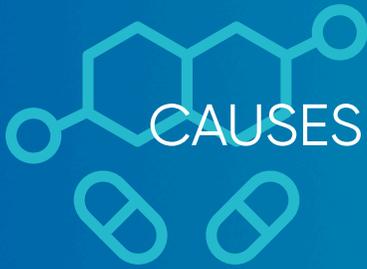
Signs and symptoms depend on when GHD develops and how severe it is:

In Infants	<ul style="list-style-type: none">• Low blood sugar (hypoglycemia)• Jaundice that lasts longer than normal• Small penis in boys (micropenis)• Slow growth in length
In Children	<ul style="list-style-type: none">• Height well below average for age• Growth rate less than 2 inches per year after age 3• Looking younger than other kids the same age• Delayed tooth development• Late or no puberty• Increased fat around the face and stomach
In Adults	<ul style="list-style-type: none">• Fatigue and low energy• Decreased muscle mass• Weight gain, especially belly fat• Anxiety, depression, or social isolation• Thin, dry skin• Reduced bone density• High cholesterol

Important: Many children with GHD have normal intelligence. The condition affects physical growth, not brain development.

References:

1. Hormone Health Network. "Signs and Symptoms of GHD." Endocrine Society.
2. Cleveland Clinic. "Growth Hormone Deficiency." my.clevelandclinic.org.



CAUSES AND RISK FACTORS

What Causes GHD?

GHD can be present from birth (congenital) or develop later (acquired):

Congenital Causes (Present at Birth)

- Genetic mutations affecting the pituitary gland
- Problems with brain or pituitary development before birth
- Sometimes no cause can be found

Acquired Causes (Develops Later)

- Brain tumors near the pituitary gland
- Head injury or trauma
- Radiation treatment to the head
- Infections affecting the brain
- Surgery near the pituitary gland

Idiopathic GHD

In many cases, especially in children, the exact cause of GHD is unknown. This is called "idiopathic" GHD.

Risk Factors

- Family history of GHD or short stature
- History of brain tumor or brain surgery
- Previous radiation to the head
- Certain genetic conditions
- Severe head injury

References:

1. National Organization for Rare Disorders. "Growth Hormone Deficiency." rarediseases.org.
2. Boston Children's Hospital. "Growth Hormone Deficiency." childrenshospital.org.



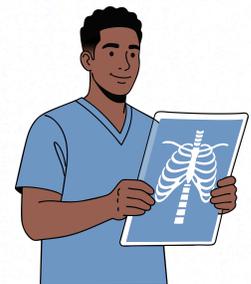
How is GHD Diagnosed?

Diagnosing GHD involves several steps:

Growth Chart Review

What It Is: Tracking height and weight over time

Why It Matters: Shows if growth is slower than expected



Bone Age X-Ray

What It Is: An X-ray of the hand and wrist

Why It Matters: Shows if bones are maturing at the normal rate

Blood Tests

What They Check: IGF-1 and IGFBP-3 levels (proteins affected by GH)

Why It Matters: Low levels may suggest GHD



Growth Hormone Stimulation Test

What It Is: Medicine is given to trigger GH release, then blood is drawn

Why It Matters: Confirms if the pituitary gland can make enough GH

MRI of the Brain

What It Is: Detailed pictures of the brain and pituitary gland

Why It Matters: Looks for tumors or structural problems



Other Hormone Tests

The pituitary makes many hormones. Your doctor may test others to get the full picture.

References:

1. Pediatric Endocrine Society. "Diagnosis of GHD." pedsendo.org.
2. Hormone Health Network. "Testing for GHD." Endocrine Society.



WHAT TO EXPECT

Treatment Course

With treatment, most children with GHD can reach a normal adult height. Here's what to expect:

Treatment is Long-Term

- Children usually take GH until they stop growing (growth plates close)
- This may be several years of daily injections
- Some people need GH for life

Results Take Time

- Growth is fastest in the first year of treatment
- It takes time to "catch up" with peers
- Regular monitoring helps track progress

What to Expect in Children

- Increase in height (usually 3-4 inches in the first year)
- Increased appetite
- More energy
- Clothes and shoes may need to be replaced often

What to Expect in Adults

- Improved energy and mood
- Increased muscle mass
- Decreased body fat
- Improved bone density over time

Commitment is Key

Daily injections and regular doctor visits are essential for the best results.

References:

1. MAGIC Foundation. "What to Expect with GH Therapy." magicfoundation.org.



GROWTH HORMONE THERAPY

Growth hormone therapy replaces the hormone your body doesn't make enough of.

HOW IT WORKS

Synthetic growth hormone is identical to the natural hormone made by your body. It's given as a daily injection under the skin (subcutaneous).

