

# Symptoms of respiratory system diseases



# Physical examination

## 1. General inspection

Cyanosis (diffuse, warm) – respiratory failure

Hyperemia of the face and upper half of the body – lung emphysema (EL)

Earthy color skin, dry skin – chronic bronchitis (CB)

Symptom of “drumsticks and watch glasses” – chronic hypoxia (CB and EL)

Smoker's tongue, smoker's fingers - (CB and EL)

Neck veins distension, ascites, edema in the legs - cor pulmonale (right ventricular failure)

## 2. Examination of the chest

- 1) The shape of the chest normal (asthenic, normo- and hypersthenic) pathological (emphysematous, paralytic, keeled, funnel-shaped, deformed with curvature of the spine)
- 2) Symmetry (determined visually or with a measuring tape):
  - asymmetry due to an increase in one half – hydrothorax (HT), pneumothorax (PT)
  - asymmetry due to a decrease in one half - pleural adhesions, atelectasis, removal of part of the lung
- 3) Participation of both halves of the chest in the act of breathing.

One part doesn't participate – pleural pain, PT, after resection (surgery)



4) The position of the clavicles, supra- and subclavian fossae, the state of the intercostal spaces:

bilateral smoothness or bulging of pits and intercostal spaces - EL

unilateral smoothness of intercostal spaces - PT, HT

5) Respiratory rate (norm 16-20 per minute).

An increase in respiratory rate is a sign of damage to the bronchopulmonary system (not only) .

6) Type of breath, normal types: abdominal, thoracic, mixed, pathological types (distinguished based on the rhythm and depth of breathing)



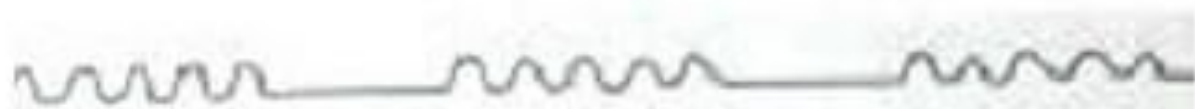
normal breath



**Breath of Cheyne-Stokes**



***RI* breath of Kussmaul**



# 3. Palpation of the chest

## Objectives

1. Assess pain
2. Determine the resistance of the chest
3. Study the phenomenon of voice vibration

# Voice vibration

- *palpation sensation of chest vibration when pronouncing individual words containing the sound R-R (tractor)*

It is evaluated on symmetrical areas of the chest, starting from the front and top.

Conducting voice vibration depends on the timbre of the voice, gender, chest thickness.

