PATIENT CARE THEORY 2

Unit 1 Part 1:

Respiratory System Review

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Learning Objectives

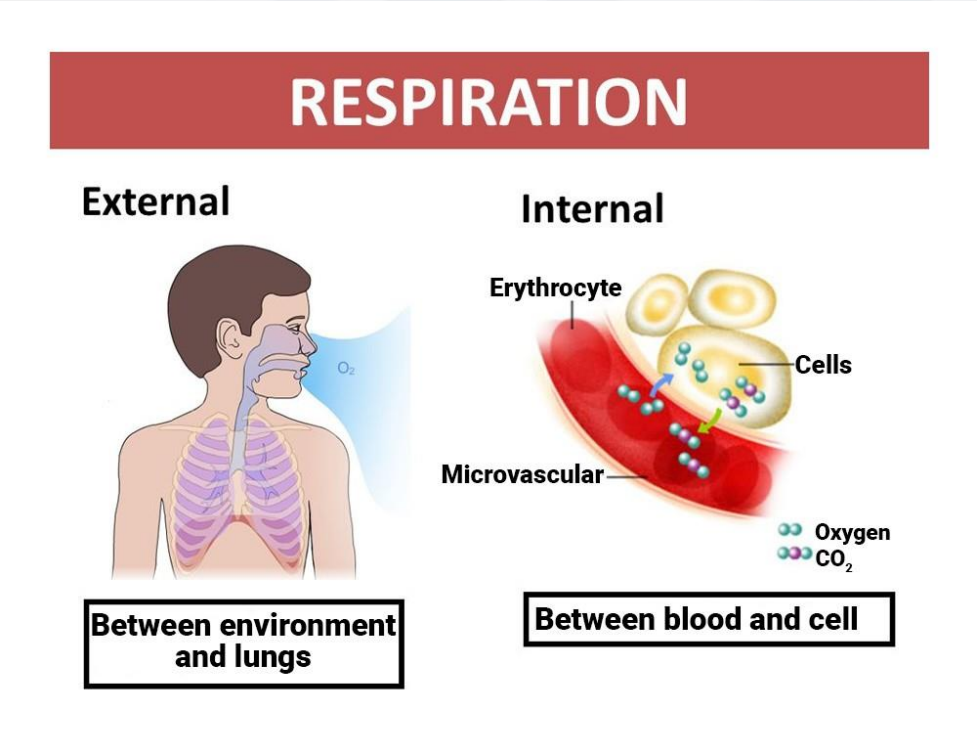
- Review the function of the respiratory system
- Review the anatomy of the respiratory system
- Identify common respiratory emergencies

Function of the Respiratory System

- Respiration
- Ventilation
- Diffusion and perfusion
- Control of breathing

Functions

- Respiration
  - The exchange of gases
    - External/internal

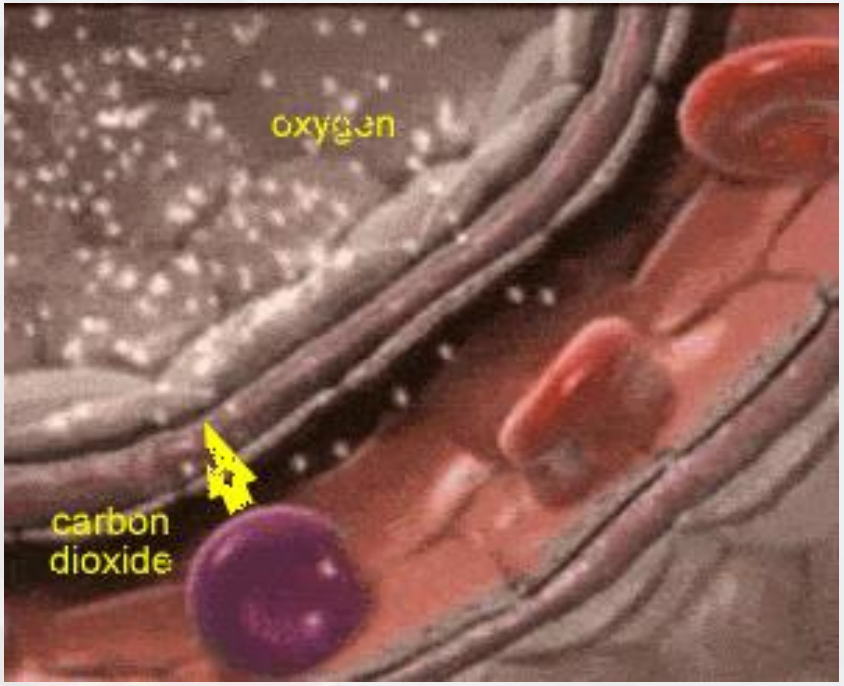


Functions

- Ventilation
  - Movement of air into and out of the lungs
    - Inspiratory phase
    - Expiratory phase
  - Required for respiration to occur
  - Dependent on changes in pressure in the thoracic cavity
  - Coordinated effort on behalf of the respiratory, central nervous and musculoskeletal systems

