

Homeostasis Lab

The Effects of Exercise on Homeostasis

Living things maintain a stable internal environment. All organisms need to keep their internal environment relatively stable, even when external conditions change dramatically. This condition is called **homeostasis**. (Miller & Levine, Biology) In this activity you will be identifying the conditions in the human body that help you stay constant. Additionally, you will describe how organisms maintain stable internal conditions while living in changing external environments.

Exercise causes many factors of homeostasis to kick in. Some of these conditions include:

- Change in skin color
- Perspiration level
- External/surface level body temperature
- Breathing rate
- Heart rate

In this lab activity, you will be observing and collecting data on the above factors while a subject undergoes exercise.

Materials needed:

- Classroom chair for exercise
- Stopwatch
- Vernier Lab Quest
- Vernier Temperature Probe

Procedure:

1. Working in groups of 4, select a student that will be the “exerciser” and will be able to maintain exercise for 8-10 minutes at a steady pace. This person will stop every 2 minutes for measurements and observations, but otherwise will be doing step-ups. Select group members for the following jobs:
 - a. Timer – will keep time for all exercising
 - b. Recorder – will record all data into the data charts
 - c. Measurer - will be responsible for taking/helping with observations of the exerciser

2. Record the resting observations and values of the exerciser at rest in table 1 below.

Data Table 1

Homeostasis Factor	Result for Exerciser
Skin Color	

(pale, pink, red)	
Perspiration level (none, mild, medium, high)	
External body temperature (using probe)	
Breathing rate (number of breaths in 1 min)	
Heart rate (pulse at wrist/neck in 1 min)	

3. Once all resting vitals have been recorded above, the exerciser will begin doing step ups at constant rate on the chair. The timer will time the exercise and let the group know when the first 2 minutes have gone by. After the first 2 minutes **quickly** make observations, measurements and record them on **Data table 2**.
4. The Exerciser will continue step-ups at 2-minute intervals until the 8-minute time period has been completed. After each 2-minute interval observations and measurements should be made as quickly as possible.
5. When the 8 minutes is up, the exerciser will rest for 1 minute. After 1 minute, observations and measurements will be taken for the final time. Record data in Data Table 2.
6. Make a separate graph for each of the following:
 - **External Body Temperature at Various Intervals of Exercise**
 - **Breathing Rate at Various Intervals of Exercise**
 - **Heart Rate at Various Intervals of Exercise**
7. Answer the questions in the conclusion section to describe and explain the results of the lab.
8. Once graphs and questions are answered, follow the directions provided to put all information from this lab into your Biology Lab Notebook.

Data Table 2

Time Intervals	Skin Color	Perspiration Level	External Body Temperature	Breathing Rate	Heart Rate
Rest					
2 Minutes					
4 Minutes					
6 Minutes					
8 Minutes					
Rest After Exercise 1 Minute					

Questions/Conclusion:

1. What are the changes you observed in the body color and perspiration level in response to?
2. How do the changes help the body adjust to maintain equilibrium (homeostasis)?
3. Why do you think a change in body temperature occurs?
4. Your body uses which mechanisms to maintain a constant body temperature?
5. Why does an increased breathing rate accompany exercise?
6. Why does an increased heart rate accompany exercise?
7. Using the answers to the above questions and some minor research, construct a conclusion about your body's ability to maintain equilibrium (homeostasis).
8. Complete your lab notebook protocol for this lab.