Voice vibration **symmetrically weakened** - EL, obesity

**locally weakened** - HT, PT, obstructive atelectasis

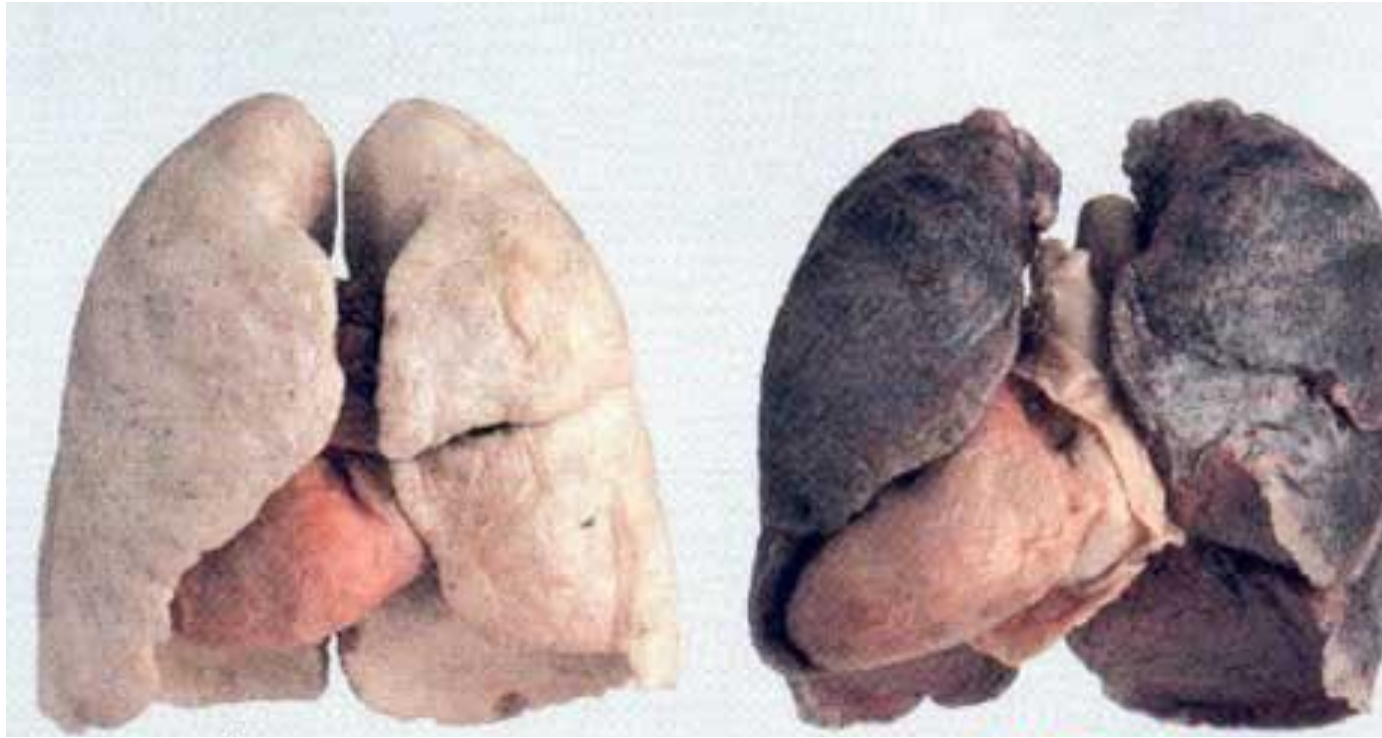
**local enhancement** - compaction of lung tissue

(pneumonia, tumor, compression atelectasis)



