Physiology Test bank

Guyton & BRS

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Motor system -Motor Functions of the Spinal Cord-

1. In which type of neuron does the axon form synaptic junctions with the skeletal muscle cells (extrafusal fibers) that comprise the major part of a muscle?

A) Alpha motor neuron
B) Pyramidal neuron
C) Gamma motor neuron D) Granule cell
E) Purkinje cell

Answer: A

2. A 17-year-old boy sustains serious head and neck trauma during a football game. Physical examination shows a positive Babinski sign. What part of the brain has most likely been damaged in this boy?

A) Anterior motor neurons
B) Cerebellum
C) Corticospinal tract
D) Premotor cortex

Answer: A

3. Which of the following is best described as an elongated, encapsulated receptor found in the dermal pegs of glabrous skin that is especially abundant on lips and fingertips?

A) Merkel disc
B) Free nerve endings
C) Meissner corpuscle
D) Ruffini endings

Answer: C

4. As the axons of motor neurons leave the spinal cord and course peripherally to skeletal muscle, they must pass through which structure?

A) Posterior column
B) Posterior root
C) Ventral white commissure
D) Posterior horn
E) Anterior root

Answer: E

5. In which type of neuron does the axon form synaptic junctions with skeletal muscle cells (intrafusal fibers) within the muscle spindles?

A) Alpha motor neuron
B) Pyramidal neuron
C) Gamma motor neuron
D) Granule cell
E) Purkinje cell

Answer: C

A 29-year-old man steps on a broken bottle with his bare right foot. His right leg immediately lifts while his left leg extends before he can consciously react to the pain. Use this information to answer Questions 6 and 7.

6. This action is attributable to which reflex?

A) Stretch reflex
B) Patellar tendon reflex
C) Golgi tendon reflex
D) Flexor withdrawal reflex

Answer: D

7. Which of the following best describes the type of reflex arc and sensory receptor for this reflex?

Reflex Arc	Sensory Receptor
A) Disynaptic	Pacinian corpuscle
B) Disynaptic	Nociceptor
C) Monosynaptic	Pacinian corpuscle
D) Monosynaptic	Golgi tendon organ
E) Polysynaptic	Nociceptor
F) Polysynaptic	Muscle spindle

Answer: E

8. In a muscle spindle receptor, which type of muscle fiber is responsible for the dynamic response?

A) Extrafusal muscle fiber
B) Static nuclear bag fiber
C) Nuclear chain fiber
D) Dynamic nuclear bag fiber
E) Smooth muscle fiber

Answer: D

9. Which cells receive direct synaptic input from Golgi tendon organs?

A) Type Ia inhibitory interneurons
B) Dynamic gamma motor neurons
C) Alpha motor neurons
D) Type Ib inhibitory interneurons
E) Type II excitatory interneurons

Answer: D

10. In the patellar tendon reflex, which of the following items will synapse directly on alpha motor neurons that innervate the muscle being stretched?

A) Ia sensory fiber
B) Ib sensory fiber
C) Excitatory interneurons
D) Gamma motor neurons
E) Inhibitory interneurons

Answer: A

11. The withdrawal reflex is initiated by stimulation delivered to which receptor?

A) Muscle spindle
B) Joint capsule receptor
C) Cutaneous free nerve ending
D) Golgi tendon organ
E) Pacinian corpuscle

Answer: C

12. Which of the following reflexes best describes incoming pain signals that elicit movements performed by antagonistic muscle groups on either side of the body?

A) Crossed extensor reflex
B) Withdrawal reflex
C) Reciprocal inhibition
D) Autogenic inhibition

Answer: A

13. Which reflex is correctly paired with the sensory structure that mediates the reflex?

A) Autogenic inhibition—muscle spindle
B) Reciprocal inhibition—Golgi tendon organ
C) Reciprocal inhibition—Pacinian corpuscle
D) Stretch reflex—muscle spindle
E) Golgi tendon reflex—Meissner corpuscle

Answer: D

14. A 10-year-old boy jumps off the porch and lands on the balls of his feet. The increase in muscle tension causes a sudden, complete relaxation of the affected muscles. Which sensory receptor is most likely to mediate this relaxation of muscles when tension is increased?

