

Name _____

Course/Section _____

Date _____

Professor/TA _____



Activity 48.2 What would happen if you modified a particular aspect of neuron function?

In the questions below, test your understanding of the various parts of the nervous system by asking yourself what would happen if (some part) was damaged. What would the system still be able to do? What would it be unable to do?

1. Some nerve gases and insect poisons work by destroying acetylcholine esterase. Acetylcholine esterase is normally present in acetylcholine synapses and acts to degrade acetylcholine. What is likely to happen to nervous transmission in insects exposed to this type of insect poison?

2. The pufferfish (fugu) contains the poison tetrodotoxin. Some shellfish produce a paralytic poison called saxotoxin. Both of these poisons block the Na^+ channels in neurons. What specific effects could these toxins have on neuron function?

3. A type of spider (the funnel-web spider) produces a toxin that blocks the Ca^+ channels.

a. Can a neuron exposed to this toxin fire an action potential? Explain.

b. Can a neuron transmit a signal across the synapse using neurotransmitters? Explain.



4. You isolate a section of a squid giant axon and arrange an experiment so that you can change the solution bathing the axon. You insert an electrode into the axon and place another electrode outside the cell so that you can measure the potential across the cell membrane. With the axon bathed in normal extracellular fluid, you observe a resting potential of -70mV and action potentials, when stimulated, that reach $+55\text{ mV}$.

mM concentration of each ion				
		Experimental concentration in (a)		
		Normal concentrations		
Ion	Inside neuron	Outside neuron	Inside neuron	Outside neuron
Na^+	50	440	50	440
K^+	400	20	400	40

a. You change the solution bathing the neuron by increasing the K^+ concentration to 40 mM. What effect will this have on the neuron? For example, will it depolarize the membrane and make it easier to start an action potential? Will it hyperpolarize the membrane and make it more resistant to starting an action potential? Or will it have no effect? Explain your answer.

b. What would happen if, instead of adding more K^+ to the outside, you added more Na^+ to the fluid bathing the neuron? Explain.