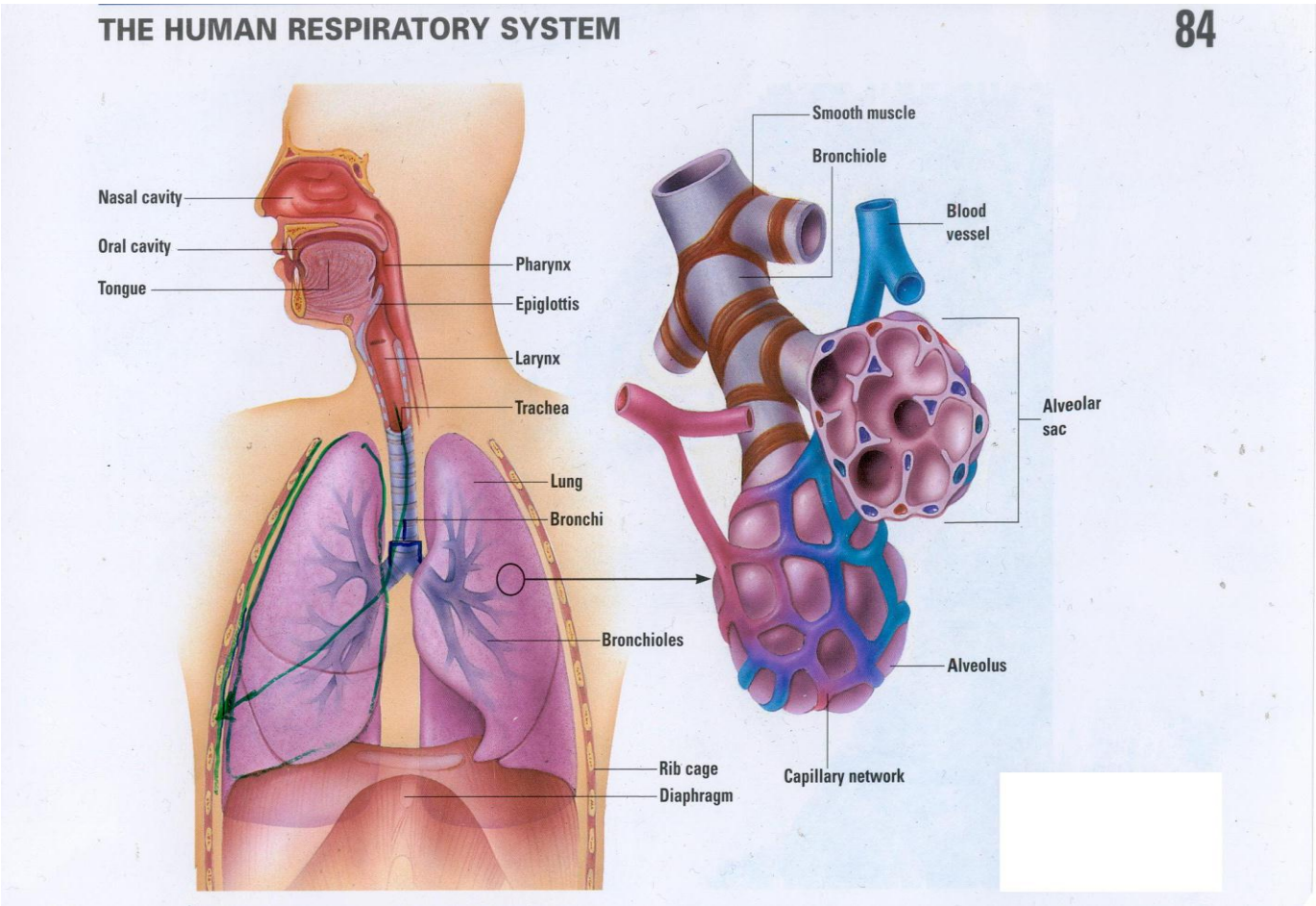
Unit L Notes #1 : Respiratory Tract and Function



A) Respiratory Tract Structures;

1. Nasal Cavity -Air is warmed, filtered, and moistened.

2. Pharynx

- Back of throat

- Common passage for air and food.

