1. Concepts: Fill in the following sections with information from the text and lecture.

a. Hormone Action - Direct Gene Activation/Second-Message System:

2. Control of Hormone Release:
4. Hormone Control - Negative Feedback:
THE ENDOCRINE SYSTEM:

The endocrine system, vital to homeostasis, plays an important role in regulating the activity of body cells. By acting through blood-borne chemical messengers, called hormones, the endocrine system organs orchestrate cellular changes that lead to growth and development, reproductive capability, and the physiological homeostasis of many body systems.

This chapter covers the location of the various endocrine organs in the body, the general function of the various hormones, and the consequences of their hypersecretion or hyposecretion.

1. Complete the following statements by choosing answers from the key choices. Record the answers in the answer blanks.

   **Key Choices**

   Cardiovascular system       More rapid       Nervous system       Slower and more prolonged
   Hormones                    Nerve impulses
   e.

   The endocrine system is a major controlling system in the body. Its means of control, however, is much a. ____________________ than that of the b. ____________________, the other major body system that acts to maintain homeostasis. Perhaps the reason for this is that the endocrine system uses chemical messengers, called c. ____________________, instead of d. ____________________. These chemical messengers enter the blood and are carried throughout the body by the activity of the e. ____________________.

2. Complete the following statements by choosing answers from the key choices. Record the answers in the answer blanks.

   **Key Choices**

   Altering activity        Negative feedback        Steroid or amino acid-based
   Anterior pituitary       Neural        Stimulating new or unusual activities
   Hormonal                Neuroendocrine        Sugar or protein
   Humoral                  Receptors        Target cell(s)
   Hypothalamus             Releasing hormones

   All cells do not respond to endocrine system stimulation. Only those that have the proper a. ____________________ on their cell membranes are activated by the chemical messengers. These responsive cells are called the b. ____________________ of the various endocrine glands. Hormones promote homeostasis by c. ____________________ of body cells rather than by d. ____________________.

   Most hormones are e. ____________________ molecules. The various endocrine glands are prodded to release their hormones by nerve fibers (a f. ____________________ stimulus), by other hormones (a g. ____________________ stimulus), or by the presence of increased or decreased levels of various other substances in the blood (a h. ____________________ stimulus). The secretion of most hormones is regulated by a i. ____________________ system, in which increasing levels of that particular hormone "turn off" its stimulus. The j. ____________________ is called the master endocrine gland because it regulates so many other endocrine organs. However, it is in turn controlled by k. ____________________ secreted by the l. ____________________. The structure identified in the last question is also part of the brain, so it is appropriately called a m. ____________________ organ.
3. Figure 9-1 depicts the anatomical relationships between the hypothalamus and the anterior and posterior lobes of the pituitary in a highly simplified way. First, identify each of the structures listed below by labeling them on the diagram. Then, on the appropriate lines write in the names of the hormones that influence each of the target organs shown at the bottom of the diagram.

Hypothalamus  Turk’s saddle of the sphenoid bone  Anterior pituitary  Posterior pituitary

**Figure 9-1**
4. Figure 9-2 is a diagram of the various endocrine organs of the body. Next to each letter on the diagram, write the name of the endocrine-producing organ (or area). To complete your identification of the hormone-producing organs, name the organs (not illustrated) described in items K and L.

K. Small glands that ride "horseback" on the thyroid ______________________

L. Endocrine-producing organ present only in pregnant women ____________________

Figure 9-2
5. For each of the following hormones, indicate the organ (or organ part) producing or releasing the hormone by inserting the appropriate letters from Figure 9-2 in the answer blanks.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ____ ACTH</td>
<td>h. ____ Glucagon</td>
<td>o. ____ PTH</td>
</tr>
<tr>
<td>b. ____ ADH</td>
<td>i. ____ Insulin</td>
<td>p. ____ Growth hormone</td>
</tr>
<tr>
<td>c. ____ Aldosterone</td>
<td>j. ____ LH</td>
<td>q. ____ Testosterone</td>
</tr>
<tr>
<td>d. ____ Cortisol</td>
<td>k. ____ Melatonin</td>
<td>r. ____ Thymosin</td>
</tr>
<tr>
<td>e. ____ Epinephrine</td>
<td>l. ____ Oxytocin</td>
<td>s. ____ Thyroxine</td>
</tr>
<tr>
<td>f. ____ Estrogen</td>
<td>m. ____ Progesterone</td>
<td>t. ____ TSH</td>
</tr>
<tr>
<td>g. ____ FSH</td>
<td>n. ____ Prolactin</td>
<td></td>
</tr>
</tbody>
</table>

