

The endocrine system has often been compared to a fine concert symphony. When all instruments are playing properly, the sound is melodious. If one instrument plays too loud or too soft, however, it affects the overall quality of the entire performance.

The endocrine system is a ductless system that releases hormones into the bloodstream to help regulate body functions. The pituitary gland may be considered the conductor of the orchestra, as it stimulates many of the endocrine glands to secrete their powerful hormones. All hormones, whether stimulated in this manner or by other control mechanisms, are interdependent. A change in the level of one hormone may affect the level of many other hormones.

In addition to the endocrine glands, prostaglandins ("tissue hormones") are powerful substances similar to hormones that have been found in a variety of body tissues. These hormones are often produced in a tissue and diffuse only a short distance to act on cells within that area. Prostaglandins influence respiration, blood pressure, gastrointestinal secretions, and the reproductive system, and they may some day play an important role in the treatment of diseases such as hypertension, asthma, and ulcers.

The endocrine system is a system of communication and control. It differs from the nervous system in that hormones provide a slower, longer-lasting effect than do nerve stimuli and responses. Your understanding of the "system of hormones" will alert you to the mechanisms of our emotions, our responses to stress, our growth, our chemical balances, and many other of our body functions.

## TOPICS FOR REVIEW

Before progressing to Chapter 10, you should be able to identify and locate the primary endocrine glands of the body. Your understanding should include the hormones that are produced by these glands and the method by which these secretions are regulated. Your study will conclude with the pathological conditions that result from the malfunctioning of this system.

# MECHANISMS OF HORMONE ACTION

## REGULATION OF HORMONE SECRETION

### PROSTAGLANDINS

Match the term on the left with the proper selection on the right.

*Group A*

- \_\_\_\_\_ 1. Pituitary
- \_\_\_\_\_ 2. Parathyroids
- \_\_\_\_\_ 3. Adrenals
- \_\_\_\_\_ 4. Ovaries
- \_\_\_\_\_ 5. Thymus

- A. Pelvic cavity
- B. Mediastinum
- C. Neck
- D. Cranial cavity
- E. Abdominal cavity

*Group B*

- \_\_\_\_\_ 6. Negative feedback
- \_\_\_\_\_ 7. Tissue hormones
- \_\_\_\_\_ 8. Second messenger hypothesis
- \_\_\_\_\_ 9. Exocrine glands
- \_\_\_\_\_ 10. Target organ cells

- A. Explanation for hormone organ recognition
- B. Respond to a particular hormone
- C. Prostaglandins
- D. Discharge secretions into ducts
- E. Specialized homeostatic mechanism that regulates release of hormones

*Fill in the blanks.*

The (11) \_\_\_\_\_ hypothesis is a theory that attempts to explain why hormones cause specific effects in target organs but do not (12) \_\_\_\_\_ or act on other organs of the body. Protein hormones serve as (13) \_\_\_\_\_, providing communication between endocrine glands and (14) \_\_\_\_\_. The second messenger (15) \_\_\_\_\_ provides communication within a hormone's (16) \_\_\_\_\_. (17) The study of the important roles of the \_\_\_\_\_ and \_\_\_\_\_ in second messenger systems resulted in Nobel Prizes.



*If you have had difficulty with this section, review pages 225-231.*

# PITUITARY GLAND HYPOTHALAMUS

Circle the correct answer.

18. The pituitary gland lies in the \_\_\_\_\_ bone.
- A. Ethmoid
  - B. Sphenoid
  - C. Temporal
  - D. Frontal
  - E. Occipital
19. Which one of the following structures would *not* be stimulated by a tropic hormone from the anterior pituitary?
- A. Ovaries
  - B. Testes
  - C. Thyroid
  - D. Adrenals
  - E. Uterus
20. Which one of the following is *not* a function of FSH?
- A. Stimulates the growth of follicles
  - B. Stimulates the production of estrogens
  - C. Stimulates the growth of seminiferous tubules
  - D. Stimulates the interstitial cells of the testes
21. Which one of the following is *not* a function of LH?
- A. Stimulates the maturation of a developing follicle
  - B. Stimulates the production of estrogens
  - C. Stimulates the formation of a corpus luteum
  - D. Stimulates sperm cells to mature in the male
  - E. Causes ovulation
22. Which one of the following is *not* a function of GH?
- A. Increases glucose catabolism
  - B. Increases fat catabolism
  - C. Speeds up the movement of amino acids into cells from the bloodstream
  - D. All of the above are functions of GH
23. Which one of the following hormones is *not* released by the anterior pituitary gland?
- A. ACT
  - B. TSH
  - C. ADH
  - D. FSH
  - E. LH