3. Glottis

- Opening at the top of larynx
- Upper part of windpipe
- Covered by epiglottis when swallowing food

4. Larynx

- Voice box, which contains the vocal cords

5. Vocal Cords

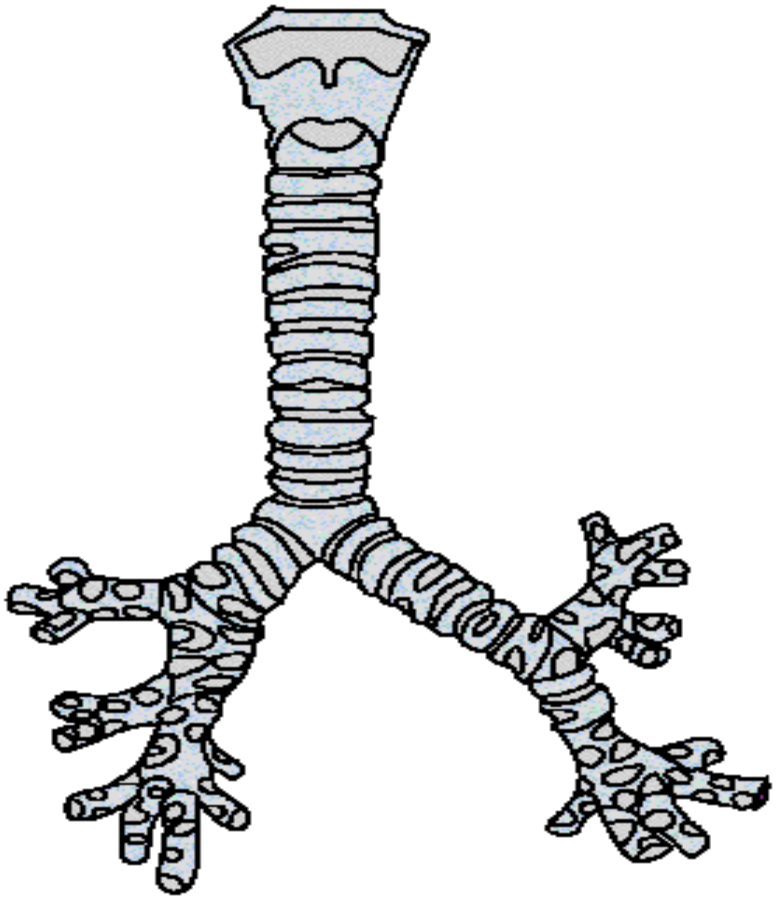
- Vibrate, as air is forced past, producing sound.

6. Trachea

- “Windpipe”
- Re-enforced with rings of cartilage to prevent collapsing under vacuum pressure.
- Lined with cilia: filter and move debris

7. Bronchi

- Branches off of the trachea.
- One to each lung, ringed with cartilage.
- “Bronchus” - singular.



8. Bronchioles (Bronchioli)

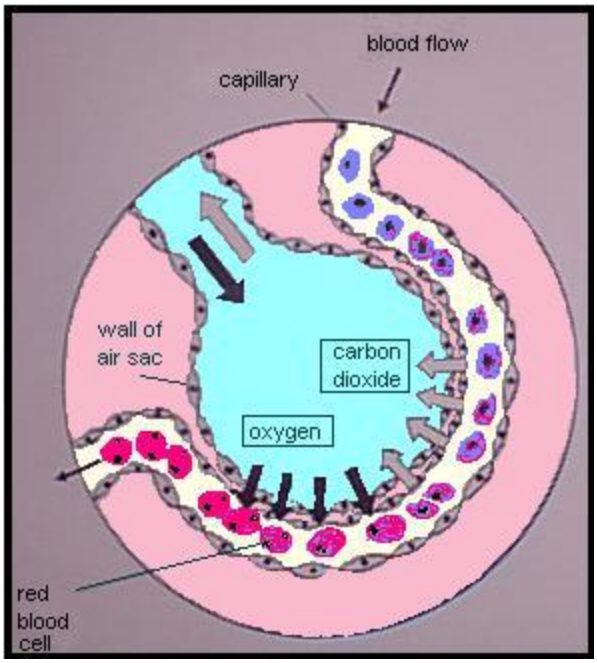
- Vast network of smaller branches off of the bronchi.

- No cartilage for support.

9. Alveoli

- Rounded air sacs found at the end of the microscopic bronchioles.

- Structure consists of walls only one-cell thick, this design allows for gas exchange (diffusion) to take place.



10. Pleural Membranes

- Double membrane that covers the lungs, inner membrane lines lungs (visceral pleura), second outer membrane lines the thoracic cavity (parietal pleura)

- These serous membranes secrete a watery fluid, which acts as a lubricant to allow the surface of the lungs to slide over the body wall (thoracic cavity) more easily.

- They also seal off the thoracic cavity, to make it airtight.

