



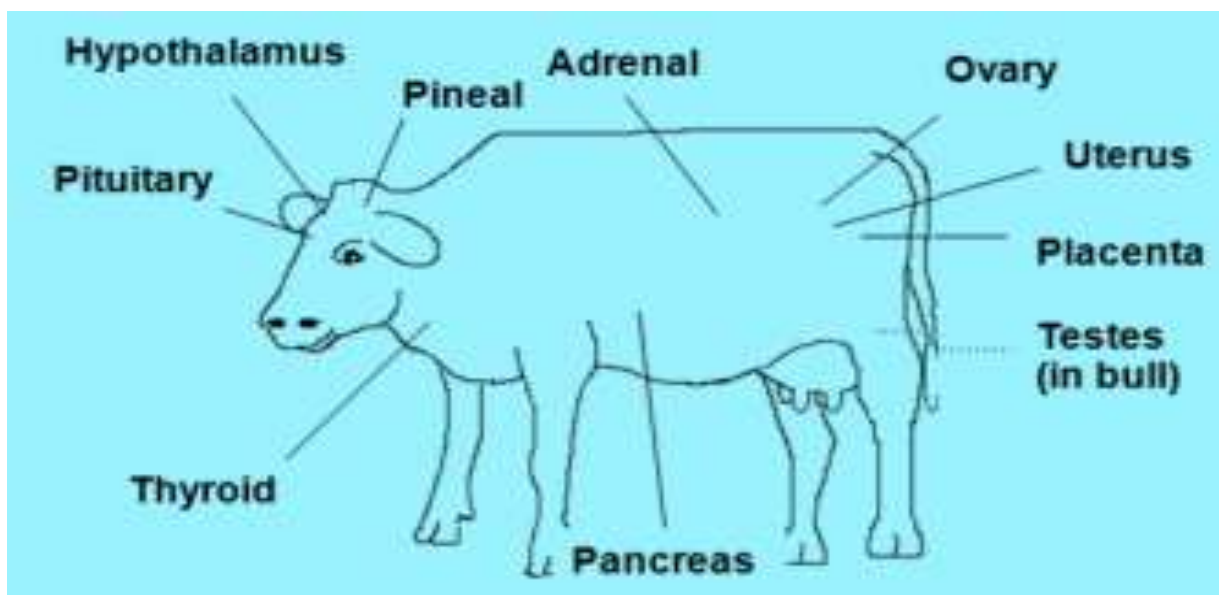
**Lecture title:** The Endocrine System (introduction)

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**Summary:** The first lecture is introduction to the Endocrine system, with general view on the hormones and their mechanism of action.

## The Endocrine System (Endocrinology)



**Endocrinology:** is the study of the homeostatic chemical adjustments and other activities accomplished by hormones.

- » The endocrine system has evolved to allow physiological processes to be coordinated & regulated.
- » The system used chemical messengers called hormones.

**Hormones:** chemicals that are produced by specific endocrine glands (ductless glands) are transported by the vascular system (blood) and are able to affect distant targets in low concentration. Hormones act on their target cells to regulate the blood concentrations of nutrients molecules, water, salt and other electrolytes among other



homeostatic activities, Hormones also play a key role in controlling growth, reproduction & stress adaptation.

## 1-Purely endocrine organs

- » Pituitary gland
- » Pineal gland
- » Thyroid gland
- » Parathyroid glands
- » Adrenal: 2 glands
  - Cortex
  - Medulla

