

Animal Hormones – regulate homeostasis

- Affect animal's development, physiology, anatomy, and behavior

Plant Hormones	Animal Hormones
Small molecules only	Peptides/ proteins and/or small molecules
Produced throughout the plant	Produced in specialized "glands"
Mainly local targets (nearby cells and tissues)	Distant targets ("action at a distance")
Effects vary depending on interaction with other hormones	Specific effects
"Decentralized" regulation	Regulation by central nervous system

Classes of Hormones – 3 Major Classes

- Peptide and Protein Hormones

- Large!
- Water soluble (blood!)
- Vesicles (exocytosis)
- Receptors are EXTRIOR (b/c of water solubility)

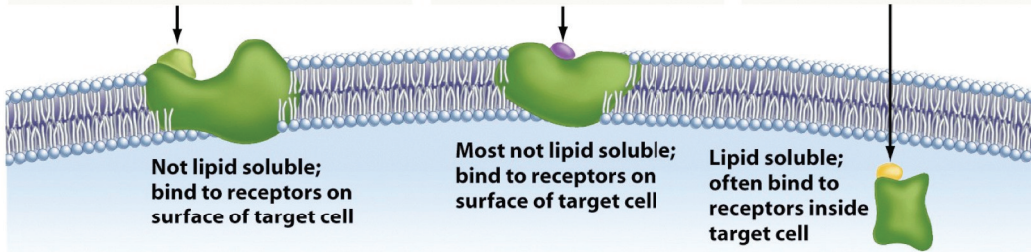
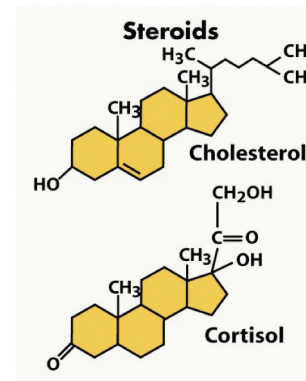
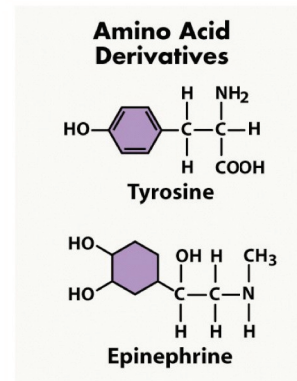
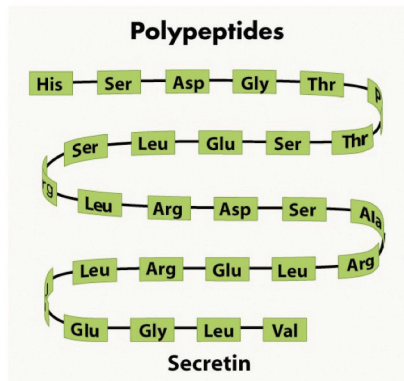


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- Steroid Hormones

- Synthesized from cholesterol
- Lipid soluble (can pass across membranes)
- Carrier proteins in blood

STEROID HORMONE ACTION

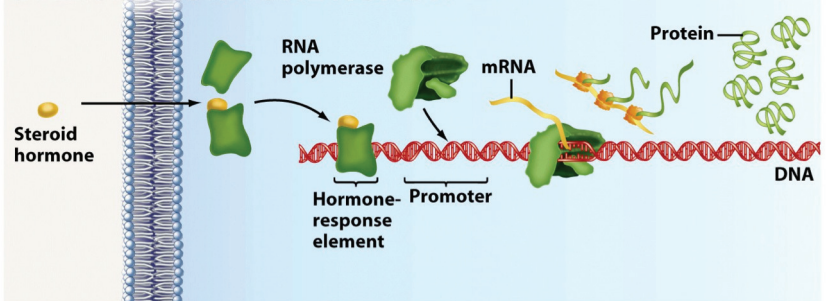
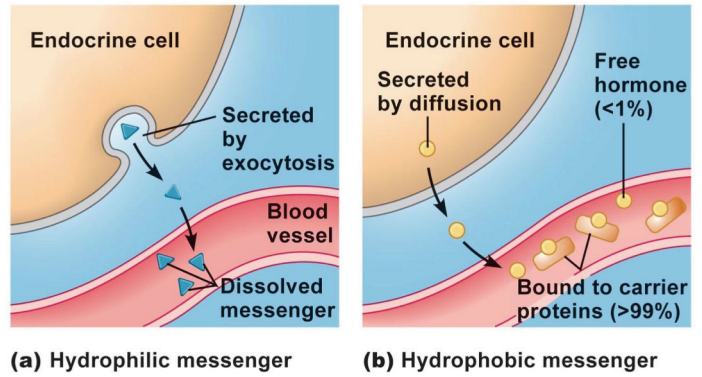


