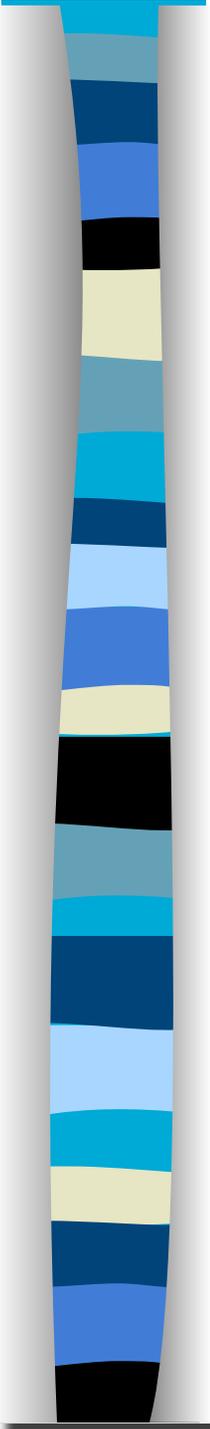


61a A&P: Respiratory System

Class Outline



5 minutes

Attendance, Breath of Arrival, and Reminders

10 minutes

Lecture:

25 minutes

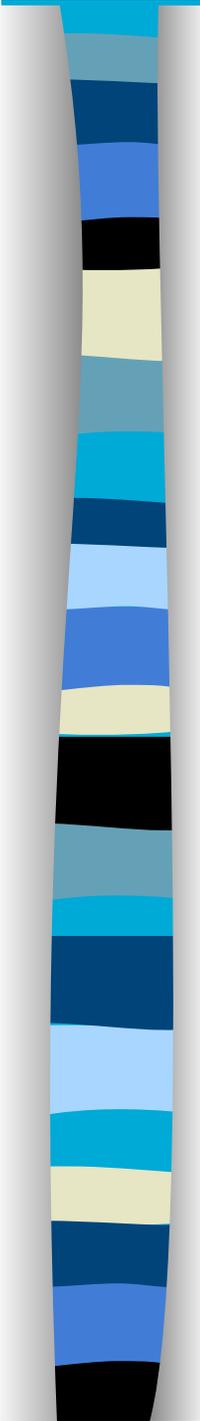
Lecture:

15 minutes

Active study skills:

60 minutes

Total



61a A&P: Respiratory System

Class Reminders

ABMP Exam Coach

- “Access your ABMP account” using instructions on page A-74
- Familiarize yourself with ABMP Exam Coach, especially the “Study Subjects” section
- Preview the preparation assignments for MBLEx Prep classes (74a, 75a, 80a, 81a, 84a, 86a, 87a)

Assignments:

- 64b Executive Summary (due before the end of class)
 - Packet 21-22
 - Sections 1-3 to be done *before* this class. Section 4 will be done in class.
 - The completed Executive Summary to be handed in at end of class.
- 66a Review Questions (due before class starts)

Exams:

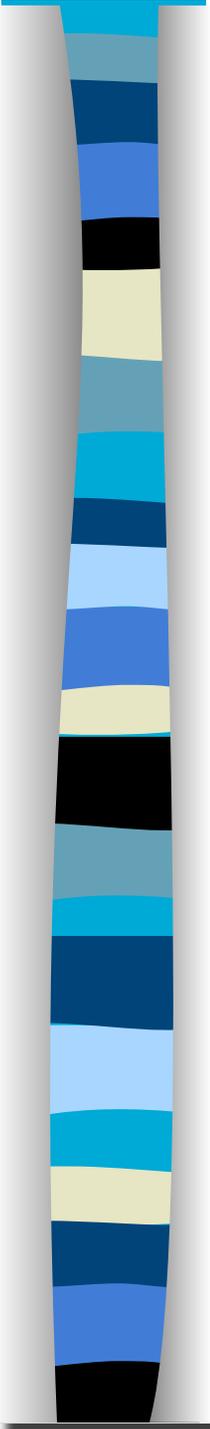
- 62b Deep Tissue: Touch Assessment **Bring your grading sheet for evaluation A: 85**

Quizzes:

- 67a Written Exam Prep Quiz (study material from classes 59a, 64b, and 65b)
- 67b Kinesiology Quiz (all 57 muscles covered so far)
- 68a Written Exam Prep Quiz (61a, 62a, 63a, 64a, 65a, and 66a)

Preparation for upcoming classes:

- 62a Pathology: Respiratory System
 - Packet E: 151-152.
 - RQ – Packet A-198.
- 62b Deep Tissue: Touch Assessment
 - Packet A: 81-82 and 85-86.



Classroom Rules

Punctuality - everybody's time is precious

- Be ready to learn at the start of class; we'll have you out of here on time
- Tardiness: arriving late, returning late after breaks, leaving during class, leaving early

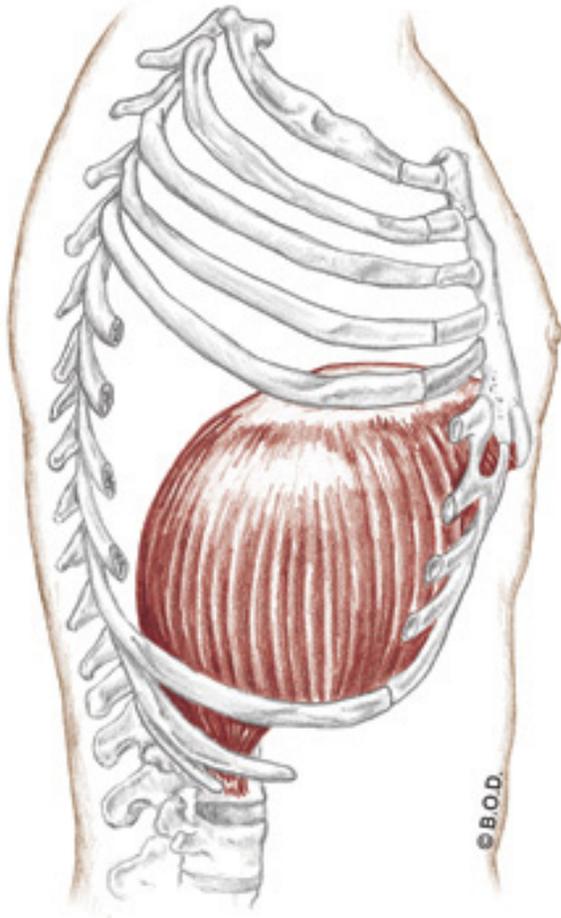
The following are not allowed:

- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones that are visible in the classroom, bathrooms, or internship

You will receive one verbal warning, then you'll have to leave the room.

Diaphragm

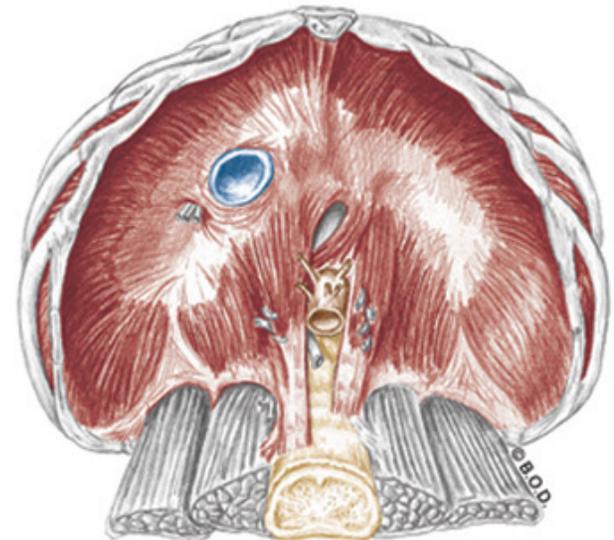
Trail Guide, Page 213



Lateral View

The **diaphragm** is the primary muscle of respiration.

It has a broad, umbrella-like shape that separates the thoracic cavity from the abdominal cavity.



Inferior View

Diaphragm, page 213

A Draw down the central tendon of the diaphragm

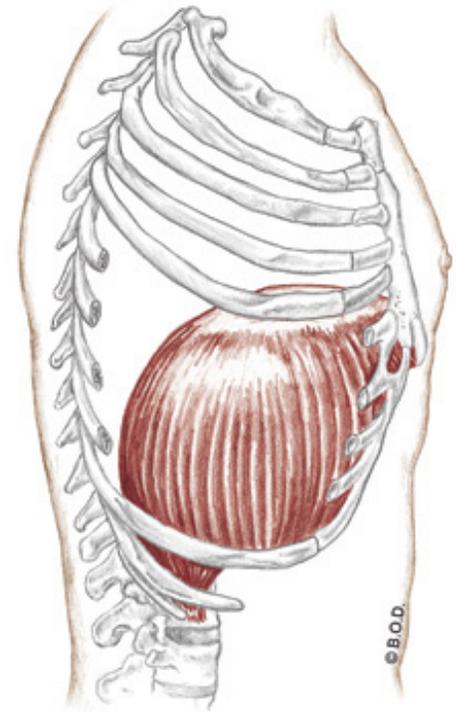
Increase the volume of the thoracic cavity during inhalation

O Costal attachment: Inner surface of the lower 6 ribs

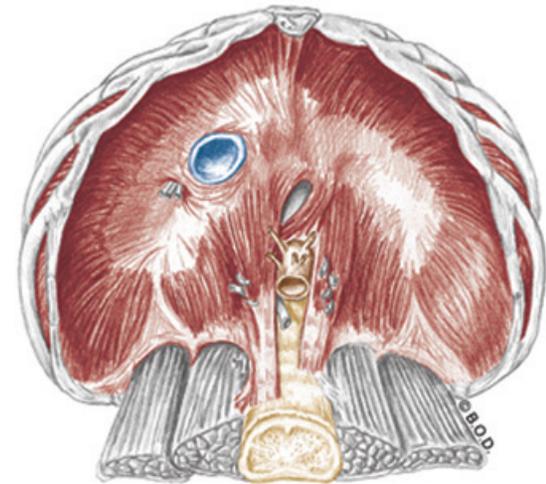
Lumbar attachment: Upper 2 or 3 lumbar vertebrae

Sternal attachment: Inner part of the xiphoid process

I Central tendon



Lateral View



Inferior View

Diaphragm, page 213

A Draw down the central tendon of the diaphragm

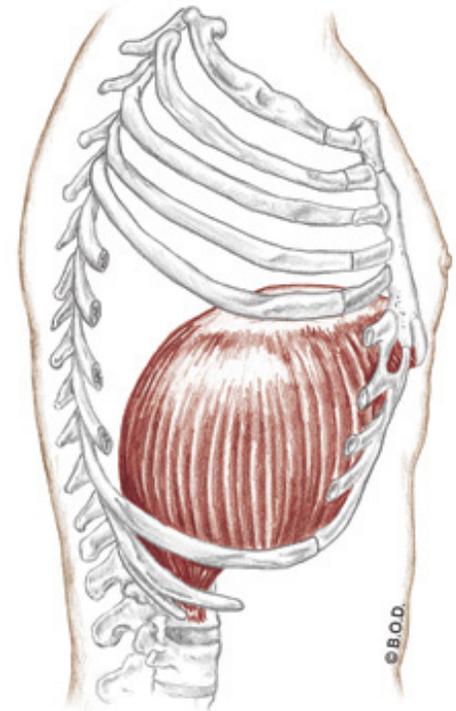
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O Costal attachment: Inner surface of the lower 6 ribs

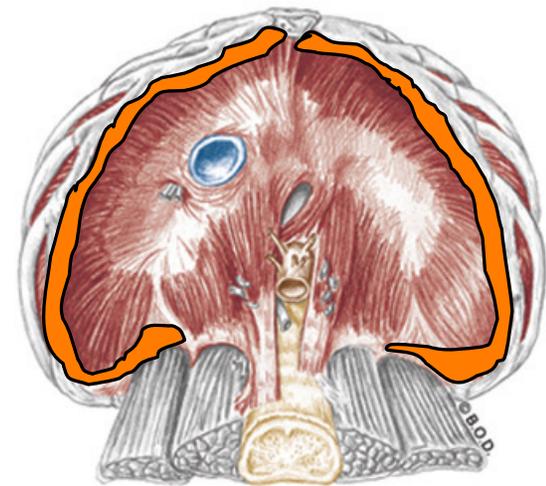
Lumbar attachment: Upper 2 or 3 lumbar vertebrae

