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Exercise 6: Cardiovascular Physiology: Activity 4: Examining the Effects of Chemical Modifiers on Heart Rate Lab Report

Pre-lab Quiz Results

You scored 100% by answering 4 out of 4 questions correctly.

1. The parasympathetic nervous system releases \_\_\_\_\_ to affect heart rate.

You correctly answered: d. acetylcholine

2. A cholinergic drug that worked the same as acetylcholine would

You correctly answered: c. be an agonist and decrease heart rate.

3. Norepinephrine affects the heart rate by

You correctly answered: a. increasing the rate of depolarization and increasing the frequency of action potentials.

4. The \_\_\_\_\_ receptor binds norepinephrine and epinephrine.

You correctly answered: b.  $\beta$ -1 adrenergic

Experiment Results

Predict Question:

Predict Question 1: Pilocarpine is a cholinergic drug, an acetylcholine agonist. Predict the effect that pilocarpine will have on heart rate.

Your answer : b. Pilocarpine will decrease heart rate.

Predict Question 2: Atropine is another cholinergic drug, an acetylcholine antagonist. Predict the effect that atropine will have on heart rate.

Your answer : a. Atropine will increase heart rate.

Stop & Think Questions:

Which of the following is true of epinephrine?

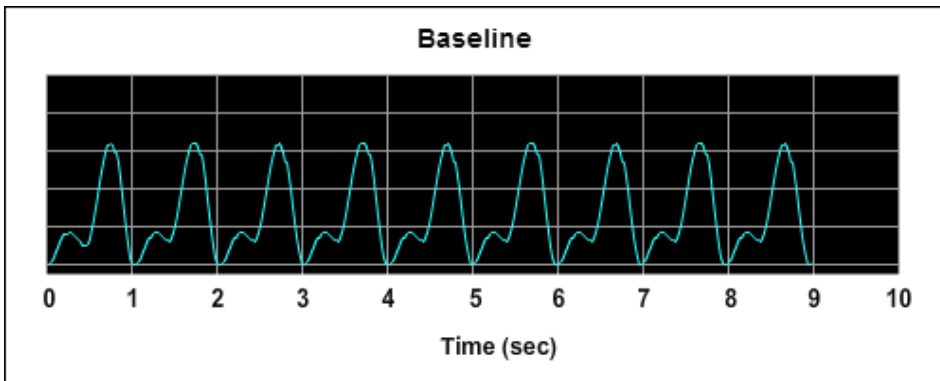
You correctly answered: c. It increases the heart rate and mimics the sympathetic nervous system.

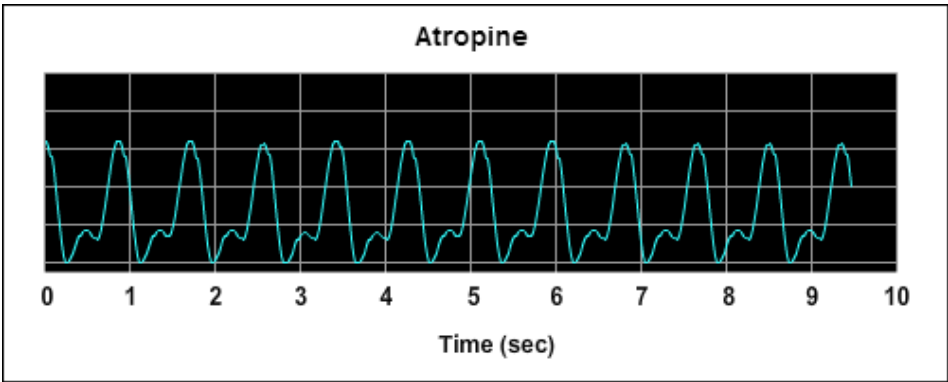
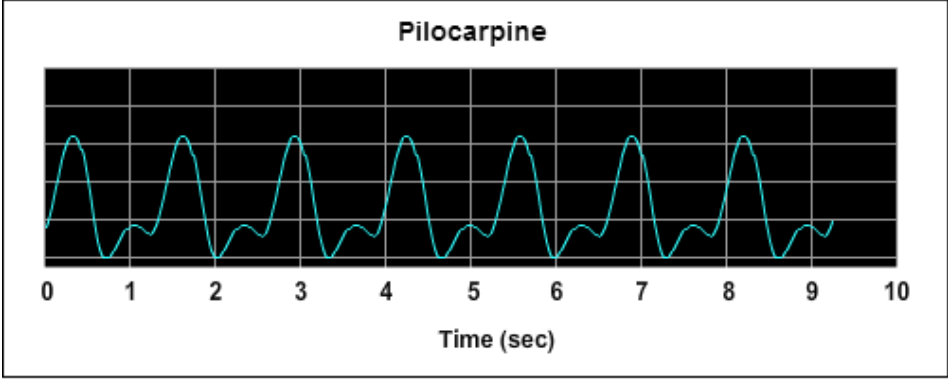
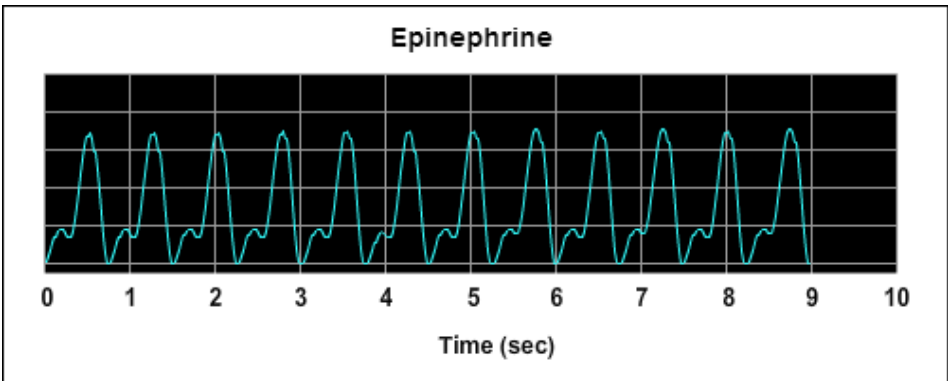
The final chemical modifier we will look at is digitalis (also known as digoxin and digitoxin and derived from the foxglove plant). Individuals with weakened hearts need to allow maximum time for venous return and increased stroke volume and would therefore most likely benefit from

