

Wednesday, November 15th, 2023

Following directions on the mark-sense form, write your **name, and student number** in the blanks and fill in the bubbles. In addition, write your **name** on this exam.

When finished with the test, turn in both the mark-sense form and the exam at the front of the room.

PLACE ALL ANSWERS ON THE MARK-SENSE FORM

MULTIPLE CHOICE: Always choose the BEST, most complete answer. (2 points each)

Correct answers are in **red bold face**.

1. Excitable cells that convert physical stimuli into changes in membrane potential are
 - a. **called sensory receptors.**
 - b. found only in the skin.
 - c. not found in muscles.
 - d. not found in our internal organs.
 - e. never able to fire action potentials.

2. The type of stimulus that is most effective in activating a sensory receptor is called the
 - a. threshold.
 - b. **adequate stimulus.**
 - c. receptor protein.
 - d. motor unit.
 - e. perceptron.

3. A series of neurons that are connected by synapses from the sensory receptor to second and third order sensory neurons in the central nervous system is called a
 - a. topographic map.
 - b. neural code.
 - c. **labelled line.**
 - d. sensory map.
 - e. magnetic resonance image.

4. In a sensory receptor, the decline in response to a long-lasting stimulus is called
 - a. summation.
 - b. the neural code.
 - c. reciprocal innervation.
 - d. excitation coupling.
 - e. adaption.**

5. The somatic sensory system is responsible for transmitting information about all the following types of physical stimuli EXCEPT
 - a. temperature
 - b. sound**
 - c. pain
 - d. vibration
 - e. touch

6. Primary sensory neurons conveying pain and temperature information synapse onto a secondary neuron in the
 - a. cerebellum.
 - b. medulla.
 - c. somatosensory cortex.
 - d. spinal cord.**
 - e. thalamus.

7. What are the differences between how sharp, fast pain and slow, diffuse pain are detected?
 - a. Sharp fast pain is detected by slowly adapting receptors only.
 - b. Slow, diffuse pain is detected by receptors restricted to the skin surface.
 - c. Slow, diffuse pain is detected exclusively by Pacinian corpuscles.
 - d. Sharp, fast pain is detected by receptors located in the hands but not the feet.
 - e. There are two distinct sensory receptors detecting the two types of pain, A-delta and C fibers.**

8. Which of the following is a primary taste modality?
 - a. hot
 - b. cold
 - c. umami**
 - d. metallic
 - e. spicy

9. What kind of protein is an olfactory receptor?
- voltage-gated ion channel
 - ligand-gated ion channel
 - catalytic receptor
 - receptor tyrosine kinase
 - G protein coupled receptor (GPCR)**
10. Each olfactory sensory neuron has _____ different type(s) of olfactory receptor proteins embedded in its membrane.
- 1**
 - 5-7
 - 20
 - 382
 - 5000
11. The fact that odorant molecules can bind to more than one type of olfactory receptor protein explains why
- novel odorant molecules cause the expression of new olfactory sensory neurons.
 - some odors activate non-olfactory accessory neurons.
 - we can discriminate more distinct odors than there are distinct types of olfactory receptors.**
 - each individual olfactory sensory neuron expresses many different receptor proteins.
 - olfactory sensory neurons are short-lived.
12. Our experience of flavor in the food we ingest is thought to arise from the convergence of which three sensory modalities?
- tactile, visual and vestibular
 - olfactory, visual and taste
 - auditory, olfactory and somatosensory
 - taste, olfactory and somatosensory**
 - taste, olfactory and vestibular
13. ALL of the following vibrate or move in response to a sound wave EXCEPT the
- stereocilia.
 - tympanic membrane.
 - basilar membrane.
 - utricle.**
 - oval window.

