Respiratory System

Organs and Structures

HS1

DHO8 7.10, PG 202

Objectives

Describe the structures and functions of the respiratory system.

A. Identify the structures of the respiratory system.

B. Differentiate between breathing and respiration.

C. Describe the gaseous exchange between air and blood.

D. Explain how gaseous transport takes place in the blood.

Start Day 1

SLIDES 3-17

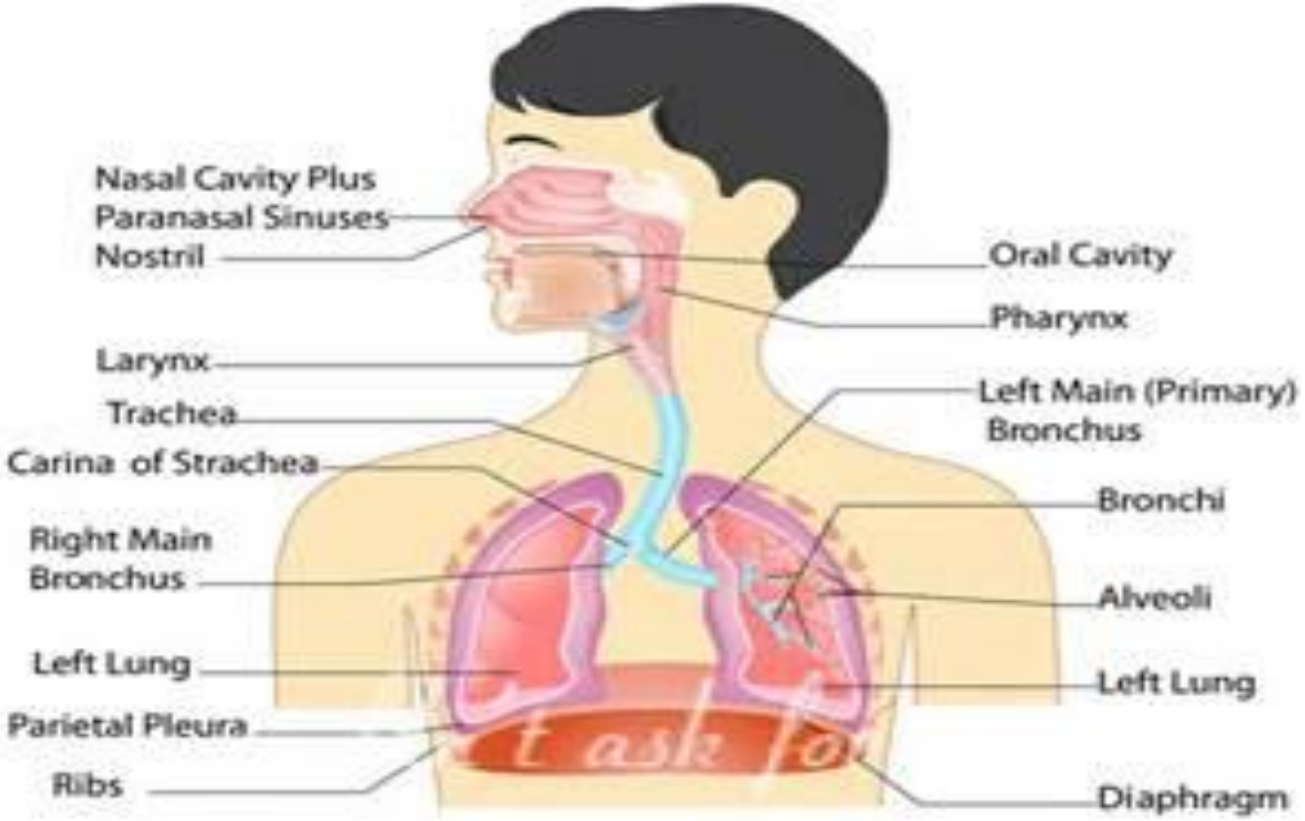
Respiratory System
DHO 7.10, pg 202

- Resp system made up of lungs & air passages
- Functions of resp system=taking in O2, removing CO2
- O2=gas needed by all body cells
- CO2=gas that is a metabolic waste product produced by cells when they convert food into energy
- Body has 4-6 minute supply of O2 so resp system

works continuously to prevent death

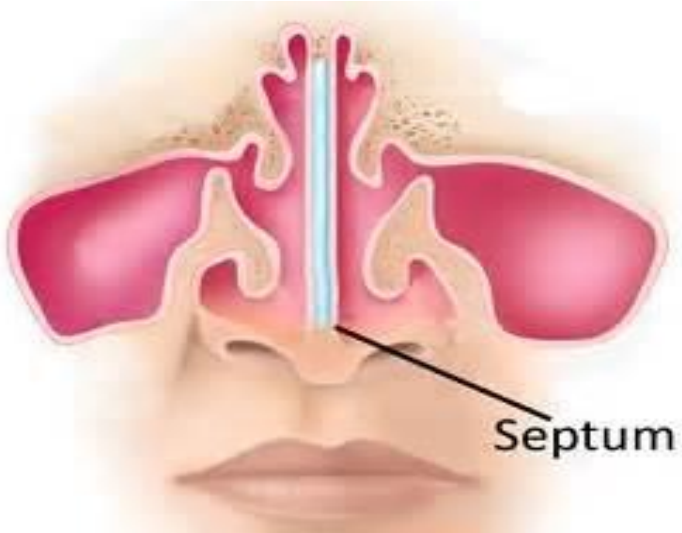
Respiratory System

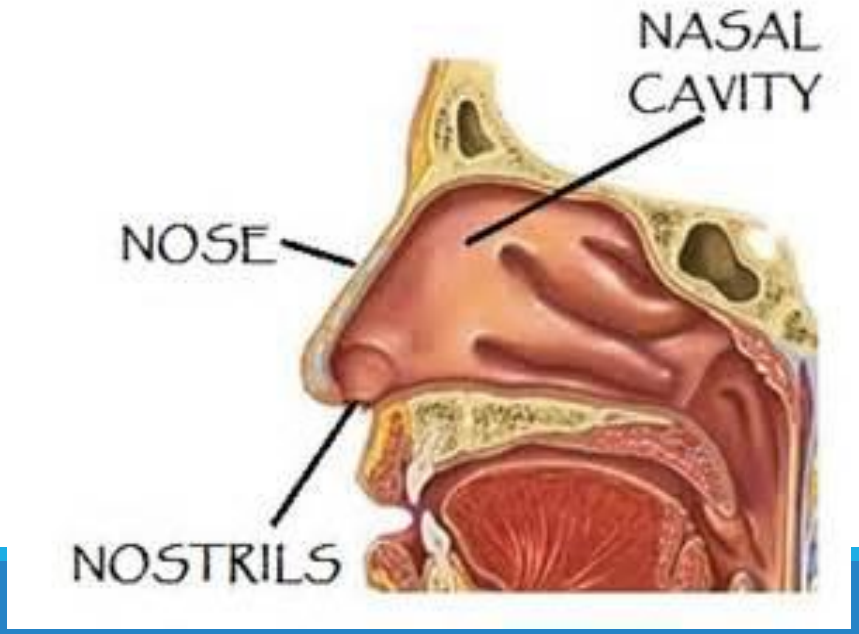
- Parts of resp system: nose, pharynx, larynx, trachea, bronchi, alveoli, lungs



Nose

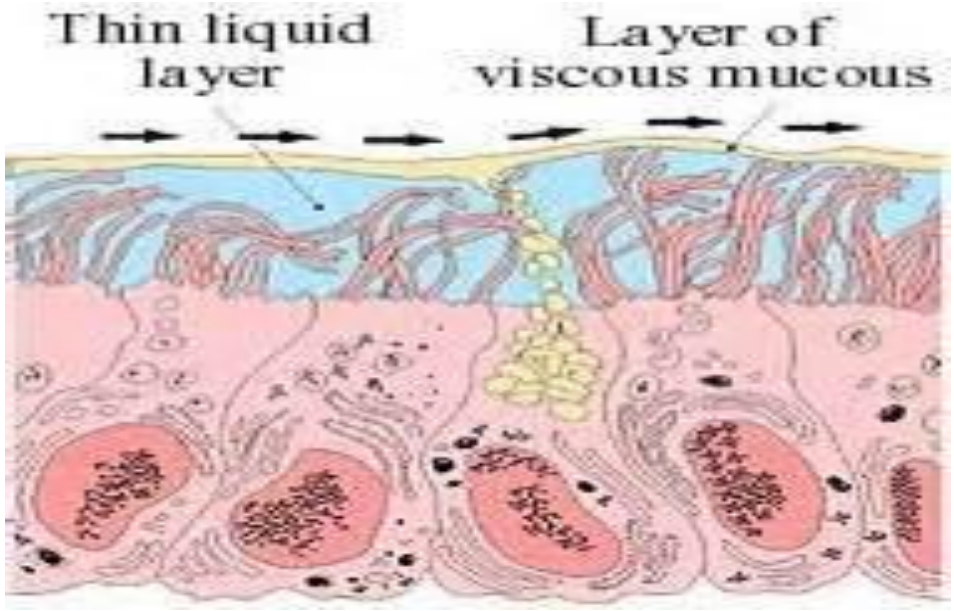
- Nostrils (nares)=2 openings through which air enters
- Nasal septum=wall of cartilage that divides the nose into 2 hollow spaces
- Nasal cavities=hollow spaces, lined with mucous membrane & have rich blood supply
  - As air enters cavities it is warmed, filtered, & moistened
  - Mucus moistens the air & helps trap pathogens & dirt





