SNS COLLEGE OF NURSING

SARAVANAMPATTI,COIMBATORE-35

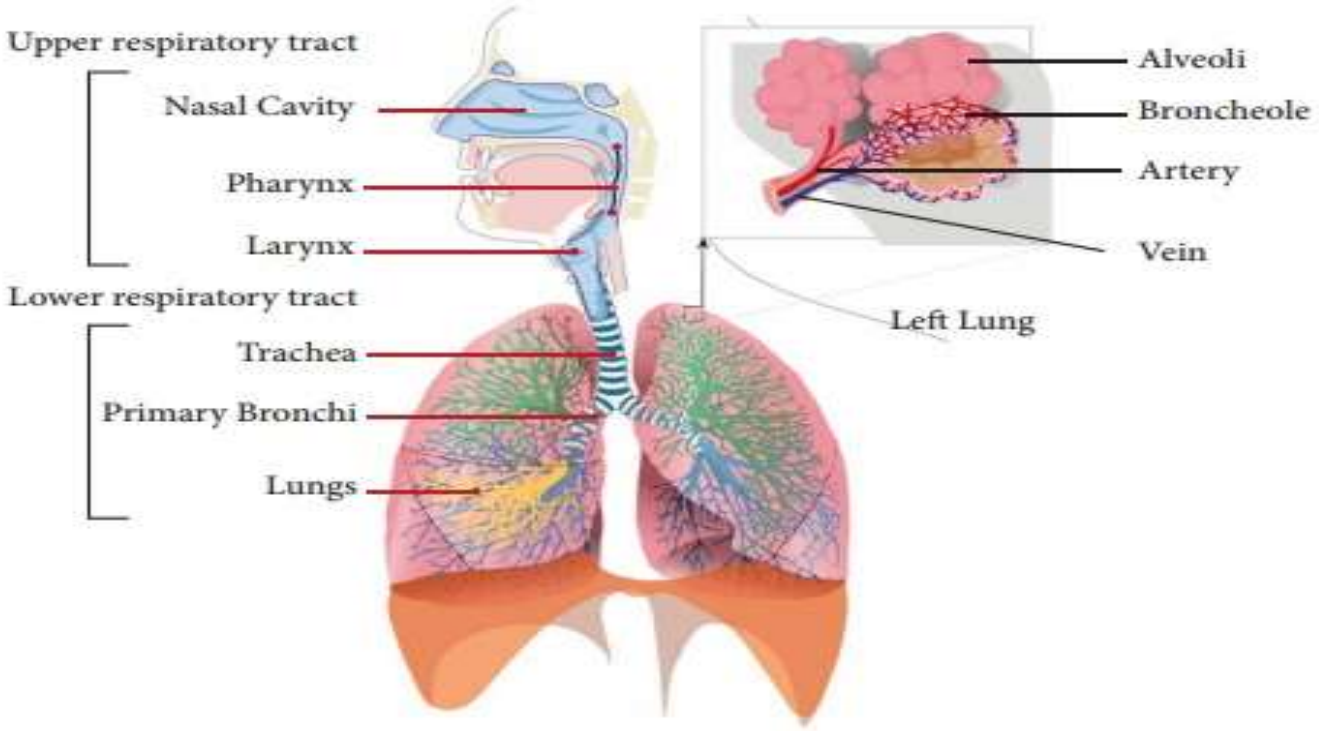
DEPARTMENT OF NURSING

COURSE NAME : BSC (NURSING) I YEAR

SUBJECT : ANATOMY AND PHYSIOLOGY

UNIT II: RESPIRATORY PHYSIOLOGY

THE RESPIRATORY SYSTEM



PHYSIOLOGY

- The respiratory system works with the circulatory system to provide this oxygen and to remove the waste products of metabolism.
- It also helps to regulate pH of the blood.
- Respiration is the sequence of events that results in the exchange of oxygen and carbon dioxide between the atmosphere and the body cells.