Figure 47-14 Biological Science, 2/e

- **Amine Hormones**

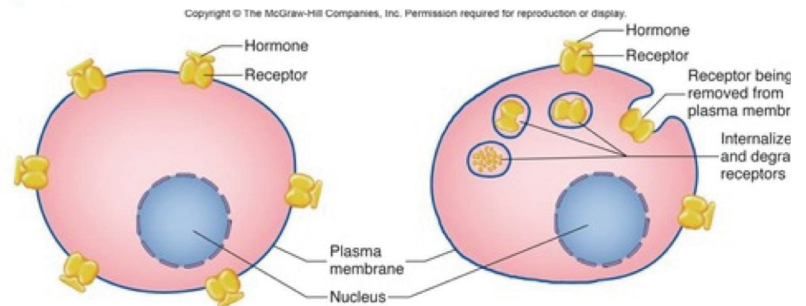
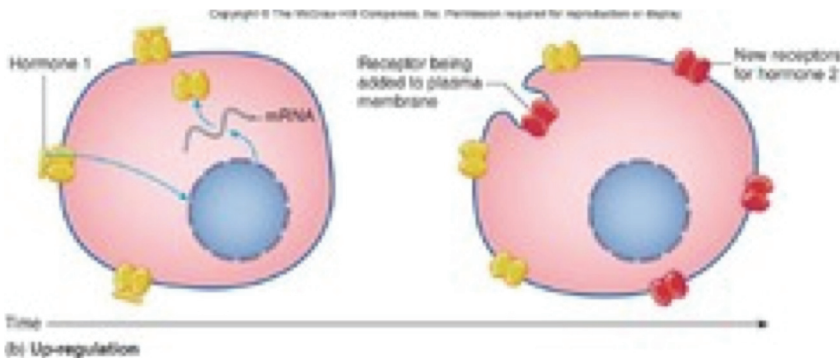
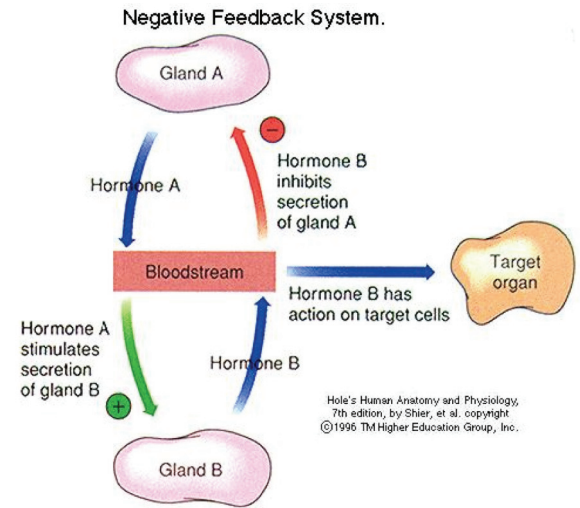
- **Small (derived from amino acids, e.g. thyroxine & epinephrine → tyrosine, melatonin → tryptophan)**
- **Polar/Non-polar = Hydrophobic or Hydrophilic**



Hormone Action

- **Bind to receptors – Membrane vs. Intracellular**
- **Regulation – Negative Feedback**
- **Changes the number of receptors in the membrane**

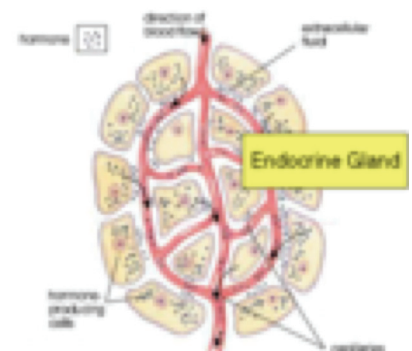
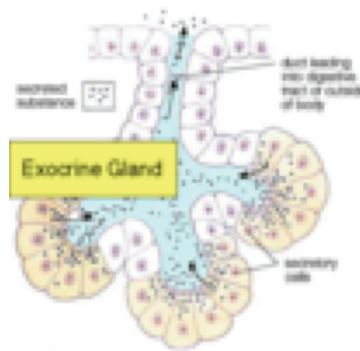
- **Low hormone = Increase number of receptor (upregulate)**
- **High hormone = Decrease number of receptor (downregulate)**



