

March 6, 2015

Circulation and Respiration

Announcements

- Quiz 5 now available
 - Due Sunday, March 8, 11:59 pm
- Critical thinking #3 now available
 - Due Monday, March 16, 11:59 pm

Outline

- Structure and Function of Respiratory and Circulatory Systems
 1. Breathing
 2. Transport of gases to circulatory system
 3. Exchange of gases with body cells

Cellular Respiration

- $C_6H_{12}O_6 + 6O_2 \rightarrow 6H_2O + 6CO_2 + ATP + Heat$
 - O_2 required for cellular respiration to convert Glucose into ATP
 - CO_2 produced as a waste product
- Not breathing results in the stopping of cellular respiration and other cellular operation because of a lack of energy
- Blood delivers Oxygen and picks up Carbon Dioxide that was discarded

Gas exchange relies on multiple systems

- To sustain life and cellular processes, organisms need to exchange gases
 - Humans can survive without breathing for 4-6 min
- Respiratory System and Circulatory System closely linked

- o Blood gets oxygen, loses carbon dioxide in lungs and moves into heart
- o Heart pumps blood to body tissues
- o Both do similar function of delivering and taking stuff
- Oxygen in and Carbon Dioxide out

Cardiovascular Disease

- Diseases of the heart and blood vessels
 - o ~40% of deaths in US from cardiovascular disease
- Atherosclerosis” chronic cardiovascular disease
 - o Plaque= fatty deposits build up on inner walls of arteries
 - Walls of arteries become thick and stiff
 - Increases blood pressure
 - Eventually can lead to complete blockage
- Heart Attack: blockage of coronary arteries causes cardiac muscle cells to die
 - o SA node can no longer maintain normal rhythm
- Stroke: death of brain cells caused by ruptured or blocked arteries to brain
 - o Prevents transport of oxygen
- Prevention
 1. Don't Smoke
 - Smoking doubles chance of heart attack
 2. Exercise
 - Regular exercise decreases risk by 50%
 3. Heart-Healthy Diet
 - Low in cholesterol, trans fats, and saturated fats

Respiratory Surface

- Respiratory Surface: Location of gas exchange between internal and external environments
- Large surface area to maximize gas exchange
 - o Fish → Gills
 - Respiratory surface is gills and interacts with water
 - o Earthworms → Skin
 - Exchange gases directly with environment through skin
 - o Crickets → Tracheal System
 - Air sacs running through body that allows for gas exchange everywhere
 - o Humans → Lungs
 - Maximizes surface area for the space that it actually takes up

Gas Exchange: 3 Processes

- Breathing: alternating between inhale and exhale
 - o Inhale: brings air into lungs
 - O_2 diffuses across epithelial tissue into blood vessels
 - Chest expands
 - Diaphragm contracts
 - o Exhale: forces air out of lungs
 - CO_2 diffuses from blood into lungs
 - Released during exhale
 - Chest contracts
 - Diaphragm relaxes