

SE-3: Sensory & Neuromuscular Function

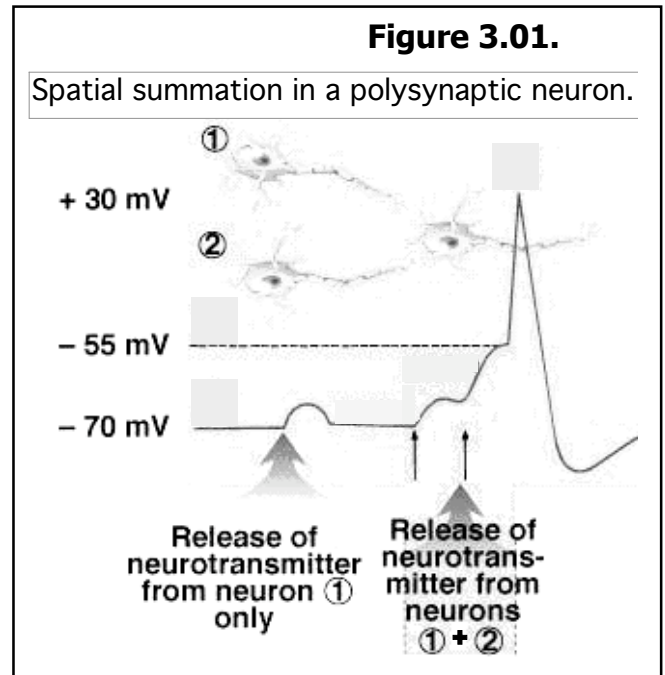
Bio 6A/ Bruce Heyer

Use a 882-E Scantron to mark all correct answers. You may use books or notes or discuss answers with your classmates. Write "Sensory-Motor Quiz" in the subject area of your Scantron.

- The part of the brain responsible for conscious thought and higher mental capabilities is the
 - cerebellum.
 - cerebrum.
 - pons.
 - medulla oblongata.
 - thalamus.
- The central nervous system is
 - all the nerves in the body.
 - the brain and cranial nerves.
 - the spinal cord and spinal nerves.
 - the motor and sensory nerves.
 - the brain and spinal cord.
- The peripheral nervous system is
 - all the nerves in the body.
 - the brain and cranial nerves.
 - the spinal cord and spinal nerves.
 - the motor and sensory nerves.
 - the brain and spinal cord.
- The only neurons stimulated by factors other than by other neurons are the
 - autonomic neurons
 - somatic neurons
 - sensory neurons
 - interneurons
 - motor neurons
- A nerve impulse is
 - a short burst of weak electricity along a nerve fiber.
 - a series of distinct membrane excitations along a nerve fiber.
 - the rapid axonal transport of vesicles down a nerve fiber.
 - the twitch of a nerve fiber.
- Action potentials can code for stimulus intensity by
 - altering frequency.
 - altering magnitude.
 - altering duration.
 - altering both duration and magnitude.
- Which of the following is **not** true about myelination?
 - It consists of glial cells called oligodendrocytes and Schwann cells
 - It is only found in the peripheral nervous system
 - It increases the speed of the propagation of the action potential down the axon
 - Action potentials are propagated in between myelin cells at points called Nodes of Ranvier
 - Deterioration of myelin causes multiple sclerosis
- Which of the following is incorrectly matched?
 - cnidarian: nerve net
 - mollusc: anterior nerve ring and longitudinal nerve cords
 - echinoderm: nerve ring and radial nerve cords
 - insect: dorsal nerve cord with segmental ganglia
 - vertebrate: dorsal nerve tube

