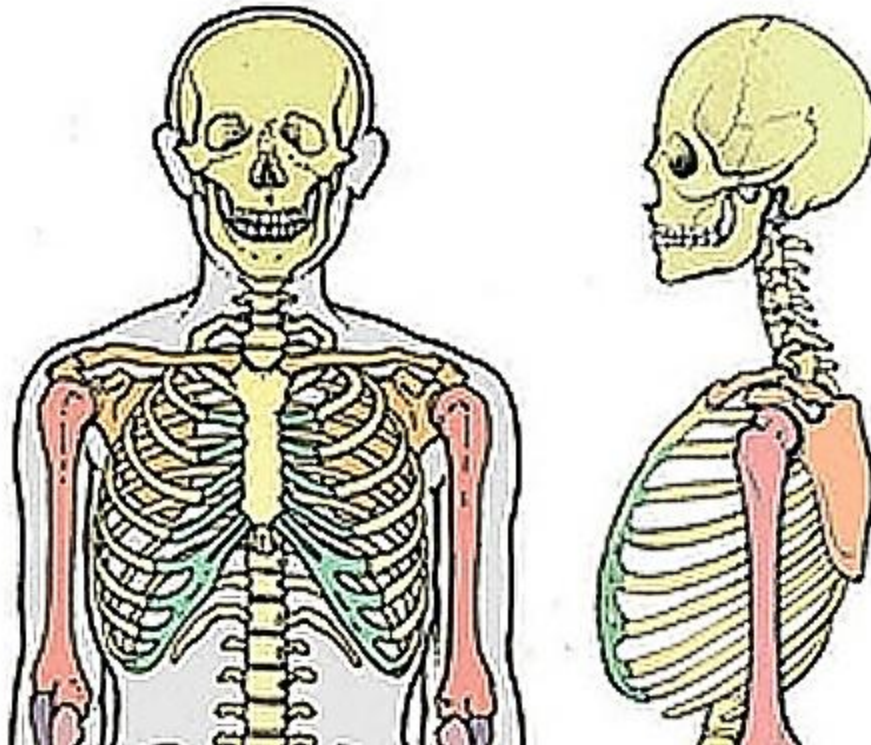




Train the trainer

Physiological basics of human respiration

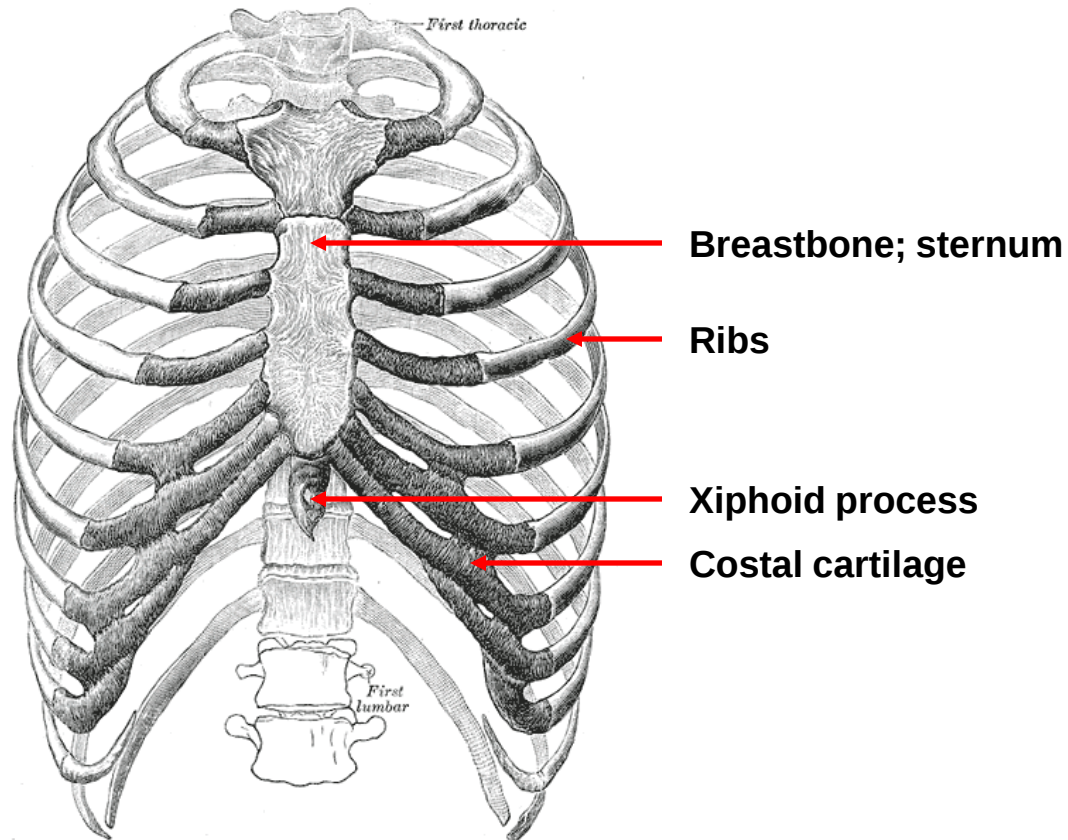
Chest / thorax



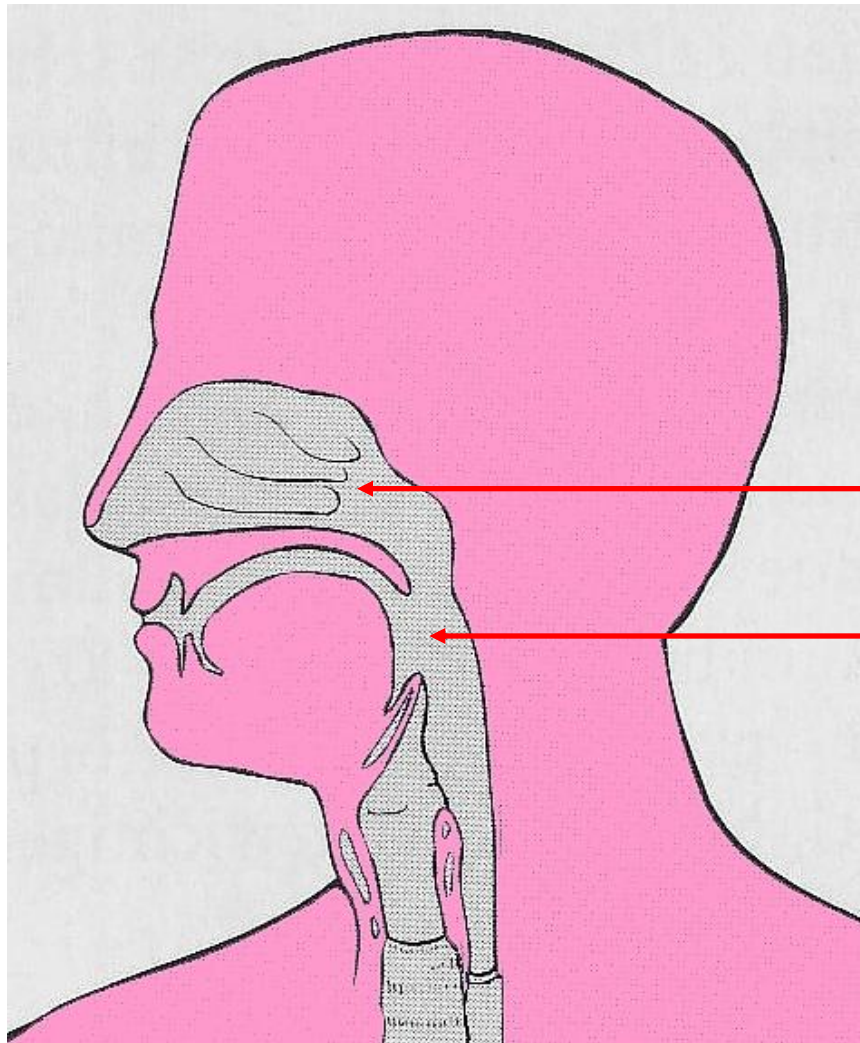
Function of the thorax:

- To Protect very important organs such as the lungs and the heart
- is attached to the spine
- is flexible enough to let us breathe in and breathe out