Sternal attachment: Inner part of the xiphoid process

I Central tendon



Lateral View



Inferior View

Diaphragm, page 213

A Draw down the central tendon of the diaphragm

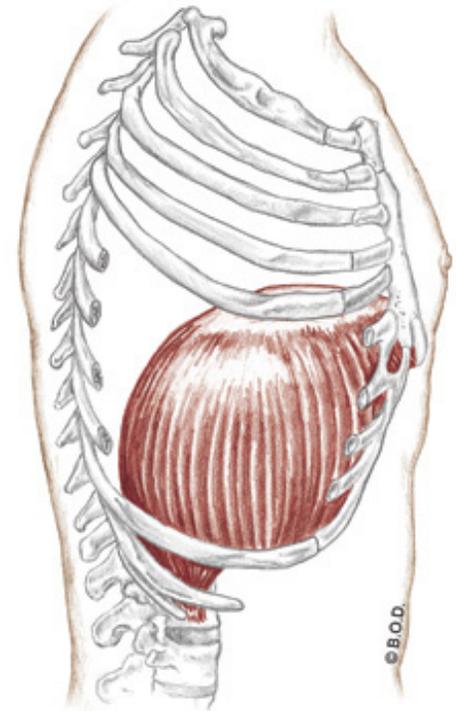
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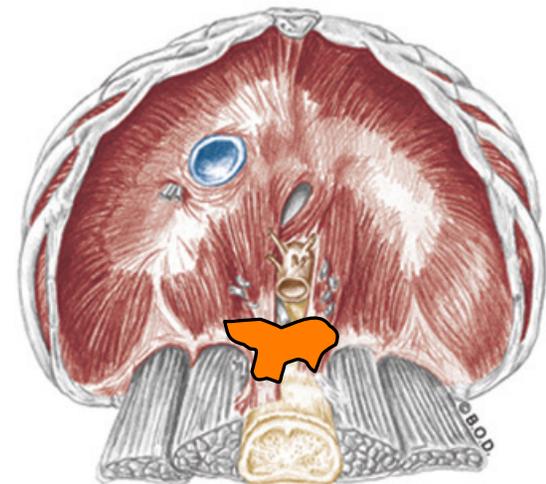
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Sternal attachment: Inner part of the xiphoid process

I Central tendon



Lateral View



Inferior View

Diaphragm, page 213

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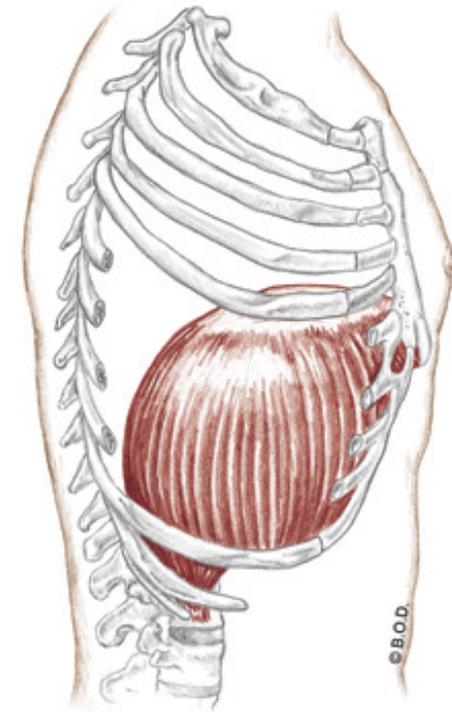
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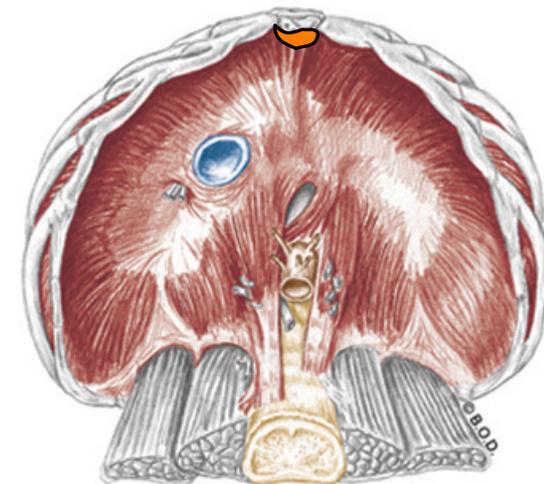
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Sternal attachment: Inner part of the xiphoid process

I Central tendon



Lateral View



Inferior View

Diaphragm, page 213

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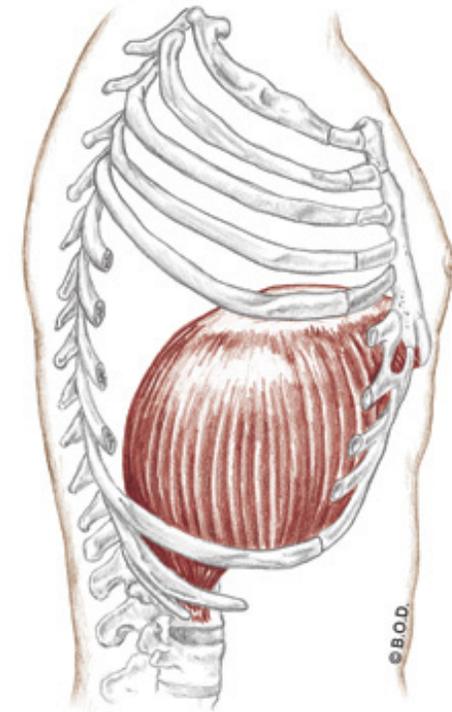
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O Costal attachment: Inner surface of the lower 6 ribs

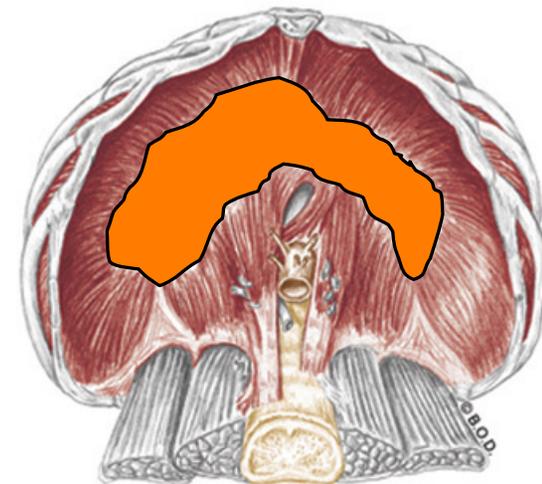
Lumbar attachment: Upper 2 or 3 lumbar vertebrae

Sternal attachment: Inner part of the xiphoid process

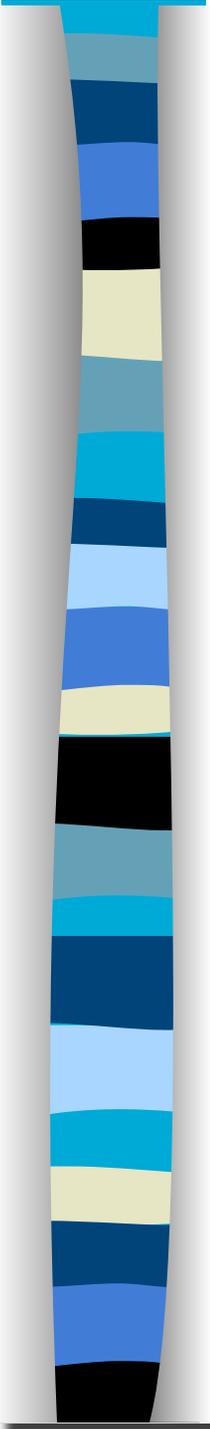
I Central tendon



Lateral View



Inferior View

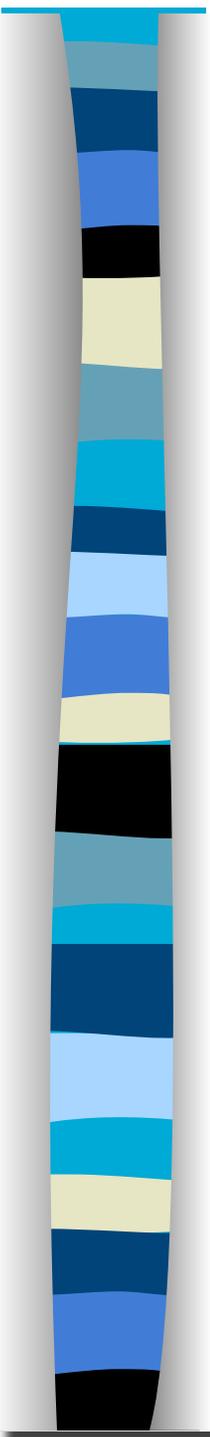


Introduction

Respiration Movement of air in and out of the lungs, and the exchange of oxygen and carbon dioxide between the blood and body tissues.

The respiratory and cardiovascular systems work together to provide oxygen to the tissues and remove metabolic wastes including carbon dioxide.

Failure of either system results in disruption of homeostasis and rapid cell death from oxygen deprivation.



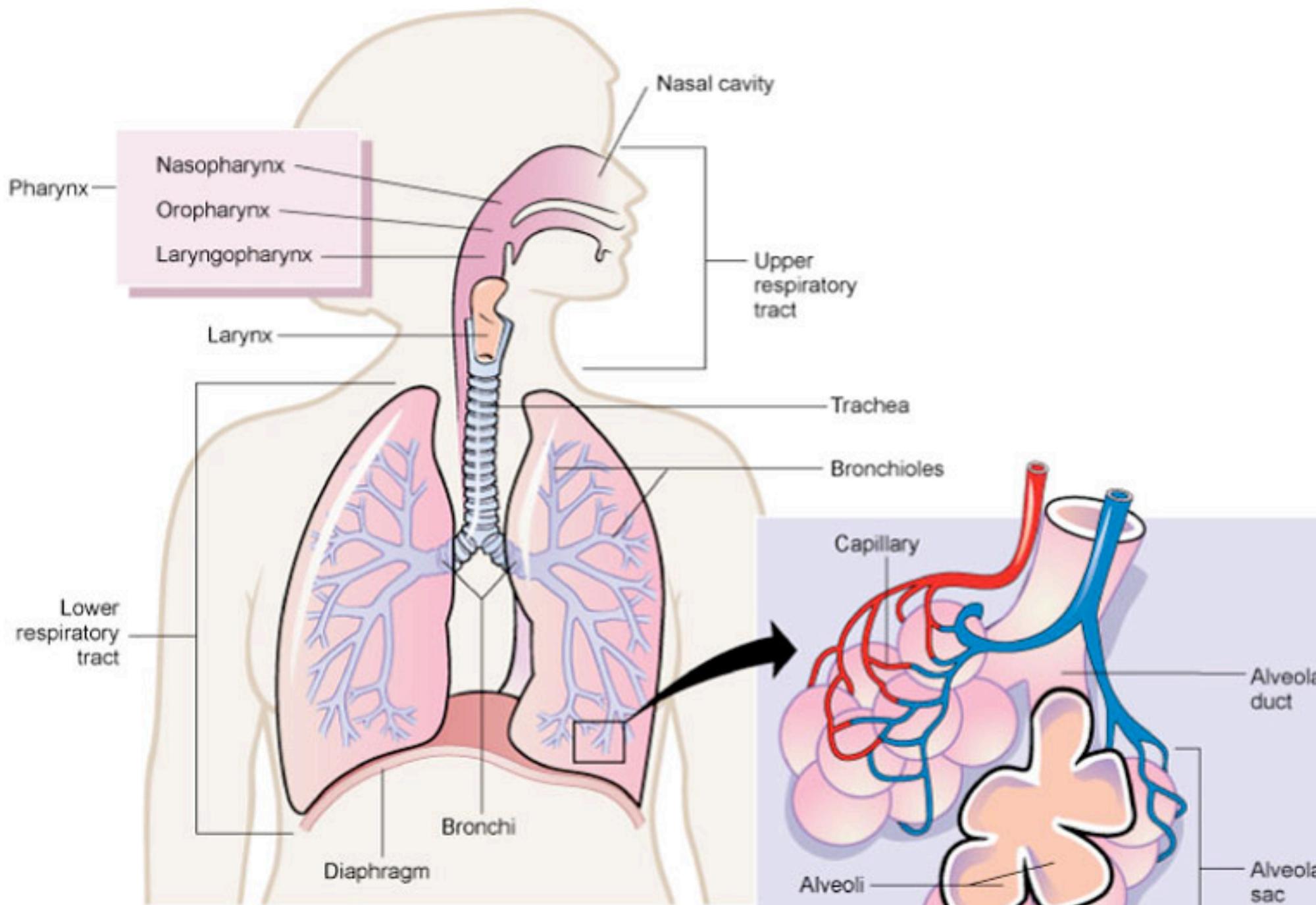
Anatomy

Upper respiratory tract

- Nose and nasal cavity
- Pharynx
- Larynx
- Sinuses

Lower Respiratory tract

- Trachea
- Bronchi and Bronchioles
- Alveolar ducts and alveoli
- Lungs
- Diaphragm



