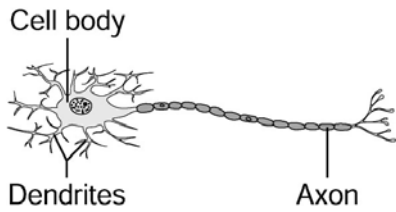
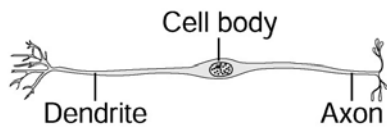


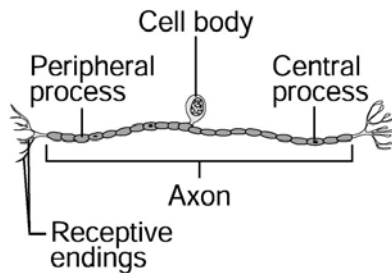
Matching Questions



A



B



C

Figure 11.1

Using Figure 11.1, match the following:

- 1) Which nerve would connect to a muscle?

Answer: A

Diff: 1 Page Ref: Tbl. 11.1

- 2) Which nerve would be found in the retina of the eye?

Answer: B

Diff: 1 Page Ref: Tbl. 11.1

- 3) Which neuron is a sensory neuron found in a reflex arc?

Answer: B

Diff: 1 Page Ref: Tbl. 11.1

- 4) Which neuron is never myelinated?

Answer: B

Diff: 1 Page Ref: Tbl. 11.1

- 5) Which neuron is rare?

Answer: B

Diff: 1 Page Ref: 395

6) In a reflex arc, which neuron has its cell body inside the spinal cord?

Answer: A

Diff: 1 Page Ref: 396; Tbl. 11.1

7) Which neuron is common only in dorsal root ganglia of the spinal cord and sensory ganglia of cranial nerves?

Answer: C

Diff: 1 Page Ref: 395

8) Which is by far the most common neuron type?

Answer: A

Diff: 1 Page Ref: 395

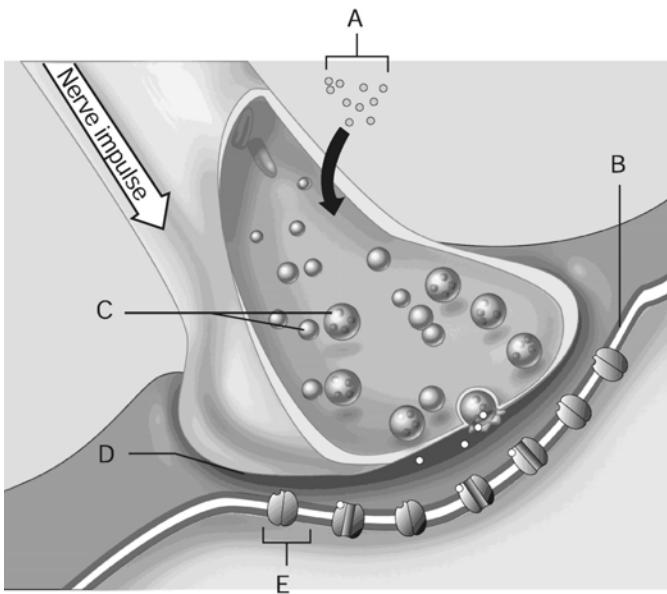


Figure 11.2

Using Figure 11.2, match the following:

9) Ion channel.

Answer: E

Diff: 1 Page Ref: 410; Fig. 11.18

10) Synaptic vesicles.

Answer: C

Diff: 1 Page Ref: 410; Fig. 11.18

11) Calcium ions.

Answer: A

Diff: 3 Page Ref: 410; Fig. 11.18

12) Postsynaptic membrane.

Answer: B

Diff: 1 Page Ref: 410; Fig. 11.18

13) Synaptic cleft.

Answer: D

Match the following:

14) Neurotransmitters are released at the _____.