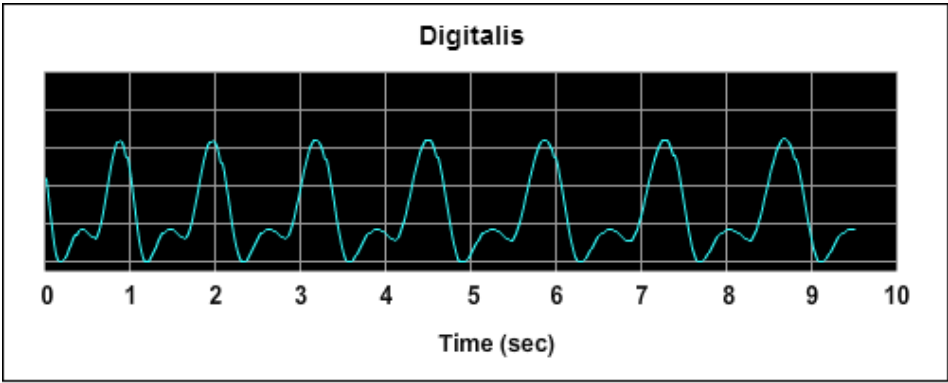
You correctly answered: c. increased force of contraction and decreased heart rate

Experiment Data:

Solution	Heart Rate
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Epinephrine	78
Pilocarpine	44
Atropine	69
Digitalis	41







## Post-lab Quiz Results

You scored 100% by answering 4 out of 4 questions correctly.

1. Pilocarpine decreased the heart rate. Typical of cholinergic agonists, it  
You correctly answered: b. decreased the frequency of action potentials.

2. The effect of atropine was to  
You correctly answered: c. mimic the sympathetic nervous system.

3. The modifiers tested that decrease the heart rate were  
You correctly answered: c. digitalis and pilocarpine.

4. To increase the heart rate, the best choices would be  
You correctly answered: b. epinephrine and atropine.

## Review Sheet Results

1. Describe the effect that pilocarpine had on the heart and why it had this effect. How well did the results compare with your prediction?

Your answer:

Pilocarpine is a cholinergic drug, an acetylcholine agonist released by the parasympathetic nerve fibers. The acetylcholine decreases the action potential by binding up the muscarinic cholinergic receptors. This would decrease the heart rate. It went from a normal rate of 59 to 44.

2. Atropine is an acetylcholine antagonist. Does atropine inhibit or enhance the effects of acetylcholine? Describe your results and how they correlate with how the drug works. How well did the results compare with your prediction?

Your answer:

The atropine inhibits the effect of acetylcholine as evidenced by the increase of heart rate from 59 to 69. Since atropine is an acetylcholine antagonist it worked opposite to the acetylcholine thus increasing heart rate. My prediction is correct since the atropine caused an increase in the frog heart rate.

3. Describe the benefits of administering digitalis.

Your answer:

Digitalis is used to bolster a weak heart in congestive heart failure. People with a bad heart need to have maximum time for the venous return and increased stroke volume, and would benefit from increased force of contraction and decreased heart rate caused by digitalis.

4. Distinguish between cholinergic and adrenergic chemical modifiers. Include examples of each in your discussion.

Your answer:

Cholinergic is a chemical modifier that mimic, inhibit or enhance the action of acetylcholine. Some cholinergic chemical modifiers are nicotinic and muscarinic. Adrenergic is a chemical modifier that mimic, inhibit or enhance the action of epinephrine. Some examples are albuterol, norepinephrine and epinephrine