

## Chapter 6

# Endocrine System of Man

### Chemical Coordination:

Hormonal system, concerned with different metabolic reactions.

### Glands:

Produces Secretions

### Types of Gland:

Two types:

- 1) Endocrine gland
- 2) Exocrine gland

### Hormones:

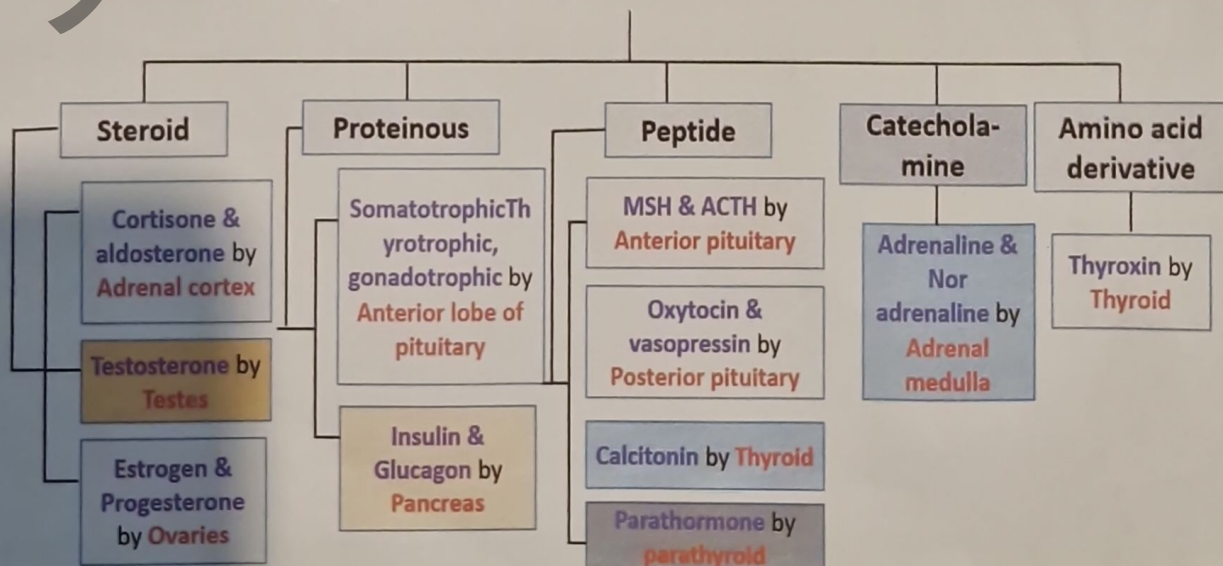
Chemical messengers of endocrine gland.

Hormones as a chemical Messenger.

- Small soluble organic molecule, which is effective in low concentration.
- Transports signals from one cell to another.
- Effect on the cells having specific receptors.

### Chemical nature of hormone:

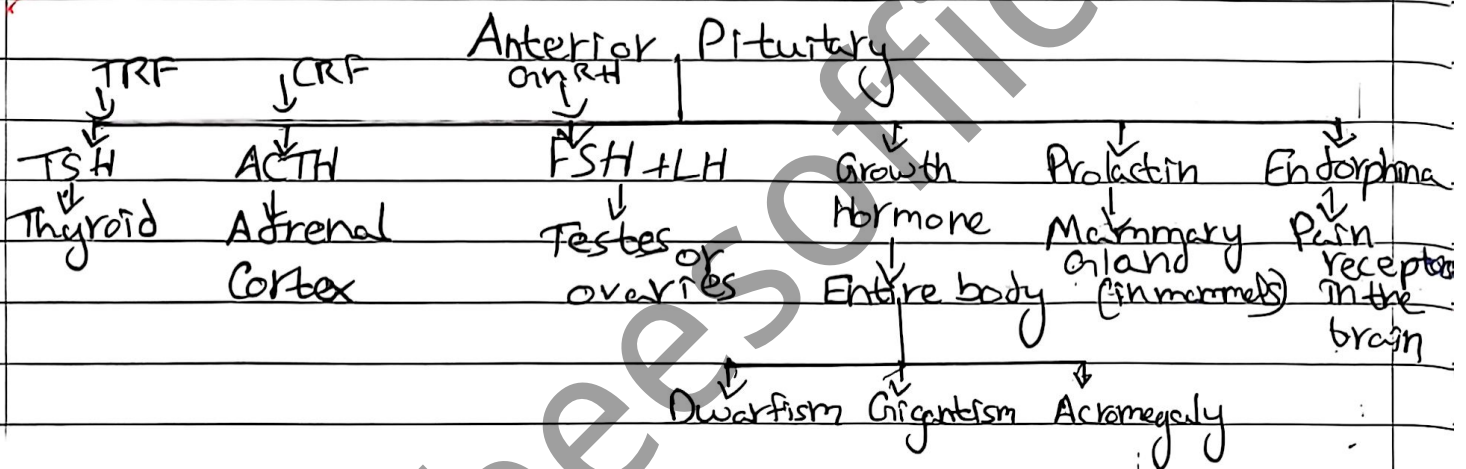
- Organic substances



## Pituitary Gland:

- Below hypothalamus
- Master gland
- 3 lobes:

- 1) Anterior
- 2) Posterior
- 3) Median



## Median Lobe

MSH

MSH inhibitory regulation → Stimulate production and release of melanin

## Posterior Lobe

Oxytocin

uterine muscles  
Mammary glands

Oxytocin

over secretion  
Rupturing of uterine wall

under secretion  
Inhibits normal labour process

ADH

Kidney stones

under secretion

Diabetes insipidus

over secretion

Kidney stones

## Thyroid Gland:

Two lobes inferior to larynx.

### Hormones

T<sub>3</sub>

T<sub>4</sub>

Thyroxin

Calcitonin

### Functions:

- Promote metabolic rate
- Enhance glucose catabolism
- Synthesis of cholesterol in liver
- Development of nervous system in fetus and infants
- Acts on muscles for development and functioning.
- Promote growth & maturation of skeleton
- Normal motility of GIT

→ Promoted by high level of calcium in blood  
inhibited by low level of calcium in blood.

### Function:

- Increases deposition of Ca in bones.
- Inhibits absorption by intestine and decreases reabsorption by kidney tubules.
- Important in childhood

↓  
Hyperthyroidism  
Graves Disease

↓  
Hypothyroidism  
myxedema  
goiter

- ↓
- Deficiency disturbs functioning of muscles & nervous system.
  - Kidney Stones.

### Congenital Under Secretion:

- Cretinism
- Delay of bone maturation and to puberty
- Infertility

## Parathyroid Gland:

- 4 parathyroid gland on thyroid gland
- Small light colour lump on the posterior side of thyroid.

### Hormone:

Parathormone (releases Ca from bones)

- Parathormone by low level of calcium in blood
- inhibited by high level of calcium in blood.

### Hypercalcemia

Over Secretion

#### Problems:

- Soften bones
- Depress nervous system & muscle weakness
- Kidney stones

### Hypocalcemia

Under Secretion

#### Problems:

- Increases excitability of neuron
- Tetany
- Fatal if untreated

## Pancreas:

### Islets of Langerhans:

#### Hormones

#### Insulin

- Produced by B-cells (more in number)

#### Function:

- Decreases blood sugar level
- Promotes glycogenesis
- Increase use of glucose in respiration
- Promote conversion of glucose to fats
- Inhibits gluconeogenesis (formed from other compounds)

over secretion  
Problems: Hypoglycemia

Diabetes mellitus  
Hyperglycemia

#### Glucagon

- Produced by Alpha Cell (less in number)

#### Function:

- Increase blood sugar level
- Stimulated levels:  
→ Sympathetic nervous system

#### Inhibited by:

Insulin and Somatostatin

# Adrenal Gland:

## Parts of Adrenal Gland

### Adrenal Medulla

Epinephrine

Stimulator of:

→ Metabolic activities

→ Bronchial dilator

→ Blood flow to skeleton

Produced:

→ Emergency Situation

→ Under the influence of sympathetic nervous system

Function:

- Immediate response to stress
- Synergistic effect

Nor-Epinephrine

→ Influence on

peripheral

vasoconstriction

Under the influence of ACTH

Glucocorticoid

e.g. Cortisone

Regulate blood

glucose level

over secretion:

- Addison's disease

- Weakness of

muscle action,

loss of salts

- Stress situation

cold, leads to death

Mineralocorticoid

e.g. Aldosterone

Regulate

blood mineral

level

Under secretion:

- Cushing's disease

- Excessive

protein

breakdown

resulting

muscular

and bone

weakness.

Androgen: (Testosterone)

From adrenal cortex

in small amount

Hypertension  
Over-secretion

Failed to  
combat energy  
situation

Under secretion

## Gonads:

Also Produces gametes

Ovaries

Promoted by Testes  
ICSH (Interstitial Stimulating hormone) ↓  
↓  
Testosterone

↓  
Estrogen

→ Reduced from Graafian follicles under the action of FSH

→ Negative effect of FSH

→ Released at start of puberty

Functions:

→ Secondary characteristics

→ Healing of uterine wall after menstruation

over secretion  
→ Development of fibroids

→ Polystic ovaries

↓  
Progesterone

→ Released from corpus luteum under action of LH.

→ Inhibits FSH production

→ Thickening of uterus lining

→ Suppresses ovulation

under secretion

→ Causes miscarriage during pregnancy

→ Decreases chances of pregnancy during menstrual cycle.

under secretion  
→ female fail to mature

→ Sterility

→ From interstitial cell among seminiferous tubule.