INJECTION DEVICES	Several types of devices make injections easier: <ul style="list-style-type: none">• Pen devices (most common) - easy to use with small needles• Auto-injectors - hide the needle• Needle-free devices - use pressure instead of needles
WHEN TO INJECT	<ul style="list-style-type: none">• Usually given once daily• Best given at bedtime (mimics natural GH release)• Same time each day for best results
WHERE TO INJECT	Common injection sites: <ul style="list-style-type: none">• Stomach (abdomen) - avoid the belly button area• Thighs• Upper arms• Buttocks Rotate sites to prevent skin problems.
STORAGE	<ul style="list-style-type: none">• Most GH products need refrigeration• Do not freeze• Check expiration dates• Follow package instructions carefully

References:

1. Hormone Health Network. "Growth Hormone Treatment." Endocrine Society.



HOW TO GIVE INJECTIONS

Your healthcare team will train you on how to give injections. Here are the basic steps:

Before You Start

1. Wash your hands thoroughly with soap and water
2. Gather all supplies
3. Check the medication (color, expiration date)
4. Let refrigerated medication warm to room temperature (about 30 minutes)

Giving the Injection

1. Choose an injection site and clean with alcohol
2. Pinch the skin gently
3. Insert the needle at a 90-degree angle (or 45 if very thin)
4. Push the plunger slowly
5. Wait a few seconds before removing the needle
6. Do not rub the injection site

After the Injection

- Dispose of needles in a sharps container
- Record the injection site and date
- Store medication properly

Tips for Children

- Let them choose the injection site
- Use distraction (TV, games, deep breaths)
- Praise them afterward
- Consider numbing cream if needed
- Establish a consistent routine





MONITORING PROGRESS

Regular check-ups are essential to make sure treatment is working:

How Often to See the Doctor

- Every 3-6 months during active treatment
- More often when first starting treatment
- Your doctor will adjust based on your needs

What to Expect at Appointments

- Height and weight measurements
- Review of growth chart
- Blood tests (IGF-1, thyroid, blood sugar)
- Bone age X-ray (periodically)
- Discussion of any side effects or concerns

Signs Treatment is Working

- Increased growth rate
- Improved energy
- Better appetite
- Need for larger clothes and shoes

Track Progress at Home

- Measure height at the same time of day
- Use the same measuring spot (against a wall)
- Keep a log of measurements
- Note any changes in energy, mood, or appetite

Dose Adjustments

Your doctor may adjust the dose based on growth response, blood test results, and side effects.



TIPS FOR TAKING YOUR MEDICATION



DO:

- Give injections at the same time each day (bedtime is best)
- Rotate injection sites to prevent skin problems
- Store medication properly (usually refrigerated)
- Keep all doctor appointments
- Track growth at home
- Tell your doctor about all other medications
- Plan ahead for travel (keep medication cool)

If You Miss a Dose

- If you remember the same day, give it when you remember
- If it's the next day, skip the missed dose
- Never give two doses at once
- Let your doctor know if you miss doses often



DON'T:

- Skip doses - consistency is key for best results
- Double up if you miss a dose
- Freeze the medication
- Use medication that looks cloudy or discolored
- Inject into the same spot every time
- Stop treatment without talking to your doctor



Common Side Effects: Injection site reactions (redness, swelling), headache, joint or muscle pain, fluid retention. Most are mild and improve over time.

References:

1. Hormone Health Network. "Taking Growth Hormone." Endocrine Society.



WHEN TO CALL YOUR DOCTOR

! CALL 911 OR GO TO THE EMERGENCY ROOM IF:

- Severe allergic reaction (trouble breathing, swelling of face/throat)
- Severe headache with vomiting or vision changes
- Signs of high blood sugar (extreme thirst, frequent urination, confusion)

! CALL YOUR DOCTOR'S OFFICE IF:

- Persistent headaches
- Hip or knee pain, limping
- Vision changes
- Severe or worsening injection site reactions
- Unusual fatigue
- Nausea or vomiting
- Swelling in hands or feet
- Signs of ear infection (in children)
- No growth improvement after several months
- Any concerns about treatment



Special Warning - Hip Pain in Children

Children on GH therapy have a slightly higher risk of slipped capital femoral epiphysis (hip problem). If your child develops hip or knee pain or starts limping, call the doctor right away.

*Keep Your Follow-Up Appointments!
Regular monitoring is essential for safe and effective treatment.*



BONE AGE	How mature the bones are, shown by an X-ray of the hand
ENDOCRINOLOGIST	A doctor who specializes in hormones
GHD	Growth hormone deficiency
GROWTH HORMONE (GH)	A hormone that helps the body grow and stay healthy
GROWTH PLATES	Areas at the end of bones where growth happens
HORMONE	A chemical messenger in the body
IDIOPATHIC	Of unknown cause
IGF-1	Insulin-like growth factor 1, a protein that shows GH activity
PITUITARY GLAND	A small gland in the brain that makes growth hormone
SHORT STATURE	Height significantly below average for age and sex
SUBCUTANEOUS	Under the skin (type of injection)
STIMULATION TEST	A test that checks if the pituitary can make enough GH



Learn More:

- MAGIC Foundation: magicfoundation.org
- Hormone Health Network (Endocrine Society): hormone.org
- Human Growth Foundation: hgfound.org
- Pediatric Endocrine Society: pedsendo.org
- National Institute of Child Health and Human Development: nichd.nih.gov
- Mayo Clinic - Growth Hormone Deficiency: mayoclinic.org
- Cleveland Clinic - Growth Disorders: clevelandclinic.org



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This booklet is for informational purposes only and is not intended to replace professional medical advice. Always consult your healthcare provider for diagnosis and treatment.

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