

Investigating Pulse Rate

Lab 14

Background

The heart pumps blood through blood vessels to all parts of the body. With each contraction of the heart, blood is forced into the arteries. This surge of pressure is felt in the arteries as the *pulse*. The rhythmic pulse can be felt any place where an artery is close to the surface of the body and can be pressed against some firm tissue.

The pulse rate is exactly equal to the heartbeat rate. Medical personnel use the pulse rate as one indication of how the heart is functioning. Heart rate is influenced by many things, such as age, sex, physiological state, psychological state, and temperature. In this activity you will investigate how several of these factors influence the pulse rate.

Objectives

In this activity, you will:

1. Feel a pulse and determine pulse rates.
2. Determine the effect on pulse rate of standing at attention, holding your breath, breathing into a bag, deep breathing, and exercise.
3. Make a line graph to show the effect of exercise on pulse rate.

Materials

clock or watch with second hand
paper bags

Procedures and Observations

Work in pairs. Throughout this activity you and your partner will take turns being the subject and the experimenter. First you must learn how to take a pulse.

1. Study Figure 1 to see how to locate the pulse in your partner's wrist.

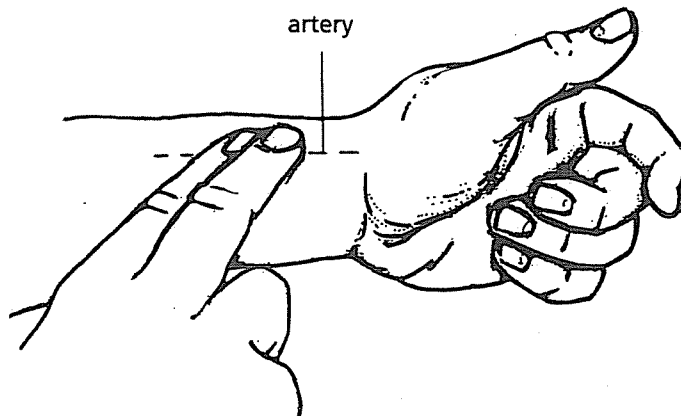


Figure 1

2. After you have sat quietly for 1 minute, have your partner count your pulse for 15 seconds.
 - a. Record this number in Table 1. Determine your pulse rate for 1 minute by multiplying the number by 4. Then record your pulse rate per minute in Table 1.

Table 1. Determining Resting Pulse Rate

Trial	Pulse rate/15 sec.	Pulse rate/min.
1		
2		
3		

3. Repeat Step 2 two more times. Then switch roles with your partner.
 - b. Record the results in Table 1 and then determine your average resting pulse rate per minute. Record your average resting pulse rate in Table 2 and on the chart on the board according to your sex.
4. The subject should stand stiffly at attention for 2 minutes. Then, while the subject is still standing at attention, the pulse should be taken by the experimenter for 15 seconds. Switch roles.
 - c. Determine your pulse rate per minute by multiplying this number by 4. Record your at-attention pulse rate in Table 2 and on the board.

Table 2. Effect of Activity on Pulse Rate

Activity	Your Pulse rate/min.	Average Female Pulse rate/min.	Average Male Pulse rate/min.
resting			
standing at attention			
holding breath			
breathing into paper bag			
breathing deeply			
exercise			
exercise (1 min after)			
exercise (2 min after)			
exercise (3 min after)			
exercise (4 min after)			
exercise (5 min after)			
exercise (6 min after)			

5. While seated, the subject should take a deep breath, exhale part of it, and hold the breath as long as possible. While breath is being held, the subject's pulse should be taken by the experimenter for 15 seconds. Then switch roles.
 - d. Determine your pulse rate per minute by multiplying this number by 4. Record your breath-holding pulse rate in Table 2 and on the board.

Investigating Pulse Rate (continued)

6. While seated, the subject should hold an open paper bag tightly over the mouth. Do not breathe through the nose. The subject should breathe through the mouth from the air in the bag for 2 minutes. Toward the end of the second minute, the pulse of the subject should be taken by the experimenter for 15 seconds. Then switch roles.

e. *Determine your pulse rate per minute by multiplying this number by 4. Record your breathing-into-bag pulse rate in Table 2 and on the board.*

7. While seated, the subject should take deep breaths regularly for 30 seconds. After the first 15 seconds, the pulse of the subject should be taken by the experimenter for the remaining 15 seconds of deep breathing. Then switch roles.

Note: *If you become lightheaded while taking deep breaths, hold your breath for a few seconds.*

f. *Determine your pulse rate per minute by multiplying this number by 4. Record your deep-breathing pulse rate in Table 2 and on the board.*

The time needed for your pulse to return to the sitting pulse rate is called recovery time.

8. The subject should step up and down from a sturdy chair, run in place or do jumping jacks for one minute. Immediately after exercise, the subject should sit and the pulse should be taken for 15 seconds. Then it should be taken again after 45 seconds, so that a 15 second pulse is taken every minute for 6 minutes. Switch roles.

g. *Determine each pulse rate per minute by multiplying the numbers by 4. Record your after-exercise pulse rates in Table 2 and on the board.*

h. *Determine the class pulse rate averages for males and females in each activity and record them in Table 2.*

Analysis and Interpretations

1. How does your resting pulse rate compare with the average for your sex? What is illustrated by any difference between your resting pulse rate and the average?

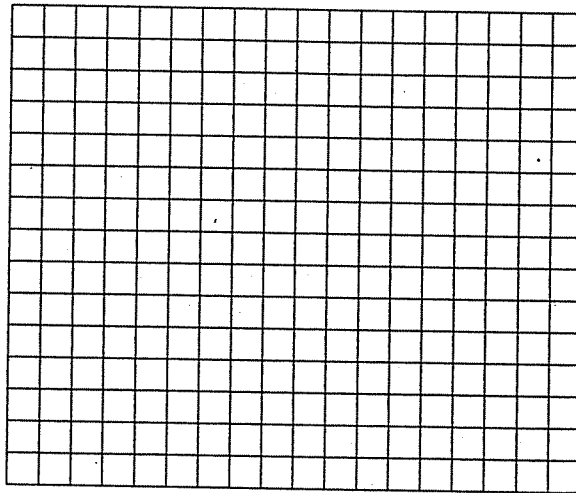
2. Why did you take a resting pulse rate?

3. Why do you think that holding your breath or breathing into a bag affects the pulse rate?

4. Which activity increased your pulse rate the most? What does this increase indicate?

5. What do you think is the relationship between physical condition and pulse rate after exercise? Between physical condition and recovery time?

6. Construct a line graph to show what happens to your pulse rate after exercise. Put pulse rate per minute on the vertical axis and time in minutes on the horizontal axis.



7. Why do athletes often have a lower pulse rate than nonathletes?

Computer Activity

In Laboratory Experiment 14, you investigated the effects of physical activity on your resting pulse rate. The computer program called *Cardiovascular Fitness Lab* uses a light probe to automatically monitor your pulse rate during exercise or while at rest.