Functions

- Diffusion and Perfusion
  - Gas exchange across the alveolar-pulmonary capillary membranes
- Control of breathing
  - Influenced by neural and chemical factors
  - Pons, medulla, stretch receptors in the lungs, chemoreceptors in the carotid body
  - Stimulus for breathing? O2 vs CO2



Functions

- Respiratory Cycle
  - Normal expiration occurs→ intrathoracic pressure = atmospheric pressure
  - CNS signals the phrenic nerve to contract the diaphragm →creates a negative (lower) pressure compared to atmospheric pressures → air rushes into the lungs → gas exchange occurs
  - Stretch receptors in the lungs stimulate the CNS (vagus nerve) to inhibit inspiration (prevents overinflation)→muscles relax → exhalation occurs (passive process)

Functions

- Hypoventilation
  - Slow shallow breathing
  - Causes $C0_2$ to build up in the blood -> Acidosis
- Hyperventilation
  - Rapid, deep breathing
  - Causes excess CO_2 to be blown off -> Alkalosis

Hypoxic Drive

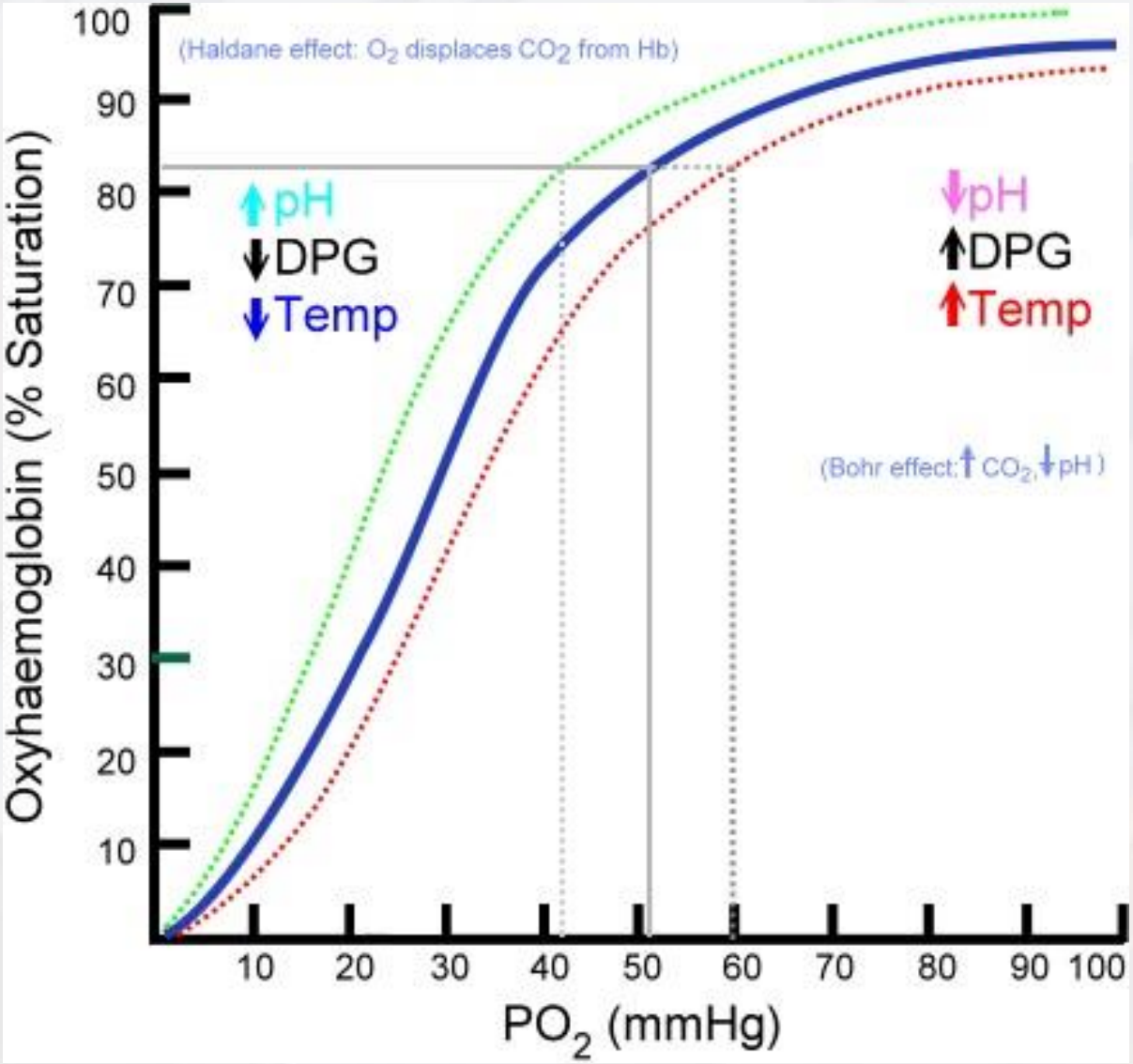
- Mechanism that uses oxygen chemoreceptors to trigger respiration in patients where hypoxemia exists
- Pt's with COPD have chronically higher PCO2 levels (COPD) so tend to have a stronger hypoxic drive
- Giving oxygen to COPD patients – what do we know?

