Chapter 22

The Nervous and Endocrine Systems Worksheets

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- Lesson 22.1: The Nervous System
- Lesson 22.2: The Endocrine System
22.1 The Nervous System

Lesson 22.1: True or False

Write true if the statement is true or false if the statement is false.

1. An action potential is necessary for a nerve impulse to occur.
2. Sensory neurons carry nerve impulses from the brain and spinal cord to muscles and glands.
3. The peripheral nervous system includes the brain and spinal cord.
4. The myelin sheath is similar to the plastic that encases an electrical cord.
5. The somatic nervous system controls the reactions necessary to write “true” or “false.”
6. The sensory division of the CNS includes the eyes, ears, mouth, nose, and skin.
7. The spinal cord is the most complex organ of the human body and the control center of the nervous system.
8. Taste buds on the tongue are actually found in taste receptor cells.
9. All psychoactive drugs are illegal.
10. Balance is due to an interaction between your hearing and vision receptors.
11. Neurotransmitters are molecules that cross the synapse.
12. The peripheral nervous system includes the sensory division and the motor division.
13. The cerebrum is the largest part of the brain.
14. The reason you can smell your food is because of the taste buds in your nose.
15. Dendrites extend from the cell body and send nerve impulses to other neurons.
Lesson 22.1: Critical Reading

Name___________________ Class________________________ Date___________

Read these passages from the text and answer the questions that follow.

Nerve Cells

Although the nervous system is very complex, nervous tissue consists of just two basic types of nerve cells: neurons and glial cells. **Neurons** are the structural and functional units of the nervous system. They transmit electrical signals, called **nerve impulses**. Glial cells provide support for neurons. For example, they provide neurons with nutrients and other materials.

Neuron Structure

As shown in the FlexBook, a neuron consists of three basic parts: the cell body, dendrites, and axon. You can watch an animation of the parts of a neuron at this link: [http://www.garyfisk.com/anim/neuronparts.swf](http://www.garyfisk.com/anim/neuronparts.swf).

- **The cell body** contains the nucleus and other cell organelles.
- **Dendrites** extend from the cell body and receive nerve impulses from other neurons.
- **The axon** is a long extension of the cell body that transmits nerve impulses to other cells. The axon branches at the end, forming axon terminals. These are the points where the neuron communicates with other cells.

Myelin Sheath

The axon of many neurons has an outer layer called a **myelin sheath**. Myelin is a lipid produced by a type of a glial cell known as a Schwann cell. The myelin sheath acts like a layer of insulation, similar to the plastic that encases an electrical cord. Regularly spaced nodes, or gaps, in the myelin sheath allow nerve impulses to skip along the axon very rapidly.

Types of Neurons

Neurons are classified based on the direction in which they carry nerve impulses.

- **Sensory neurons** carry nerve impulses from tissues and organs to the spinal cord and brain.
- **Motor neurons** carry nerve impulses from the brain and spinal cord to muscles and glands.
- **Interneurons** carry nerve impulses back and forth between sensory and motor neurons.

Questions

1. What is a neuron? What are glial cells?

2. What is the role of a dendrite and an axon?

3. What does the myelin sheath do?
4. Describe the three types of neurons.
Lesson 22.1: Multiple Choice

Name___________________ Class___________________ Date________

Circle the letter of the correct choice.

1. Neurons transmit electrical signals called
   (a) nerve signals.
   (b) nerve impulses.
   (c) nerve potential.
   (d) axon impulses.

2. The parts of a neuron include
   (a) the cell body.
   (b) one axon.
   (c) numerous dendrites.
   (d) all of the above.

3. What is an action potential?
   (a) An action potential is a sudden reversal of the electrical charge across the membrane of a resting neuron.
   (b) An action potential is a sudden reversal of the electrical charge across the membrane of an active neuron.
   (c) An action potential is a slow reversal of the electrical charge across the membrane of a resting neuron.
   (d) An action potential is a sudden reversal of the chemical charge across the membrane of a resting neuron.

