

Review questions for Endocrine lecture

Multiple choice review questions:

- 1) Which of the following general chemical categories is *not* represented by a group of hormones?
 - A) amines
 - B) polypeptides and proteins
 - C) nucleic acids
 - D) steroids

- 2) Which statement about physiological regulation by hormones is false?
 - A) Target cells must have specific receptor proteins with which the hormones combine.
 - B) When hormones bind to target cells, the target cell is pre-programmed to react in a certain way.
 - C) The hormone travels from its source to the target cell in the bloodstream
 - D) The target cell depolarizes to +30 mV.

- 3) The anterior pituitary gland is unable to
 - A) make and release tropic hormones.
 - B) respond to tropic hormones from the hypothalamus.
 - C) secrete oxytocin.
 - D) secrete hormones that alter the activity of the adrenal cortex and thyroid gland.

- 4) The anterior pituitary hormone associated with dwarfism, gigantism, and acromegaly is
 - A) Thyroxine.
 - B) GH.
 - C) Cortisone
 - D) Cortisol

- 5) Which is not true about thyroxine
 - A) It is the major hormone secreted by the thyroid gland
 - B) It travels in the blood.
 - C) It regulates the body's metabolic rate
 - D) It contains chlorine atoms

- 6) A person with hyperthyroidism will have all of the following symptoms except...
 - A) High body temperature
 - B) weight loss
 - C) high metabolic rates
 - D) lethargy (tiredness)

- 7) A person who is experiencing a goiter can be treated with dietary supplements of
- A) calcium.
 - B) ADH.
 - C) corticosteroids.
 - D) iodine.
- 8) Which of the following hormones contain the element iodine?
- A) T_4
 - B) epinephrine
 - C) steroids
 - D) corticosteroids
- 9) Which statement about the *parathyroid* glands is *false*?
- A) They regulate calcium levels
 - B) They are embedded in the thyroid gland.
 - C) They secrete parathyroid hormone (PTH) and calcitonin.
- 10) Which hormones are *not* secreted by the adrenal cortex?
- A) aldosterone
 - B) sex steroids: testosterone and estrogen
 - C) cortisone and other glucocorticoids
 - D) epinephrine and some norepinephrine
- 11) Which function of glucocorticoids is most supportive of the hypothesis that prolonged stress results in an increased incidence of cancer and other diseases?
- A) Glucocorticoids stimulate an increase in heart rate and in cardiac output.
 - B) Glucocorticoids cause generalized vasoconstriction that elevates blood pressure.
 - C) Glucocorticoids increase blood volume and alter electrolyte balance.
 - D) Glucocorticoids can inhibit the ability of the immune system to protect against disease.
- 12) Which of the following is a deleterious (harmful) effect produced by prolonged stress?
- A) increased parasympathetic activity
 - B) suppression of growth hormone secretion and action
 - C) increased thyroid hormone production and secretion
 - D) Decreased immune activity
- 13) Which is not true about steroid hormones? They...
- A) contain 4 fused rings of carbon atoms
 - B) are hydrophilic molecules
 - C) include the glucocorticoids and aldosterone
 - D) include estrogen

- 14) The adrenal medulla secretes
A) aldosterone and cortisol.
B) thyroxine.
C) epinephrine and norepinephrine.
D) ADH and oxytocin.

Answers to multiple choice review questions:

1 = C	6 = D	11 = D
2 = D	7 = D	12 = D
3 = C	8 = A	13 = B
4 = B	9 = C	14 = C
5 = D	10 = D	

Fill-in-the-blank review questions:

- 1) The _____ system and the _____ system are both organ systems for communication between body parts, but of the two, the _____ system's effects tend to be slower and longer lasting.
- 2) A(n) _____ is any structure in the body that makes and secretes a substance.
- 3) Glands that release hormones are known as _____ glands.
- 4) Hormones are defined as _____ that travel in the _____.
- 5) In general, the effects of hormones are to regulate the body's functions of _____, _____, _____, and _____.
- 6) The three general chemical classes of hormones are _____, _____, and _____.
- 7) _____ hormones are made from modified amino acids.
- 8) _____ hormones are chains of linked amino acids.
- 9) _____ hormones are a type of lipid molecules. They all have a backbone of _____ (a number) of fused carbon rings.