https://www.youtube.com/watch?v=T7R3Z4sW76o

Describe the following

- Bohr effect?
  - As we exhale, we blow off _____, (CO2/O2) then as a result,
  - the blood pH _____ (rises/falls) and becomes more _____(acidic/alkaline)
  - Hemoglobin's affinity for _____(CO2/O2) _____(increases/decreases)
  - At the tissue level _____(CO2/O2) diffuses from the tissues to blood
  - This shifts the blood pH to the _____ (acidic/alkaline side)
  - Hemoglobin's affinity for _____(CO2/O2) _____(increases/decreases)

Oxyhemoglobin Dissociation Curve



Define the following terms

- Anatomical dead space?
- Alveolar dead space?
- Physiological dead space?

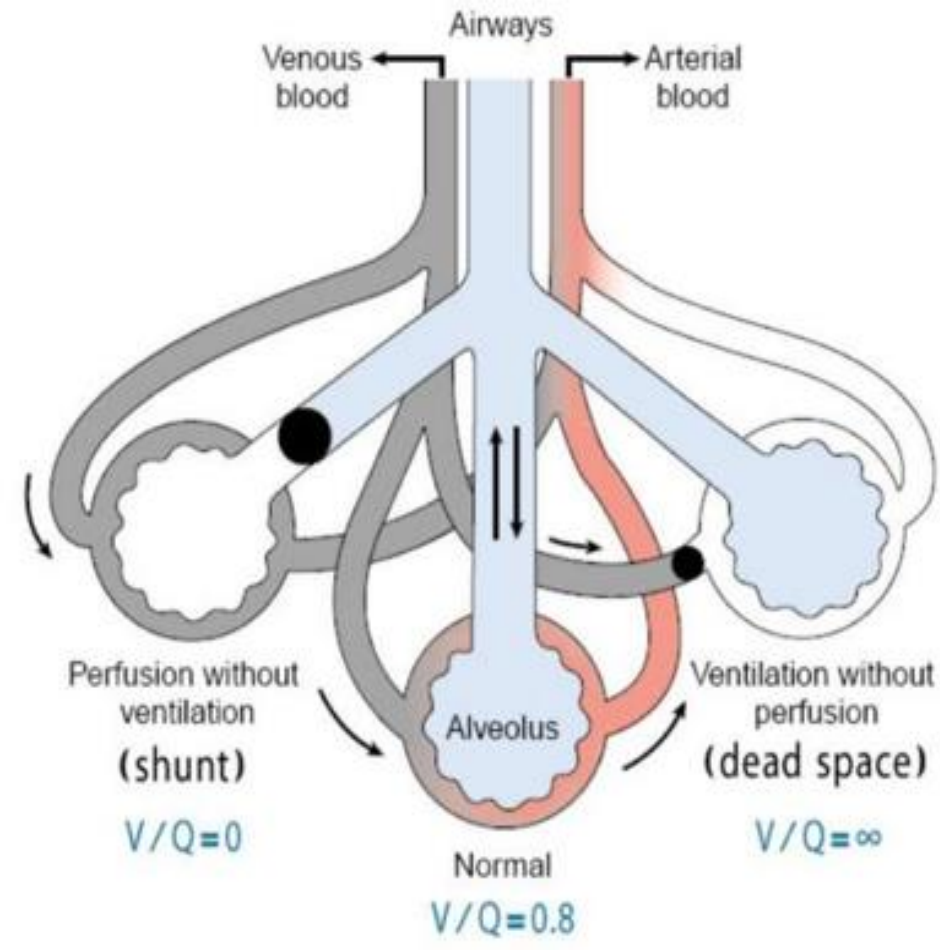
Describe the following

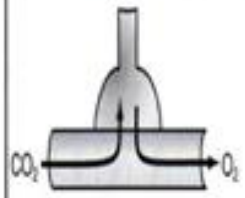
A shunt? Pulmonary shunting

List examples of conditions that cause a shunt?

