


Anatomy & Physiology

The background features a stylized anatomical illustration of the human respiratory system, including the trachea, bronchi, and lungs, rendered in a glowing blue and red color scheme. A human heart is prominently displayed in the center, colored in a realistic red. Overlaid on the scene are several white ECG (heart rate) lines, suggesting a connection between anatomy and physiological function.

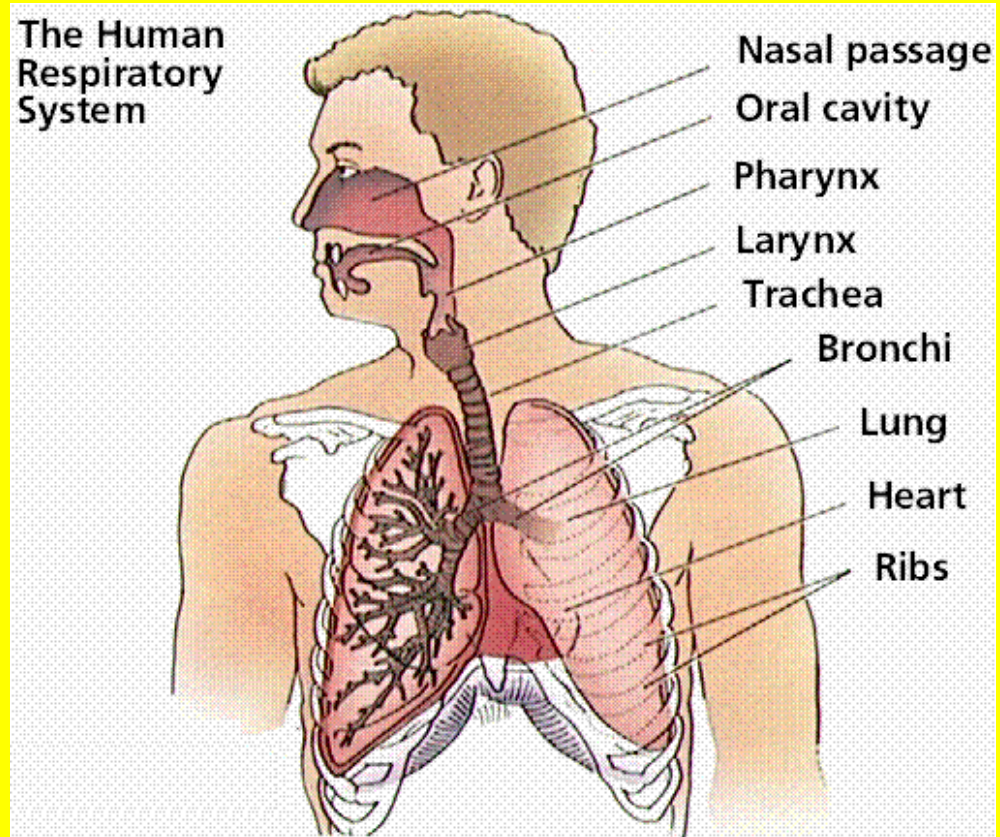
RESPIRATORY SYSTEM



What is the respiratory system?

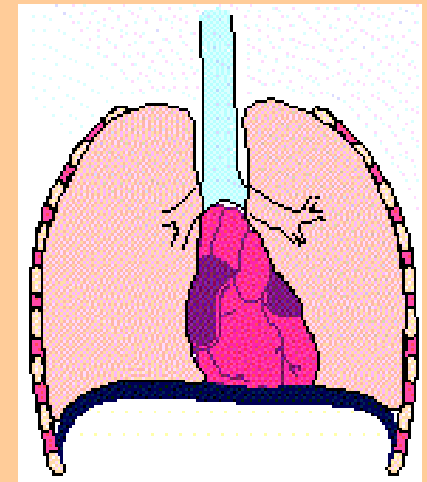
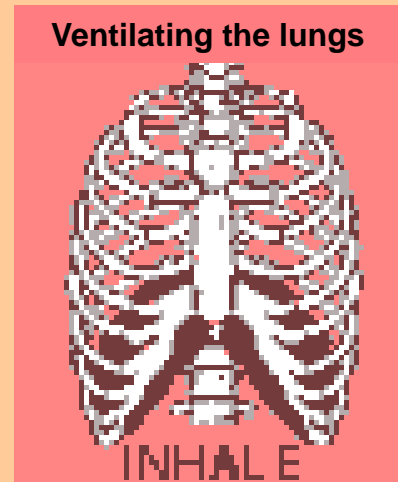
The respiratory system consists of the nose, pharynx (FAIR inks), larynx (LAIR inks), trachea (TRAY kee ah), bronchi (BRAHN kye), and lungs.

The primary function of this system is to furnish oxygen for individual tissue cells, and to take away the waste products and carbon dioxide produced by those same cells.



External & internal respiration...

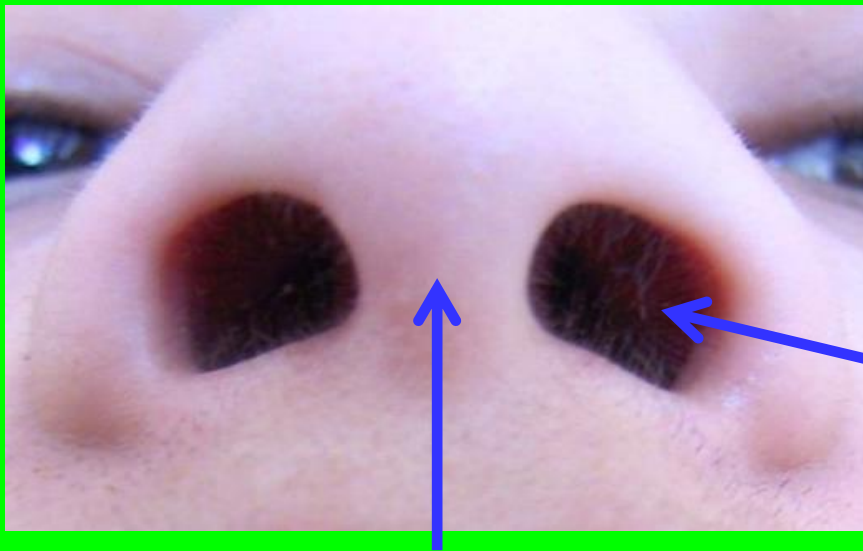
External respiration is the process of inhaling oxygen into the lungs, and exhaling carbon dioxide. That process includes the ventilation of the lungs and the exchange of air in the lungs and blood within the capillaries of the alveoli of the lungs.



Internal respiration is the metabolic process by which living cells use blood flowing through the capillaries, absorbing the oxygen (O_2) they need and releasing the carbon dioxide (CO_2) they create.

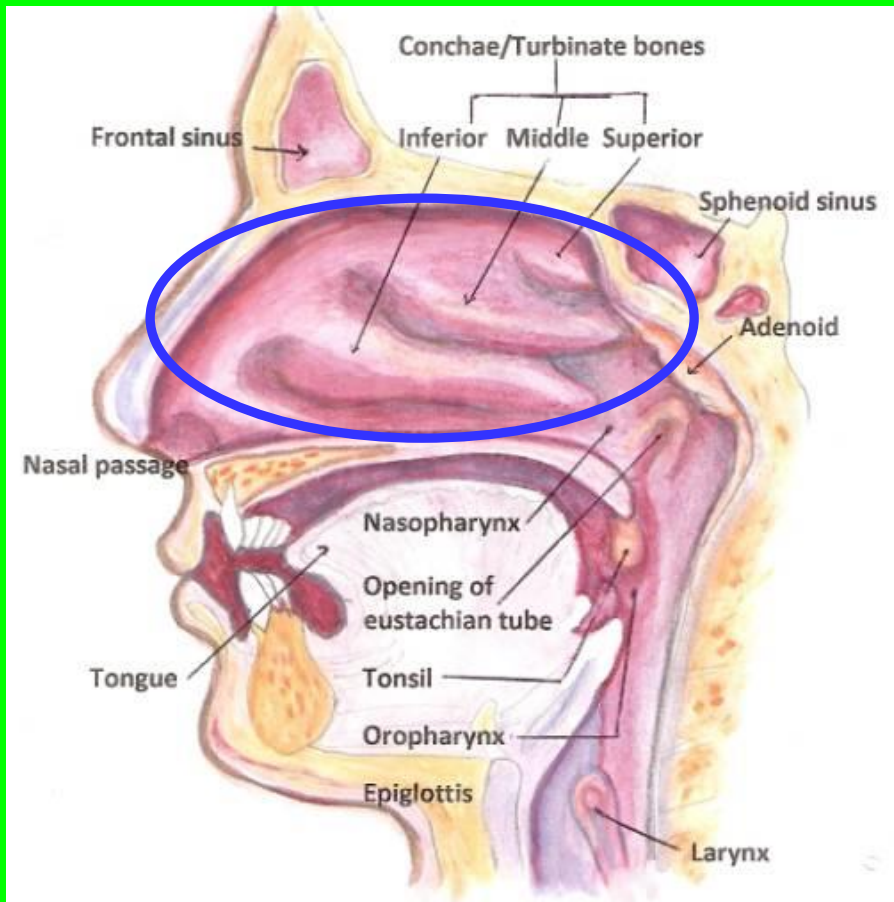
The nose...