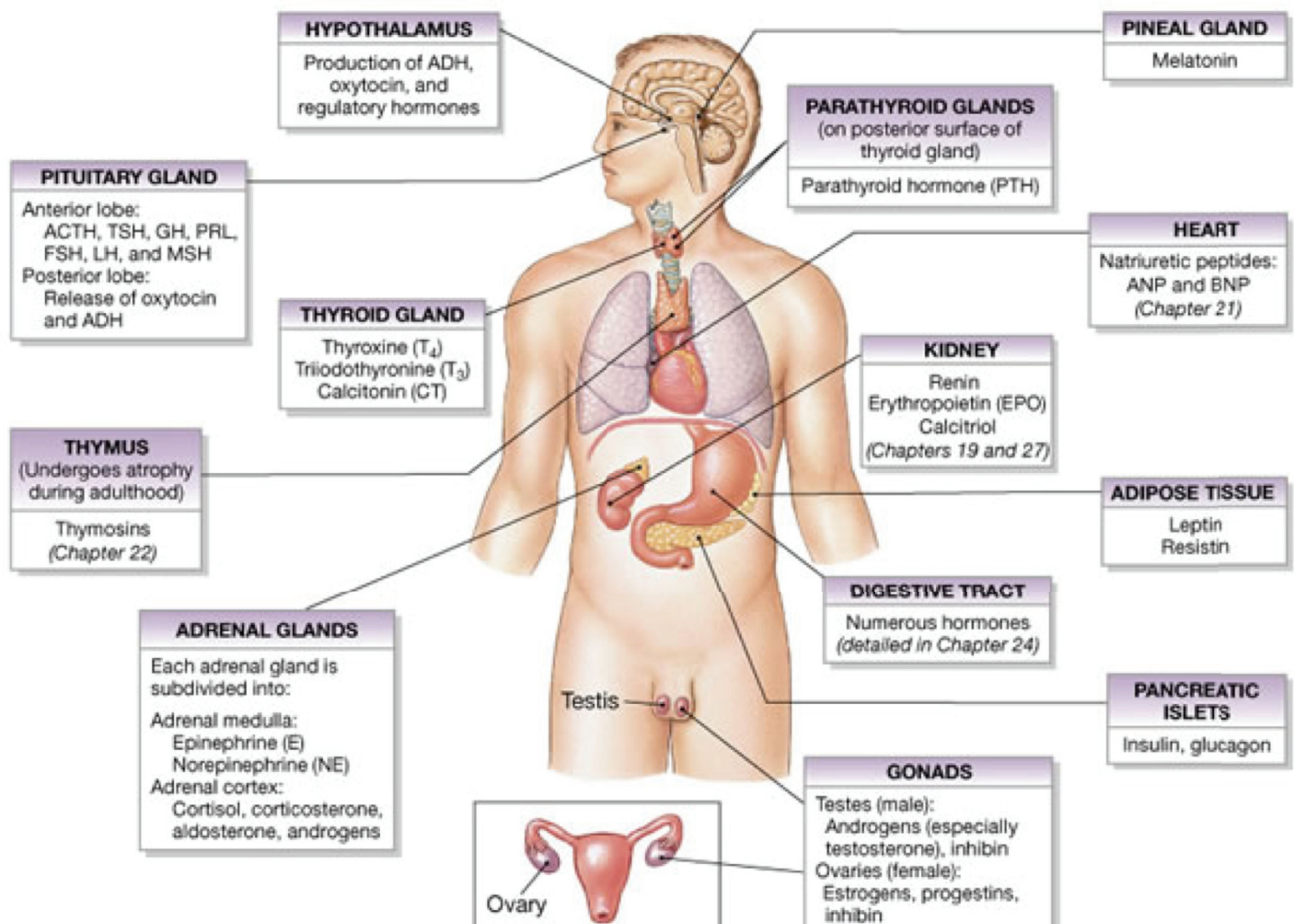
- Have antagonistic mates (one hormone counteracts the effect of another, e.g. insulin/glucagon)

Endocrine System – a collection of cells (e.g. adipose cells), tissues, and organs responsible for hormone production and secretion.