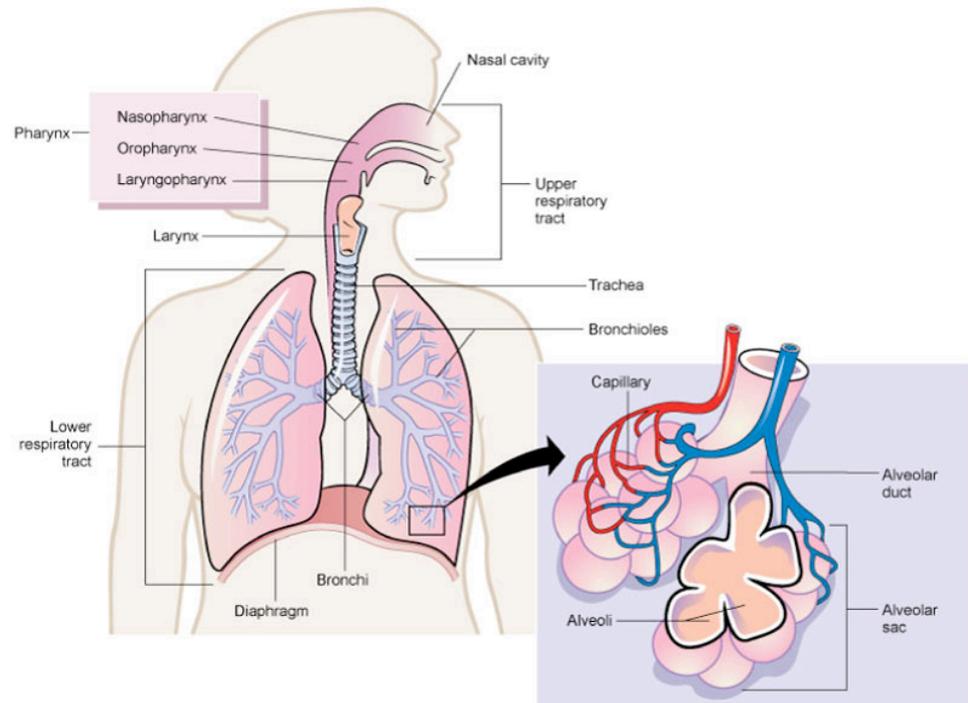
Physiology

Exchange gases

Olfaction

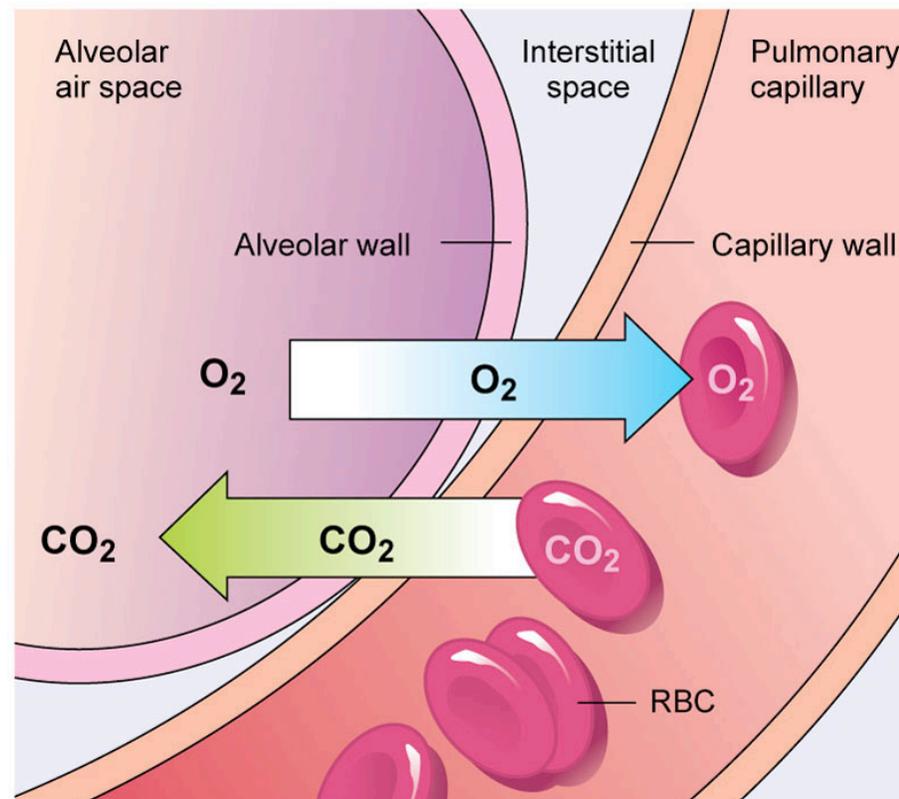
Sound production

Maintenance of homeostasis



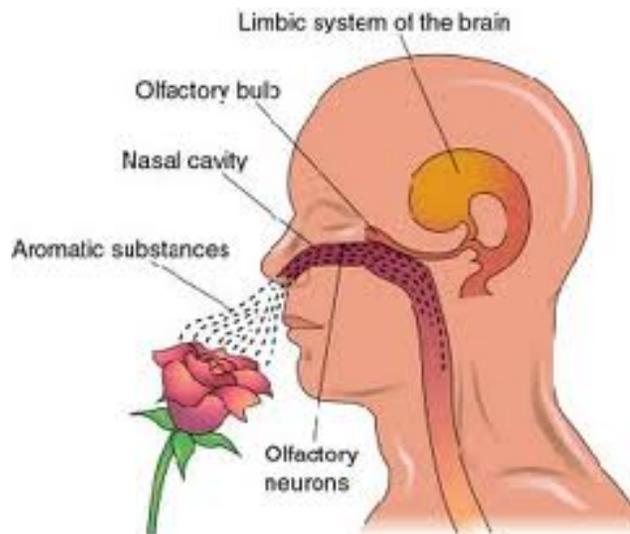
Physiology

Exchange gases Oxygen and CO₂ exchange occurs through the capillary walls in the lungs and in the systemic circulation. _



Physiology

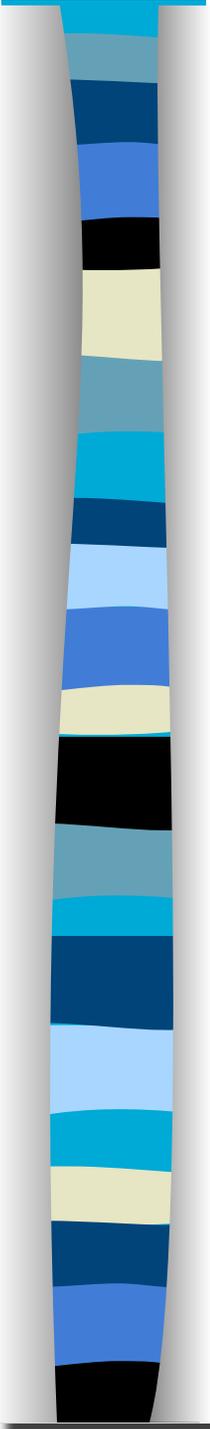
Olfaction The sense of smell. During inhalation, scent molecules are forced against ends of the olfactory nerves which connect to the olfactory bulb. The nerve impulse is then carried to the cortex for interpretation.



Physiology

Sound production Air moving over the vocal cords combined with movements of the lips, facial muscles, and tongue forms words and produces speech.

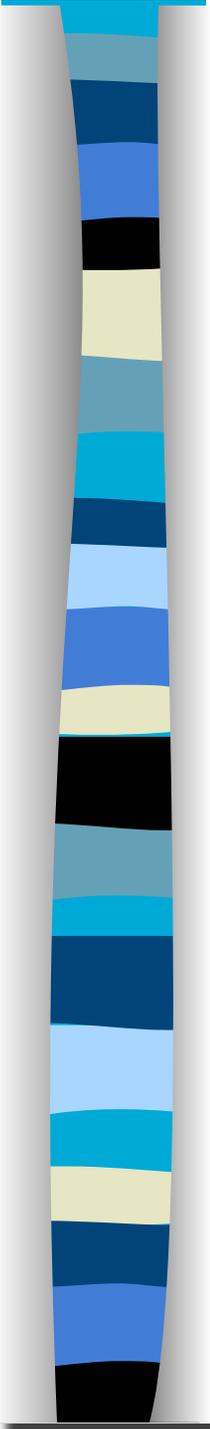




Physiology

Maintenance of homeostasis Maintains oxygen levels in the blood.

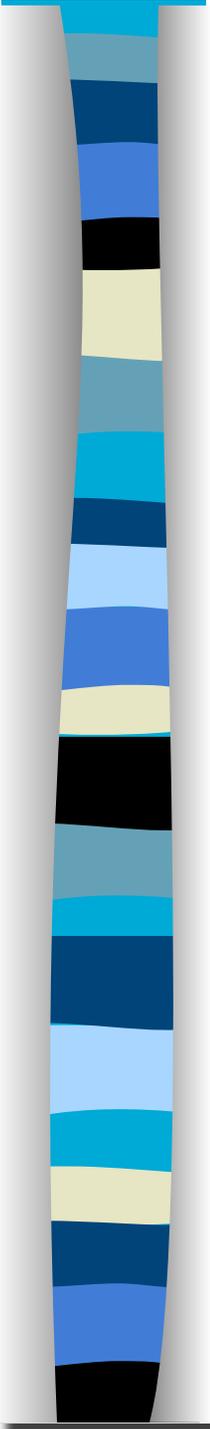
Eliminates wastes such as carbon dioxide and heat. Also regulates blood pH.



Response Moment

The 4 physiologies of the Respiratory System:

- 1.
- 2.
- 3.
- 4.



Response Moment

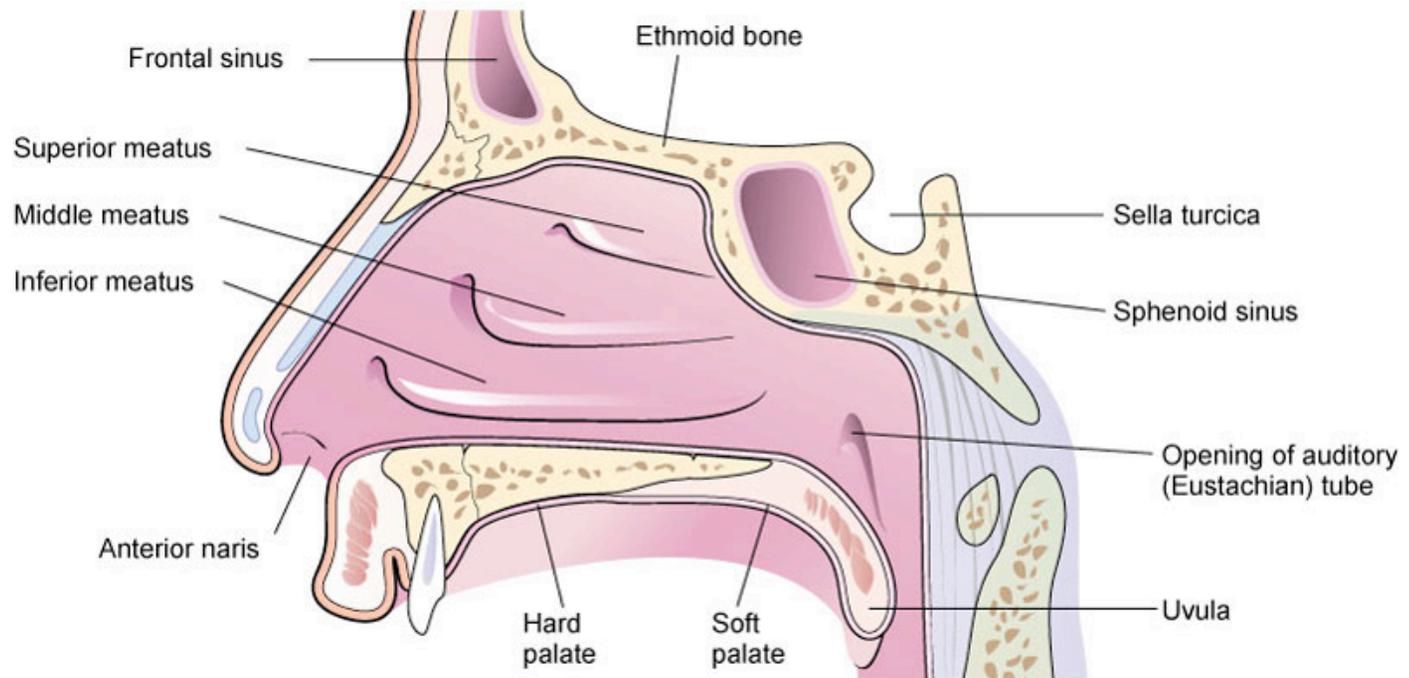
The 4 physiologies of the Respiratory System:

1. Exchange of gases
2. Olfaction
3. Sound production
4. Maintenance of homeostasis

Upper Respiratory Tract

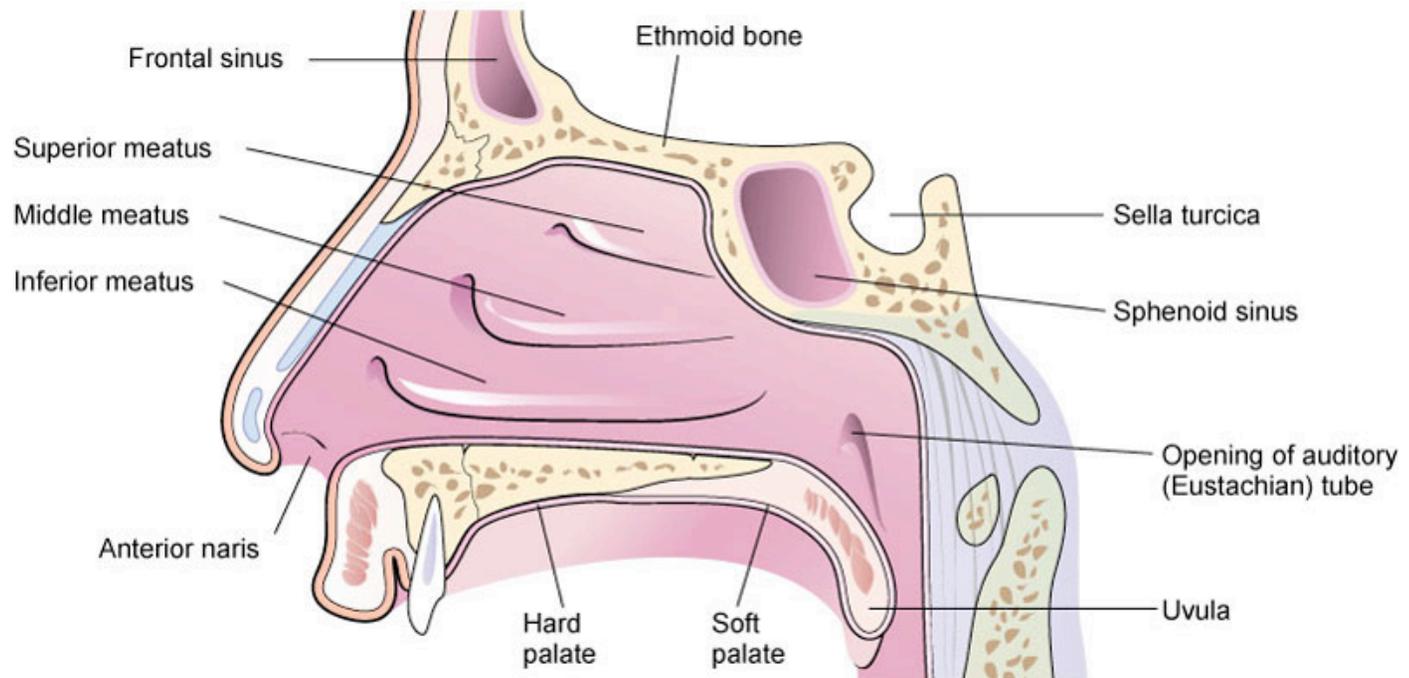
Nose Port of entry for air and the beginning of the air conduction pathway.

Nasal hair Traps particles and foreign matter as air flows through the nose.



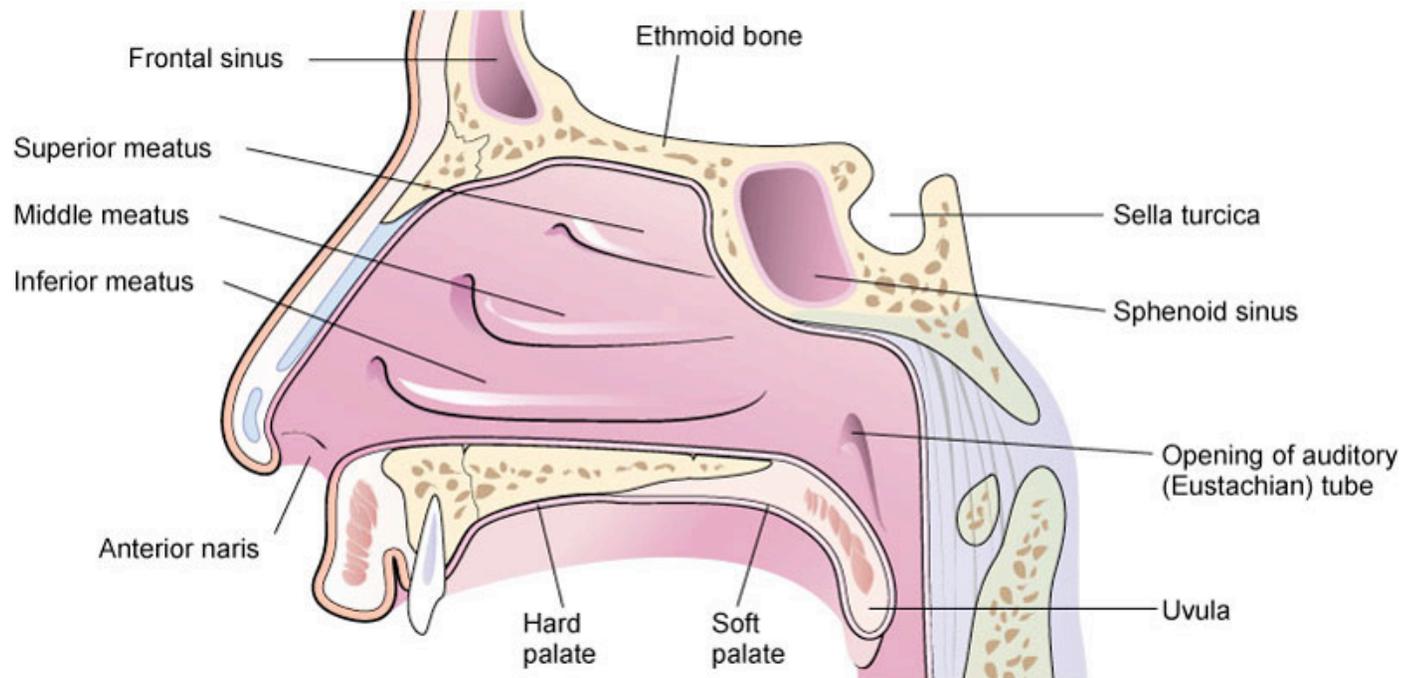
Upper Respiratory Tract

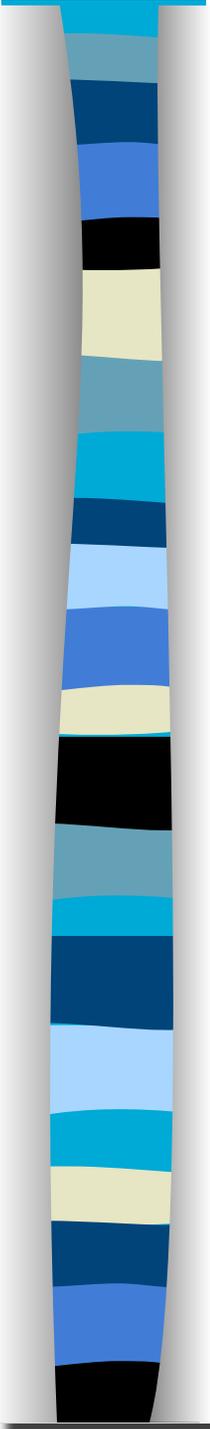
Nasal cavity Cavity just behind the nose where air is warmed by superficial blood vessels and moistened by mucosal secretions.



Upper Respiratory Tract

Cilia Tiny hair-like projections of the mucosae that trap foreign particles and transport them down the throat where they are either swallowed or coughed out through the mouth.





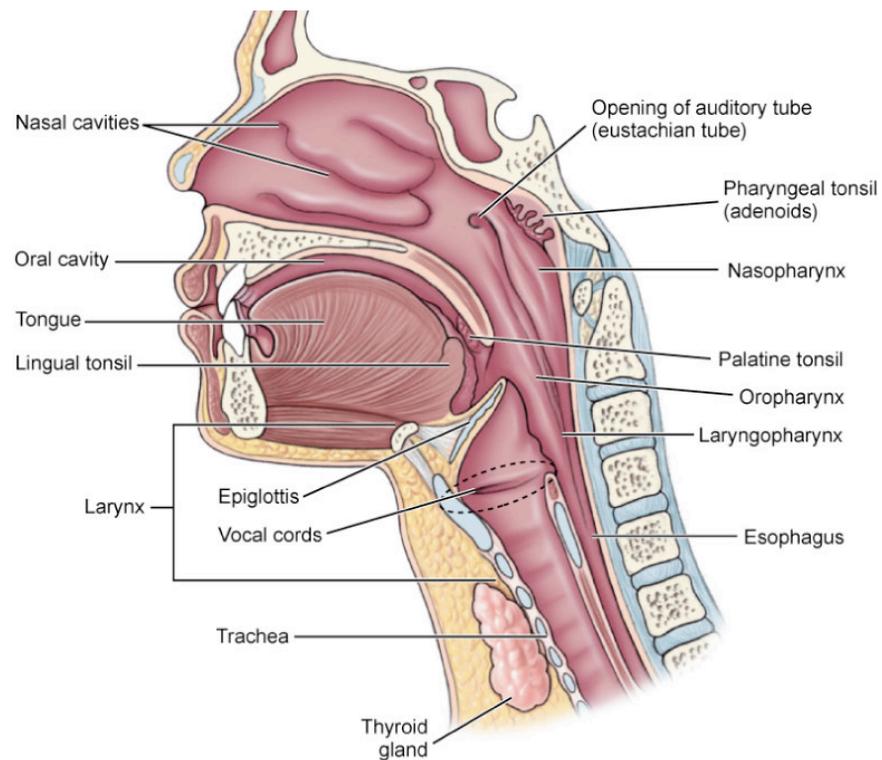
Upper Respiratory Tract

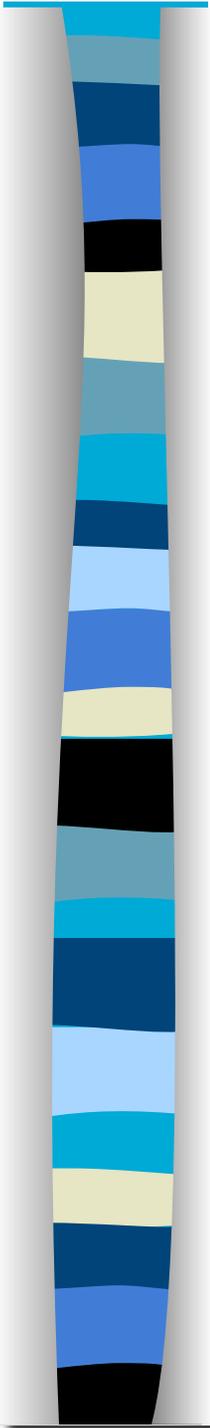
Pharynx (AKA: throat) Muscular tube shared by the respiratory and digestive systems. Contains tonsils and openings to the Eustachian tubes.

Larynx (AKA: voice box) Connects the pharynx to the trachea.
Houses the vocal cords where sound is produced when air passes over them.

Upper Respiratory Tract

Epiglottis Elastic cartilage in the larynx that closes the trachea during swallowing to prevent food and water from entering the lower respiratory tract.