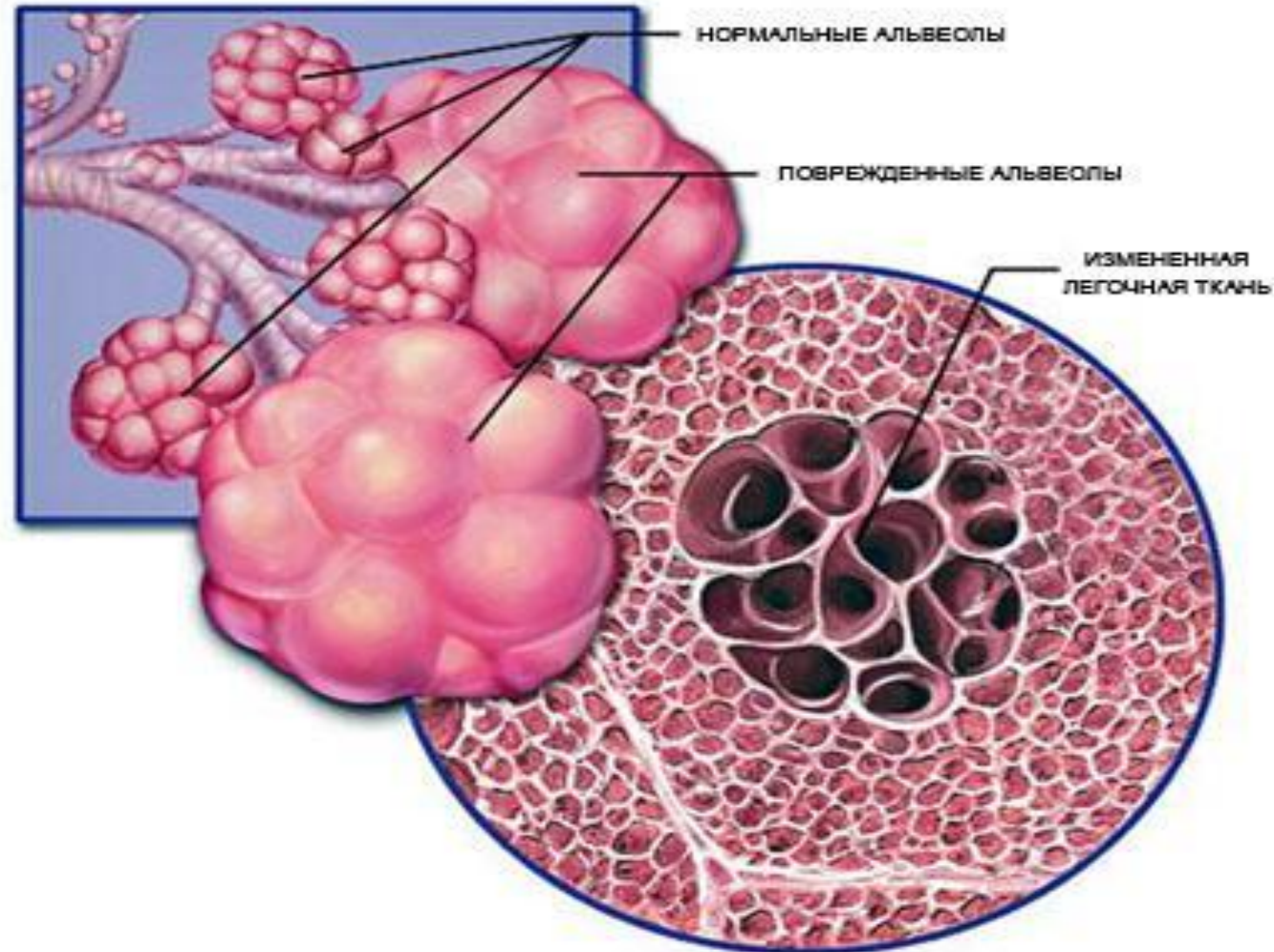


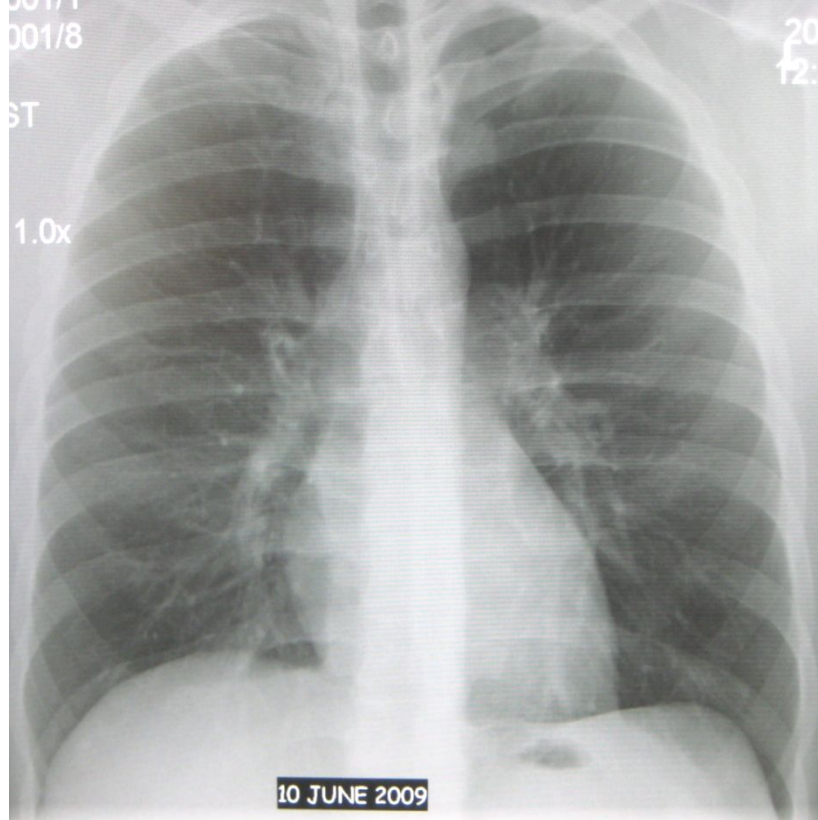
# Basic pathology of the lung