- **Endocrine Glands – organs that produce and secrete hormones into the blood stream.**



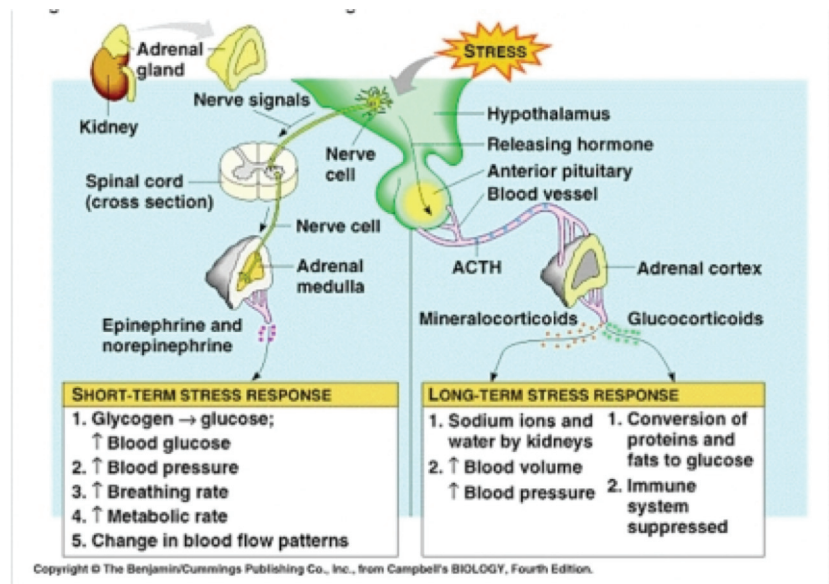
Overview of the Endocrine System



Hormone Functions

- Development – T3 & Insect Metamorphosis, Androgens (Testosterone/Estrogen) & Sexual Development in Vertebrates, Growth Hormone and Growth in Mammals.

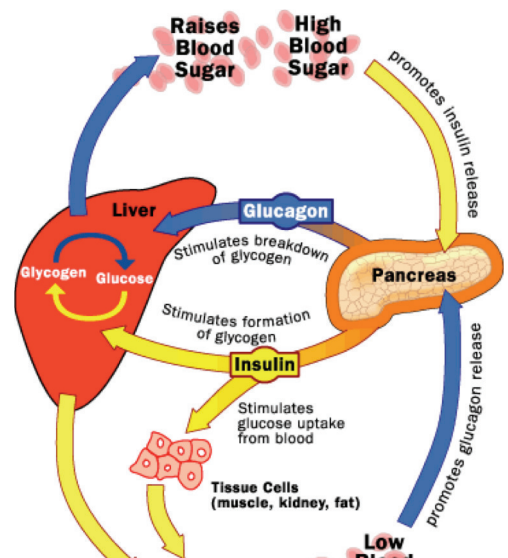
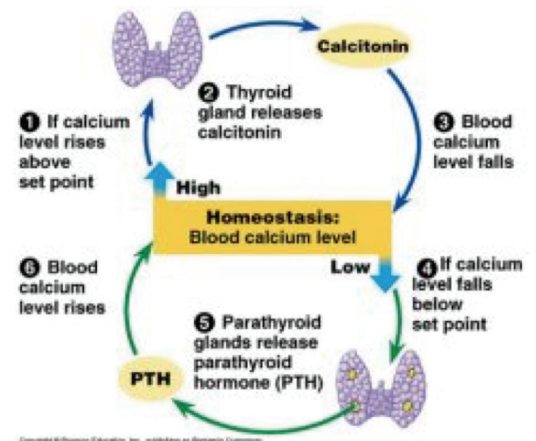
- Environmental responses – Secretin & Food, STRESS RESPONSE (epinephrine & norepinephrine = short term;



mineralocorticoids & glucocorticoids – cortisol = long term)