Chest / thorax

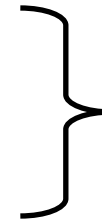


Functional anatomy of the respiratory system



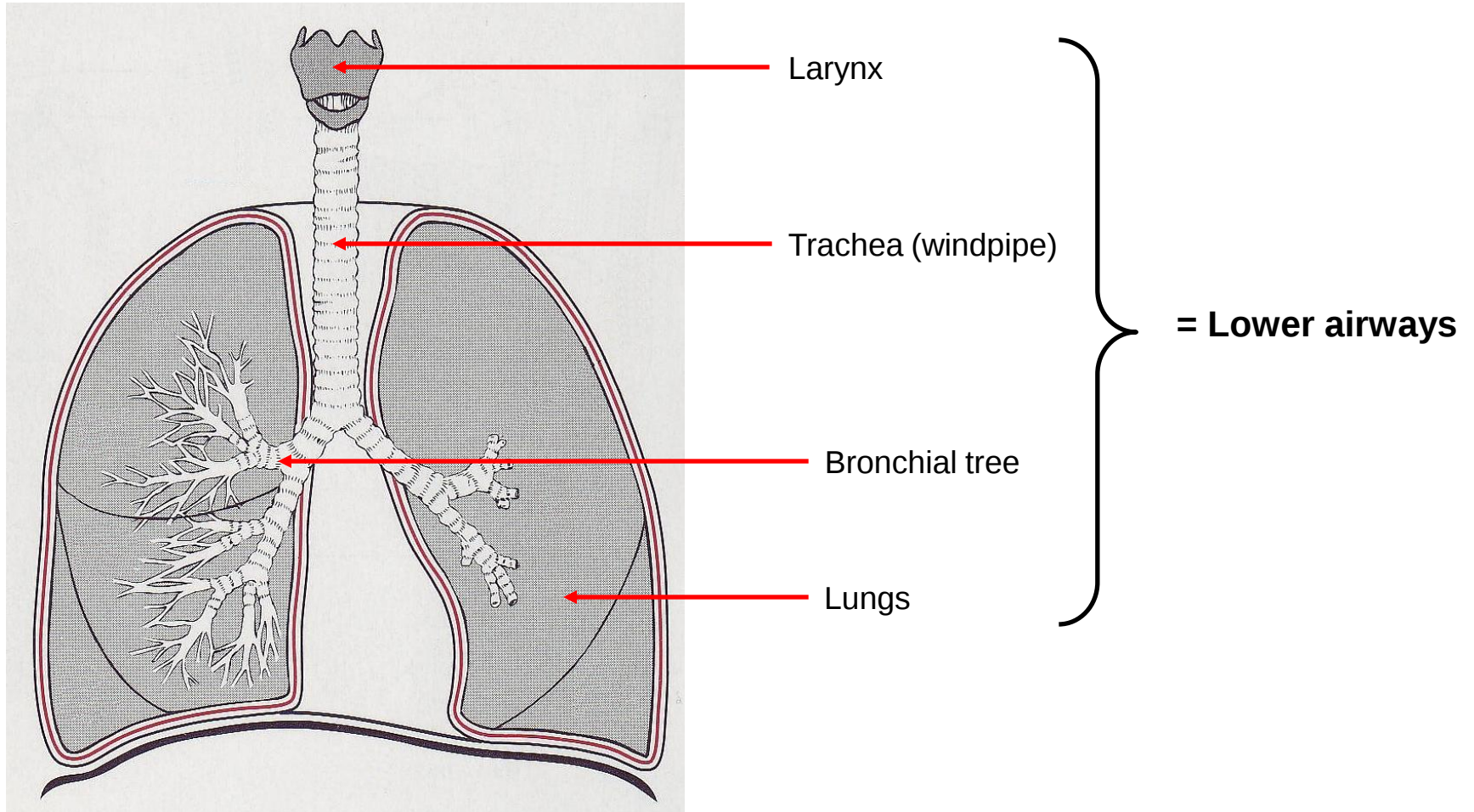
Nose + nasal cavity

Pharynx



= Upper airways

Functional anatomy of the respiratory system



Functional anatomy of the respiratory system

GENERAL:

Upper and lower airways are forming together the ANATOMIC DEADSPACE.

QUESTION:

What does this mean?

Functional anatomy of the respiratory system

GENERAL:

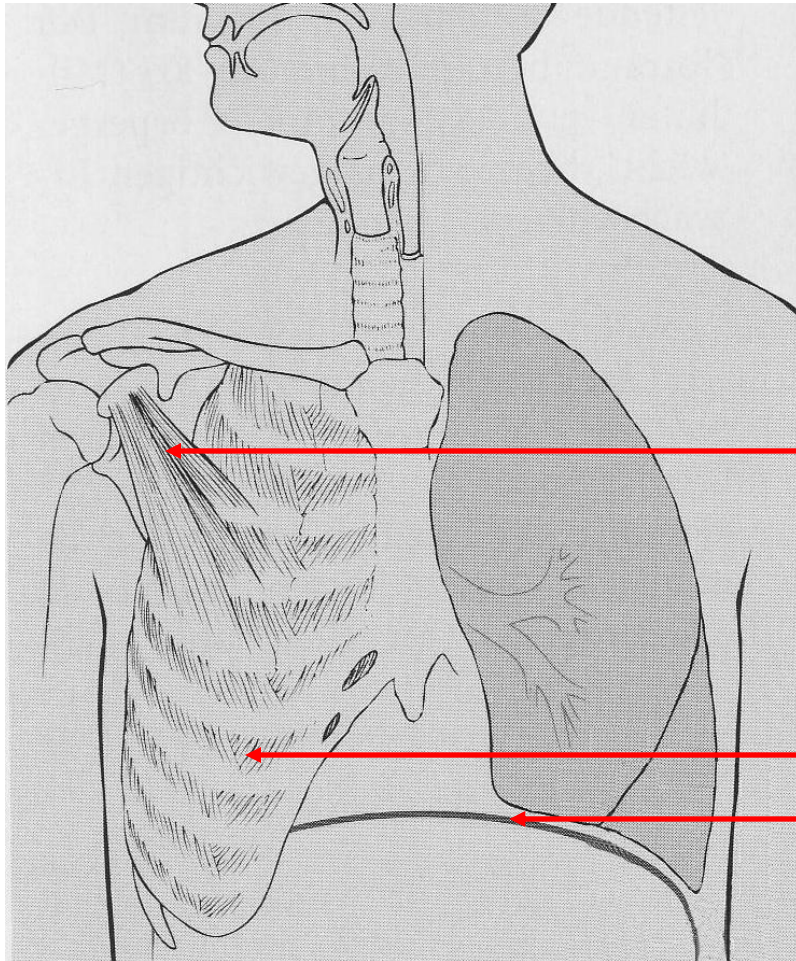
Upper and lower airways are forming together the ANATOMIC DEADSPACE.

QUESTION:

What does this mean?

Anatomic dead space is the total volume of the conducting airways from the nose or mouth down to the level of the terminal bronchioles, and is about 150 ml on the average in humans. The anatomic dead space fills with inspired air at the end of each inspiration, but this air is exhaled unchanged. Thus, assuming a normal tidal volume of 500 ml, about 30% of this air is "wasted" in the sense that it does not participate in gas exchange.