The external opening of the nose is the nostrils or anterior nares.



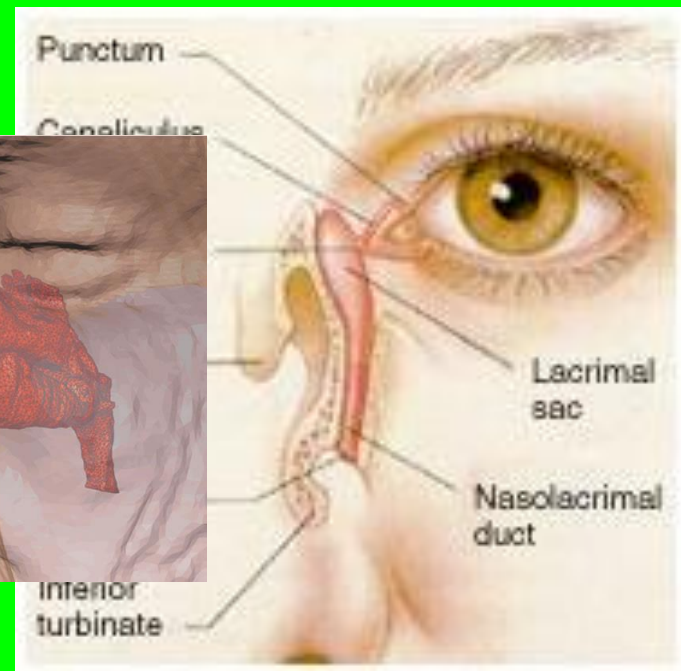
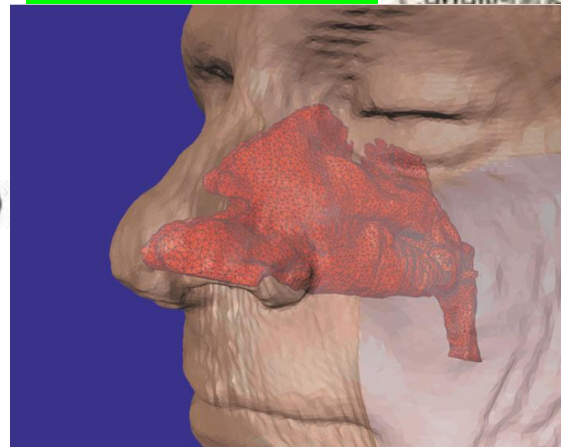
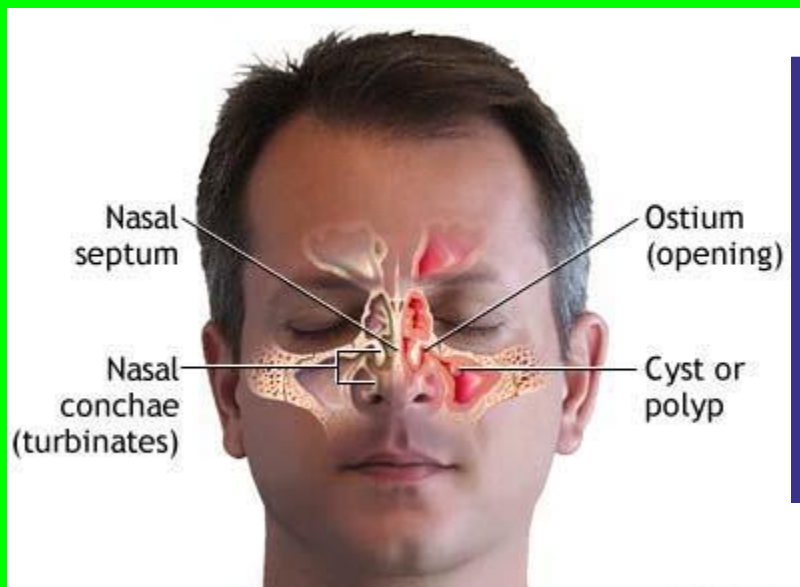
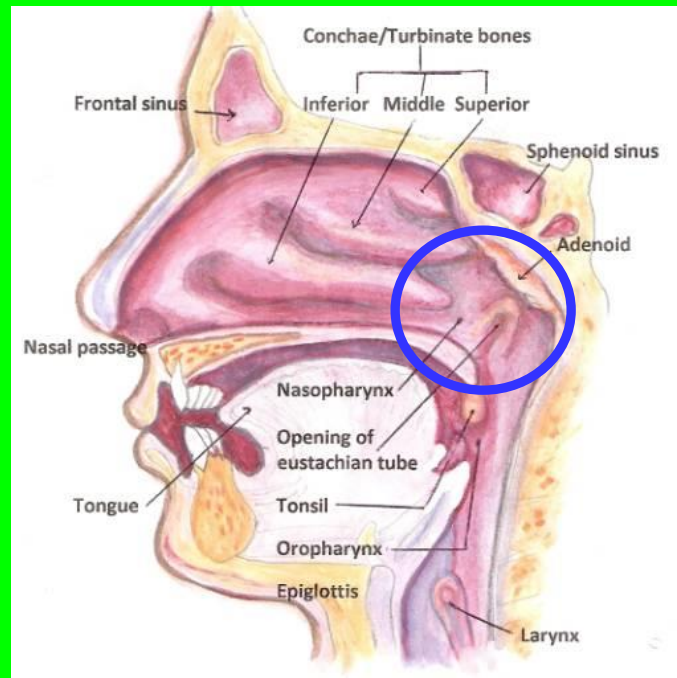
The dividing partition between the nostrils is the nasal septum, which forms two nasal cavities.

Each cavity is divided into 3 air passages: the superior, middle, and inferior conchae (KON kuh).



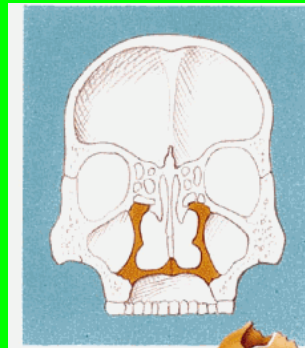
The nose...

The conchae passages lead to the passageway called the pharynx. Here, the ear is connected to the sinuses, the ears through the eustachian tubes, and even the eyes through the nasolacrimal ducts.