10) Fill in the blanks in the following description of how the endocrine system works:

Hormones are released from structures in the body called _____. (The pituitary, the thyroid, and the adrenal are all examples of these structures). After it is released, a hormone travels in the _____ to its target tissue, which is the tissue that will respond to the hormone. The target tissue is able to respond to the hormone that because the cells of the target tissue have _____, which bind to the hormone and trigger the cells to take a specific action in response to it.

11) When a hormone's target organ is another endocrine gland, and the hormone regulates that gland's release of hormone, the first hormone is called a _____ hormone.

12) The pituitary gland is below and connected to the _____. The amount and types of hormones made by the pituitary gland are controlled by _____ hormones from the _____.

13) The pituitary gland has two parts: The _____ pituitary and the _____ pituitary.

14) The posterior/anterior (circle one) pituitary synthesizes the majority of the pituitary hormones.

15) The two hormones secreted by the posterior pituitary are _____ and _____.

16) The _____ is sometimes called the "master gland" of the body because it releases many hormones that control other endocrine glands. What is the term for a hormone that controls another endocrine gland? _____

17) Growth hormone is secreted by the _____ gland (be as specific as possible).

18) Because growth hormone is the body's major growth regulator, too little results in _____ and too much (before puberty) results in _____.

19) Growth hormone causes growth by increasing _____ tissue and _____ tissue, but it decreases _____ tissue.

20) The major hormone secreted by the thyroid gland is called _____ hormone.

21) Thyroid hormone is also called _____ and _____.

22) The hormone thyroxine has _____ (a type of atom) attached to the basic structure of the hormone molecule.

23) The number 4 in "T4" refers to the number of _____ atoms bound to T4 hormone.

24) Thyroid hormone is unusual in that _____ are its target cells.

25) In response to T4, cells increase their use of _____ for energy.

- 26) If a person gets too little iodine in their diet, their thyroid will swell, a condition known as having a _____.
- 27) Hyperthyroidism is also known as _____ and results these symptoms: _____, _____, and _____.
- 28) If a person's thyroid is making too little thyroxin, that person is said to be _____. The usual symptoms of this condition are: _____, _____, and _____.
- 29) If a child's thyroid is making too little thyroxin, two severe symptoms (not seen in hypothyroid adults) can occur: _____ and _____. The child with this condition is said to have _____.
- 30) Parathyroid hormone is the only hormone secreted by the parathyroid glands; and its primary action is to increase/decrease (circle one) the concentration of _____ in the bloodstream.
- 31) When the body is low on calcium, the _____ gland releases _____ hormone to increase calcium levels. When the body has excess calcium, the _____ gland releases _____ hormone to increase calcium levels.
- 32) PTH stimulates cells in _____ tissue that _____.
- 33) Calcitonin stimulates cells in _____ tissue that _____.
- 34) Which two hormones that we mentioned in lecture have antagonistic effects?
- 35) The thyroid gland is controlled by tropic hormones from the _____ gland, but these tropic hormones are in turn controlled by tropic hormones released from the _____.
- 36) The outer portion of the adrenal glands is called the adrenal _____, whereas the inner portion of the adrenal gland is called the adrenal _____.
- 37) The inner portion of the adrenal glands is made of _____ tissue.
- 38) The adrenal cortex synthesizes these two different steroid hormones in large amounts: _____ and _____.
- 39) Cortisol and cortisone are together called _____. The first part of the name comes from the fact that they help to regulate the concentration of _____. The second part of the name comes from the fact that they are secreted by the adrenal _____, and the final part of the name comes from the fact that they are steroid hormones.
- 40) _____ disease is when too little of all the adrenal cortex hormones are made. President Kennedy had this disease.
- 41) The adrenal _____ (a part of the adrenal gland) secretes the hormone _____, which regulates _____ (an ion) levels in the blood.