Nose

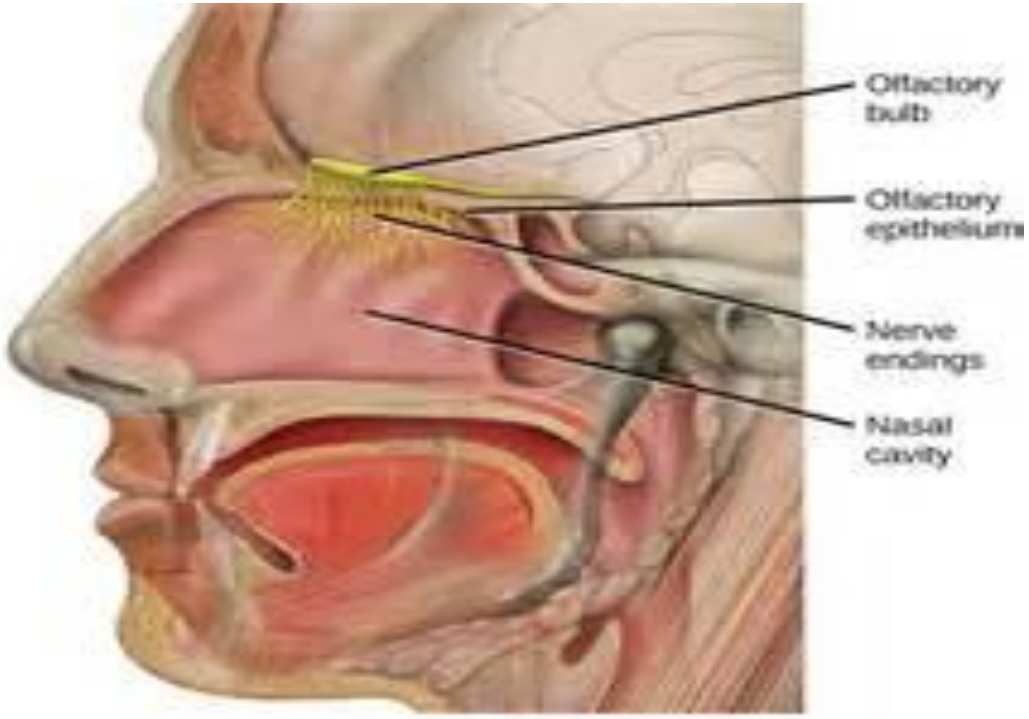
- Cilia=tiny hairlike structures in nasal cavities that filter air to trap dust & other particles
  - They help move the mucous layer lining the airway to push trapped particles toward the esophagus where they can be swallowed



Nose

- Olfactory receptors=provide for the sense of smell

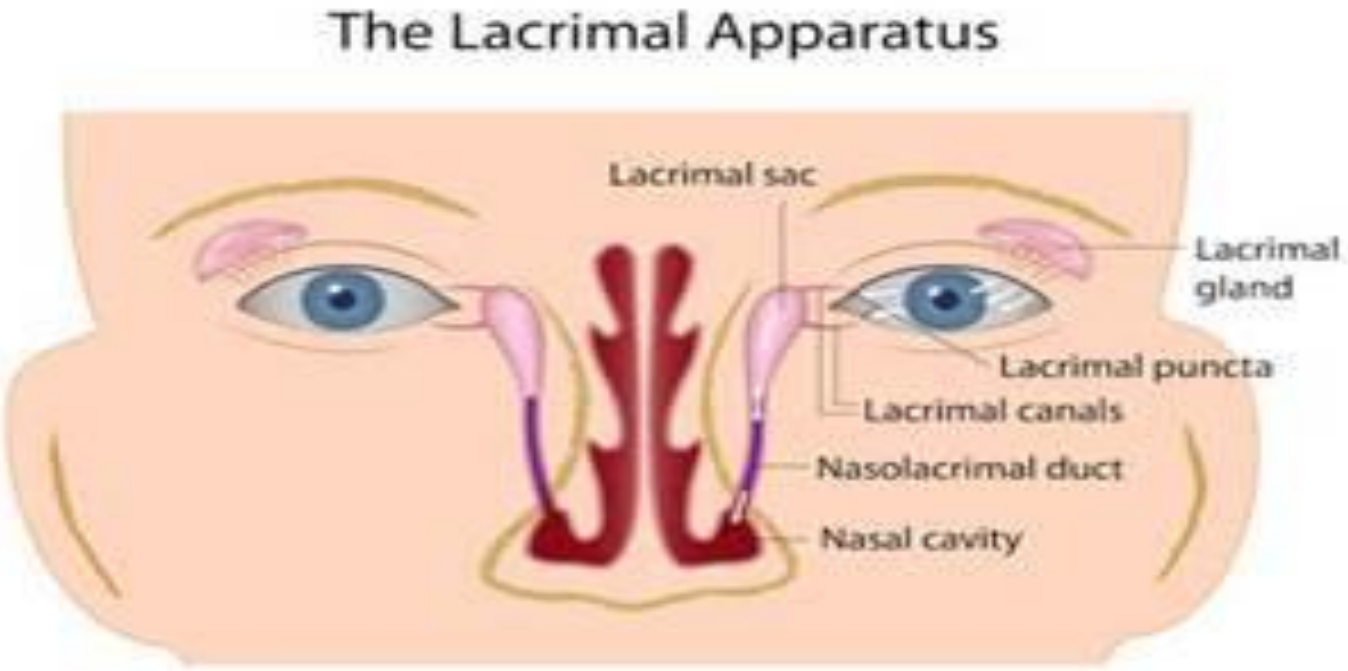
(a)



(b)

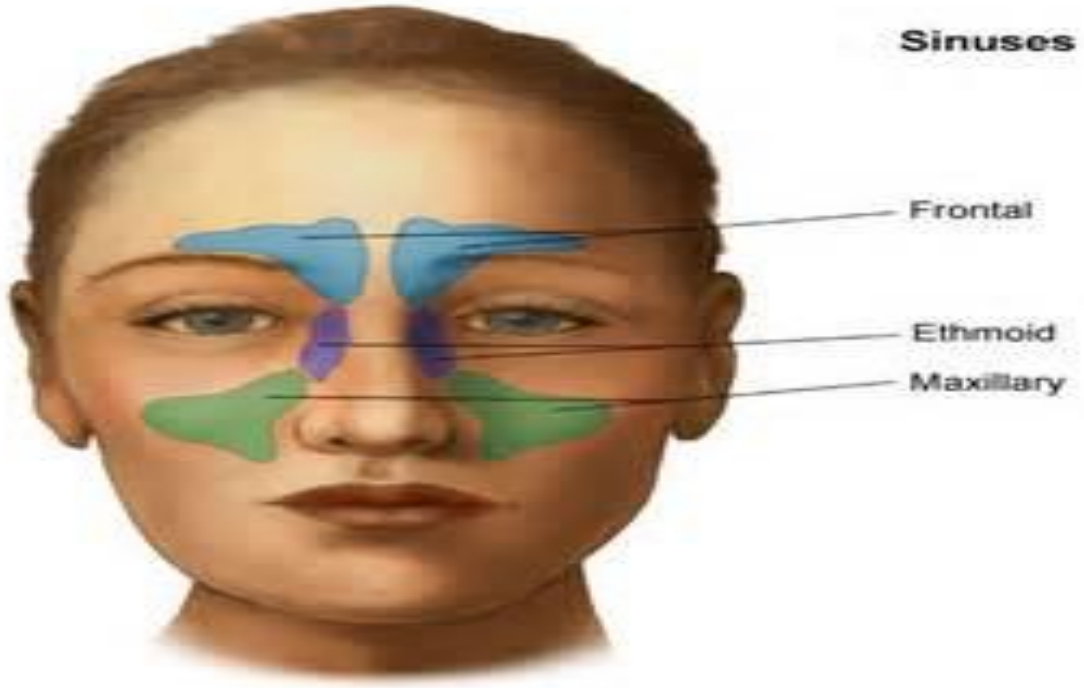
Nose

- Nasolacrimal ducts=drain tears from eye into nose to provide additional moisture for the air



Nose

- Sinuses=cavities in skull that surround nasal area
  - Connected to nasal cavity by short ducts
  - Lined with mucous membrane that warms & moistens air
  - Provide resonance for voice (vibration for sound)



Test Your Knowledge

What is the primary function of mucus and cilia in the nostrils?