Functional anatomy of the respiratory system



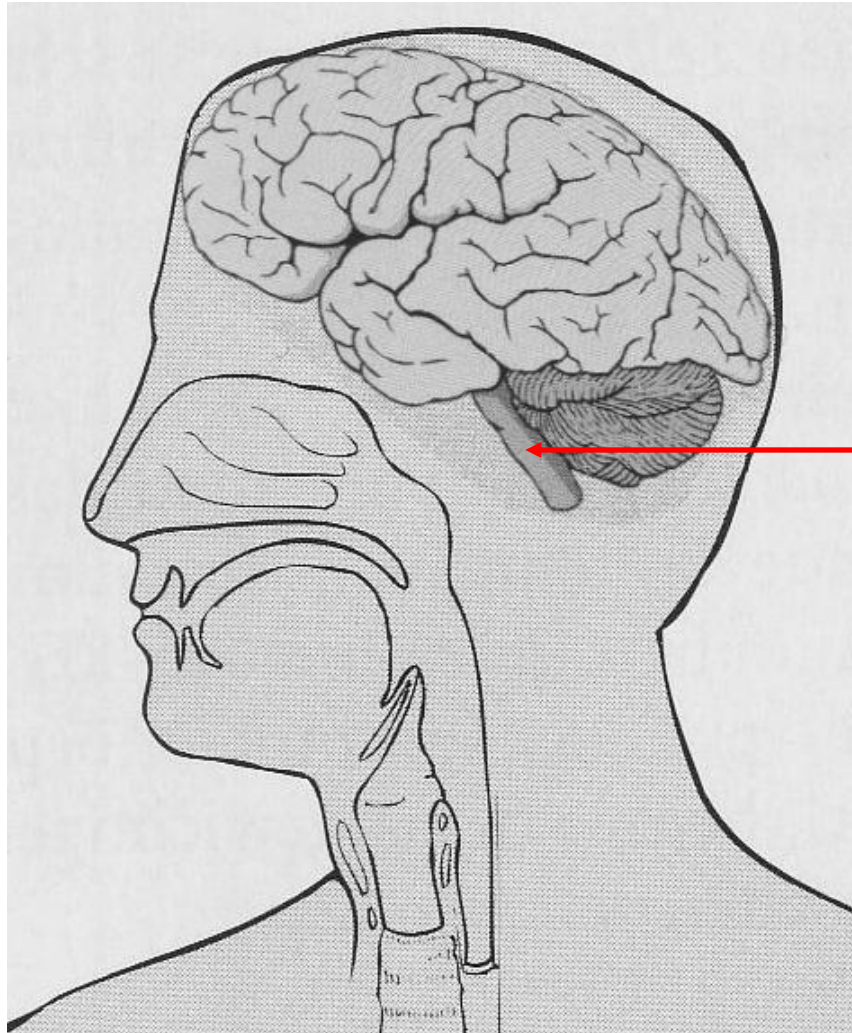
Rib lifting muscles

Pectoral muscles

Diaphragm

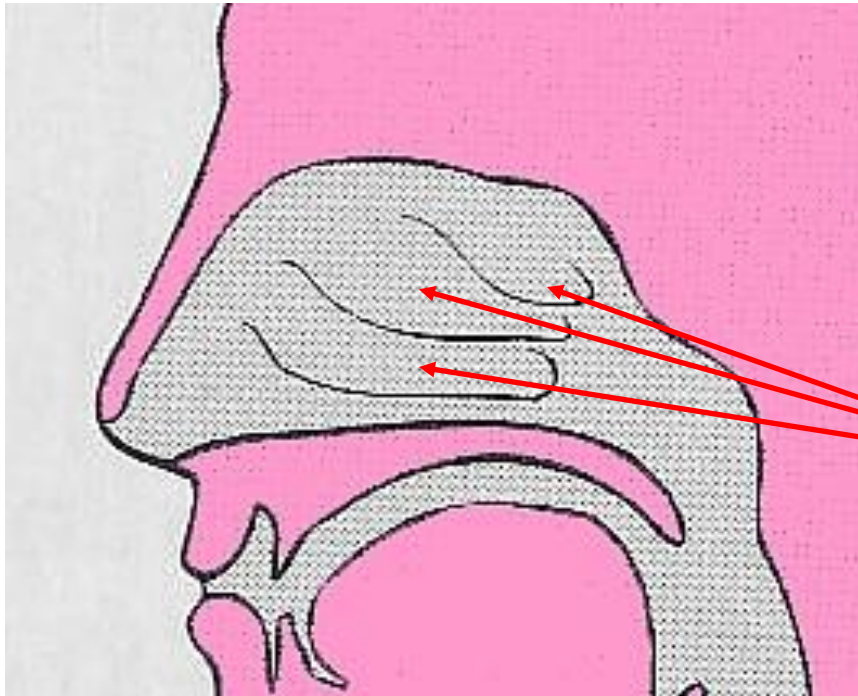
= Mechanical system

Functional anatomy of the respiratory system



Medulla oblongata } = **Respiratory center**

Upper airways



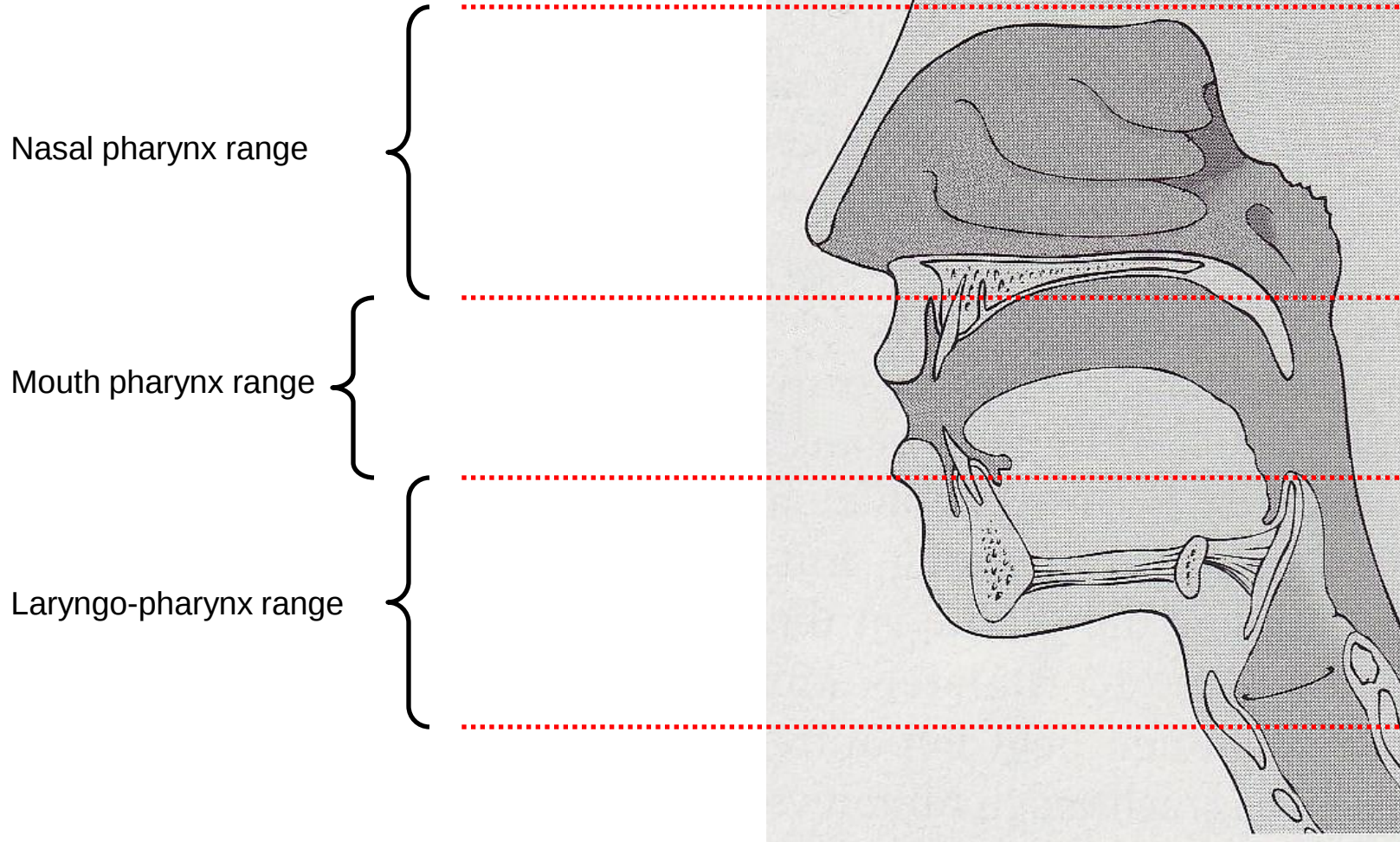
Nasal cavity:

- Divided into 2 parts by the nasal septum
- 3 nasal concha in each part (Concha = small piece of bone coated by erectile tissue)

Function of the nasal cavity:

- Humidification of inhaled air
- Heating of inhaled air
- Cleaning of inhaled air (by nasal hairs and [ciliated epithelium](#))