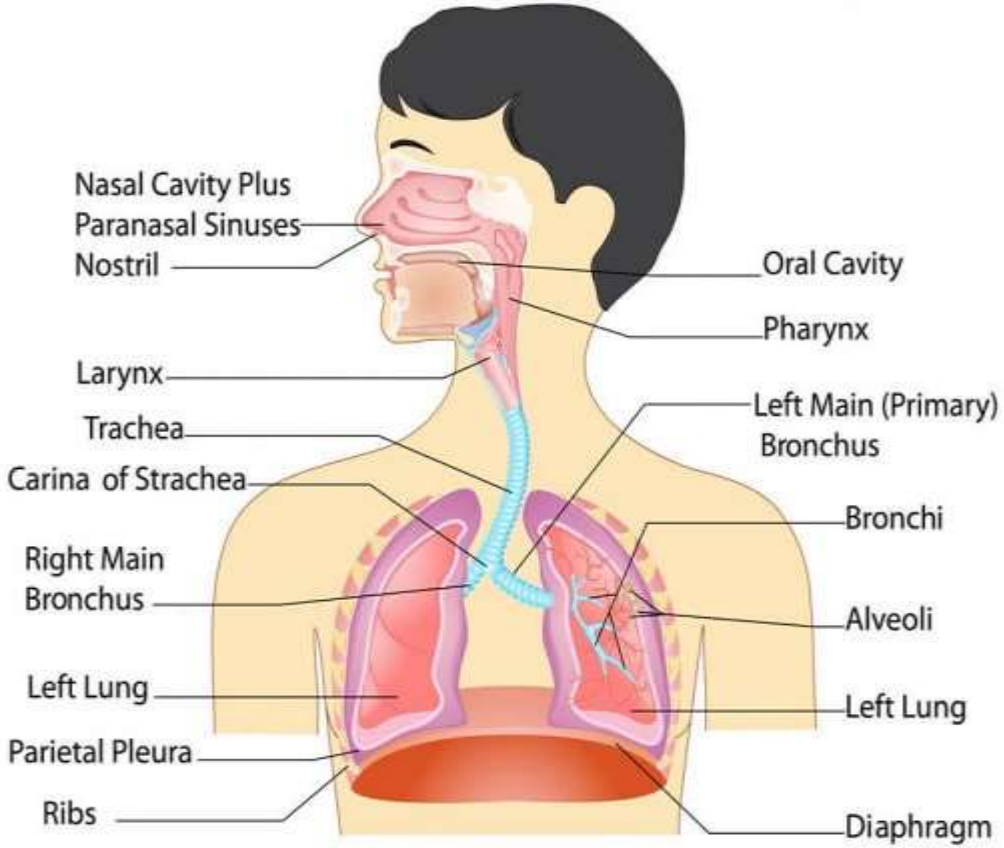
FUNCTIONS OF RESPIRATORY SYSTEM

- **Pulmonary ventilation** Air must move into and out of the lungs so that gasses in the air sacs are continuously refreshed, and this process is commonly called breathing.
- **External respiration.** Gas exchange between the pulmonary blood and alveoli must take place.
- **Respiratory gas transport.** Oxygen and carbon dioxide must be transported to and from the lungs and tissue cells of the body via the bloodstream.
- **Internal respiration.** At systemic capillaries, gas exchanges must be made between the blood and tissue

RESPIRATION

- **Rule.**

- Volume changes lead to pressure changes,
- which lead to the flow of gases to equalize pressure.