24. Which one of the following is not a function of prolactin?
- A. Stimulates breast development during pregnancy
  - B. Stimulates milk secretion after delivery
  - C. Causes the release of milk from glandular cells of the breast
  - D. All of the above are functions of prolactin
25. The anterior pituitary gland:
- A. Secretes eight major hormones
  - B. Secretes tropic hormones that stimulate other endocrine glands to grow and secrete
  - C. Secretes ADH
  - D. Secretes oxytocin
26. TSH acts on the:
- A. Thyroid
  - B. Thymus
  - C. Pineal
  - D. Testes
27. ACTH stimulates the:
- A. Adrenal cortex
  - B. Adrenal medulla
  - C. Hypothalamus
  - D. Ovaries
28. Which hormone is secreted by the posterior pituitary gland?
- A. MSH
  - B. LH
  - C. GH
  - D. ADH
29. ADH serves the body by:
- A. Initiating labor
  - B. Accelerating water reabsorption from urine into the blood
  - C. Stimulating the pineal gland
  - D. Regulating the calcium/phosphorus levels in the blood
30. What disease is caused by hyposecretion of the ADH?
- A. Diabetes insipidus
  - B. Diabetes mellitus
  - C. Acromegaly
  - D. Myxedema
31. The actual production of ADH and oxytocin takes place in which area?
- A. Anterior pituitary
  - B. Posterior pituitary
  - C. Hypothalamus
  - D. Pineal
32. Inhibiting hormones are produced by the:
- A. Anterior pituitary
  - B. Posterior pituitary
  - C. Hypothalamus
  - D. Pineal

Select the correct term from the choices given and write the letter in the answer blank.

- \_\_\_\_\_ A. Anterior pituitary                      B. Posterior pituitary                      C. Hypothalamus
- \_\_\_\_\_ 33. Adenohypophysis
- \_\_\_\_\_ 34. Neurohypophysis
- \_\_\_\_\_ 35. Induced labor
- \_\_\_\_\_ 36. Appetite
- \_\_\_\_\_ 37. Acromegaly
- \_\_\_\_\_ 38. Body temperature
- \_\_\_\_\_ 39. Sex hormones
- \_\_\_\_\_ 40. Tropic hormones
- \_\_\_\_\_ 41. Gigantism
- \_\_\_\_\_ 42. Releasing hormones



If you have had difficulty with this section, review pages 231-235.

## THYROID GLAND PARATHYROID GLANDS

Circle the correct answer.

43. The thyroid gland lies (above or below) the larynx.
44. The thyroid gland secretes (calcitonin or glucagon).
45. For thyroxine to be produced in adequate amounts, the diet must contain sufficient (calcium or iodine).
46. Most endocrine glands (do or do not) store their hormones.
47. Colloid is a storage medium for the (thyroid or parathyroid) hormone.
48. Calcitonin (increases or decreases) the concentration of calcium in the blood.
49. Simple goiter results from (hyperthyroidism or hypothyroidism).
50. Hyposecretion of thyroid hormones during the formative years leads to (cretinism or myxedema).
51. The parathyroid glands secrete the hormone (PTH or PTA).
52. Parathyroid hormone tends to (increase or decrease) the concentration of calcium in the blood.



If you have had difficulty with this section, review pages 235-237.

## ADRENAL GLANDS

Fill in the blanks.

53. The adrenal gland is actually two separate endocrine glands, the \_\_\_\_\_  
\_\_\_\_\_ and the \_\_\_\_\_.
54. Hormones secreted by the adrenal cortex are known as \_\_\_\_\_.
55. The outer zone of the adrenal cortex secretes \_\_\_\_\_.
56. The middle zone secretes \_\_\_\_\_.
57. The innermost zone secretes \_\_\_\_\_.

