Lecture notes for Wednesday, November 13, 2002

Outline:
- Pulmonary ventilation
- Inspiration
- Expiration
- Lung volumes

Pulmonary Ventilation
= inhalation/inspiration + exhalation/expiration

- Air flow into & out of lungs is due to PRESSURE gradient.

Boyle’s Law
- The pressure of a gas within a chamber is inversely proportional to the volume of the chamber: \( P = \frac{1}{V} \)
- Increase in the size of the chamber decrease in pressure of gas within

Lung Volume
- Changes due to contraction of diaphragm & intercostal muscles

Atmospheric Pressure
at sea level = 760 mm Hg

- Inter pleural pressure is ALWAYS lower that atmospheric pressure to prevent the lungs from collapsing
- Pneumothorax (pneumo = air) lung collapse

At REST
- Alveolar pressure is equal to atmospheric pressure & interpleural pressure = 756 mm Hg

Normal resting inspiration
- Diaphragm contracts
- Thoracic cavity expands
- Lungs volume increases
- Alveolar pressure decreases
- Air enters into lungs
Normal resting expiration

- Muscles relax
- Thoracic cavity reduces
- Lung volume decreases
- Alveolar pressure increases
- Air flows out of lungs

Factors affecting airflow

- Airway resistance: increased resistance increase pressure
- Compliance: effort required to stretch the lungs

Lung Volumes

- At rest breathe x 12/minute = RESPIRATORY RATE
- Volume of one breathe = TIDAL VOLUME = 500 ml
- Minute ventilation =
  
  RR x TV = 6 L/min

- Anatomic dead space (in the conducting airways)= 30% of tidal volume
- Alveolar ventilation rate = 350 ml x 12 = 4200 ml