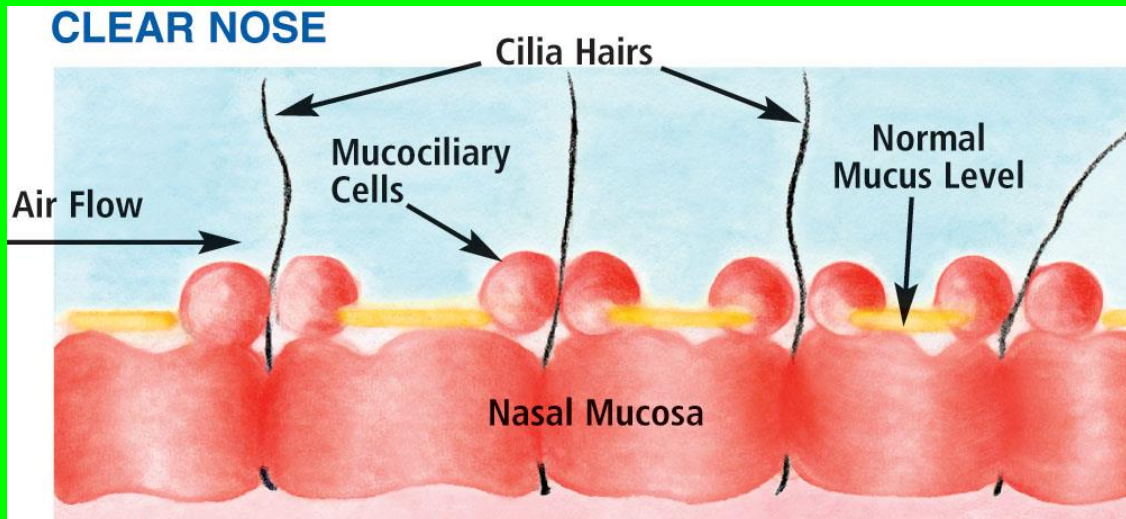
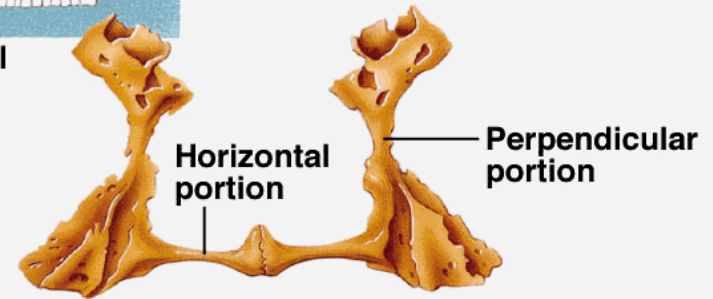
The nose...

The palatine (palate) bones and maxilla (upper jaw bone) separate the nasal cavities from the mouth cavity. Cilia (hairs) line the mucous membrane. About 1 qt. of mucous is produced daily.

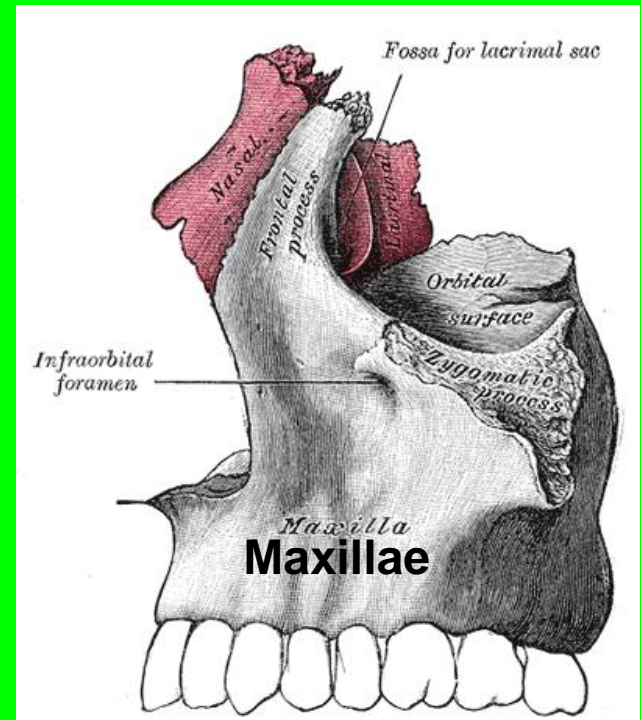


Coronal section

Palatine Bones



CLEAR NOSE



The nose...



The nose has 5 functions:

- 1. It serves as an air passageway.**
- 2. It warms and moistens inhaled air.**
- 3. Its cilia and mucous membrane trap dust, pollen, bacteria, and foreign matter.**
- 4. It contains olfactory receptors, which smell odors.**
- 5. It aids in phonation and the quality of voice.**

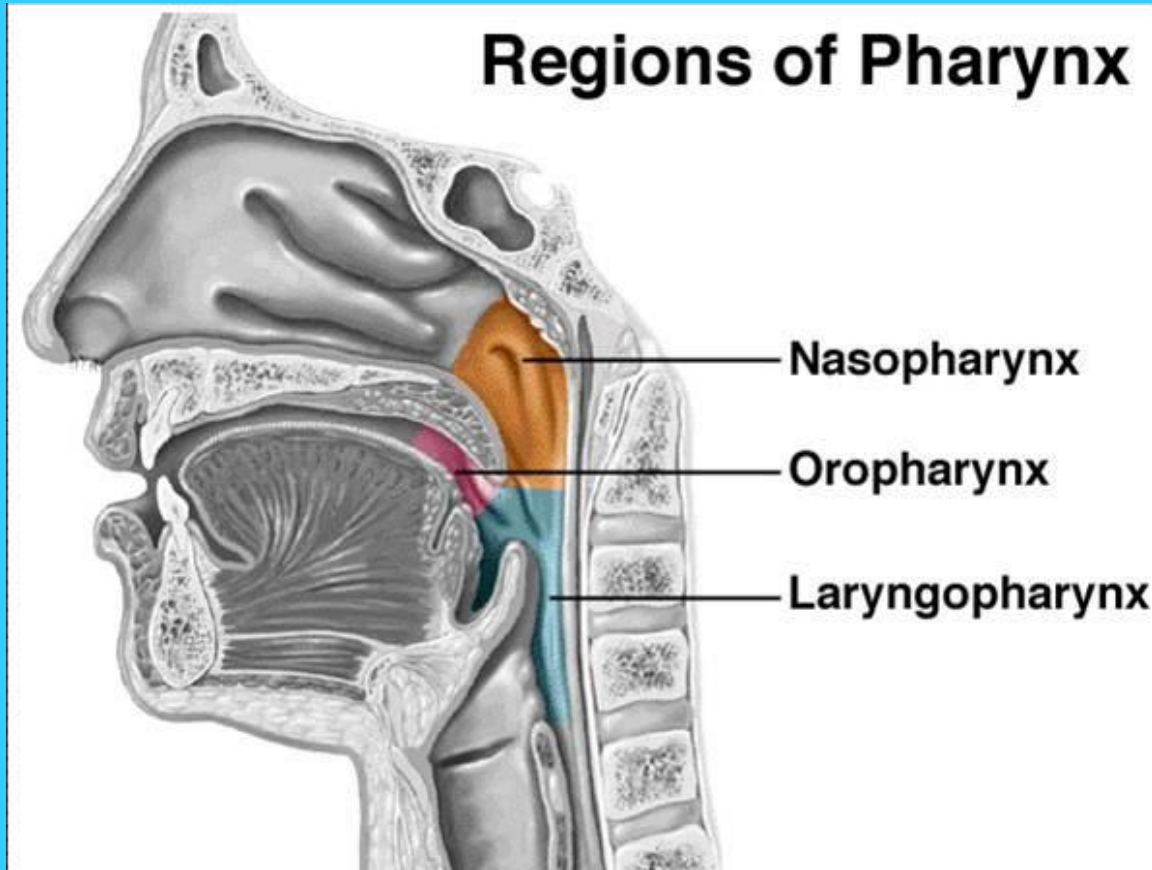


The nose...

Did you guess the owners of these noses?



The pharynx...






The nasopharynx is behind the nose; the oropharynx is behind the mouth; the laryngopharynx is behind the larynx.

