

7.012 Neurobiology Section Problem

This is an old exam question.

You are studying neurobiology in mice, and you have isolated several different mutant neurons, each of which exhibits a specific phenotype. For the following questions indicate what aspect of the neuron's normal physiology that are likely to be **deficient** in the mutant. (Note: influx means flow into the neuron; efflux means flow out of the neuron.)

Circle all that could apply in each case.

a) Upon stimulation to the -50 mV threshold, the mutant 1 neuron is unable to further depolarize.

Na ⁺ influx	Na ⁺ efflux	K ⁺ influx	K ⁺ efflux	Ca ⁺⁺ influx	Ca ⁺⁺ efflux	Vesicle fusion	myelin
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b) Upon stimulation beyond the threshold, mutant 2 depolarizes completely but fails to repolarize.

Na ⁺ influx	Na ⁺ efflux	K ⁺ influx	K ⁺ efflux	Ca ⁺⁺ influx	Ca ⁺⁺ efflux	Vesicle fusion	myelin
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c) Upon arrival of an action potential to the nerve terminal, neurotransmitters fail to release in mutant 3.

Na ⁺ influx	Na ⁺ efflux	K ⁺ influx	K ⁺ efflux	Ca ⁺⁺ influx	Ca ⁺⁺ efflux	Vesicle fusion	myelin
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d) Upon stimulation by a neurotransmitter, post-synaptic mutant neuron 4, at resting potential, fails to depolarize.

Na ⁺ influx	Na ⁺ efflux	K ⁺ influx	K ⁺ efflux	Ca ⁺⁺ influx	Ca ⁺⁺ efflux	Vesicle fusion	myelin
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e) With a harmful stimulus, animals typically learn to respond more vigorously not only to that stimulus, but also to other stimuli, even harmless ones associated with it. This process is called....

Habituation	Sensitization	Recapitulation	Myelination	Inhibition
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