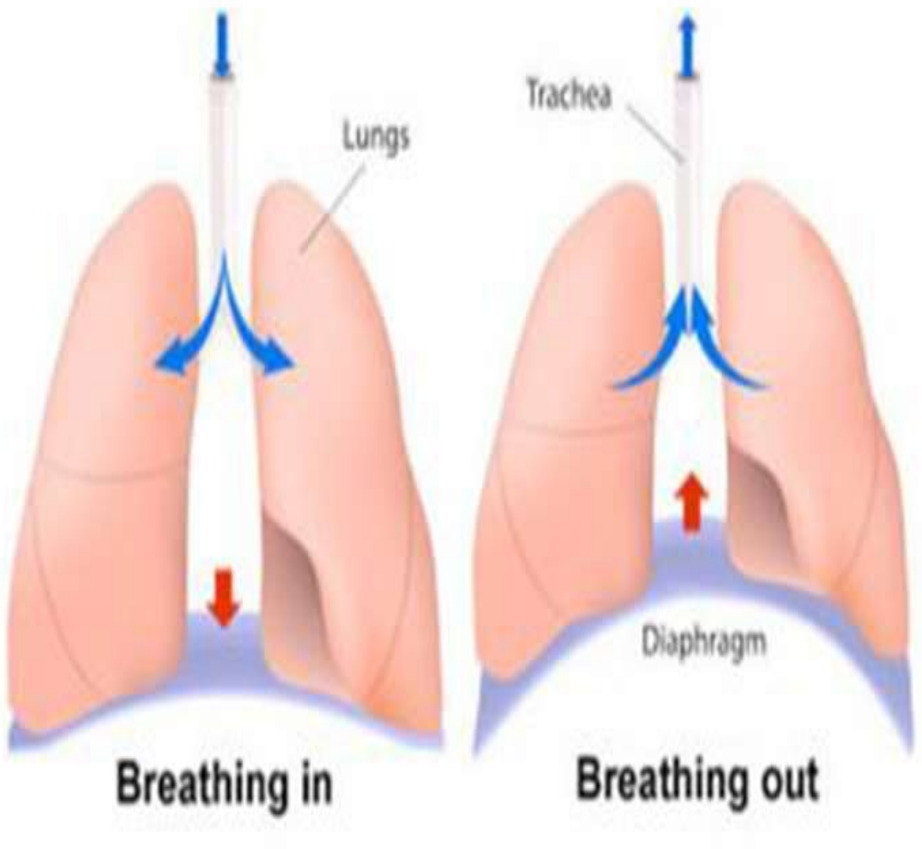
FUNCTIONS OF RESPIRATORY SYSTEM

- **External respiration or pulmonary gas exchange**
  Involves the oxygen being loaded and carbon dioxide being unloaded from the blood.
- **Internal respiration or systemic capillary gas exchange**,
  Oxygen is unloaded and carbon dioxide is loaded into the blood.
- **Gas transport.**

- Oxygen inside the RBCs to form oxyhemoglobin,
- carbon dioxide as bicarbonate ion, or a smaller amount

RESPIRATORY PROCESS

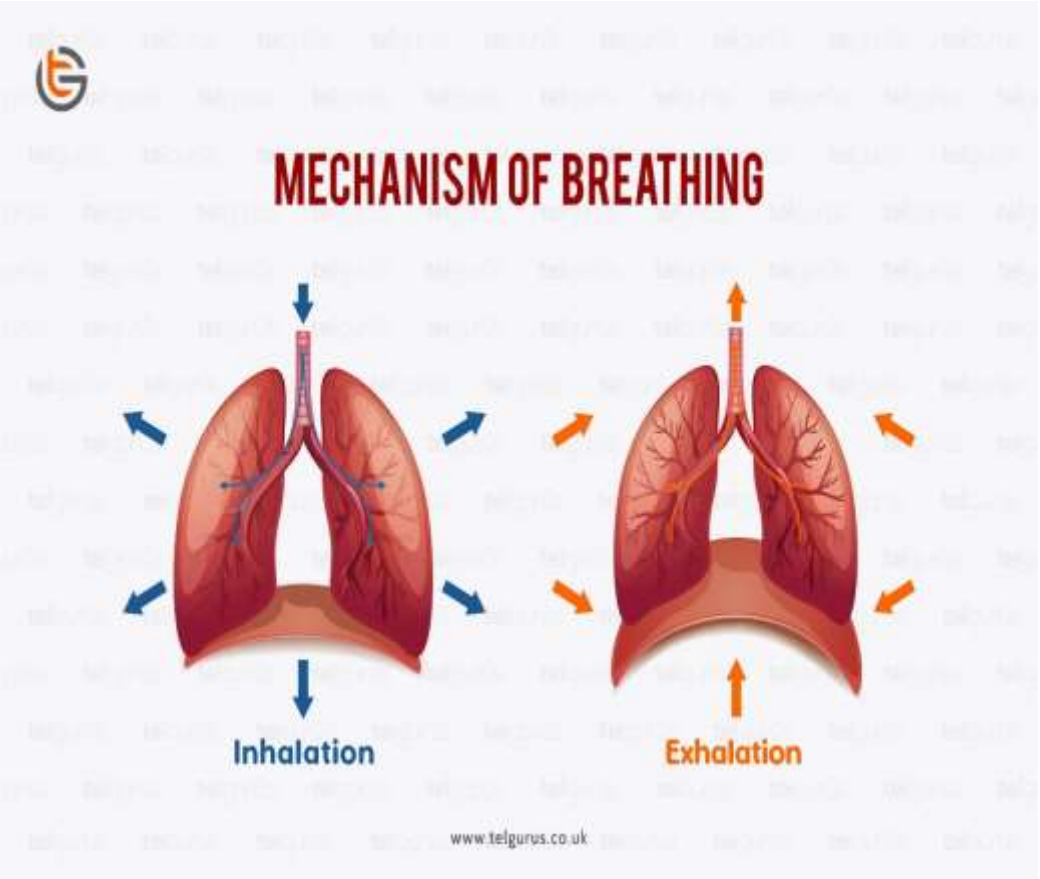
- **Inspiration-** Air is flowing into the lungs;
- chest is expanded laterally,
- the rib cage is elevated, and
- the diaphragm is depressed and flattened;
- lungs are stretched to the larger thoracic volume,
- the intrapulmonary pressure to fall and
- air to flows into the lungs.