A) Free nerve ending
B) Golgi tendon organ
C) Krause corpuscle
D) Muscle spindle
E) Pacinian corpuscle

Answer: B

15. The withdrawal reflex is initiated by stimulation delivered to which receptor?

A) Muscle spindle
B) Joint capsule receptor
C) Cutaneous free nerve ending
D) Golgi tendon organ
E) Pacinian corpuscle

Answer: C

16. Which reflex is responsible for polysynaptic excitation of contralateral extensors?

A) Stretch reflex
B) Golgi tendon reflex
C) Flexor withdrawal reflex
D) Subliminal occlusion reflex

Answer: C

17. Which of the following is a characteristic of nuclear bag fibers?

A) They are one type of extrafusal muscle fiber
B) They detect dynamic changes in muscle length
C) They give rise to group Ib afferents
D) They are innervated by α-motoneurons

Answer: B

Somatic sensation & Pain

1. Pain receptors in the skin are typically classified as which of the following?

A) Encapsulated nerve endings
B) A single class of morphologically specialized receptors
C) The same type of receptor that detects position sense
D) Free nerve endings

Answer: D

2. Which of the following best describes an expanded tip tactile receptor found in the dermis of hairy skin that is specialized to detect continuously applied touch sensation?

A) Free nerve endings
B) Merkel disc
C) Pacinian corpuscle
D) Ruffini endings

Answer: B

3. Which of the following is best described as an elongated, encapsulated receptor found in the dermal pegs of glabrous skin that is especially abundant on lips and fingertips?

A) Merkel disc
B) Free nerve endings
C) Meissner corpuscle
D) Ruffini endings

Answer: C

4. Which of the following best describes the concept of specificity in sensory nerve fibers that transmit only one modality of sensation?

A) Frequency coding principle
B) Concept of specific nerve energy
C) Singularity principle
D) Labeled line principle

Answer: D

5. Which of the following is an encapsulated receptor found deep in the skin throughout the body, as well as in fascial layers, where it detects indentation of the skin (pressure) and movement across the surface (vibration)?

A) Pacinian corpuscle
B) Meissner's corpuscle
C) Free nerve endings
D) Ruffini endings

Answer: A

6. Which substance enhances the sensitivity of pain receptors but does not directly excite them?

A) Bradykinin
B) Serotonin
C) Potassium ions
D) Prostaglandins

Answer: D

7. Which of the following is an important functional parameter of pain receptors?

A) Exhibit little or no adaptation
B) Not affected by muscle tension
C) Signal only flexion at joint capsules
D) Can voluntarily be inhibited

Answer: A

8. The excitatory or inhibitory action of a neurotransmitter is determined by which of the following?

A) The function of its postsynaptic receptor
B) Its molecular composition
C) The shape of the synaptic vesicle in which it is contained
D) The distance between the pre- and postsynaptic membranes

Answer: A

9. Which of the following best describes the concept of specificity in sensory nerve fibers that transmit only one modality of sensation?

A) Frequency coding principle
B) Concept of specific nerve energy
C) Singularity principle
D) Labeled line principle

Answer: D

10. Which system transmits somatosensory information with the highest degree of temporal and spatial fidelity?

A) Anterolateral system
B) Dorsal column–medial lemniscal system
C) Corticospinal system
D) Spinocerebellar system

Answer: B

11. Sensory receptor potentials:

A) are action potentials
B) always bring the membrane potential of a receptor cell toward threshold

C) always bring the membrane potential of a receptor cell away from threshold
D) are graded in size, depending on stimulus intensity
E) are all or none

Answer: D

12. Like other sensory systems, the somatosensory system has a descending component that functions to regulate the overall sensitivity of the system. Which of the following selections best describes the function of the corticofugal signals transmitted from the somatosensory cortex downward to the thalamus and dorsal column nuclei?

A) Increase or decrease the perception of signal intensity
B) Decrease the ability to detect body position sense
C) Remove the thalamus from the processing of somatosensory signals
D) Allow ascending information to bypass the nucleus cuneatus and gracilis

Answer: A

13. Interneurons that utilize the neurotransmitter enkephalin to inhibit afferent pain signals are most likely to be found in which region of the central nervous system?

A) Dorsal horn of spinal cord
B) Postcentral gyrus
C) Precentral gyrus
D) δ-type A
E) Type C fiber
F) Ventral horn of spinal cord

Answer: A

14. The pathway of which system crosses in the ventral white commissure of the spinal cord within a few segments of entry and then courses to the thalamus contralateral to the side of the body from which the signal originated?

