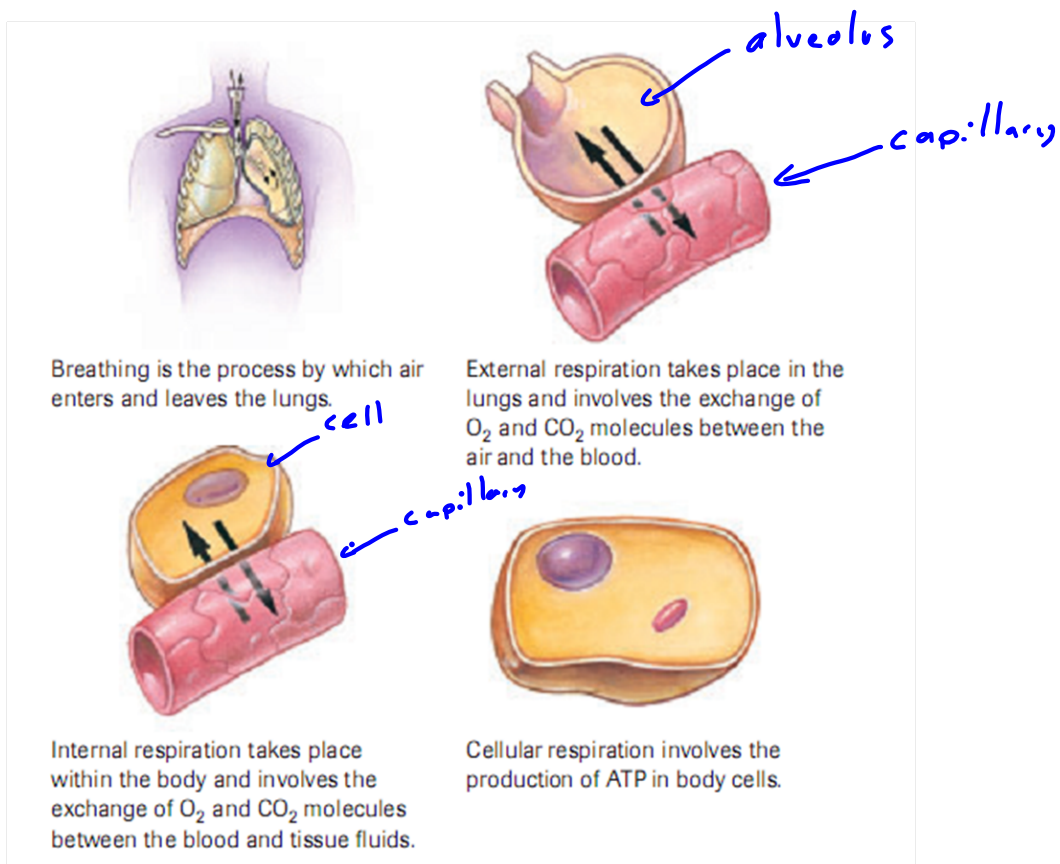


Human Systems - Respiration: Lesson 1 - Structures of Respiration

- **Breathing** - movement of air into and out of our lungs; brings oxygen in and carbon dioxide out
 - Inspiration: (aka inhalation) - air moves into lungs
 - Expiration: (aka exhalation) - air moves out of lungs
- **Cellular respiration** - cells use oxygen to create energy for the body; creates carbon dioxide and other waste
 - Happens in every body cell
 - Glucose + oxygen → energy(ATP) + carbon dioxide + water
- **External respiration** - takes place in the lungs and involves the exchange of O₂ and CO₂ molecules **between the air and the blood**
- **Internal respiration** - takes place within the body and involves the exchange of O₂ and CO₂ molecules between the **blood and tissue fluids.**



Structures of the Respiratory System

a. Nasal and oral cavities:

- Filter, warm and humidify air
- Oral and nasal cavities are separated by the hard and soft palates
- Blood vessels in mouth and nose lose heat that warms air
- Air coming through enters the pharynx
- Tiny hairs and mucous trap dirt, bacteria, viruses and other airborne material

b. Pharynx:

- Opening where nasal and oral cavities meet
- Can be called the throat
- Esophagus is normally closed and trachea (windpipe) is normally open
- Epiglottis covers trachea when food is swallowed

c. Larynx:

- Triangular box with the apex (point) being the Adams apple
- Glottis is a variable sized opening at the top of the larynx
- Vocal cords are mucous membrane folds supported by elastic ligaments
- Air passes through the glottis, vibrating the cords, producing sound
- High tones are caused when the chords are tense
- Low tones are caused when the chords are relaxed
- Called the voice box because vocal cords are in the larynx

http://www.nelson.com/ABbio20-30/teacher/protect/otr/Bio2030OTR/attachments/i_AnimationSimulation/vocal_cords.html



Trachea: Wind pipe

- Tube made of smooth muscle supported by rings of cartilage
- Approx. 12cm. in length
- Only air goes into the trachea
- Cells lining the trachea produce mucous to capture debris
- Cilia (tiny hairs) line the inside to sweep debris back up
 - Smoking kills cilia and increases mucous production
- Tracheotomy - cutting a hole in the trachea to insert a tube if the trachea gets blocked

Bronchi:

- Trachea divides into two tubes, one leading to each lung
- Bronchi branch into bronchioles
- Bronchi resemble the trachea but as it branches into smaller tubes walls get thinner and cartilage rings disappear
- Each bronchiole ends in sacs called alveolar sacs
- Each alveolar sac is subdivided into alveoli (alveolus)
 - Millions in each lung
 - Tiny size exposes large surface area for gas exchange
- Asthma - bronchioles constrict reducing the flow of air

Lungs

- Everybody has two lungs (right and left)
- Right lung is divided into three lobes, left into two lobes (to fit around heart)
- Each lobe is divided into lobules
- Each lobule has a bronchiole serving many alveoli
- Each alveolus is made of a thin layer of cells (epithelium) surrounded by capillaries
- The thin layers of the alveoli and the capillaries allow gases to pass through
- Gas exchange occurs between the air in alveoli and blood in capillaries