Response Moment

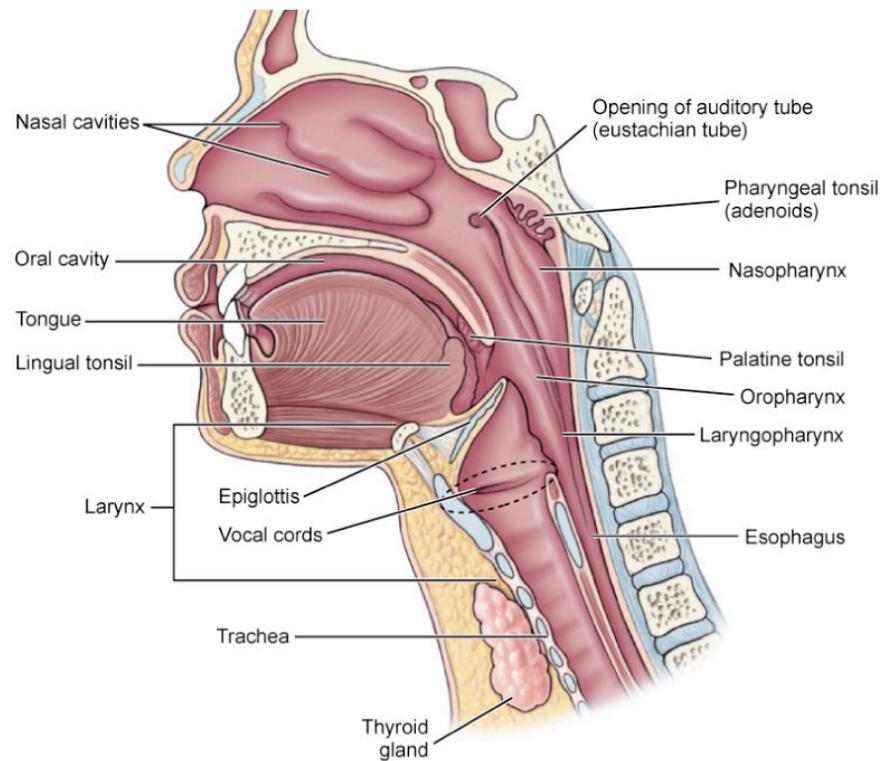
7 anatomical features of the upper respiratory tract:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Response Moment

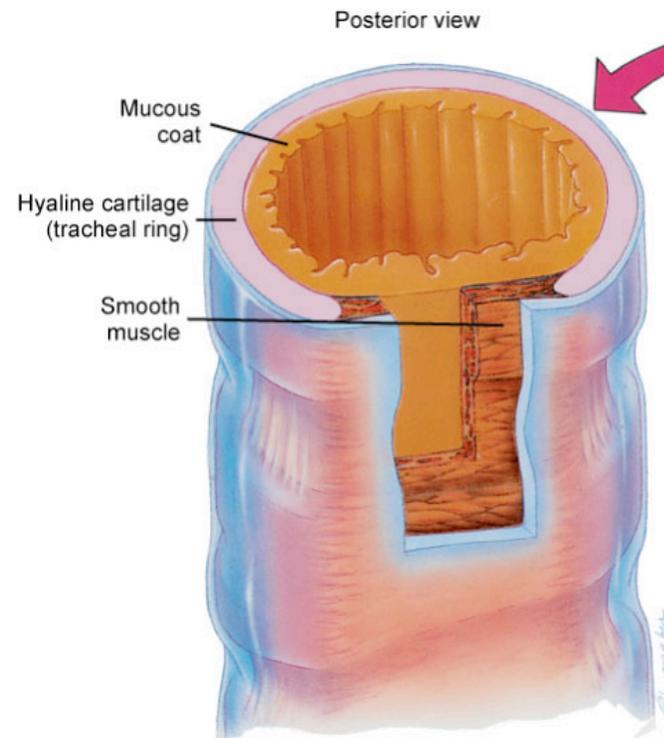
7 anatomical features of the upper respiratory tract:

1. Nose
2. Nasal hairs
3. Nasal cavity
4. Cilia
5. Pharynx
6. Larynx
7. Epiglottis



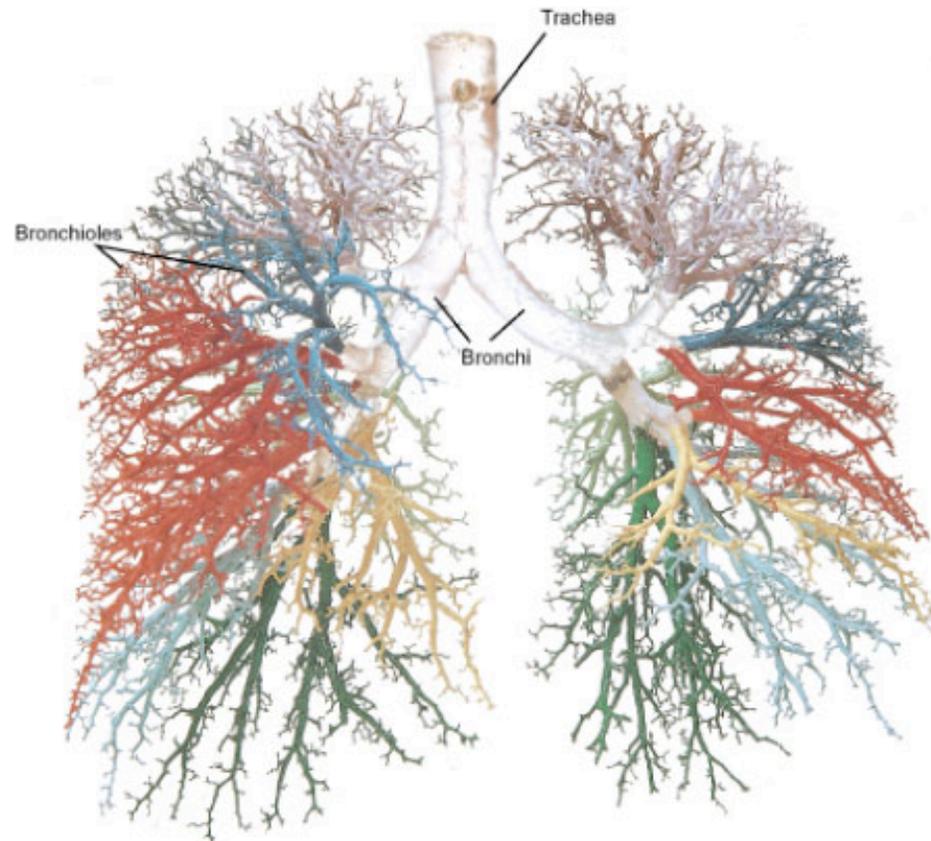
Lower Respiratory Tract

Trachea (AKA: windpipe) Tube that connects the larynx to the lungs.



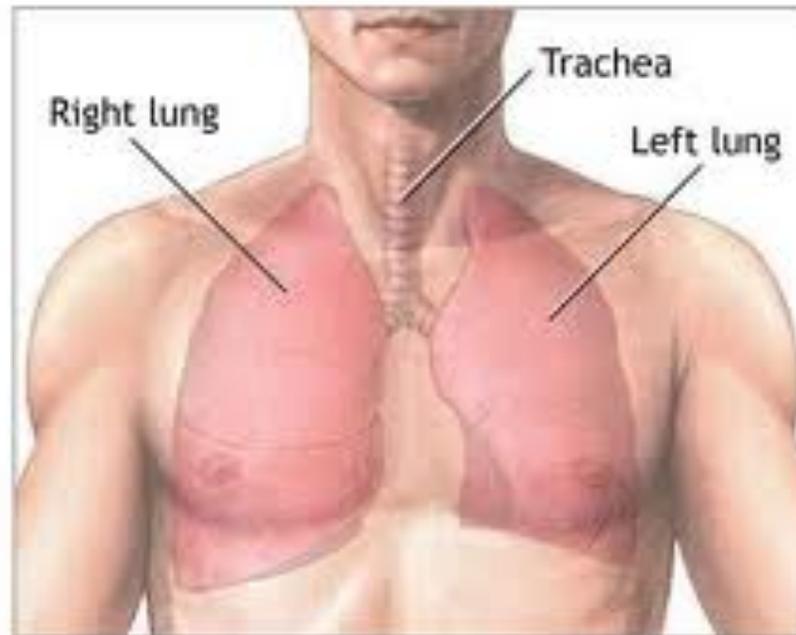
Lower Respiratory Tract

Primary bronchi Air conduction passageways from the trachea to each lung.



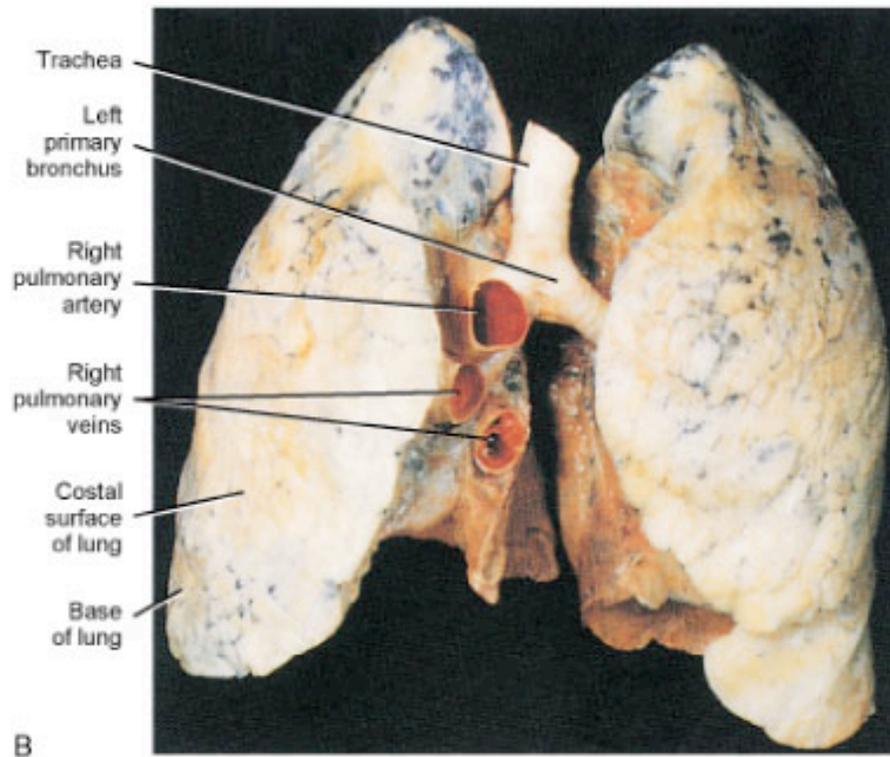
Lower Respiratory Tract

Lungs Primary organs of respiration. Extend from the diaphragm to just above the clavicles. Right lung has 3 lobes. Left lung has 2 lobes.



Lower Respiratory Tract

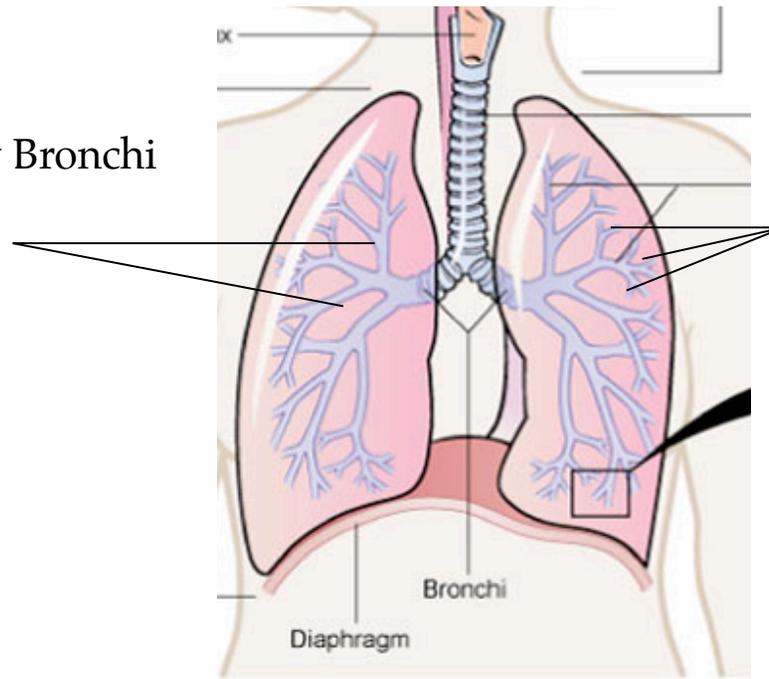
Lungs Primary organs of respiration. Extend from the diaphragm to just above the clavicles. Right lung has 3 lobes. Left lung has 2 lobes.



Lower Respiratory Tract

Secondary and tertiary bronchi (not detailed in Salvo) Branches from the primary bronchi, similar to them but decreasing in size.

