FRQ Friday – 3/12

AP Biology Insta-Review @apbiopenguins

2019 #4

2013 #8

2014 #1a & 1b

FRQ 2019 #4

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Acetylcholine is a neurotransmitter that can activate an action potential in a postsynaptic neuron (Figures 1 and 2). A researcher is investigating the effect of a particular neurotoxin that causes the amount of acetylcholine released from presynaptic neurons to increase.

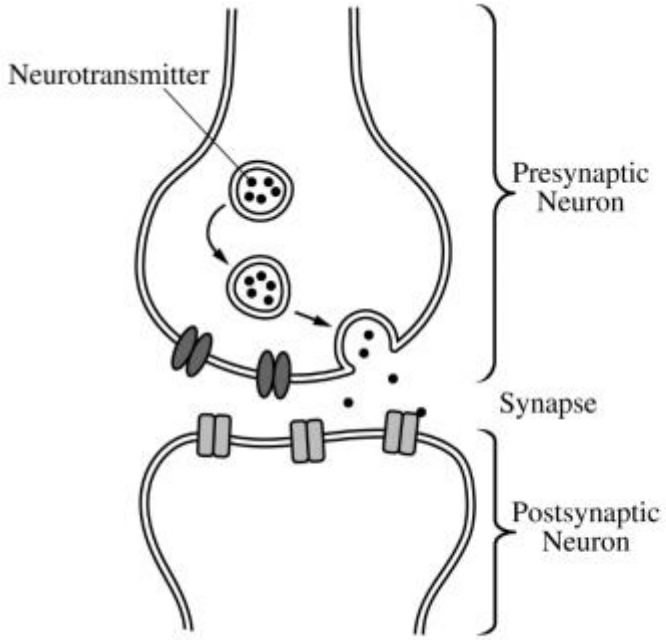

Figure 1. Release of neurotransmitters into the synapse in response to an action potential

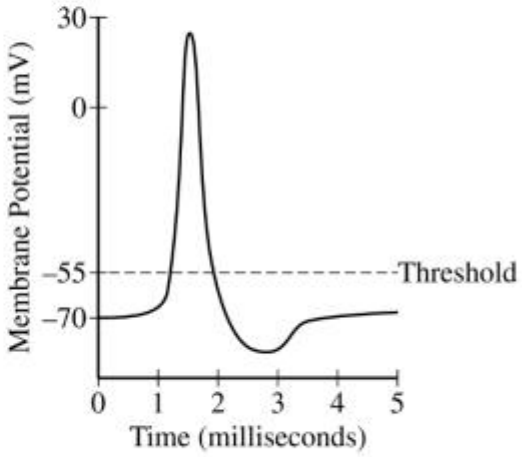

Figure 2. Model of a typical action potential in a neuron

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(a) **Describe** the immediate effect of the neurotoxin on the number of action potentials in a postsynaptic neuron. **Predict** whether the maximum membrane potential of the postsynaptic neuron will increase, decrease, or stay the same.

Acetylcholine is a neurotransmitter that can activate an action potential in a postsynaptic neuron (Figures 1 and 2). A researcher is investigating the effect of a particular neurotoxin that causes the amount of acetylcholine released from presynaptic neurons to increase.

Description (1 point)

- It will increase the number of action potentials.

Prediction (1 point)

- It will stay the same.

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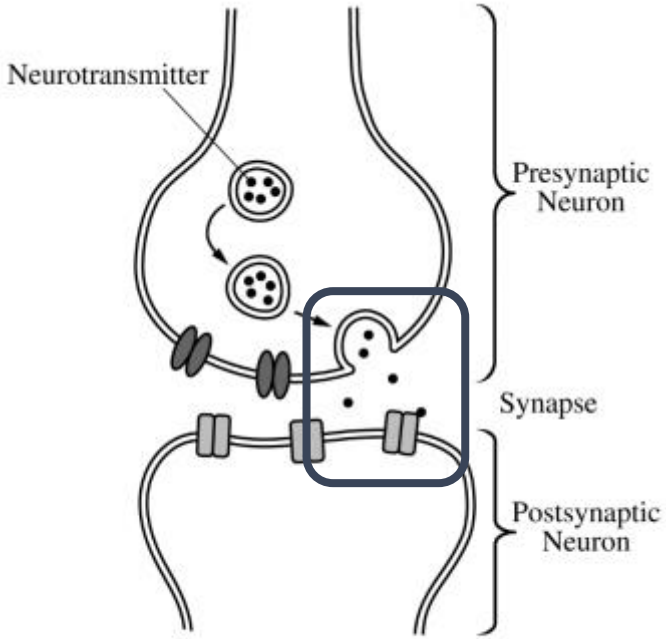

