**Chapter 48: Problems Created by Dr. Frederick**

1. In the communication link between a motor neuron and a skeletal muscle,
   1. the motor neuron is considered the presynaptic cell and the skeletal muscle is the postsynaptic cell.
   2. the motor neuron is considered the postsynaptic cell and the skeletal muscle is the presynaptic cell.
   3. action potentials are possible on the motor neuron but not the skeletal muscle.
   4. action potentials are possible on the skeletal muscle but not the motor neuron.
   5. the motor neuron fires action potentials but the skeletal muscle is not electrochemically excitable.
2. For a neuron with an initial membrane potential at -70 mV, an increase in the movement of potassium ions out of that neuron's cytoplasm would result in
   1. depolarization of the neuron.
   2. hyperpolarization of the neuron.
   3. the replacement of potassium ions with sodium ions.
   4. the replacement of potassium ions with calcium ions.
   5. the neuron switching on its sodium-potassium pump to restore the initial conditions.
3. A "resting" motor neuron is expected to
   1. releases lots of acetylcholine.
   2. to have high permeability to sodium ions.
   3. to be equally permeable to sodium and potassium ions.
   4. exhibit a resting potential that is more negative than the "threshold" potential.
   5. have a higher concentration of sodium ions on the inside the cell than on the outside.
4. A toxin that binds specifically to voltage-gated sodium channels in axons would be expected to
   1. prevent the hyperpolarization phase of the action potential.
   2. prevent the depolarization phase of the action potential.
   3. prevent graded potentials.
   4. increase the release of neurotransmitter molecules.
   5. have most of its effects on the dendritic region of a neuron.
5. After the depolarization phase of an action potential, the resting potential is restored by
   1. the opening of sodium activation gates.
   2. the opening of voltage-gated potassium channels and the closing of sodium activation gates.
   3. a decrease in the membrane's permeability to potassium and chloride ions.
   4. a brief inhibition of the sodium-potassium pump.
   5. the opening of more voltage-gated sodium channels.
6. Saltatory conduction is a term applied to conduction of impulses
   1. across electrical synapses.
   2. an action potential that skips the axon hillock in moving from the dendritic region to the axon terminal.
   3. rapid movement of an action potential reverberating back and forth along a neuron.
   4. jumping from one neuron to an adjacent neuron.
   5. jumping from one node of Ranvier to the next in a myelinated neuron.
7. The steps below refer to various stages in transmission at a chemical synapse:
   * + 1. Neurotransmitter binds with receptors associated with the postsynaptic membrane.
       2. Calcium ions rush into neuron's cytoplasm.
       3. An action potential depolarizes the membrane of the axon terminal.
       4. The ligand-gated ion channels open.
       5. The synaptic vesicles release neurotransmitter into the synaptic cleft.

**Which sequence of events is correct?**

* 1. 1 → 2 → 3 → 4 → 5
  2. 2 → 3 → 5 → 4 → 1
  3. 3 → 2 → 5 → 1 → 4
  4. 4 → 3 → 1 → 2 → 5
  5. 5 → 1 → 2 → 4 → 3

1. What happens when a neuron's membrane depolarizes?
   1. There is a net diffusion of Na+ out of the cell.
   2. The equilibrium potential for K+ (EK) becomes more positive.
   3. The neuron's membrane voltage becomes more positive.
   4. The neuron becomes less likely to generate an action potential.
   5. The inside of the cell becomes more negative relative to the outside.
2. Why are action potentials usually in only one direction along an axon?
   1. The nodes of Ranvier can conduct potentials in only one direction.
   2. The brief refractory period prevents reopening of voltage-gated Na+ channels.
   3. The axon hillock has a higher membrane potential than the terminals of the axon.
   4. Ions can flow along the axon in only one direction.
   5. Voltage-gated channels for both Na+ and K+ open in only one direction.
3. Where are neurotransmitter receptors located?
   1. on the nuclear membrane
   2. at nodes of Ranvier
   3. on the postsynaptic membrane
   4. on the membranes of synaptic vesicles
   5. in the myelin sheath