Upper airways

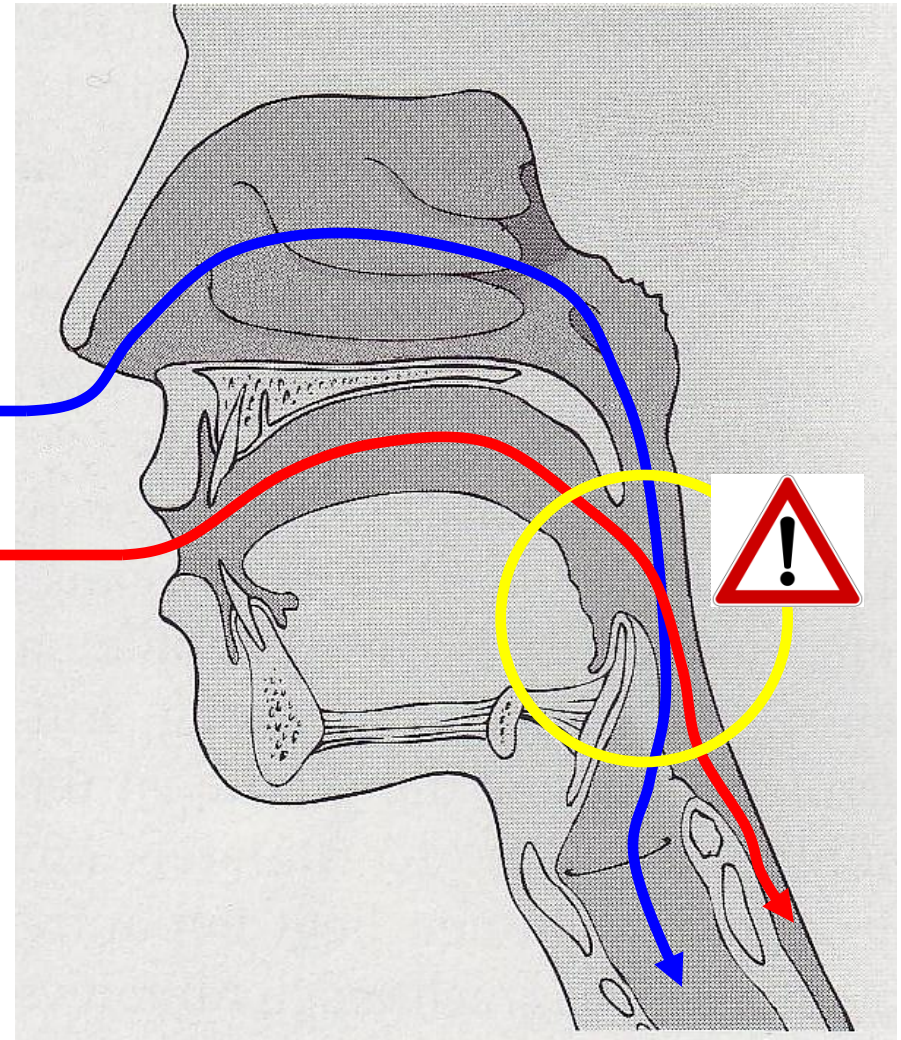


Upper airways

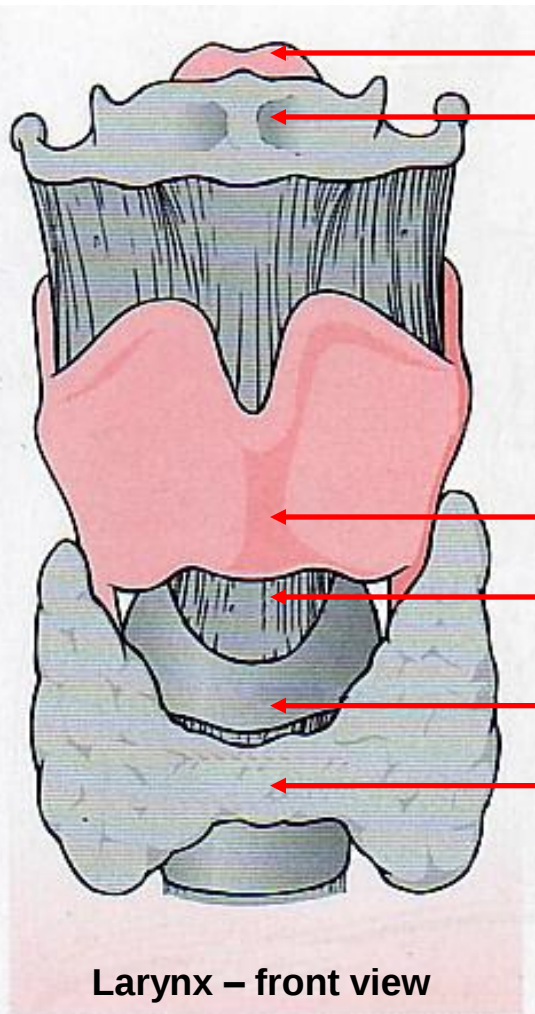
- Food and air have to cross each other!
- Air takes a more curved and therefore more difficult way through the upper airways!
- This causes many problems during the treatment of emergency patients with a respiratory disorder

Inhaled Air

Meals & Drinks



Lower airways



Larynx – front view

Epiglottis

Hyoid bone

Vocal cord

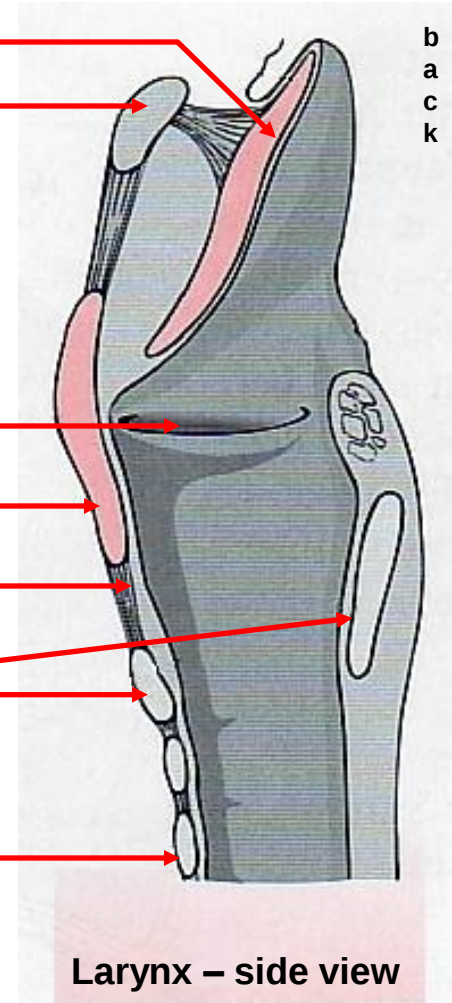
Thyroid cartilage

Ligamentum conicum (band)

