PARTS AND STRUCTURE OF THE RESPIRATORY SYSTEM

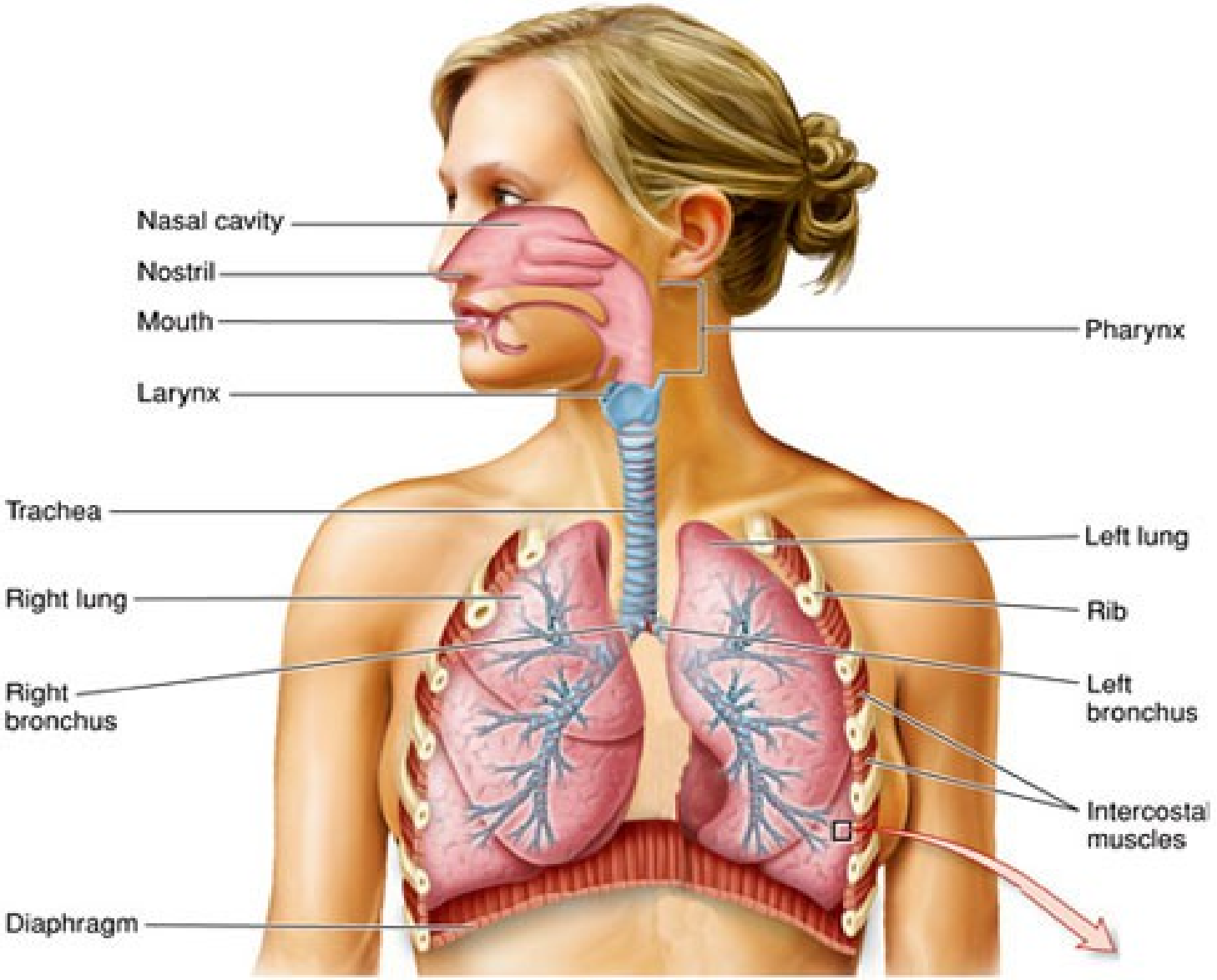
Parts of the Respiratory System

- The RS can be divided into two parts:

1. Respiratory Tract, (path that air follows).
   - Nasal passage
   - Pharynx
   - Larynx
   - Trachea
   - Bronchi, (branch out into bronchioles).