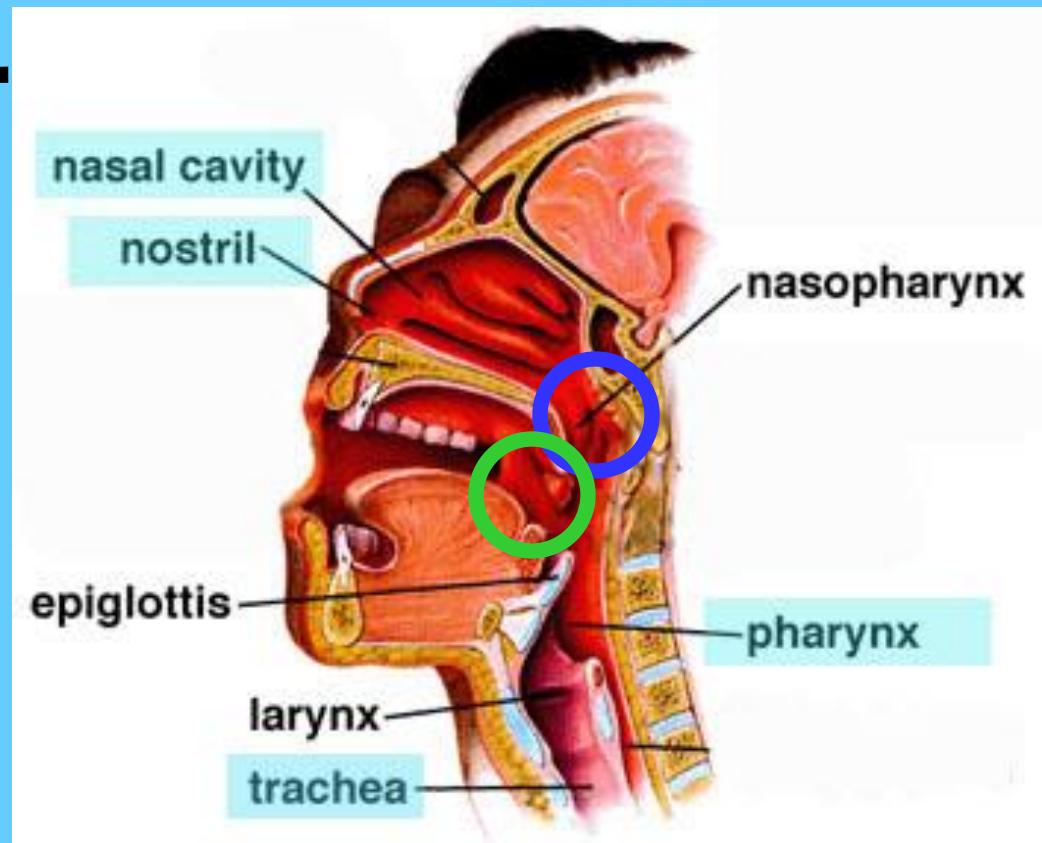
The pharynx is the correct term for the throat. It is a muscular and membranous tube that is about 5 inches long, extending downward from the base of the skull. It eventually becomes the esophagus.

The pharynx...

There are 7 openings into the pharynx.

In the nasopharynx, there are two openings from the eustachian tubes of the ear , and two openings from the posterior nares of the nose .

In the oropharynx is one opening from the mouth .



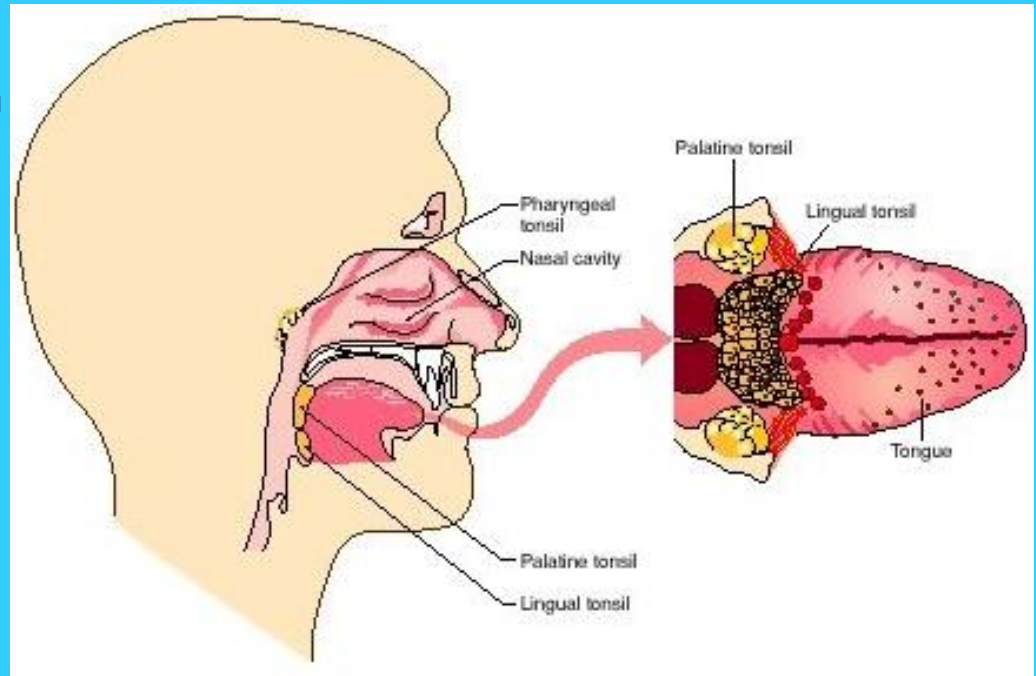
The pharynx...

The pharynx also contains 3 pairs of tissues that are part of the lymphatic system:

1. the pharyngeal tonsils... the adenoids
2. the palatine tonsils
3. the lingual tonsils

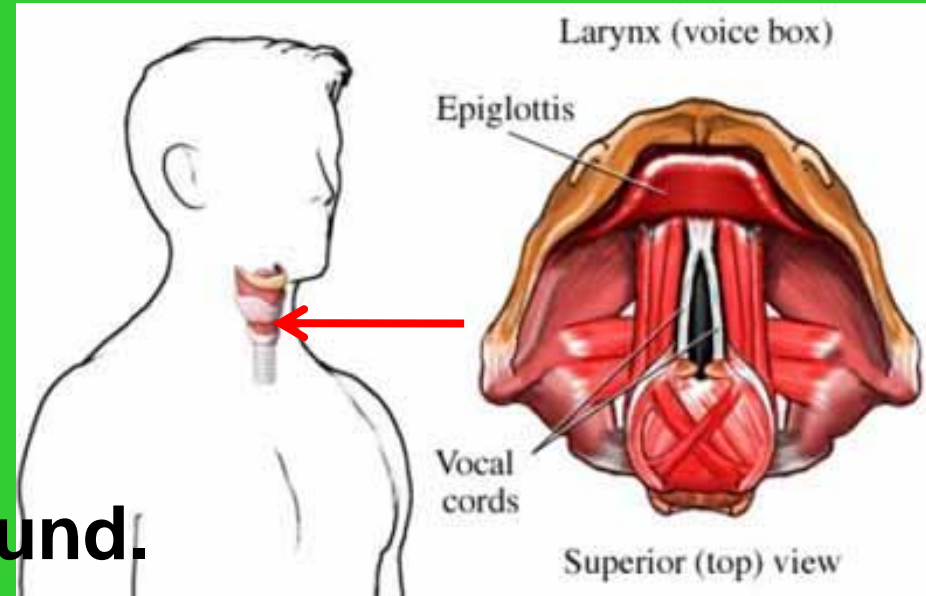
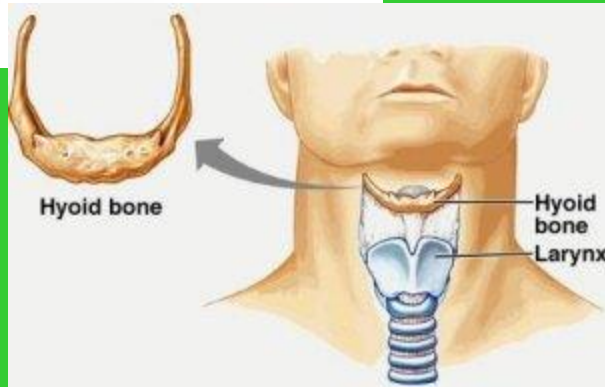
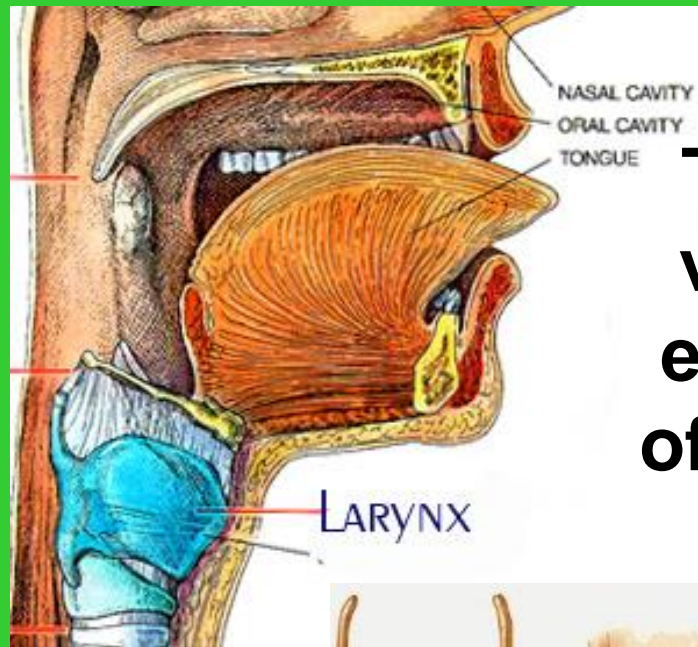
The pharynx has 3 functions:

1. serves as a passageway for air
2. serves as a passageway for food
3. aids in phonation by changing its shape.