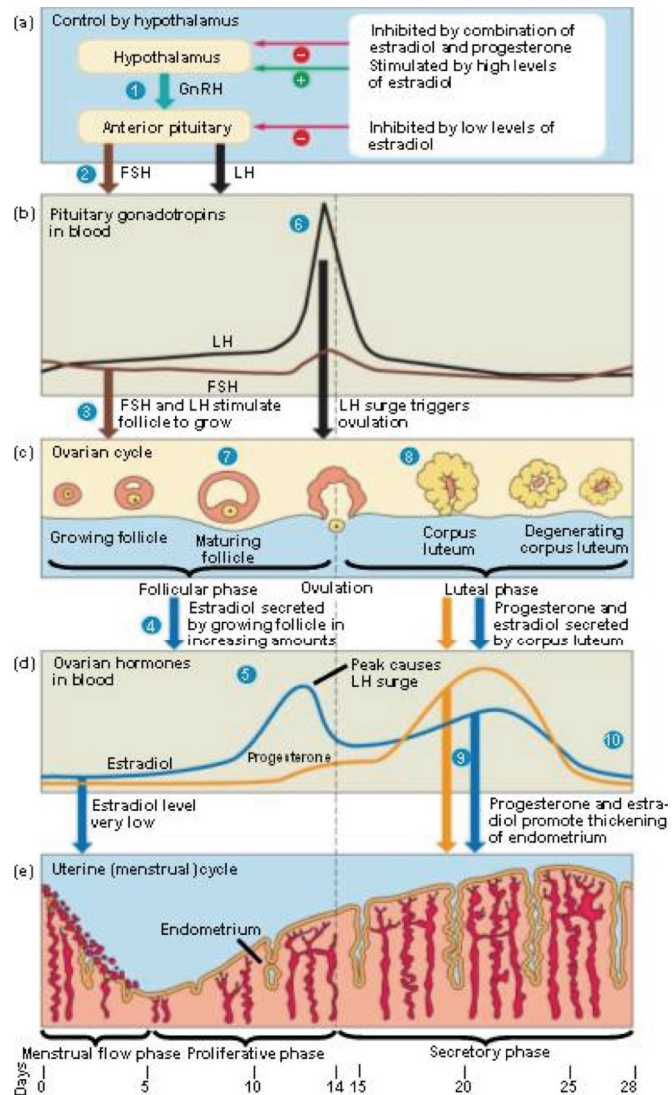
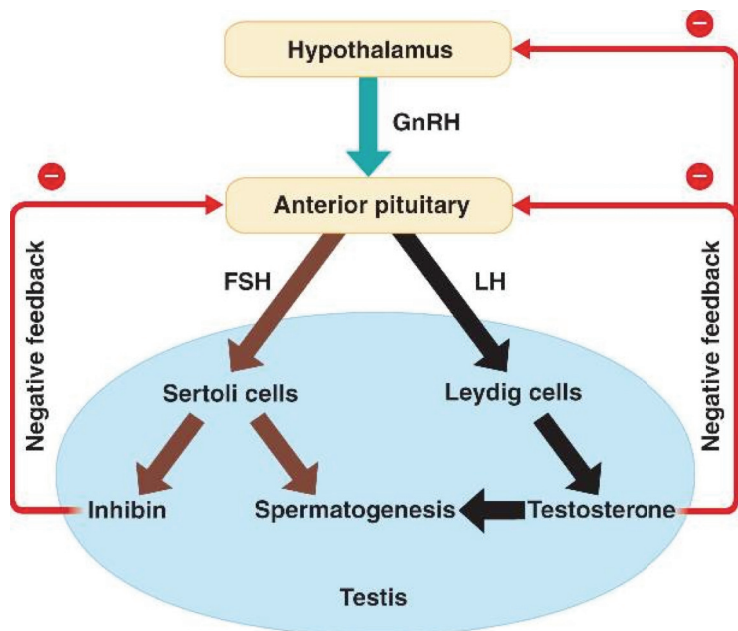
- Homeostasis – Pairs of hormones closely and tightly regulate the internal environment (osmolarity, volume of fluids etc...)