Answer: D

Diff: 1 Page Ref: 409

A) Dendrites

B) Axon

C) Nissl bodies

D) Axon terminal

15) The rough ER of the cell.

Answer: C

Diff: 1 Page Ref: 391

16) Conducts impulses toward the nerve cell body.

Answer: A

Diff: 1 Page Ref: 393

17) Conducts impulses away from the nerve cell body.

Answer: B

Diff: 1 Page Ref: 393

Match the following:

18) Period during which the neuron cannot respond to a second stimulus, no matter how strong.

Answer: A

Diff: 1 Page Ref: 406

A) Absolute refractory period

B) Depolarization

C) Action potential

D) Repolarization

E) Relative refractory period

19) The interior of the cell becomes less negative due to an influx of sodium ions.

Answer: B

Diff: 1 Page Ref: 400-402

20) The specific period during which potassium ions diffuse out of the neuron due to a change in membrane permeability.

Answer: D

Diff: 1 Page Ref: 404

21) Called a nerve impulse when transmitted.

Answer: C

Diff: 1 Page Ref: 402

22) An exceptionally strong stimulus can trigger a response.

Answer: E

Diff: 1 Page Ref: 406

Match the following:

23) Numerous nerve impulses arriving at a synapse at closely timed intervals exert a cumulative effect.

Answer: B

Diff: 1 Page Ref: 412; Fig. 11.20

A) Threshold stimulus

B) Temporal summation

C) Subthreshold stimulus

24) Stimulation of a postsynaptic neuron by many terminals at the same time.

Answer: D

Diff: 1 Page Ref: 412; Fig. 11.20

D) Spatial summation

25) An insufficient stimulus.

Answer: C

Diff: 1 Page Ref: 405; Fig. 11.14

26) Any stimulus below this intensity will result in no response in a neuron.

Answer: A

Diff: 2 Page Ref: 405; Fig. 11.14

True/False Questions

- 1) The all-or-none phenomenon as applied to nerve conduction states that the whole nerve cell must be stimulated for conduction to take place.
Answer: FALSE
Diff: 1 Page Ref: 406
- 2) Reflexes are rapid, automatic responses to stimuli.
Answer: TRUE
Diff: 1 Page Ref: 423
- 3) Efferent nerve fibers may be described as motor nerve fibers.
Answer: TRUE
Diff: 1 Page Ref: 388
- 4) Saltatory conduction occurs because of the presence of salt (NaCl) around the neuron.
Answer: FALSE
Diff: 1 Page Ref: 407; Fig. 11.16
- 5) Cell bodies of sensory neurons are located in ganglia lying outside the central nervous system.
Answer: TRUE
Diff: 1 Page Ref: 395
- 6) Myelination of the nerve fibers in the central nervous system is the job of the oligodendrocyte.
Answer: TRUE
Diff: 1 Page Ref: 391
- 7) During depolarization, the inside of the neuron's membrane becomes *less* negative.
Answer: TRUE
Diff: 1 Page Ref: 400
- 8) Neurons in the CNS are organized into functional groups.
Answer: TRUE
Diff: 1 Page Ref: 395-421
- 9) Strong stimuli cause the amplitude of action potentials generated to increase.
Answer: FALSE
Diff: 1 Page Ref: 406
- 10) The oligodendrocytes can myelinate several axons.
Answer: TRUE
Diff: 1 Page Ref: 391
- 11) Enkephalins and endorphins are peptides that act like morphine.
Answer: TRUE
Diff: 1 Page Ref: 418
- 12) A synapse formed between the axon ending of one neuron and the cell body of another neuron is called an axosomatic synapse.
Answer: TRUE
Diff: 1 Page Ref: 408-409

