

## Does Growth Hormone Boost Kid's Chance of Success?

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***With increased bullying and a heightened interest in funding experiences and opportunities that will contribute to their child's success and happiness, parents have begun to request human growth hormone injections to increase their children's height. Formerly used in situations where children could not produce enough growth hormone, children who have sufficient levels of growth hormone, but are still small for their age and gender, may be treated with daily or weekly injections.***

### **Key takeaways:**

- Children diagnosed with a growth hormone deficiency (GHD) can be treated with growth hormone injections to help add several inches to their height.
- Currently, parents of children who have normal growth hormone levels, but are of small stature, often consider giving recombinant human growth hormone injections to increase their children's height.
- The average increase in height with recombinant human growth hormone injections is two inches.

→ The long-term side effects of treatment of children with normal growth hormone with recombinant human growth hormone injections requires further study.

→ Parents and pediatric endocrinologists should develop a balanced plan of care considering potential risks vs. the maximum dose that will be used over a safe period of time, while increasing dietary sources of amino acids that can help increase natural growth hormone levels.

## **Growth hormone deficiency in kids**

Growth hormone regulates growth, muscle and bone strength, and normal fat distribution in children. Growth hormone also affects fat (lipid) and sugar (glucose) levels. The pituitary gland at the base of the brain secretes growth hormone.

With a growth hormone deficiency (GHD), a child will grow more slowly and have a significantly shorter stature than children of the same age and gender. Of children with short stature, 1:4000 to 1:10,000 cases are due to GHD. If not treated, GHD can follow the child into adulthood, creating issues with metabolic functions.

Children with GHD will have a very short stature, with a drop in height on the growth charts of two or more percentiles. The treatment

for children diagnosed with GHD is injections of recombinant human growth hormone daily, or now, potentially weekly. This treatment can continue until the child's growth plates close, preventing them from growing taller.

## **Boosting height and success in kids**

Some children are of smaller stature without having a GHD diagnosis. This is because their pituitary glands make sufficient growth hormone, but they remain smaller than other children their age. Small stature is two standard deviation scores below the mean height for others of the same age and gender.

Approximately 3% of children are of small stature. These cases are diagnosed as idiopathic short stature (ISS). These children were born normal-sized but were slow to grow and usually have a family history of short stature.

Parents whose children suffer from short stature but are otherwise healthy often seek treatment to increase their child's height. Today, bullying is problematic among our children in school. The Centers for Disease Control and Prevention cites bullying as a common problem, with 1 in 5 children experiencing bullying. Perhaps we can use this cite if you agree it supports the statement The National Center for Educational Statistics indicates that one in every five students report being bullied. The reasons for bullying vary, but physical appearance, such as being short, is one of the major reasons cited. Most parents will do anything to prevent a child

from being segregated or bullied for being short or small for their age.

Parents want their children to succeed academically and socially. Most want them to have more opportunities and a better life than they had. They will shell out at least \$8,600 per year on enrichment activities (tutoring, books, novel experiences, lessons, computers, summer camps, and support) to improve their chances of succeeding in school, according to a [2016 Georgetown study](#).

## **Treating healthy kids**

In 2003, the Food and Drug Administration approved the use of human growth hormone to treat children who have short stature with an unknown cause. This opened the door for parents to request growth hormone to improve the height of shorter children with normal growth hormone levels. As a result, pediatric endocrinologists may offer the option to treat children without medical cause for their short stature with growth hormone.

It is important for a parent to know how much height a child will gain. Although it is hard to predict, the average amount a child will benefit from human growth hormone injections is two inches.

Parents who want this “advantage” for their child will pay between \$1,000 and \$5,000 for injectable recombinant growth hormone, depending upon the dose needed. This treatment may go on for months or years. Buying the medication online or outside the

United States can be cheaper, but there are inherent concerns about product quality and the legality of doing so. Furthermore, insurance companies have been aggressively using formularies and increased patient cost-sharing to limit their exposure to this high-cost specialty drug.