The larynx...

The larynx, commonly called the voicebox, is located at the upper end of the trachea, below the root of the tongue and hyoid bone. It is lined with mucous membrane.



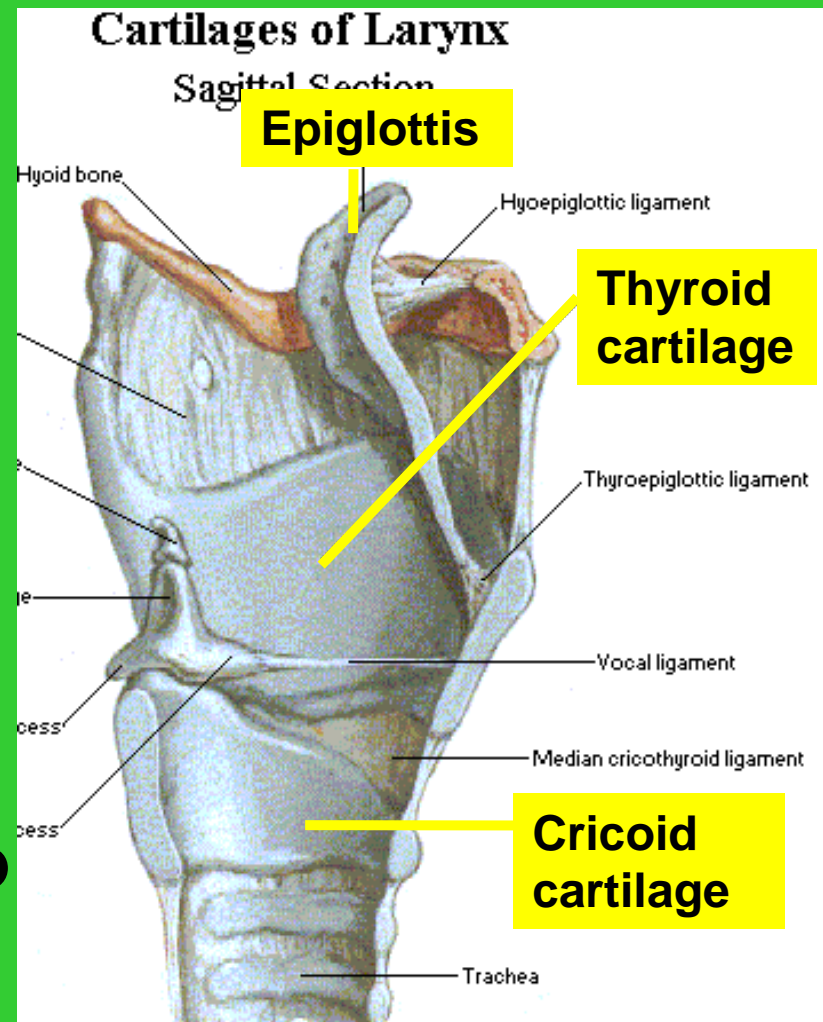
The larynx contains vocal cords, which produce sound.

Short, tense vocal cords produce high notes; long relaxed vocal cords produce low notes.

The larynx...

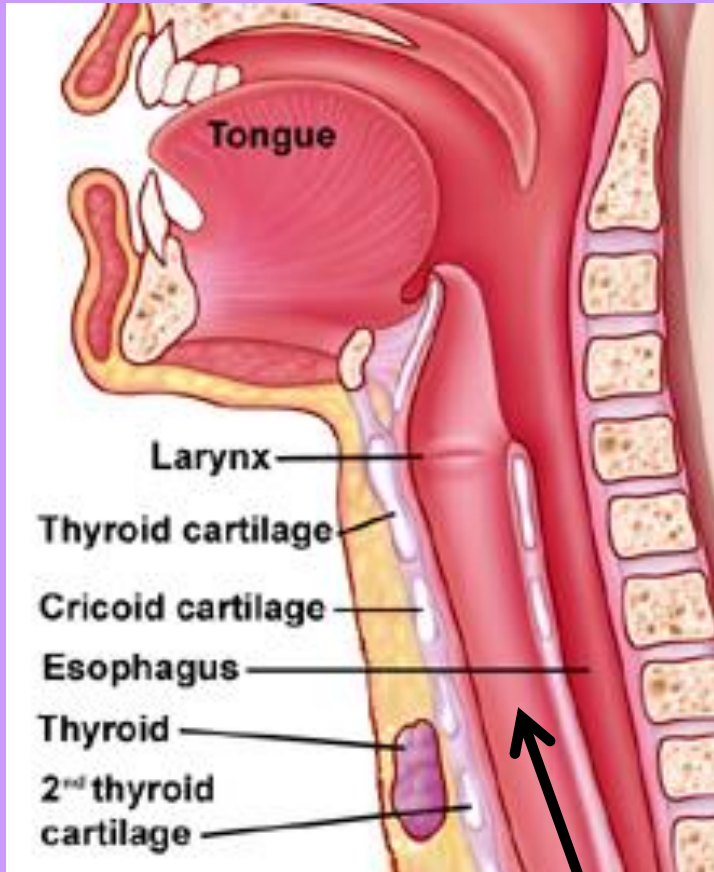
We can see several of the cartilage structures of the larynx in this side view:

1. The thyroid cartilage or Adam's apple is usually larger in the male, allowing longer vocal cords and contributing to a deeper male voice
2. The epiglottis covers the entrance of the larynx while swallowing, to avoid choking
3. The cricoid (KRY koid) cartilage contains the vocal cords



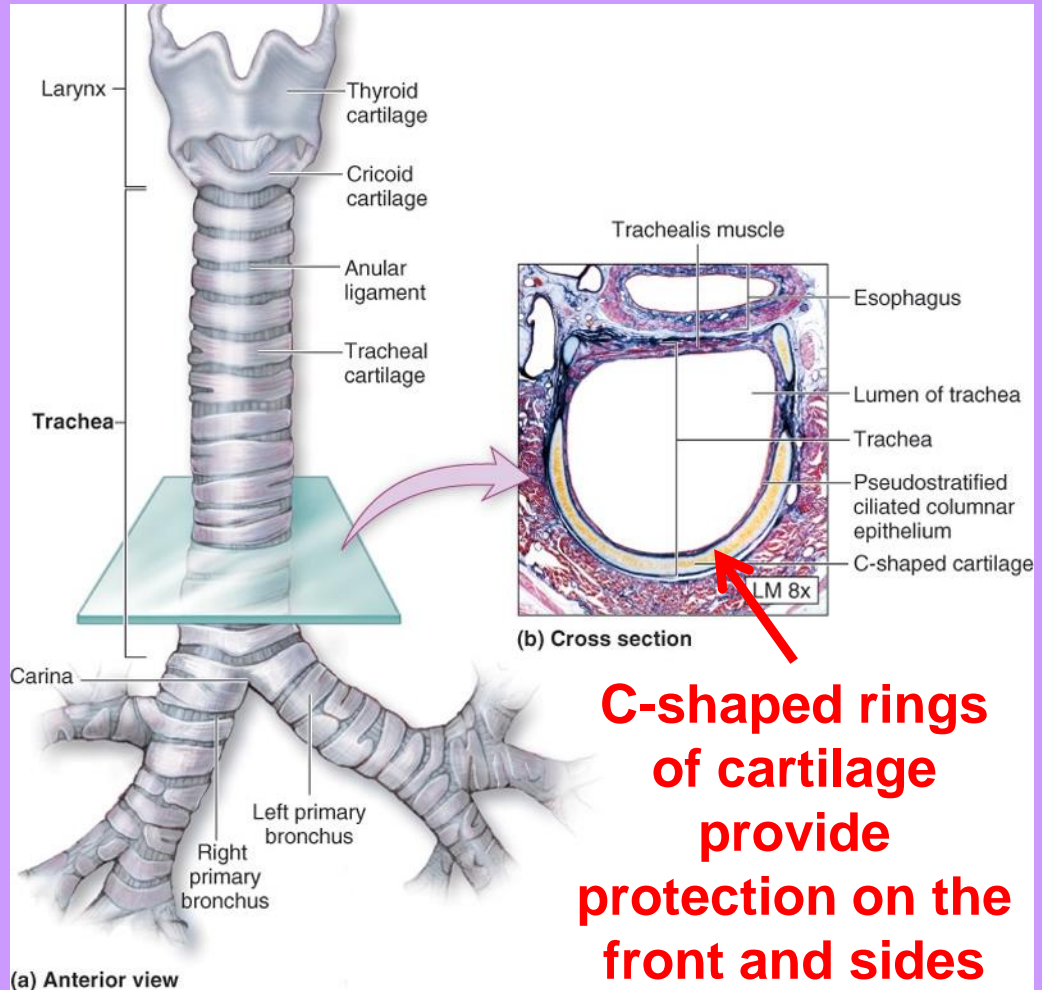
The trachea...