A) Sound production

B) filtration

C) temperature control

D) respiration

Correct Answer: B

Test Your Knowledge

Where are the sinuses located?

A) In the front lobe of the brain

B) In the skull surrounding the nasal cavity

C) Inside the nares

D) Under the cheek bones in the subq tissue

Correct Answer: B

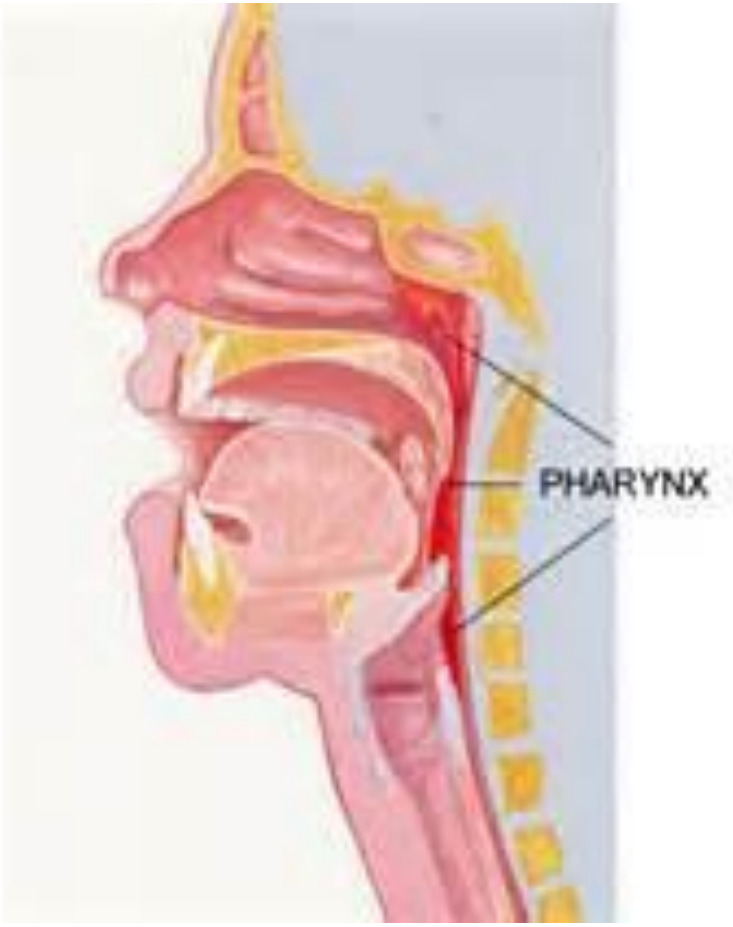
Pharynx

- AKA throat
- Lies behind nasal cavities
- As air leaves nose it enters pharynx
- Divided into 3 sections:

nasopharynx

oropharynx

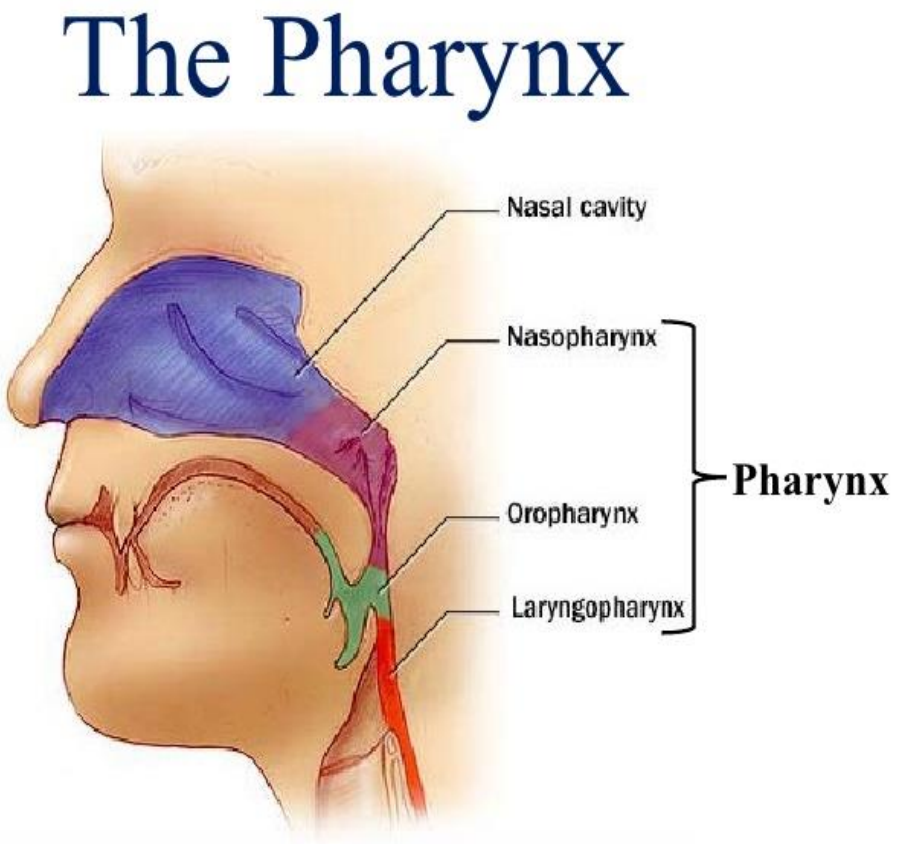
laryngopharynx



Pharynx

Nasopharynx:

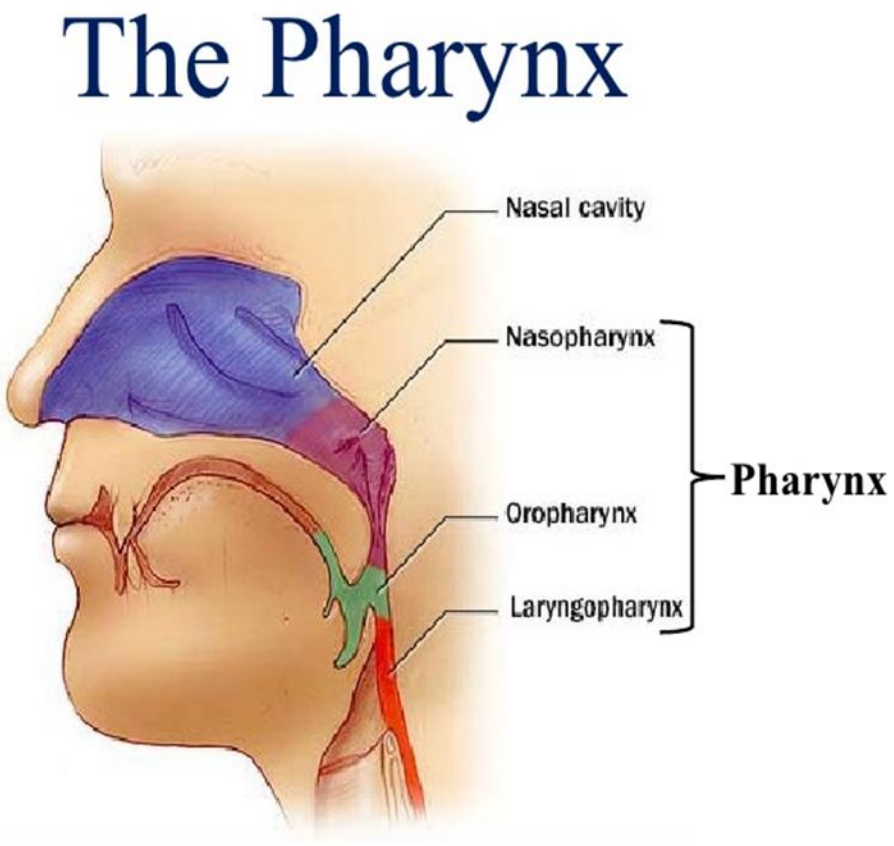
- Upper portion of phaynx
- Located behind nasal cavities
- Contains pharyngeal tonsils (adenoids)
- Contains eustachian tube openings



Pharynx

Oropharynx:

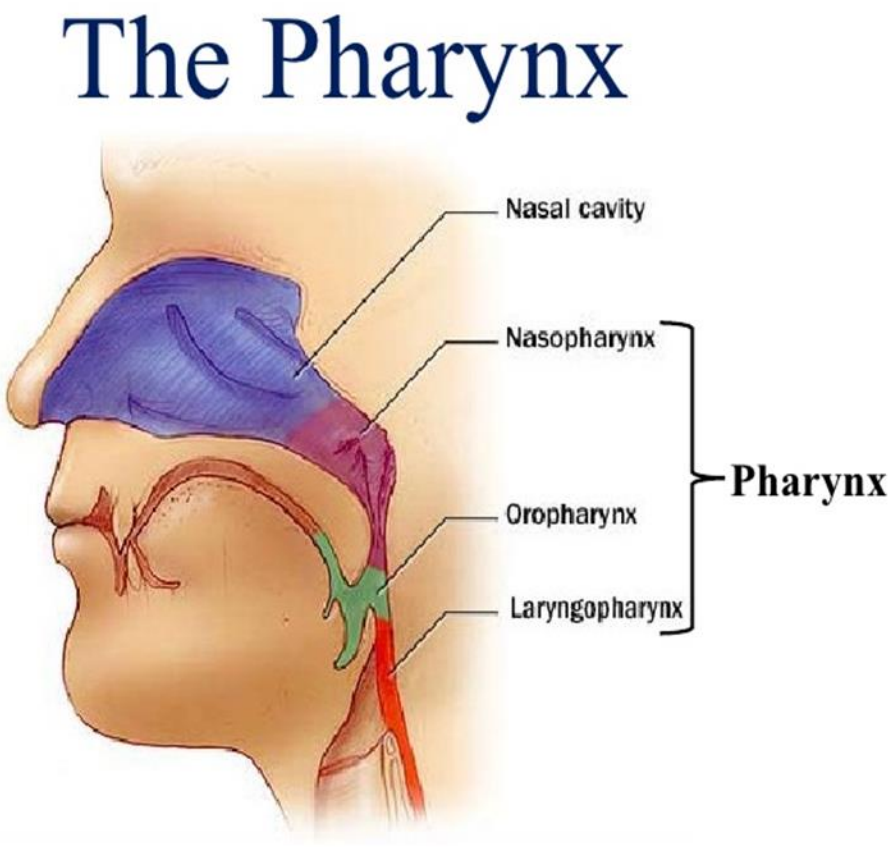
- Middle portion of pharynx
- Located behind oral cavity
- Receives air from nasopharynx
- Receives air & food from mouth



Pharynx

Laryngopharynx:

- Bottom section of pharynx
- Esophagus & trachea branch off here



Test Your Knowledge
(end for day one)

What structure is the passageway for both food and air?

A) pharynx

B) bronchus

C) trachea

D) larynx

Correct Answer: A

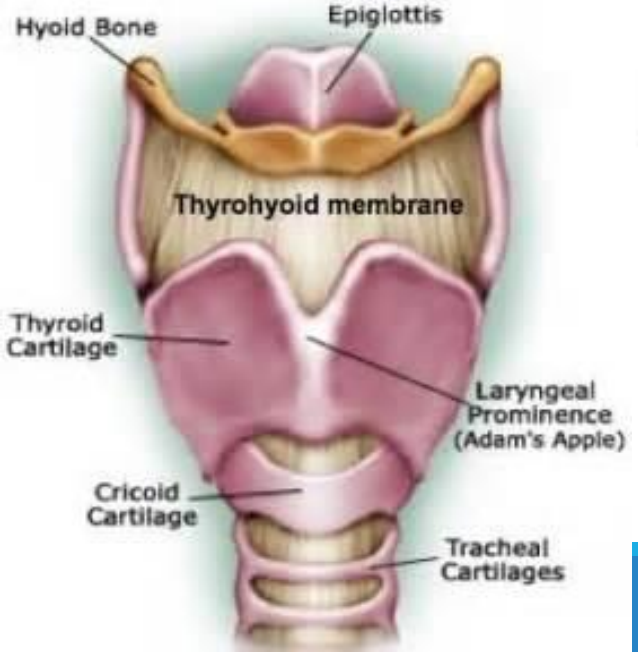
Start Day 2

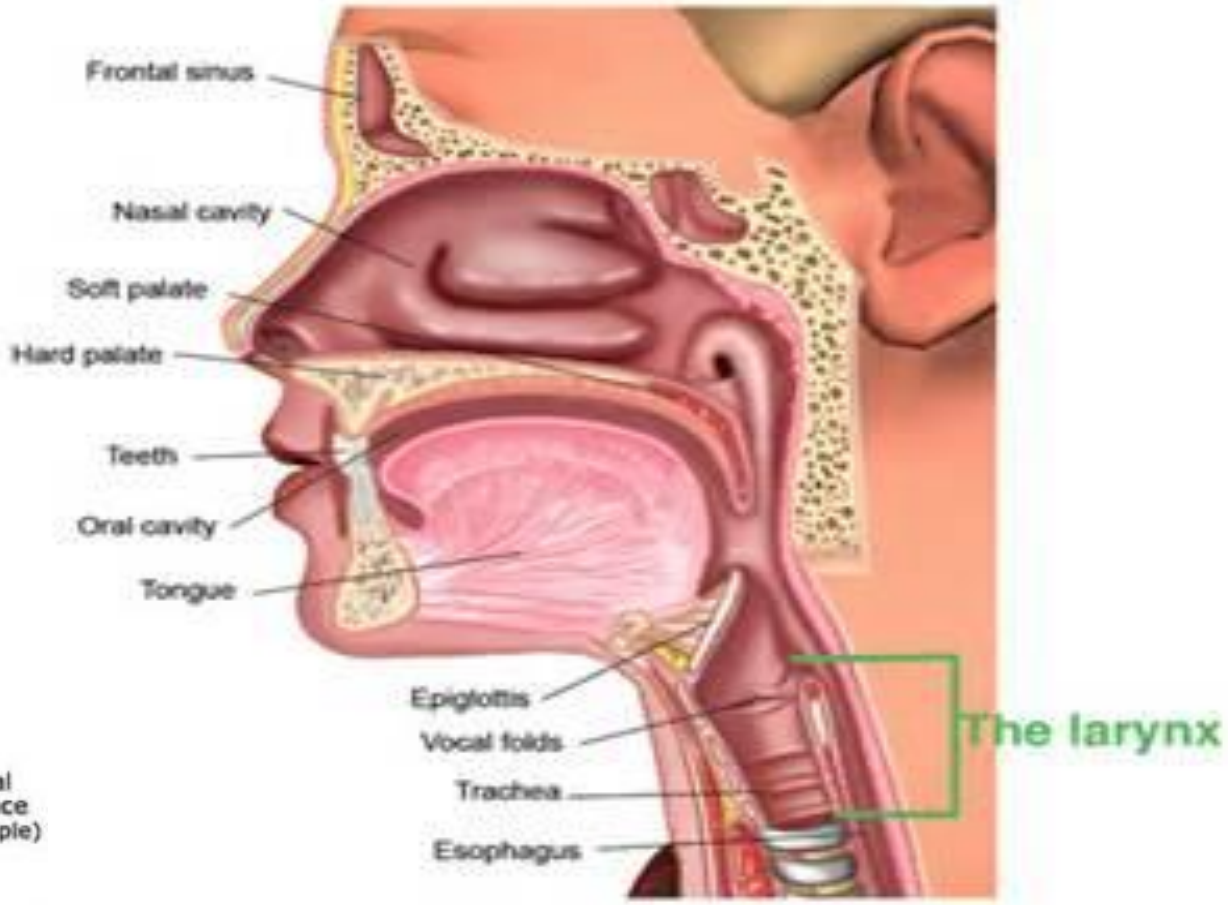
SLIDES 18-33

Larynx

- AKA voice box
- Lies between pharynx and trachea
- Has 9 layers of cartilage
- Largest cartilage (thyroid cartilage)

