**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) T4

 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

2 = D

3= C

4 = B

5 = D

6 = D

7 = D

8 = A

9 = C

10 = D

11 = D

12 = D

13 = B

14 = C

**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

44) Adrenal cortex

45) Adrenal gland

 Pituitary

 Hypothalamus

46) Pituitary

 Hypothalamus

47) Cushing’s syndrome

48) Immune

49) Medulla

 Epinephrine (adrenaline)

 Norepinephrine

50) Up

 Down

 Up

 Up

 0

51) Sympathetic

52) Melatonin

53) Decreases

 Light

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 giantism 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

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 gluco-

corticoid 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)

 O---------------Pituitary gland

+X----------------Parathyroid and thyroid glands

 G G -------------------Adrenal glands

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.