Figure 1. Release of neurotransmitters into the synapse in response to an action potential

(b) The researcher proposes two models, A and B, for using acetylcholinesterase (AChE), an enzyme that degrades acetylcholine, to prevent the effect of the neurotoxin. In model A, AChE is added to the synapse. In model B, AChE is added to the cytoplasm of the postsynaptic cell. **Predict** the effectiveness of EACH proposed model. **Provide reasoning** to support your predictions.

(1 point per row; 2 points max.)

	Prediction	Reasoning
Model A	Effective	Acetylcholine is in the synapse.
Model B	Not effective	Acetylcholine is not in the cytoplasm of the postsynaptic cell.

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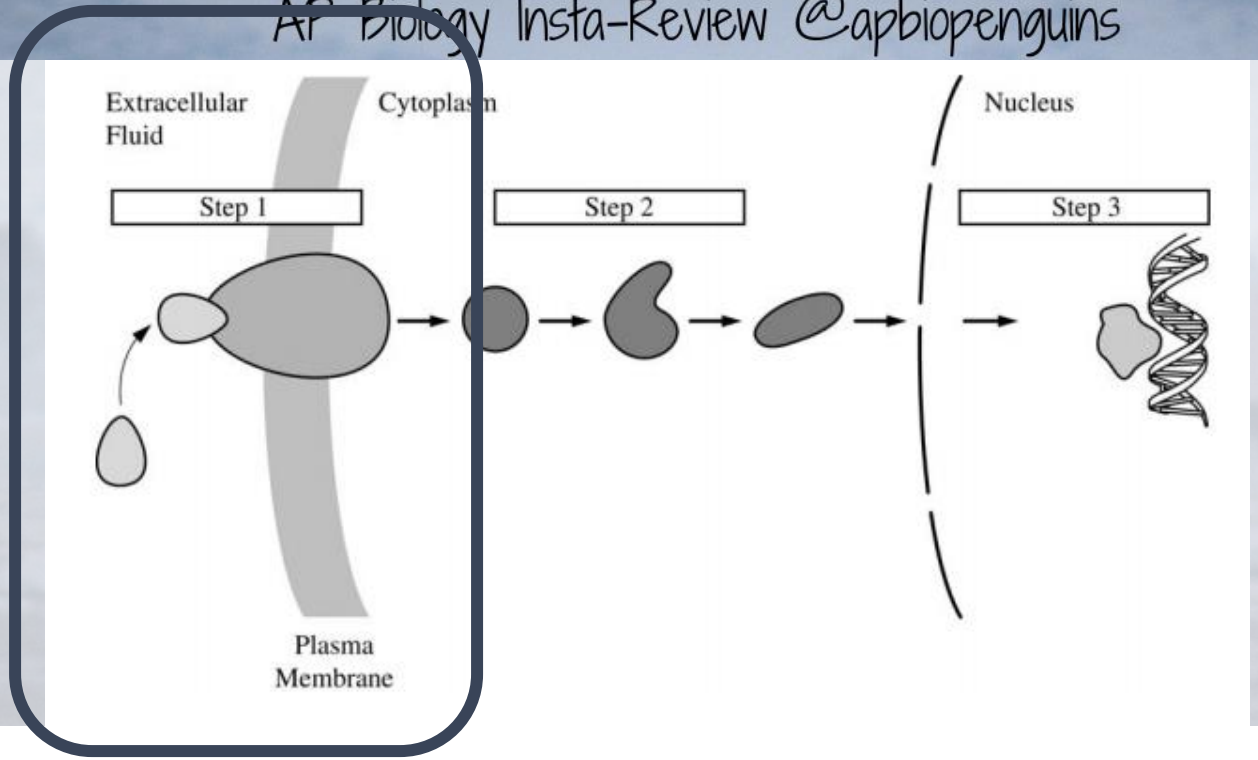