The trachea or windpipe is a smooth, muscular tube leading from the larynx to the main bronchi.

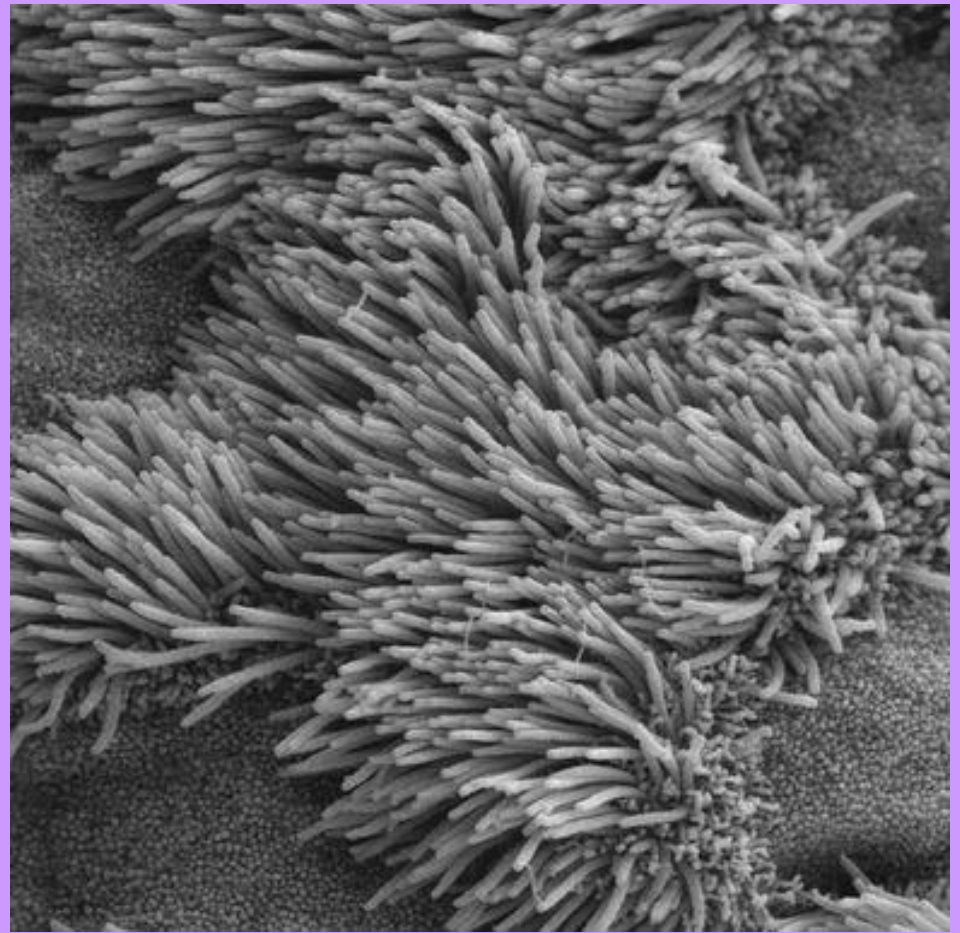
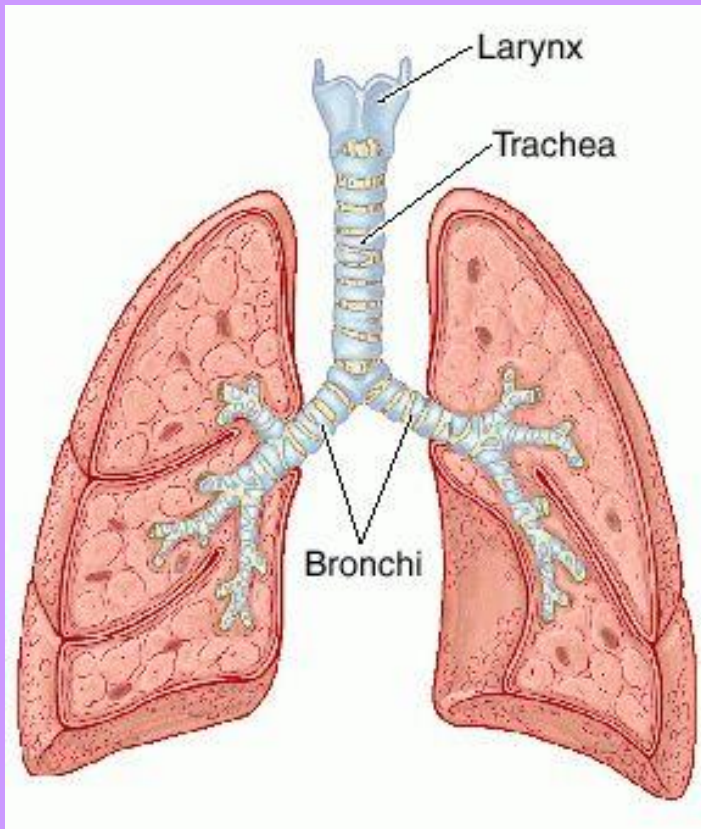


Trachea

Cartilage rings prevent crushing of the trachea



The trachea...



The trachea is the passageway for air to and from the lungs. It is lined with cilia (hairs), which sweep foreign matter out of the pathway. It is only about 1 inch in diameter and 4 ½ inches long.

The bronchi...