2. Lungs

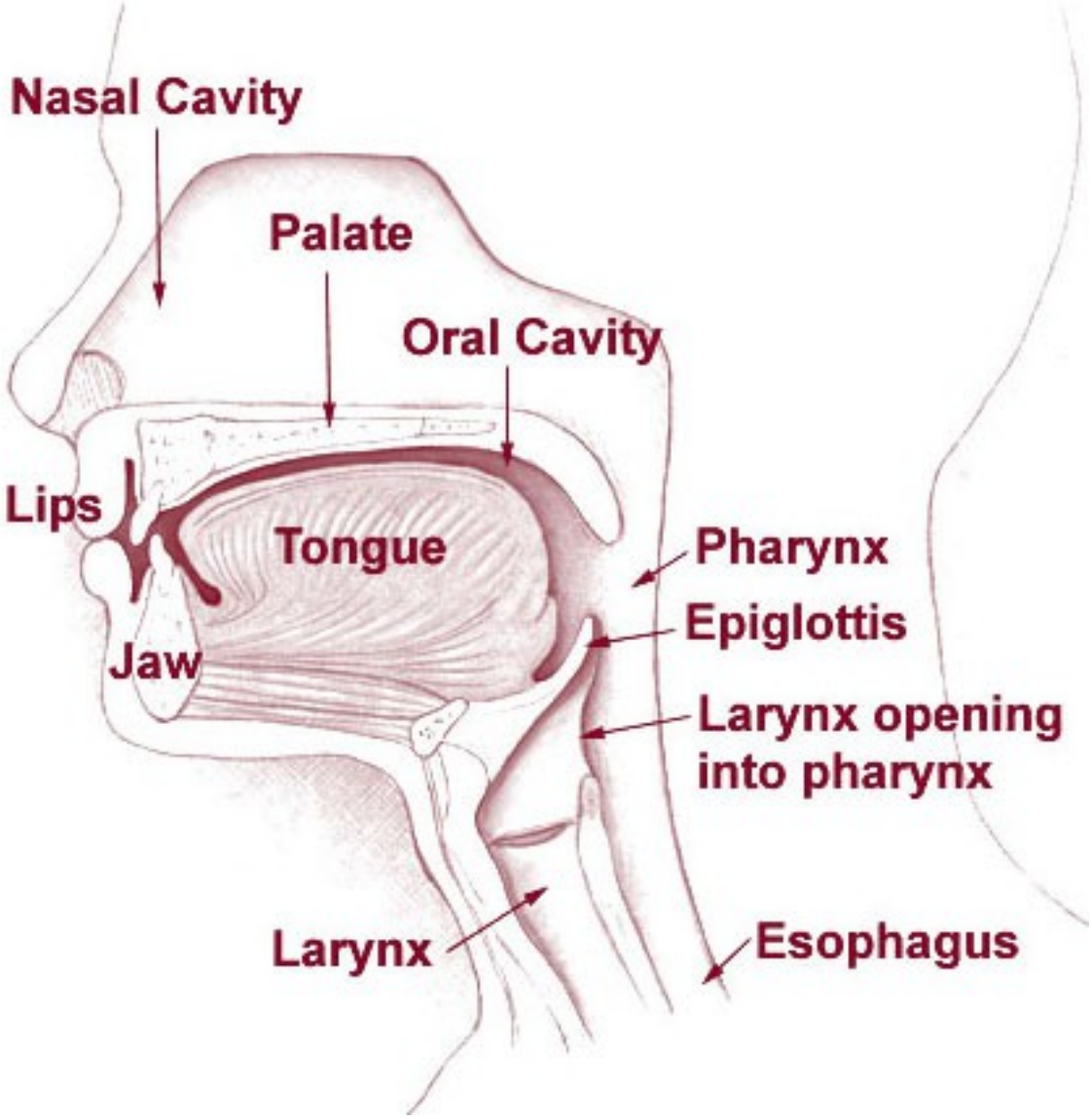
KNOW THESE PARTS!



Respiratory Tract
#1 – Nasal Passage

- The passage by which oxygen and CO_2, (and other gases), travel in and out of the body.
- The nasal passage starts at the nostrils and ends at the beginning of the pharynx.
- The nasal passage has two functions:
  1. Filter the air that is breathed in using the nose hairs, (called cilia).
  2. Warm and moisten the air using the mucus throughout the nasal passage.

The Nasal Passage



Respiratory Tract
#2 - Pharynx

- The **pharynx** plays an especially important role in the body, as it is common between the digestive and the respiratory tracts.
- Its main role is to ensure food goes into the esophagus and that air goes into the lungs.

- In order to do this, the **epiglottis**, (a small fold of tissue), will open and close the respiratory tract depending on what passes through the pharynx.