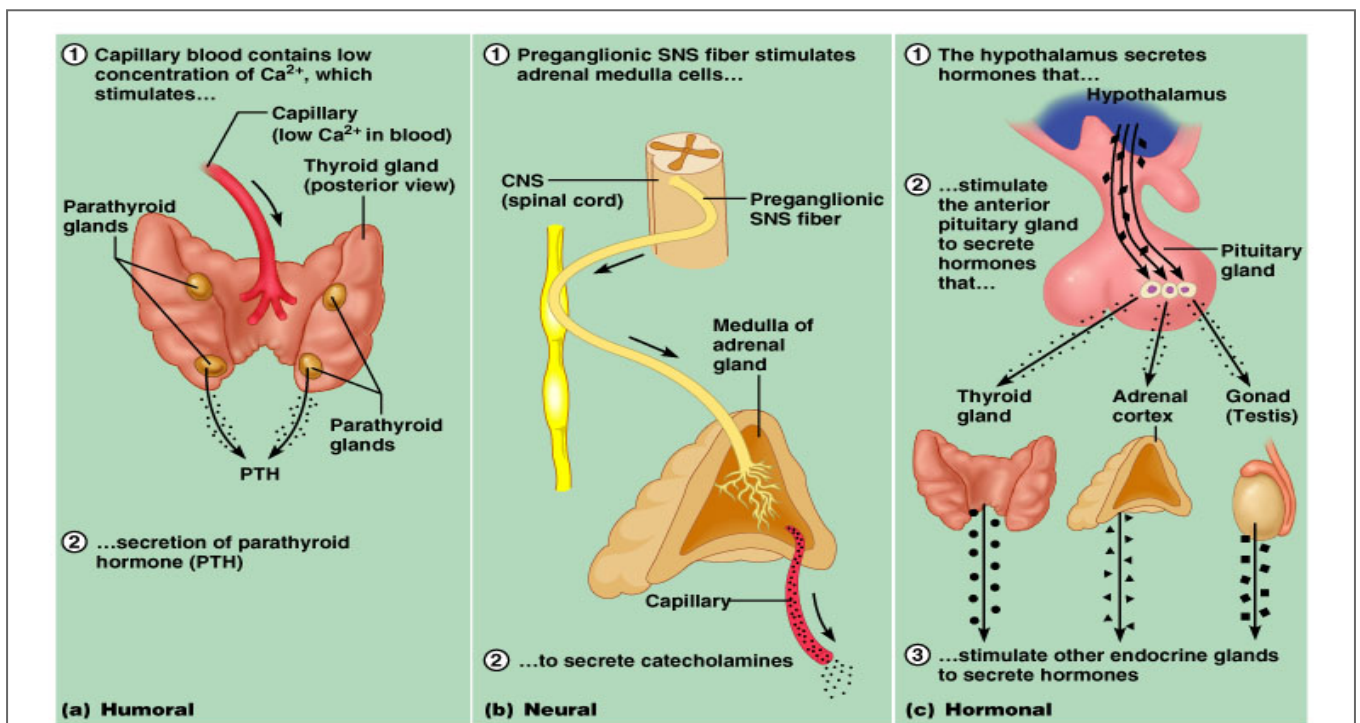
## 2-Endocrine cells in other organs

- » Pancreas
- » Thymus
- » Gonads
- » Hypothalamus

### Mechanisms of hormone release:

**(a) Humoral:** in response to changing levels of ions or nutrients in the blood.

**(b) Neural:** stimulation by nerves.





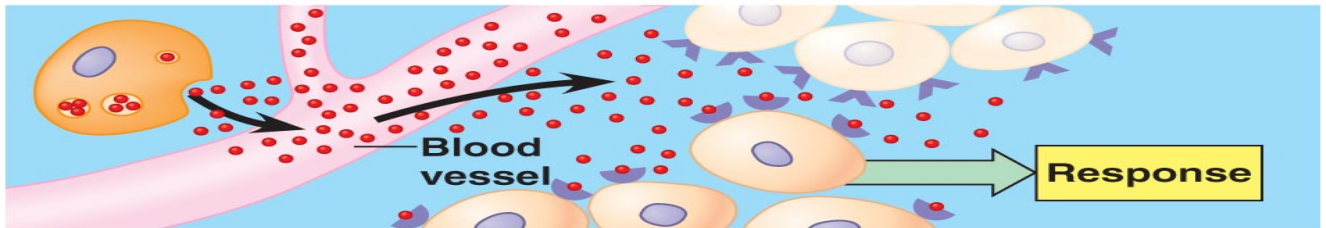
(c) **Hormonal:** stimulation received from other hormones.

### Other chemical messengers

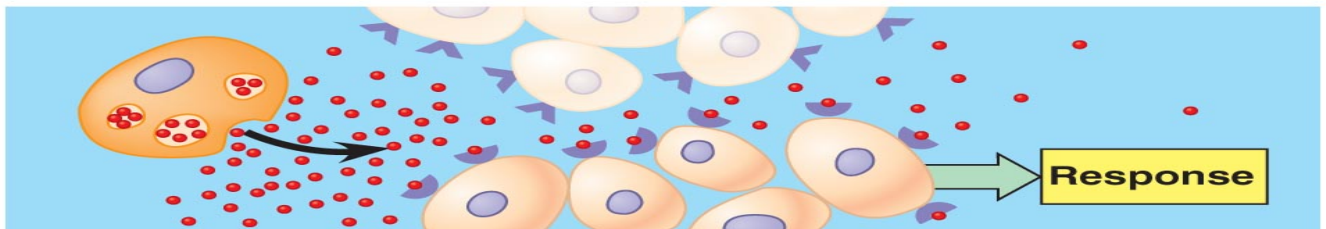
»»» Paracrine

»»» Autocrine

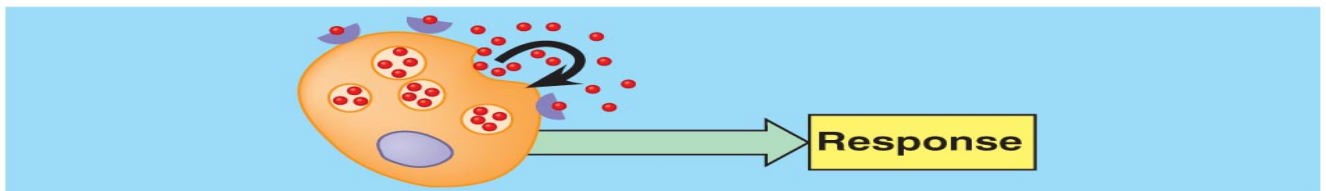
»»» Neurotransmitters



(a) Endocrine signaling



(b) Paracrine signaling



(c) Autocrine signaling

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\*\*\* Neurosecretory neurons release their chemical messengers, neurohormones into the blood and distributed by the blood to the target cells.

Thus, the neurosecretory neurons are considered part of the endocrine system.

## Homeostasis is essential for survival of cells

### Relationship between Nervous System & Endocrine Glands:

The nervous & endocrine systems are the two main control systems of the body. Although the endocrine & nervous systems have their own areas of specialization, they are interconnected functionally. The nervous system directly or indirectly control the secretion of many hormones.



The endocrine & nervous systems are integrated in their control of Physiologic processes.

An example of the close interaction of the two systems in the reflex in which suckling causes the release of milk.

1-Suckling initiates the transmission of nerve impulses from the mammary gland to the hypothalamus (by way of the spinal tract).

2-neurosecretory neurons within the supraoptic & Para ventricular nuclei are stimulated to synthesize oxytocin.

3-oxytocin is transported along axons of these nerves and is released from nerve endings in the posterior pituitary into blood vascular system.

4-oxytocin is then carried to the mammary gland, where it causes contraction of myoepithelial cells; these cells surround the smallest unit of milk –secreting cells, called the alveolus. This results in the movement of milk into the large cistern adjacent to the teat, subsequently into the teat.