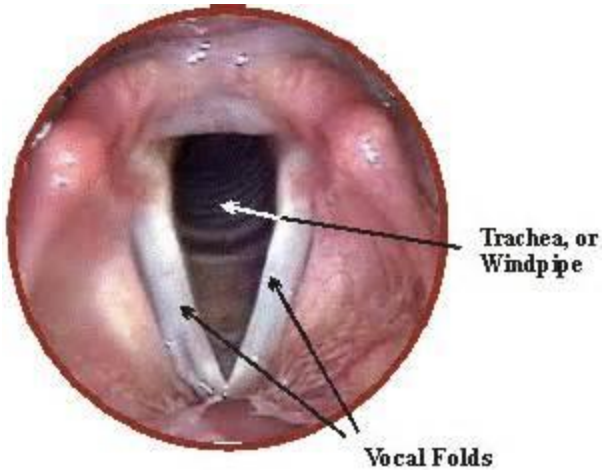
AKA Adam's apple

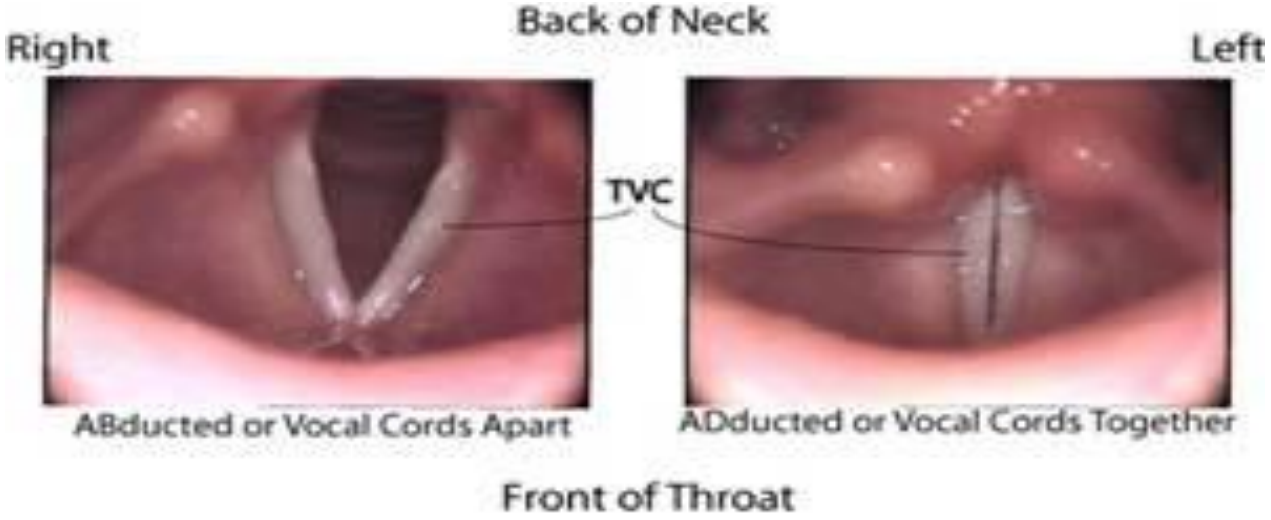




Larynx

- Contains 2 folds=vocal cords
- Glottis=opening between vocal cords
- Vocal cords vibrate & produce sound when air leaves the lungs
- Tongue & lips act on the sound to produce speech





Larynx

- Epiglottis=leaflike piece of cartilage that closes the opening into the larynx during swallowing to prevent food & liquids from entering resp tract

Test Your Knowledge

If your epiglottis were to suddenly stop working, what activity could be life threatening?

A) breathing

B) walking

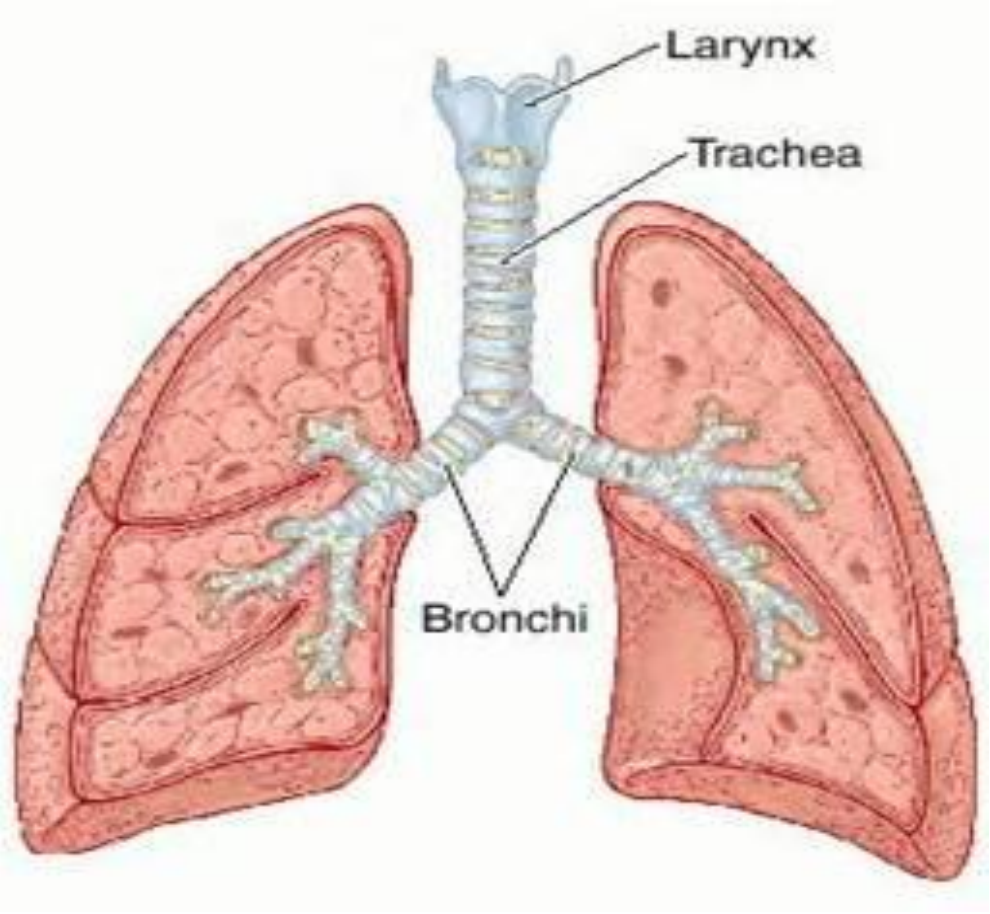
C) coughing

D) Eating

Correct Answer: D

Trachea

- AKA windpipe
- Tube that extends from larynx to center of chest
- Carries air between pharynx and bronchi
- Series of C-shaped cartilages (which are open on dorsal surfaces) help keep trachea open



Test Your Knowledge

The nostrils, larynx, and trachea are all made primarily of:

A) cartilage

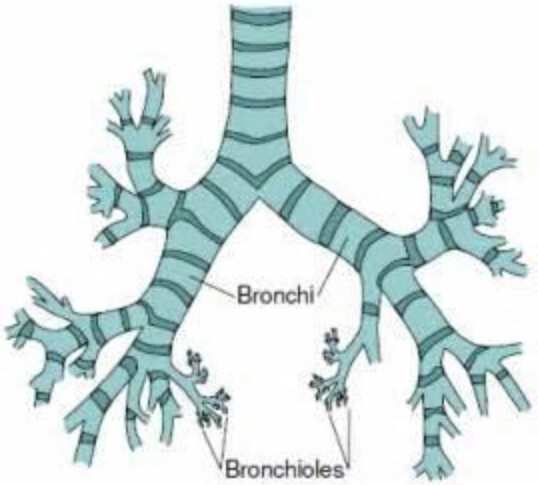
B) bone

C) muscle

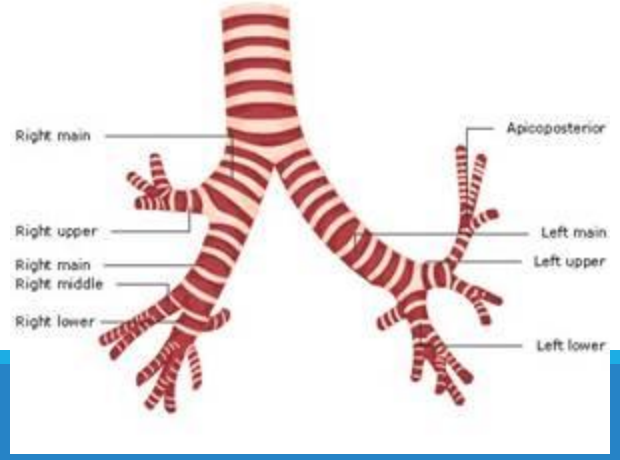
D) tendons

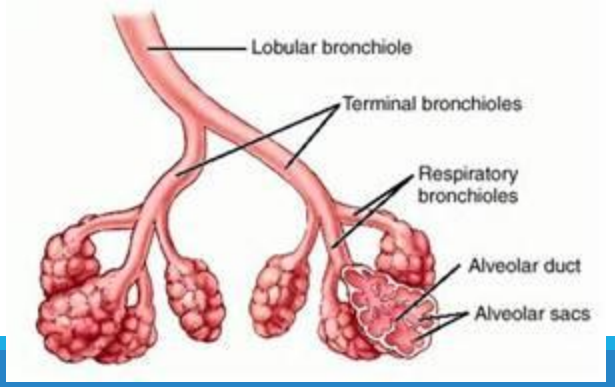
Correct Answer: A

Bronchi



- Right and Left bronchus branch from the trachea near the center of the chest
- Right bronchus is shorter, wider, and extends more vertically than left
- Each bronchus enters a lung and carries air from trachea to lung
- Each bronchus continues to divide into smaller and smaller bronchi in the lungs
- Smallest branches of the bronchi are bronchioles
- Smallest bronchioles called terminal bronchioles end in air sacs (alveoli)





Test Your Knowledge

What structure connects the larynx to the bronchi?