14. The transmission of sound waves from the outer ear to the inner ear is dependent upon
- a. the ossicles in the middle ear.**
 - b. fluid entering the inner ear through the round window.
 - c. the connection between the helicotrema and the tectorial membrane.
 - d. the connection between the tectorial membrane and the Eustachian tube.
 - e. the size of the middle ear.
15. The optimal sound frequency to excite a response in a hair cell in the cochlea is strongly influenced by
- a. the size of its tip-link proteins.
 - b. its location along the basilar membrane.**
 - c. its distance from the tectorial membrane.
 - d. the density of K^+ leak channels.
 - e. the type of neurotransmitter it releases.
16. The semicircular canals are principally responsible for
- a. diffusing pressure from the cochlear duct.
 - b. detecting faint, low-frequency sounds.
 - c. regeneration of hair cells in the cochlea.
 - d. protecting hair cells in the cochlea from loud sounds.
 - e. detecting rotational movements of the head.**
17. Maintaining visual fixation during head movements is the primary function of
- a. the balance reflex.
 - b. the gag reflex.
 - c. the consensual pupillary reflex.
 - d. the vestibulo-ocular reflex.**
 - e. the stretch reflex.
18. The sensory receptors responsible for detecting gravitational forces exerted on the body are
- a. muscle spindles.
 - b. hair cells.**
 - c. Golgi tendon organs.
 - d. chemoreceptors.
 - e. Pacinian corpuscles.

19. Adjustments in the shape of the lens to keep objects in focus is called
- adaptation.
 - accommodation.**
 - astigmatism.
 - tinnitus.
 - resonance.
20. Which of the following is TRUE for photoreceptors in the dark?
- cyclic nucleotide channels are closed
 - rhodopsin is bleached
 - they are depolarized**
 - they release less neurotransmitter than in the light
 - transducin is activated
21. The existence of different photopigments in different cone photoreceptors is the basis for
- eye color.
 - accommodation.
 - the blind spot.
 - color vision.**
 - heightened sensitivity of rod photoreceptors in dim light.
22. During active muscle contractions, force generation depends upon transient chemical bonds that are formed between
- adjacent muscle fascicles.
 - acetylcholine and Ca^{++} channels.
 - T-tubules and sarcoplasmic reticulum.
 - troponin and tropomyosin.
 - myosin and actin.**
23. The propagation of action potentials from the sarcolemma to the interior of the muscle fiber is dependent on the
- motor endplate.
 - T-tubules.**
 - myofibrils.
 - sarcoplasmic reticulum.
 - Golgi apparatus.

24. The speed of muscle shortening varies with
- the level of ATP in the sarcoplasm.
 - the diameter of the T-tubules.
 - the load that the muscle is working against.**
 - the amount of acetylcholine released at the neuromuscular junction.
 - the rate of ATP synthesis.
25. Muscle contraction is terminated when
- the thick filaments begin to shorten.
 - the thin filaments slide toward the center of the sarcomere.
 - Cl⁻ ions are released from the sarcoplasmic reticulum.
 - Ca⁺⁺ ions are pumped back into the sarcoplasmic reticulum.**
 - Ca⁺⁺ is released from the T-tubules.
26. Which of the following is true about motor units?
- One somatic motor neuron innervates only one muscle fiber.
 - The motor unit includes the afferent neurons innervating the muscle.
 - Each muscle fiber is innervated by multiple somatic motor neurons.
 - Each muscle fiber is innervated by a single somatic motor neuron.**
 - The motor unit includes the upper motor neurons.
27. During both voluntary and reflex movements, the first motor units to be recruited are
- slow, fatigue-resistant motor units.**
 - the ones with the fastest contraction speed.
 - the ones that generate the most force.
 - innervated by the largest somatic motor neurons.
 - the ones that fatigue the fastest.
28. Motor neurons are normally activated in order of increasing size because
- small cells receive more synaptic input than large cells.
 - small cells consume more energy than large cells.
 - small cells have fewer inhibitory connections than large cells.
 - large cells express fewer neurotransmitter receptors.
 - small cells are easier to excite than large cells.**

29. The activation of sensory afferent fibers innervating muscle spindles initiates the

- a. **stretch reflex.**
- b. flexion reflex.
- c. vestibulo-ocular reflex.
- d. crossed extension reflex.
- e. startle reflex.

30. Range of movement errors and delayed initiation of movement are typical of lesions to the

- a. spinal cord.
- b. optic tract.
- c. **cerebellum.**
- d. vestibular nuclei.
- e. corticospinal tract.

END OF TEST

Please turn in your mark-sense form and your question sheets at the front of the room.