

Respiratory system

Non respiratory functions of lungs:

- 1 Acid base balance.
 - 2 Regulation
 - H₂O balance.
 - Heat loss.
 - 3
 - 4 Defense against pathogens and foreign particles in airways.
 - 5 Helps Venous return via resp. Pump
 - 6 Activation of Angiotensin I to Angiotensin II
↓ ACE
 - 7 Anti Coagulant Heparin → mast cell.
 - 8 olfaction
 - 9 Vocalization
- During Swallowing
- Nose : Elevation of soft palate close Post Nasal opening
- Larynx : Elevation of Larynx to be covered by Epiglottis
- Apnea = stoppage of breathing.

① External resp

Body

- a) Pulm. Ventilation
- b) Exchange of gases at alveoli
simple diffusion
- c) Transport of gases in blood
chemical & physical forms
- d) Exchange of gases at tissue

② Internal resp

Cell

Consumption of O₂
Production of CO₂

● upper resp tract

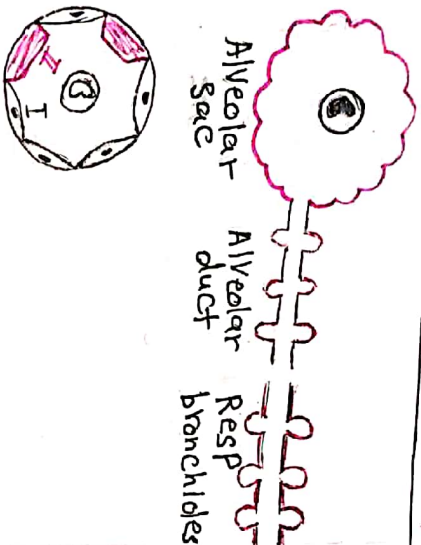
Nose, mouth, pharynx, larynx

● lower resp tract

Tracheobronchial Tree, Alveoli

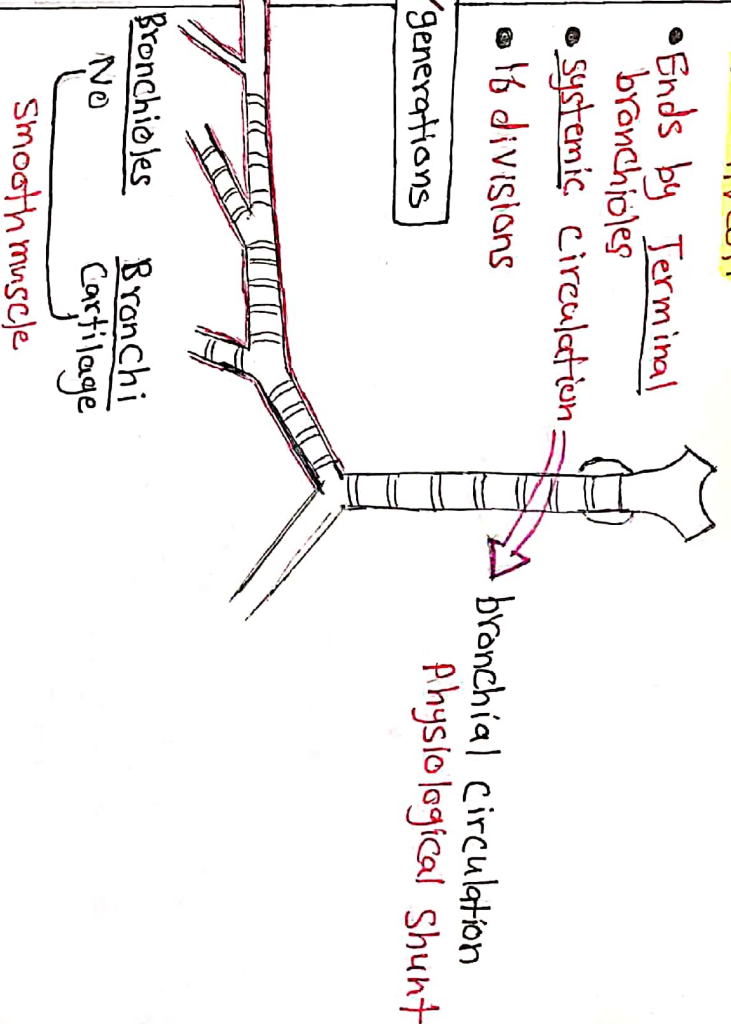
Respiratory Zone

- Alveoli
- Begins by Resp bronchioles
- Pulmonary circulation
- 7 divisions



Conducting Zone = Dead space

- No alveoli
- Ends by Terminal bronchioles
- systemic circulation
- 16 divisions



Functions:

- 1) Gas exchange Type 1
- 2) Surfactant Type 2
- 3) Defensive Macrophage Dust cell

Functions:

- 1) Distribution of air to resp. Zone
- 2) Warms & Humidifies & Defensive

Mucous
Mucous escalator
Macrophages

Parasymp → Muscarinic R → bronchoconstriction.
symp → β_2 R → bronchodilation.