A) Anterolateral system
B) Dorsal column–medial lemniscal system
C) Corticospinal system
D) Spinocerebellar system

Answer: A

15. Which system conveys information concerning highly localized touch sensation and body position (proprioceptive) sensation?

A) Anterolateral
B) Dorsal column–medial lemniscal
C) Corticospinal
D) Spinocerebellar

Answer: B

16. The first-order (primary afferent) cell bodies of the dorsal column–medial lemniscal system are found in which structure?

A) Spinal cord dorsal horn
B) Spinal cord ventral horn
C) Dorsal root ganglia
D) Nucleus cuneatus

Answer: C

17. Stimulation of which brain area can modulate the sensation of pain?

A) Superior olivary complex
B) Locus ceruleus
C) Periaqueductal gray area
D) Amygdala

Answer: C

18. Which structure carries axons from the nucleus gracilis to the thalamus?

A) Fasciculus gracilis
B) Fasciculus lemniscus
C) Lateral spinothalamic tract
D) Medial lemniscus

Answer: D

19. Which body part is represented superiorly and medially within the postcentral gyrus?

A) Upper limb
B) Lower limb
C) Abdomen
D) Genitalia

Answer: B

20. A 10-year-old boy cuts his finger with a pocketknife and immediately applies pressure to the damaged area with his other hand to partially alleviate the pain. Inhibition of pain signals by tactile stimulation of the skin is mediated by which type of afferent neurons from mechanoreceptors?

A) α-type A
B) β-type A
C) δ-type A
D) Type C

Answer: B

21. Which of the following is a group of neurons in the pain suppression pathway that uses enkephalin as a neurotransmitter?

A) Postcentral gyrus
B) Nucleus raphe magnus
C) Periaqueductal gray area
D) Type AB sensory fibers
Answer: C

22. Which structure carries axons from neurons in the ventral posterolateral nucleus of the thalamus to the primary somatosensory cortex?
A) Medial lemniscus
B) External capsule
C) Internal capsule
D) Extreme capsule
Answer: C

23. The highest degree of pain localization comes from which of the following?
A) Simultaneous stimulation of free nerve endings and tactile fibers
B) Stimulation of free nerve endings by bradykinin
C) Nerve fibers traveling to the thalamus by way of the paleospinothalamic tract
D) Stimulation of δ-type A fibers
Answer: A

24. Which of the following is the basis for referred pain?
A) Visceral pain signals and pain signals from the skin synapse with separate populations of neurons in the dorsal horn
B) Visceral pain transmission and pain transmission from the skin are received by a common set of neurons in the thalamus
C) Visceral pain signals are rarely of sufficient magnitude to exceed the threshold of activation of dorsal horn neurons
D) Some visceral pain signals and pain signals from the skin provide convergent input to a common set of neurons in the dorsal horn
Answer: D

25. Within the primary somatosensory cortex, the various parts of the contralateral body surface are represented in areas of varying size that reflect which of the following?
A) The relative size of the body parts
B) The density of the specialized peripheral receptors
C) The size of the muscles in that body part
D) The conduction velocity of the primary afferent fibers
Answer: B

26. Stimulation by touching or pulling on which structure is least likely to cause a painful sensation?

A) The postcentral gyrus
B) The dura overlying the postcentral gyrus
C) Branches of the middle meningeal artery that lie superficial to the dura over the postcentral gyrus
D) Branches of the middle cerebral artery that supply the postcentral gyrus

Answer: A

27. Which statement concerning visceral pain signals is correct?

A) They are transmitted along sensory fibers that course mainly with sympathetic nerves in the abdomen and thorax
B) They are not stimulated by ischemia in visceral organs
C) They are transmitted only by the lightly myelinated δ-type A sensory fibers
D) They are typically well localized

Answer: A

29. Pain from the stomach is referred to which area of the body?

A) Upper right shoulder area
B) Abdominal area above the umbilicus
C) Proximal area of the anterior and inner thigh
D) Abdominal area below the umbilicus

Answer: B

30. Vibratory sensation depends on the detection of rapidly changing, repetitive sensations. The high-frequency end of the repetitive stimulation scale is detected by which structure?

