

## 2.3 Chemical Communication by Hisrich

### 2.3.a What is a hormone?

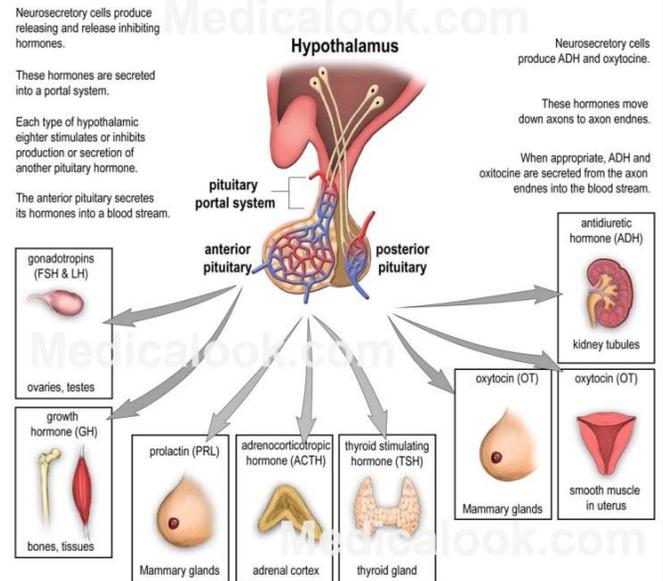
A hormone is a chemical (specifically a protein) secreted by an **endocrine gland** (gland is just a name for an organ that secretes something) that signals a system to do something.

- Some hormones are short-term (like adrenalin speeding up heart rate) and some are long term (like growth hormone)
- The same hormone can be secreted by multiple organs (for example, the ovaries and adrenal glands both make estrogen).
- Very small amounts of hormones can have very large effects.

**Endocrine glands** is another name for endocrine organs and they are found in the **endocrine system**.

- They include the pancreas, thymus, thyroid, **pituitary gland**, pineal gland, adrenal glands, ovaries and testes.
- Endocrine glands are found throughout the body, but are all ultimately controlled by the **hypothalamus** and **pituitary gland** in the brain.

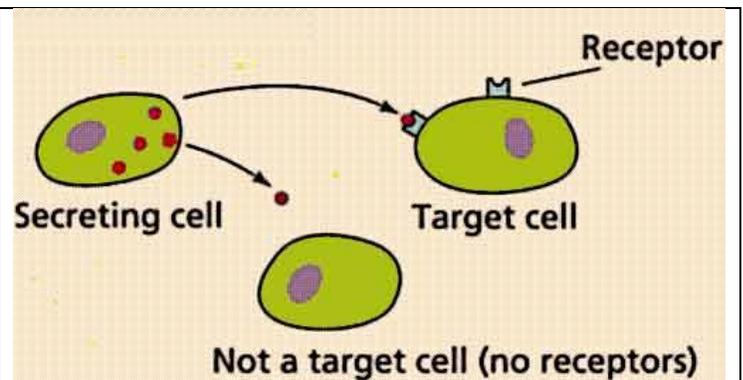
Below are examples of **hormones** and what they do.



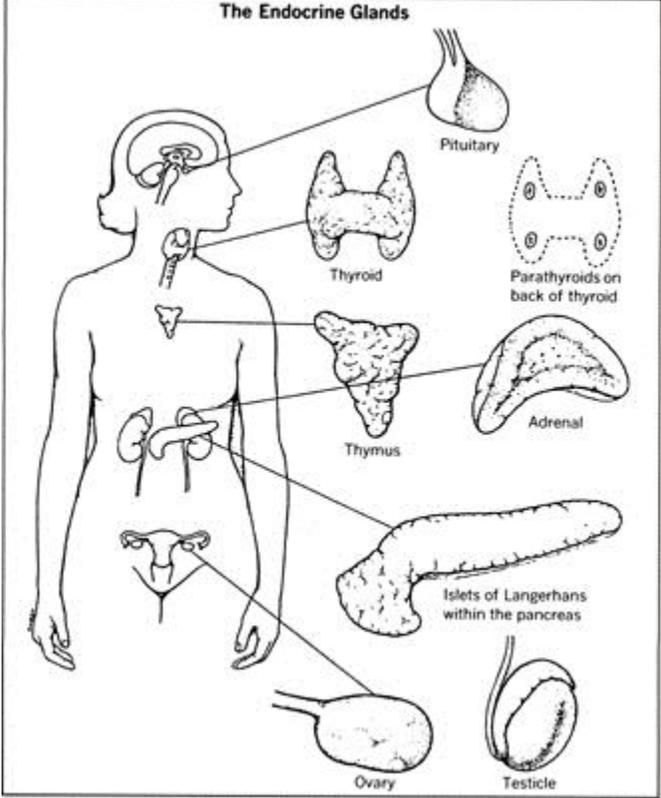
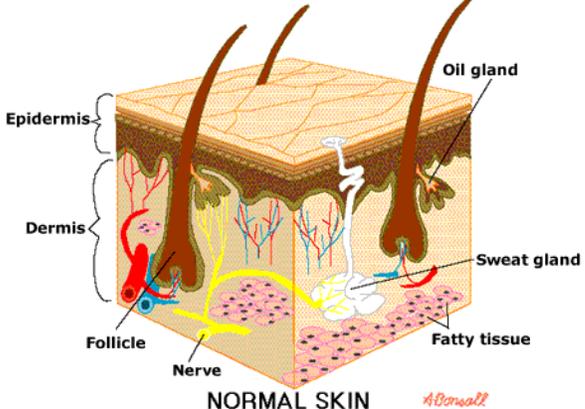
insulin	secreted by pancreas → regulates blood sugar levels by allowing cells to take in sugar
GH (growth hormone)	secreted by pituitary → stimulates growth
FSH (follicle stimulating hormone)	secreted by anterior pituitary → stimulates maturity, including sexual maturity
<b>glucagon</b>	secreted by pancreas → increases sugar levels in blood
TRH	secreted by <b>hypothalamus</b> → triggers pituitary gland to secrete TSH
TSH	secreted by pituitary gland → triggers thyroid gland to secrete T3/T4
T3/T4	secreted by thyroid gland → regulate metabolism