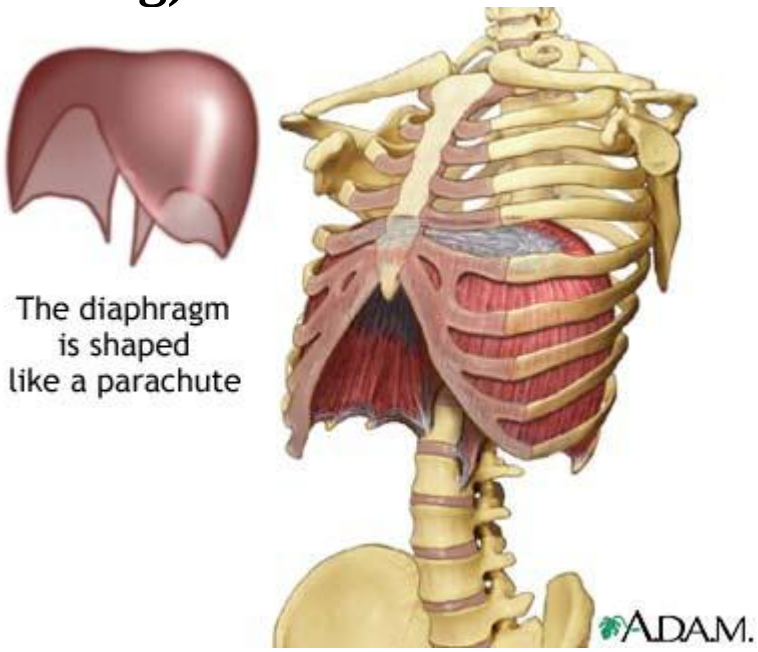
11. Thoracic Cavity

- Chest cavity

- Region from the diaphragm to throat.

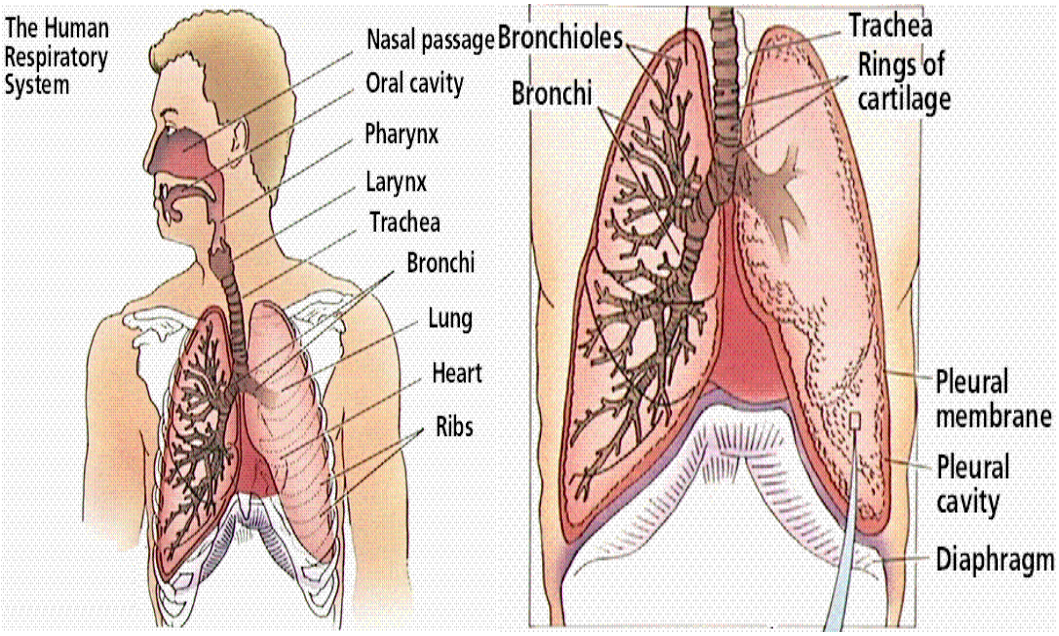
12. Diaphragm

- Dome-shaped horizontal muscle.
- Separates the thoracic cavity from the abdominal cavity.
- Contraction of muscle results in inspiration (inhaling).



13. Ribs

- Protect internal organs
- When ribs contract with the intercostal muscles, they rise upward and outward, this results in an increase to the volume of the thoracic cavity.



B) Air Passageways: Filters, Warms, Moistens

Several things happen to the air on its journey into the alveoli:

1. *Cleansed of debris*. This is a two-part process

a. The initial cleaning is done by the nose hairs and mucous in the nasal passageways.

b. The second is the process that occurs further along the respiratory tract. The mucous lining and the cilia along the trachea and the bronchi act as a trap and a conveyer belt. Pretty well any material other than the

gases of the inhaled air will get caught in the mucous lining these structures. The cilia are in constant motion beating the debris-laden mucous upward towards the pharynx. When this material is detected at the back of the mouth, it is swallowed (or coughed up and spit out). Note: Cilia do not act as the filter.