4. At the synapse,
   (a) neurotransmitter molecules travel across the axon terminals and bind to receptors on the membrane of the other cell.
   (b) neurotransmitter molecules travel across the axon terminals and bind to vesicles on the membrane of the other cell.
   (c) neurotransmitter molecules travel across the synaptic cleft and bind to receptors on the membrane of the other cell.
   (d) neurotransmitter molecules travel across the synaptic cleft and bind to signal proteins on the membrane of the other cell.

5. The largest part of the human brain is the
   (a) cerebellum.
   (b) cerebrum.
   (c) frontal lobe.
   (d) brain stem.

6. Your somatic nervous system is responsible for
   (a) involuntary activities not under conscious control.
   (b) emergency situations.
   (c) the organs of your digestive system.
   (d) voluntary activities that are under conscious control.

7. Alzheimer’s disease most likely occurs when
   (a) nervous tissue degenerates.
(b) nervous tissue may become infected by microorganisms.
(c) there are problems with blood flow.
(d) there are brain or spinal cord injuries.

8. Your sense of balance is the responsibility of
   (a) your eyes.
   (b) your ears.
   (c) both your eyes and ears.
   (d) your sense of touch.

9. The peripheral nervous system consists of
   (a) all the nervous tissue that lies outside the central nervous system.
   (b) your brain and spinal cord.
   (c) all your neurons and axons.
   (d) all of the above.

10. The central nervous system consists of
    (a) all the nervous tissue that lies outside the central nervous system.
    (b) just your brain.
    (c) just your spinal cord.
    (d) your brain and spinal cord.
Lesson 22.1: Vocabulary I

Match the vocabulary word with the proper definition.

Definitions

1. electrical signal transmitted by the neurons
2. carry nerve impulses from the brain and spinal cord to muscles and glands
3. difference in electrical charge when a neuron is not actively transmitting a nerve impulse
4. the place where an axon terminal meets another cell
5. acts like a layer of insulation
6. carry nerve impulses from tissues and organs to the spinal cord and brain
7. consists of all the nervous tissue that lies outside the central nervous system
8. structural and functional unit of the nervous system
9. molecules that travel across the synaptic cleft and bind to receptors on the membrane of the other cell
10. carry nerve impulses back and forth between sensory and motor neurons
11. a sudden reversal of the electrical charge across the membrane of a resting neuron
12. includes the brain and spinal cord
13. a cable-like bundle of axons
14. part of the neuron that contains the nucleus and other cell organelles
15. extends from the cell body and receives nerve impulses from other neurons
16. a long extension of the cell body that transmits nerve impulses to other cells

Terms

a. action potential
b. axon
c. cell body
d. central nervous system
e. dendrite
f. interneuron
g. motor neuron
h. myelin sheath
i. nerve
j. nerve impulse
k. neuron
l. neurotransmitter
m. peripheral nervous system
n. resting potential
o. sensory neuron
p. synapse
Lesson 22.1: Vocabulary II

Fill in the blank with the appropriate term.

1. ______________ are the structural and functional units of the nervous system.
2. A nerve impulse travels down an axon membrane as an electrical ______________ potential.
3. Human senses include sight, hearing, balance, taste, smell, and ______________.
4. ______________ are chemicals that affect the body’s structure or function.
5. The ______________ are also responsible for the sense of balance.
6. Sensory nerves carry nerve impulses from ______________ to the central nervous system.
7. The______________ nervous system controls mainly voluntary activities that are under conscious control.
8. Neurons consist of a cell body, ______________, and axon.
9. A nerve is a cable-like bundle of ______________.
10. ______________ is use of a drug without the advice of a medical professional and for reasons not originally intended.
11. The ______________ is protected by the vertebrae.
12. The place where an axon terminal meets another cell is called a ______________.
13. ______________ drugs affect the central nervous system.
14. The central nervous includes the brain and ______________.
15. The ______________ is a long extension of the cell body that transmits nerve impulses to other cells.
An action potential can be referred to as a “wave of depolarization” down the axon. Explain what you think this means.
22.2 The Endocrine System

Lesson 22.2: True or False

Write true if the statement is true or false if the statement is false.