58. Glucocorticoids act in several ways to increase \_\_\_\_\_.
59. Glucocorticoids also play an essential part in maintaining \_\_\_\_\_.
60. The adrenal medulla secretes the hormones \_\_\_\_\_ and \_\_\_\_\_.
61. The adrenal medulla may help the body resist \_\_\_\_\_.
62. Deficiency or hyposecretion of adrenal cortex hormones results in a condition called \_\_\_\_\_.

Select the correct term from the choices given and write the letter in the answer blank.

- |       |                                |                    |
|-------|--------------------------------|--------------------|
|       | A. Adrenal cortex              | B. Adrenal medulla |
| _____ | 63. Mineralocorticoids         |                    |
| _____ | 64. Anti-immunity              |                    |
| _____ | 65. Adrenaline                 |                    |
| _____ | 66. Cushing's syndrome         |                    |
| _____ | 67. "Fight or flight" syndrome |                    |
| _____ | 68. Aldosterone                |                    |
| _____ | 69. Androgens                  |                    |



If you have had difficulty with this section, review pages 236-241.

## PANCREATIC ISLETS

## SEX GLANDS

## THYMUS

## PLACENTA

## PINEAL GLAND

Circle the term that does not belong.

- |                   |                    |               |                   |
|-------------------|--------------------|---------------|-------------------|
| 70. Alpha cells   | Glucagon           | Beta cells    | Glycogenolysis    |
| 71. Insulin       | Glucagon           | Beta cells    | Diabetes mellitus |
| 72. Estrogens     | Progesterone       | Corpus luteum | Thymosin          |
| 73. Chorion       | Interstitial cells | Testosterone  | Semen             |
| 74. Immune system | Mediastinum        | Aldosterone   | Thymosin          |
| 75. Pregnancy     | ACTH               | Estrogen      | Chorion           |
| 76. Melatonin     | Menstruation       | "Third eye"   | Semen             |



# APPLYING WHAT YOU KNOW

92. Mrs. Fortner made a routine visit to her physician last week. When the laboratory results came back, the report indicated a high level of chorionic gonadotropin in her urine. What did this mean to Mrs. Fortner?

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93. Mrs. Wilcox noticed that her daughter was beginning to take on the secondary sex characteristics of a male. The pediatrician diagnosed the condition as a tumor of an endocrine gland. Where specifically was the tumor located?

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94. Mrs. Hart was pregnant and was 2 weeks past her due date. Her doctor suggested that she enter the hospital and said he would induce labor. What hormone will he give Mrs. Hart?

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## 95. WORD FIND

Can you find 16 terms from this chapter? Words may be spelled top to bottom, bottom to top, right to left, left to right, or diagonally.

S S I S E R U I D M E S I T W  
 N D N X E B A M E D E X Y M I  
 I I G O N R S G X T I I Y V B  
 D O M S I N I T E R C C U Q D  
 N C X S R T N B O T V M Y O M  
 A I M E C L A C R E P Y H I X  
 L T Y R O I E Z Q R T J V K F  
 G R E T D P S N I L D J M X N  
 A O O S N I D K I N K S P P O  
 T C P R E T I O G R I F M X G  
 S L M H Y P O G L Y C E M I A  
 O A J L H O R M O N E O T G C  
 R C E L T S E L C N P N X U U  
 P I O S W R T X C G U L O E L  
 G G V Y H M S H Y K A K N Q G

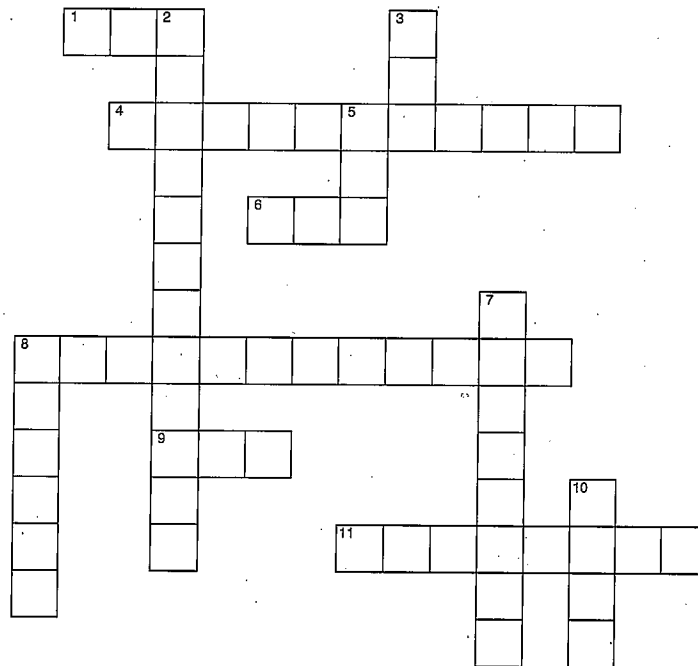
Corticoids	Glucagon	Myxedema
Cretinism	Goiter	Prostaglandins
Diabetes	Hormone	Steroids
Diuresis	Hypercalcemia	Stress
Endocrine	Hypoglycemia	
Exocrine	Luteinization	

