

### 6.5 Gas Exchange - The Respiratory System

**Function:** To supply oxygen to the body's cells and remove carbon dioxide as waste.

Air is 21% oxygen, 78 % nitrogen, 1% trace gases ( $CO_2$ , Argon)

**Ventilation** - the process of taking in oxygen (air) from the environment = Breathing!

**Gas Exchange** - the exchange of  $O_2$  and  $CO_2$  between an organism and the environment

**Cell Respiration** - the breakdown of glucose to make ATP. Occurs in the mitochondria of cells

### Structures

**Nasal Cavity** - warms, moistens, and filters air  
- cilia and nose hairs trap dust particles

**Pharynx** - common to both air and food  
- epiglottis prevents food from entering trachea  
- Contains the larynx - air rushing past, causes cords to vibrate and produce sound.

**Trachea** - a 12 cm hollow tube  
- has c-shaped cartilaginous rings that provide support and protection

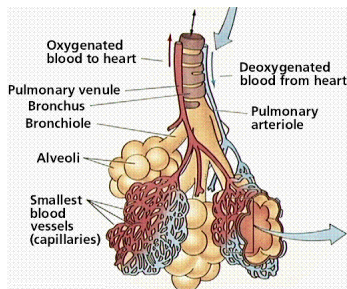
**Bronchi** - trachea splits into 2 bronchi.  
- Bronchi branch into smaller bronchioles  
- Bronchioles end in small air sacs called alveoli

**Lung** - the organ of respiration  
- covered by a membrane called the pleura  
- protected by the ribs and sternum

**Diaphragm** - dome shaped muscle separating the thoracic and abdominal cavities  
- movement provides pressure and volume changes to allow breathing

**Alveoli** - 150 Million of alveoli per lung  
- Bronchioles end in small air sacs  
- location of gas exchange

- Many alveoli increase the total surface area available for gas exchange
- Consist of a single layer of cells for short diffusion distance
- moist to allow gases to dissolve
- surrounded by a dense network of capillaries



### Gas Exchange

- A ventilation system is needed to maintain a high concentration gradient in the alveoli.  $O_2$  and  $CO_2$  exchange occurs by diffusion and is a passive process.
- $O_2$  moves out of the alveoli into the red blood cells which travel from the lungs to the heart then to the body cells
- $CO_2$  comes from the body cells to the heart then to the lungs out of the red blood cells and into the alveoli to be exhaled

### Mechanism of Breathing

#### Inhalation

- Diaphragm contracts (flattens and moves down)
- External intercostal muscles contract (internal relax)
- Ribs move up and out
- volume increases; pressure decreases
- Air moves in!

#### Exhalation

- Diaphragm relaxes (returns to dome shape)
- External intercostal muscles relax (internal contract)
- Ribs move down and in
- volume decreases; pressure increases
- Air moves out!!