A) Merkel discs
B) Meissner corpuscles
C) Pacinian corpuscles
D) Free nerve endings

Answer: C

31. The ability to detect two points simultaneously applied to the skin is based on which physiologic mechanism?

A) Presynaptic inhibition
B) Lateral inhibition
C) Medial inhibition
D) Feed-forward inhibition

Answer: B

32. Position sense, or more commonly proprioceptive sensation, involves muscle spindles and which of the following?

A) Skin tactile receptors
B) Deep receptors in joint capsules
C) Both tactile and joint capsule receptors
D) Pacinian corpuscles

Answer: C

33. Which statement concerning sensory neurons or their functional properties is true?

A) All sensory fibers are unmyelinated
B) In spatial summation, increasing signal strength is transmitted by using progressively greater numbers of sensory fibers
C) Increased stimulus intensity is signaled by a progressive decrease in the receptor potential
D) Continuous subthreshold stimulation of a pool of sensory neurons results in disfacilitation of those neurons

Answer: B

34. For a sensory nerve fiber that is connected to a Pacinian corpuscle located on palmar surface of the right hand, the synaptic connection with the subsequent neuron in the corresponding sensory pathway is located in

A) The right dorsal column nucleus
B) The left dorsal column nucleus
C) The dorsal horn of the right side of the spinal cord
D) The dorsal horn of the left side of the spinal cord

Answer: A

35. Which statement accurately describes a feature of temperature sensation by the nervous system?

A) Cold receptors continue to be activated even if skin temperature is lowered well below its freezing point
B) Both cold and warm receptors each have very specific, nonoverlapping ranges of temperature sensitivity
C) Warm and cold receptors respond to both steady state temperatures and to changes in temperature
D) Temperature receptor function is the result of ion conduction changes and not changes in their metabolic rate

Answer: C

36. The sensation of temperature is signaled mainly by warm and cold receptors whose sensory fibers travel in association with the sensory fibers carrying pain signals. Which statement best characterizes the transmission of signals from warm receptors?

A) Warm receptors are well-characterized histologically

B) Signals from warm receptors are mainly transmitted along slow-conducting type C sensory fibers

C) Warm receptors are located well below the surface of the skin in the subcutaneous connective tissue

D) There are 3 to 10 times more warm receptors than cold receptors in most areas of the body

Answer: B

Olfaction and Gustation

1. Which taste sensation is the most sensitive (i.e., has the lowest stimulation threshold)?

A) Acid
B) Bitter
C) Salty
D) Sour
E) Sweet

Answer: B

2. Which substance will elicit the sensation of bitter taste?

A) Aldehydes
B) Alkaloids
C) Amino acids
D) Hydrogen ions
E) Ketones

Answer: B

3. Which substance is responsible for the umami taste sensation?

A) Acetic acid
B) Potassium tartrate
C) Long-chained organic substances containing nitrogen
D) Fructose
E) Glutamate

Answer: E

4. Olfactory receptor cells belong to which group of cells?

A) Bipolar neurons
B) Fibroblasts
C) Modified epithelial cells
D) Multipolar neurons
E) Pseudounipolar neurons

Answer: A

5. A lesion of the chorda tympani nerve would most likely result in:

A) impaired olfactory function
B) impaired vestibular function
C) impaired auditory function
D) impaired taste function
E) nerve deafness

Answer: D

6. Which sensory system has the smallest range of intensity discrimination?

A) Auditory
B) Gustatory
C) Olfactory
D) Somatosensory
E) Visual

Answer: C

7. After olfactory receptor cells bind odor molecules, a sequence of intracellular events occurs that culminates in the entrance of specific ions that depolarize the olfactory receptor cell. Which ions are involved?

A) Calcium
B) Chloride
C) Hydrogen
D) Potassium
E) Sodium

Answer: E

8. Olfactory information transmitted to the orbitofrontal cortex passes through which thalamic nucleus?

A) Dorsomedial
B) Lateral geniculate
C) Medial geniculate
D) Ventral posterolateral
E) Ventral posteromedial

Answer: A

9. Which type of papillae is located in the posterior part of the tongue?

A) Circumvallate
B) Foliate
C) Fungiform
D) Fungiform and circumvallate
E) Papilla of Vater

Answer: A

10. The first central synapse for neurons transmitting the sweet taste sensation is in which structure?

A) Dorsal sensory nucleus of vagus nerve
B) Nucleus of solitary tract
C) Nucleus of olfactory nerve
D) Nucleus of hypoglossal nerve

Answer: B

11. Which type of papillae is located in the folds along the lateral surfaces of the tongue?

A) Circumvallate
B) Foliate
C) Fungiform
D) Fungiform and circumvallate
E) Papilla of Vater

Answer: B

Audition

1. Which of the following is the middle ear ossicle that is attached to the tympanic membrane?

A) Columella
B) Incus
C) Malleus
D) Modiolus
E) Stapes.

