بسم الله الرحمن الرحيم

Lung volumes:

Lung volumes and **lung capacities** refer to the volume of air in the lungs at different phases of the respiratory cycle. The average total lung capacity of an adult human male is about 6 liters' of air. The average human respiratory rate is 30-60 breaths per minute at birth, decreasing to 12-20 breaths per minute in adults. The mass of one breath is approximately (0.5-5g). A Litre of air weighs about 1.2 grams.

Factors Affecting Lung Normal Values:

Age changes affect the lung tissue, muscles and bones, which all impact the breathing. The maximum amount of air the **lungs** can hold—the total **lung capacity**—is about six liters. After about age 35, lungs function declines and as a result, **breathing** can slowly become more difficult over time. Lung volumes vary with different people as follows:

Larger volume	Smaller volumes
taller people	shorter people
people who live at higher altitudes	people who live at lower altitudes
fit	obese

It is possible to approach this subject in list all the possible physiological variables, which affect ventilation. They are Influence of : PaO_2. pH. Pain. Body temperature. Blood pressure. Pregnancy. Exercise. And hyperglycemia.

Factors influence on lung volumes and capacities. Lungs usually reach their maximum in capacity in early adulthood and decline with **age** after that. Lung function reference values are based on anthropometric factors, such as weight, height, sex, and age.

Environmental lung diseases are caused by harmful particles, mists, vapors, or gases that are inhaled, eating **healthy** foods, getting enough sleep, and being active every day can help **keep the respiratory system**, cardiovascular **system** and immune **system** strong. Getting enough exercise makes the lungs stronger and better at giving body the oxygen it needs. To keep the lungs healthy, do the following:

1- Stop smoking and avoid secondhand smoke.
2- Eat foods rich in antioxidants.
3- Get vaccinations like the flu vaccine and the pneumonia vaccine.
4- Exercise more frequently, which can help the lungs function properly.
5- Improve indoor air quality.

Experts believe vitamins A, C, and E—the so-called ACE antioxidants—combat oxidative stress in the lungs. Several studies have shown that these vitamins, as well as vitamin D, may help improve lung health, the damaged lung tissue doesn't repair itself. However, there are things you **can do** to slow the progression of the disease, improve the symptoms, stay out of hospital and live longer. Getting enough water is as important for

the lungs as it is for the rest of the body, keep the mucosal linings in the lungs thin. "This thinner lining helps the lungs function better."

Conscious and Un-conscious control of Respiration:

Conscious breathing is an umbrella term for medical and therapeutic methods that improve the **breathing** function. These methods involve directing awareness to **breathing** and developing habits that improve respiration. Human respiration is **controlled consciously** or unconsciously.

Our breath is the crucial link between our mind and our body. It's the only system in the body that works both consciously and unconsciously. It affects how all our other internal systems work (digestion, the immune system, heart, nerves, brain etc.).

The respiratory center in the brainstem is responsible for controlling a person's breathing rate. It sends a message to the respiratory muscles telling them when to breathe. The medulla, located nearest the spinal cord, directs the spinal cord to maintain breathing, and the pons, a part of the brain very near the medulla, provides further smoothing of the respiration pattern. This control is automatic, involuntary and continuous. There are receptors, called chemoreceptors, in arch of the aorta and throughout the arteries send signals to the respiratory center to increase or decrease the ventilatory output depending on the condition of these metabolic variables.