Cricoid cartilage

Thyroid gland

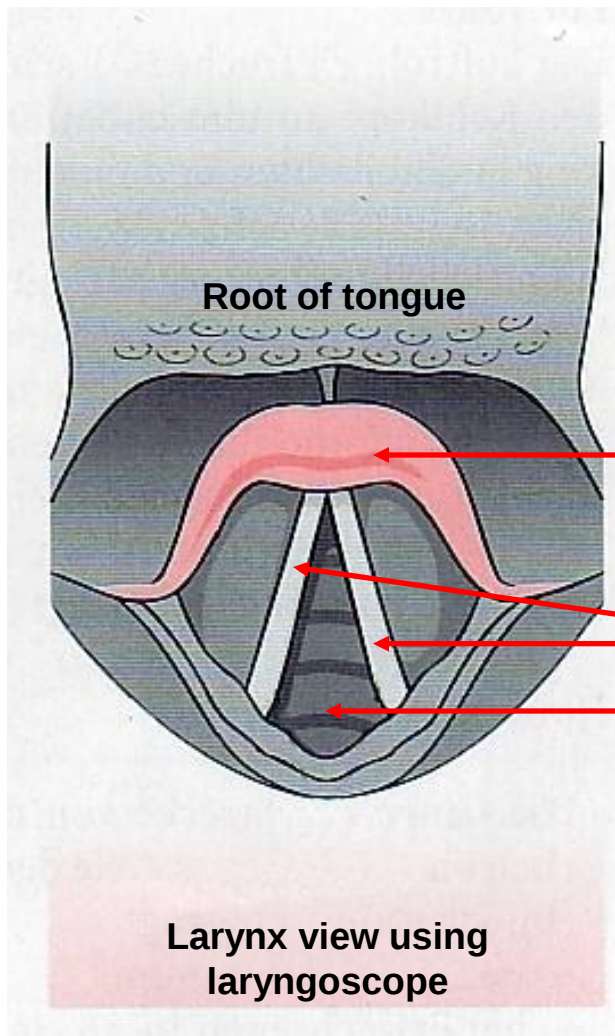
cartilage ring



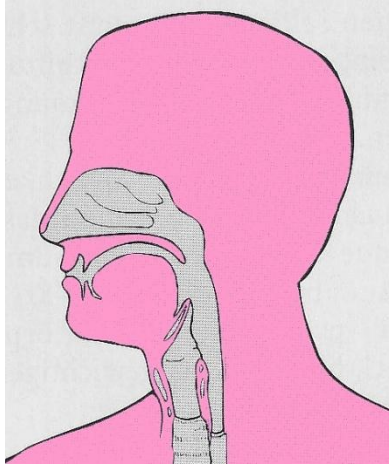
b
a
c
k

Larynx – side view

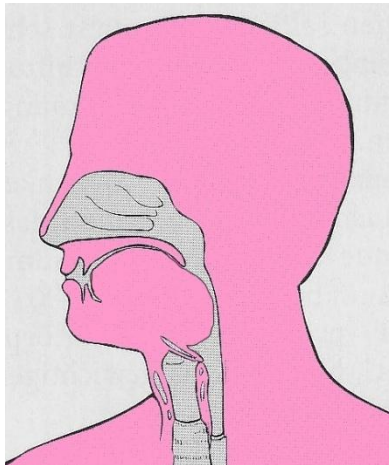
Lower airways



Lower airways

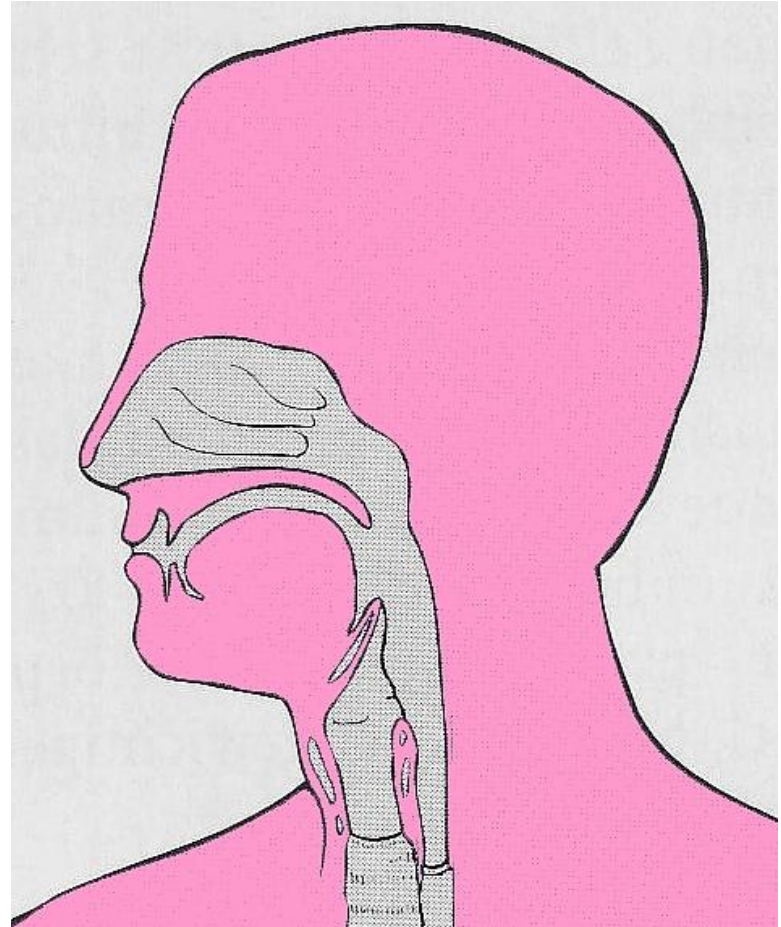


Normal condition:
Open airways for breathing

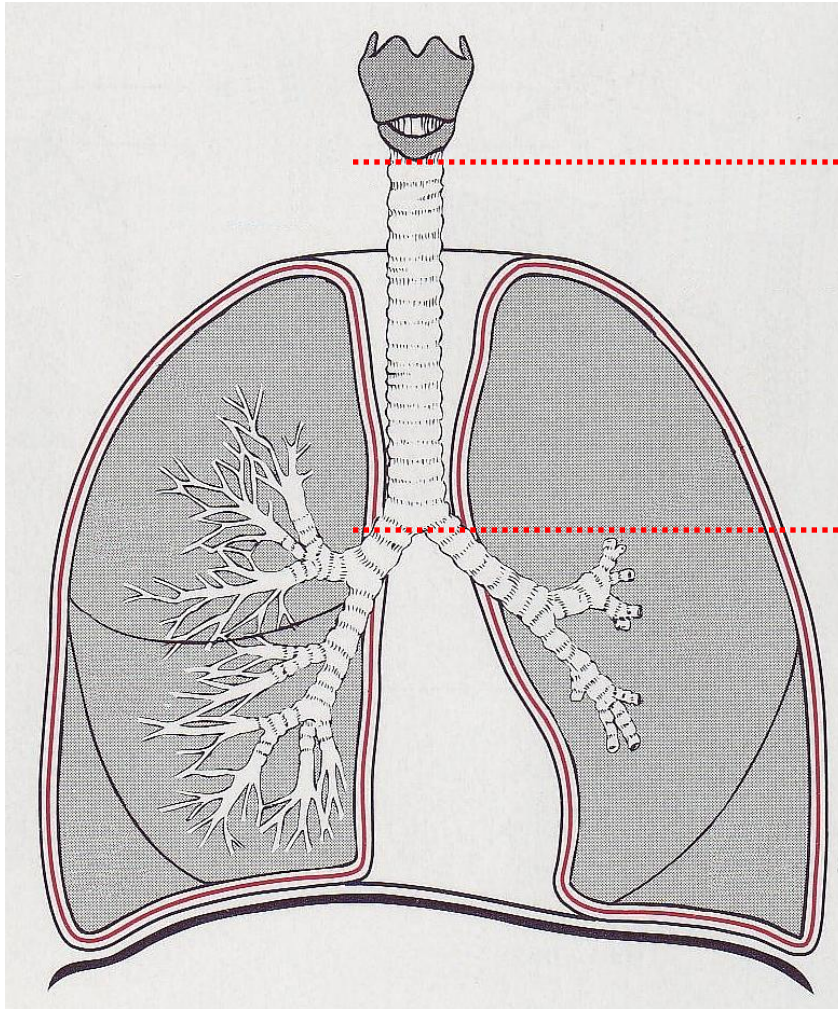


Special situation:
Airways closed by the
epiglottis while swallowing
food or beverages

Animation: Larynx while swallowing

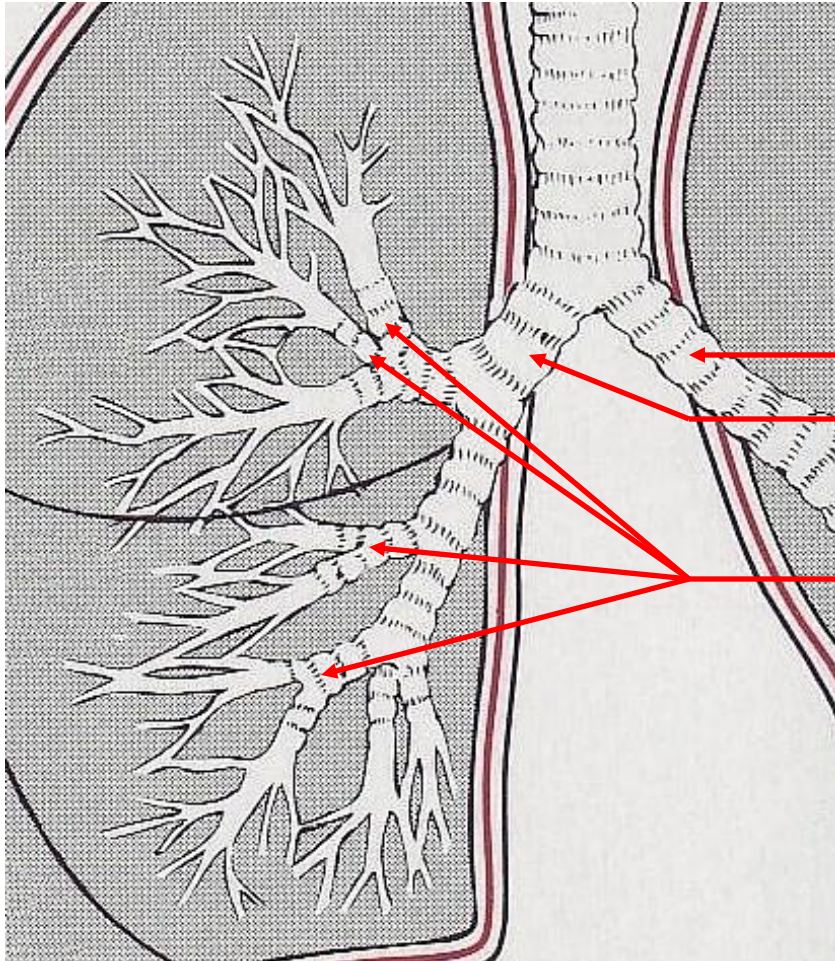


Trachea



- Trachea consists of elastic tissue
- Length, adult = 10-16 cm
- Length, child = 3.5 – 8 cm
- Inner diameter = 1,5 – 3 cm
- The inner mucous membrane consist of ciliated epithelium