2. *Adjusted to body temperature.*

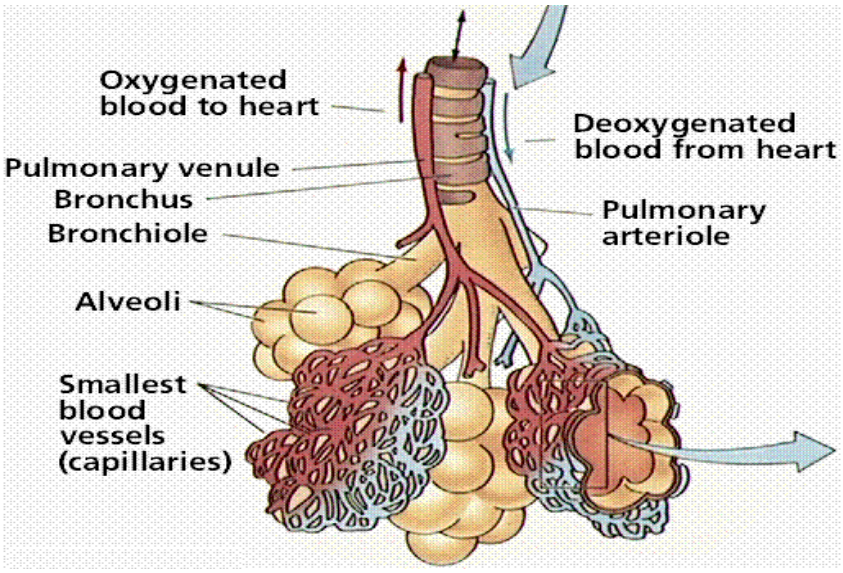
a. The more contact that incoming air has with moist tissues that are 37°C the closer the temperature of the inhaled air get to 37°C. By the time air gets to the alveoli, there will be very little difference if any in the temperature of the incoming air with that of the surrounding tissues.

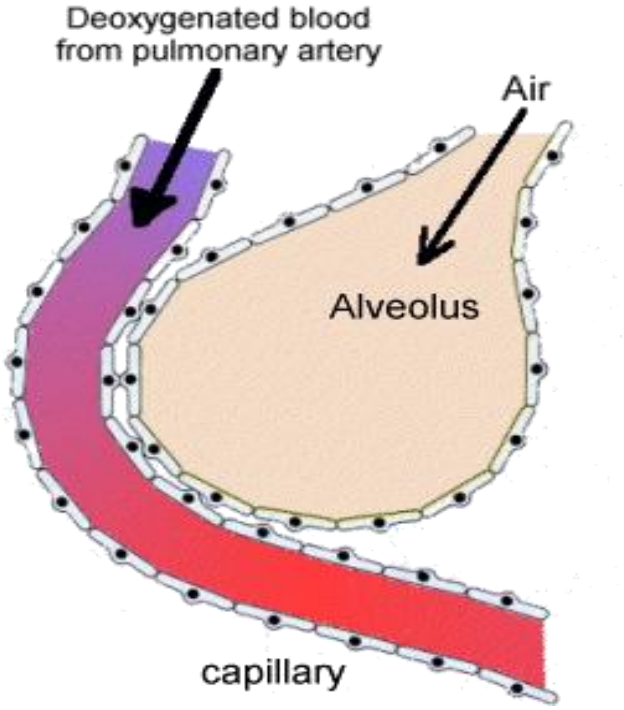
3. *Adjusted to 100% humidity.*

a. One of the functions of the mucous membranes lining the respiratory tract is to increase the humidity of in-coming air. Moist

air prevents alveoli from drying out, moist tissue is essential for maximizing diffusion.

C) Specializations of Alveoli





1. They are very numerous.
Up to 300 million alveoli in the human lung.
This provides a great surface area for diffusion

2. They are very thin-walled. Alveolar walls are only one cell thick. This aids in diffusion.

3. The alveoli have a coating of *Lipoprotein* on their inner surface. This helps to maintain surface tension thus preventing them from collapsing and sticking together during exhalation.

4. They are supplied with stretch receptors. These are nerve endings that are sensitive to stretch. During inhalation, they signal when the alveoli are full enough (stretched). This marks the onset of exhalation.

5. The alveoli surfaces have a very rich blood supply from the pulmonary capillaries to ensure maximum diffusion. They are highly vascularized.

6. Made up of Squamous (flat) Epithilial cells

Three things that make the lungs very efficient at gas exchange

1. Huge surface area
2. Only 2 cell layers separate air in lungs from the blood in capillary
3. Moist