A) pleura

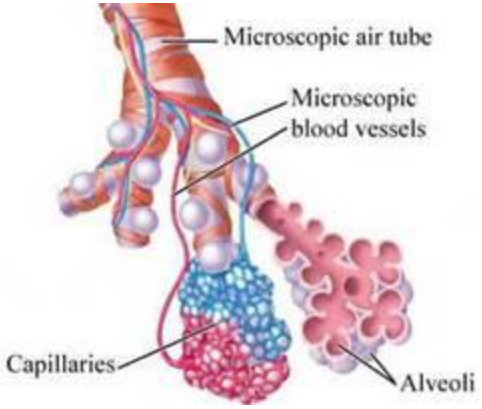
B) oropharynx

C) trachea

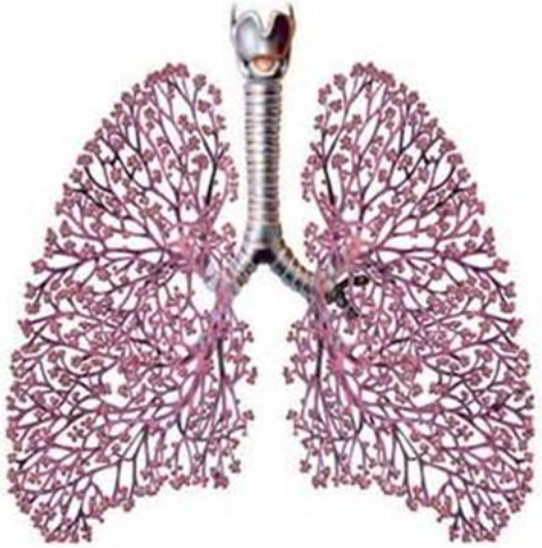
D) bronchioles

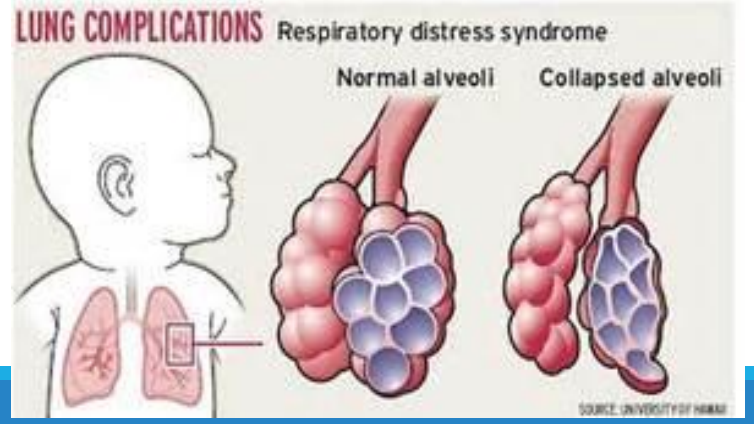
Correct Answer: C

Alveoli



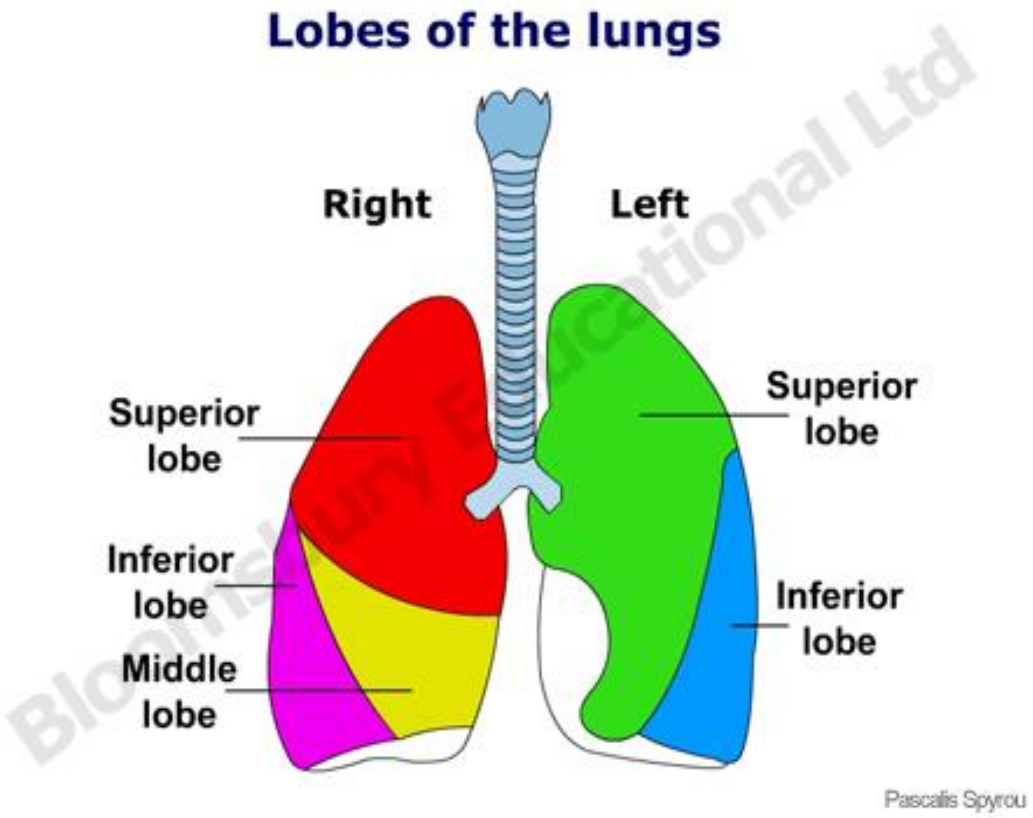
- Alveoli resemble bunch of grapes
- Adult lung has about 500 million alveoli
- Made up of one layer of squamous epithelial tissue and network of blood capillaries
- Capillaries allow O2 and CO2 exchange between blood and lungs
- Inner surfaces are covered with lipid (fatty) substance called surfactant
- Surfactant helps prevent alveoli from collapsing





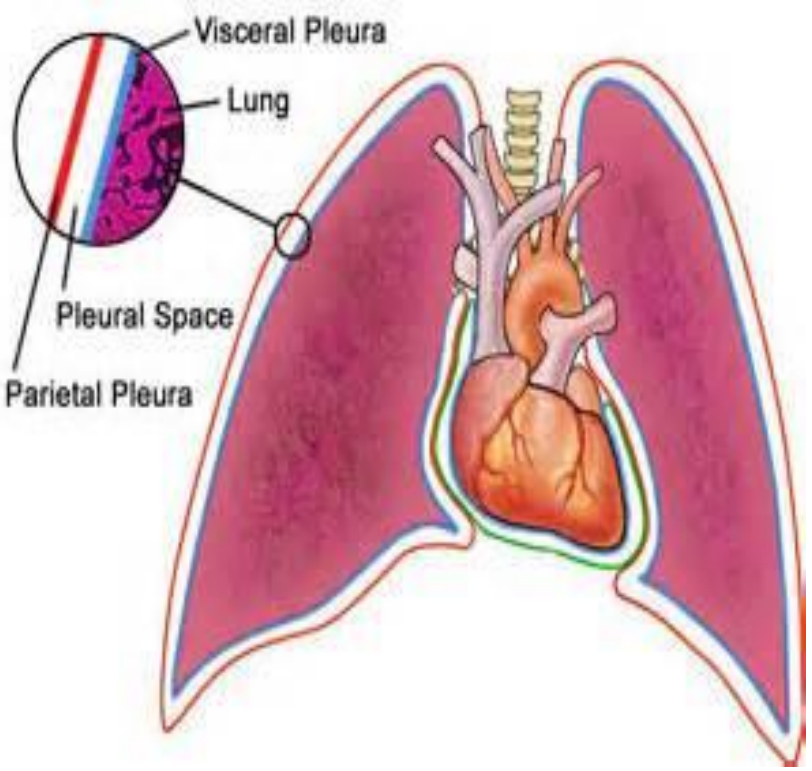
Lungs

- Located in thoracic cavity
- Right lung has 3 sections or lobes:
  - superior, middle, inferior
- Left lung has 2 sections or lobes:
  - superior, inferior
- Why does left lung only have 2 sections?
- The heart is located toward the left side of the chest



Pleura

- Each lung is enclosed in a membrane or sac called the pleura
- Pleura has 2 layers of serous membrane:
  - visceral and parietal
- Visceral pleura=attached to the surface of the lung
- Parietal pleura=attached to the chest wall
- Pleural space is located between the 2 layers and is filled with thin layer of pleural fluid
- Pleural fluid=lubricates the membranes & prevents friction as lungs expand during breathing



Test Your Knowledge

If a person could not produce surfactant, his/her:

A) alveoli would collapse

B) bronchi would collapse

C) vocal chords would not vibrate

D) epiglottis would close

Correct answer: A

Test Your Knowledge

Where in the respiratory tract does the exchange of oxygen and carbon dioxide take place?