Bronchial tree

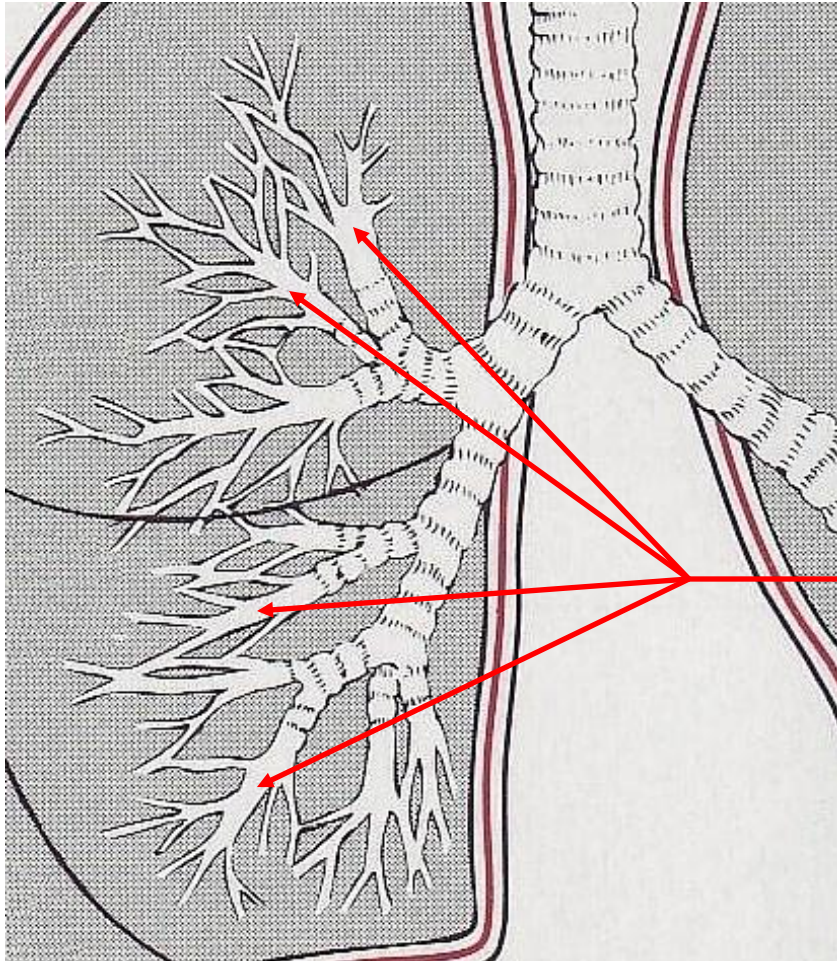


Left main bronchus

Right main
bronchus

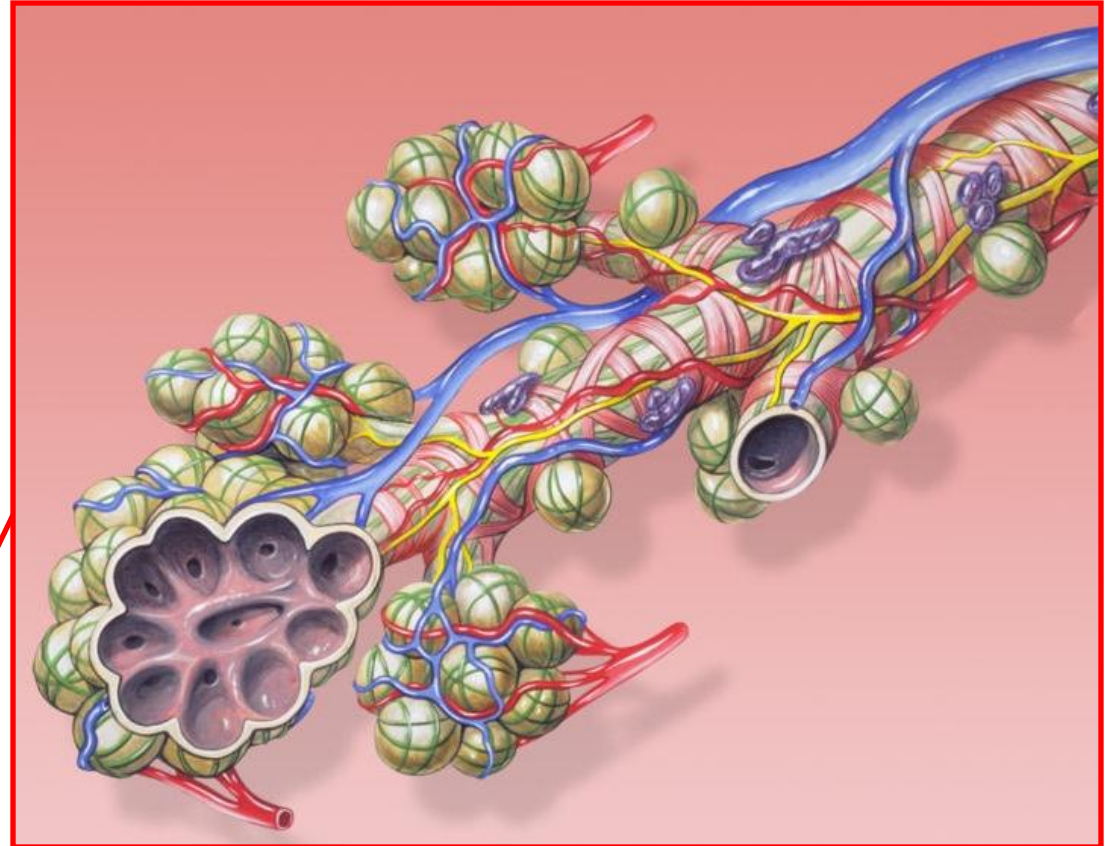
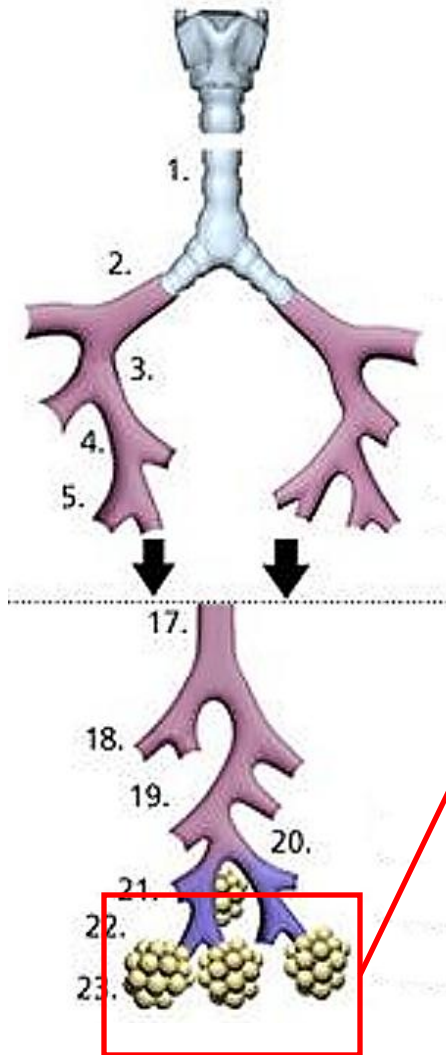
Bronchus

Bronchioles

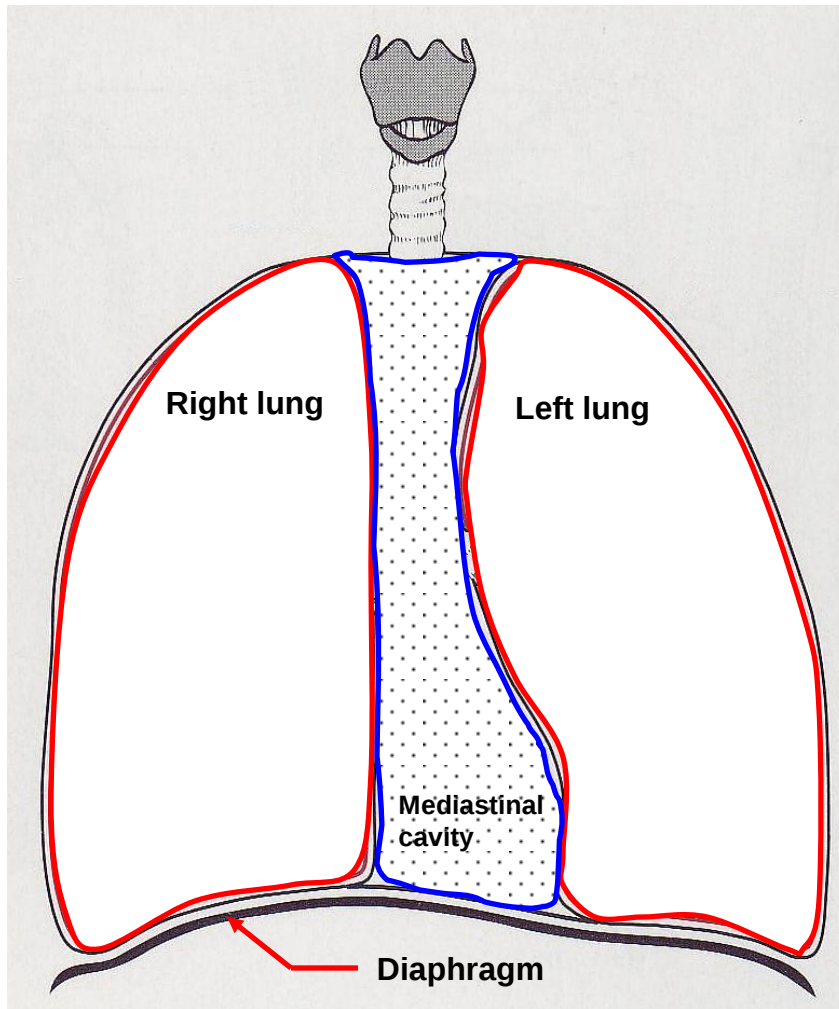


Bronchioles

Alveoles



Lung



The lung is divided in two halves:

- the right lung
- the left lung

Both lungs have their own cavity:

- the right lung in the right pleural cavity
- the left lung in the left pleural cavity
- the 2 cavities are separated from each other by a 3rd cavity called mediastinum

GENERAL:

QUESTION:

Which main organ do we find in the mediastinal cavity?