- **Food = digestive system**

  next step: the esophagus

  epiglottis closes the larynx

- **Air = respiratory system**

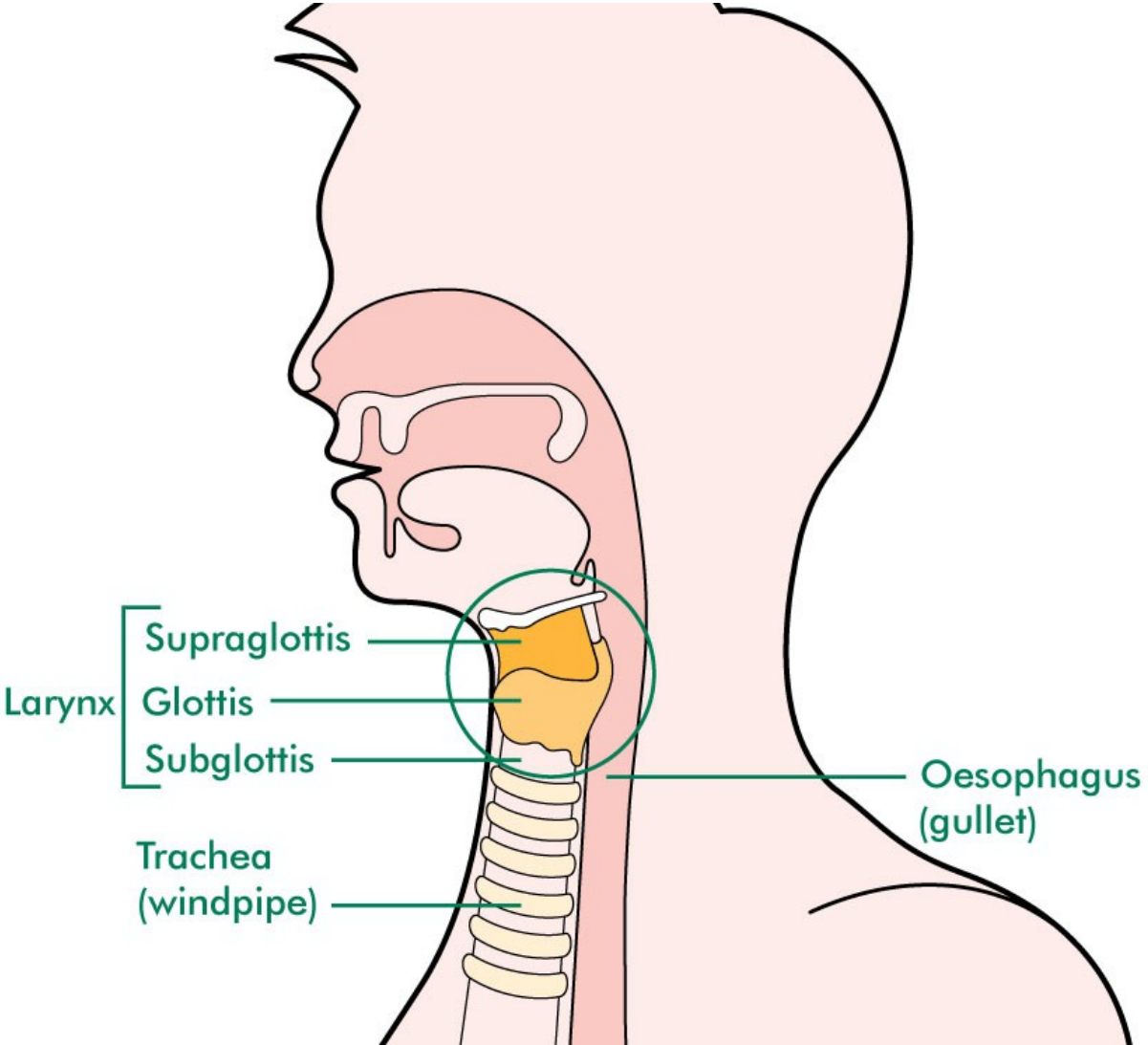
  next step: the larynx

  epiglottis opens the larynx

Respiratory Tract
#3 - Larynx

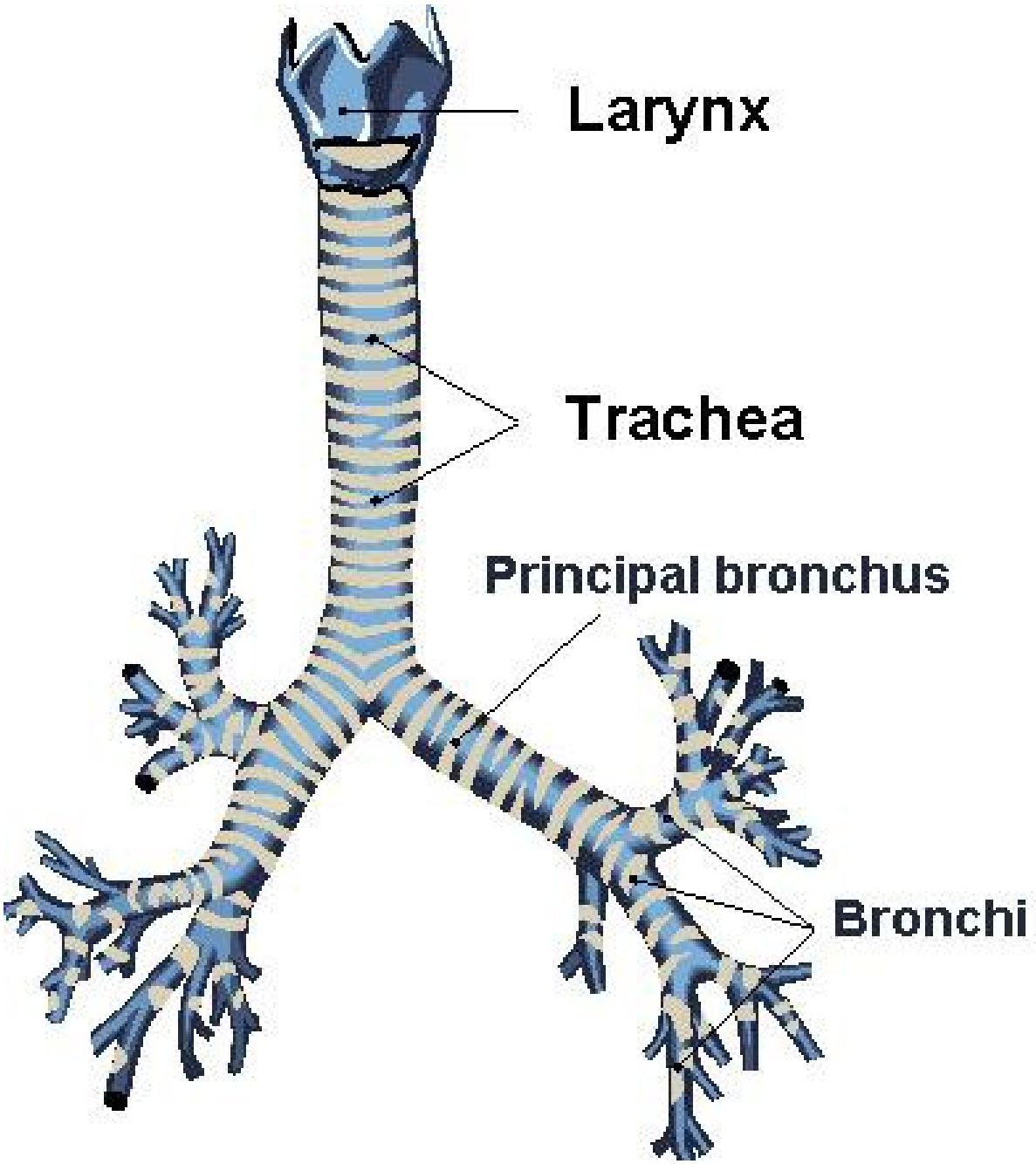
- The larynx is separated from the pharynx by the epiglottis.
- It is composed of cartilage.
- This is where the vocal cords are, so ultimately where our voice and other sounds come from.
- The larynx of males is larger and protrudes, which is why they have an Adam's Apple.