- Calcitonin & Parathyroid Hormone → regulate Calcium ion concentration in the blood stream
- Insulin & Glucagon → regulate the blood sugar levels in blood stream



- **Reproduction – Controls the reproductive cycles of males and females; regulates spermatogenesis and oogenesis/menstruation.**

- **FSH & LH – Ovulation & Menstruation**
- **FSH & LH -- Spermatogenesis**



Endocrine System & Nervous System

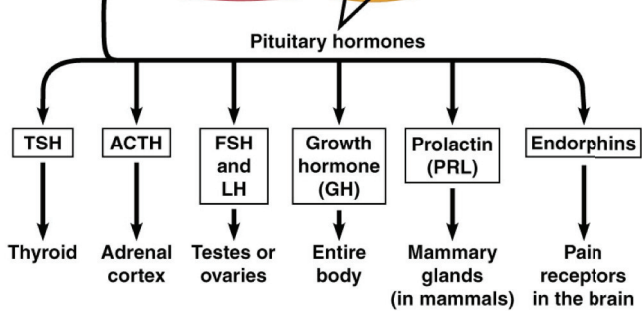
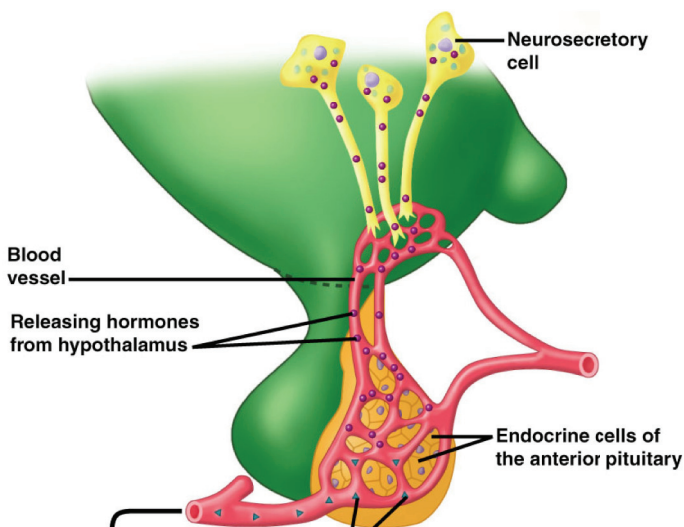
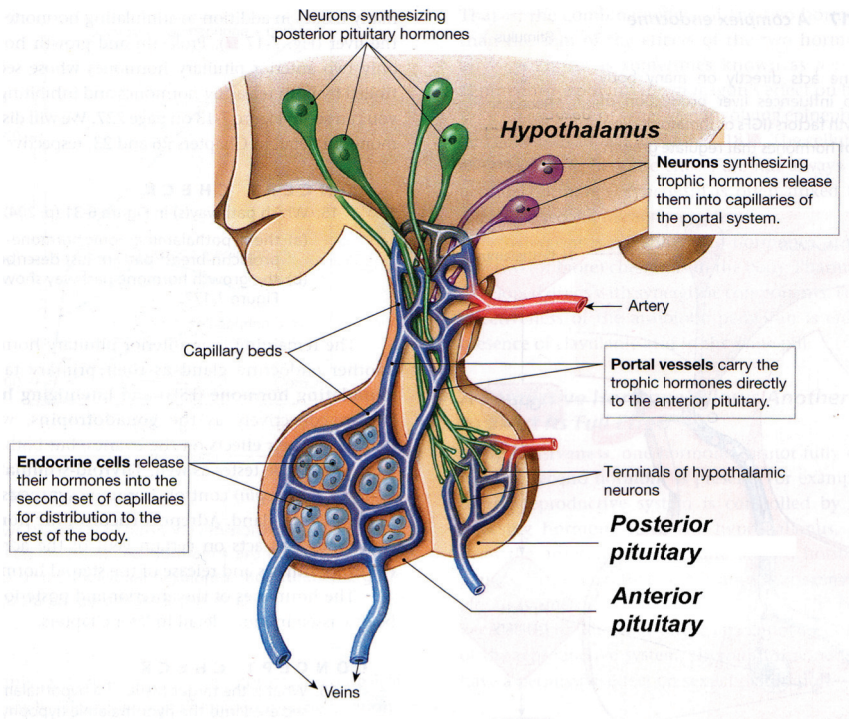
- **complement**
- **interact**
- **linked by the Pituitary Gland**

	Nervous System	Endocrine System
<i>Mode</i>	Electrical → Chemical	Blood borne
<i>Messengers</i>	Neurotransmitters	Hormones
<i>Release</i>	Close to cell of influence	Distant to cell of influence
<i>Target Cells</i>	Specific location (only at nerve supply)	More widespread
<i>Speed</i>	Fast	Slow
<i>Duration</i>	Short	Long

Pituitary Gland

An endocrine gland that serves as the interface between the nervous and endocrine systems.

- Two parts/lobes: Anterior and Posterior



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