# Pulmonary emphysema / Эмфизема легких

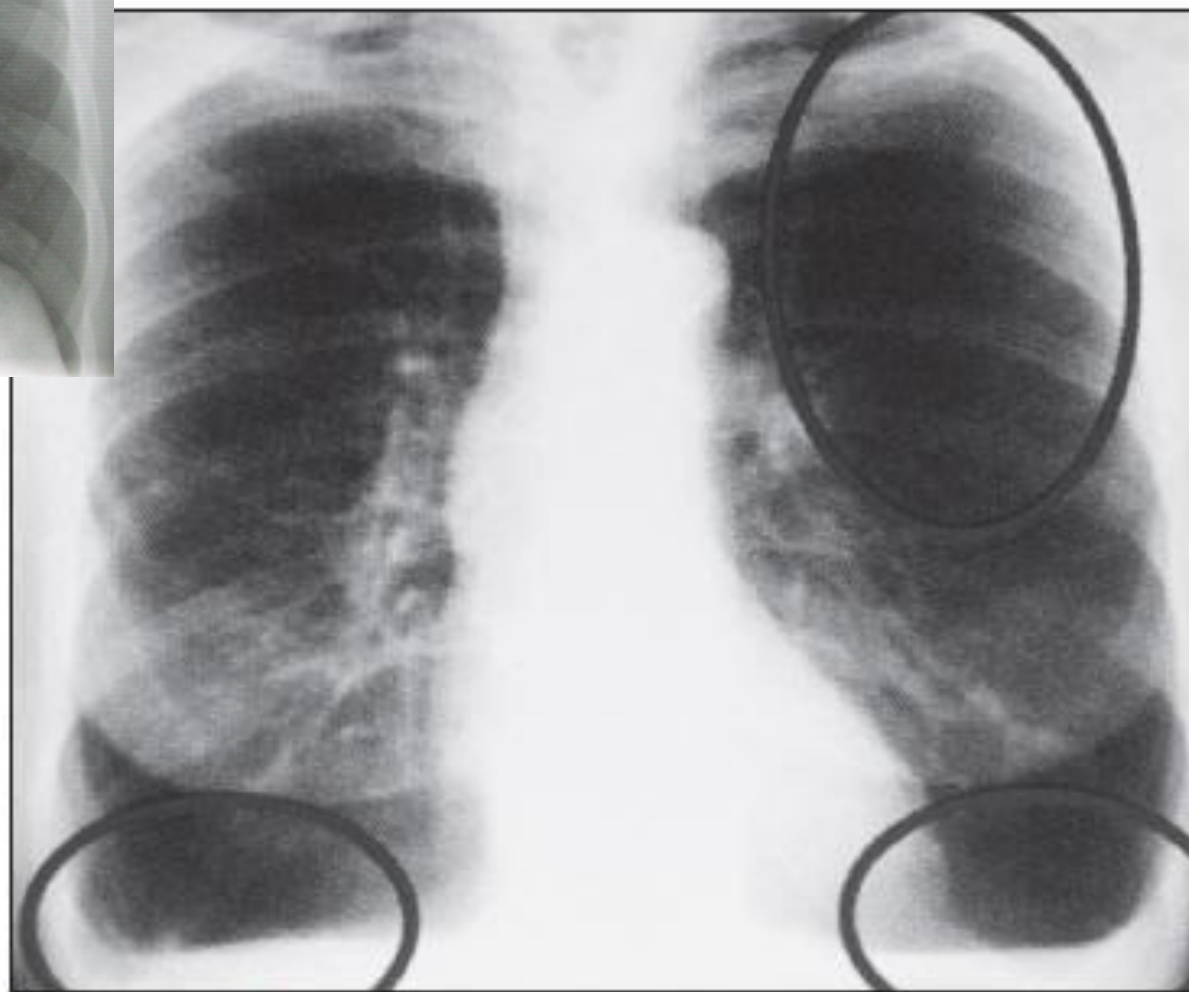
- increased airiness of the lungs