Step 1 = hormone/ligand binding to receptor to initiate/trigger/induce signaling OR signal reception

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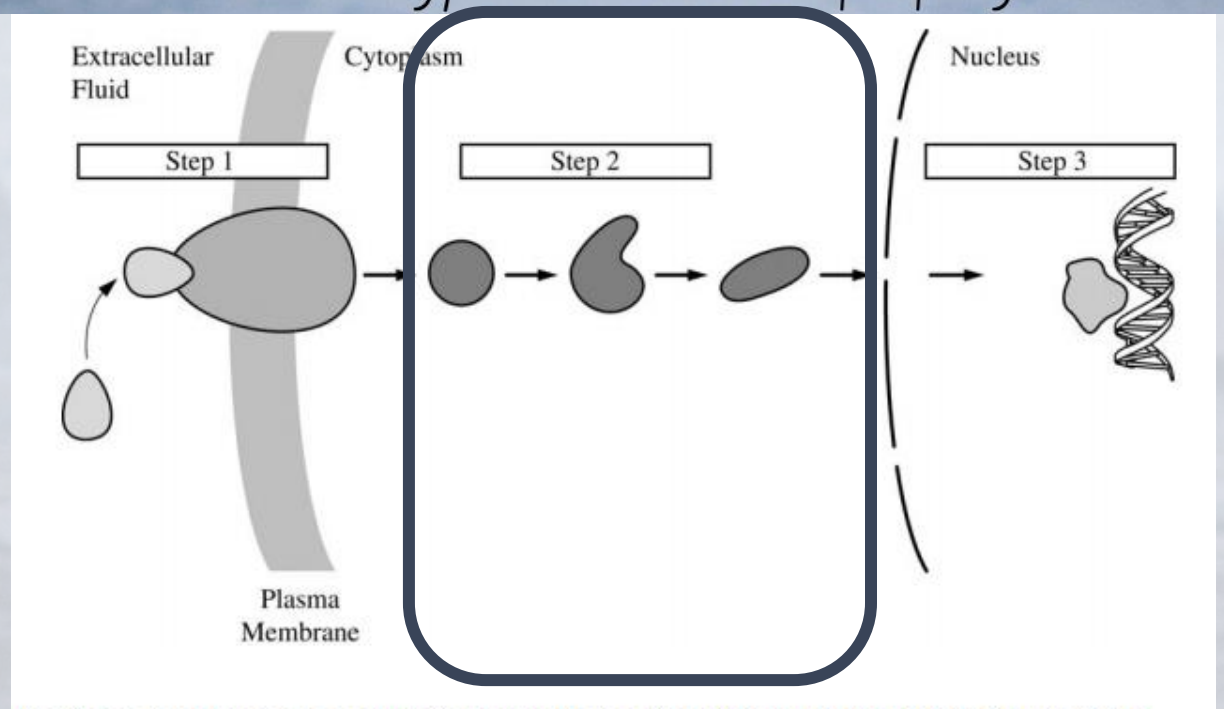

Step 2 = an intracellular cascade that transduces/amplifies/transfers the signal from plasma membrane to nucleus (or other cellular effectors)