- 42) _____ are hormones secreted by the adrenal cortex in response to long-term stress.
- 43) Glucocorticoids provide energy to deal with stress by converting _____ and _____ into _____, but they also inhibit the _____ system.
- 44) Although mostly made in the testes, the male hormone _____ is present in both genders because the _____ produces a little of it.
- 45) A female patient has the following symptoms: High blood sugar, slender legs but fat deposits on the face and neck, facial hair, and depressed immune system. A hormone-releasing tumor in what gland is most likely the cause? _____. What tumors in what two other glands might also be the cause? _____ and _____.
- 46) The adrenal cortex is controlled by tropic hormones from the _____ gland, but these tropic hormones are in turn controlled by tropic hormones released from the _____.
- 47) A patient with _____ syndrome has elevated hormone secretion from the adrenal cortex.
- 48) Prolonged stress lowers the activity of the _____ system.
- 49) The adrenal _____ (a part of the adrenal gland) secretes the hormone _____ and the neurotransmitter _____ into the bloodstream in response to short-term stress. This is sometimes called the “fight or flight” response.
- 50) Many of the hormones we discussed in lecture affect the concentration of glucose in the blood. In the blank space after each hormone, write Up if the hormone raises the concentration of glucose. Write Down if it lowers the concentration of glucose. Write 0 if the hormone does not change glucose levels.
- Cortisol _____
- Thyroid hormone _____
- Epinephrine _____
- Cortisone _____
- Calcitonin _____
- 51) The adrenal medulla secretes the neurotransmitter norepinephrine and the hormone epinephrine directly into the blood when stimulated by nerve signals from the _____ division of the nervous system.

Answers to fill-in-the-blank review questions:

- 1) Endocrine
Nervous
Endocrine
- 2) Gland
- 3) Endocrine gland
- 4) Signal molecules
Blood
- 5) Growth
Development
Metabolism
Reproduction
- 6) Amine hormones
Protein/Peptide hormone
Steroid hormones
- 7) Amine hormones
- 8) Protein/Peptide hormones
- 9) Steroid
Four
- 10) Endocrine glands
Bloodstream
Receptor proteins
- 11) Tropic
- 12) Hypothalamus
Tropic
Hypothalamus
- 13) Anterior
Posterior
- 14) Anterior
- 15) Oxytocin
Antidiuretic hormone
- 16) Pituitary gland
Tropic hormone
- 17) Anterior pituitary
- 18) Dwarfism
Giantism
- 19) Bone
Muscle
Fatty
- 20) Thyroid hormone
- 21) Thyroxine
T4
- 22) Iodine
- 23) Iodine
- 24) All cells in the body
- 25) Glucose
- 26) Goiter
- 27) Graves disease
High body temperature
Weight loss
Excess nervousness and energy
- 28) Hypothyroid
Weight gain
Low body temperature
Low energy/Apathy
- 29) Stunted growth
Mental retardation
Cretinism
- 30) Increase
Calcium
- 31) Parathyroid
Parathyroid hormone
Thyroid
Calcitonin
- 32) Bone
Dissolve bone
- 33) Bone
Make bone
- 34) Calcitonin and parathyroid hormone
- 35) Pituitary
Hypothalamus
- 36) Cortex
Medulla
- 37) Nervous
- 38) Aldosterone
Glucocorticoids
- 39) Glucocorticoids
Glucose
Cortex
- 40) Addison's
- 41) Cortex
Aldosterone
Na⁺
- 42) Glucocorticoids
- 43) Fat
Muscle
Glucose