RESPIRATORY PROCESS

- **Expiration. -**Air is leaving the lungs;

- the chest is depressed and the lateral dimension is reduced,
- the rib cage is descended, and
- the diaphragm is elevated and dome-shaped;
- lungs recoil to a smaller volume,
- intrapulmonary pressure rises,
- air flows out of the lung.

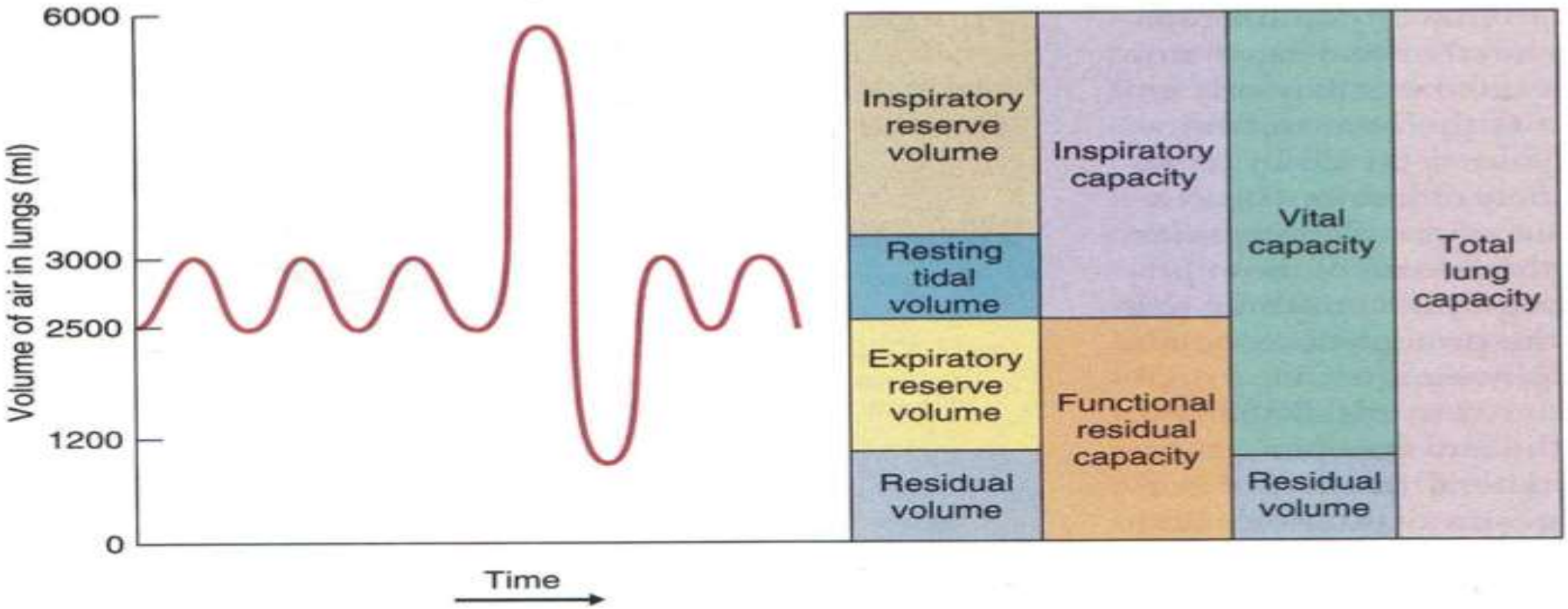


LUNG VOLUMES

- **Tidal volume.(TV)**
- Normal quiet breathing moves **approximately 500 ml** of air into and out of the lungs with each breath.

- **Inspiratory reserve volume.(IRV)**
- The amount of air that can be taken in forcibly over the tidal volume is the inspiratory reserve volume, which is normally between **2100 ml to 3200 ml.**