## **Potential side effects**

No parent would knowingly authorize a treatment they knew would harm their child. Also, there is no definitive proof that long-term treatment with recombinant growth hormone will cause problems for these children in later life. However, in December 2020, JAMA Pediatrics cited a study by pediatric endocrinologists at Karolinska University Hospital that had disturbing results.

They reported that the 3,408 children treated with recombinant growth hormone, who were followed for 25 years after treatment, were generally found to be at higher risk for cardiovascular complications. The risk of having a heart attack or stroke was two-thirds higher for men and twice as high for women treated with growth hormone, than for 50,036 similar people who were not treated with growth hormone.

Although the Karolinska University Hospital was a small study, and the long-term effects of giving healthy children of small stature recombinant growth hormone are still not known, it raises questions about balancing the risk of treatment against the benefits of increased height.

Some of the more commonly documented side effects of the medication include:

- Abnormal touch sensation
- Dizziness
- Nervousness
- Headache
- Slow or fast heartbeat

Less common and more rare side effects include:

- Chest pain
- Bloating
- Nausea or vomiting
- Carpal tunnel syndrome
- Swollen hands or feet
- Fatigue or insomnia

Furthermore, if a child is irresponsibly treated with human growth hormone after the growth plates have fused or is administered excessive doses of the medication, abnormal growth of the bones (acromegaly), diabetes, or heart disease can result.

## **Balancing the risks**

If a magic pill could make your child look the same as everyone else and save them the pain of being bullied, most parents would at least consider purchasing this medication for their child. Unfortunately, treating a healthy but small child with recombinant human growth hormone

injections is a little less straightforward. The return on the investment may not be as positive as they hope.

The amount of growth may be much less than desired, and the possibility of side effects, including the risk of potentially serious long-term side effects, exists. For those children who grow more than an inch or two after only a few years of treatment, which limits their exposure, the expense and unknown risks may be worth it. For those who gain an inch or less of height, despite increasing doses over a longer period, the gain may not outweigh the risks.

Families need pediatric endocrinologists who are well versed in the actual and potential risks of using recombinant human growth hormone over time to treat healthy children with small stature. Although there have been stricter guidelines for dosing schedules, further long-term studies are needed to continue to develop guidelines on what dose over what period poses the least risk but is still effective for these children.

In addition to offering injectable recombinant human growth hormone, pediatric endocrinologists should also encourage parents to promote a healthy lifestyle in these children. Diets that include chicken, dairy products, and eggs are important. These foods are rich in amino acids (tyrosine, lysine, arginine, and tryptophan), which stimulate the body's natural growth hormone. Researchers are also exploring oral supplementation with certain amino acids as an option.

As with most things, no magic pill or injection can be given to resolve the issue of small stature in healthy children without incurring some potential long-term risk. However, these risks can be managed by parents and pediatric endocrinologists who manage expectations, dosages, and the length of time such injections are used. Perhaps one of the best investments a parent can make is in the general health of their children by encouraging a diet rich in foods high in the amino acids that promote the production of natural growth hormone.

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## **Resources:**

1. [Student Reports of Bullying: Results From the 2017 School Crime Supplement to the National Crime Victimization Survey.](#)
2. [Born to Win, Schooled to Lose: Why Equally Talented Students Don't Get Equal Chances to Be All They Can Be.](#)
3. [Growth Hormone Deficiency.](#)
4. [Guidelines for growth hormone and insulin-like growth factor-I treatment in children and adolescents; growth hormone deficiency, idiopathic stature, and primary insulin-like growth factor-I deficiency.](#)
5. [Association of Childhood Growth Hormone Treatment With Long-term Cardiovascular Morbidity.](#)
6. [Fast Fact: Preventing Bullying.](#)

7. Growth hormone deficiency and the transition from pediatric to adult care.
  8. FPL for approved NDA 19-640/S-033.
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