Immune	Norepinephrine
44) Adrenal cortex	50) Up
45) Adrenal gland	Down
Pituitary	Up
Hypothalamus	Up
46) Pituitary	0
Hypothalamus	51) Sympathetic
47) Cushing's syndrome	52) Melatonin
48) Immune	53) Decreases
49) Medulla	Light
Epinephrine (adrenaline)	54) Seasonal affective disorder (SAD)

Short answer questions:

- 1) Explain briefly how it is possible that hormones can circulate throughout the entire body yet they only cause changes in their specific target tissue.
- 2) Explain why excess growth hormone before puberty causes gigantism but excess puberty after puberty does not.
- 3) Name the disease caused by excess growth hormone after puberty and explain why excess growth hormone causes enlarged jaw and fingers, the major symptoms of the disease.
- 4) Explain why thyroid hormone is sometimes called T4.
- 5) A patient was found to have chronically low calcium levels in the blood due to elevated calcitonin hormone. One explanation for the elevated calcitonin might be a calcitonin-producing tumor in the thyroid gland, the gland that makes the hormone.
 - a) If tests showed no tumor in the thyroid gland, name another gland that might have a tumor and explain how a tumor in that gland could cause elevated calcitonin.
 - b) If tests showed no tumor in the gland that you named in question (a), name yet another gland that might have a tumor and explain how a tumor in that gland could cause elevated calcitonin.
- 6) The hormones calcitonin and parathyroid hormone both help regulate calcium levels. Explain how calcitonin lowers blood calcium, and parathyroid hormone increases blood calcium.

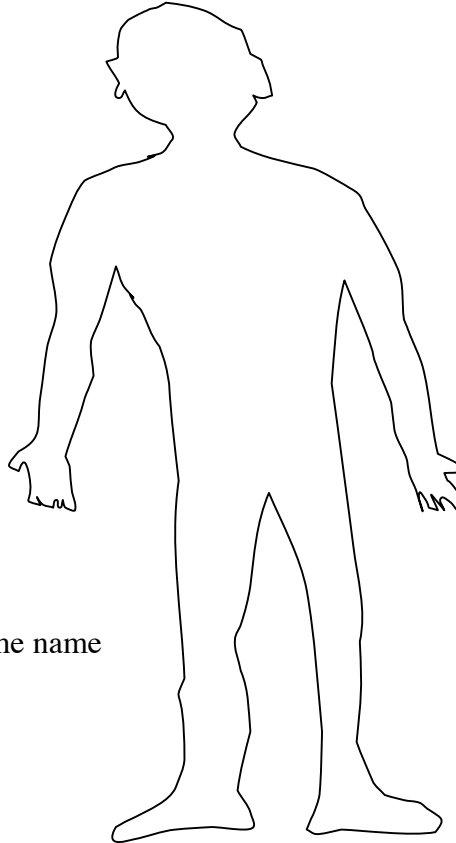
7) On the figure to the right...

a) Draw an X where the hormone that increases calcium is made. Label the name of that gland on the drawing.

b) Draw a + where the hormone that controls our basal metabolic rate is made. Label the name of that gland on the drawing.

c) Draw an O where many tropic hormones are made. Label the name of that gland on the drawing.

d) Draw a G where the glucocorticoid hormones are made. Label the name of those glands on the drawing.



8) A female patient has Cushing's syndrome because of a tumor in her adrenal cortex. The major symptoms are high blood sugar, slender legs but fat deposits on the face and neck, and a depressed immune system. This patient, however, also shows increased facial hair, increased musculature, and a deeper voice. Explain briefly how these last three symptoms are related to the tumor.

Answers to short answer questions:

1) The cells of the hormone's target organ have a receptor protein that specifically binds the hormone. This allows the target organ to respond to the hormone. The organs in the body that do not respond to the hormone do not have a receptor to bind the hormone.