Function:

→ Sperm production

→ Maintain reproductive organ in mature functional state

under secretion

→ Development of feminine characteristics

→ Male sterility

(Table 6.1 from book)

## Neurosecretory Role of Hypothalamus:

Hypothalamus is a part of forebrain that involves in different functions by the nervous system and also master-control centre of the endocrine system.

- It contains special group of neuro-secretory cells (conduct impulses and releases secretions) that directly controls the pituitary gland.
- The hormone produced by the hypothalamus are either the releasing factor or inhibiting factor of pituitary hormone.
- These hormones are produced in the cell bodies and packed into the granules and transported to the axon ending that forms the synapse with the blood capillaries.
- The neuro-secretory cells of the hypothalamus also produces two primary hormones i.e. ADH and oxytocin which are stored in the posterior lobe of pituitary and released from nerve here when needed.

(Table 6.2 from book)

## Feedback Mechanism - main heading

"A type of interaction in which mechanism is itself controlled by the products of the reactions."

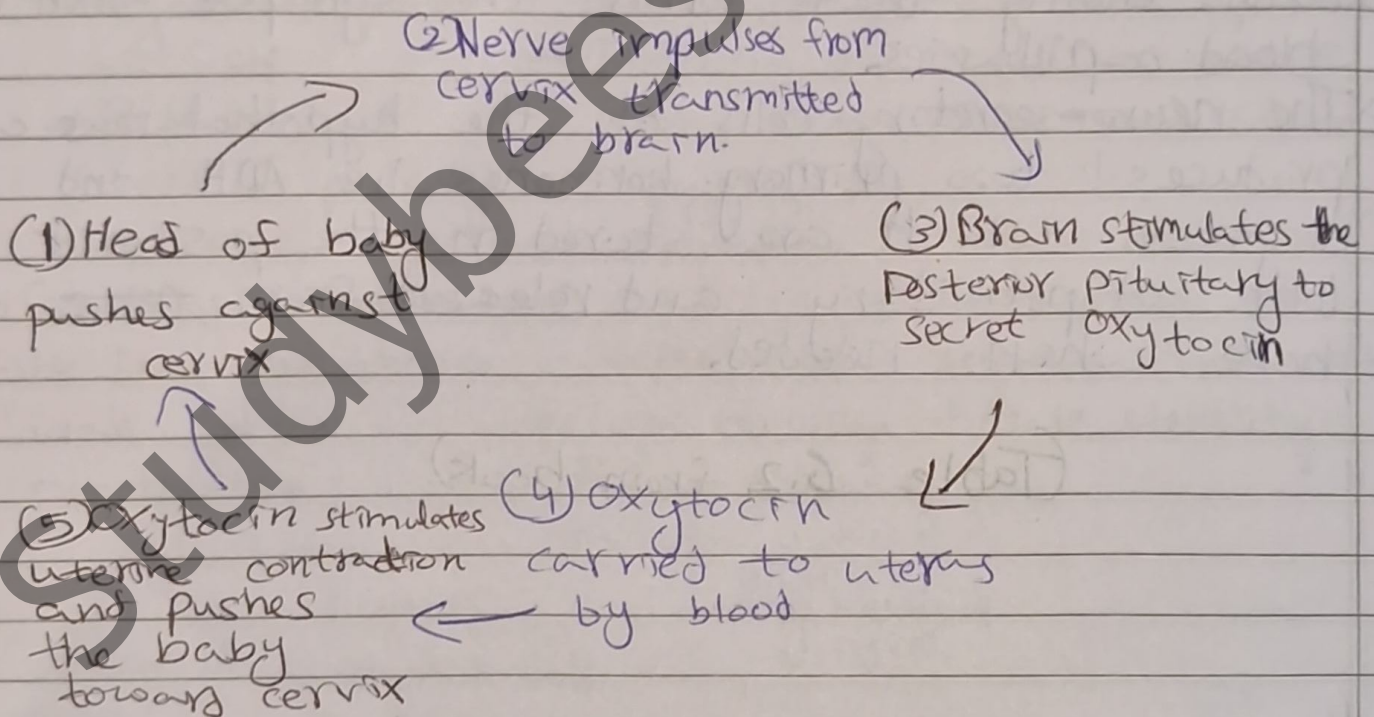
### Positive Feedback:

In positive feedback, an end product speeds up the production/mechanism/reaction.

- It is non-homeostatic
- Rare in healthy individuals

### Examples:

Labour process during childbirth



## Negative Feedback:

End product of the mechanism reverses the direction of the change and tend to maintain homeostasis.

→ It regulates the different processes in the human body.

Example:

Maintenance of blood glucose level