Норма

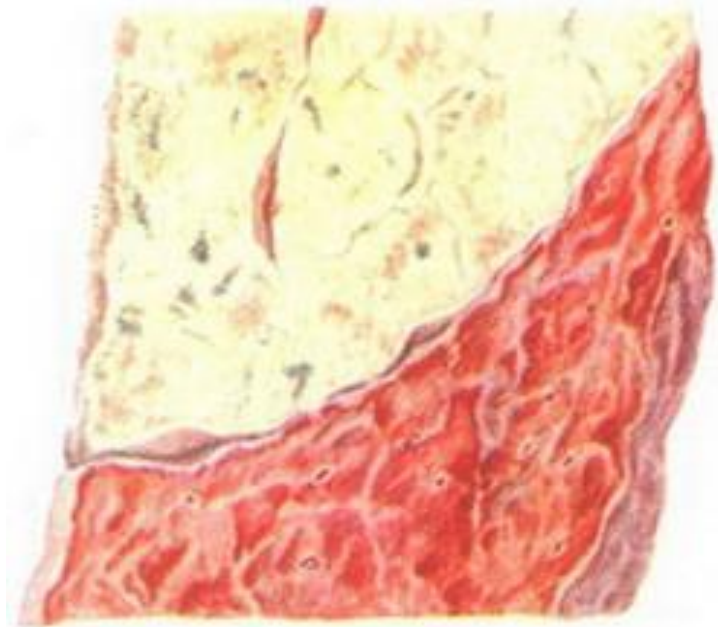
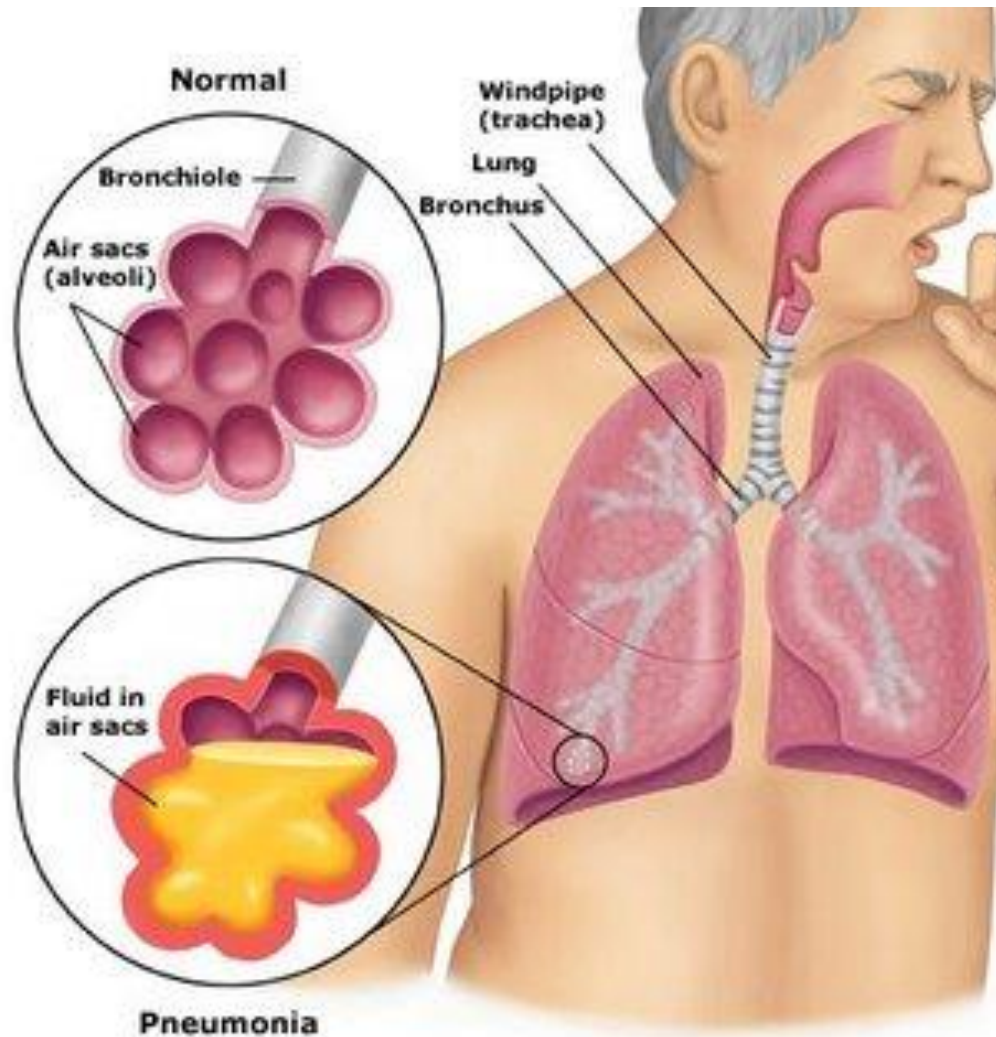
Эмфизема