- V/Q Mismatch

(78) Shunting



CONDITION	V/Q RATIO	TERM	CONSEQUENCES
	1	V-Q Match	Normal PaO_2
	>1	Dead Space Ventilation	↓PaO_2 ↑$PaCO_2$
	<1	Venous Admixture	↓PaO_2 Normal or ↓$PaCO_2$

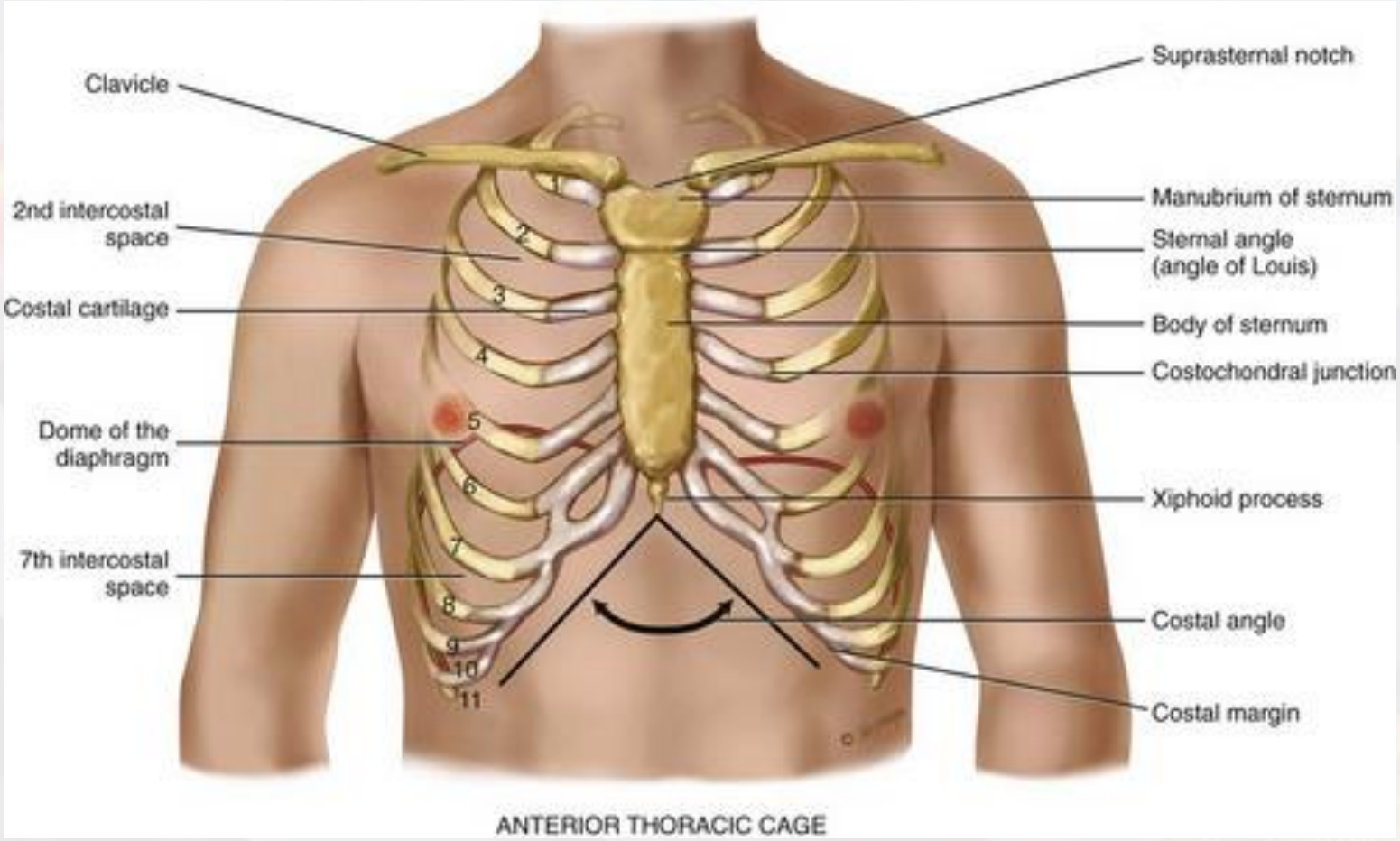
Anatomical Structures

- Important to know reference points
  - Pinpoint findings from physical exam
    - Topographical landmarks
    - Reference lines