9. A neurotransmitter that opens which of the following protein gates would result in an inhibitory postsynaptic potentials (IPSP) in the target cell? (Select **all** correct answers!)
- A)** aquaporin
 - B)** Ca^{++} -gate
 - C)** Cl^- -gate
 - D)** K^+ -gate
 - E)** Na^+ -gate
10. In Figure 49.3 of Campbell, 9th ed., which neuron illustrated would elicit an IPSP in its target cell?
- A)** the sensory neuron on the motor neuron.
 - B)** the sensory neuron on the interneuron.
 - C)** the interneuron on the antagonistic motor neuron.
 - D)** the antagonistic motor neuron on the antagonistic muscle.
11. The surface area of the brain's sensory cortex corresponding to the hand is larger than the area corresponding to the upper arm because the skin on the hand
- A)** has a greater surface area.
 - B)** has greater sensitivity.
 - C)** has greater acuity.
 - D)** has greater sensory convergence.
12. The conversion of an environmental stimulus into nerve impulses is called
- A)** induction
 - B)** conduction
 - C)** production
 - D)** transduction
 - E)** perception
13. An increase in convergence of receptive fields causes
- A)** increased sensitivity and acuity
 - B)** decreased sensitivity and acuity
 - C)** increased sensitivity and decreased acuity
 - D)** decreased sensitivity and increased acuity
 - E)** increased sensitivity and no effect on acuity
14. Insect sensilla
- A)** are equivalent to taste receptors.
 - B)** can be found on the legs.
 - C)** are made up of chemoreceptors.
 - D)** all of the above.
 - E)** None of the above
15. Which of the following are **not** transduced by mechanoreceptors?
- A)** auditory receptors
 - B)** equilibrium receptors
 - C)** spindle receptors
 - D)** nociceptors
 - E)** touch receptors
16. The pathway for light to be conducted in the eye is
- A)** cornea pupil lens posterior compartment retina
 - B)** lens retina pupil posterior compartment cornea
 - C)** sclera iris lens posterior compartment retina
 - D)** lens iris retina posterior compartment sclera
 - E)** cornea lens retina posterior compartment iris

17. Refer to Figure 3.01. What does +30 mV represent?
A) Threshold potential.
B) Action potential.
C) Resting potential.
D) Refractory potential.
18. Refer to Figure 3.01. What does -55 mV represent?
A) Threshold potential.
B) Action potential.
C) Resting potential.
D) Refractory potential.
19. Refer to Figure 3.01. What does -70 mV represent?
A) Threshold potential.
B) Action potential.
C) Resting potential.
D) Refractory potential.
20. The voltage change from -70 toward -55 mV represents
A) polarization.
B) repolarization.
C) depolarization.
D) hyperpolarization.
21. The voltage change from +30 toward -70 mV represents
A) polarization.
B) repolarization.
C) depolarization.
D) hyperpolarization.
22. This voltage change from +30 toward -70 mV occurred because
A) Na⁺-gates opened.
B) Na⁺-gates closed.
C) K⁺-gates opened.
D) K⁺-gates closed.
23. Spatial summation
A) occurs when a single neuron releases neurotransmitter rapidly.
B) occurs because of the convergence of many neurons on a single postsynaptic cell.
C) only involves excitatory postsynaptic potentials (EPSPs).
D) only involves inhibitory postsynaptic potentials (IPSPs).
24. Stimulation by neuron #1 alone in Figure 3.01 did not initiate a voltage spike because
A) the membrane potential did not change.
B) the membrane potential did not change enough to open Na⁺-gates.
C) the post-synaptic neuron was in its refractory period.
D) the post-synaptic neuron does not have receptors for neuron #1's neurotransmitter.
25. The stimulation of the action potential in Figure 3.01 resulted from
A) spatial summation of excitatory postsynaptic potentials (EPSPs).
B) temporal summation of excitatory postsynaptic potentials (EPSPs).
C) spatial summation of inhibitory postsynaptic potentials (IPSPs).
D) temporal summation of inhibitory postsynaptic potentials (IPSPs).