- 13) In myelinated axons the voltage-gated sodium channels are concentrated at the nodes of Ranvier.
Answer: TRUE
Diff: 1 Page Ref: 394
- 14) Action potentials can be generated by virtually all cells of the body because all cells possess cell membranes.
Answer: FALSE
Diff: 1 Page Ref: 397
- 15) Voltage is always measured between two points and may be called the potential between these two points.
Answer: TRUE
Diff: 1 Page Ref: 397
- 16) Neurons that are far away from the center of the neuron pool and that are not easily excited by an incoming stimulus are in the discharge zone.
Answer: FALSE
Diff: 1 Page Ref: 421
- 17) Acetylcholine is not a biogenic amine.
Answer: TRUE
Diff: 1 Page Ref: 417-418
- 18) The two major classes of graded potentials are transmitter potentials and receptor potentials.
Answer: FALSE
Diff: 2 Page Ref: 401
- 19) A graded potential that is the result of a neurotransmitter released into the synapse between two neurons is called a postsynaptic potential.
Answer: TRUE
Diff: 2 Page Ref: 401
- 20) Large-diameter nerve fibers conduct impulses much faster than small-diameter fibers.
Answer: TRUE
Diff: 2 Page Ref: 407
- 21) The nodes of Ranvier are found only on myelinated, peripheral neural processes.
Answer: FALSE
Diff: 2 Page Ref: 394-395
- 22) Sensory neurons have long dendrites, while motor neurons have long axons.
Answer: TRUE
Diff: 2 Page Ref: 395-396
- 23) A stimulus traveling toward a synapse appears to open calcium channels at the presynaptic end, which in turn promotes fusion of synaptic vesicles to the axonal membrane.
Answer: TRUE
Diff: 3 Page Ref: 409-410
- 24) A positive feedback cycle is the main force in the generation of graded potentials at receptor ends.
Answer: FALSE
Diff: 3 Page Ref: 401
- 25) If bacteria invaded the CNS tissue, microglia would migrate to the area to engulf and destroy them.
Answer: TRUE
Diff: 3 Page Ref: 391

Multiple-Choice Questions

- 1) Direct-acting neurotransmitters _____.
- A) require cyclic AMP
 - B) mediate very slow responses
 - C) open ion channels to provoke rapid responses
 - D) act through second messengers

Answer: C

Diff: 1 Page Ref: 409

- 2) Which of the following is correct relative to Ohm's law?
- A) $I = R / V$
 - B) Current is directly proportional to the voltage.
 - C) $R = V + I$
 - D) The more intense the stimulus, the more voltage changes.

Answer: B

Diff: 1 Page Ref: 398

- 3) Ciliated CNS neuroglia that play an active role in moving the cerebrospinal fluid are called _____.
- A) ependymal cells
 - B) Schwann cells
 - C) oligodendrocytes
 - D) astrocytes

Answer: A

Diff: 1 Page Ref: 391

- 4) The sheath of Schwann is also called the _____.
- A) myelin sheath
 - B) axolemma
 - C) neurilemma
 - D) white matter

Answer: C

Diff: 1 Page Ref: 394

- 5) Bipolar neurons are commonly _____.
- A) motor neurons
 - B) called neuroglial cells
 - C) found in ganglia
 - D) found in the retina of the eye

Answer: D

Diff: 1 Page Ref: 395

- 6) An excitatory neurotransmitter secreted by motor neurons innervating skeletal muscle is _____.
- A) cholinesterase
 - B) norepinephrine
 - C) acetylcholine
 - D) gamma aminobutyric acid

Answer: C

Diff: 1 Page Ref: 415, 417

7) A neural circuit in which a single impulse is transmitted over and over is a _____.

- A) diverging circuit
- B) converging circuit
- C) reverberating circuit
- D) repetitive circuit

Answer: C

Diff: 1 Page Ref: 422

8) The period after an initial stimulus when a neuron is *not* sensitive to another stimulus is the _____.

- A) resting period
- B) repolarization
- C) depolarization
- D) refractory period

Answer: D

Diff: 1 Page Ref: 406

9) A neuronal circuit that concentrates or directs a large number of incoming impulses to a rather small number of neurons is called a(n) _____.