A) larynx

B) bronchi

C) trachea

D) alveoli

Correct answer: D

Test Your KNowledge

Your lungs are divided into lobes. How many lobes do you have?

A) one

B) two

C) five

D) four

Correct Answer: C

Test Your Knowledge
(end day 2)

What does the pleura allow your lungs to do?

A) expand during breathing

B) trap dust and other particles

C) keep the alveoli distended

D) cough

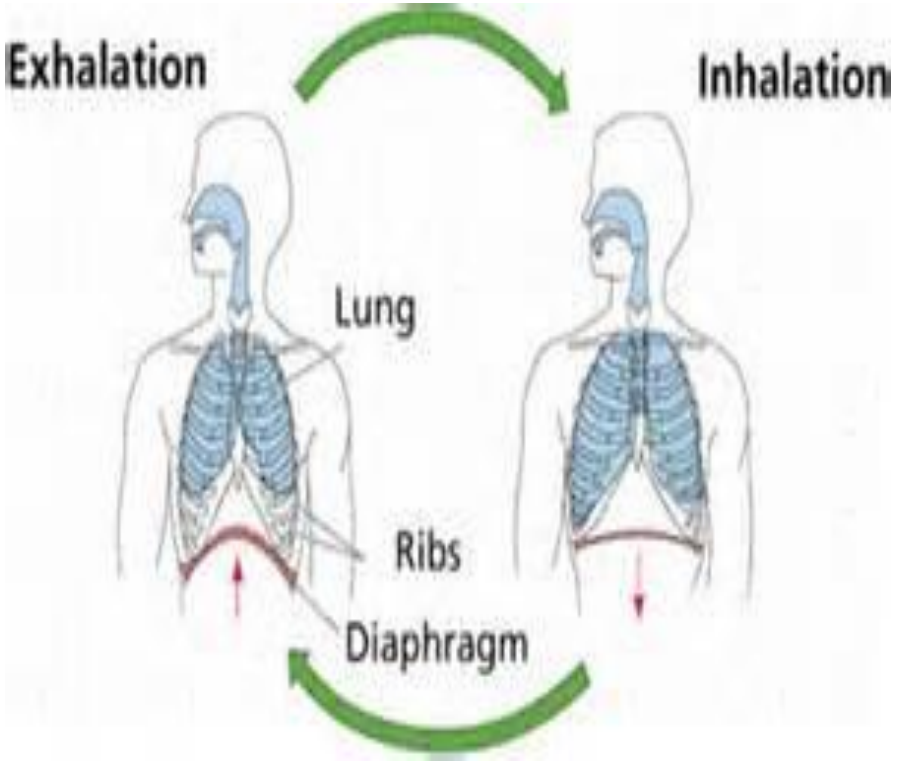
Correct Answer: A

Start Day 3

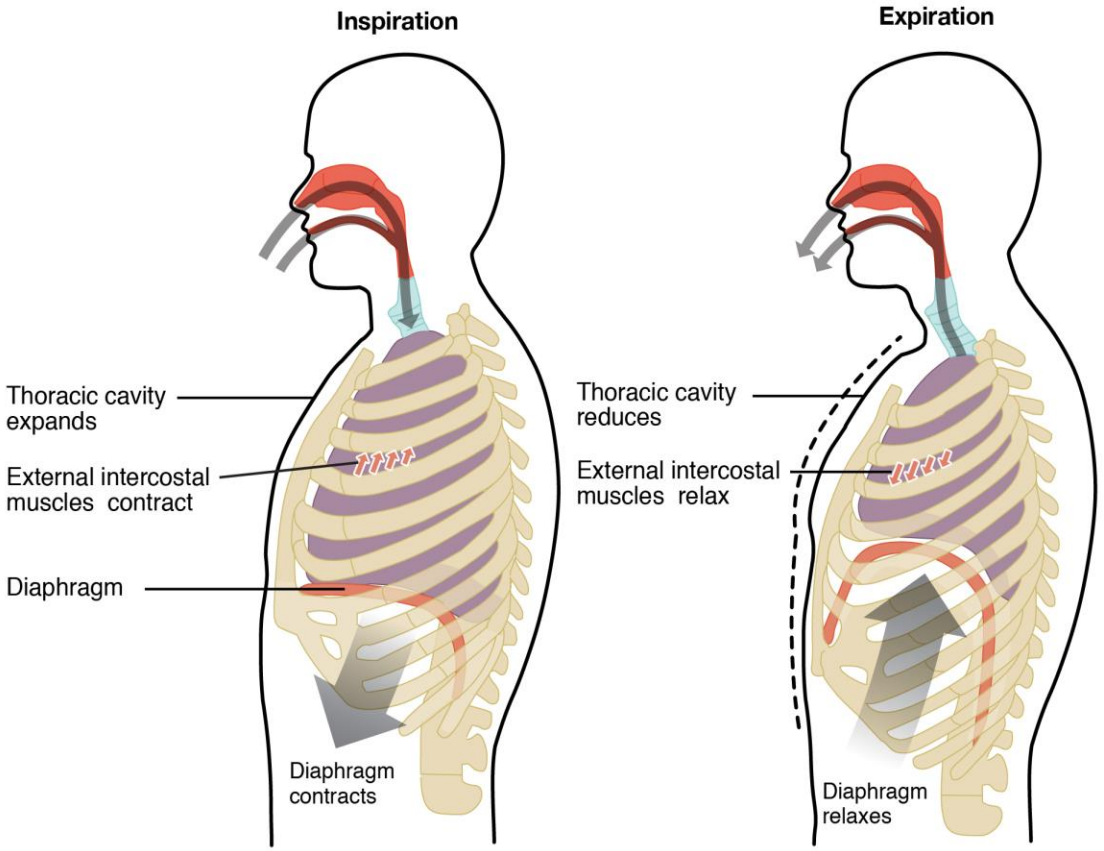
SLIDES 34-40, THE END OF PRESENTATION

Process of Breathing, DHO 7.10, pg 205

- Ventilation=process of breathing
- Breathing is the physical process of moving air in and out of the lungs.
- Ventilation has 2 phases: inspiration and expiration
- Inspiration=inhalation; process of breathing air IN
- Expiration=exhalation; process of breathing OUT



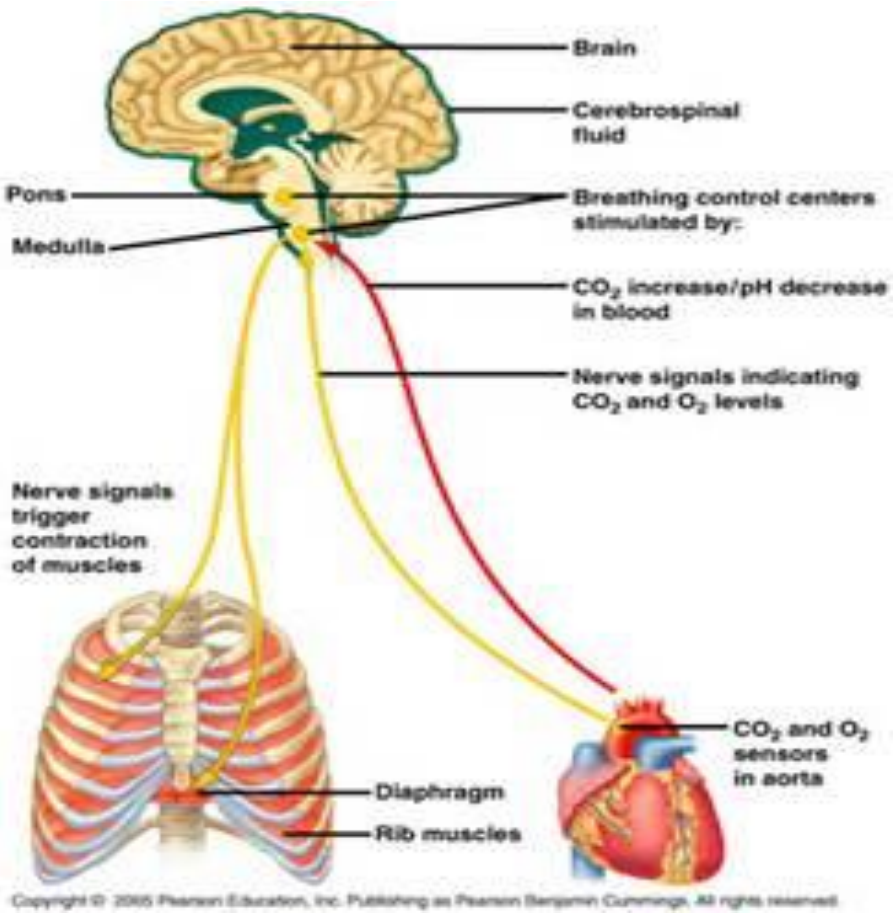
Inspiration & Expiration



- Diaphragm=dome-shaped muscle between thoracic and abdominal cavities
- For inspiration the diaphragm & intercostal muscles contract and enlarge the thoracic cavity to create a vacuum. Air rushes in through the airways to the alveoli where gas exchange happens.
- When diaphragm & intercostal muscles relax, expiration happens as air is forced out of lungs & air passages.