_____ 1. Steroid hormones can enter the nucleus and influence the expression of genes.

_____ 2. Hormones are chemical messengers.

_____ 3. A target cell is the type of cell that has an effect on hormones.

_____ 4. Non-steroid hormones bind to their receptors in the cytoplasm of the cell.

_____ 5. The pancreas is a large endocrine gland in the neck.

_____ 6. Hypersecretion by an endocrine gland is often caused by a tumor.

_____ 7. Most hormone feedback mechanisms involve positive feedback loops.

_____ 8. Milk production by a mother for her baby is positively regulated.

_____ 9. Type 2 diabetes cannot be treated by insulin injections.

_____ 10. The thyroid gland is often called the “master gland” of the endocrine system.

_____ 11. Secondary messengers affect cell processes inside the cell.

_____ 12. Negative feedback controls insulin secretion by the adrenal gland.

_____ 13. Negative feedback regulation occurs when a product feeds back to decrease its own production.

_____ 14. Endocrine hormones travel throughout the body in the blood.
Lesson 22.2: Critical Reading

Read these passages from the text and answer the questions that follow.

Hormone Regulation: Feedback Mechanisms

Hormones control many cell activities, so they are very important for homeostasis. But what controls the hormones themselves? Most hormones are regulated by feedback mechanisms. A feedback mechanism is a loop in which a product feeds back to control its own production. Most hormone feedback mechanisms involve negative feedback loops. Negative feedback keeps the concentration of a hormone within a narrow range.

Negative Feedback

Negative feedback occurs when a product feeds back to decrease its own production. This type of feedback brings things back to normal whenever they start to become too extreme. The thyroid gland is a good example of this type of regulation. It is controlled by the negative feedback loop shown in the FlexBook.

Here’s how thyroid regulation works. The hypothalamus secretes thyrotropin-releasing hormone, or TRH. TRH stimulates the pituitary gland to produce thyroid-stimulating hormone, or TSH. TSH, in turn, stimulates the thyroid gland to secrete its hormones. When the level of thyroid hormones is high enough, the hormones feed back to stop the hypothalamus from secreting TRH and the pituitary from secreting TSH. Without the stimulation of TSH, the thyroid gland stops secreting its hormones. Soon, the level of thyroid hormone starts to fall too low. What do you think happens next? Negative feedback also controls insulin secretion by the pancreas.

Positive Feedback

Positive feedback occurs when a product feeds back to increase its own production. This causes conditions to become increasingly extreme. An example of positive feedback is milk production by a mother for her baby. As the baby suckles, nerve messages from the nipple cause the pituitary gland to secrete prolactin. Prolactin, in turn, stimulates the mammary glands to produce milk, so the baby suckles more. This causes more prolactin to be secreted and more milk to be produced. This example is one of the few positive feedback mechanisms in the human body. What do you think would happen if milk production by the mammary glands was controlled by negative feedback instead?

Questions

1. What is a feedback mechanism?

2. What is negative feedback regulation? Give an example.

3. What is positive feedback regulation? Give an example.
4. How are most hormones regulated?

5. What do you think would happen if milk production by the mammary glands was controlled by negative feedback loop?
Lesson 22.2: Multiple Choice

Name___________________ Class____________________ Date________

Circle the letter of the correct choice.

1. Glands of the endocrine system include
   (a) the thyroid gland.
   (b) the pituitary gland.
   (c) the gonads.
   (d) all of the above.

