TOPICS

• Gross anatomy and histology of the respiratory system
• Muscles of respiration
• Mechanism of respiration
• Gaseous exchange
• Regulation of respiratory processes
• Alkalosis and acidosis
• Lung volumes, capacities, compliance
• Common disorders of the respiratory system
COMPONENTS OF THE RESPIRATORY SYSTEM

Nose (Nasal cavity) → Pharynx → Larynx (Adam’s apple) → Trachea → Bronchi (primary, secondary, tertiary) → Lungs

Bronchioles → alveolar ducts → Alveoli (tiny air sacs)

Direction of air flow (air passage)
LARYNX (Voice box)

- Connects the pharynx with the trachea
- Responsible for
  - Voice production
  - Guarding the trachea against entry of food and liquid when swallowing
View

Larynx

Epiglottis

Glottis:
  True vocal cords
  Rima glottidis

False vocal cords

Pharynx

Superior view

Figure 23-6c Principles of Anatomy and Physiology, 11/e
MECHANISM OF RESPIRATION

• The respiratory muscles
  – Involve in increasing and decreasing the volume of the thoracic cavity
  • The pressure decreasing or increasing proportionately
  – The respiratory muscles consist of
    • The intercostal muscles
    • The diaphragm
INSPIRATION

• Process of breathing in air
• Respiratory muscles and diaphragm contract
  – the rib cage rises, diaphragm descends
• Thoracic cavity volume increases
• Lungs expand and its volume increases
• The pressure inside the lungs drops below the atmospheric pressure
• Atmospheric air rich in oxygen flows down the pressure gradient into the lungs
Lung lobule

- Terminal bronchiole
- Blood vessel
- Respiratory bronchiole
- Alveolar ducts
- Alveoli
- Alveolar sacs
- Visceral pleura

LM about 30x

Figure 23-11b  Principles of Anatomy and Physiology, 11/e
GASEOUS EXCHANGE

• Results from pressure differences

• $O_2$ pressure
  – In the air in the alveolus ~ 100 mm Hg
  – In the blood in the capillary ~ 40 mm Hg
  – $PO_2$: alveolus > capillary
  – $O_2$ diffuses from alveoli to capillary blood

• $CO_2$ pressure
  – In the air in the alveolus ~ 40 mm Hg
  – In the blood in the capillary ~ 46 mm Hg
  – $PCO_2$: capillary > alveolus
  – $CO_2$ diffuses from capillary blood to the alveolus
LUNG VOLUME MEASUREMENTS

• Measurement of the amount of air that the lungs may contain at various points in the respiratory cycle
  • Using an instrument – spirometer

• Used for pulmonary function testing
  – To evaluate the status of the lungs
    • To detect lung disorders
SOME COMMON DISORDERS OF THE RESPIRATORY SYSTEM

• **Asthma**
  – Narrowing of the bronchi (lung passageways) making breathing difficult
  – May be accompanied by *wheezing* sound

• **Bronchitis**
  – Inflammation of the bronchi
  – Usually following infection

• **Hiccup**
  – sudden, involuntary contractions of the diaphragm