Answer: C

2. Which compartment of the cochlea contains the organ of Corti?

A) Ampulla
B) Saccule
C) Scala media
D) Scala tympani
E) Scala vestibuli

Answer: C

3. Which of the following best describes when the transmission of sound waves in the cochlea occurs?

A) When the foot of the stapes moves inward against the oval window and the round window bulges outward
B) When the foot of the stapes moves inward against the round window and the oval window bulges outward
C) When the head of the malleus moves inward against the oval window and the round window bulges outward
D) When the incus moves inward against the oval window and the round window bulges outward
E) When the incus moves inward against the round window and the oval window bulges outward

Answer: A

4. A 20-year-old soldier sustains a noise-induced hearing loss over a period of 6 months from multiple exposures to loud sounds, Loss of which structure is most likely to contribute to the hearing deficit?

A) Cochlea
B) Inner hair cells
C) Organ of Corti
D) Scala media
E) Scala vestibuli

Answer: B
The inner hair cells are the actual sensory receptors of the organ of Corti, if damaged will not grow back

5. Which molecules move from the endolymph into the stereocilia and depolarize the hair cell?
A) Calcium ions
B) Chloride ions
C) Hydrogen ions
D) Potassium ions
E) Sodium ions
Answer: D

6. The stereocilia of hair cells are embedded in which membrane?
A) Basilar
B) Reissner's
C) Tectorial
D) Tympanic
E) Vestibular
Answer: C

7. In the central auditory pathway, which option represents the correct sequence of structures in the pathway?
A) Cochlear nuclei–superior olive–inferior colliculus via the lateral lemniscus–medial geniculate–auditory cortex
B) Cochlear nuclei–inferior olive–inferior colliculus via the medial lemniscus–medial geniculate–auditory cortex
C) Cochlear nuclei–superior olive–superior colliculus via the lateral lemniscus–lateral geniculate–auditory cortex
D) Cochlear nuclei–inferior olive–inferior colliculus via the lateral lemniscus–lateral geniculate–auditory cortex
E) Cochlear nuclei–trapezoid body–dorsal acoustic stria–inferior colliculus via the lateral lemniscus– medial geniculate–auditory cortex
Answer: A

8. Which statement regarding the transmission of auditory information from the ear to the cerebral cortex is correct?
A) Inferior colliculus neurons synapse in the cochlear nuclei of the brain stem
B) Neurons with cell bodies in the spiral ganglion of Corti synapse in the inferior colliculus
C) The majority of neurons from the cochlear nuclei synapse in the contralateral superior olivary nucleus

D) There is no crossing over of information between the right and left auditory pathways in the brain stem
E) Trapezoid neurons synapse in the cochlear nuclei of the brain stem

Answer: C

9. Which event prompts the auditory system to interpret a sound as loud?

A) A decreased number of inner hair cells become stimulated
B) A decreased number of outer hair cells become stimulated
C) Hair cells excite nerve endings at a diminished rate
D) The amplitude of vibration of the basilar membrane decreases
E) The amplitude of vibration of the basilar membrane increases

Answer: E

10. Auditory information is relayed through which thalamic nucleus?

A) Dorsomedial
B) Lateral geniculate
C) Medial geniculate
D) Ventral posterolateral
E) Ventral posteromedial

Answer: C

11. The primary auditory cortex lies primarily in which lobe of the cerebral cortex?

A) Frontal
B) Limbic
C) Occipital
D) Parietal
E) Temporal

Answer: E

12. Which brain stem structure plays a major role in determining the direction from which a sound originates?

A) Cochlear nucleus
B) Inferior colliculus
C) Lateral lemniscus
D) Superior olivary nucleus
E) Trapezoid

Answer: D

Vision

1. A 10-year-old boy looks at ants through a magnifying glass. He finds that the ants must be 10 centimeters from the convex lens to be in focus. Which value best describes the refractive power of the lens (in diopters)?

A) 0.1
B) 1.0
C) 10
D) 100
E) 1000

Answer: C

Which of the following best describes the "blind spot" of the eye?

