

EXERCISE AND ENDOCRINOLOGY

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Physical activity exerts an important influence on the endocrine system, modulating synthesis and secretion of several hormones. Almost every organ and system in the body are affected by physical activity and exercise, mainly through the endocrine and the neuroendocrine systems.

As the body transitions from a resting to an active state, the rate of metabolism must increase to provide the necessary energy. This requires the coordinated integration of many physiological and biochemical systems. Such integration is possible only if all of the involved tissues, organs, and systems can efficiently communicate. Although the nervous system is responsible for much of this communication, fine-tuning the physiological responses to any disturbance in homeostasis is primarily the responsibility of the endocrine system.

The endocrine system is defined as all tissues or glands that secrete hormones, and once these hormones are secreted into the blood, they act as signals throughout the body. Hormones are involved in most physiological processes, so their actions are relevant to many aspects of exercise and sport.

Hormones are categorized as two basic type steroid and non-steroid hormones. The steroid types are cortisol, aldosterone testosterone, oestrogen and progesterone. The non-steroid hormones are thyroxin and triiodothyronine, epinephrine, nor-epinephrine, insulin, glucagon and pituitary hormones.

Effect of exercise on hormonal secretions is varied. It affects the metabolic rate, the blood sugar, blood flow and exerts psychological effects.

Exercise, particularly heavy weightlifting, stimulates the release of luteinizing hormone from the anterior pituitary gland, and luteinizing hormone triggers testosterone production. Exercise that involves intense bursts of energy also stimulates the release of thyroxin from the thyroid gland. Exercise can help control or reduce weight because testosterone and thyroxin speed up metabolism.

Insulin is a hormone that regulates glucose/ blood sugar, by transporting it to muscles and tissues that use glucose for energy. Excessive insulin in the blood reduces the sensitivity

to insulin and glucose stays in the blood when insulin sensitivity goes down, and this leads to diabetes. Exercise might increase insulin sensitivity by reducing blood concentrations of insulin. Blood insulin levels begin decreasing after 10 minutes of aerobic exercise, and weight training might increase sensitivity to insulin at rest, and these reduce the reliance on insulin injections for type 2 diabetics.

The adrenal medulla releases epinephrine during exercise and increases epinephrine levels at higher exercise intensities. Epinephrine increases the amount of blood pumped by the heart. Epinephrine also enhances the ability to use muscles during exercise by dilating the blood vessels, which lets the muscles get more oxygen-rich blood. Thyroxin secretions during exercise increase the amount of blood in the body by about 30% , and these secretions might remain elevated for around five hours

The effects of exercise on the endocrine system might positively affect the mental state. Exercise-induced testosterone might increase confidence and libido. Conversely, low testosterone levels might inhibit motivation, self-confidence, concentration and memory.

During exercise, the pituitary gland releases human growth hormone, which stimulates the body to increase bone, muscle and tissue production. When one starts exercising, the thyroid gland sends out hormones that regulate the body's temperature, heart rate and blood pressure. It also regulates the alertness and focus that are needed to work at a high intensity.

The adrenal gland secretes cortisol and aldosterone, and both these hormones regulate blood pressure, glucose, acts as an anti-inflammatory agent, regulates hydration levels, the speed of the heart and the strength of contractions. It also turns stored carbohydrates into energy.