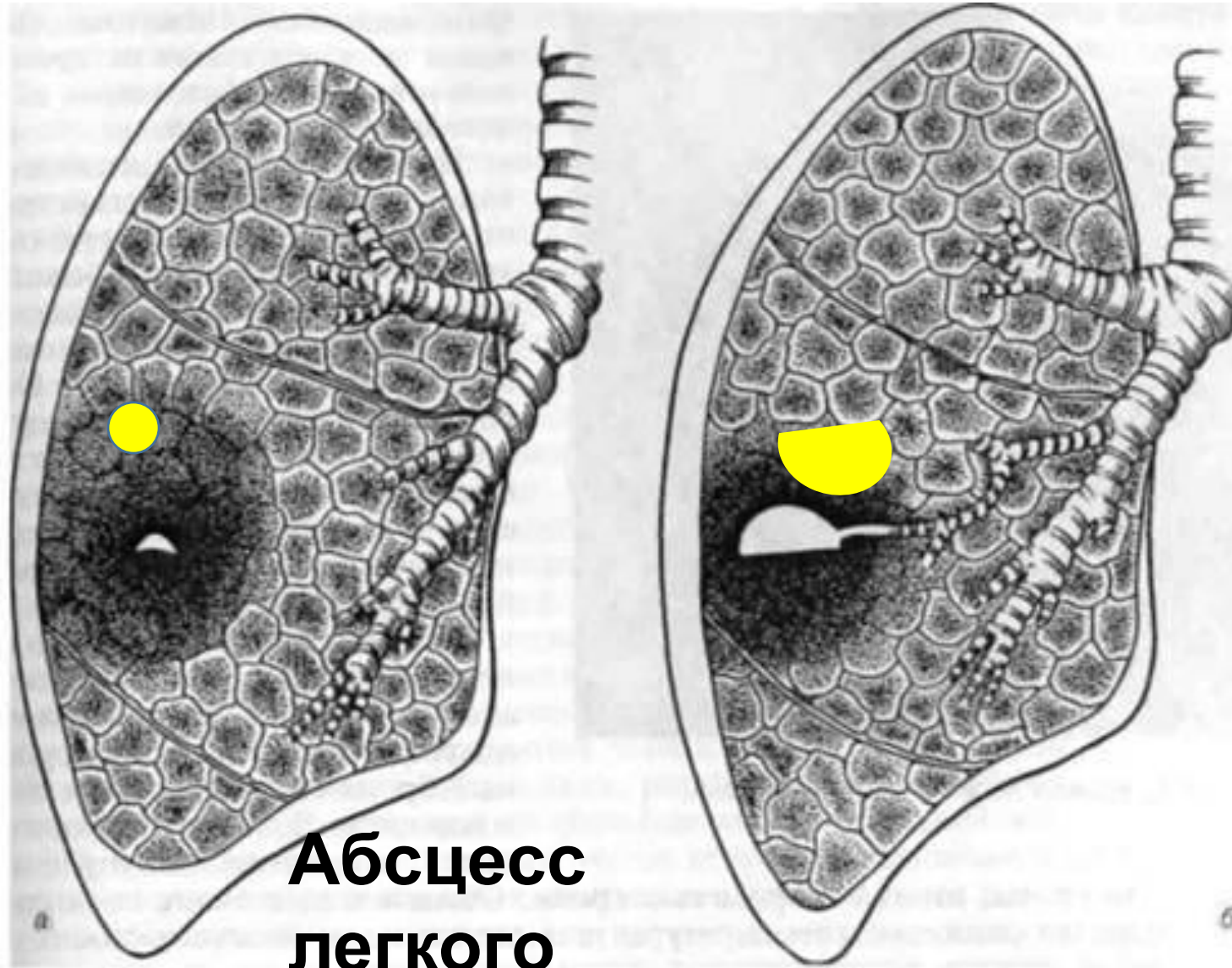
# Pneumonia

-acute infection of