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Topic: Functions of Thyroid Gland

Functions of thyroid hormone:

The actions of thyroid hormones are mediated by their binding to nuclear receptors. Receptors for thyroid hormone are, like all the steroid hormone receptors, act as transcription factors that regulate gene expression in target cells.

Unlike some steroid receptors (such as glucocorticoids) , thyroid hormone receptors exist in the nucleus, not the cytoplasm, and may remain bound to DNA in the absence of hormone binding.

Thyroid hormones play an important role in the regulation of the **basal metabolic rate**. It increases the basal metabolic rate in most tissues (exceptions include brain, spleen and testes) by stimulating the use of cellular oxygen.

When the basal metabolic rate increases, cellular metabolism of carbohydrates, lipids, and proteins increases. As cells produce and use more ATP, more heat is generated, and body temperature rises. This phenomenon is called the **calorigenic effect**.

A second major effect of thyroid hormones is to stimulate synthesis of $\text{Na}^+ - \text{K}^+$ ATPase. Together with human growth hormone and insulin, thyroid hormones accelerate body growth, particularly the growth of the nervous and skeletal systems.

Calcitonin is a peptide hormone secreted by parafollicular cells of the thyroid gland that are distinct from the thyroid follicles. Thyroid cells produce calcitonin in response to high calcium levels in the blood.

It decreases plasma calcium concentration by decreasing mobilization of calcium from bones; therefore promotes osteoblastic activity.

Parathyroid gland:

The parathyroid glands are four small glands present on the back side of the thyroid gland, one pair each in the two lobes of the thyroid gland.

They secrete parathyroid hormone (PTH) or collip's hormone, which increases levels of calcium in the blood. Its secretion is regulated by the calcium level in the blood.

Bone tissue acts as a storage reservoir for calcium and PTH stimulates the removal of calcium from the bone to increase levels in the blood; therefore it stimulates osteoclastic activity.

It increases the reabsorption of calcium by the renal tubules of kidney so that less is in urine but at the same time it stimulates the loss of phosphates in the urine.

It also stimulates kidney to secrete calcitriol which, in turn, increases calcium absorption from the digested food in the gut. PTH is thus a hypercalcemic hormone; i.e. it increases the blood calcium levels.

Thymus Gland:

The thymus is located behind the sternum between the lungs. It grows during childhood, but gradually decreases in size after puberty.

The hormones produced by the thymus—**thymosin, thymic humoral factor, thymic factor and thymopoietin**—promote the maturation of T-cells and may retard the aging process.

Thymus hormones called thymosins stimulate the development and differentiation of T-lymphocytes or T-cells.

They play a role in regulating the immune system by stimulating other kinds of immune cells as well. It is also responsible for growth during childhood.