Topographical Landmarks

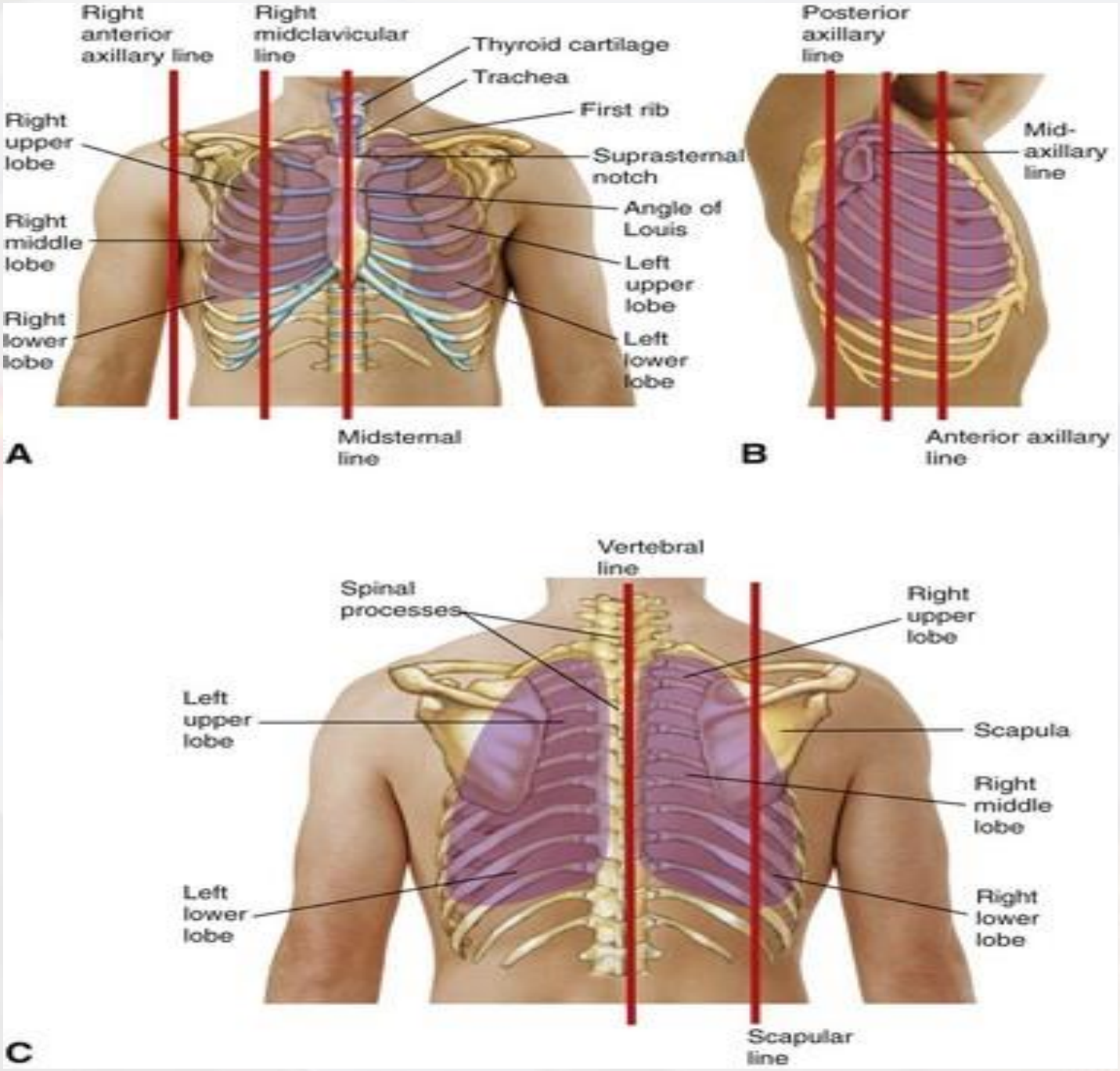
- Suprasternal Notch
- Clavicles
- Nipples/ Nipple line
- Manubriosternal junction (angle of Louis)
  - Point at which the 2nd rib articulates with the sternum
- Costal Angle
  - Usually no more than 90°
  - Costochondral junction: Ribs insert at approximately 45 ° angles

