

## Hypothalamic Control of Endocrine System

Introduction - The hypothalamus is a small but very important area in the center of the brain. It plays an important role in hormone production and helps to stimulate many important processes in the body and is located in the brain, between the pituitary gland and thalamus.

When the hypothalamus is not working properly, it can cause problems in the body that lead to a wide range of rare disorders, maintaining hypothalamic health is a very vital.

Functions of hypothalamus - The main role of hypothalamus is to maintain steady state or keep the body in homeostasis as much as possible.

Homeostasis means a healthful balanced body. The hypothalamus acts as the connector between the endocrine and nervous systems to achieve this. It plays a part in many essential functions of the body such as -

- 1) body temperature
- 2) Thirst
- 3) appetite and weight control.
- 4) emotions
- 5) Sleep cycles
- 6) Sex drive
- 7) Child birth
- 8) Blood pressure and heart rate
- 9) Production of digestive juices
- 10) Balancing body fluids.

As different systems and parts of the body sends signals to the brain, they alert the hypothalamus to any unbalanced factors that need addressing. The hypothalamus then responds by releasing the right hormones into the bloodstream to balance the body for eg maintenance of body temperature at 98.6°F.

Hormones of the hypothalamus - To maintain homeostasis the hypothalamus is responsible for creating or controlling many hormones in the body. The hypothalamus works with the pituitary gland which makes and sends other important hormones around the body.

4. Hormones secreted by hypothalamus includes -

- (1) Antidiuretic hormone - antidiuretic hormone increase the water absorbing capacity of the tubules of kidney.
- (2) Corticotropin-releasing hormone - It regulates the metabolism and immune response by working with the pituitary gland and adrenal gland to release certain steroids.
- (3) Gonadotropin releasing hormone - It instructs the pituitary gland to release more hormone that keep the sexual organs working.
- (4) Oxytocin - A hormone involved in several processes including the release of mother's breast milk production in lactating mothers.

Prolactin - Controlling hormones, which tell the pituitary gland to either start or stop breast milk production in lactating mothers. Hypothalamic releasing hormone activates the thyroid which releases the hormones that regulate metabolism, energy levels and developmental growth.

The hypothalamus also directly influences growth hormones, it commands the pituitary gland to either increase or decrease their presence in the body, which is essential for both growing children and fully developed adults.

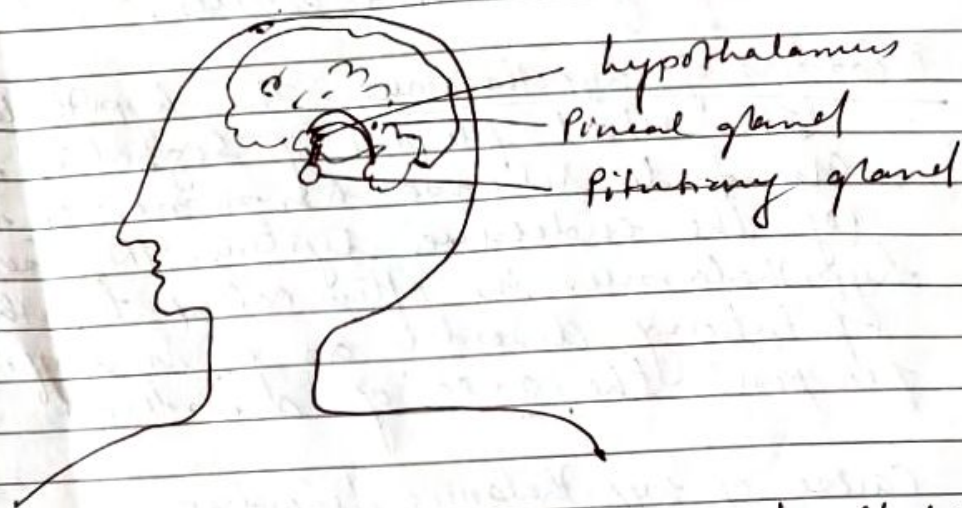
Disorders of hypothalamus - The hypothalamus serves the vital purpose of signaling the pituitary gland to release hormones to the rest of the endocrine system. The disorders of hypothalamus is often called hypothalamic pituitary disorder as it is difficult to pinpoint the area of disorders.

Causes of hypothalamic disorders -

- 1) Most common cause is head injury impacting the hypothalamus, surgery, radiation and tumours can also cause disease in the hypothalamus.
  - 2) The other factor is related to genetic disorders for eg - Kallmann syndrome causing hypothalamic disorder in children with delayed puberty and failure to menstruate.
  - 3) Malnutrition eating disorders, surgery also cause hypothalamic disorders.
- Thus we can say that "The hypothalamus is the powerhouse"

System's main switchboard. Most of the body's critical hormones, which promote growth, metabolism and normal functioning, are prompted by chemical signals from the hypothalamus.

These hormones in turn, communicate with the hypothalamus to provide feedback about body's functional status. Damage to the hypothalamus can impair one or all of these hormone systems and lead to disastrous consequences, causing the complete shut-down of hormone production.



Diagrammatic representation of hypothalamus and pituitary gland.

The hypothalamus is responsive to —

- 1) Photoperiod and regulation of circadian rhythms.
- 2) Olfactory stimuli, including pheromones
- 3) Secretion of gonadal and corticosteroids
- 4) Autoregulatory inputs
- 5) Blood borne stimuli including leptin, ghrelin, angiotensin, insulin, pituitary hormones, cytokines & plasma concentrations of glucose and osmolarity etc.
- 6) Hanging stress.
- 7) Invading microorganisms by increasing body temperature, resetting of body's thermostat.