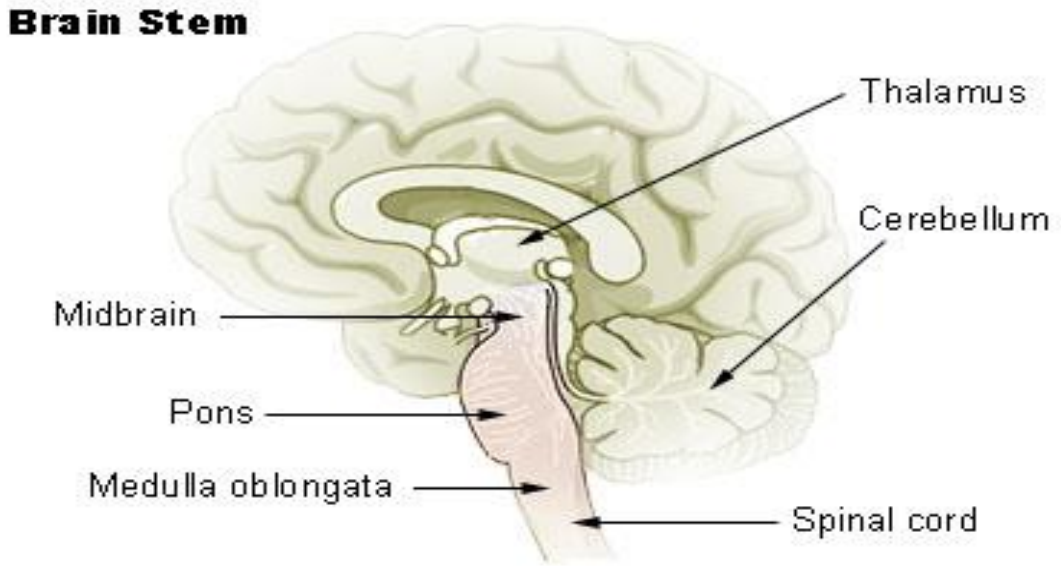
Ventilation facilitates respiration, which refers to the utilization of oxygen and removal of carbon dioxide by the body, or by individual cells in cellular respiration. Under most conditions, the partial pressure of carbon dioxide (PCO2), or concentration of carbon dioxide, controls the respiratory rate.

Role of pons and Medulla in Respiratory Transient:

The respiratory center is located in the medulla oblongata and Pons, in the brainstem. The respiratory center is made up of three

major respiratory groups of neurons, two in the medulla and one in the pons. In the medulla they are the dorsal respiratory group, and the ventral respiratory group. In the pons, the pontine respiratory group includes two areas known as the pneumotaxic centre and the apneustic centre. The respiratory centre is responsible for generating and maintaining the rhythm of respiration. The respiratory center receives input from chemoreceptors, mechanoreceptors, the cerebral cortex, and the hypothalamus in order to regulate the rate and depth of breathing.

Input is stimulated by altered levels of oxygen, carbon dioxide, and pH, by hormonal changes relating to stress, and anxiety from the hypothalamus, and also by signals from the cerebral cortex to give a conscious control of respiration.



Acid-base balance:

Acid-base balance refers to the mechanisms the body uses to keep its fluids close to neutral pH (that is, neither basic nor acidic) so that the body can function normally. The respiratory system contributes to the balance of acids and bases in the body by regulating the blood levels of carbonic acid. CO_2 in the blood readily reacts with water to form carbonic acid. When the

CO_2 level in the blood rises, the excess CO_2 reacts with water to form additional carbonic acid, lowering blood pH. The loss of CO_2 from the body reduces blood levels of carbonic acid and thereby adjusts the pH upward, toward normal levels. Excessive deep and rapid breathing reduces the level of carbonic acid, making the blood too alkaline.

Buffering systems:

Proper physiological functioning depends on a very tight balance between the concentrations of acids and bases in the blood. Acid-balance is measured using the pH scale. A variety of buffering systems permits blood and other bodily fluids to maintain a narrow pH range, even in the face of perturbations. A buffer is a chemical system that prevents a radical change in fluid pH by dampening the change in hydrogen ion concentrations in the case of excess acid or base. The buffer systems in the human body are extremely efficient. It takes only seconds for the chemical buffers in the blood to make adjustments to pH. The respiratory tract can adjust the blood pH upward in minutes by exhaling CO2 from the body. The renal system can also adjust blood pH through the excretion of hydrogen ions (H+), and generating bicarbonate that helps maintain blood plasma pH within a normal range. But this process takes hours to days to have an effect.

Role of body system in the regulation of acid-base balance:

Acid base balance in the human body is essential for all living organisms. PH stands for potential hydrogen and is defined as the Negative logarithm of the concentration of hydrogen ions. PH is measured on a pH scale ranging from 0 to 14. 0 is considered highly acidic, while a pH of 14 is very basic, and a pH of 7 is neutral. The average pH in human blood is about 7.4, and narrowly ranges from 7.35 to 7.45. A slight change outside of this range can be devastating to cells and the entire body. The normal

day activity affects the pH, this includes the air we breathe, the food we eat, and our urine that is excreted. Diet, however, plays a major role in acid base balance in the human body. A healthy diet should consist of about 75% alkaline foods such as vegetables, fruits and non animal proteins. The other 25% of a healthy diet includes acidic foods such as animal proteins (meat), grains, and dairy products. There are three important mechanisms the body uses to regulate PH. The first is a chemical buffer, the second line of defense is the respiratory system, and last, is the urinary system. These three mechanisms work together to keep body pH within that narrow range.