

Unit 2, Lab 5

PTA/OTA 106 Regional Anatomy and Physiology

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1. TRACHEA:

Carina Tracheal cartilage (hyaline) Trachealis muscle

2. BRONCHI: (Left & Right Side)

Primary bronchi Secondary bronchi Tertiary bronchi
Bronchioles Terminal bronchioles Respiratory bronchioles
Alveolar ducts

3. LUNGS: (Left & Right)

(EXTERNAL ANATOMY)

Apex Base Hilus
Horizontal fissure Inferior lobe Middle lobe
Oblique fissure Pulmonary arteries Pulmonary veins
Superior lobe Parietal pleura Visceral pleura

(INTERNAL ANATOMY)

Alveolar ducts Alveolar sacs Alveolus
Lobules Respiratory bronchioles Surfactant
"Type 1" Alveolar cells "Type 2" Alveolar cells

4. RESPIRATORY MUSCLES:

Principal Muscles of Inspiration:

Diaphragm

Accessory Muscles of Inspiration:

External intercostals Pectoralis minor Scalenes
Sternocleidomastoid

Principal muscles of expiration:

No active muscles- Diaphragm relaxes

Muscles of Expiration:

External Obliques Internal Intercostals Internal Obliques
Rectus Abdominus Transversus Abdominus

5. Lung Model:

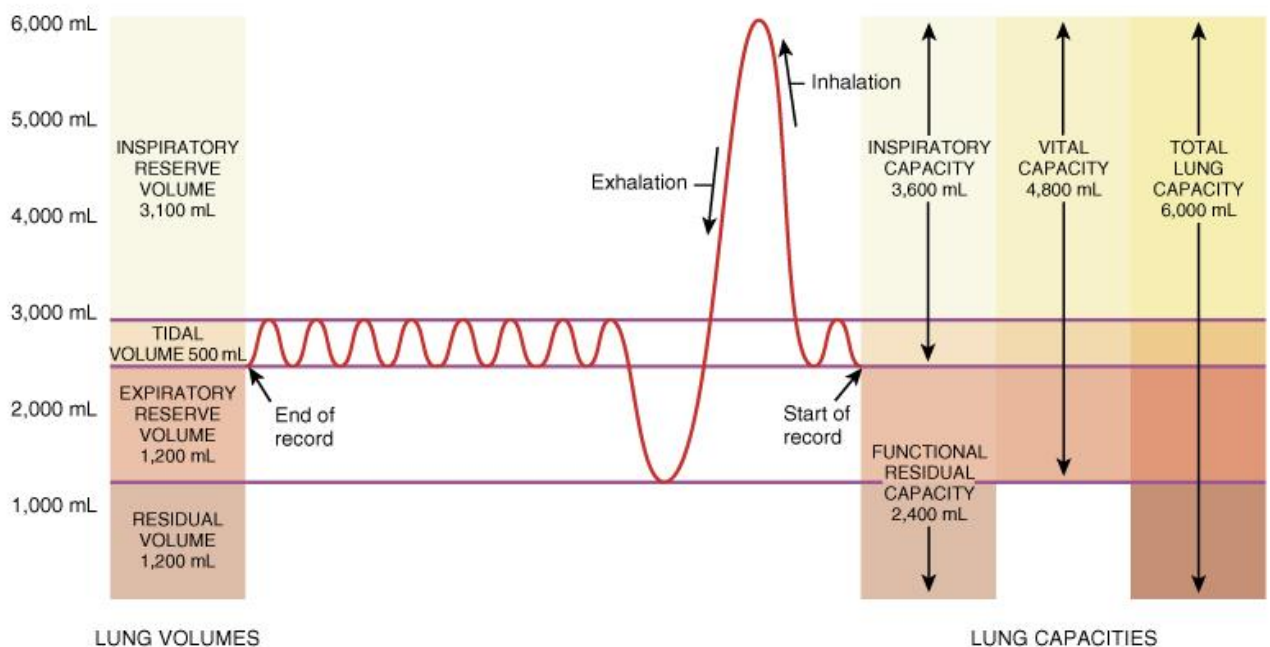
Observe the lung model. The model consists of a glass bell jar with a Heavy plastic or rubber sheet covering the wide open end. The narrow upper opening is plugged with a rubber stopper through which a Y glass tube is passed. Small red balloons are fastened to the arms of the "Y" tube.

a.) What happens to the balloons when the bottom sheet is pulled downward?

b.) What happens when the sheet is pushed upward?