### 2.3.b How do hormones interact with target cells?

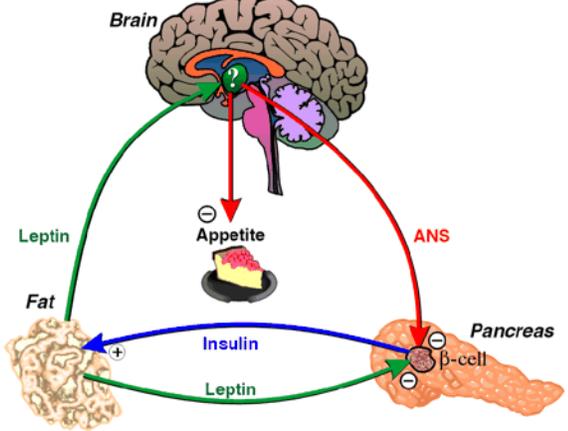
Each **hormone** travels in the blood looking for target cells. Target cells have receptors that the **hormone** fits into, like a key. For example, a male sex **hormone** would only fit receptors in cells in the male sex organ and would have no effect on other cells.



2.3.c What are examples of endocrine glands and exocrine glands in the human body?

Endocrine (“secrete within”) glands	Exocrine (“secrete outside”) glands											
 <p style="text-align: center;">The Endocrine Glands</p> <p style="text-align: center;">Secrete <b>hormones</b> INSIDE the body</p>	<p>Below are examples</p> <table border="1" data-bbox="803 241 1542 451"> <thead> <tr> <th>Gland</th> <th>Product &amp; Location</th> </tr> </thead> <tbody> <tr> <td>• Sweat glands</td> <td>• Sweat, skin</td> </tr> <tr> <td>• Cowper’s glands</td> <td>• Pre-ejaculate, penis</td> </tr> <tr> <td>• Cobelli’s glands</td> <td>• Mucus, esophagus,</td> </tr> <tr> <td>• Mammary glands</td> <td>• Milk, breasts</td> </tr> </tbody> </table>  <p style="text-align: center;">NORMAL SKIN <i>A Bonwell</i></p> <p>Excretes products through a duct to the outside, usually of the body, but sometimes just outside an organ</p>		Gland	Product & Location	• Sweat glands	• Sweat, skin	• Cowper’s glands	• Pre-ejaculate, penis	• Cobelli’s glands	• Mucus, esophagus,	• Mammary glands	• Milk, breasts
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2.3.d How do feedback loops help regulate the action of hormones?

	<p>Feedback loops keep hormones in balance.</p> <ul style="list-style-type: none"> <li>• When hormone levels go ABOVE homeostasis, feedback loops REDUCE hormone levels.</li> <li>• When hormone levels drop BELOW homeostasis, feedback loops bring them back up to normal levels.</li> </ul> <p>Examples of this include:</p> <ul style="list-style-type: none"> <li>• Insulin &amp; blood sugar</li> <li>• T3/T4 &amp; metabolism</li> <li>• Growth hormone &amp; growth</li> </ul>
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2.3.e How can too little or too much of a hormone lead to disease?

Hormones must be perfectly balanced for optimal health. Disease can result if they are too high or too low.		
Hormone	Problem with Levels	Resulting Disease
Insulin	Too Low	Type I Diabetes—high blood sugar
Growth Hormone	Too High	Acromegaly—excess growth
T3/T4	Too High	Hyperthyroidism—high metabolism
Cortisol	Too Low	Addison’s Disease—weakness, etc.