## DID YOU KNOW?

The total daily output of the pituitary gland is less than 1/1,000,000 of a gram, yet this small amount is responsible for stimulating the majority of all endocrine functions.

## THE ENDOCRINE SYSTEM

Fill in the crossword puzzle.



### Across

1. Secreted by cells in the walls of the heart's atria
4. Adrenal medulla
6. Estrogens
8. Converts amino acids into glucose
9. Melanin
11. Labor

### Down

2. Hypersecretion of insulin
3. Antagonist to diuresis
5. Increases calcium concentration
7. Hyposecretion of Islands of Langerhans (one word)
8. Hyposecretion of thyroid
10. Adrenal cortex

# CHECK YOUR KNOWLEDGE

## Multiple Choice

Circle the correct answer.

1. What does the outer zone of the adrenal cortex secrete?
  - A. Mineralocorticoids
  - B. Sex hormones
  - C. Glucocorticoids
  - D. Epinephrine
2. From what condition does diabetes insipidus result?
  - A. Low insulin levels
  - B. High glucagon levels
  - C. Low antidiuretic hormone levels
  - D. High steroid levels
3. Which of the following statements about a young child whose growth is stunted, whose metabolism is low, whose sexual development is delayed, and whose mental development is retarded is *true*?
  - A. The child suffers from cretinism.
  - B. The child has an underactive thyroid.
  - C. The child could suffer from a pituitary disorder.
  - D. All of the above
4. What can result when too much growth hormone is produced by the pituitary gland?
  - A. Hyperglycemia
  - B. A pituitary giant
  - C. Both A and B
  - D. None of the above
5. Which of the following glands is *not* regulated by the pituitary?
  - A. Thyroid
  - B. Ovaries
  - C. Adrenals
  - D. Thymus
6. Which of the following statements about antidiuretic hormone is *true*?
  - A. It is released by the posterior lobe of the pituitary.
  - B. It causes diabetes insipidus when produced in insufficient amounts.
  - C. It decreases urine volume.
  - D. All of the above

7. What controls the development of the body's immune system?
  - A. Pituitary
  - B. Thymus
  - C. Pineal body
  - D. Thyroid
8. Administration of what would best treat a person suffering from severe allergies?
  - A. Gonadocorticoids
  - B. Glucagon
  - C. Mineralocorticoids
  - D. Glucocorticoids
9. What endocrine gland is composed of cell clusters called the islets of Langerhans?
  - A. Adrenals
  - B. Thyroid
  - C. Pituitary
  - D. Pancreas
10. Which of the following statements concerning prostaglandins is *true*?
  - A. They control activities of widely separated organs.
  - B. They can be called tissue hormones.
  - C. They diffuse over long distances to act on cells.
  - D. All of the above

## Matching

Select the most appropriate answer from column B for each item in column A. There is only one correct answer for each item.

<i>Column A</i>	<i>Column B</i>
_____ 11. Goiter	A. Glucocorticoid hormones
_____ 12. Ovulation	B. Antidiuretic hormone
_____ 13. Diabetes mellitus	C. Calcitonin
_____ 14. Lactation	D. Oxytocin
_____ 15. Diabetes insipidus	E. Growth hormone
_____ 16. Chorionic gonadotropins	F. Placenta
_____ 17. Cushing's syndrome	G. Luteinizing hormone
_____ 18. Labor	H. Insulin
_____ 19. Acromegaly	I. Prolactin
_____ 20. Hypercalcemia	J. Thyroid hormones

# Endocrine Glands

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_
- 6. \_\_\_\_\_
- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_