Larynx


Larynx
Supraglottis
Glottis
Subglottis
Oesophagus
(gullet)
Trachea
(windpipe)

Respiratory Tract
#4 - Trachea

- Attached to the larynx is the trachea. This tube has many rings made of cartilage to keep it open.
- Its job is to filter the air even more than in the nose with its cilia. These are hair-like fibers.
- It also warms the air before it gets to the lungs with the mucus secreted by the glands in the trachea.

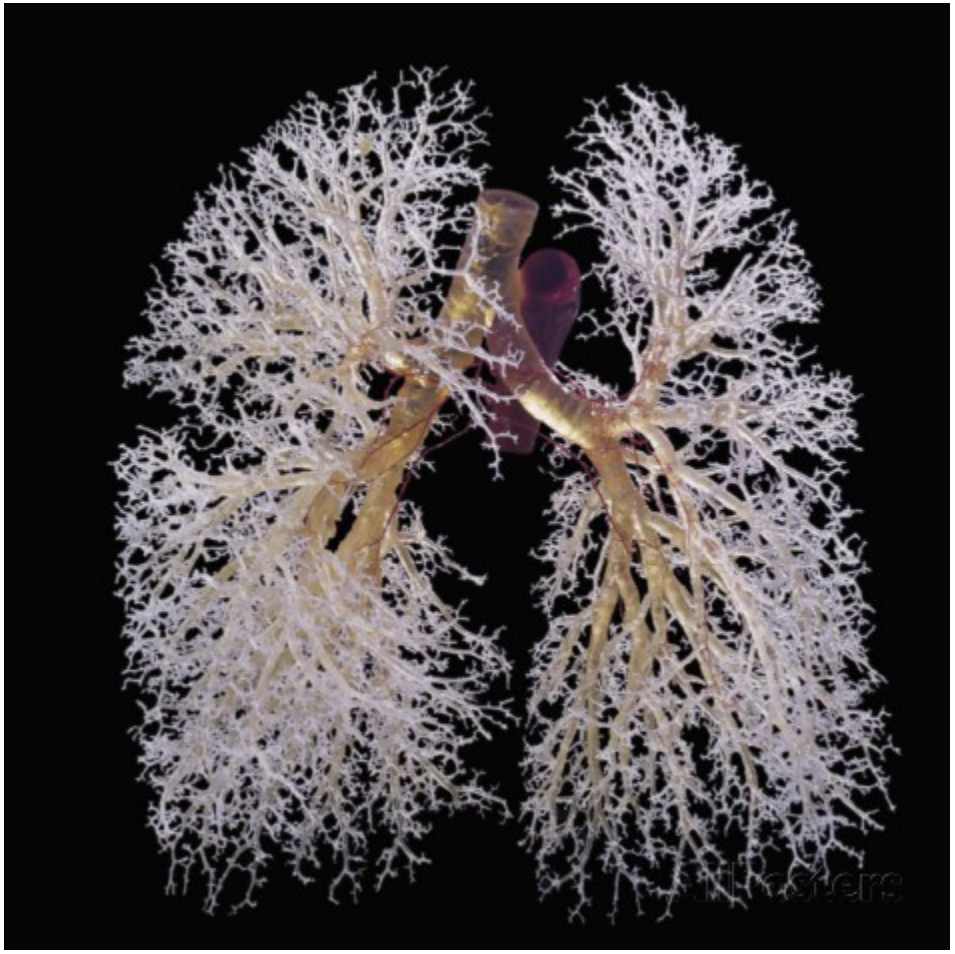


Trachea and Bronchi

Respiratory Tract
#5 - Bronchi

- Singular: Bronchus
- Like the trachea, these are tubes made of cartilaginous rings to keep them open. They also have cilia and mucus for filtering and warming of air.
- From the bronchi, they keep getting smaller and smaller inside the lung. These are called bronchioles.

