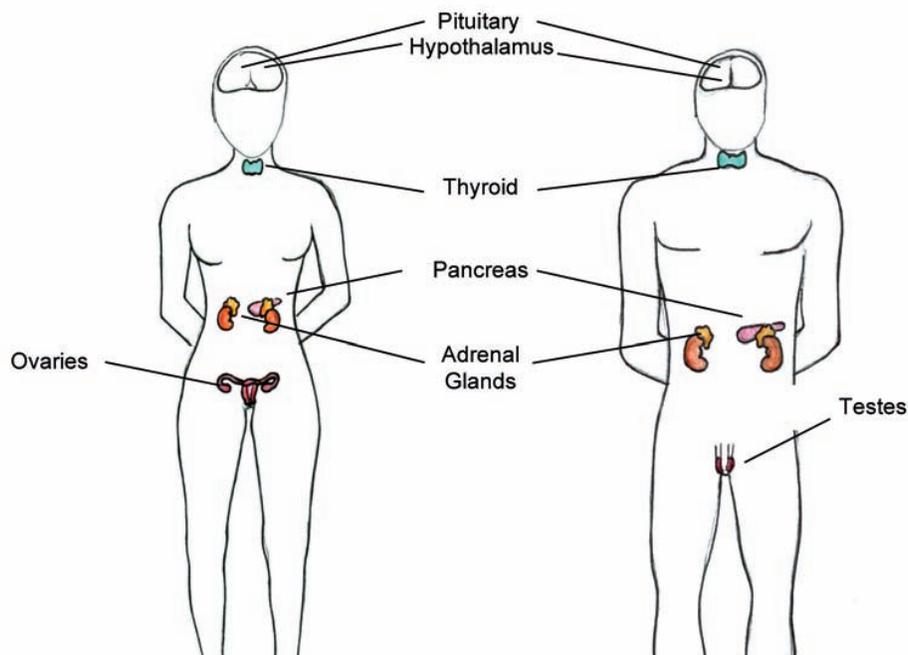


Endocrine Problems after Childhood Cancer: Growth Hormone Deficiency

Some people who were treated for cancer during childhood may develop endocrine (hormone) problems as a result of changes in the function of a complex system of glands known as the endocrine system.

What is the endocrine system?

The endocrine system is a group of glands that regulates many body functions including growth, puberty, energy level, urine production, and stress response. Glands of the endocrine system include the pituitary, hypothalamus, thyroid, adrenals, pancreas, ovaries (in females), and testes (in males). The hypothalamus and pituitary are sometimes called the "master glands" because they control many of the other glands in the endocrine system. Unfortunately, some treatments given for childhood cancer can damage the endocrine system, resulting in a variety of problems.



What are hormones?

Hormones are chemical messengers that carry information from the endocrine glands through the bloodstream to the body's cells. The endocrine system makes many hormones (such as growth hormone, sex hormones, adrenal and thyroid hormones) that work together to maintain specific bodily functions.

What is growth hormone deficiency?

Growth hormone (GH) is made by the pituitary gland. In order for children to grow to their full height potential, they need adequate amounts of GH. GH works with thyroid hormone, exercise, proper nutrition, and rest to help children and teenagers grow. GH also helps maintain normal blood sugar levels and is needed for the normal development of teeth. In addition to helping with bone growth, GH affects how well the heart and blood vessels work, how the body uses fat, makes muscle, and strengthens bones, and generally influences overall health throughout life. In healthy people, GH production continues into adulthood. Adults need small amounts of GH to maintain proper amounts of fat, muscle and bone. GH may also play a role in regulating mood and emotion.

Cancer treatments, such as radiation or surgery to structures in the head or brain, may cause malfunction of the glands that control growth. As a result, the pituitary gland may not make enough GH, resulting in growth hormone deficiency. GH deficiency can also occur in people who have never had cancer treatment.

Signs and symptoms of growth hormone deficiency

Slowing of growth (height) is one of the most obvious signs of GH deficiency in children. A GH deficient child usually grows less than 2 inches per year. Children with GH deficiency are smaller and tend to look younger than children their same age, but they usually have normal body proportions.

Adults who have GH deficiency may have a variety of different physical symptoms, such as thinning of the bones, decreased muscle strength, increased body fat, or high blood cholesterol levels. Adults may also have emotional symptoms such as feeling tired, anxious, irritable, gloomy, unmotivated, or having a decreased interest in sex.

Risk factors for growth hormone deficiency

Risk factors related to treatment for cancer during childhood include:

- Cancer treatment before reaching adult height, especially in very young patients
- Radiation to any of the following areas:
 - Brain (cranial)
 - Eye or eye socket (orbit)
 - Ear or infratemporal region (midfacial area behind the cheekbones)
 - Nasopharynx (area above the roof of the mouth)
 - Total body (TBI)

- Surgery to the brain, especially the central region of the brain where the pituitary gland is located (suprasellar region)

Recommended screening after cancer treatment

All childhood cancer survivors should have a **yearly physical examination** including measurement of height and weight, and assessment of pubertal status, nutritional status, and overall well-being. **For patients with the risk factors listed above, this screening should be done every 6 months until growth is completed.** If there are signs of poor growth, an x-ray of the wrist (**bone age x-ray**) should be done. Other possible causes of growth problems, such as low thyroid function, should also be checked.

If GH deficiency is suspected, your healthcare provider will probably refer you to an endocrinologist (doctor who specializes in hormone problems). The endocrinologist will do more specific tests to evaluate the problem.

How is growth hormone deficiency treated?

If GH deficiency is detected, your endocrinologist will suggest treatment options for you. Usually this involves supplementing or replacing the GH that your pituitary gland is not making on its own. Synthetic GH is given by injection. GH is usually given for several years, until the person reaches an acceptable adult height or the greatest possible height. Your endocrinologist can give you information about how much growth is possible on GH therapy. Treatment options for GH deficiency that persists into adulthood should be discussed on an individual basis with your endocrinologist.

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Additional health information for childhood cancer survivors is available at
www.survivorshipguidelines.org

Note: Throughout this *Health Links* series, the term "childhood cancer" is used to designate pediatric cancers that may occur during childhood, adolescence, or young adulthood. *Health Links* are designed to provide health information for survivors of pediatric cancer, regardless of whether the cancer occurred during childhood, adolescence, or young adulthood.

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