Functions

- 1. Air Distribution
- 2. Gas Exchange
- O₂ supplied to cells, CO₂ removed
- 3. Homeostasis
- Gas exchange
- 4. Filters, warms, & humidifies "air"
- 5. Speech/Sound production
- 6. Olfaction (smell)

Types of Respiration

- External respiration: exchange of gases between atmosphere and blood.
- Internal Respiration: exchange between blood and cells.

Respiratory Mucosa

- Mucus membrane that lines the air distribution tubes
 - Air purification & filtration
 - 125 mL of mucus produced daily
- Cilia
 - Hair-like structures
 - Move in 1 direction: pushes mucus out of lower tract, toward pharynx





Upper Respiratory Tract

- Nose & Sinuses
- Oral Cavity
- Pharynx
- Larynx



Lower Respiratory Tract

- Trachea
- Bronchi
- Bronchioles
- Lungs/Alveoli



The Nose: Structure

- Septum divides right & left sides
- Sinuses:
 - Frontal (1)
 - Maxillary (2)
 - Sphenoid (3)
 - Ethmoid (4)



The Nose: Functions

- Warms & moistens inhaled air
- Filters out some dust and debris
- Sense organs of smell





Pharynx: Structure

- Tube, ~ 5 inches long
- 3 sections
 - Nasopharynx
 - Behind nasal cavity
 - Oropharynx
 - Behind oral cavity
 - LaryngopharynxLeading into trachea



Pharynx: Structure

Tonsils

- Masses of lymphatic tissue embedded in the mucus membrane
- Palatine: in the oropharynx
- Pharyngeal (adenoids): in nasopharynx
- Lingual: behind tongue



Pharynx: Functions

- Passage for air to the lungs
- Passage for food & liquids to the esophagus



Larynx: Structure

- aka "Voice Box"
 - Vocal Cords: 2 fibrous bands across the larynx
- Several pieces of cartilage
 - Epiglottis
 - Partially covers opening of larynx
 - Trapdoor action during swallowing to prevent food/liquid from entering the trachea
 - Thyroid cartilage: "Adam's Apple"
 - Cricoid cartilage



Larynx: Functions • Air passage Voice production Vocal cords

Juring speech, the vocal cords at stretched over the glottis and vibi as air passes through them, produ-the voice. he vocal cords are the folds of co : (the glottis) that produce the v opening of the

Top view of laryns

ch, the vocal cords

nx, and the

Trachea: Structure

- C-shaped rings of cartilage hold the tube open
- · Ciliated mucous lining



Trachea: Function

- Passage for air to move to/from lungs
- Obstruction can cause death in minutes!
 - More than 4,000 deaths in US each year
 - Heimlich maneuver can be used to free the trachea of obstruction



Bronchi & Bronchioles: S

- <u>Bronchi</u>: two branches from trachea: smooth muscle and cartilage lined with cilia and mucus.
- <u>Bronchioles</u>: branch off bronchi; cilia and mucus



Bronchi & Bronchioles: F

• Air distribution; air moves to & from alveoli



Alveoli: Structure

- · Single layer thick
- · Grape-like clusters



Alveoli: Function

• Exchange of gases between air & blood – Large surface area



Lungs: Structure

- Fills most of the chest cavity (middle space for the heart)
- Right has 3 lobes, Left has 2
- Pleura: moist, smooth, slippery membrane that reduces friction while breathing
 - Parietal pleura lines chest cavity
 - Visceral pleura covers lungs



Diffusion

3 things happen to the air we inhale:

- 1.oxygen is removed 2.carbon dioxide is added
- 3.water vapor is added





Pulmonary Ventilation

- Expiration: movement of air out of lungs
 - Passive process



Pulmonary Ventilation

- Changes in size & shape of thorax cause changes in air pressure in the cavity
 - (Inspiration) Diaphragm flattens, increasing length of thorax, reducing pressure & drawing air IN to lungs
 - (Expiration) Diaphragm relaxes, decreasing size of cavity, increasing pressure & air leaves the lungs

Regulation of Breathing

- Controlled by brain
- Regulated by cell activity
- High CO₂ = increase rate/depth
- Low CO₂ = slower rate
- Can consciously override the brain temporarily

RESPIRATORY DISEASES

Rancho High School

Common Respiratory Disorders

- Include:
 - emphysema
 - asthma
 - influenza
 - lung cancer
 - pneumonia
 - tuberculosiscarbon dioxide poisoning



Emphysema

- Is a long-term, progressive disease of the lung that primarily causes shortness of breath
- Involves the lung tissues necessary to support the physical shape and function of the lung being destroyed



emphysema affects over three million people in the United States

Emphysema

- Makes the affected bronchioles unable to hold their shape properly when you exhale
- · Is primarily caused by cigarette smoking
- Is treated with medications, surgery or transplantation



Asthma

- Is a chronic disease that affects your airways
- Involves the inside walls of your airways being swollen due to an irritant



- Cannot be cured, but can be controlled
- · Is treated with medication and inhalers

three to six percent of the United States population has asthma

Lung Cancer

- · Is a disease where tissue in the lung grows out of control
- · Can arise in any area of the lung



Lung Cancer

- · Is the most common form of cancerrelated death in men and the second most common in women
- Can be treated with the removal of the affected area or chemotherapy



Pneumonia

• Is an illness of the lungs and respiratory system in which the alveoli become inflamed and flooded

with fluid



pneumonia is a leading cause of death among the elderly and people who are chronically and terminally i

Pneumonia

- · Can result from a variety of causes, including:
 - infection with bacteria
 - viruses
 - fungi or parasites
 - chemical or physical
 - injury to the lungs



Pneumonia

- Occurs in all age groups
- · Is treated according to cause
- if bacterial, it can be treated with antibiotics



Tuberculosis

- Is a common and deadly infectious disease caused by mycobacterium
- Attacks the lungs but can also affect almost any part of the body



tuberculosis is commonly called consumption because it seems to consume people from the inside out

Tuberculosis

- Is spread through the air from one person to another
- Can be found by a skin test
 - placing a small amount of a substance under the skin and determining if a bump grows
- Can be treated with medication



Carbon Dioxide Poisoning

- · Is also called hypercapnia
- Is a condition where there is too much carbon dioxide (CO2) in the blood



 Is generally caused by hypoventilation, lung disease or diminished consciousness

the average American car releases 300 pounds of carbon dioxide into the air per tank of gas

Carbon Dioxide Poisoning

 Can be caused by exposure to environments containing abnormally high concentrations of carbon dioxide (usually due to volcanic or geothermal causes) or by rebreathing exhaled carbon dioxide