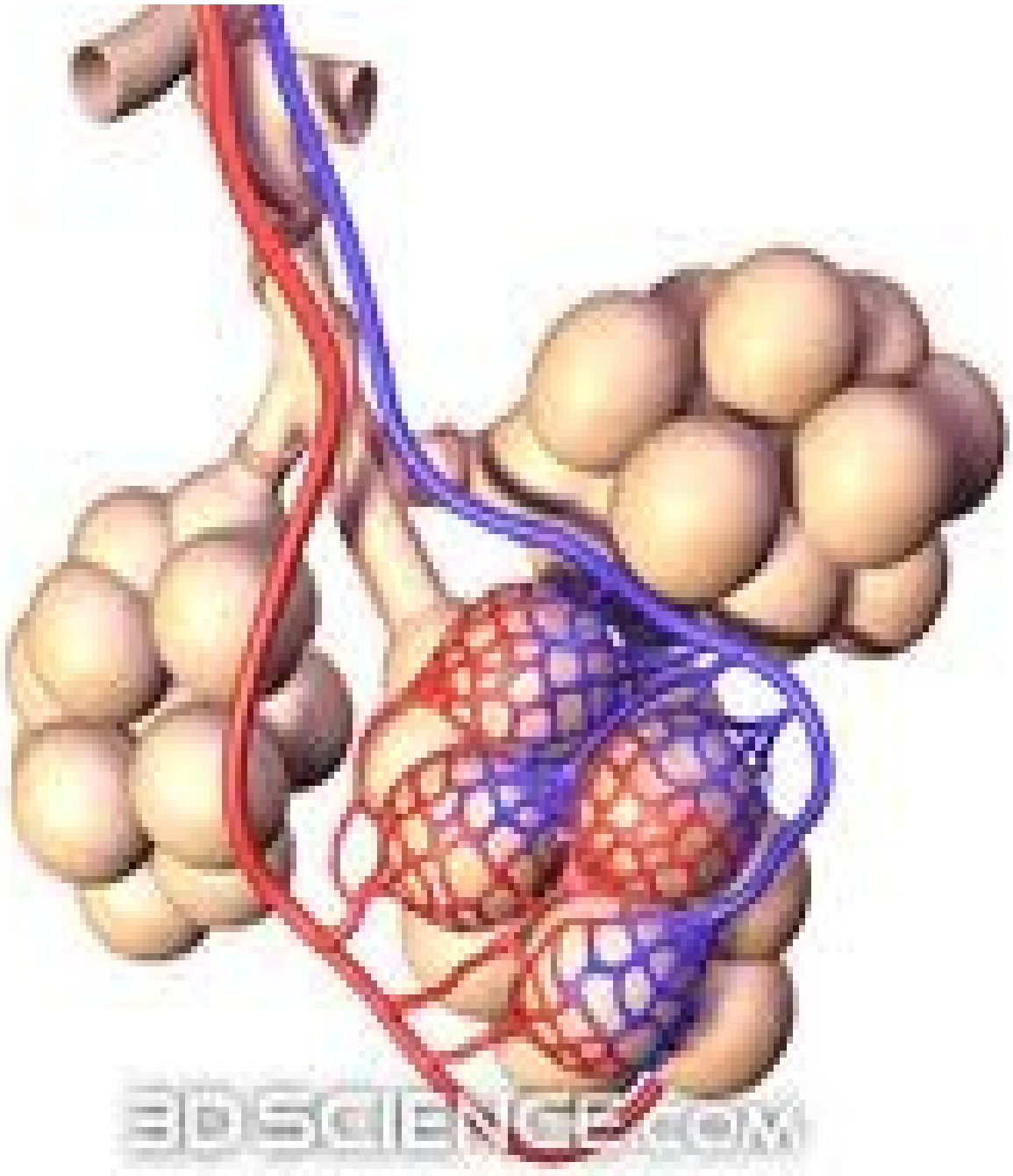
Bronchi and Bronchioles



Lungs

- The lungs are two spongy, elastic sacs, containing millions of smaller sacs called alveoli.
- The alveoli are attached to the end of the bronchioles.
- Lungs are filled with the bronchi and bronchioles.
- Because the lungs are soft, they are protected by our rib cages.
- Their purpose is the very important gas exchange between our bodies and the external world.

Lungs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PURPOSE OF THE RESPIRATORY SYSTEM

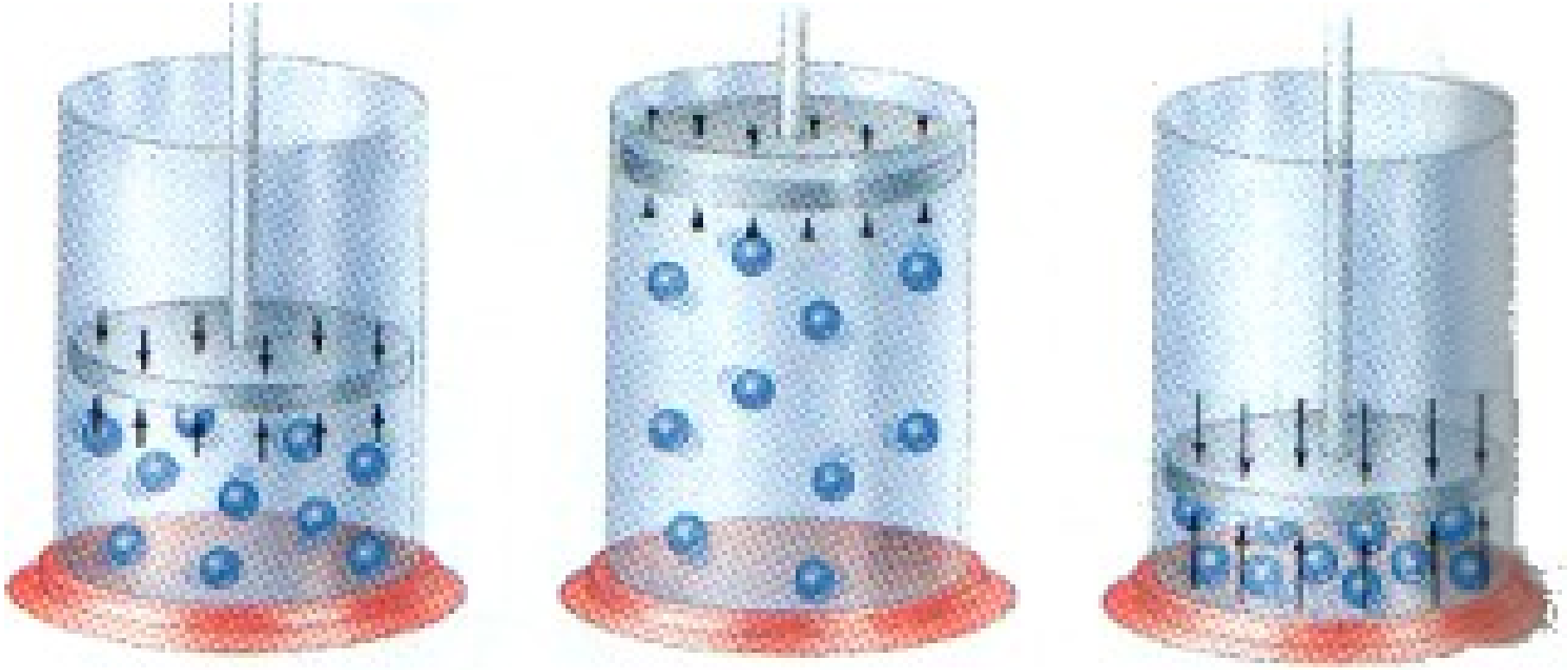
What is the purpose of the RS?