LUNG VOLUMES



LUNG VOLUMES

- **Intrapulmonary volume.** Intrapulmonary volume is the volume within the lungs.

  The normal pressure within the pleural space,

  The intrapleural pressure, is always negative,

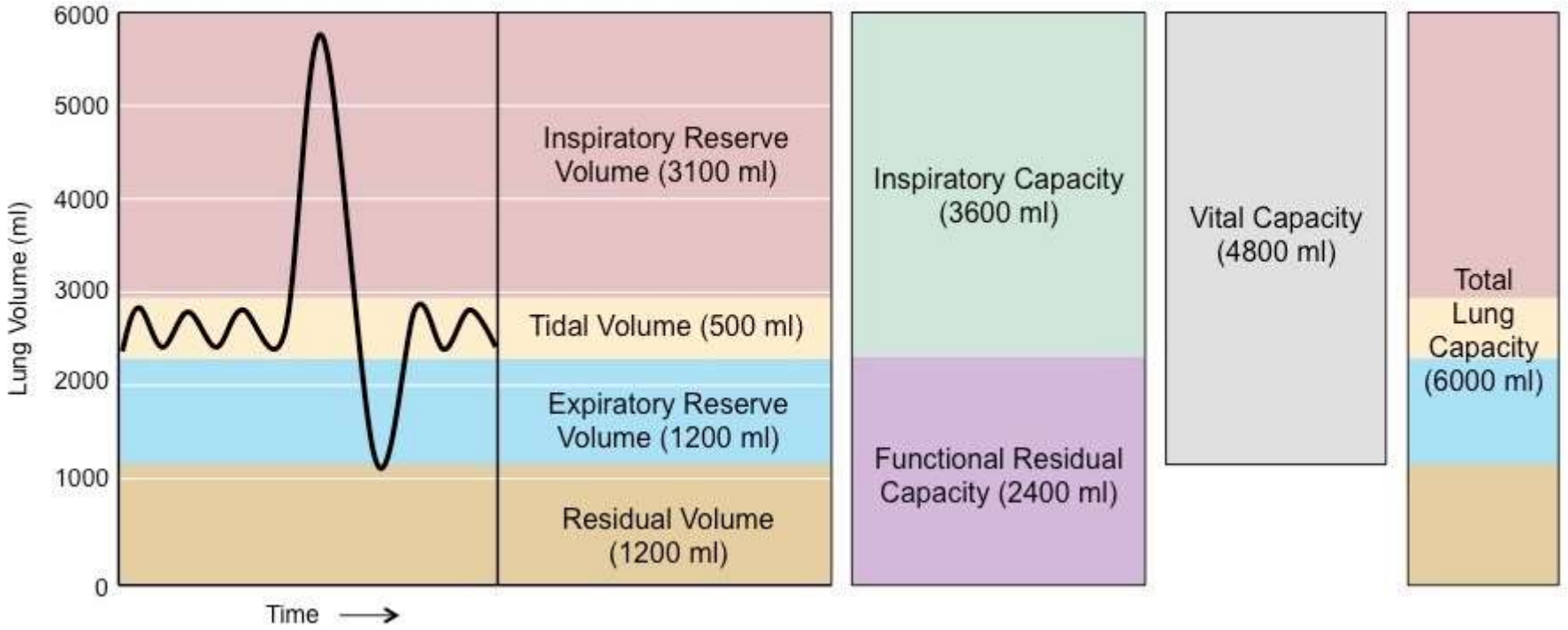
  This is the major factor preventing the collapse of the lungs.
- **Intrapleural pressure.**
- **Nonrespiratory air movements.**
- Nonrespiratory movements are a result of reflex activity,
- Some may be produced voluntarily such as cough, sneeze, crying, laughing, hiccups, and yawn