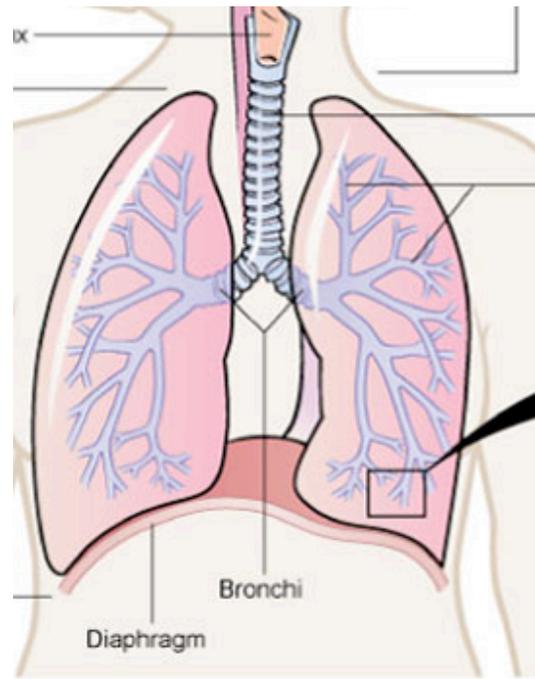
Secondary Bronchi



Tertiary Bronchi

Lower Respiratory Tract

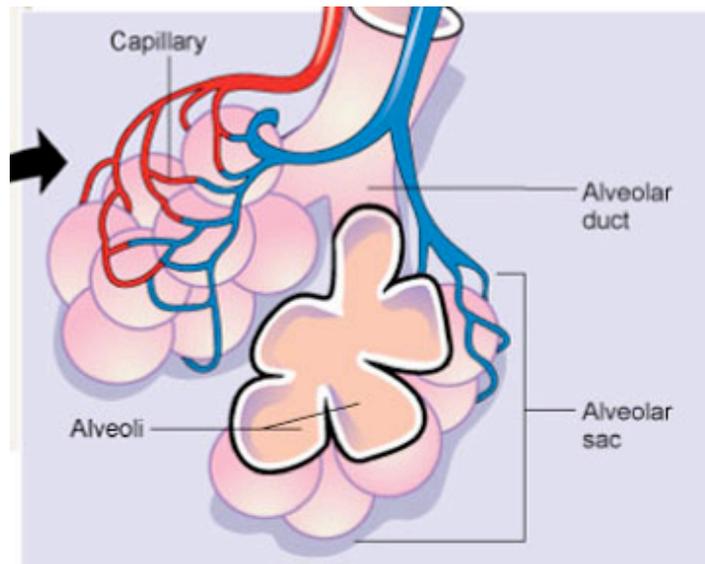
Bronchioles Smaller branches off the tertiary bronchi, having no cartilage, and surrounded by smooth muscle.

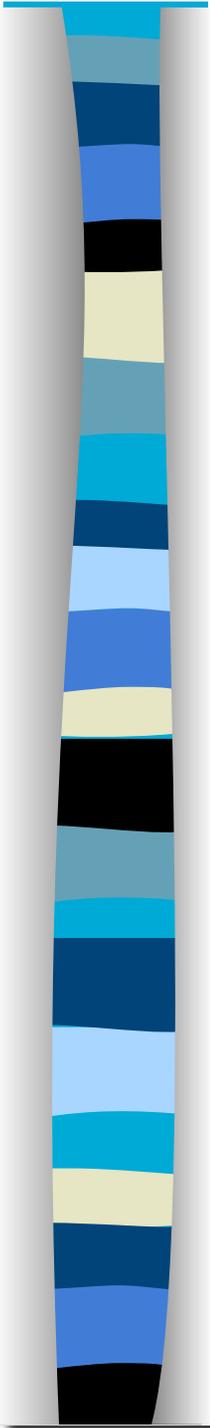


Lower Respiratory Tract

Alveolar ducts Connect bronchioles to alveoli.

Alveoli Tiny sacs attached in clusters resembling grapes to alveolar ducts. Made of single-layer epithelial tissue and surrounded by capillaries which together make gas exchange possible.





Response Moment

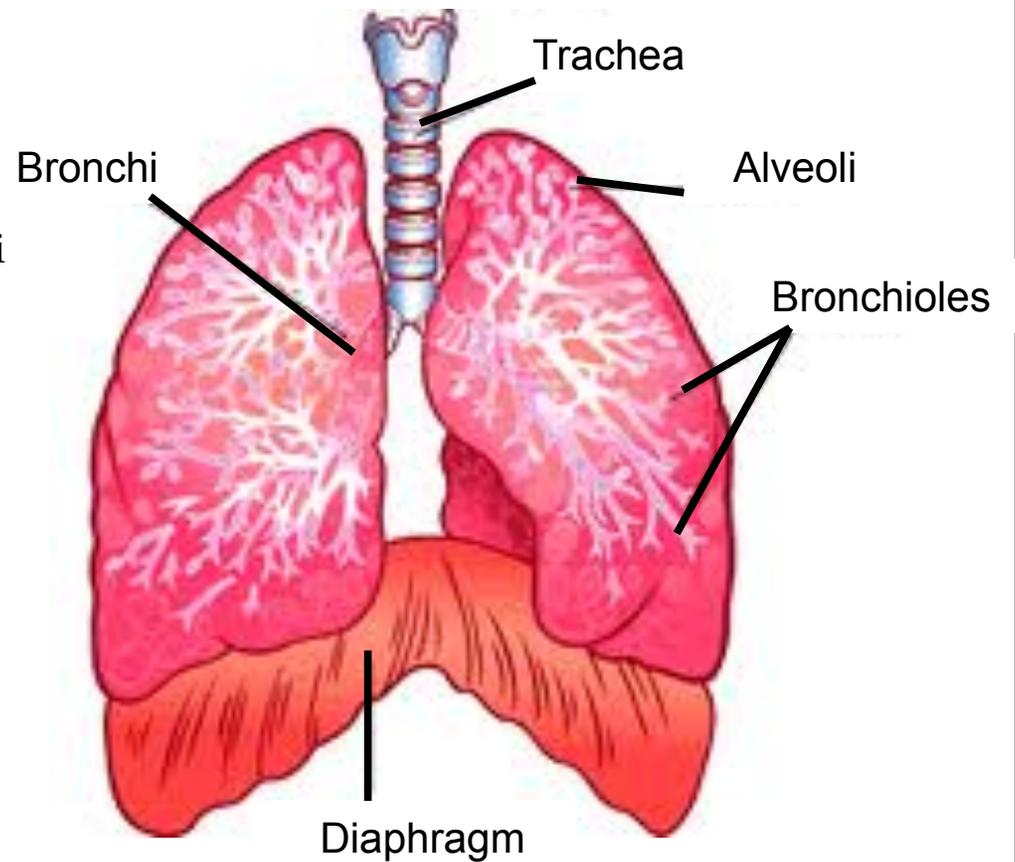
7 anatomical features of the lower respiratory tract:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Response Moment

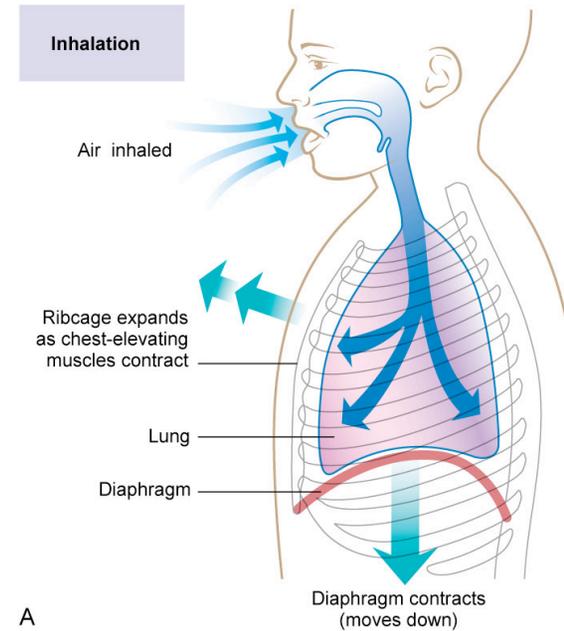
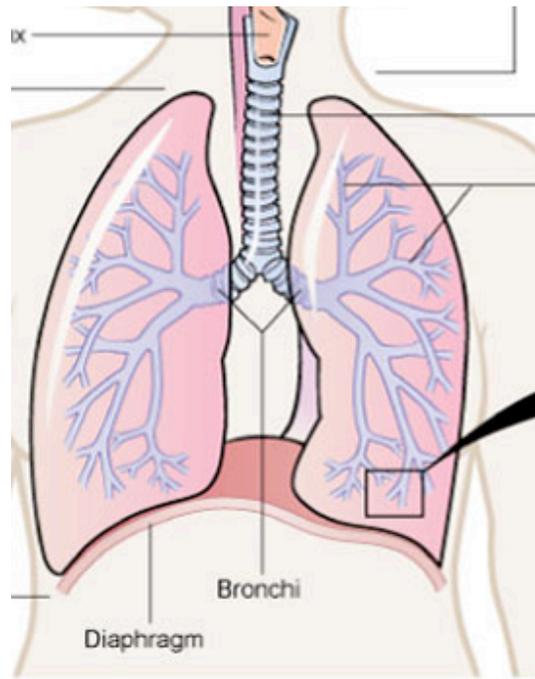
7 anatomical features of the lower respiratory tract:

1. Trachea
2. Primary bronchi
3. Lungs
4. Secondary and tertiary bronchi
5. Bronchioles
6. Alveolar ducts
7. Alveoli



Diaphragm

Diaphragm Main muscle of respiration and structure separating the thoracic cavity from the abdominal cavity.



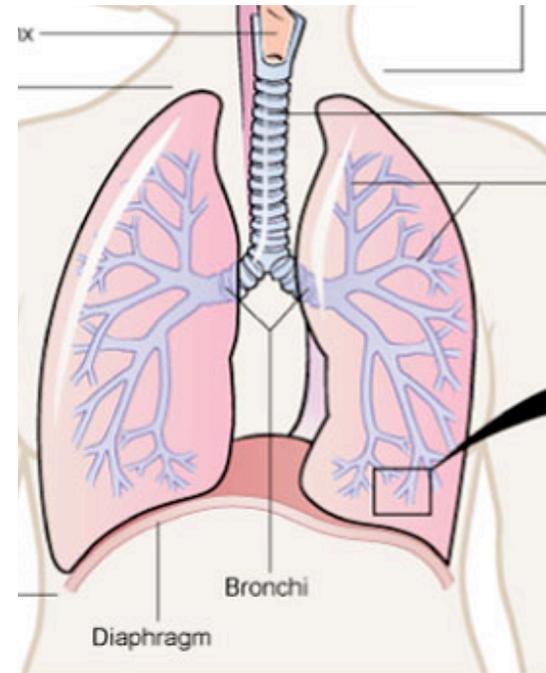
Response Moment

Main organ of respiration?

- Lungs

Main muscle of respiration?