A) Located 5 degrees lateral to the central point of vision
B) The exit point of the optic nerve
C) Contains only rods and thus has monochromatic vision
D) Contains no blood vessels
E) The area where chromatic aberration of the lens is the greatest

Answer: B

3. An 85-year-old woman visits the ophthalmologist because of difficulty seeing. The patient is given an eye examination, and bifocal lenses are prescribed. The physician notes that the lenses of her eyes are clear. The woman sees well with her new prescription glasses. Which of the following best describes the most likely vision problem in this woman?

A) Cataracts
B) Glaucoma
C) Hyperopia
D) Myopia
E) Presbyopia

Answer: E

A person with presbyopia cannot accommodate for near and far vision, which means that the lenses of the eyes have lost their elasticity and thus cannot change their focal point.

4. Light entering the eye passes through which retinal layer first?

A) Inner nuclear layer
B) Outer nuclear layer
C) Outer plexiform layer
D) Photoreceptor layer
E) Retinal ganglion layer

Answer: E

- Light passes through the eye to the retina in the posterior portion of the eye

5. Ganglion cells attached to photoreceptors located on the temporal portion of the retina project to which structure?

A) Contralateral lateral geniculate nucleus
B) Ipsilateral lateral geniculate nucleus
C) Ipsilateral medial geniculate nucleus
D) Calcarine fissure
E) Contralateral medial geniculate nucleus

6. When parallel light rays pass through a concave lens, which of the following will occur?

A) The rays converge toward each other
B) The rays diverge away from each other
C) The rays maintain a parallel relationship
D) The rays reflect back in the direction from where they came
E) The rays refract to one focal point

Answer: B

A concave lens diverges light rays; in contrast, a convex lens will converge light rays toward each other

7. Which molecules combine to form rhodopsin?

A) Bathorhodopsin and 11-cis-retinal
B) Bathorhodopsin and all-trans-retinal
C) Bathorhodopsin and scotopsin
D) Scotopsin and 11-cis-retinal
E) Scotopsin and all-trans-retinal

Answer: D

8. Analysis of visual detail occurs in which secondary visual area?

A) Brodmann's area 18
B) Inferior ventral and medial regions of the occipital and temporal cortex
C) Frontal lobe
D) Occipitoparietal cortex
E) Posterior midtemporal area

Answer: B

A 23-year-old student is trapped in an elevator with no light. Twenty minutes later the student finds an emergency light and turns it on. Use this information to answer Questions 9–11.

9. Which substance is most likely to increase in the rods of the retina when the light is turned on?

A) Cyclic adenosine monophosphate (cAMP)
B) Cyclic guanosine monophosphate (cGMP)
C) Metarhodopsin II
D) Rhodopsin
E) Vitamin A

Answer: C

10. Which of the following best describes the permeability to sodium and potassium in rod cells in response to the light?

A) Decreased sodium permeability, decreased potassium permeability
B) Decreased sodium permeability, increased potassium permeability
C) Decreased sodium permeability, no change in potassium permeability
D) Increased sodium permeability, decreased potassium permeability
E) Increased sodium permeability, increased potassium permeability
F) Increased sodium permeability, no change in potassium permeability

Answer: C

11. Which of the following best describes the electrical response of the rods to light?

A) Action potential
B) Capacitive discharge
C) Depolarization
D) Hyperpolarization

Answer: D

12. Which cell type(s) have action potentials in the retina of the human eye?

A) Bipolar cells and ganglion cells
B) Bipolar cells only
C) Bipolar cells, horizontal cells, and ganglion cells
D) Ganglion cells and horizontal cells
E) Ganglion cells only

Answer: E

13. Under low or reduced light conditions, which chemical compound is responsible for the inward-directed sodium current in the outer segments of the photoreceptors?

A) Metarhodopsin II
B) cGMP
C) 11-cis retinal
D) cAMP
E) 11-trans retinal

Answer: B

14. Which cells in layer IV of the primary visual cortex detect orientation of lines and borders?

A) Border cells
B) Complex cells
C) Ganglion cells
D) Hypercomplex cells
E) Simple cells

Answer: E

15. Which event occurs in photoreceptors during phototransduction in response to light?

A) Phosphodiesterase activity decreases
B) Transducin activity decreases
C) Hydrolysis of cGMP increases
D) Neurotransmitter release increases
E) The number of open voltage-gated calcium channels increases

Answer: C

16. During photoreception, all the following increase except:

A) cGMP phosphodiesterase
B) Transducin
C) Metarhodopsin II
D) Sodium influx into the outer segment of the rod

Answer: D

17. The condition of myopia is usually corrected by which type of lens?

A) Compound lens
B) Convex lens
C) Spherical lens
D) Concave lens
E) Cylindrical lens