Alveolar-Capillary membrane

- Area one of The largest biological mem.
 مساحة 70-80 meter² (300 million alveoli)
 limited ability to repair (in adult)

- Thickness Very thin

0.5μ in some areas

6 Layers:

Fluid lining alveoli

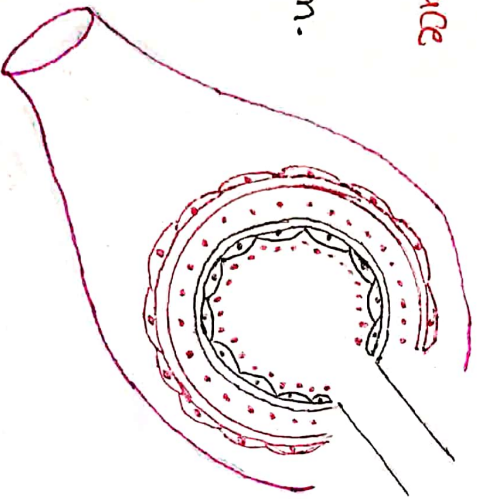
Alveolar epith.

Epith basement mem

Fluid of interstitial space

Capill endoth

Endoth basement mem.



Transpulm. (Transmural) Pressure

- Def { Difference Inside & outside P
 Alveolar & Pleural P
- Importance { Distending Pressure
- At end of normal exp $0 - (-3) = 3 \text{ cm H}_2\text{O}$ P
- At end of normal insp $0 - (-6) = 6 \text{ cm H}_2\text{O}$ P

Pneumothorax

- Def Air in Pleural Sac.

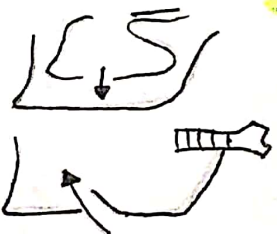
Types

1) External (open)

2) Internal (closed)

Effects

- ① Lung recoils, chest wall expands to their relaxation volumes.
- ② Trachea & mediastinum shift towards healthy side.
- ③ sudden pain & shortness of breath
- ④ Decreased VR & lymphatic return.