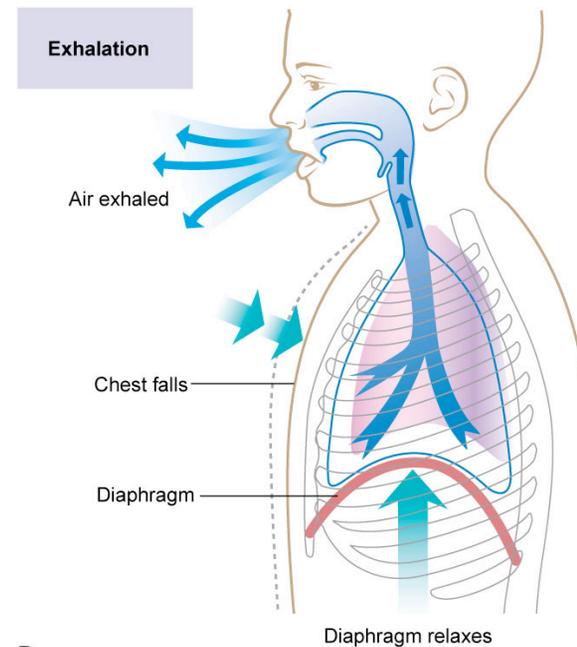
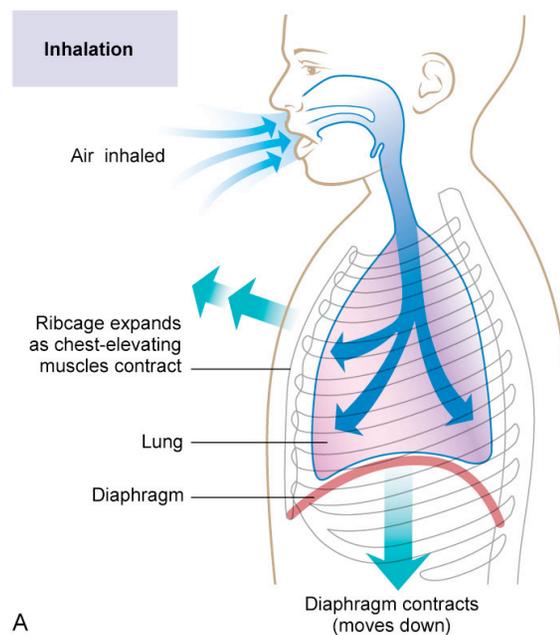
- Diaphragm



Breathing

Breathing A mechanical action consisting of two phases:

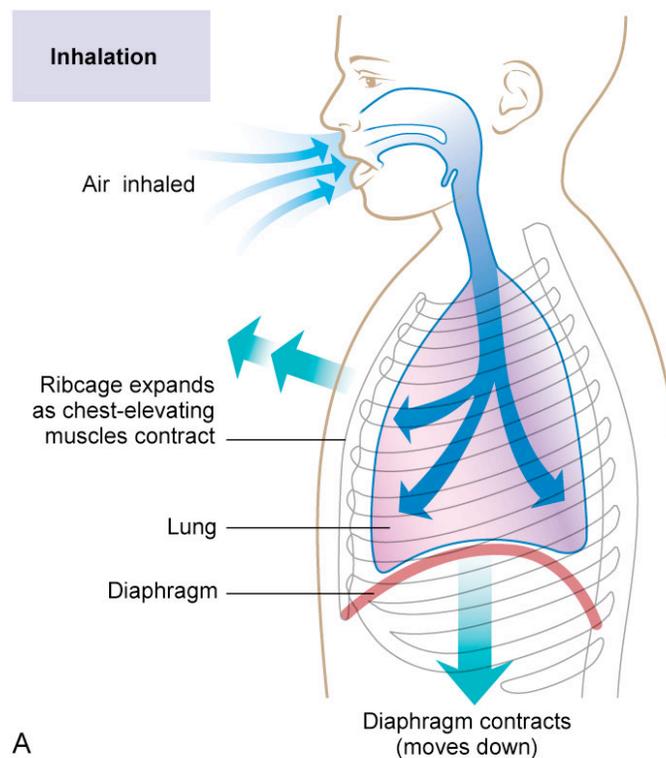
inhalation (inspiration) and exhalation (expiration). These phases are the result of nerve stimulation, muscle contraction, and differences between the pressure in the lungs and the atmospheric pressure outside the lungs. Adults breathe 12-16 times per minute.



Breathing

Inhalation (AKA: inspiration) Process of drawing air into the lungs.

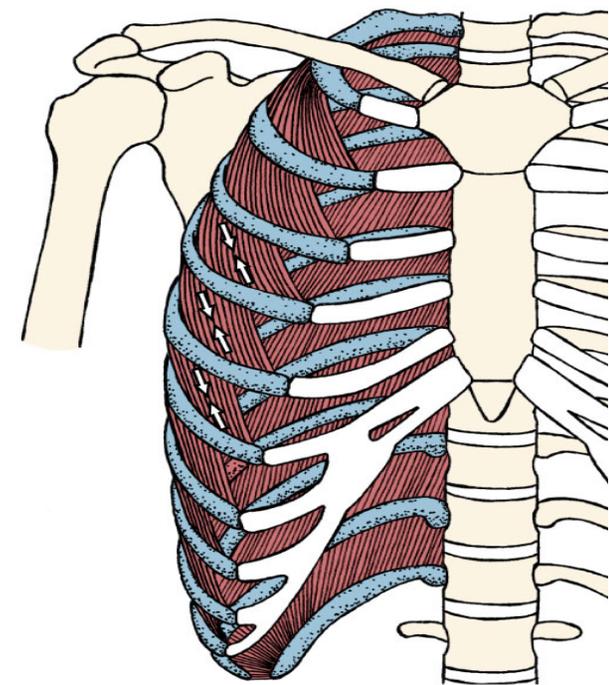
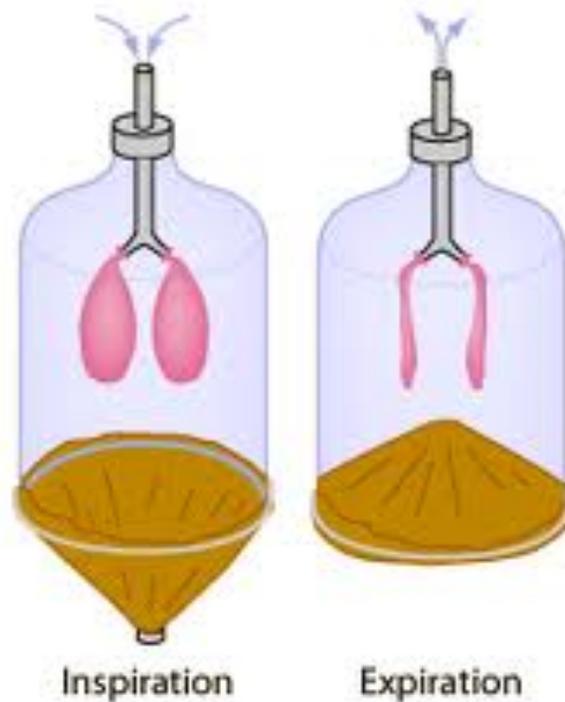
1. Diaphragm contracts and moves down.
2. External intercostals contract to lift the ribcage up and out.
3. Pressure in the lungs is now lower compared to atmospheric pressure.
4. Air moves from higher pressure (atmosphere) to lower pressure (lungs).



Breathing

Inhalation (AKA: inspiration) Process of drawing air into the lungs.

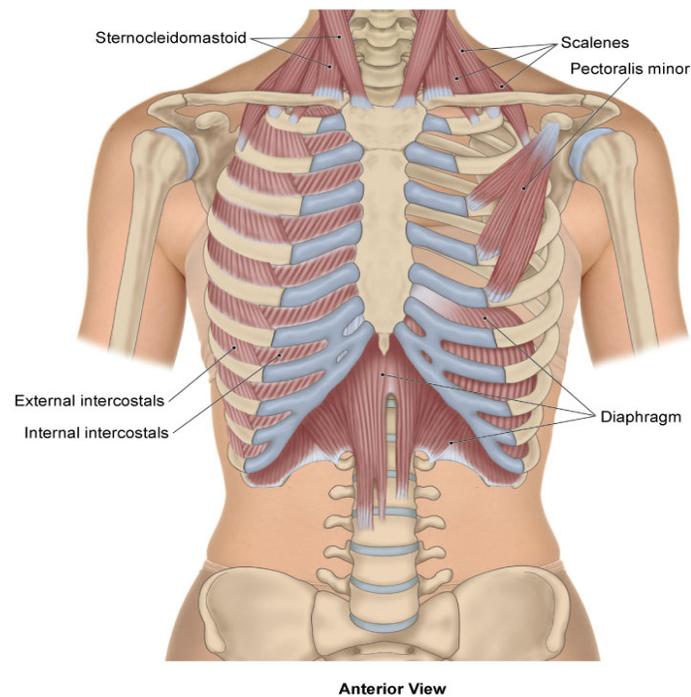
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Anterior View

Breathing

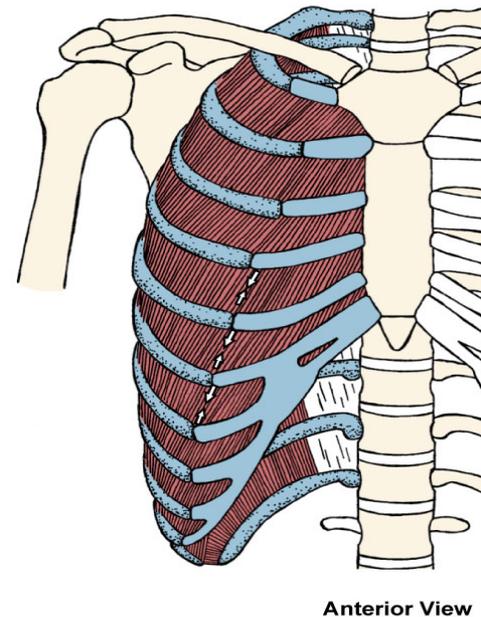
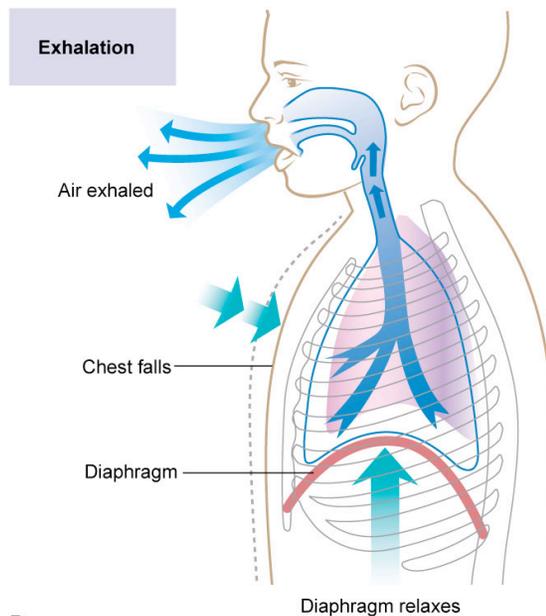
Forced inhalation Intensified and voluntary inhalation that requires contraction of accessory muscles of inhalation (sternocleidomastoid, scalenes, and pectoralis minor).



Breathing

Exhalation (AKA: expiration) Process of expelling air from the lungs.

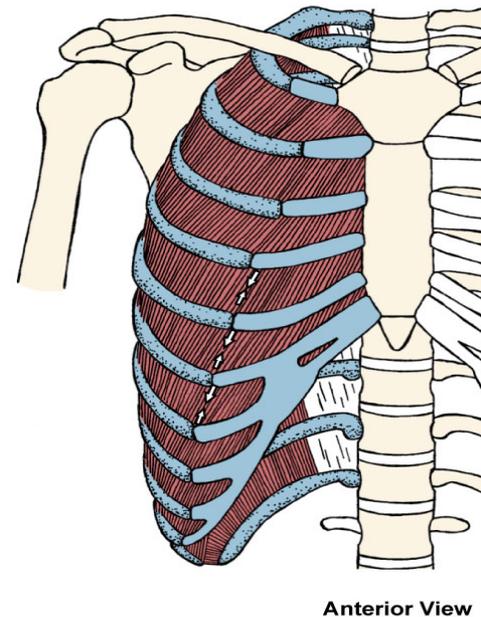
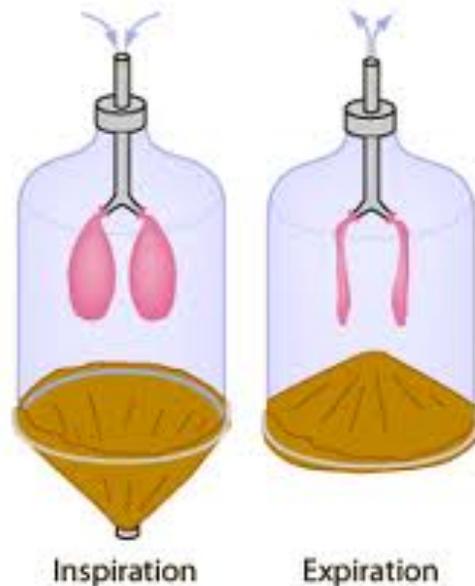
1. Diaphragm relaxes; elastic recoil of stretched tissues causes it to rise up.
2. External intercostals relax; elastic recoil of the stretched tissues causes the ribcage to move down and in.
3. Thoracic cavity and lungs are reduced in size as a result.
4. Pressure in the lungs is now higher compared to atmospheric pressure.
5. Air moves from higher pressure (lungs) to lower pressure (atmosphere).



