



Lung Capacity Lab

Subtitle



Tital vs Vital

- Vital lung capacity is the maximum amount of air that one person can expel after maximum inhalation
- Vital lung capacity is equivalent to the sum of inspiratory reserve volume, tidal volume, and expiratory reserve volume.
- Tidal volume is the amount of air that is inhaled or exhaled in one breath

What are some factors
affecting Lung
Capacity?



Size


- Tall person vs Short Person

- Diaphragm is larger in a tall person
- Usually total oxygen in take is larger in tall person



Altitude

- A person who is born and lives at sea level will develop a slightly smaller lung capacity than a person who spends their life at a high altitude. This is because the partial pressure of oxygen is lower at higher altitude which, as a result means that oxygen less readily diffuses into the bloodstream. In response to higher altitude, the body's diffusing capacity increases in order to process more air.
- When someone living at or near sea level travels to locations at high altitudes (e.g., the Andes; Denver, CO; Tibet; or the Himalayas) that person can develop a condition called altitude sickness because their lungs remove adequate amounts of carbon dioxide but they do not take in enough oxygen. (In normal individuals, carbon dioxide is the primary determinant of respiratory drive.)



Do Athletes have a larger lung capacity than non-athletes?

- High-intensity aerobic activities, like swimming, strengthen your heart and lungs, increase delivery of oxygen and make your muscles' use of oxygen more efficient.
- The full amount of oxygen you can take in during exercise can be greatly improved by interval training, which involves exercising at maximum effort for a short amount of time -- anywhere from 20 seconds to five minutes -- recovering with less intense exercise and repeating the sequence several times.
- Drinking water helps thin mucus that can build up in the lungs and hinder healthy breathing.



Drugs

- Some drugs kill alveoli which allow for gas (O₂ and CO₂) exchange
- Other drugs may inhibit the part of the brain that controls breathing and cause lung damage



Asthma or Other Medical Conditions

- Asthma as a common syndrome that presents as a physiologic dysfunction of the lung characterized by airflow limitation and airways hyperresponsiveness (AHR).
- When you have *asthma*, there is always inflammation in your airways. Left uncontrolled, this inflammation can make your lungs more sensitive to common triggers like dust, pollen, and smoke. When your lungs react to these triggers, muscles around the airways can tighten, which can cause your asthma symptoms to come back.



Pregnancy

- Specific changes in lung volumes also occur during pregnancy. Functional residual capacity drops 18–20%, typically falling from 1.7 to 1.35 liters, due to the compression of the diaphragm by the uterus. The compression also causes a decreased total lung capacity (TLC) by 5% and decreased expiratory reserve volume by 20%. Tidal volume increases by 30–40%, from 0.5 to 0.7 liters, and minute ventilation by 30–40% giving an increase in pulmonary ventilation. This is necessary to meet the increased oxygen requirement of the body, which reaches 50 mL/min, 20 mL of which goes to reproductive tissues. Overall, the net change in maximum breathing capacity is zero.



Musicians

- Good lung capacity allows musicians to take in a large amount of air to expel for a complex line of music or song

Deep Breathing:

- Most people breathe through their noses and mouths irregularly, taking shallow and inefficient breaths into their chest. The easiest way to improve lung capacity is to focus on your breathing throughout the day. When at rest, make sure you are breathing in slowly and deeply through your nose, expanding your diaphragm and not your chest. This is the most efficient way to breathe, because it utilizes more lung capacity in a regular pattern. Because of its concentration on constant deep breathing, yoga is a great exercise for athletes and musicians to practice.



Conclusion

1. What is the difference between experimental Vital Capacity (VC) and formula VC? Why?
2. What is the difference in VC between a tall and short person? Why?
3. What is the difference in VC between an athlete and non-athlete? Why?
4. What does altitude have to do with VC? Explain a person living at high altitude vs a person living at low altitude?
5. How do musicians have good lung capacities?
6. How does drugs affect lung capacity?
7. How does pregnancy affect lung capacity?



Measuring Lung Capacity

- Using the Balloon Method: Using the balloon method of measuring Vital and Tital lung capacity gives a lot of room for mistakes.
- Test results in this way will be less accurate.
- Error consists of the balloon size, whether or not air escapes during measurement, and simply measurement error.

	Group 1	Group 2
Class 1	10	14
Class 2	11	15
Average	10.5	14.5



Obesity

- Obesity impairs ventilatory function in several ways. As BMI rises, typically all lung volumes are reduced while expiratory airflow remains normal. Mechanical effects of obesity on the diaphragm and chest wall lead to impaired diaphragmatic excursion and reduced thoracic compliance. According to the National Heart, Lung, and Blood Institute, screening for a person's risk of developing obesity-related disease includes calculating the BMI, determining if other conditions associated with obesity (such as a sedentary lifestyle or hypertension) exist, and measuring waist circumference to assess for abdominal fat, which predicts the risk of obesity-associated diseases. The risk increases for men with a waist circumference larger than 40 inches and women with a waist circumference larger than 35 inches (nursingcenter.com)