

Homeostasis: It's All A Matter of Balance

60 pts.

Background Information:

Homeostasis is the process by which the internal environment of the body is kept relatively stable despite changes in the external environment. Typically, we understand that our body's ability to regulate temperature is very important. Our body has a normal "set point" for its temperature, which varies slightly from person to person. We often forget that the body regulates its internal environment in many ways. The body senses changes in the environment and responds by making changes in functions. This is a dynamic process that keeps the internal conditions of the body relatively stable.

The body can adapt to many changing conditions, but there are limits to these conditions. The body's cells will not function well if they are too cold or too hot, our heart rates cannot endlessly increase and we cannot lose excessive water without putting our cells, tissues and organs at risk. As a result, reaching or exceeding these limits can be dangerous, so our body tends to function within certain normal ranges.

Using temperature as an example, we know that the hypothalamus in the brain can act as a thermostat and control the body's functioning to regulate temperature to keep us from overheating or getting too cold. The hypothalamus causes changes in the size of blood vessels in the skin, which then has a direct impact on the amount of heat lost or retained by the body. Most systems of the body maintain homeostasis by means of negative feedback mechanisms, which reverse a response back to a normal state.

There are many examples of this type of regulation in the body, which involve various body systems. The following activity will assist you in gaining a basic understanding of homeostasis as a regulatory process that is more than just temperature.

Procedure for temperature and heart rate:

1. Answer the pre-activity questions and make predictions. (5 pts. each: total 10 pts.)
2. Take baseline data for 1 min.. on a resting individual.
3. Have the same individual do jumping jacks or step-ups for 3 min., then rest for 1 min. Record data for the entire 5 min.
4. Place all of your graphs in the lab report with an analysis of each graph. (5 pts. each: total 10 pts.)
5. Answer the post-activity questions and make conclusions about homeostasis. (5 pts. each: total 10 pts.)

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Procedure for EKG and Blood Pressure:

1. Answer the pre-activity questions and make predictions. (5 pts. each: total 10 pts.)
 2. Take one reading on a resting individual.
 3. Have the same individual do jumping jacks or step-ups for 3 min. and take a second reading.
 4. Have the individual sit for a minute, then take a third reading.
 5. Place all of your graphs in the lab report with an analysis of each graph. (5 pts. each: total 10 pts.)
 6. Answer the post-activity questions and make conclusions about homeostasis. (5 pts. each: total 10 pts.)
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Pre-Activity Questions for Temperature : For each physiological process being monitored: heart rate, skin temperature, and blood pressure, predict the following:

1. Predict the baseline rate/ measurement.
2. What do you expect to happen to the volunteer's rate/ measurement during jumping jacks/ step-ups? Why?
3. What do you expect to happen during the minute after the jumping jacks?

Paste graphs for Temperature:

Post-Activity Questions for Temperature: For each physiological response, compare the volunteer's rate/measurement with the set point range for this physiological process. Explain how and why the rate/ measurement changes during exercise and relaxation to maintain homeostasis.

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Pre-Activity Questions for Heart Rate : For each physiological process being monitored: heart rate, skin temperature, and blood pressure, predict the following:

1. Predict the baseline rate/ measurement.
2. What do you expect to happen to the volunteer's rate/ measurement during jumping jacks/ step-ups? Why?
3. What do you expect to happen during the minute after the jumping jacks?

Paste graphs for Heart Rate:

Post-Activity Questions for Heart Rate: For each physiological response, compare the volunteer's rate/measurement with the set point range for this physiological process. Explain how and why the rate/ measurement changes during exercise and relaxation to maintain homeostasis.

Pre-Activity Questions for EKG : For each physiological process being monitored: heart rate, skin temperature, and blood pressure, predict the following:

1. Predict the baseline rate/ measurement.
2. What do you expect to happen to the volunteer's rate/ measurement during jumping jacks/ step-ups? Why?
3. What do you expect to happen during the minute after the jumping jacks?

Paste graphs for EKG:

Post-Activity Questions for EKG: For each physiological response, compare the volunteer's rate/measurement with the set point range for this physiological process. Explain how and why the rate/ measurement changes during exercise and relaxation to maintain homeostasis.

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Pre-Activity Questions for Blood Pressure : For each physiological process being monitored: heart rate, skin temperature, and blood pressure, predict the following:

1. Predict the baseline rate/ measurement.
2. What do you expect to happen to the volunteer's rate/ measurement during jumping jacks/ step-ups? Why?
3. What do you expect to happen during the minute after the jumping jacks?

Paste graphs for Blood Pressure:

Post-Activity Questions for Blood Pressure: For each physiological response, compare the volunteer's rate/measurement with the set point range for this physiological process. Explain how and why the rate/ measurement changes during exercise and relaxation to maintain homeostasis.