- A) diverging circuit
- B) oscillating circuit
- C) converging circuit
- D) parallel circuit

Answer: C

Diff: 1 Page Ref: 421-422

10) Which of the following is *not* a structural feature of a neuron?

- A) synaptic cleft
- B) Nissl bodies
- C) dendrites
- D) axon

Answer: A

Diff: 1 Page Ref: 391-393, 409

11) The part of a neuron that conducts impulses away from its cell body is called a(n) _____.

- A) axon
- B) dendrite
- C) neurolemma
- D) Schwann cell

Answer: A

Diff: 1 Page Ref: 393

12) The chemically gated channel, NMDA, allows _____ ions entry into the nerve cell.

- A) Na⁺
- B) K⁺
- C) Ca²⁺
- D) Cl⁻

Answer: C

Diff: 1 Page Ref: 412-413

- 13) The point at which an impulse from one nerve cell is communicated to another nerve cell is the _____.
- A) cell body
 - B) synapse
 - C) receptor
 - D) effector

Answer: B

Diff: 1 Page Ref: 409

- 14) The role of acetylcholinesterase is to _____.
- A) act as a transmitting agent
 - B) amplify or enhance the effect of ACh
 - C) destroy ACh a brief period after its release by the axonal endings
 - D) stimulate the production of serotonin

Answer: C

Diff: 1 Page Ref: 415, 417

- 15) Which of the following is *not* a function of the autonomic nervous system?
- A) innervation of smooth muscle of the digestive tract
 - B) innervation of cardiac muscle
 - C) innervation of glands
 - D) innervation of skeletal muscle

Answer: D

Diff: 1 Page Ref: 388

- 16) Collections of nerve cell bodies outside the central nervous system are called _____.
- A) nuclei
 - B) nerves
 - C) ganglia
 - D) tracts

Answer: C

Diff: 1 Page Ref: 392

- 17) The term *central nervous system* refers to the _____.
- A) autonomic nervous system
 - B) brain, spinal cord, and peripheral nerves
 - C) brain and spinal cord
 - D) spinal cord and spinal nerves

Answer: C

Diff: 1 Page Ref: 388

- 18) The substance released at axon terminals to propagate a nervous impulse is called a(n) _____.
- A) ion
 - B) cholinesterase
 - C) neurotransmitter
 - D) biogenic amine

Answer: C

Diff: 1 Page Ref: 409-410

19) A neuron that has as its primary function the job of connecting other neurons is called a(n) _____.

- A) efferent neuron
- B) afferent neuron
- C) association neuron
- D) glial cell

Answer: C

Diff: 2 Page Ref: 395-397

20) Saltatory conduction is made possible by _____.

- A) the myelin sheath
- B) large nerve fibers
- C) diphasic impulses
- D) erratic transmission of nerve impulses

Answer: A

Diff: 1 Page Ref: 407

21) Which of these ions is actively transported through the cell membrane to establish a resting potential?

- A) Na
- B) Cl
- C) Mg
- D) Ca

Answer: A

Diff: 1 Page Ref: 402

22) The part of the neuron that normally receives stimuli is called _____.

- A) an axon
- B) a dendrite
- C) a neurolemma
- D) a Schwann cell

Answer: B

Diff: 1 Page Ref: 393

23) Choose the statement that is most correct about membrane potential.

- A) Voltage is measured by placing two electrodes on the exterior of the axon.
- B) Voltage is measured by placing one electrode inside the membrane and another outside the membrane.
- C) Voltage is measured by placing one electrode on one end of the axon and another electrode on the other end.
- D) Voltage is measured by placing one electrode on the axon and grounding the other electrode.

Answer: B

Diff: 1 Page Ref: 399

24) The sodium-potassium pump _____.