Topographical Landmarks

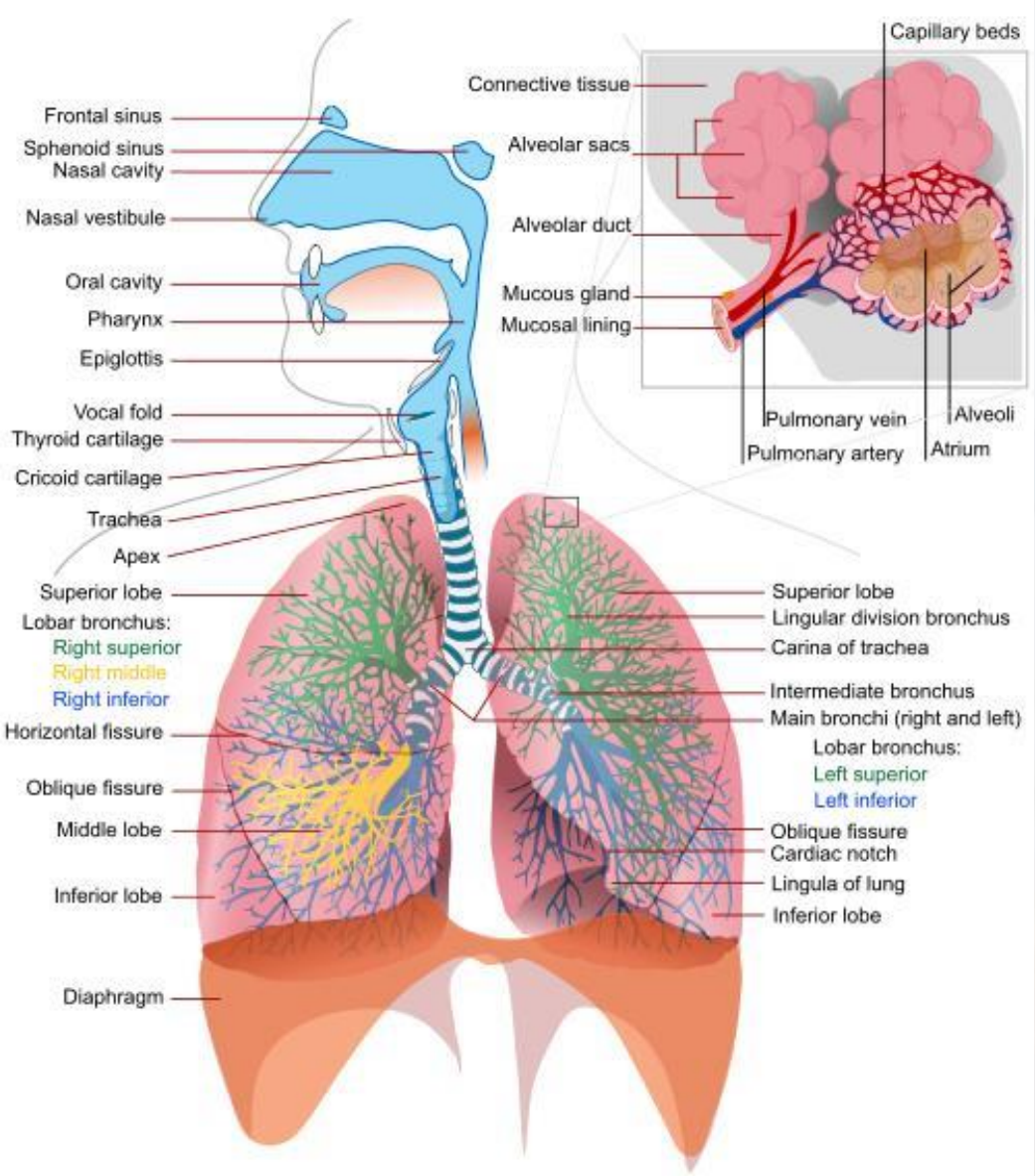


Reference Lines

- Anterior Chest
  - Midsternal line
  - Anterior axillary lines
  - Midclavicular lines
- Posterior Chest
  - Vertebral line
  - Midscapular line
- Axilla
  - Anterior axillary lines
  - Midaxillary lines
  - Posterior axillary lines


Right anterior axillary line
Right midclavicular line
Thyroid cartilage
Trachea
First rib
Suprasternal notch
Angle of Louis
Left upper lobe
Left lower lobe
Right upper lobe
Right middle lobe
Right lower lobe
Midsternal line
A
Posterior axillary line
Mid-axillary line
Anterior axillary line
B
Vertebral line
Spinal processes
Right upper lobe
Left upper lobe
Scapula
Right middle lobe
Left lower lobe
Right lower lobe
Scapular line
C

