

APPENDIX C

Skills Lab 2 - Respiratory System

Part A: The Mechanics of Breathing

In this activity you are going to listen to your partner's chest while they breathe in and out deeply and slowly. Different sounds can be heard in different locations. The stethoscope may also be placed on the back to listen to the lungs. For normal lungs, you should hear only the rush of air into and out of the lungs. Abnormal lung sounds include crackles and wheezes. If the lung rubs on the chest wall, there may be friction rubs. Crackles sound like a sheet of paper being crushed. They indicate that there is fluid in the lungs. Wheezes are high-pitched whistling noises. Friction rubs are squeaky sounds that you might expect when two objects are rubbed together.

Purpose: To study gas exchange in humans.

Materials: stethoscope, measuring tape, rubbing alcohol, cotton balls

Safety: If you have any indication of an ear infection, do not use the stethoscope.

Method:

1. Sterilize the earpieces of the stethoscope by rubbing them with a cotton ball dipped in alcohol and air dry.
2. After a full INHALATION, use a tape measure and record the circumference of the chest at the fifth rib and the circumferences of the abdomen at the umbilicus (belly button).
3. After a full EXHALATION, use a tape measure and record the circumference of the chest at the fifth rib and the circumference of the abdomen at the umbilicus (belly button).
4. Place the bell of a stethoscope on the trachea of the subject and record your observations when the subject inhales, exhales and swallows.
5. Place the bell of a stethoscope on the back of the subject and record the sounds you hear as you move the bell to various locations as the subject breathes deeply.
6. Sterilize the earpieces.

Observations:

INHALATION		EXHALATION	
Circumference at 5 th rib (cm)	Circumference at umbilicus (cm)	Circumference at 5 th rib (cm)	Circumference at umbilicus (cm)

Inhalation sounds	Exhalation sounds	Swallowing sounds	Back sounds

Conclusions:

1. What happened to the size of the chest during inhalation? Exhalation?
2. Explain the sounds you heard when the subject swallowed.
3. How did the sounds compare on the front and back of the subject?

Part B: Lung Volume and Capacity

The volume of air that moves in and out of the lungs at each breath can vary widely, depending on your level of activity. These volumes can be defined and measured.

- Tidal volume – the volume of air inhaled or exhaled during normal, quiet breathing
- Inspiratory Reserve Volume – the additional volume of air that can be forcibly inhaled after a normal (“tidal”) inhalation
- Expiratory Reserve Volume – the additional volume of air that can be forcibly exhaled after a normal (“tidal”) exhalation
- Vital Capacity – the total volume of air that can be moved in and out of the lungs
- Residual Volume – the volume of air remaining in the lungs after a full exhalation (this gas never leaves the lungs)

Purpose: To find your different lung volumes.

Materials: spirometer, mouthpieces, rubbing alcohol, cotton balls

- Method:
1. Sterilize the mouthpieces by rubbing them with a cotton ball dipped in alcohol and air dry.
 2. Set the gauge to zero before you place a sterilized mouthpiece in the spirometer.
 2. Be careful not to inhale at any time through the mouthpiece. Develop a regular, relaxed breathing pattern so you will obtain accurate results. After inhaling normally, place the mouthpiece attached to the spirometer in your mouth and exhale normally. Read the gauge on the spirometer and record the volume as your **tidal volume**.
 3. Reset the spirometer to zero. Inhale normally, then place the mouthpiece attached to the spirometer in your mouth and exhale normally. Read the gauge on the spirometer and then exhale forcibly. Record the difference as your **expiratory reserve volume**.
 4. Reset the spirometer to zero. Inhale as much air as possible and then exhale for as long as your can into the spirometer. Read the gauge on the spirometer and record as your **vital capacity**.
 5. Collect data from two other students and record them in your data table.
 6. Sterilize the mouthpieces.

Observations:

Student Name	Tidal volume (L)	Expiratory Reserve Volume (L)	Vital Capacity (L)

Conclusions:

1. Determine your **inspiratory reserve volume** by using the following formula:
Vital Capacity = Tidal Volume + Inspiratory Reserve Volume + Expiratory Reserve Volume
2. How did your values compare to the other two students from your class?
3. Can you account for differences in your results?