- A) pumps three sodium ions outside the cell and two potassium ions inside
- B) pumps two sodium ions outside the cell and three potassium ions inside
- C) pumps three sodium ions inside the cell and two potassium ions outside
- D) pumps two sodium ions inside the cell and three potassium ions outside

Answer: A

Diff: 1 Page Ref: 399-400

- 25) An action potential _____.
- A) is essential for impulse propagation
 - B) involves the influx of negative ions to depolarize the membrane
 - C) is initiated by potassium ion movement
 - D) involves impulse propagation dependent on chemically gated ion channels

Answer: A

Diff: 1 Page Ref: 402

- 26) Select the correct statement about synapses.
- A) Cells with interconnected cytoplasm are chemically coupled.
 - B) The release of neurotransmitter molecules gives cells the property of being electrically coupled.
 - C) Neurotransmitter receptors are located on the axons of cells.
 - D) The synaptic cleft prevents an impulse from being transmitted directly from one neuron to another.

Answer: D

Diff: 1 Page Ref: 409

- 27) Which of the following is a good example of a neuromodulator?
- A) acetylcholine
 - B) any protein
 - C) any carbohydrate
 - D) a hormone

Answer: D

Diff: 1 Page Ref: 419

- 28) Which group of fibers spreads impulses at up to 1 meter per second?
- A) group A fibers
 - B) group B fibers
 - C) group C fibers
 - D) group D fibers

Answer: C

Diff: 1 Page Ref: 408

- 29) The sympathetic and parasympathetic are subdivisions of the _____.
- A) central nervous system
 - B) voluntary nervous system
 - C) autonomic nervous system
 - D) somatic nervous system

Answer: C

Diff: 1 Page Ref: 388-389

- 30) Ependymal cells _____.
- A) are a type of neuron
 - B) are a type of macrophage
 - C) are the most numerous of the neuroglia
 - D) help to circulate the cerebrospinal fluid

Answer: D

Diff: 1 Page Ref: 391

31) Neuroglia that control the chemical environment around neurons by buffering potassium and recapturing neurotransmitters are _____.

- A) astrocytes
- B) oligodendrocytes
- C) microglia
- D) Schwann cells

Answer: A

Diff: 1 Page Ref: 390

32) Schwann cells are functionally similar to _____.

- A) ependymal cells
- B) microglia
- C) oligodendrocytes
- D) astrocytes

Answer: C

Diff: 1 Page Ref: 391

33) Immediately after an action potential has peaked, which cellular gates open?

- A) sodium
- B) chloride
- C) calcium
- D) potassium

Answer: D

Diff: 1 Page Ref: 404

34) Nerve cell adhesion molecules (N-CAMs) _____.

- A) release nerve growth factor
- B) are found on "pathfinder" neurons
- C) are crucial in the production of neurotransmitters
- D) are crucial for the development of neural connections

Answer: D

Diff: 1 Page Ref: 423-424

35) An inhibitory postsynaptic potential (IPSP) is associated with _____.

- A) a change in sodium ion permeability
- B) hyperpolarization
- C) opening of voltage-gated channels
- D) lowering the threshold for an action potential to occur

Answer: B

Diff: 1 Page Ref: 412

36) Which of the following will occur when an excitatory postsynaptic potential (EPSP) is being generated on the dendritic membrane?

- A) Specific sodium gates will open.
- B) Specific potassium gates will open.
- C) Sodium gates will open first, then close as potassium gates open.
- D) A single type of channel will open, permitting simultaneous flow of sodium and potassium.

Answer: D

Diff: 1 Page Ref: 411

37) When a sensory neuron is excited by some form of energy, the resulting graded potential is called a(n)

- _____.
- A) postsynaptic potential
 - B) excitatory potential
 - C) action potential
 - D) generator potential

Answer: D

Diff: 2 Page Ref: 401

38) All of the following are true of graded potentials except that they _____.

- A) are short-lived
- B) can form on receptor endings
- C) increase amplitude as they move away from the stimulus point
- D) can be called postsynaptic potentials

Answer: C

Diff: 2 Page Ref: 401-402

39) Which of the following is true about the movement of ions across excitable living membranes?