respiratory part



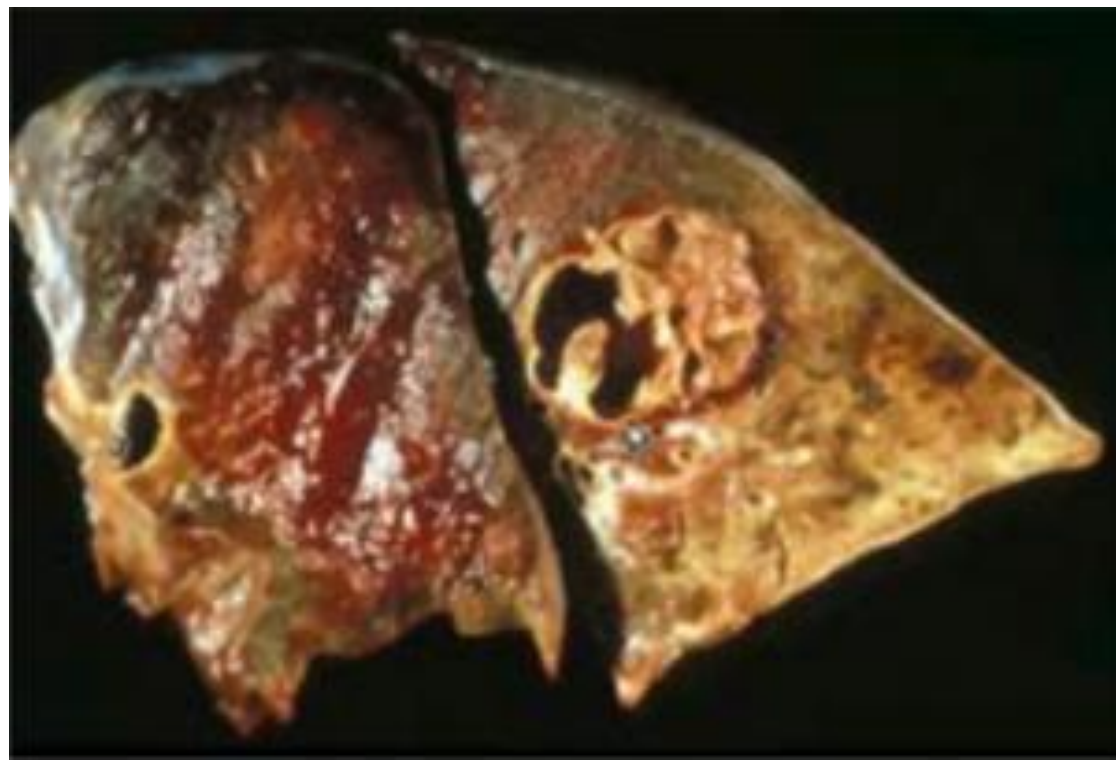


# Abscess

