CH 13

RESPIRATORY SYSTEM

• Breathing terms
• Physics of breathing
• Pulmonary Volumes
BREATHING TERMINOLOGY

- **Breathing**: aka: Pulmonary ventilation; Moving air in and out of the lungs

- **External Respiration**: gas exchange between blood and the alveoli (air sacs)

- **Respiratory Gas Transport**: Moving gases using the bloodstream

- **Internal Respiration**: gas exchange between blood and body tissues outside the lungs
Under Pressure!

- **Atmospheric Pressure:**
  - The pressure of air outside your body

- **Intrapulmonary Pressure:**
  - The pressure inside the alveoli (air sacs) inside your lungs

- **Intrapleural Pressure:**
  - The pressure inside your thoracic cavity (surrounding the lungs)
Pressures

- **Intrapleural** pressure must always be **lower** than **atmospheric** pressure of the lung will collapse.

  Pneumothorax = collapsed lung

- Intrapulmonary pressure is controlled by the **difference** between atmospheric and intrapleural pressure.
Inspiration (Inhaling):

- the diaphragm contracts
- the external intercostal muscles contract
- internal intercostal muscles relax
- the volume of the thoracic cavity increases
- intraplural pressure decreases
- intrapulmonary pressure decreases; the lungs expand with air
Expiration (Exhaling):

- the diaphragm relaxes
- the external intercostals relax
- the internal intercostals contract
- the volume of the thoracic cavity decreases
- intrapleural pressure inside the cavity increases
- intrapulmonary pressure increases; the lungs are pressed and air is released
Respiratory Volumes

- **Tidal Volume**: That amount of air inhaled and exhaled during normal quiet breathing.

- **Inspiratory Reserve Volume (IRV)**: The amount of air forcibly inhaled beyond tidal volume.

- **Expiratory Reserve Volume (ERV)**: The amount of air forcibly exhaled after the tidal volume.

- **Vital Capacity**: Total amount of exchangeable air \( (VC = TV + IRV + ERV) \)

- **Residual Volume**: The air in the lungs that cannot be exhaled at all.
Respiratory Volumes cont…

**Dead air**: Air that is in the process of being exhaled but is trapped in the airway outside the air sacs (alveoli). This air is not available for gas exchange.
Dead Air
air ways

Vital capacity

residual air

Expir. Reserve

Tidal

Inspir. Reserve

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