26. The pathway for sound vibrations to be conducted in the ear is
- A)** cochlea □ auditory canal □ middle ear bones □ oval window □ tympanic membrane
 - B)** auditory canal □ oval window □ cochlea □ tympanic membrane □ middle ear bones
 - C)** middle ear bones □ tympanic membrane □ oval window □ auditory canal □ cochlea
 - D)** cochlea □ tympanic membrane □ auditory canal □ oval window □ middle ear bones
 - E)** auditory canal □ tympanic membrane □ middle ear bones □ oval window □ cochlea
27. The tympanic membrane of the outer ear
- A)** converts air pressure into electrical signals
 - B)** connects to the malleus, stapes, and incus bones
 - C)** contains mechanosensitive ion channels
 - D)** allows pressure waves to dissipate into the sinuses
 - E)** None of the above
28. Active hearing
- A)** is used by bats when searching for food
 - B)** is used by moths when avoiding bats
 - C)** is used by fish when avoiding predators
 - D)** Both b and c
 - E)** None of the above
29. The general neural pathway for a spinal reflex is
- A)** sensor to motor neuron to interneuron to effector to sensory neuron
 - B)** sensor to sensory neuron to interneuron to motor neuron to effector
 - C)** effector to sensory neuron to motor neuron to interneuron to sensor
 - D)** effector to motor neuron to interneuron to sensory neuron to sensor
 - E)** sensor to interneuron to sensory neuron to motor neuron to effector
30. For a "monosynaptic" spinal reflex, which of the elements in the previous question is omitted?
- A)** effector
 - B)** interneuron
 - C)** motor neuron
 - D)** sensor
 - E)** sensory neuron
31. A motor unit is
- A)** all the muscle fibers in a specific muscle.
 - B)** all the myofibrils in a specific muscle fiber.
 - C)** all the motor neurons stimulating a specific muscle fiber.
 - D)** all the muscle fibers stimulated by a specific motor neuron.
 - E)** an antagonistic set of muscles.
32. White skeletal muscle fibers
- A)** have more mitochondria than red fibers.
 - B)** have more myofibrils than red fibers.
 - C)** have more myoglobin than red fibers.
 - D)** have more endurance than red fibers.
33. Red skeletal muscle fibers are red because
- A)** they have more glycogen.
 - B)** they're engorged with blood.
 - C)** they have more myoglobin.
 - D)** they have more myosin.
34. This red stuff in red skeletal muscle fibers enhances their function by
- A)** increasing their aerobic capacity.
 - B)** increasing their maximum tension.
 - C)** increasing their glucose transport.
 - D)** increasing their cross-bridge formation.

35. In Figure 3.02, what protein does "D" represent?
A) myosin.
B) actin.
C) troponin.
D) tropomyosin.
36. In Figure 3.02, what does "C" represent?
A) myosin head.
B) actin.
C) troponin.
D) tropomyosin.
37. In Figure 3.02, what does "B" represent?
A) myosin head.
B) actin.
C) troponin.
D) tropomyosin.
38. Which part binds to Ca^{2+} ?
A) myosin head.
B) actin.
C) troponin.
D) tropomyosin.
39. Which part binds to ATP?
A) myosin head.
B) actin.
C) troponin.
D) tropomyosin.
40. Which part binds to actin?
A) myosin head.
B) myosin tail.
C) troponin.
D) tropomyosin.
41. Following motoneuron stimulation, what step starts the cycles of sliding filaments?
A) Binding Ca^{2+} .
B) Binding ATP.
C) Binding $\text{ADP} + \text{P}_i$.
D) Binding actin.
42. During skeletal muscle contraction, myofibrils shorten because
A) thin filaments shorten.
B) thick filaments shorten.
C) T-tubules shorten.
D) sarcomeres shorten.
43. In regards to the relationship between **resting** muscle fiber length and the tension it can generate
A) maximal tension can be generated when the thick and thin filaments slightly overlap.
B) maximal tension can be generated when the thick and thin filaments do not overlap.
C) maximal tension can be generated when the thick and thin filaments maximally overlap.
D) the amount of overlap is unimportant in determining the maximal tension it can generate.