LUNG VOLUMES

- **Expiratory reserve volume (ERV).**
- The amount of air that can be forcibly exhaled after a tidal expiration, the expiratory reserve volume, is approximately 1200 ml.

- **Residual volume(RV**).
- Even after the most strenuous expiration, about 1200 ml of air still remains in the lungs and it cannot be voluntarily expelled; this is called residual volume, and it is important because it helps to keep the alveoli inflated.

LUNG CAPACITIES



LUNG CAPACITIES

- **Vital capacity.(VC) -** the maximum capacity of air a person can expel from the lungs
- **VC= TV+ IRV+ ERV= 4600 ML**

Inspiratory Capacity (IC) – Max amount of air that can be inspired after normal tidal expiration

IC = TV+IRV = 3500 ML

- **Expiratory Capacity (EC) -** Max amount of air that can be expired after normal tidal inspiration
- **EC= TV+ ERV= 1600 ML**

LUNG CAPACITIES

- **FUNCTIONAL RESIDUAL CAPACITY (FRC)**
- The volume of air remaining in the lungs after normal tidal expiration
- FRC = ERV+RV = 2300 ML
- Breath holding is possible because of this FRC
- Dilution of toxic gases takes place here only

- **TOTAL LUNG CAPACITY (TLC)**

Volume of air in lungs after max inspiration VC+ RV= 5800 **ml**

LUNG CAPACITIES

- **Dead space volume.**
- The air that enters the respiratory tract remains in the conducting zone passageways and never reaches the alveoli;
- This is called the **dead space volume** and during a normal tidal breath, it amounts to about **150 ml.**
- **Functional volume.** The functional volume, which is the air that actually reaches the respiratory zone and contributes to gas exchange, is **about 350 ml**
- **Minute volume (MV)**

