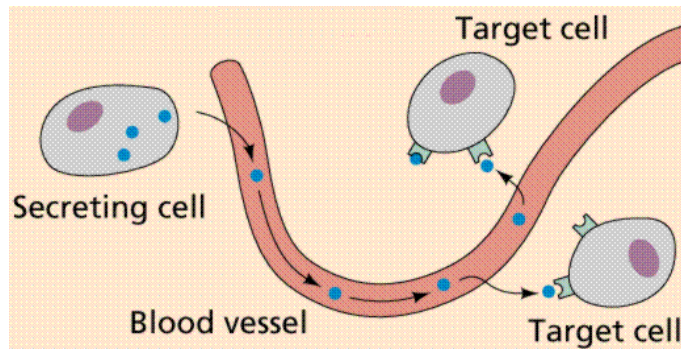


### 39-1 The Endocrine System p. 997

- Composed of **glands** that release their products into the bloodstream. These products deliver messages throughout the body.
- **Hormones** are travelling chemicals that affect the function of various organs and cells.
- **Target cells** have special receptors on their cell membranes to which specific hormones can bind, thus activating a particular process.



#### Glands of the System

- **Glands** are organs that produce and secrete chemical substances into the body.
- 1) **Exocrine glands:**
    - secrete hormones via ducts (small tubes) directly into intended organs.
    - e.g. sebaceous glands in skin, salivary glands, tears, sweat
  - 2) **Endocrine glands:**
    - secrete hormones into bloodstream.
    - e.g. pituitary, thyroid, pancreas, ovaries, testes

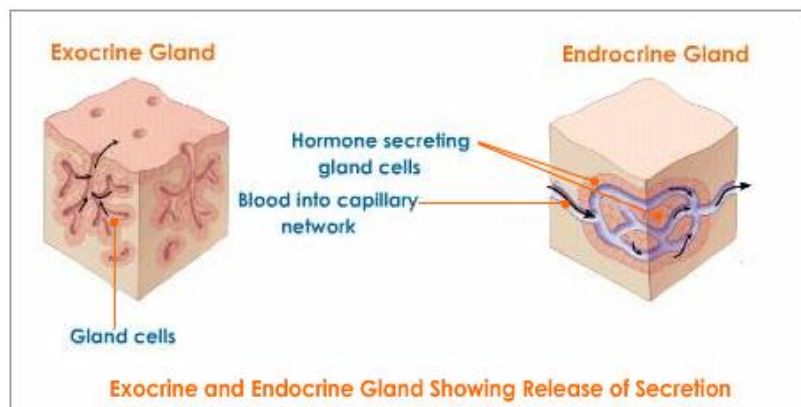
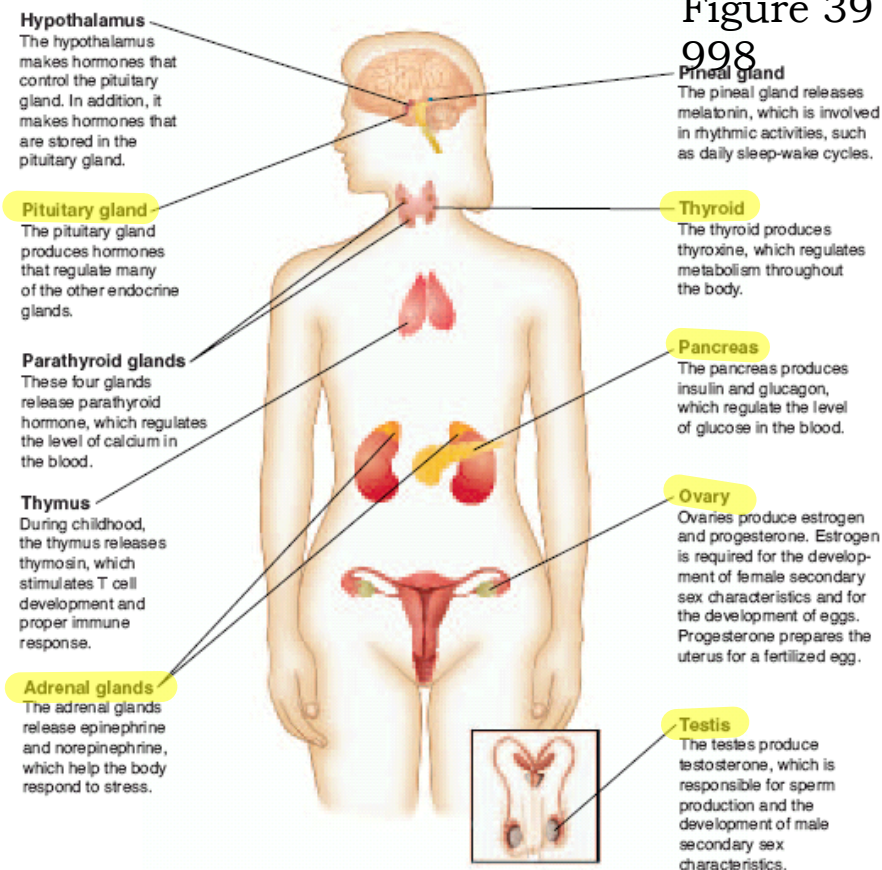


