CHEMICAL COORDINATION AND INTEGRATION

ENDOCRINE GLANDS AND HORMONES

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- Regulation of body functions like metabolism, growth and vital activities by some specific chemicals is called Chemical coordination and integration.
- The neural system and the endocrine sytem jointly co-ordinate and regulate the physiological functions in the body.
- The neural co-ordination is fast, very exact and short lived, whereas chemical co-ordination is usually slow, widespread and long lasting.

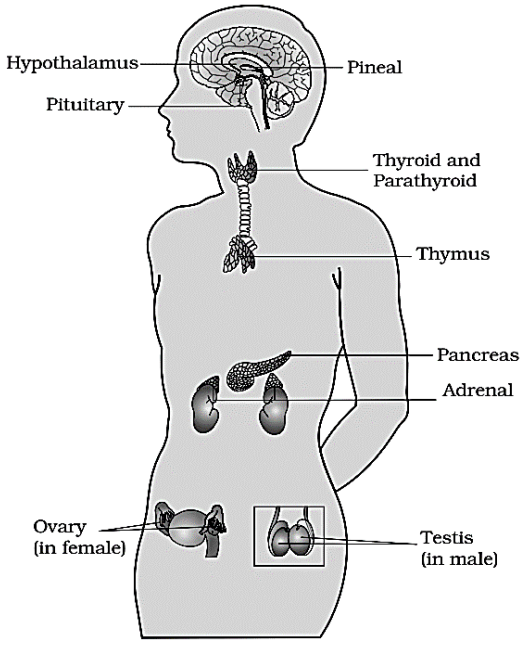

Fig. Location of endocrine glands

- All cells of our body are not inerverted by nerve fibres but the cellular function need to be continuously regulated so a special kind of coordination and integration has to be provided. This function is carried out by **hormone.**

- **Glands** on the basis of their secretions -

1. **Exocrine glands** are glands with ducts which secretes digestive enzyme, milk, sweat etc.
2. **Endocrine glands** are ductless glands and pour their secretion directly into blood. Their secretions are called **hormones**.
3. **Heterocrine / Mixed glands**: They have both exocrine and endocrine tissues.

   Organised endocrine gland: Where hormone producing cells present in cluster/tissue, they are called organised endocrine gland.

   Examples: Pituitary, Pineal, Thyroid, Parathyroid, Thymus, Adrenal, Pancreas and **Gonads.**

   Non-organised endocrine gland: Where hormone producing cells are present in scattered form, they are called non-organised or diffused endocrine tissue.

   Example: Heart, Liver, Kidney, Gastrointestinal tract.

Differences between Nervous and Endocrine Coordination

	Nervous Co-ordination		Endocrine Co-ordination (Chemical Co-ordination)
1.	Information passes as electrical impules along nerve fibres.	1.	Information passes as a chemical substance through the blood and lymph.
2.	There is rapid transmission of information.	2.	There is slow transmission of information.
3.	Response is immediate, very exact, shot lived.	3.	Response is usually slow, wide spread, long lasting.

HORMONE

- **Hormones** are chemicals produced by endocrine glands and released into the blood and transported to a distantly placed target organs.
- First discovered hormone is Secretin. It was discovered by "Bayliss & Starling in 1902".

❖ The term hormone was coined by "Starling':

❖ Hormones are also called "Primary messengers" or "chemical messengers"

- ❖ Hormones are non-nutrient chemicals which act as intercellular messenger and are produced in trace amount.

- They do not be stored in body usually (Except thyroxine)
- Hormones are **non-antigenic** & **non-species specific** substances.
- Usually, hormones do not participate in the metabolic activities of target cells but they affect and control the activity level of these target cells.

Chemical nature of hormones :

Nature	Harmone	Gland
A. Proteinaceous		
(i) Amino acid derivatives	Thyoxine (Idothyronine) Epinephrine Non-epineprine	Thyroid gland Adrenal medulla
(ii) Short peptides	Vasopressin, Oxytocin MSH	Hypothalamus Adenohypophysis
(iii) Long peptides	Parathyroid hormone Insulin Thyrocalcitonin ACTH	Parathyroid Pancreas Thyroid Adenohypophysis
(iv) Glyco-Proteins	TSH, FSH, LH	Adenohyophysis
B. Steroids	Mineralocorticoids Glucocorticoids Testosterone Oestrogen Progesterone	Adrenal cortex Adrenal cortex Testes Ovary Ovary

Physical & Chemical Specialties of hormones :-

- The molecules of most of the hormones are small, and their molecular weight is low
- Mostly hormones are soluble in water and few are soluble in fat and are easily diffusible in tissues.
- The secretion of hormone is always-in very small quantity because these are very reactive substances.
- Hormones are destroyed after use i.e. hormones can not be stored in the body.
  Thyroxine is exception in this regards.
- Liver and kidneys separate hormones from blood and decompose them. The product formed after decomposition is excreted with urine. It can not be reutilized.
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