Respiration

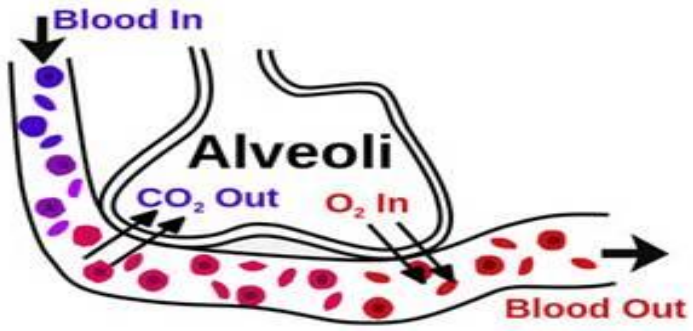
- Respiration=process of inspiration and expiration
- Respiration is controlled by respiratory center in medulla oblongata of brain
- An increased amount of CO2 in blood or decreased amount of O2 as seen in some diseases causes the respiratory center to increase RR
- Respiration is usually involuntary but you can control rate by breathing faster or slower



Stages of Respiration: External & Internal

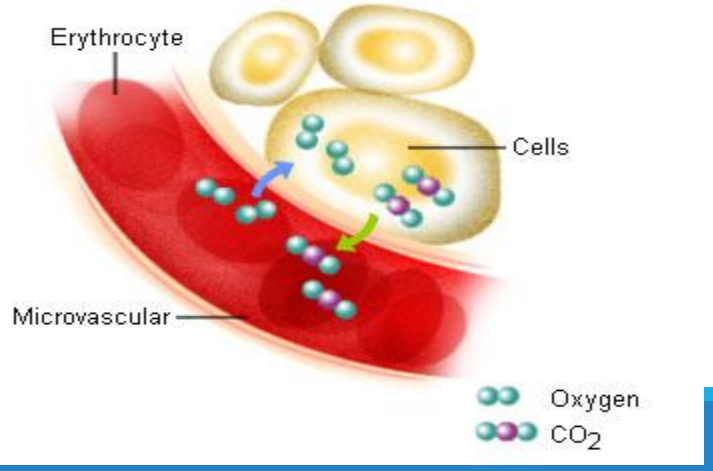
EXTERNAL

- External respiration=exchange of O2 and CO2 between **lungs and bloodstream**
- Due to the concentration levels, O2 in alveoli enters capillary blood then CO2 carried in capillary blood moves to alveoli where it is expelled during exhalation
- Cellular respiration= process of cells using O2 and nutrients to produce energy, water, & CO2



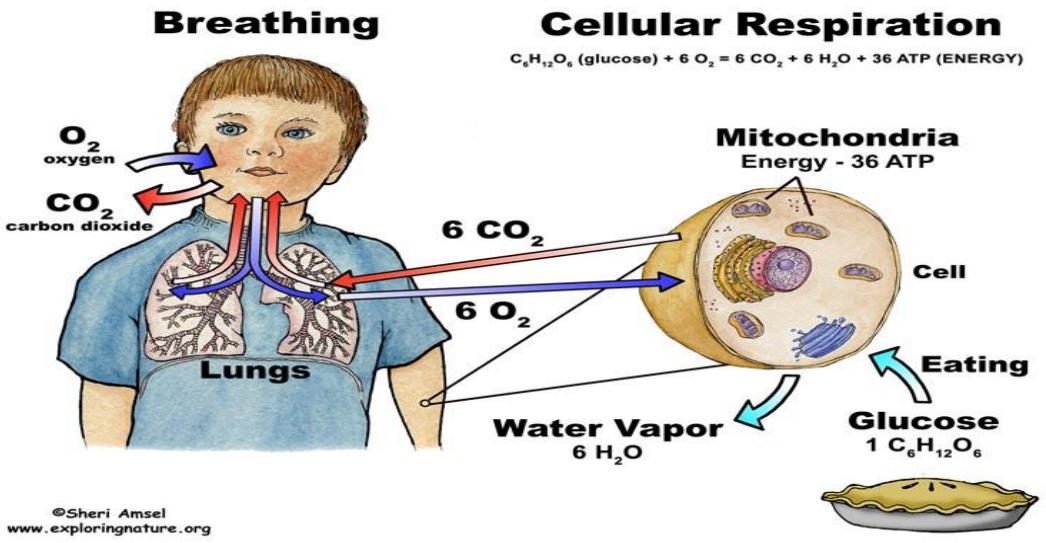
INTERNAL

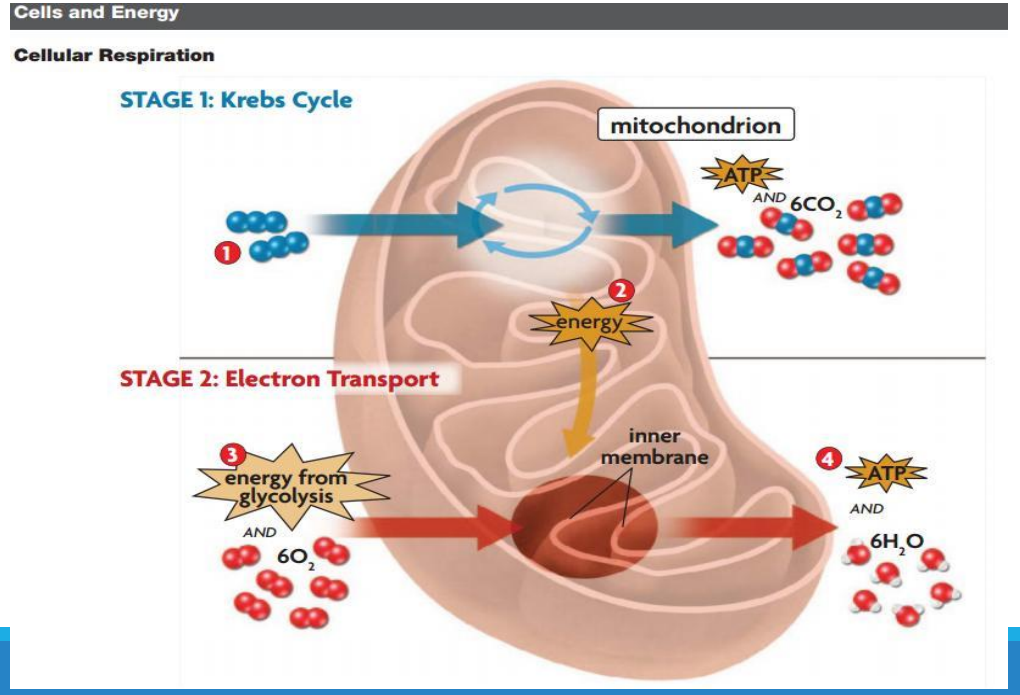
- Internal respiration=exchange of CO2 and O2 between **tissue cells and bloodstream**
- Due to the concentration levels, O2 carried in blood leaves the capillaries and enters tissue cells & CO2 leaves cells and enters blood to be transported back to lungs for external respiration



Cellular Respiration

- Cellular respiration=the systemic cells use the delivered O2 to make energy, water, and CO2.
- Then, CO2 leaves the cells and enters the bloodstream (because CO2 concentration is higher in the cells than bloodstream) to be transported back to the lungs, for external respiration to take place!!
- Everything has come full circle at this point, and it starts all over again!





Test Your Knowledge

In the process of breathing, during what stage does the movement of the diaphragm enlarge the thoracic cavity?

A) internal respiration

B) external respiration

C) inspiration

D) expiration

Correct Answer: C

During cellular respiration, what happens to the carbon dioxide?

A) it leaves the alveoli and is exhaled from the lungs

B) it leaves the bloodstream and enters the alveoli

C) it leaves the cells and enters the bloodstream

D) it leaves the alveoli and enters the bloodstream

Correct Answer: C