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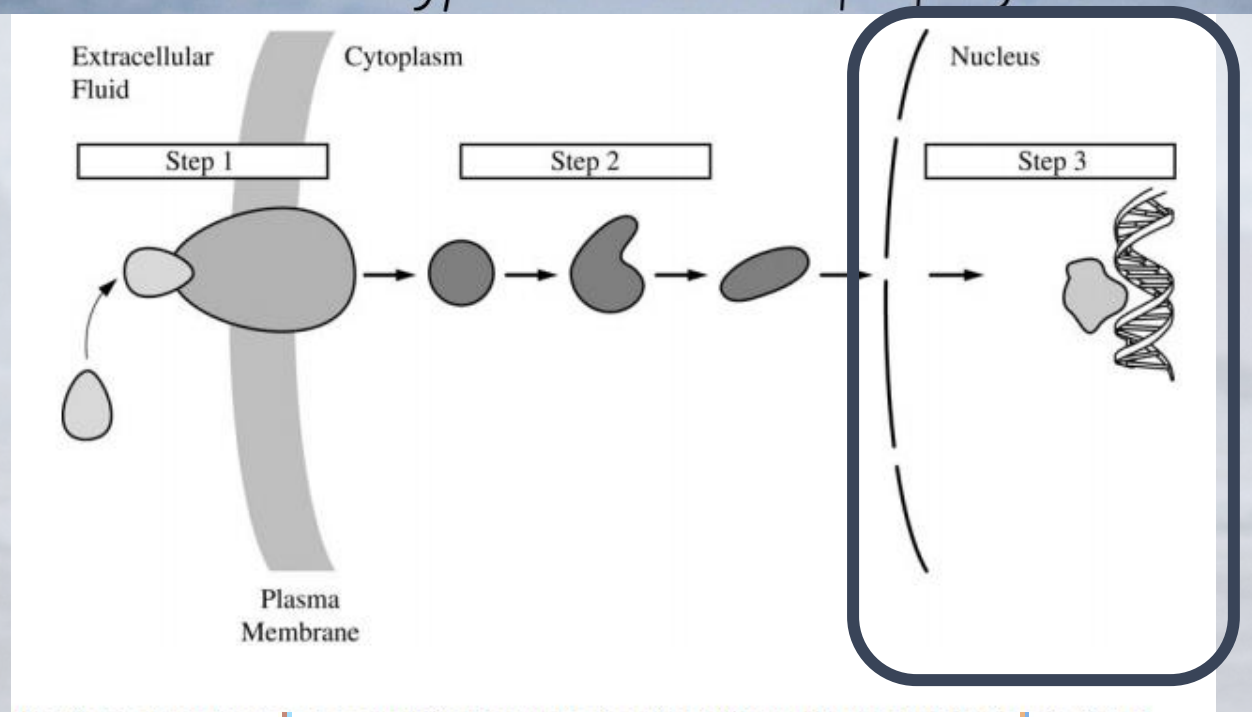

Step 3 = transcription/expression of target genes is stimulated/repressed

FRQ 2014 #1a & 1b

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Trichomes are hairlike outgrowths of the epidermis of plants that are thought to provide protection against being eaten by herbivores (herbivory). In a certain plant species, stem trichome density is genetically determined.

To investigate variation in stem trichome density within the plant species, a student counted the number of trichomes on the stems of six plants in each of three different populations. The student used the data to calculate the mean trichome density (numbers of hairs per square centimeter) for each population. The results are provided in the table below.

TRICHOME DENSITY IN THREE PLANT POPULATIONS (number of trichomes/cm^2)

Population	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Mean	Standard Error of the Mean (SEM)
I	8	11	9	10	8	6	9	1
II	12	6	15	9	13	8	11	1
III	13	17	9	14	12	16	14	1

FRQ 2014 #1a & 1b

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(a) On the axes provided, **create** an appropriately labeled graph to illustrate the sample means of the three populations to within 95% confidence (i.e., sample mean ± 2 SEM).