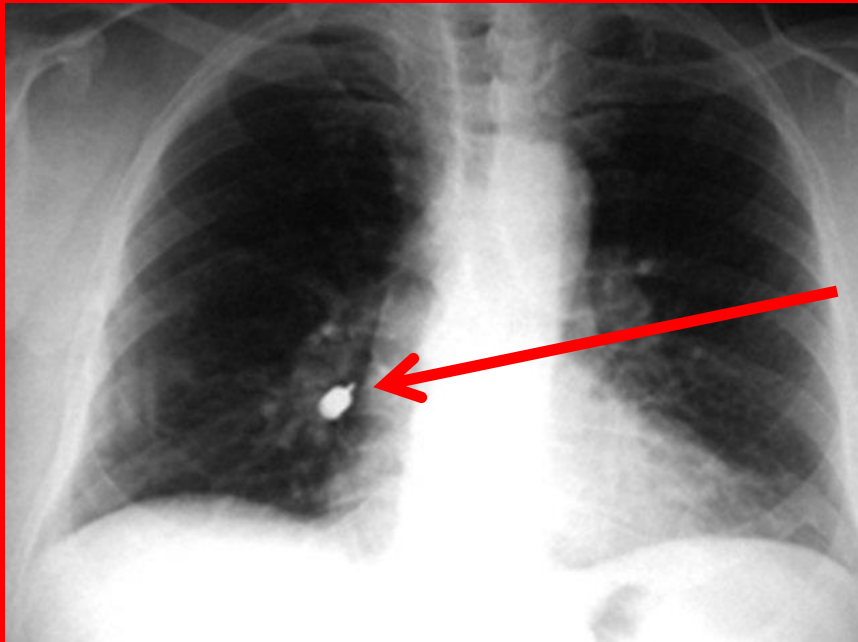
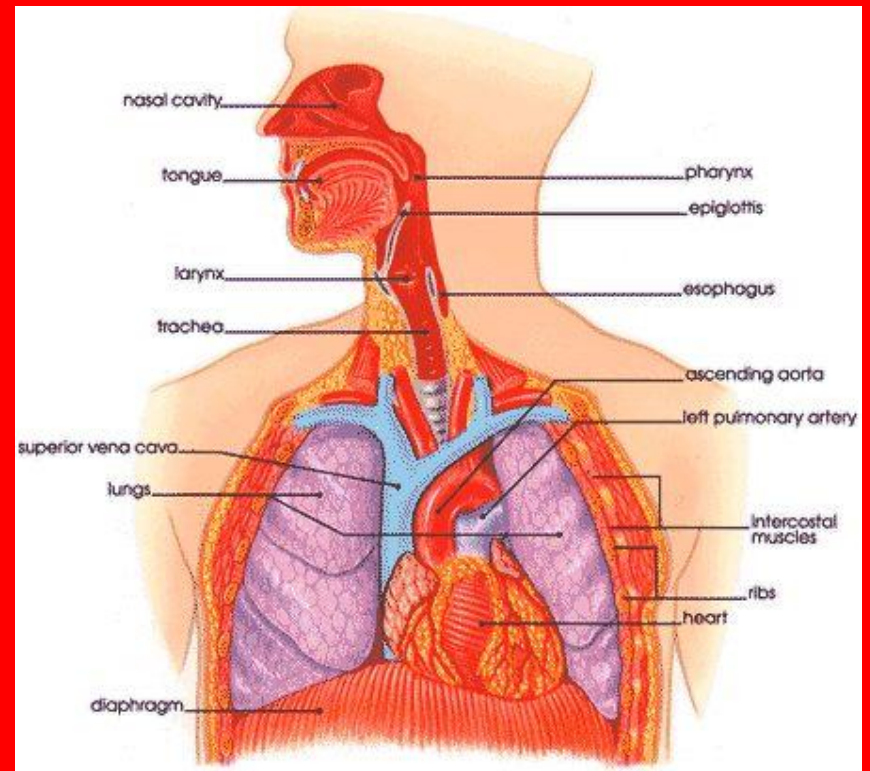
The bronchi are the two main branches at the bottom of the trachea, providing passageway for air to the lungs. The trachea divides into the right bronchus and the left bronchus, and then divides further into the bronchial tree.



As the branches of the bronchial tree get smaller, the 2 primary bronchi become bronchioles, and then very small alveolar (al VEE ah ler) ducts.

The bronchi...

The left bronchi is smaller than the right bronchi, because room is needed to accommodate the heart.

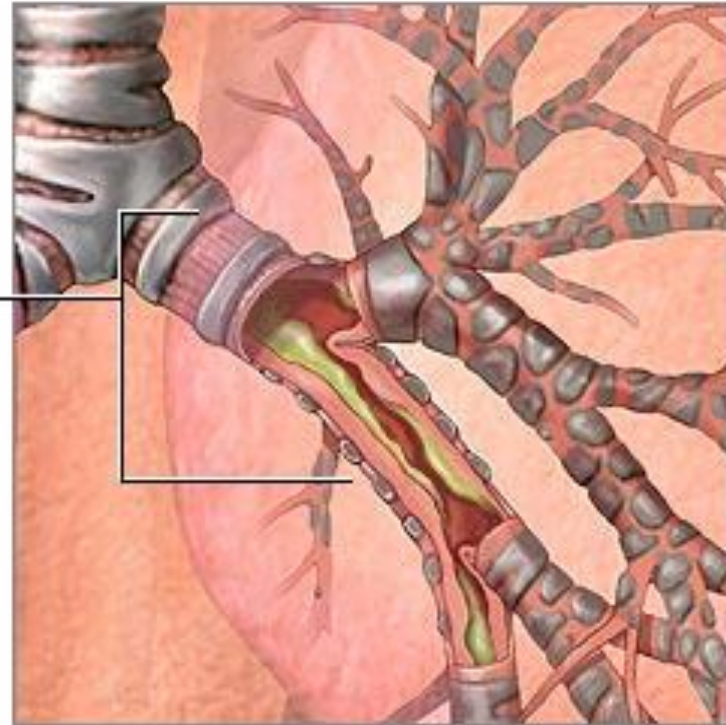


If a foreign body is inhaled or aspirated (drawn by suction), it usually lodges in the larger right bronchi (as shown in this Xray) or enters the right lung.

The bronchi...



Inflamed
primary and
secondary
bronchi

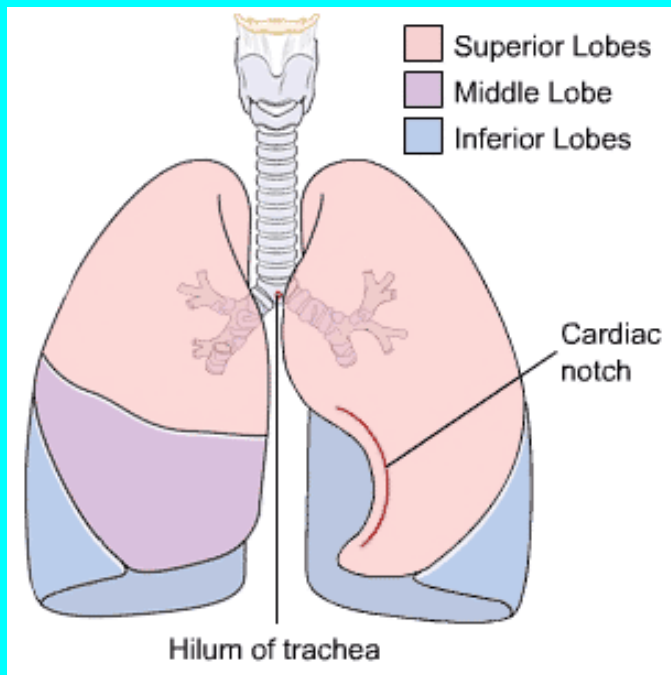
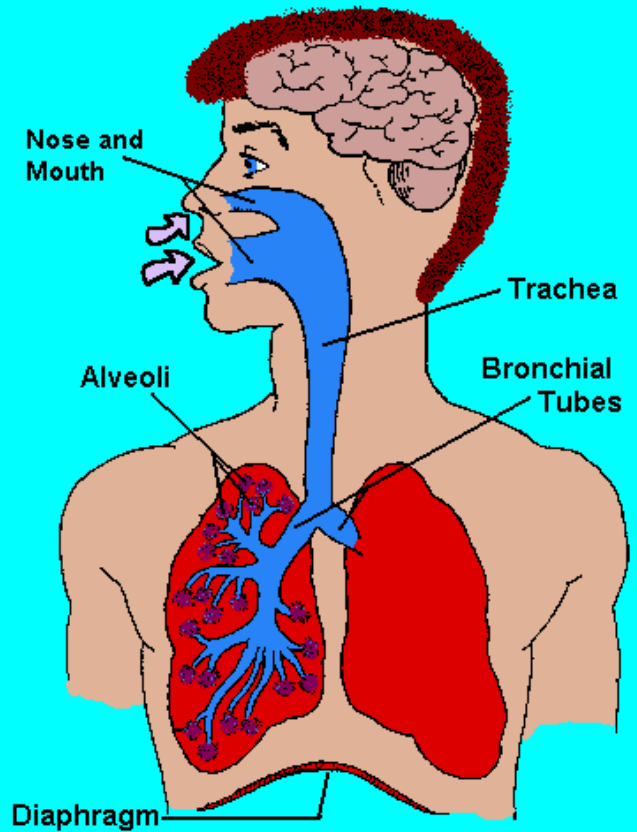


Acute bronchitis usually results from
an infection such as a cold or flu

In the presence of infection, the bronchi sometimes become inflamed, resulting in a diagnosis of bronchitis.

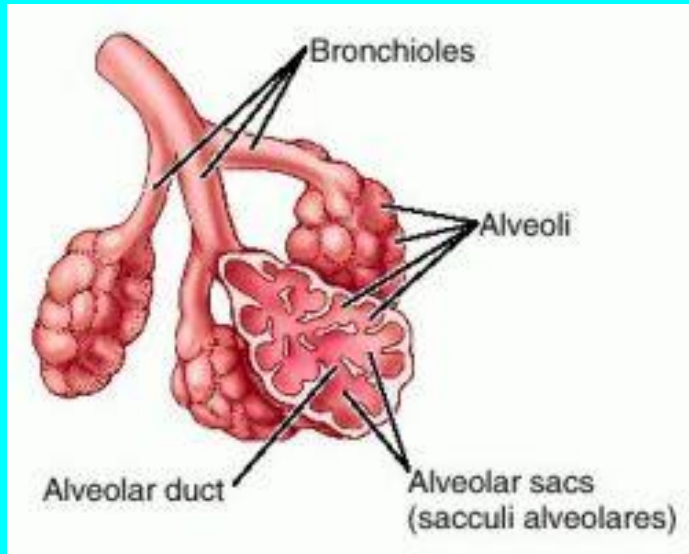
The lungs...