Figure 39 - 2, p. 998

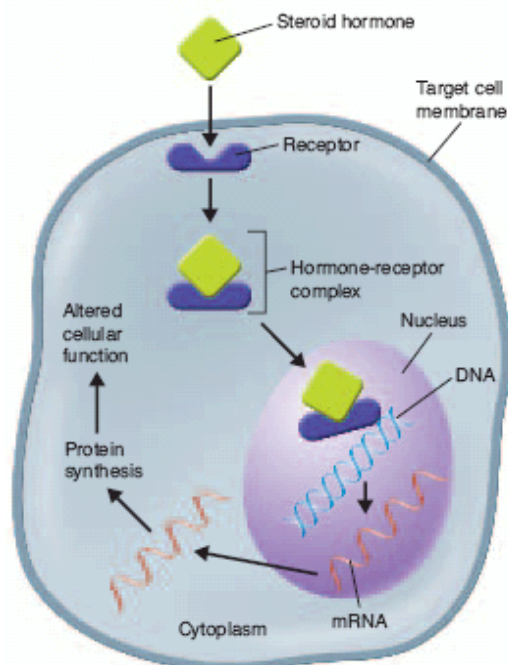


Gland	Function	Some Hormones Produced
hypothalamus	controls the secretions of the pituitary gland	thyroid-releasing hormone
pituitary	regulates body functions and controls actions of other glands	growth hormone, thyroid-stimulating hormone
thyroid	regulates the body's metabolism	thyroxine
adrenal	helps the body prepare for and deal with stress	corticosteroids, epinephrine, norepinephrine
pancreas	maintains the level of glucose in the blood	insulin, glucagon
ovaries	produce eggs and female sex hormones	estrogen, progesterone
testes	produce sperm and male sex hormones	testosterone

## Hormone Action

### Steroid Hormones:

- Can help control metabolism, immune functions, water balance, etc.
- Are lipids synthesized from cholesterol, so they can pass directly through cell membrane.
- Bind to receptor of target cell to create a **hormone-receptor complex**.
- Complex enters cell nucleus and binds to DNA control sequence.
- Specific gene transcription is initiated and proteins are created as a result.



- Steroid hormones can turn on and off genes, and thus can alter gene expression.

Figure 39 - 3, p. 999

## Non-steroid Hormones

- Mainly peptide based, like insulin and glucagon.
- They *cannot* cross cell membrane, so will bind to a receptor on the cell's surface.
- This binding action activates an internal enzyme.
- The enzyme facilitates the actions of a secondary messenger which can activate or inhibit cell processes.