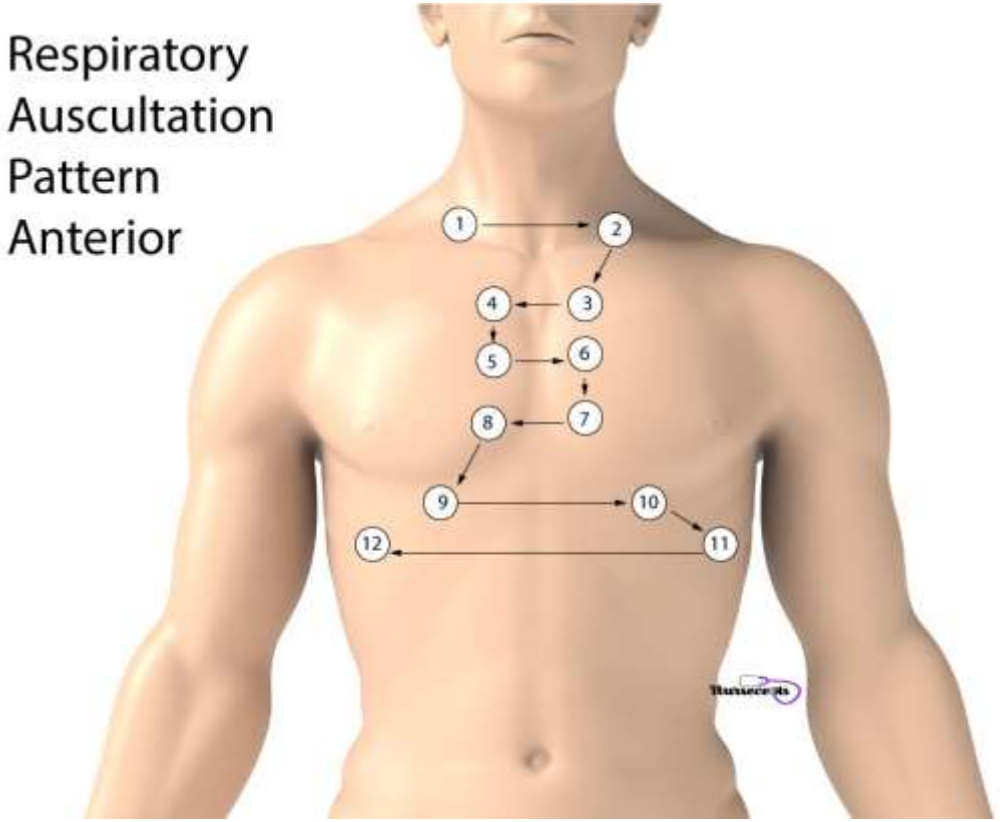
volume of air inspired or expired per minute = TV*RR = 6-7.5 l/min

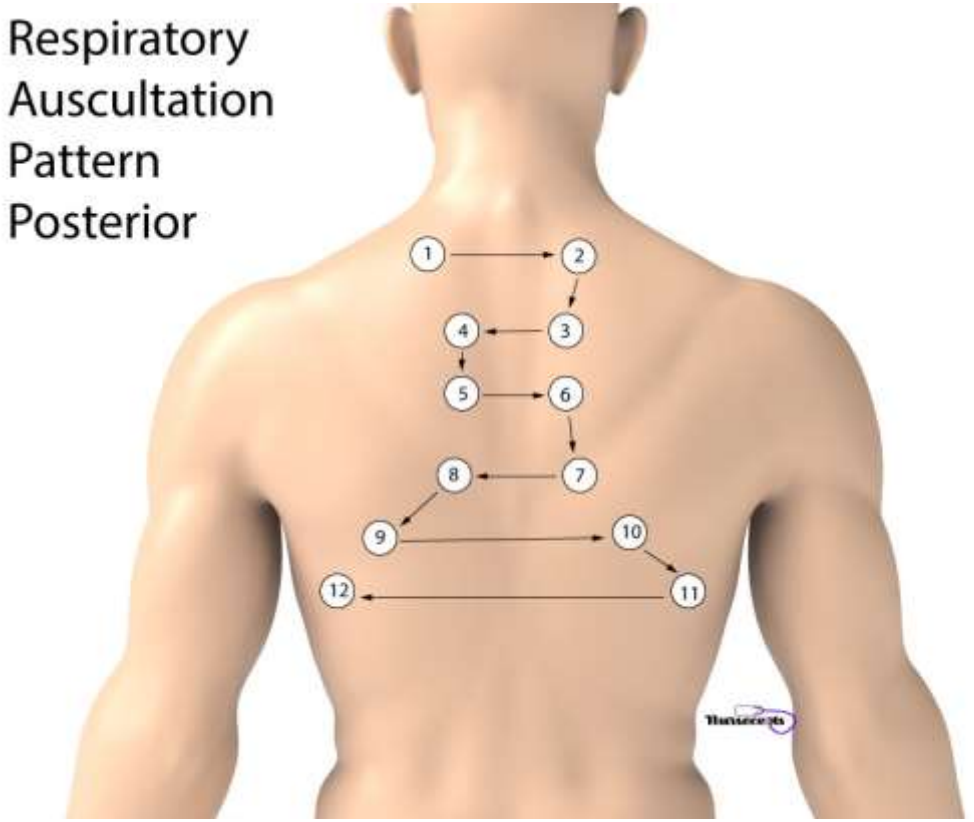
RESPIRATORY SOUNDS

- **Bronchial sounds.** Bronchial sounds are produced by
- air rushing through the large respiratory passageways (trachea and bronchi).