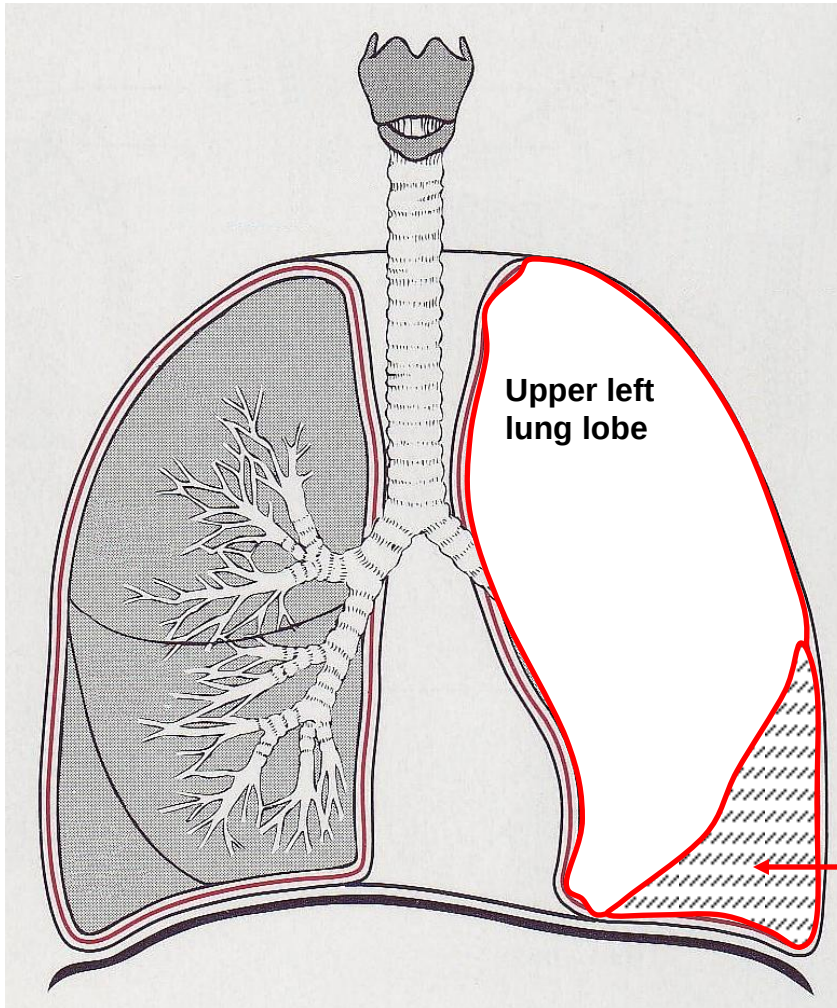
GENERAL:

QUESTION:

Which main organ do we find in the mediastinal cavity?

The Heart

The left lung

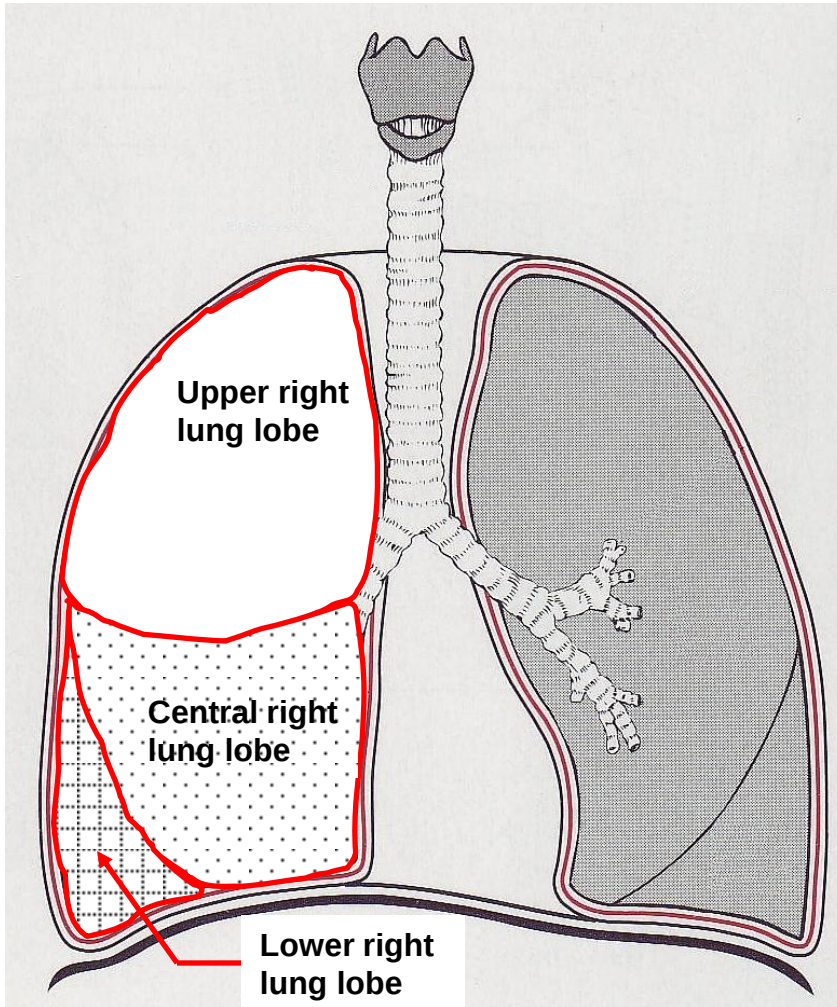


The **left** lung is divided in **2** lobes:

- the upper left lobe
- the lower left lobe

Lower left
lung lobe

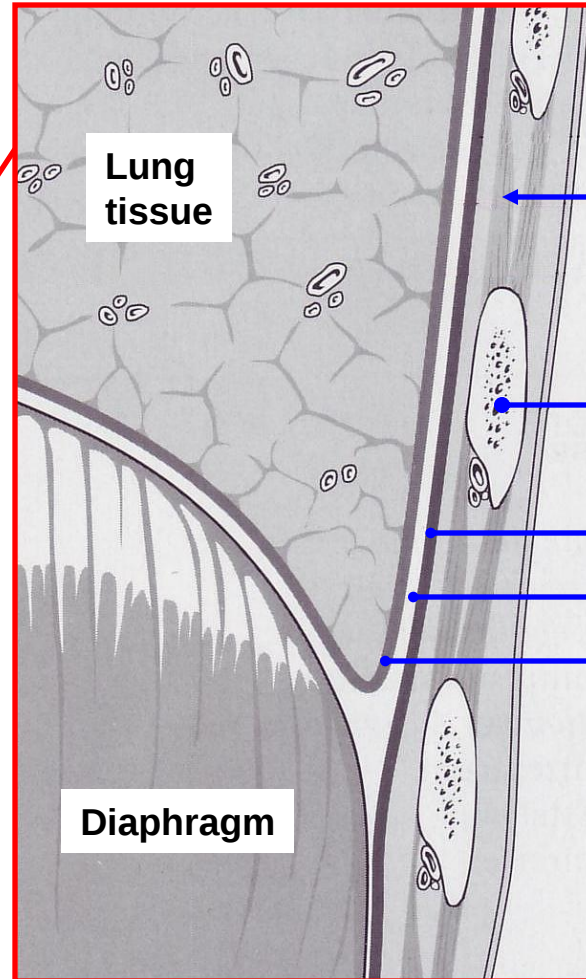
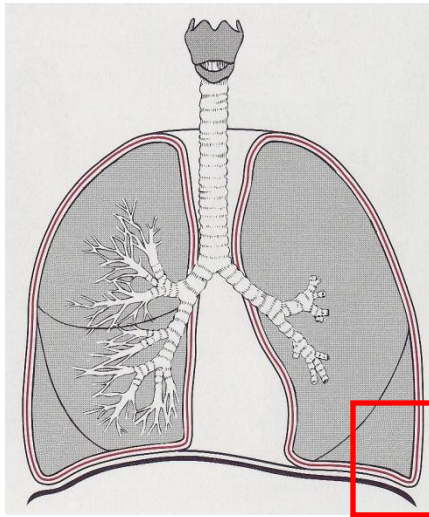
The right lung



The **right** lung is divided in **3** lobes:

- the upper right lung lobe
- the central right lung lobe
- the lower right lung lobe

Lung



Intercostal space with
intercostal muscles

Rib

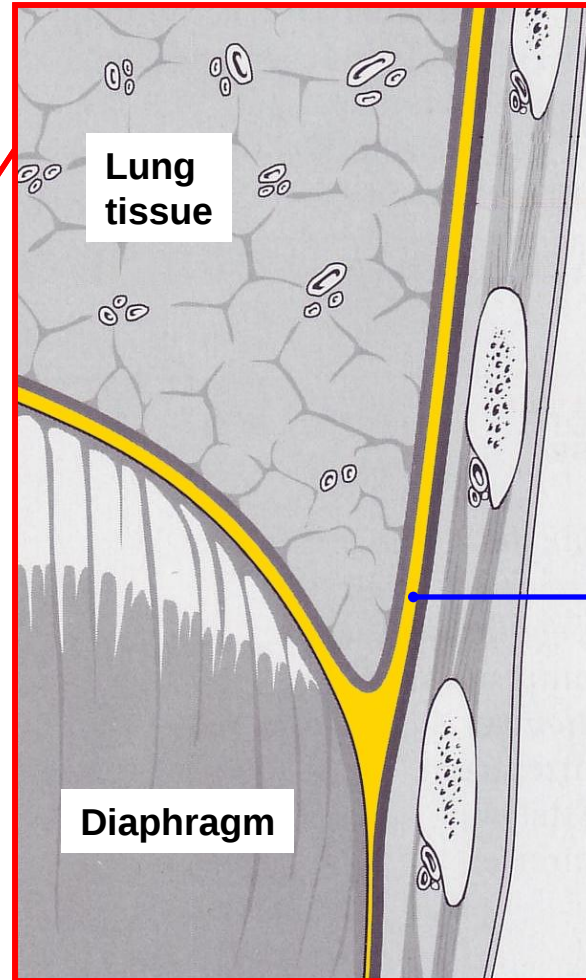
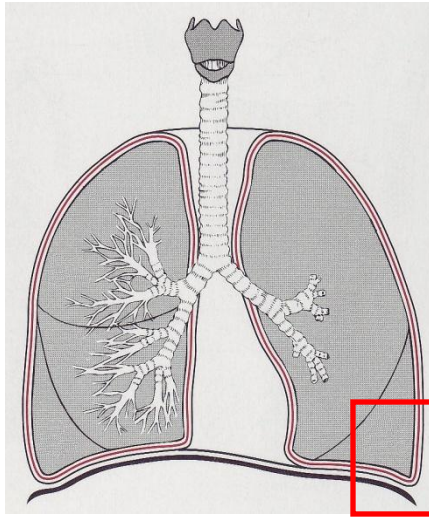
Costal pleura