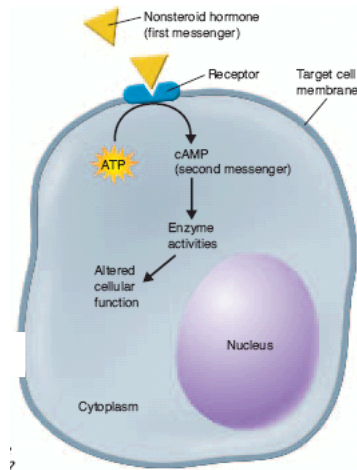


Figure 39 - 3, p. 999

## Prostaglandins

- Almost all cells produce small amounts of hormone-like substances called prostaglandins.
- They generally only affect nearby cells, and so are known as "local hormones."
- e.g. can cause uterine or blood vessel contractions; smooth muscle contractions in small intestine

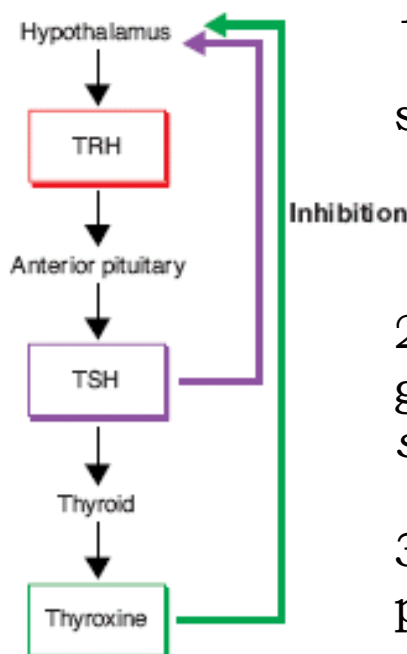
## Control Mechanisms

Recall - Homeostasis

- Homeostasis is maintained by negative feedback, or feedback inhibition.

*Controlling metabolism:*

- Metabolism is the sum of all chemical reactions in the body.
- Metabolism is increased by thyroxine, a hormone produced by the thyroid.
- The thyroid doesn't choose how much thyroxine to produce on its own, but relies on a negative feedback mechanism.