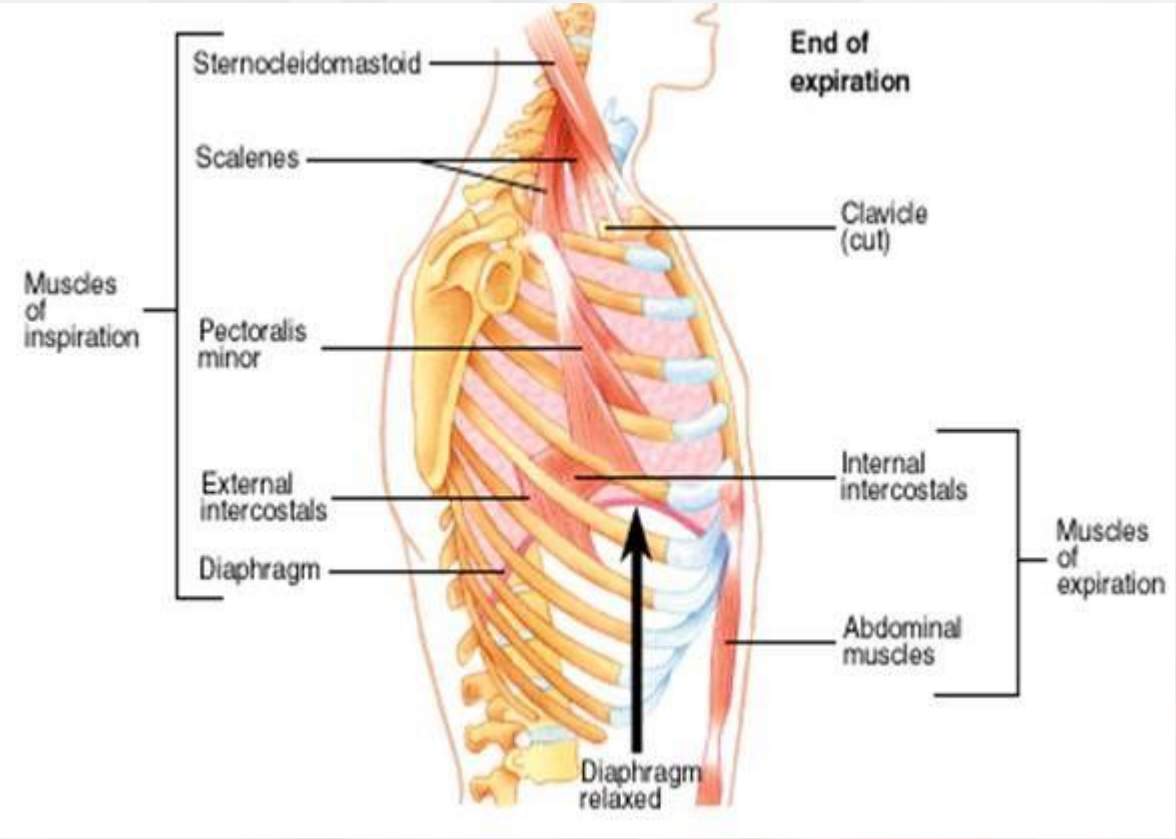
Anatomy review



Key Anatomical points

- Lungs
  - Are symmetrical
  - Divided into lobes
    - Right =
    - Left =
- Primary muscles of respiration
  - Diaphragm – divides chest from abdomen (cervical nerve? Innervates at?)
  - External intercostal muscles
  - Accessory Muscles -?

Accessory Muscles for breathing



Key Anatomical points

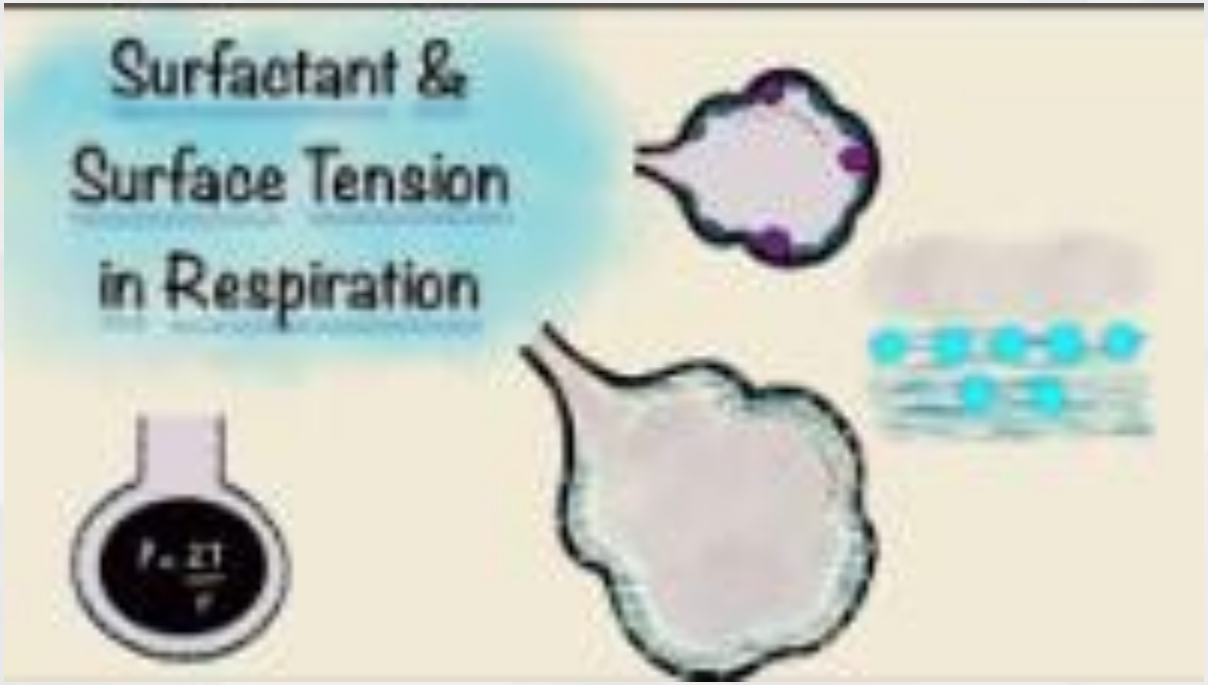
- Upper Airway
  - Nose, pharynx, larynx, intrathoracic trachea
  - Functions in respiration
    - Conduct air to lower airway
    - Filter to protect lower airway
    - Warm and humidify inspired air