- **Vesicular breathing sounds.** Vesicular breathing sounds occur
- As air fills the alveoli,
- They are soft and
- Resemble a muffled breeze.

RESPIRATORY SOUND -AUSCULTATION

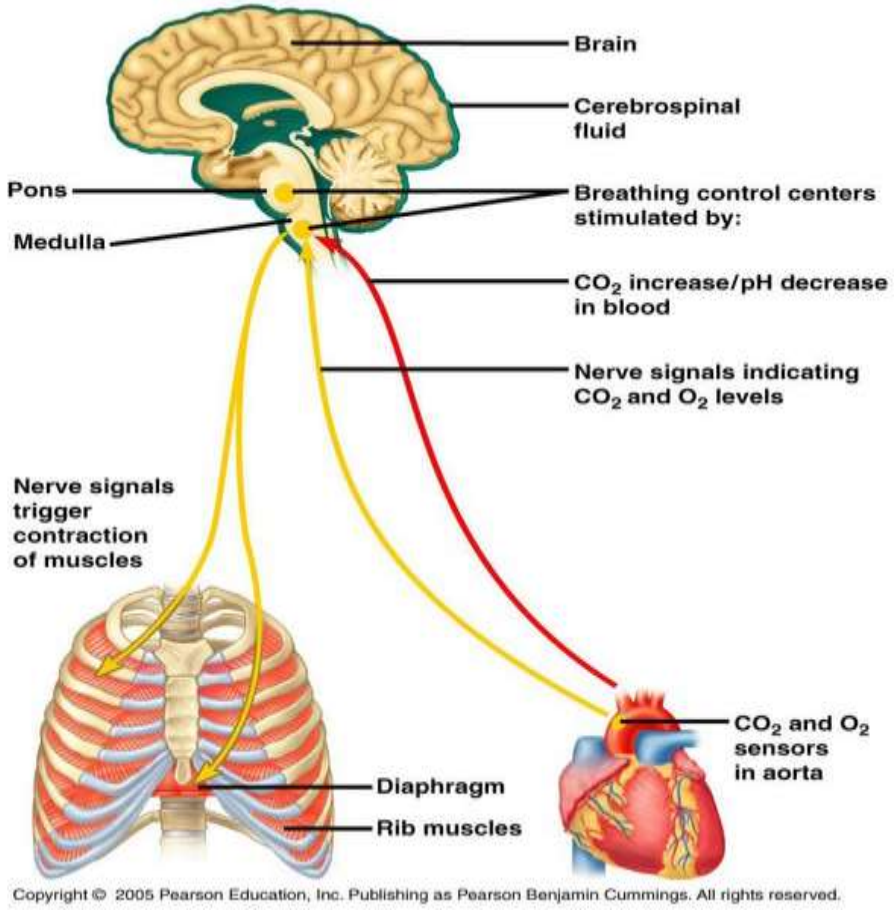




CONTROL OF RESPIRATION

- *Neural Regulation*

- Phrenic and intercostal nerves.
- Medulla and pons.
- Eupnea.
- Hyperpnea.



CONTROL OF RESPIRATION

- ***Non-neural Factors***

- **Physical factors.**
- **Volition (conscious control).**
- **Emotional factors.**
- **Chemical factors.**
- **Hyperventilation.**

CONCLUSION

- A clear understanding about the respiratory physiology is important to assess the normal and abnormal functioning.
- The process of respiration, mechanisms of breathing, Lung Volumes and capacities are the most dominant function of respiratory organs.
- Ausculation of breath sounds and the control of respiration are other crucial elements in understanding the physiology of respiratory system

REFERENCE

- Ashalatha Textbook Of Anatomy and Physiology For Nurses With Free Practice Workbook Jaypee Brothers Medical Publishers fourth edition

- Nachiket Dr Shankar Textbook and Workbook of Applied Anatomy and Applied Physiology for Nurses 2nd Edition


THANK
You!