The lungs are two spongy organs located in the thorax. They consist of elastic tissue, filled with an interlacing network of tubes and sacs that carry air and blood vessels that carry blood.



Each lung is divided into lobes, the right lung into 3 lobes and the left lung into 2. The left lung has an indentation called the cardiac depression or notch... for placement of the heart.

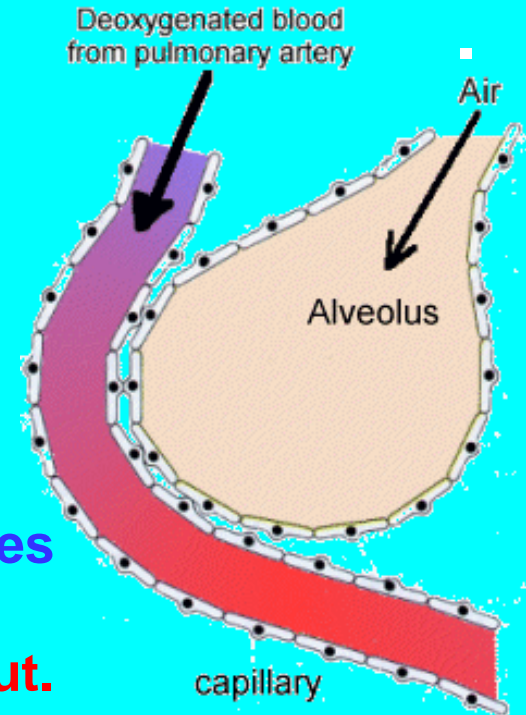
The lungs...



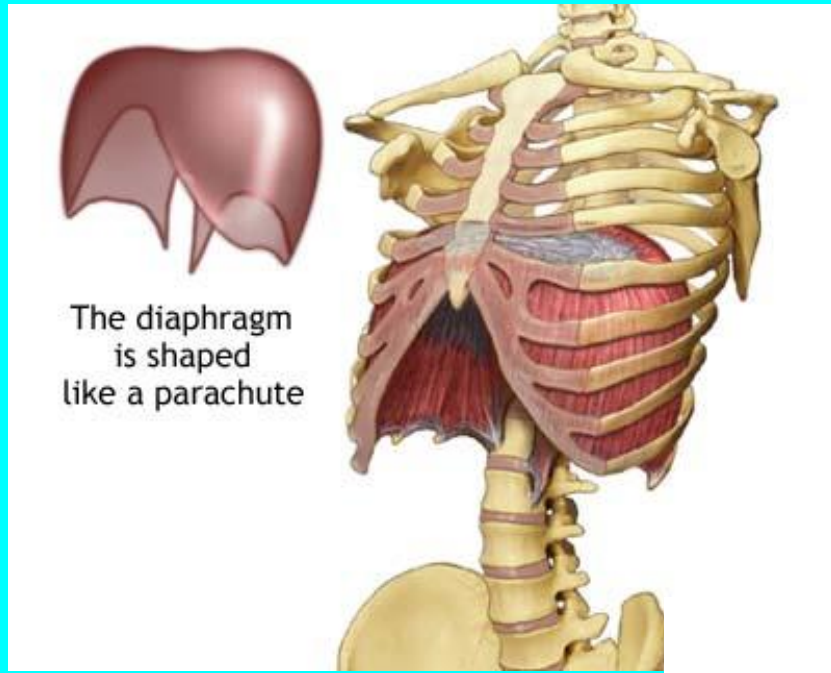
At the end of each bronchiole are the alveoli (al VEE oh lye). The lungs contain about 300 million alveoli sacs, which are the air cells where the exchange of oxygen and carbon dioxide takes place with the capillaries.



Deoxygenated blood comes in and drops off CO₂; oxygenated blood goes out.



The lungs...



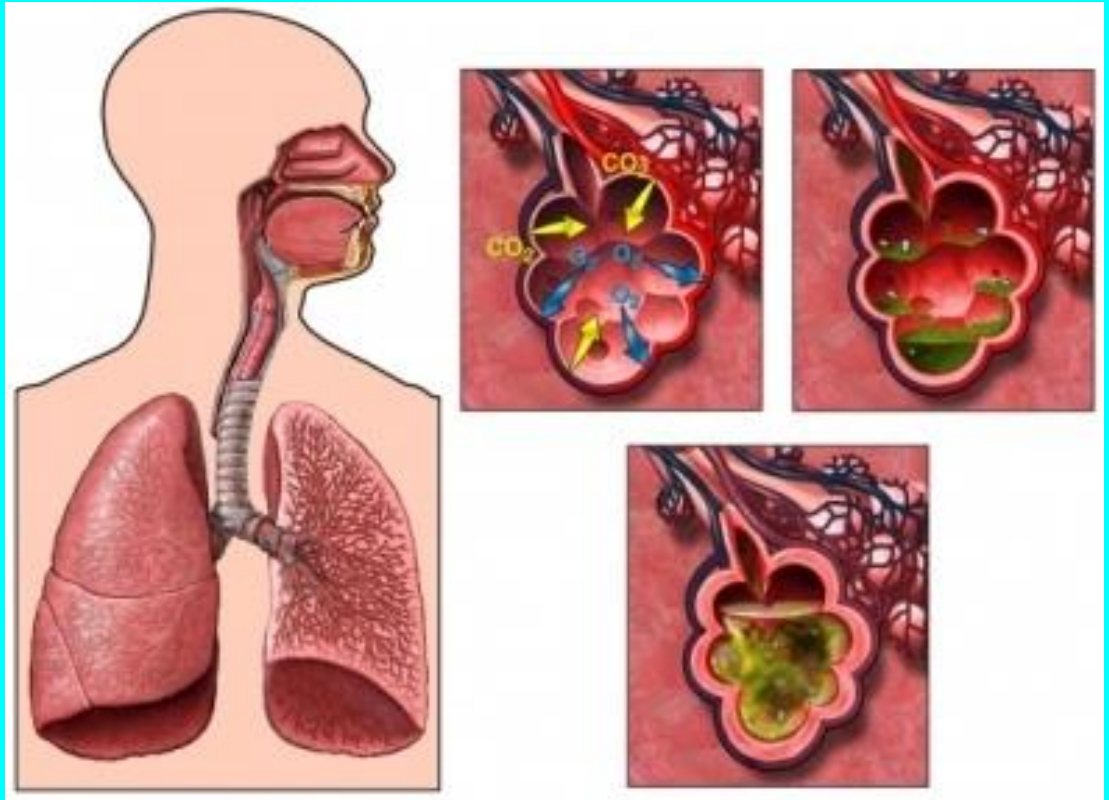
The base of the lungs rest on the diaphragm, a muscular wall separating the thorax from the abdominal cavity. It is involved in respiration, drawing downward in the chest during inhalation, and pushing upward during exhalation.



Tidal volume refers to the amount of air inhaled or exhaled during normal breathing... about 500 ml. Total lung capacity is 3.6-9.4 liters in an average male.

The lungs...

Pathogens, white cells and immune proteins present during an infection may cause the air sacs to become inflamed and filled with fluid.



This is characteristic of pneumonia. If both lungs are involved, it is termed as double pneumonia. If someone is unconscious, it's possible to aspirate stomach contents into the lungs, causing aspiration pneumonia.

Vital signs...



The normal respiration rate for a 5 year old is 20-25 breaths per minute; for someone 15 years or older is 15-20 breaths per minute.

Vital signs, essential elements for determining an individual's state of health, include temperature, pulse, respiration, and blood pressure. A deviation from normal of any or all of the vital signs indicates a state of illness, and can be used by the physician in a diagnosis, prognosis (prospects of survival and recovery), and treatment.

Anatomy & Physiology

THE END

RESPIRATORY SYSTEM