Key Anatomical points

- Lower Airway
  - Trachea, bronchi, bronchioles
  - Functions in respiration
    - Conduct air to alveoli
    - Clear mucociliary structures
- Trachea splits into left and right mainstem
  - Bronchi further subdivide into bronchioles
  - Right “mainstem” is shorter, wider and more upright than left -> what does this mean?

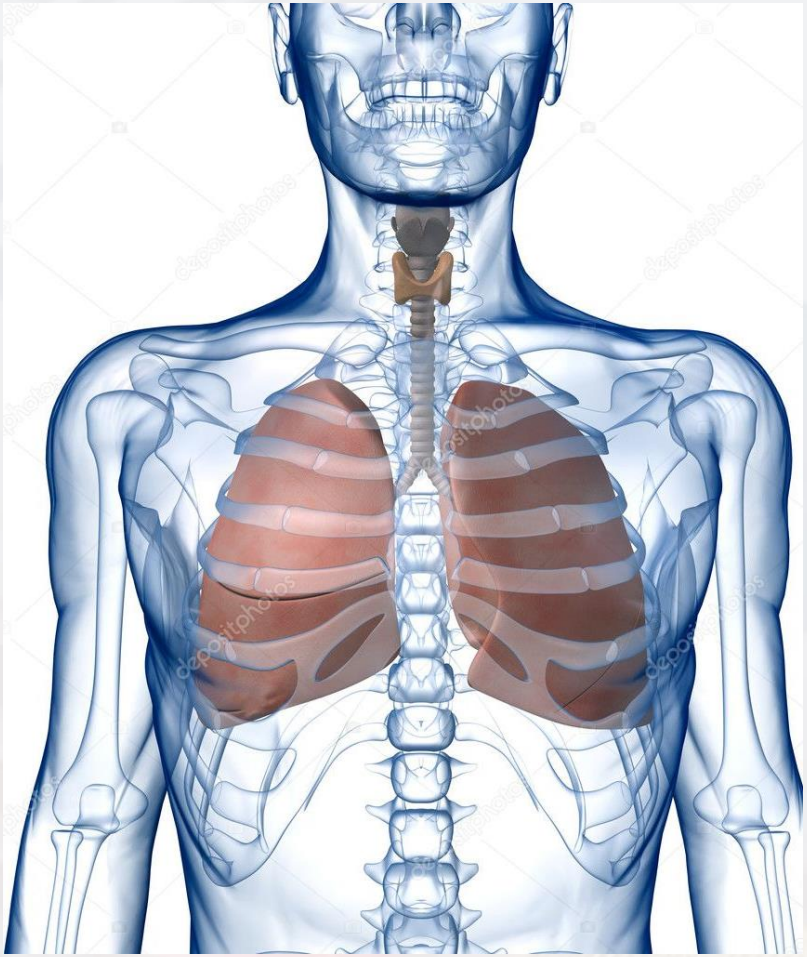
Key Anatomical points

- Alveoli
  - Functional unit
    - Gas exchange
    - Produces surfactant



Location

- Lungs
  - Sit at ~ 6th rib midclavicular line
  - 7-8th mid axillary
  - 9th – 10th posterior



QUESTIONS?