Pleural cavity

Pleura

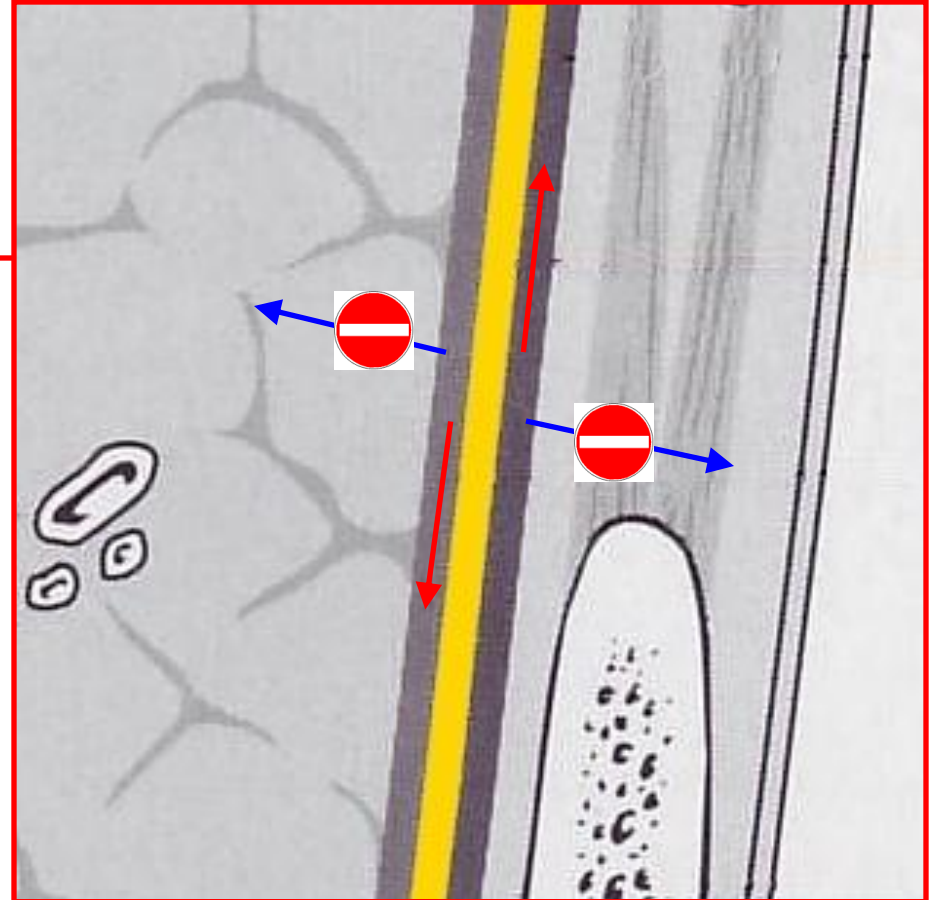
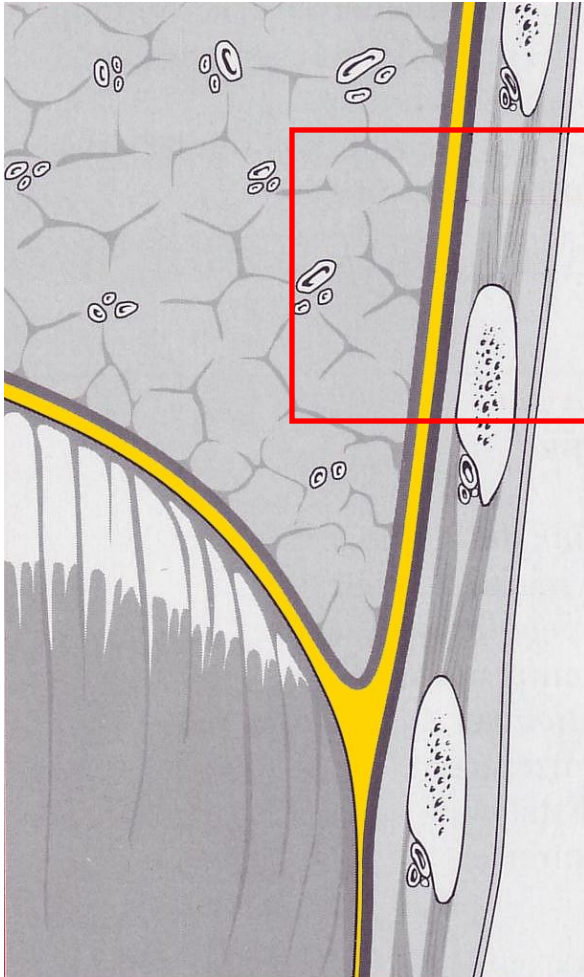
Diaphragm

Lung

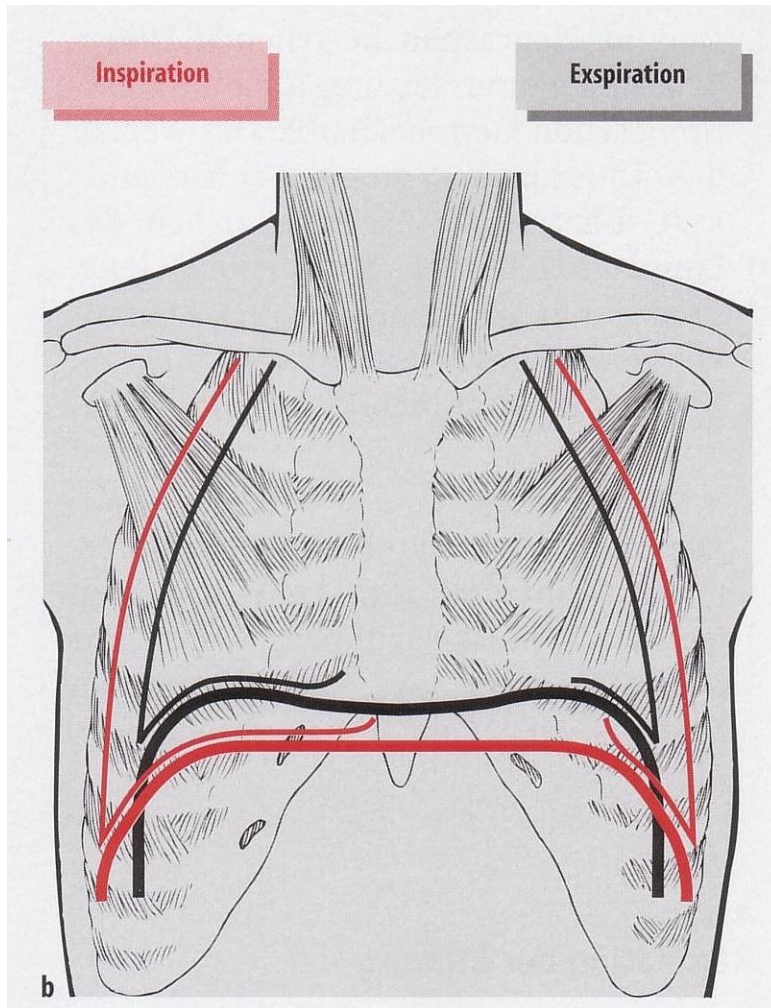


Pleural cavity filled
with a secretion

Lung



Mechanic of respiration



The 2 phases of respiration:

- Expiration
- Inspiration

are caused by maximizing and minimizing the volume of the left and right lung cavities.

GENERAL:

QUESTION:

Which phase of a normal respiratory cycle is active? Inspiration or expiration?

Which phase of a normal respiratory cycle is passive? Inspiration or expiration?

GENERAL:

QUESTION:

Which phase of a normal respiratory cycle is active?

Inspiration

Which phase of a normal respiratory cycle is passive?

expiration

Thank you for your attention!