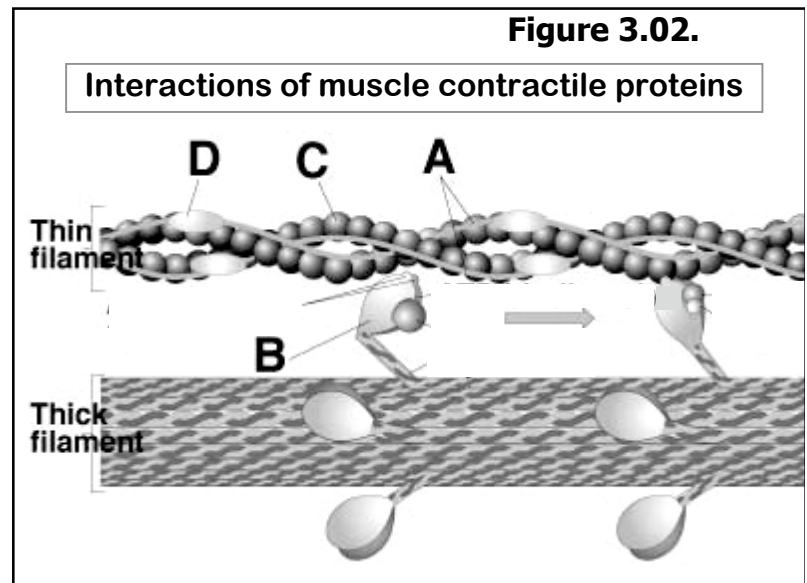
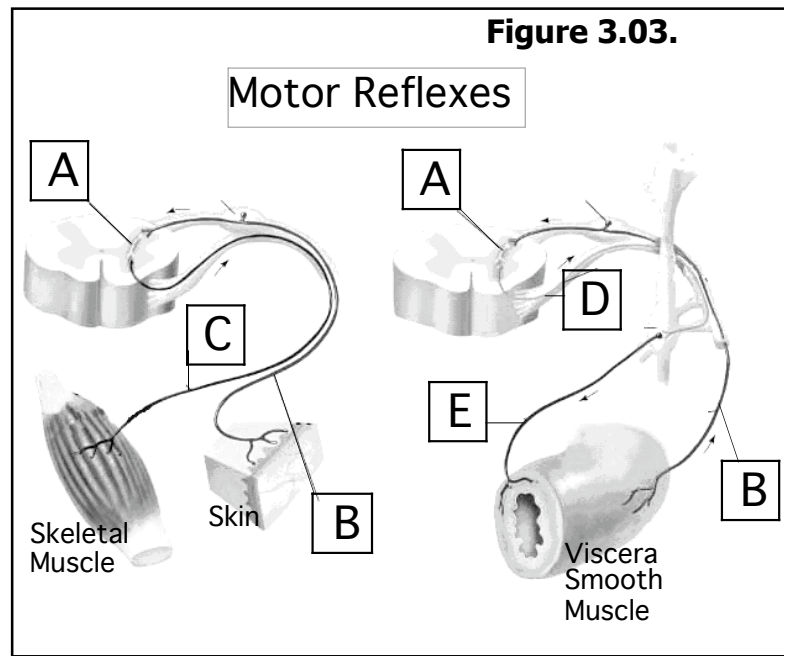


Figure 3.03.



44. In Figure 3.03, what type of neurons are "A"?
- A)** Somatic motor neuron.
 - B)** Autonomic motor neuron.
 - C)** Sensory neuron.
 - D)** Interneuron.
45. In Figure 3.03, what type of neurons are "B"?
- A)** Somatic motor neuron.
 - B)** Autonomic motor neuron.
 - C)** Sensory neuron.
 - D)** Interneuron.
46. In Figure 3.03, what type of neuron is "C"?
- A)** Somatic motor neuron.
 - B)** Autonomic motor neuron.
 - C)** Sensory neuron.
 - D)** Interneuron.
47. In Figure 3.03, what type of neuron is "E"?
- A)** Somatic motor neuron.
 - B)** Autonomic motor neuron.
 - C)** Sensory neuron.
 - D)** Interneuron.
48. In Figure 3.03, the cell body for neuron B is in
- A)** a spinal grey matter horn.
 - B)** the medulla oblongata.
 - C)** a peripheral autonomic ganglion.
 - D)** the dorsal root ganglion.
49. In Figure 3.03, the cell body for neuron C is in
- A)** a spinal grey matter horn.
 - B)** the medulla oblongata.
 - C)** a peripheral autonomic ganglion.
 - D)** the dorsal root ganglion.
50. Which of the following terms would **not** refer to a motor neuron?
- A)** afferent
 - B)** autonomic
 - C)** parasympathetic
 - D)** somatic
 - E)** sympathetic