- A) Ions always move actively across membranes through leakage channels.
- B) Some ions are prevented from moving down their concentration gradients by ATP-driven pumps.
- C) Sodium gates in the membrane can open in response to electrical potential changes.
- D) The bulk of the solutions inside a cell are negatively charged.

Answer: B

Diff: 2 Page Ref: 399-400

40) _____ is an indolamine.

- A) Dopamine
- B) Epinephrine
- C) Serotonin
- D) Tyrosine

Answer: C

Diff: 2 Page Ref: 415, 418

41) A second nerve impulse *cannot* be generated until _____.

- A) the membrane potential has been reestablished
- B) the Na ions have been pumped back into the cell
- C) proteins have been resynthesized
- D) all sodium gates are closed

Answer: A

Diff: 3 Page Ref: 402

42) In what way does the interior surface of a cell membrane of a resting (nonconducting) neuron differ from the external environment? The interior is _____.

- A) positively charged and contains less sodium
- B) negatively charged and contains less sodium
- C) negatively charged and contains more sodium
- D) positively charged and contains more sodium

Answer: B

Diff: 3 Page Ref: 399

- 43) If a motor neuron in the body were stimulated by an electrode placed about midpoint along the length of the axon _____.
- A) the impulse would move to the axon terminal only
 - B) muscle contraction would occur
 - C) the impulse would spread bidirectionally
 - D) the impulse would move to the axon terminal only, and the muscle contraction would occur

Answer: C

Diff: 3 Page Ref: 401

- 44) Neurons may be classified according to several characteristics. Which of the following is correct?
- A) Group A fibers are mostly somatic sensory and motor and are the smallest in diameter.
 - B) Group B fibers are highly myelinated and have the highest conduction velocities.
 - C) Group C fibers are not capable of saltatory conduction.
 - D) A small cross-sectional area allows shorter conduction times.

Answer: C

Diff: 3 Page Ref: 408

- 45) Select the correct statement about serial processing.
- A) Spinal reflexes are an example of serial processing.
 - B) Input travels along several different pathways.
 - C) Smells are processed by serial pathways.
 - D) Memories are triggered by serial processing.

Answer: A

Diff: 3 Page Ref: 422-423

Fill-in-the-Blank/Short Answer Questions

- 1) That part of the nervous system that is voluntary and conducts impulses from the CNS to the skeletal muscles is the _____ nervous system.

Answer: somatic

Diff: 1 Page Ref: 388

- 2) _____ are found in the CNS and act as the glue that binds axons and blood vessels to each other.

Answer: Astrocytes

Diff: 1 Page Ref: 390

- 3) The gap between Schwann cells in the peripheral system is called a(n) _____.

Answer: node of Ranvier

Diff: 1 Page Ref: 394

- 4) _____ law is the relationship between voltage, current, and resistance.

Answer: Ohm's

Diff: 1 Page Ref: 398

- 5) The most common synapse in embryonic nervous tissue is the _____.

Answer: electrical synapse

Diff: 1 Page Ref: 408-409

- 6) When information is delivered within the CNS simultaneously by different parts of the neural pathway, the process is called _____ processing.