1. To obtain oxygen out of the air that our bodies need.
2. To expel waste, (carbon dioxide, CO_2), created by our bodies.

Principles of pressure and volume

- A gas will fill up any given space.
- The pressure comes from the collisions between the gas molecules.
- More collisions = more pressure.
- When volume, (space), expands, pressure decreases.
  - Why? More room for the gas to move, less chance of collision.
- When volume decreases, pressure increases.
  - Less room – more collisions.

Volume and Pressure



How respiration works

- The functions of respiration are based on the relationship between volume and pressure.
- There are three main **parts** of the anatomy involved in the mechanical action of respiration.
  - Lungs
  - Diaphragm
  - Intercostal muscles
- The diaphragm and intercostal muscles are doing the work.

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- The movement of the intercostal muscles and diaphragm depends on whether you are inhaling or exhaling.
- **Inhalation:**
  - Both the diaphragm and intercostal muscles contract, (tighten).
  - The diaphragm descends, which expands the rib cage.
  - Volume of the lungs expand and the pressure within them decreases.
  - Oxygen goes in.

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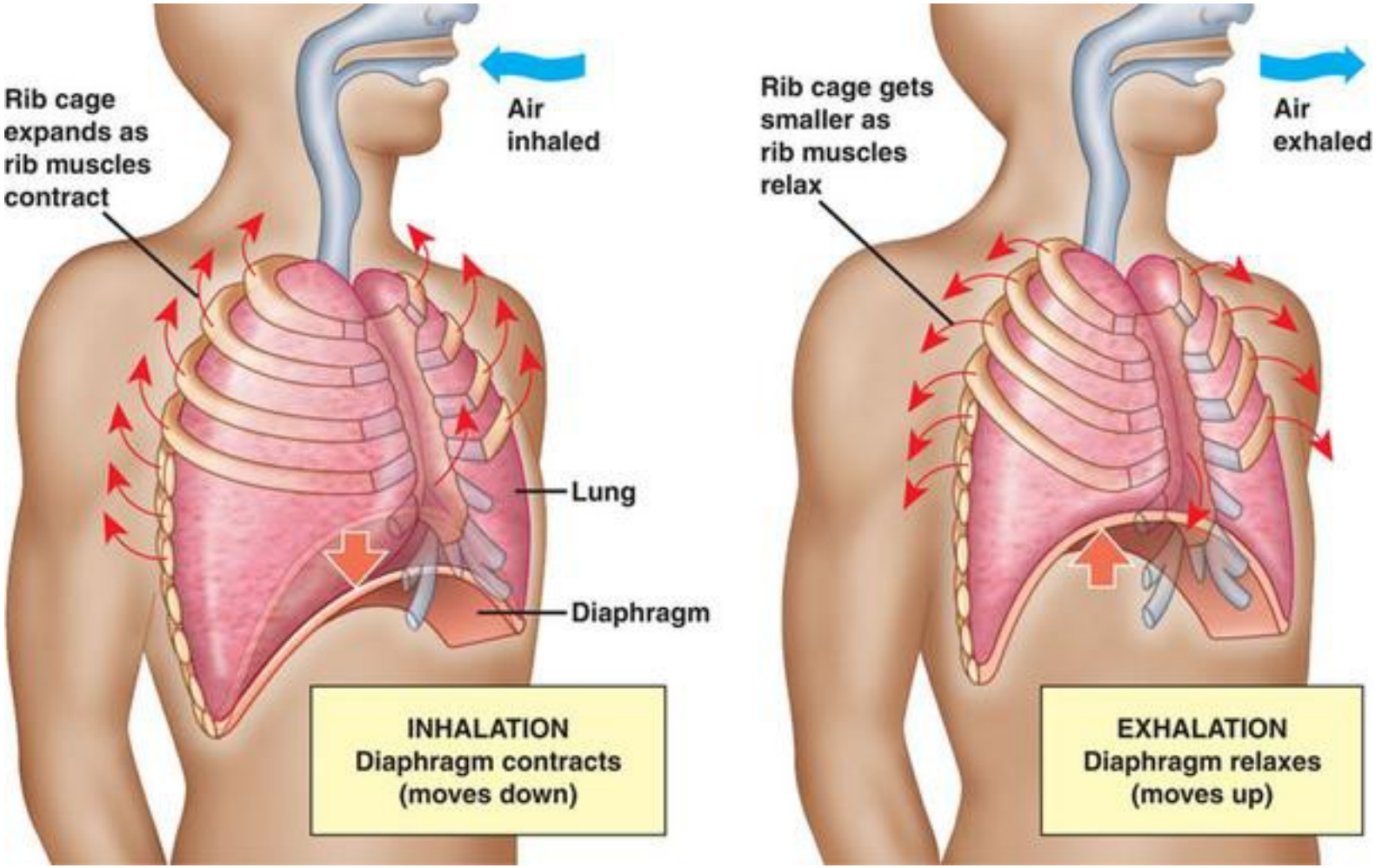
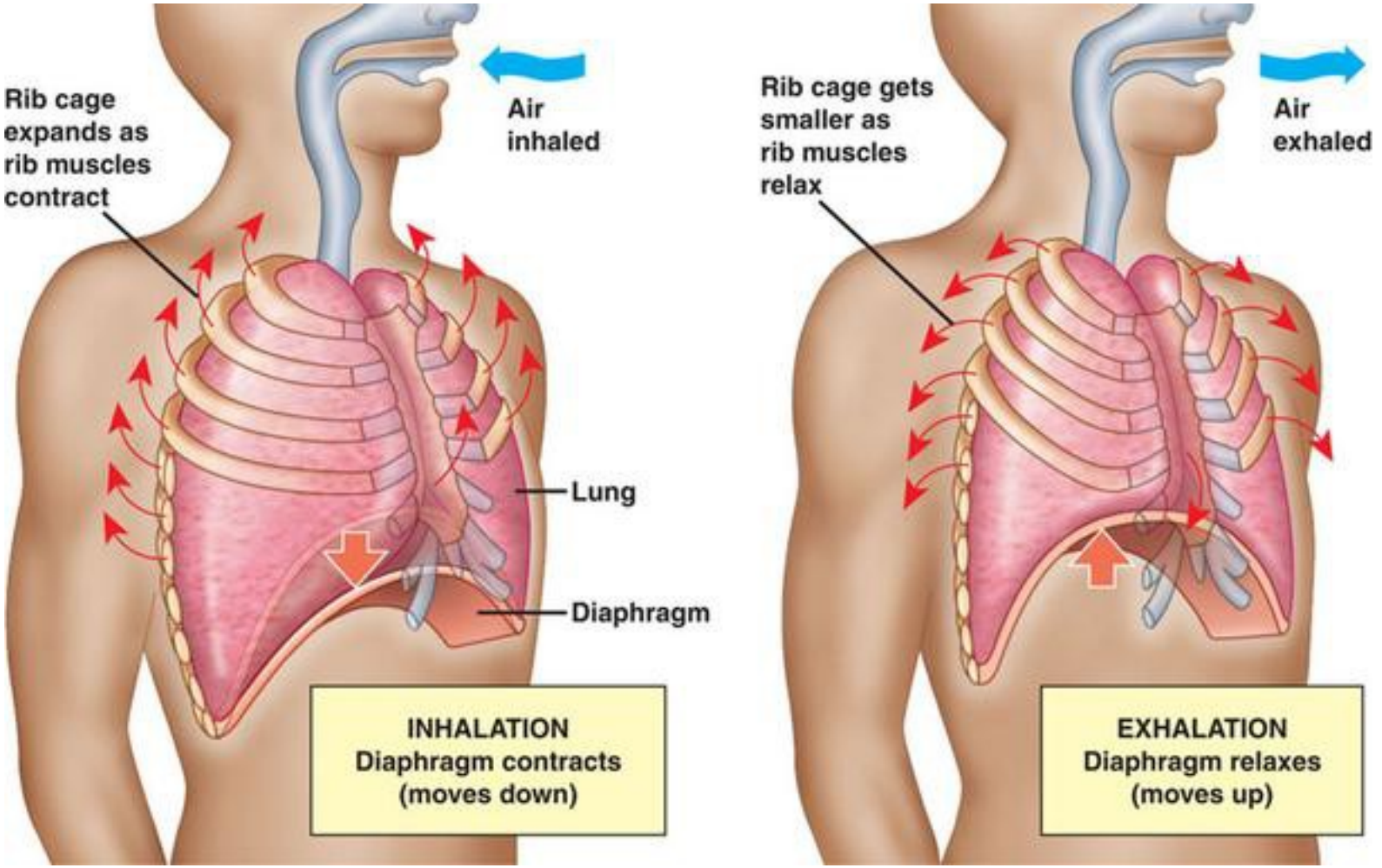
- **Exhalation:**
  - The intercostal muscles and the diaphragm relax.
  - The diaphragm ascends, the ribs fall.
  - Volume of the lungs decreases, and pressure within them increases.
  - Air inside the lungs becomes pushed out, and CO_2 exits.

Inhalation and Exhalation



Inhalation and Exhalation



FUNCTION:
GAS EXCHANGE

Keep in mind…

- **Cellular respiration:** The ability of the bodies cells to produce energy from our food and oxygen. By doing so, it also produces carbon dioxide, (waste product).
- Oxygen needs to get into the cells, carbon dioxide needs to get out.
- These gases are transported by the blood.
- These gases get in and out of the blood via the lungs

What is a gas exchange?