- c.) Use Volume and Pressure changes to explain why the above changes occurred.
- d.) What parts of the respiratory system are presented by these structural parts of the model?
- 1.) Rubber or Plastic sheet?
 - 2.) Bell Jar?
 - 3.) "Y" tube?
 - 4.) Red balloons?
- e.) What type of breathing can be demonstrated with the model?
- f.) What type of breathing can not be demonstrated with the model?

Graphic Representation of Respiratory Volumes and Capacities.



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6. Respiratory air volumes and capacities:

1. Review figure demonstrating the graphic representation of the respiratory volumes and capacities.
2. Obtain a handheld spirometer.
3. Set the needle to zero by rotating the adjustable dial.
4. Before using the spirometer, clean the mouthpiece stub with an alcohol wipe.

5. Obtain a new disposable mouthpiece and place it on the stub.
6. Keep in mind and the spirometer only measures expired air.
7. **Measure tidal volume (TV):** Tidal volume is the amount of air that enters and exits the lungs during normal quiet breathing.
 - a. Sit quietly for a few moments.
 - b. Make sure spirometer is set to zero.
 - c. Place mouthpiece between your lips and exhale 3 ordinary expirations. Breathe in through your nose and out through the mouthpiece.
 - d. Divide the total volume indicated by the needle by 3 to calculate Tidal Volume

Total volume from 3 expirations: _____

Tidal Volume: _____

- e. To calculate the total volume of air exchanged for a minute (minute respiratory volume, MRV), you need to determine the numbers of breathes per minute and then multiply by your tidal Volume from above.

Breathes/Minute: _____ MRV: _____

8. **Measure Expiratory Reserve Volume (ERV):** Expiratory Reserve Volume is the volume of air in addition to the tidal volume that leaves the lungs during forced expiration.
 - a. Breathe normally for a few moments. Set spirometer needle to zero.
 - b. Place mouthpiece in your mouth. At the end of a normal tidal expiration, exhale all of the air you can from your lungs through the spirometer.
 - c. Repeat 3 times and calculate an average.

ERV 1 _____ ERV 2 _____ ERV 3 _____

Average ERV _____

9. **Measure Vital Capacity (VC):** Is the maximum volume of air that can be exchanged by the lungs.
 - a. Breathe normally for a few moments. Set spirometer needle to zero.
 - b. Inhale and exhale as deeply as possible three times.
 - c. Inhale as deeply as possible and place the mouthpiece between your lips and exhale all the air out of your lungs through the spirometer.
 - d. Record results below and compare your results to the value in the tables provided for someone your age and height.

VC _____

10. **Calculate Inspiratory Reserve Volume (IRV):** IRV is the volume of air in addition to a tidal volume that enters your lungs during a forced inspiration. IRV can not be measured by the spirometer. It can be calculate with the following equation.

$$\text{IRV} = \text{VC} - (\text{TV} + \text{ERV}) \quad \text{Your IRV: } \underline{\hspace{2cm}}$$

11. **Calculate Inspiratory Capacity (IC):** IC is the maximum volume of air you can inhale following exhalation of a normal tidal volume. IC can not be measured by the spirometer. It can be calculate with the following equation.

$$\text{IC} = (\text{TV} + \text{IRV}) \quad \text{Your IC: } \underline{\hspace{2cm}}$$

12. **Residual Volume (RV):** RV is the volume of dead air that can not be exchanged from the lungs. Why do your lungs have this volume??