Answer: parallel

Diff: 1 Page Ref: 423

- 7) _____ potentials are short-lived, local changes in membrane potential that can be either depolarized or hyperpolarized.
Answer: Graded
Diff: 2 Page Ref: 401
- 8) _____ is a disease that gradually destroys the myelin sheaths of neurons in the CNS, particularly in young adults.
Answer: Multiple sclerosis (MS)
Diff: 2 Page Ref: 407-408
- 9) When one or more presynaptic neurons fire in rapid order it produces a much greater depolarization of the postsynaptic membrane than would result from a single EPSP; this event is called _____ summation.
Answer: temporal
Diff: 2 Page Ref: 412
- 10) _____ is a neurotransmitter of the CNS that is used by Purkinje cells of the CNS.
Answer: GABA (gamma aminobutyric acid)
Diff: 2 Page Ref: 418
- 11) Define neurotransmitter. Name two amino acid neurotransmitters, two catecholamines, and two peptides.
Answer: Neurotransmitters are chemical signals used as a means of communication. GABA and glycine are amino acid neurotransmitters; dopamine and norepinephrine are catecholamines; and endorphin and enkephalin are peptide transmitters.
Diff: 3 Page Ref: 413-419
- 12) What function is served by the increased axon diameter at the nodes of Ranvier?
Answer: Increased diameter results in increased surface area on the membrane for sodium channels. This results in increased speed of impulse propagation.
Diff: 2 Page Ref: 407
- 13) Imagine a neuron that has several hundred axonal knobs impinging on it. The majority of these axonal knobs are shown to be "firing." However, the neuron in question does *not* transmit an impulse. Give a valid explanation of why this could occur.
Answer: Both excitatory and inhibitory potentials impinge on neurons. Inhibitory postsynaptic potentials (IPSPs) are "firing," but due to the neurotransmitter released and its action, the postsynaptic neuron is inhibited from "firing" (hyperpolarized).
Diff: 3 Page Ref: 411-412
- 14) Why does a hyperpolarization phase generally follow a repolarization phase in an action potential?
Answer: Immediately after an action potential the potassium gates, being slow gates which do not respond to change in the electrical charge, allow additional K⁺ ions to flood into the cell. These K⁺ ions decrease the positive ion concentration momentarily below the normal -70mV and thus hyperpolarize the cell.
Diff: 3 Page Ref: 402, 404
- 15) What are the basic divisions of the peripheral nervous system?
Answer: Sensory and motor divisions. Motor has two divisions: the somatic and autonomic. The autonomic has two divisions: the sympathetic and parasympathetic.
Diff: 1 Page Ref: 388-389

- 16) Since all action potentials are alike, how does the brain separate situations that require immediate attention from ordinary "positional" reports?
Answer: The importance of a stimulus is derived from the number of stimuli received from the same source. The frequency of impulse transmission indicates the stimulus intensity and the brain responds appropriately.
Diff: 1 Page Ref: 405-406
- 17) How can a single axon respond to several different kinds of events?
Answer: Some axon terminals contain more than one kind of neurotransmitter. Therefore, the axon can release one or more neurotransmitters simultaneously, creating singular or multiple events.
Diff: 1 Page Ref: 413-414
- 18) ATP neurotransmitters have what basic effect on the body?
Answer: They provoke a sensation of pain.
Diff: 1 Page Ref: 416; Tbl. 11.3
- 19) How can potentially poisonous gasses like NO and CO be used by the body?
Answer: These gasses are neurotransmitters that act indirectly. Similar to hormones, NO and CO promote longer-lasting effects by acting through intracellular second-messenger molecules.
Diff: 3 Page Ref: 419

Clinical Questions

- 1) Multiple sclerosis (MS) is a disease in which the myelin sheaths are destroyed. What process does this interfere with and what would be the consequence?
Answer: Demyelination interferes with saltatory conduction, which would result in a slowing down of nerve impulse propagation.
Diff: 2 Page Ref: 407-408
- 2) A client is admitted to the hospital with exacerbation of multiple sclerosis (MS). She asks the nurse, "Why did this have to happen to me again? I was doing so well." Explain why some forms of MS are characterized by periods of remission and exacerbation.
Answer: Even though someone is diagnosed with MS, the axons are not damaged and growing numbers of sodium channels appear spontaneously in the demyelinated fibers. This may account for the cycles of relapse and remission in different patients.
Diff: 2 Page Ref: 407-408
- 3) A client was admitted for depression. What should the nurse explain to the client regarding the role of serotonin and depression?
Answer: Serotonin is a biogenic amine neurotransmitter widely distributed in the brain, where it plays a role in emotional behavior and helps to regulate the biological clock.
Diff: 3 Page Ref: 415, 418
- 4) What symptoms would a nurse focus on in his or her care of a client with multiple sclerosis?
Answer: Incontinence, visual disturbances, and weakness
Diff: 3 Page Ref: 407-408