2. Negative feedback regulation of hormones occurs
   (a) when a reactant feeds back to decrease its own production.
   (b) when a product feeds back to increase its own production.
   (c) when a product feeds back to decrease its own production.
   (d) when a reactant feeds back to increase its own production.

3. Which statement is true about the thyroid hormones? (1) They increase the rate of metabolism in cells throughout the body. (2) They control how quickly cells use energy. (3) They are not steroid hormones. (4) They are released by the parathyroid glands.
   (a) 1 only
   (b) 1 and 2
   (c) 1, 2, and 3
   (d) 1, 2, 3, and 4

4. Steroid hormones
   (a) can influence gene expression.
   (b) can diffuse across the plasma membrane.
   (c) are made of lipids.
   (d) all of the above

5. Milk production
   (a) is negatively regulated by prolactin.
   (b) is positively regulated by prolactin.
   (c) is positively regulated by milk-producing factor.
   (d) is an unregulated process in new mothers.

6. Thyrotropin-releasing hormone, or TRH,
   (a) is regulated through a negative feedback mechanism.
   (b) is regulated through a positive feedback mechanism.
   (c) is not regulated.
   (d) none of the above

7. The hormones released by the pancreas
   (a) are located near the thyroid gland.
   (b) include insulin and glucose.
   (c) work together to control the level of glucose in the blood.
   (d) all of the above

8. Which of the following statements is true concerning the hypothalamus? (1) The hypothalamus is actually part of the brain. (2) The hypothalamus can be considered a link between the nervous and endocrine systems. (3) The hypothalamus releases anti-diuretic hormone. (4) The hypothalamus produces hormones that directly regulate other body processes.
(a) 1 only
(b) 1 and 2
(c) 1, 2, and 3
(d) 1, 2, 3, and 4
Lesson 22.2: Vocabulary I

Name___________________ Class____________________ Date________

Match the vocabulary word with the proper definition.

Definitions

_____ 1. hormones that are made of lipids such as phospholipids and cholesterol
_____ 2. releases hormones that increase the rate of metabolism in cells throughout the body
_____ 3. releases hormones that helps keep the level of calcium in the blood within a narrow range
_____ 4. releases fight-or-flight hormones
_____ 5. releases hormones that work together to control the level of glucose in the blood
_____ 6. releases hormones that control sleep-wake cycles and several other processes
_____ 7. the type of cell on which a hormone has an effect
_____ 8. releases sex hormones
_____ 9. messenger molecules released by endocrine glands
_____ 10. a system of glands that release chemical messenger molecules
_____ 11. the master gland of the endocrine system
_____ 12. provides a link between the nervous and endocrine systems

Terms

a. adrenal glands
b. endocrine system
c. gonads
d. hormone
e. hypothalamus
f. pancreas
g. parathyroid glands
h. pineal gland
i. pituitary gland
j. steroid hormones
k. target cell
l. thyroid gland
Lesson 22.2: Vocabulary II

Name___________________ Class___________________ Date____________

Fill in the blank with the appropriate term.

1. Most hormones are controlled by a __________ feedback regulation mechanism.
2. Steroid hormone and their receptors form a complex that influences the expression of ____________.
3. Endocrine hormones travel throughout the body in the ____________.
4. Thyroid hormones increase the rate of ____________ in cells throughout the body.
5. Hormones of the pancreas include ____________ and glucagon.
6. ____________-stimulating hormone stimulates the ovaries to develop mature eggs.
7. The hypothalamus is actually part of the ____________, but it also secretes hormones.
8. Growth hormone stimulates body cells to synthesize proteins and ____________.
9. Most ____________ hormones control other endocrine glands.
10. Endocrine system disorders usually involve the secretion of too much or not enough ____________.
11. The endocrine system is a system of glands that release chemical ____________ molecules into the bloodstream.
12. A ____________ cell is the type of cell on which a hormone has an effect.
Lesson 22.2: Critical Writing

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how steroid hormones work.