



Age Adaptation in Hormone Production

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DESCRIPTION

The endocrine system is made up of hormone-producing organs and tissues. Hormones are naturally occurring chemicals that are produced in one place, released into the bloodstream, and then used by other target organs and systems. Hormones control target organs. Some organ systems have their own internal control systems with or in place of hormones. With age, changes occur naturally in the way body systems are controlled. Some target tissues become less responsive to their regulatory hormones. The amount of hormone produced can also change.

Blood levels of some hormones increase, others decrease, and others remain unchanged. The hormones are also broken down (metabolized) more slowly. Many hormone production organs are controlled by other hormones. Aging also changes this process. For example, an endocrine tissue may produce fewer hormones than it did when it was young, or it may produce the same amount at a slower rate.

Aging change

The hypothalamus is located in the brain. It produces hormones that control other structures of the endocrine system, including the pituitary gland. The amount of these regulatory hormones does not change, but the response of the endocrine organs can change with age. The pituitary gland is located just below (anterior pituitary) or inside (posterior pituitary) of the brain. This gland reaches its maximum size in middle age and then gets smaller. It has two parts:

- The posterior (posterior) stores the hormones produced in the hypothalamus.
- The anterior (front) part produces hormones that affect growth, thyroid (TSH), adrenal cortex, ovaries, testes, and breasts.

The thyroid gland is located in the neck. It produces hormones that help control metabolism. With aging, the thyroid gland can become lumpy (nodular). Metabolism slows down over time, starting around age 20. Because thyroid hormone is produced and broken down (metabolized) at the same rate, thyroid

function tests usually remain normal. In some people, thyroid hormone levels can increase, leading to an increased risk of death from cardiovascular disease. The parathyroid glands are four small glands located around the thyroid gland. Parathyroid hormone affects calcium and phosphate levels, which affects bone strength. Parathyroid hormone levels increase with age, which can contribute to osteoporosis. Insulin is produced by the pancreas. It helps sugar (glucose) move from the blood into cells, where it can be used as an energy source. Average fasting blood sugar increases by 6 to 14 milligrams per deciliter (mg/dL) every 10 years after age 50 as cells become less sensitive to the effects of insulin. When this level reaches 126 mg/dL or more, the person is considered to have diabetes.

The adrenal glands are located just above the kidneys. The adrenal cortex, the surface layer, produces the hormones aldosterone, cortisol, and dehydroepiandrosterone.

Aldosterone regulates water and electrolyte balance.

Cortisol is the “stress response” hormone. It affects the breakdown of glucose, proteins and fats, and has anti-inflammatory and anti-allergic effects.

Aldosterone release decreases with age. This drop can contribute to dizziness and a drop in blood pressure with sudden changes in position (orthostatic hypotension). Cortisol release also decreases with age, but blood levels of this hormone remain constant. Levels of dehydroepiandrosterone also decreased. The effect of this drop on the body is not clear. The ovaries and testes have two functions. They produce reproductive cells (eggs and sperm). They also produce sex hormones that control secondary sex characteristics, such as breasts and beards.

As men age increases they usually have lower testosterone levels.

Women have lower levels of estradiol and other estrogenic hormones after menopause.

Overall, there are hormones that decrease with age, hormones that do not change, and hormones that increase. Hormones that are normally decreased include aldosterone, calcitonin, growth hormone, and renin. In women, estrogen and prolactin levels

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are often significantly reduced. Hormones such as cortisol, epinephrine, insulin, and thyroid hormones T3 and T4 are mostly unchanged or slightly decreased. Testosterone levels usually decline gradually as men age. Hormones that can be

increased include Follicle-Stimulating Hormone (FSH), Luteinizing Hormone (LH), norepinephrine, and parathyroid hormone.