Answer: D

18. For the eye to adapt to intense light, which of the following may occur?

A) Bipolar cells will continuously transmit signals at the maximum rate possible
B) Photochemicals in both rods and cones will be reduced to retinal and opsins
C) The levels of rhodopsin will be very high
D) The size of the pupil will increase
E) Vitamin A will convert into retinal

Answer: B

19. Which statement regarding color vision is correct?

A) Green is perceived when only green cones are stimulated
B) The stimulation ratio of the three types of cones allows specific color perception
C) The wavelength of light corresponding to white is shorter than that corresponding to blue
D) When no stimulation of red, green, or blue cones occurs, there will be the sensation of seeing white
E) Yellow is perceived when green and blue cones are stimulated equally

Answer: B

20. Which statement is correct concerning the elements of the retina?

A) The total number of cones in the retina is much greater than the total number of rods
B) Each individual cone responds to all wavelengths of light
C) Photoreceptor activation (rods and cones) results in hyperpolarization of the receptor
D) The central fovea contains only rods
E) The pigment layer of the retina contains the photoreceptors

Answer: C

21. The condition of hyperopia is usually caused by which anomaly of the eye?

A) Decreased production of melanin
B) Uneven curvature of the cornea
C) An eyeball that is shorter than normal
D) An eyeball that is longer than normal
E) A lens system that is too powerful and focuses the object in front of the retina

Answer: C

22. The condition of hyperopia is usually corrected by which type of lens?

A) Compound lens
B) Convex lens
C) Spherical lens
D) Concave lens
E) Cylindrical lens

Answer: B

23. A 29-year-old student with 20/20 vision looks at a beautiful scene. The axons of ganglion cells transmitting visual signals in the form of action potentials to the primary visual cortex are most likely to synapse in which structure?

A) Lateral geniculate nucleus
B) Medial geniculate nucleus
C) Optic chiasm
D) Optic radiation

E) Superior cervical ganglion
F) Superior colliculus

Answer: A

24. Which neurotransmitter is released by both rods and cones at their synapses with bipolar cells?

A) Acetylcholine
B) Dopamine
C) Glutamate
D) Glycine
E) Serotonin

Answer: C

25. Which of the following provides about two thirds of the 59 diopters of refractive power of the eye?

A) Anterior surface of the cornea
B) Anterior surface of the lens
C) Iris
D) Posterior surface of the cornea
E) Posterior surface of the lens

Answer: A

26. Which structure secretes the intraocular fluid of the eye?

A) Ciliary processes
B) Cornea
C) Iris
D) Lens
E) Trabeculae

Answer: A

27. Which statement best describes the underlying basis of the dark current in the outer segment of the photoreceptors?

A) Dark current results from the influx of sodium ions via c-AMP–dependent sodium channels
B) Dark current results from the influx of sodium ions via c-GMP–dependent sodium channels
C) Dark current results from the efflux of potassium ions via c-GMP–dependent potassium channels
D) Dark current results from the efflux of sodium ions via c-GMP–dependent sodium channels
E) Dark current results from the efflux of sodium ions via c-AMP–dependent sodium channels

Answer: B

28. Which retinal cells have action potentials?

A) Amacrine cells
B) Bipolar cells
C) Ganglion cells
D) Horizontal cells
E) Photoreceptors

Answer: C

29. A 25-year-old student studies for a test in medical physiology. The visual contrast of the subject matter is enhanced due to lateral inhibition of the visual input by which cell type in the retina?

A) Amacrine cells
B) Bipolar cells
C) Ganglion cells
D) Horizontal cells

Answer: D

30. Which of the following responses is mediated by parasympathetic muscarinic receptors?

A) Dilation of bronchiolar smooth muscl
B) Miosis
C) Ejaculation
D) Constriction of gastrointestinal (GI) sphincters
E) Increased cardiac contractility

Answer: B

31. When compared with the cones of the retina, the rods

A) are more sensitive to low-intensity light
B) adapt to darkness before the cones
C) are most highly concentrated on the fovea
D) are primarily involved in color vision

Answer: A

32. Which of the following is a step in photoreception in the rods?

A) Light converts all-trans retinal to 11-cis retinal
B) Metarhodopsin II activates transducin
C) Cyclic guanosine monophosphate (cGMP) levels increase
D) Rods depolarize
E) Glutamate release increases

Answer: B