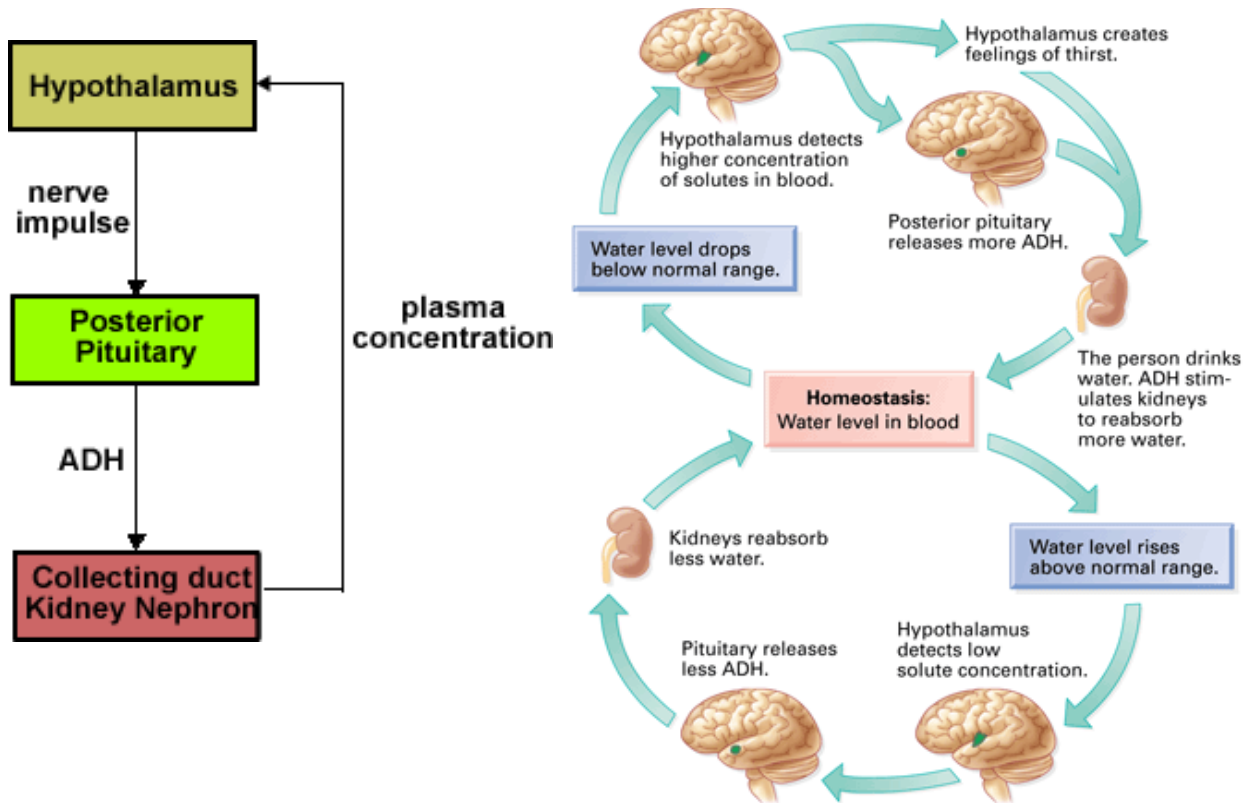
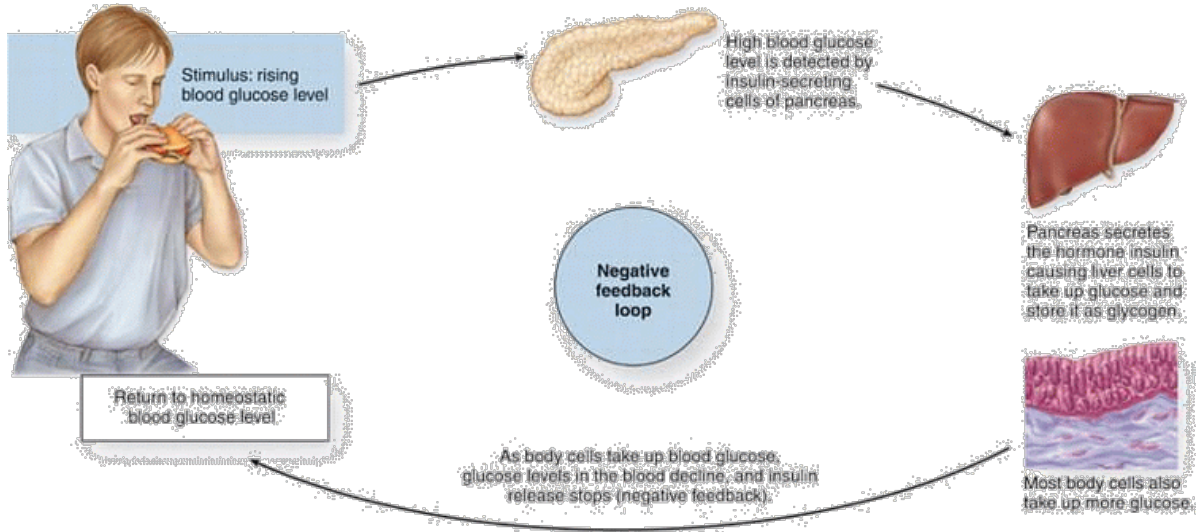
1. Hypothalamus senses a drop in thyroxine in the blood and secretes TRH (*thyrotropin-releasing hormone*).

2. TRH stimulates the pituitary gland to produce TSH (*thyroid-stimulating hormone*)

3. TSH stimulates the thyroid to produce thyroxine.

4. High levels of thyroxine inhibit the production of TRH, thus ending the cycle.

# Blood Glucose Feedback Loop



## Attachments

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Major Endocrine Glands (Correction).pdf

Hormones.asf