

Contributing Physician

Kevin Yuen, MD, FRCP (UK), FACE

Professor of Medicine
Medical Director,
Barrow Pituitary Center &
Barrow Neuroendocrinology Clinic
Phoenix, Arizona

Adults Need Growth Hormone Too!

Almost everyone understands that children need growth hormone to grow taller. For children with short stature and are not growing due to underlying growth hormone deficiency, this medication is available for treatment to promote growth and achieve normal height. Since the 1990s, it has also been discovered that adults can develop growth hormone deficiency and need growth hormone therapy for a number of very important reasons. Thus, it appears that adults, not only children, with growth hormone deficiency do indeed need growth hormone too!

Where Does Growth Hormone Come From?

Growth hormone is a small protein produced by the pituitary gland, a small dime-sized gland that extends from the base of the center of the brain located right behind the eyes. In addition to growth hormone, the pituitary gland also produces a number of other important hormones as well, such as prolactin, thyroid-stimulating hormone, luteinizing hormone, adrenocorticotrophic hormone, oxytocin, and vasopressin. The part of the brain just above the pituitary called the hypothalamus produces two hormones called growth-hormone-releasing hormone and somatostatin that plays an important role in controlling the amount of growth hormone released by the pituitary.

The amount of growth hormone released by the pituitary over our lifetime changes with increased amounts released during childhood, especially during the pubertal growth spurts, and decreasing amounts, as we get older.

When growth hormone is produced by the pituitary gland, it is released into the bloodstream that then stimulates the liver primarily to release another hormone called insulin-like growth factor-I or simply known as

IGF-I. IGF-I can be measured in blood by taking a blood sample. As IGF-I levels do not fluctuate greatly throughout the day for an individual person as much as growth hormone, IGF-I is used by physicians as a screening test to assess for growth hormone deficiency or excess in conditions such as acromegaly and gigantism. Both growth hormone and IGF-I acts on many tissues in the body, including brain, bone, fat and muscles.

What Does Growth Hormone Do?

Growth hormone functions to regulate body composition, body fluids, muscle and bone growth, mental function, and possibly heart function. On the other hand, deficiency of growth hormone in children is easy to recognize with poor growth hormone. In adults, growth hormone deficiency is not so easy to detect since adults have achieved adult height after their bones have fused, thereby preventing further growth. The deficiency of growth hormone in adults can be most appreciated by assessing the body composition. These important parts of our bodies are not nurtured properly in growth hormone deficiency, resulting in an abnormal metabolism. With this deficiency, fat tends to be deposited more easily, especially around the central part of the abdomen. Since growth hormone can affect muscles, they also change for the worse, which means there is less muscle strength and less ability to exercise. Bones, too, are affected by becoming weaker with low bone mineral density, increasing the risk of osteoporosis as we get older. This combination of more fat, less muscle and less bone mineral density represents the abnormal body composition changes as the result of growth hormone deficiency affecting adults.

Adults with growth hormone deficiency also experience adverse effects on cholesterol and glucose metabolism. These changes result in a higher overall cholesterol level in blood, which is undesirable. The “good” cholesterol

also changes. We want this “good” cholesterol level to be as high as possible. This good cholesterol (also referred to as HDL cholesterol) changes to a lower level as the result of growth hormone deficiency. In addition, because of the increased risk central fat deposition associated with adult growth hormone deficiency, the risk of developing diabetes and cardiovascular disease increases as well when they get older.

What Are Some Symptoms of Growth Hormone Deficiency in Adults?

Adults who develop growth hormone deficiency may report central weight gain, difficulty to lose weight, dry skin, fatigue, and often do not feel their usual selves. Most notice a decrease in their physical energy level and endurance for exercise. Some may avoid social contact or avoid socialization with their friends and family members, and may develop anxiety and depression. Other people with growth hormone deficiency think they feel normal, but do not remember the way they felt before they developed the growth hormone deficiency. These people may derive improvement in how they feel and energy levels after starting on growth hormone therapy.

Causes of Growth Hormone Deficiency in Adults

Most children who develop growth hormone deficiency do so because the hypothalamus, for unknown reasons, fails to function and does not produce sufficient amounts of growth-hormone-releasing hormone to stimulate the pituitary gland to release growth hormone. There may not be a visible cause of pituitary damage on MRI in most children with growth hormone deficiency. This deficiency may continue into adulthood. Adults, however, who develop growth hormone deficiency usually do so because of some damage to the pituitary gland and hypothalamus. This damage results in an inability of the pituitary

This brochure is for informational purposes only. Neither The MAGIC Foundation nor contributing medical specialists assume any liability for its contents. Consult your physician for diagnosis and treatment.