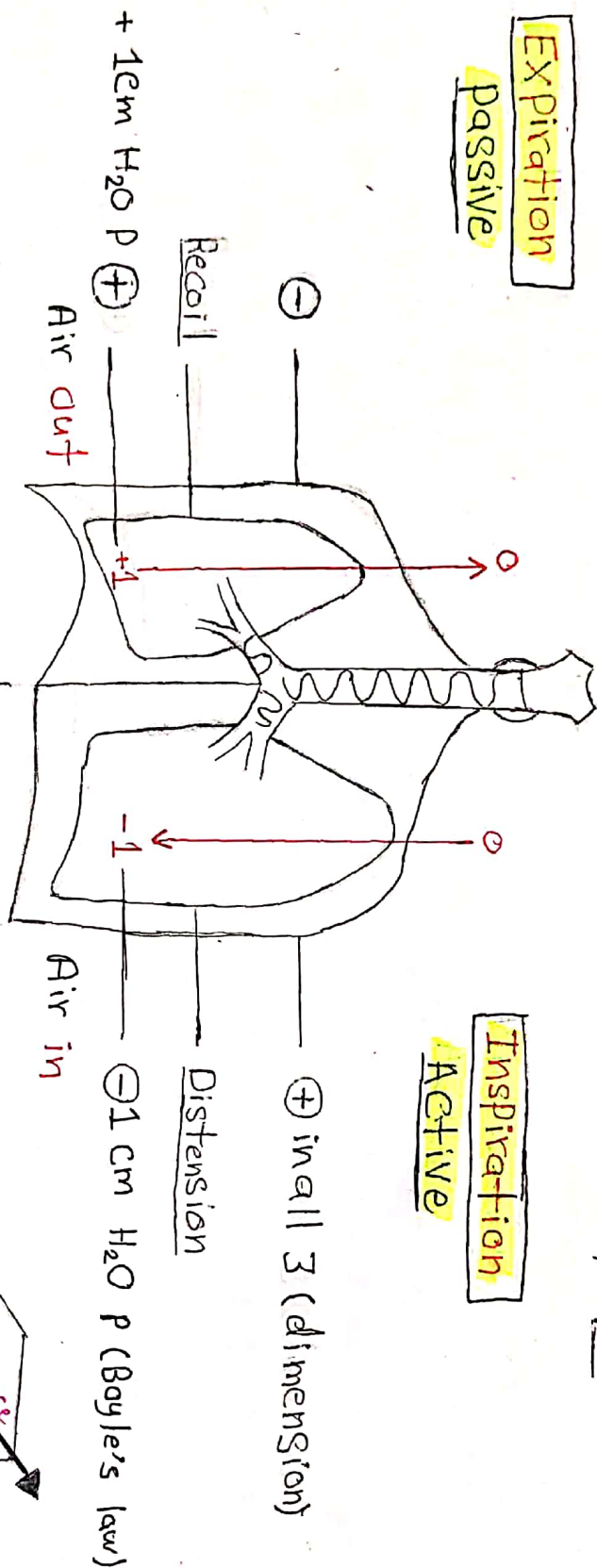


Mechanism of normal quiet breathing

Eupnea (insp, expir, resp pause)
10-18/min 1:2



Expiration Passive



Inspiration Active

Expiration muscles:
Internal intercostal ms.
Abdominal muscles

Used only with (not in Eupnea)
Forced expiration

- ⑥ Emphysema ↓ lung elasticity
- ⑦ Pulm Fibrosis (restrictive lung disease)
- ⑧ obstructive lung disease (br asthma)

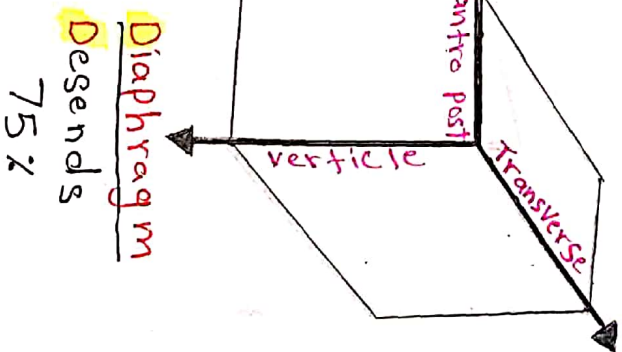
Ext intercostal
Eversion antro post
Elevation transverse

Forced inspiration
Accessory insp muscles

Sternocleidomastoid

Serratus anterior

Scalenus



Intra Pulm. (Intraalveolar)

Pressure

IntraPleural (Intrathoracic)

Pressure

• Def.: -ve P in pleural sac

• Cause:

Continuous tendency of

1 ← Lung recoil

2.5L

Chest wall → Expand

Elasticity

Surface tension 2

• Measurement:

Intraoophageal balloon

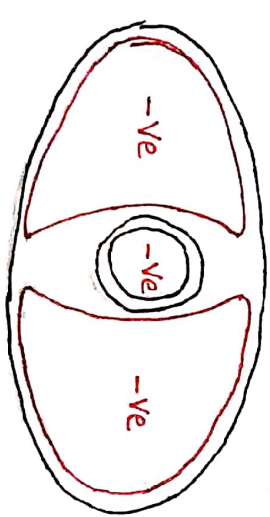
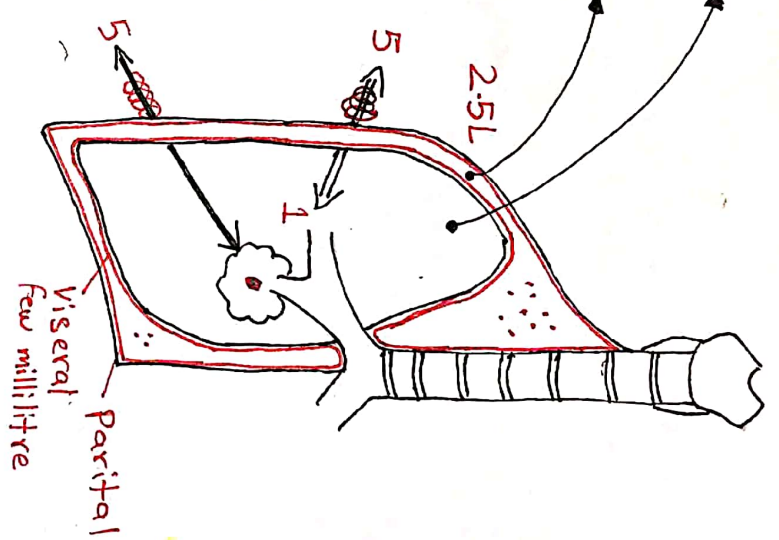
• Normal standard:

• Importances:

• +ve:

1) Valsalva

2) Pneumothorax



(cmH₂O)
-6
8

Inspiration

Expiration

Mid

End

Mid

End

Intra Pulm.

(Intraalveolar) P

Trans Pulm. P

Transmural P

IntraPleural

(Intrathoracic) ↑