Breathing

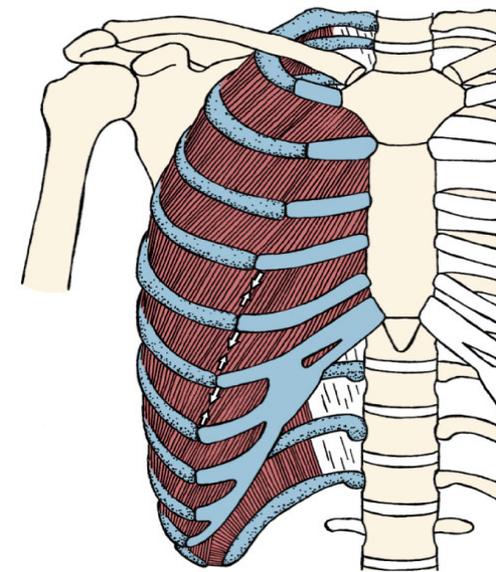
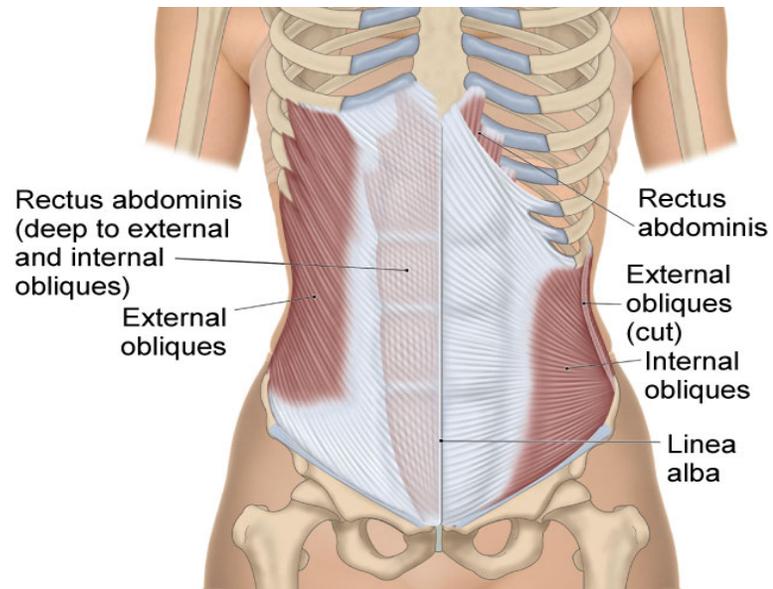
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Breathing

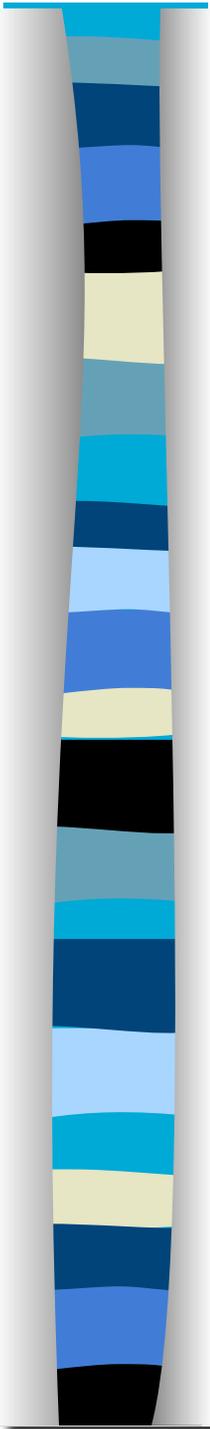
Forced exhalation Intensified and voluntary exhalation that requires contraction of accessory muscles of exhalation (internal intercostals and abdominals).



Breathing

Volitional/voluntary breathing Allows you to hold your breath while swimming under water and to take deep breaths to project your voice during public speaking.





Response Moment

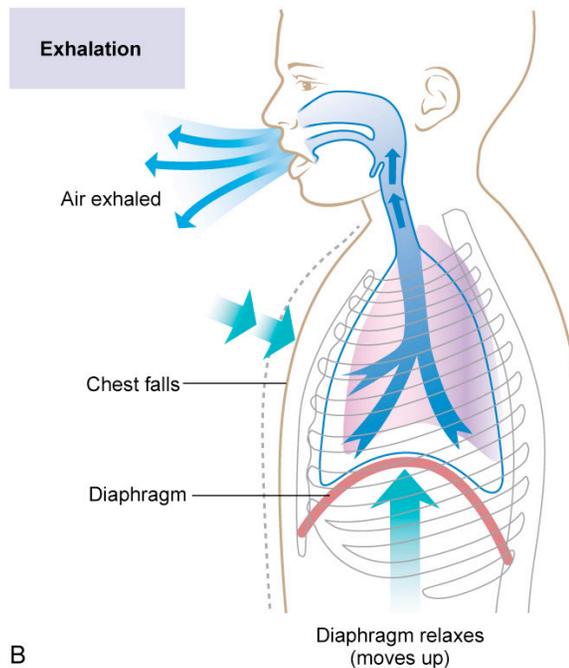
4 steps of inhalation?

- 1.
- 2.
- 3.
- 4.

Response Moment

4 steps of inhalation?

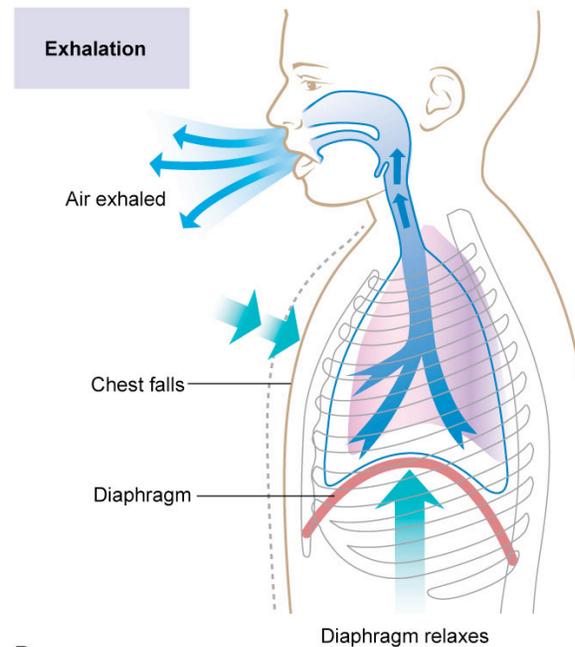
1. Diaphragm contract and moves down
2. External intercostals contract to lift the ribcage up an out
3. Pressure in the lungs is now lower compared to atmospheric pressure
4. Air moves from higher pressure (atmosphere) to lower pressure (lungs)



Response Moment

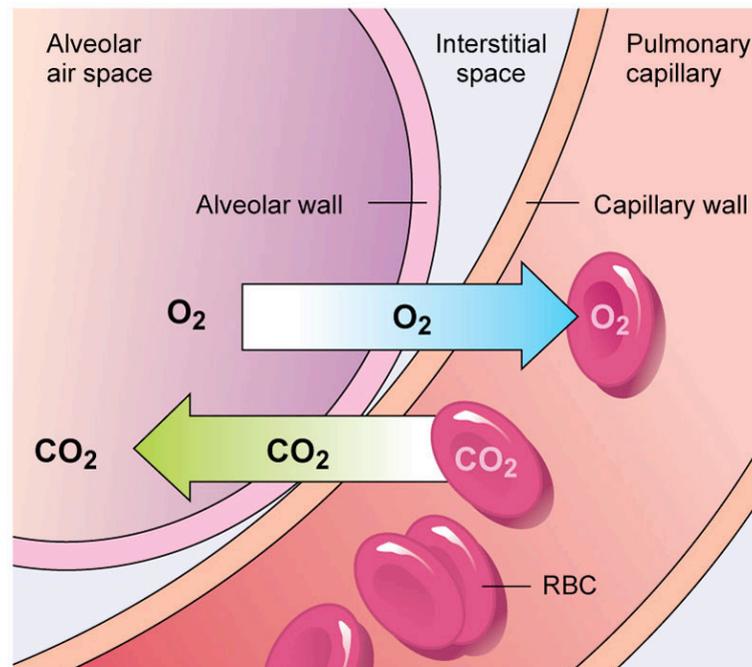
5 steps of exhalation?

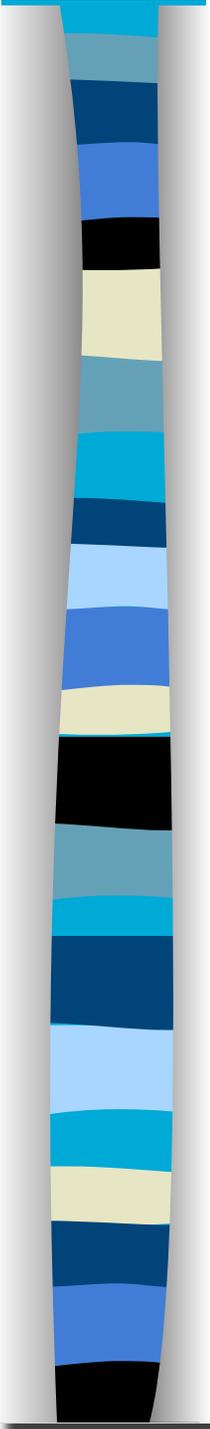
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4. Pressure in the lungs is now higher compared to atmospheric pressure
5. Air moves from higher pressure (lungs) to lower pressure (atmosphere)



External and Internal Respiration

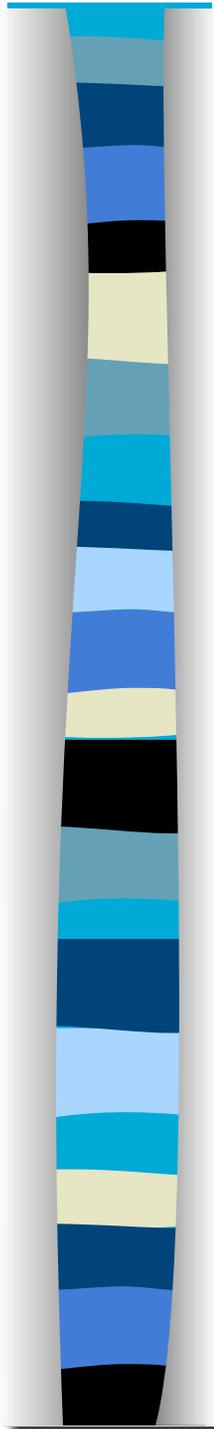
External respiration (AKA: pulmonary respiration) Gas exchange in the lungs. Occurs by diffusion between blood in capillaries and air in the alveoli.





External and Internal Respiration

Internal respiration (AKA: tissue respiration) Gas exchange between blood and the body tissues.

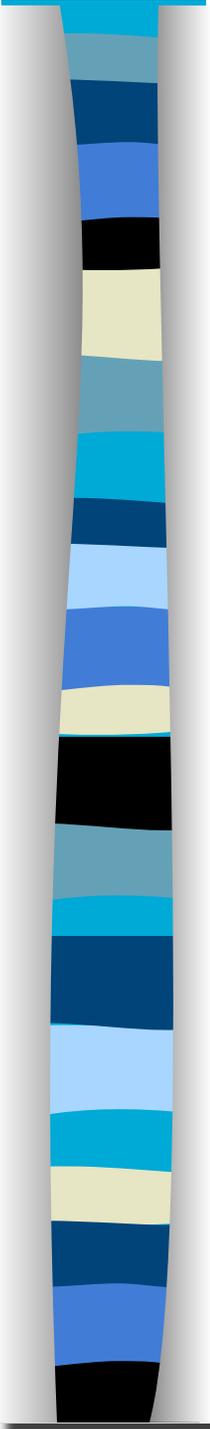


Response Moment

Definition of respiration?

Site of external respiration?

Site of internal respiration?



Response Moment

Definition of respiration?

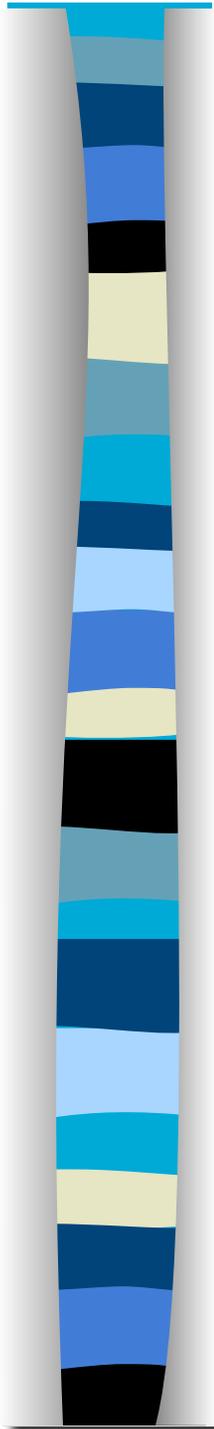
- Gas exchange

Site of external respiration?

- Lungs

Site of internal respiration?

- Tissues



61a A&P: Respiratory System