2) Growth hormone causes growth of the bones by stimulating the epiphyseal plates (cartilage growth centers within the bones). The epiphyseal plates, however, become non-functional around the time of puberty, and therefore growth hormone (even excess amounts) cannot cause any bone growth after puberty.

3) Acromegaly is the disease caused by excess growth hormone after puberty. Although it does not cause any bone growth, the excess growth hormone stimulates growth of cartilage. In particular, there is growth of the cartilage in the jaw and fingers.

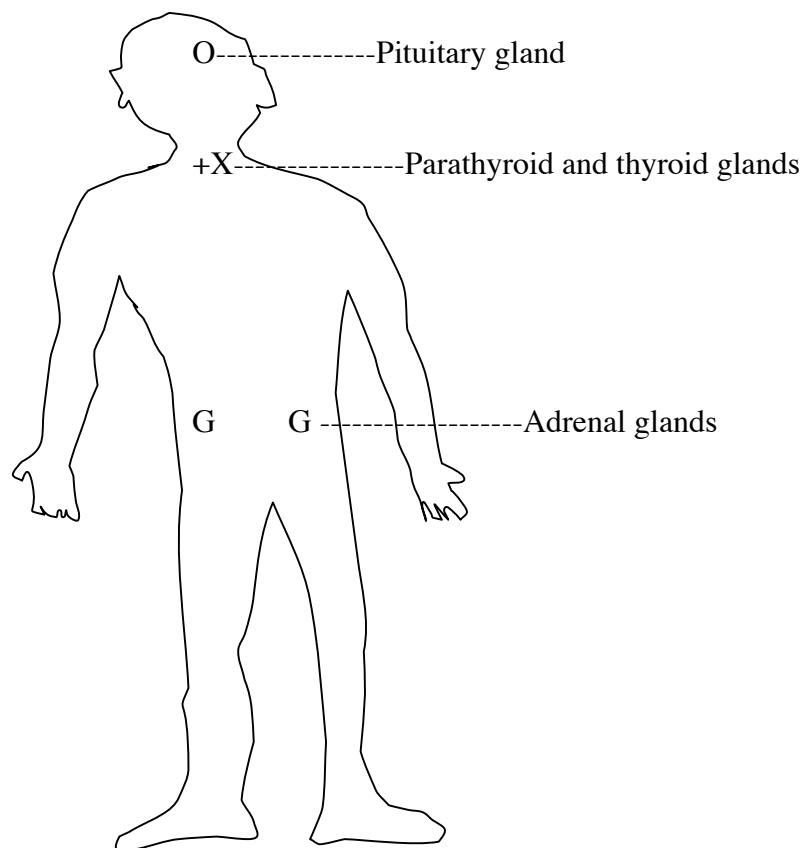
4) Thyroid hormone contains four iodine atoms as part of its molecular structure.

5) (a) The pituitary gland controls calcitonin release from the thyroid gland by way of tropic hormones. A tumor in the pituitary gland that overproduced the tropic hormone that controls calcitonin release could explain the patient's symptoms.

(b) The hypothalamus uses tropic hormones to control the amount of hormones released by the pituitary gland. A tropic-hormone releasing tumor in the hypothalamus could cause the pituitary to release too much of the pituitary's own tropic hormones, including the tropic hormone that stimulates the thyroid gland to release calcitonin.

6) Calcitonin lowers the levels of calcium in the blood by stimulating the activity of bone-building cells. Parathyroid hormone increases the levels of calcium in the blood by stimulating the activity of bone-dissolving cells.

7)



8) The testes make large amounts of testosterone, the male hormone, which causes the larger muscles, facial hair growth, and deeper voice that are characteristic of males. In both sexes, however, the adrenal gland produces small amounts of testosterone. This small amount of testosterone is normally not sufficient to cause male characteristics in females. A tumor in the adrenal gland, however, may cause excess secretion of all adrenal hormones (including testosterone) and therefore can cause masculine characteristics in a female patient.