6. Name the hormone that best fits each of the following descriptions. Insert your responses in the answer blanks.

a. __________________________ Basal metabolic hormone

b. __________________________ Programs T lymphocytes

c. __________________________ Most important hormone regulating the amount of calcium circulating in the blood; released when blood calcium levels drop

d. __________________________ Helps to protect the body during long-term stressful situations such as extended illness and surgery

e. __________________________ Short-term stress hormone; aids in the fight-or-flight response; increases blood pressure and heart rate, for example

f. __________________________ Necessary if glucose is to be taken up by body cells

g. __________________________ h. __________________________ i. __________________________

j. __________________________ Four tropic hormones

k. __________________________ Acts antagonistically to insulin; produced by the same endocrine organ

l. __________________________ Hypothalamic hormone important in regulating water balance

m. __________________________ n. __________________________ Anterior pituitary hormones that regulate the ovarian cycle

a. __________________________ p. __________________________ Directly regulate the menstrual uterine cycle

q. __________________________ Adrenal cortex hormone involved in regulating salt levels of body fluids

r. __________________________ s. __________________________ Necessary for milk production and ejection
7. Name the hormone that would be produced in inadequate amounts in the following conditions. Place your responses in the answer blanks.

a. ________________________ Sexual immaturity
b. ________________________ Tetany
c. ________________________ Excessive urination without high blood glucose levels; causes dehydration and tremendous thirst
d. ________________________ Goiter
e. ________________________ Cretinism; a type of dwarfism in which the individual retains childlike proportions and is mentally retarded
f. ________________________ Excessive thirst, high blood glucose levels, acidosis
g. ________________________ Abnormally small stature, normal proportions
h. ________________________ Miscarriage
i. ________________________ Lethargy, hair loss, low basal metabolic rate, obesity (myxedema in the adult)

8. Name the hormone that would be produced in excessive amounts in the following conditions. Place your responses in the answer blanks.

a. ________________________ Lantern jaw; large hands and feet (acromegaly in the adult)
b. ________________________ Bulging eyeballs, nervousness, increased pulse rate, weight loss (Graves’ disease)
c. ________________________ Demineralization of bones; spontaneous fractures
d. ________________________ Cushing’s syndrome-moon face, depression of the immune system
e. ________________________ Abnormally large stature, relatively normal body proportions
f. ________________________ Abnormal hairiness; masculinization

9. List the cardinal symptoms of diabetes mellitus, and provide the rationale for the occurrence of each symptom.

a.

b.

c.
10. The activity of many end organs is regulated by negative feedback. Figure 9-3A shows the basic elements of a homeostatic control system. Figure 9-3B shows a feedback loop with selected parts missing. Assume, for this system, that the stimulus that initiates it is declining T3 and T4 levels in the blood, which produces a drop in metabolic rate. Fill in the information missing in the boxes to correctly complete this feedback loop. Also indicate whether it is a negative or positive feedback loop.

11. Besides the major endocrine organs, isolated clusters of cells produce hormones within body organs that are usually not associated with the endocrine system. A number of these hormones are listed in the table below. Fill in the missing information (blank spaces) on these hormones in the table.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Chemical makeup</th>
<th>Source</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrin</td>
<td>Peptide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretin</td>
<td>Duodenum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholecystokinin</td>
<td>Peptide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythropoietin</td>
<td>Kidney in response to hypoxia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active vitamin D3</td>
<td>Skin; activated by kidneys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atrial natriuretic peptide (ANP)</td>
<td>Peptide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human chorionic gonadotropin (hCG)</td>
<td>Protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptin</td>
<td>Adipose tissue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Instructions: Use the vocabulary from this chapter to complete this crossword puzzle.

Across
2. A hormone that regulates the function of another endocrine organ.
5. Alcohol inhibits the secretion of this hormone.
8. The hormone that appears to help regulate our sleep-wake cycles is:
9. Anterior pituitary hormone that influences the activity of the adrenal cortex.
10. Endocrine gland active in immune response.
12. Epinephrine and norepinephrine.
13. Home pregnancy tests tests check for a hormone in the female’s urine called?
14. Hormone-producing glands located superior to the kidneys; each consists of medulla and cortex areas.
15. Disease caused by deficient insulin release, leading to inability of the body cells to use carbohydrates.
16. Insulin and glucagon are both hormones that are produced by the?
17. Region of the diencephalon forming the floor of the third ventricle of the brain. Controls the pituitary gland via releasing and inhibiting hormones.

Down
1. Glands that have ducts through which their secretions are carried to a particular site.
3. Small endocrine glands located on the posterior aspect of the thyroid gland. Release PTH.
4. Hormone secreted in the stomach; regulates gastric juice secretion by stimulating HCL production.
6. Substance released by the kidneys that is involved with raising blood pressure.
7. Hormones that stimulate female secondary sex characteristics; female sex hormones.
11. Gland located behind the stomach, between the spleen and the duodenum; produces both endocrine and exocrine secretions.

Miss School, Miss Out!
The Endocrine System

hormones

categories

1. bind to cell membrane receptors

2. cross cell membranes

Major Endocrine Glands

also called the neurohypophysis

3. produces hormones

4. produces hormones

5. produces hormones

Thymus

produces T3 and T4

produces calcitonin

12.

13. controls by releasing and inhibiting hormones

Anterior Pituitary

controls the pituitary gland

6.

7.

8.

9.

Tropic Hormones

Adrenal Glands

produces PTH

increases blood Ca

15.

produces catecholamines

16.

17.

Pineal Gland

produces

14.

11.

Gonads

produces

22.

21. produces insulin and glucagon

18. 19. 20.

10. Miss School, Miss Out!