- A gas exchange is when two gases, in this case oxygen and carbon dioxide change places, (oxygen: in, CO_2: out).
- Two things occur:
  1. O_2 moves from the alveoli into the capillaries, and subsequently the bloodstream.
  2. CO_2 moves from the blood and into the alveoli.

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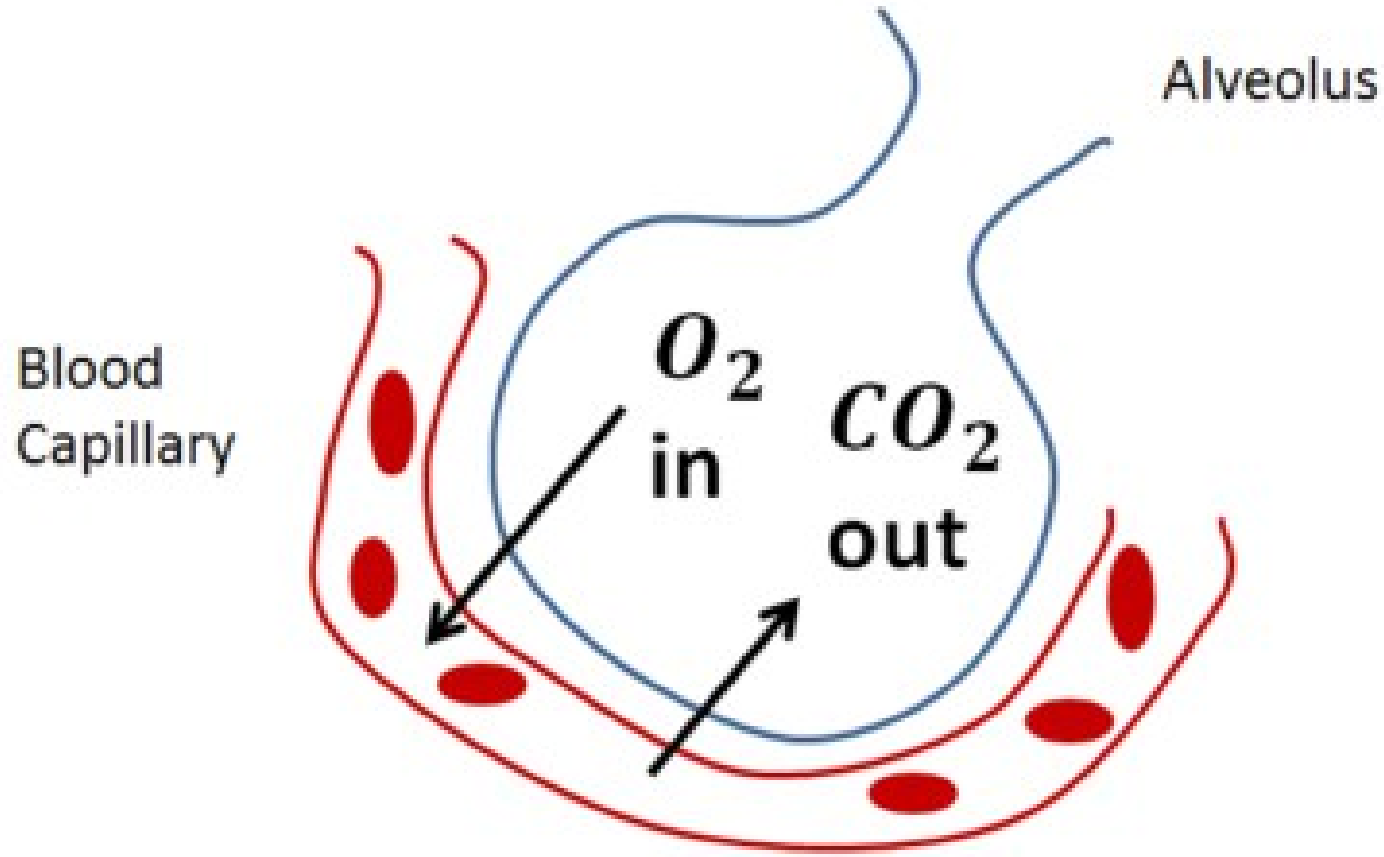
- This gas exchange happens due to a process called **diffusion.**
  - Movement of substances from a concentrated region to a less concentrated region.
- When blood reaches the lungs, it is high in CO_2 and the air in lungs is high in O_2.
- Oxygen will instantly flow into the blood because there is little there, (it diffuses). Carbon dioxide will flow into the lungs for the same reason.

Gas Exchange



Diffusion of Carbon Dioxide

- Blood arriving at the alveolus is rich in carbon dioxide.
  - Why? It has been created in the cells after cellular respiration. As a waste product, it leaves the cells to be transported by the blood.
- The concentration of CO_2 inside the alveolus is lower than in the blood.
- **Therefore, CO_2 diffuses into the alveolus.**
  - Why? It needs to leave the body. As a gas, it can only leave by the lungs and we EXHALE.

Diffusion of Oxygen

- Air arriving in the alveolus is rich in oxygen
  - Why? We have just breathed it in. It has followed the respiratory tract until arriving in the alveolus.
- The concentration of O_2 inside the alveolus is higher than in the blood of the capillaries surrounding the alveolus.
- **Therefore, O_2 diffuses into the blood.**
  - Why? It needs to travel to our numerous cells in order to do cellular respiration.