October 2019

gland to make growth hormone in sufficient amounts needed by the body. The most common cause of pituitary and hypothalamus damage in adults is a tumor in the pituitary gland and hypothalamus. Either the tumor itself, or the treatment in the form of surgery to remove the tumor or radiation therapy of the tumor can cause adult growth hormone deficiency. Other recently described conditions that can cause adult growth hormone deficiency include head injury, stroke, bleeding in the base of the brain and infections to the brain, such as meningitis. Some adults may also have persistent under-active hypothalamic drive (activity) as a cause of growth hormone deficiency similar to the most common reason for children to develop growth hormone deficiency, but this is rare.

What Methods Are Used to Detect and Confirm Growth Hormone Deficiency?

Your doctor will choose an appropriate test to detect and confirm if you have growth hormone deficiency or not. Since measuring growth hormone in the blood is hard to interpret because growth hormone secretion fluctuates throughout the day and often can be low in normal individuals, a low level in blood does not confirm growth hormone deficiency. Your doctor will choose a stimulation test that is appropriate for you that will stimulate growth hormone secretion from your pituitary gland into your bloodstream. By measuring your blood at intervals after administration of a medication to stimulate GH secretion, your responses to the stimulus can be obtained by measuring several growth hormone levels in the blood. In normal individuals there is a rise in blood growth hormone levels after the stimulus but in deficient individuals, there is either no rise, or a minimal rise, which will then confirm that you are growth hormone deficient. The commonly used medications to stimulate growth hormone secretion include insulin and glucagon. The insulin tolerance test is considered the reference standard growth

hormone stimulation test but the test is labor intensive, can cause severe hypoglycemia, and is contraindicated in certain patients. The glucagon test is considered the alternative test if the insulin tolerance test cannot be performed in certain patients. In December 2017, the United States Food and Drug Administration approved the use of a medication called Macrelin, which can be taken by mouth, as the test that can be used to test for adult growth hormone deficiency by measuring GH levels after an oral dosing.

All of these growth hormone stimulation tests requires you to be fasted. On the day of the test, an IV line will be placed in your arm for multiple blood draws to measure your growth hormone levels. Your doctor will choose one of these that best fits your situation.

How is Growth Therapy Administered?

Growth hormone is administered daily by injection underneath the skin into fat tissue. Most individuals give it to themselves in the fat in the lower abdomen. Previously, needles and syringes were used that is similar to those used by diabetic patients. Nowadays, many easy-to-use pen delivery devices are available to administer growth hormone more reliably and some pen devices can hide the needle so well that you cannot even see it when you are giving the injection. You will need a special "sharps container" for disposal of the needles. Your doctor will calculate the dose of growth hormone appropriate for you. The dose may change depending upon your responses and blood tests taken to monitor therapy. It is important to note that growth hormone cannot be administered orally because it is digested in the stomach before it can be absorbed into the bloodstream.

What Symptoms Suggest Taking Too Much Growth Hormone?

If you are receiving too much growth hormone, you may develop side-effects such as swelling of the ankles, aching in your joints, pain in your hands or rise in blood glucose and blood pressure. If these symptoms do occur, you should notify your doctor immediately. Usually side-effects subside when your dose of growth hormone is decreased or the treatment is stopped temporarily. Once the side-effects have resolved after stopping treatment, you can discuss with your physician to see if you can resume at a lower dose. It is important to note that not every patient feels better immediately being on growth hormone treatment, which is why you should be on growth hormone for at least twelve to eighteen months. During that time, your doctor will slowly adjust the dose of growth hormone that is right for you.

Summary

Adults need growth hormone all of our lives, not only as children for growth purposes. Without growth hormone as adults, there is an increased risk of developing abnormal body composition, increased central fat deposition, increased risk of cardiovascular disease and diabetes, increased risk of low bone mineral density, and reduced physical and psychological energy and well-being. Growth hormone replacement in adults with growth hormone deficiency often improves most, but not all, symptoms associated with this condition, and should be continued lifelong, if possible.

Adult Growth Hormone Deficiency



Patient Information

The MAGIC Foundation

4200 Cantera Drive, Suite 106
Warrenville, IL 60555
630-836-8200
fax 630-836-8181
800-3 MAGIC 3

www.magicfoundation.org