Hypothalamus: It is a part of the brain located below the thalamus (hence called hypothalamus) and forms a major connecting link by nervous and endocrine gland.
It is responsible for controlling almost all secretion by the pituitary via either hormonal
or nervous signal.
Specific nerve fibre in the hypothalamus are responsible for synthesizing and secreting various hormones which act upon anterior pituitary gland and modulates its secretion.
Releasing Hormone: Which enhances the anterior pituitary gland secretion
Inhibitory hormones: which inhibit the release of hormones of anterior pituitary
These nerves are different from other nerve endings of the central nervous system as they do not transmit signals from one neuron to another rather these secrete hormones which act on the anterior pituitary.

Pituitary gland:
Anterior pituitary (Adenohypophysis)
Posterior Pituitary (Neurohypophysis)

Anterior pituitary (Adenohypophysis)
Anterior pituitary gland secrete harmones which are trophic harmones. This is because they are essential for growth of their target gland and help them perform their proper function and in turn help the whole body grow.

Growth harmone
It is one of the most important harmones secreted by anterior pituitary. Growth harmone in contrast to other harmones of anterior pituitary does not act on a particular gland but exerts its effect on all or almost all tissues of the body directly. It is a protein molecules and also called somatotropin or somatotropic harmone.

Abnormalities

Hypersecretion

- *Acromegaly:* Occurs after excessive activity of growth harmone producing cell **after adolescence**. (after the epiphysis of the long bone have fused with the shafts)

The person cannot grow taller but the bones can become thicker and soft tissue can continue to grow.

- *Gigantism*

Hyposecretion

Dwarfism

Posterior pituitary (Neurohypophysis)

They are produced in neuron cell bodies of hypothalamus imparting it an endocrine features. Hormones synthesized in the cell body of these neuron are transported to the axon which form a part of posterior pituitary.

Oxytocin

ADH (Anti-Diuretic Harmone)

The thyroid gland

The thyroid gland is a vital hormone gland: It plays a major role in the metabolism, growth and development of the human body. It helps to regulate many body functions by constantly releasing a steady amount of thyroid hormones into the bloodstream. If the body needs more energy in certain situations – for instance, if it is growing or cold, or during pregnancy – the thyroid gland produces more hormones.

The thyroid gland produces three hormones:

- Triiodothyronine, also known as T3
- Tetraiodothyronine, also called thyroxine or T4

- Calcitonin

Strictly speaking, only T3 and T4 are proper thyroid hormones. They are made in what are known as the follicular epithelial cells of the thyroid.

Iodine is one of the main building blocks of both hormones. Our bodies can't produce this trace element, so we need to get enough of it in our diet. Iodine is absorbed into our bloodstream from food in our bowel. It is then carried to the thyroid gland, where it is eventually used to make thyroid hormones.

Sometimes our bodies need more thyroid hormones, and sometimes they need less. To make the exact right amount of hormones, the thyroid gland needs the help of another gland: the pituitary gland. The pituitary gland "tells" the thyroid gland whether to release more or less hormones into the bloodstream. Also, a certain amount of thyroid hormones are attached to transport proteins in the blood. If the body needs more hormones, T3 and T4 can be released from the proteins in the blood and do their job.

T3 and T4 increase the basal metabolic rate. They make all of cells in the body work harder, so the cells need more energy too.

This has the following effects of T3/T4, for example:

- Increase metabolic activity of almost all the tissue of the body, thereby, increasing basal metabolic rate
- Increase the size, number and total membrane surface area of mitochondria and all of this result in the formation of more ATP
- Important for promoting growth especially in children and fetus
- T3/T4 increases the rate of at which carbohydrate are absorbed from GI tract as well as hepatic glycogenolysis and gluconeogenesis. The brain matures (in children)
- Stimulates the fat metabolism by rapid mobilization of lipids from fat tissues.
- Increase blood flow and cardiac output, heart rate ,heart strength, respiration ,gastrointestinal motility

- Activation of the nervous system leads to improved concentration and faster reflexes

Diseases of thyroid

Hyperthyroidism (Grave's Disease)

SYMPTOMS

- High state of excitability
- Intolerance to heat
- Mild to extreme weight loss
- Muscle Weakness
- Nervousness or other psychic disorder
- Extremes Fatigue but inability to sleep
- Termors to Hand

Hypothyroidism

SYMPTOMS

- Fatigue and extreme sleepiness with sleeping upto 12-14 hour
- Extreme muscular and mental sluggishness
- Decrease cardiac output
- Sometimes increase body weight
- Development of frog like husky voice and in severe case development of endematous appearances throughout the body called myxedema.

Myxedema: It develops in the patient with almost total lack of throid harmone function. Such patient demonstrates bagginess under the eyes and swelling of faces.

Calcitonin

The third hormone produced by the thyroid gland is called calcitonin. Calcitonin is made by C-cells. It is involved in calcium and bone metabolism.

The parathyroid glands

The parathyroid glands are two pairs of small, oval-shaped glands. They are located next to the two thyroid gland lobes in the neck. Each gland is usually about the size of a pea.

Function of the parathyroid glands

Parathyroid glands produce parathyroid hormone, which plays a key role in the regulation of calcium levels in the blood. Precise calcium levels are important in the human body, since small changes can cause muscle and nerve problems.

The parathyroid hormone stimulates the following functions:

- Release of calcium by bones into the bloodstream
- Absorption of calcium from food by the intestines
- Conservation of calcium by the kidneys
- Stimulates cells in the kidney to transforms weaker forms of vitamin D into the form that is strongest at absorbing calcium from the intestines