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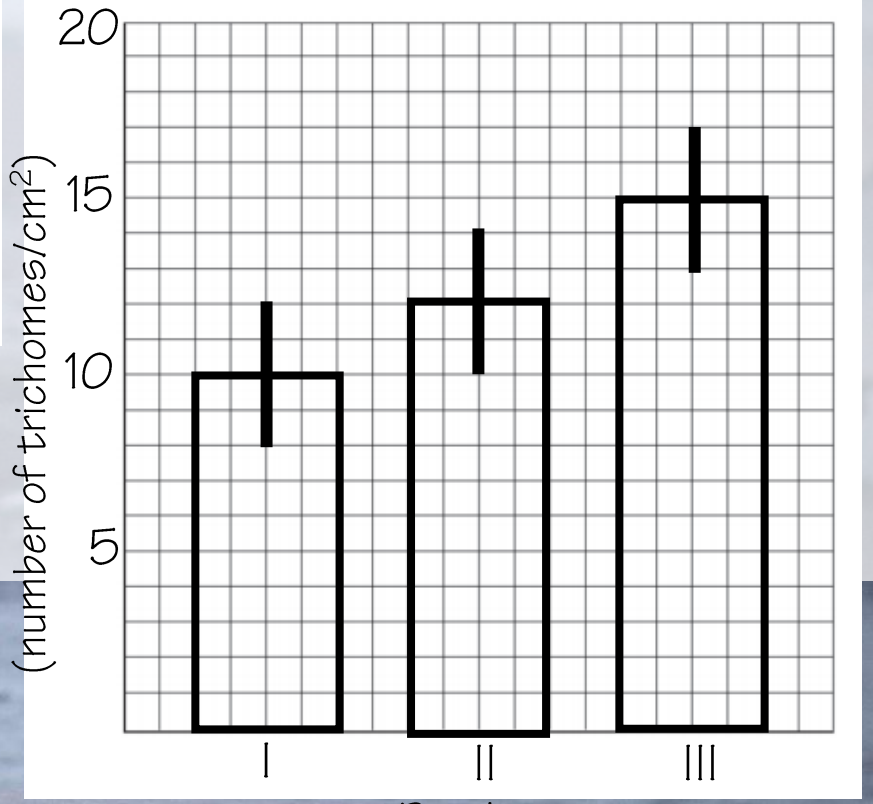

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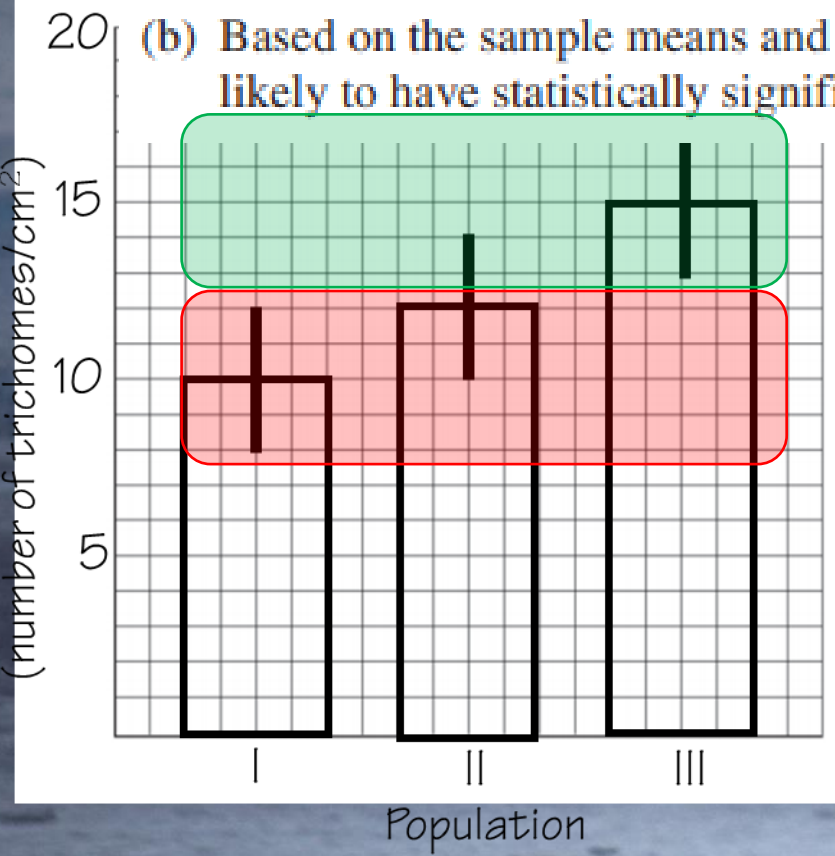

(b) Based on the sample means and standard errors of the means, **identify** the two populations that are most likely to have statistically significant differences in the mean stem trichome densities. **Justify** your response.

Identification (**1 point**)

- Populations I and III

Justification (**1 point**)

- The error bars/95 percent confidence intervals for populations I and III do not overlap
- (Sample mean + 2 SEM of population I) < (Sample mean – 2 SEM of population III)

Next FRQ Friday (3/19)

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2016 #7

2015 #4

2019 #3