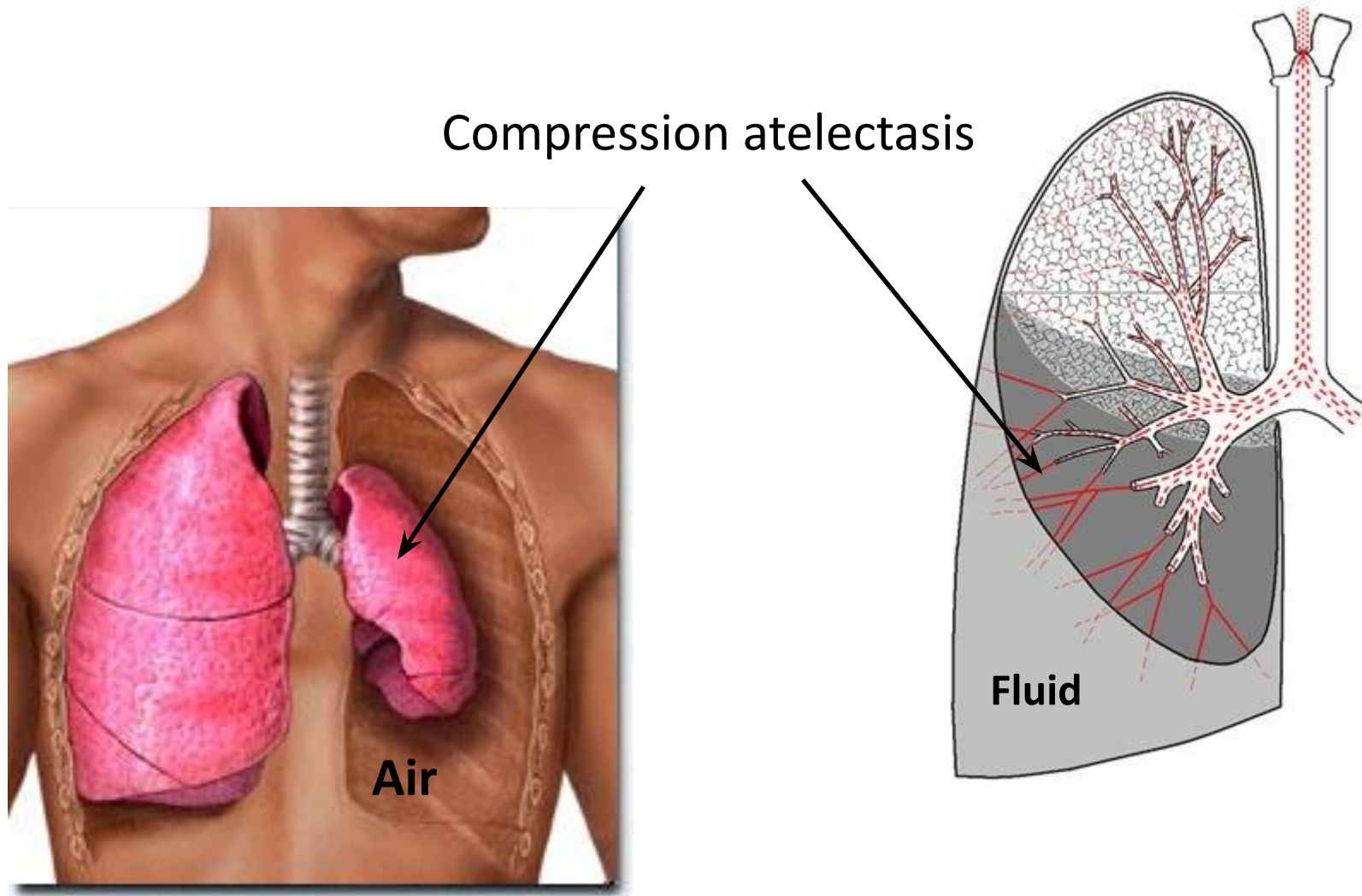


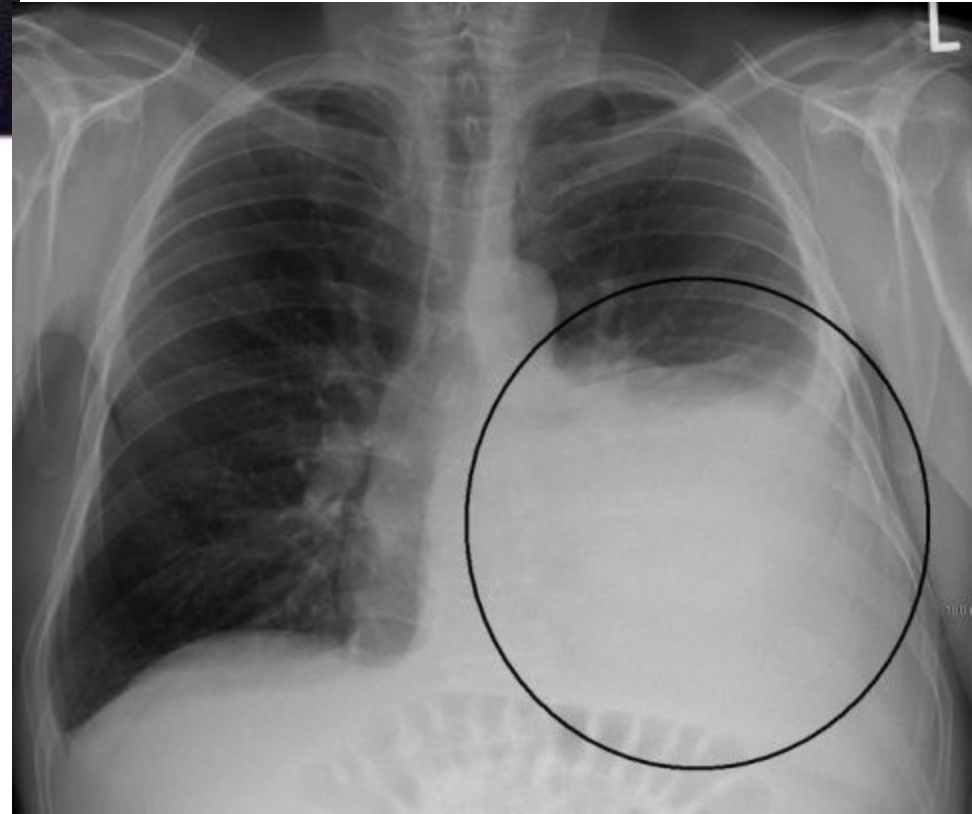
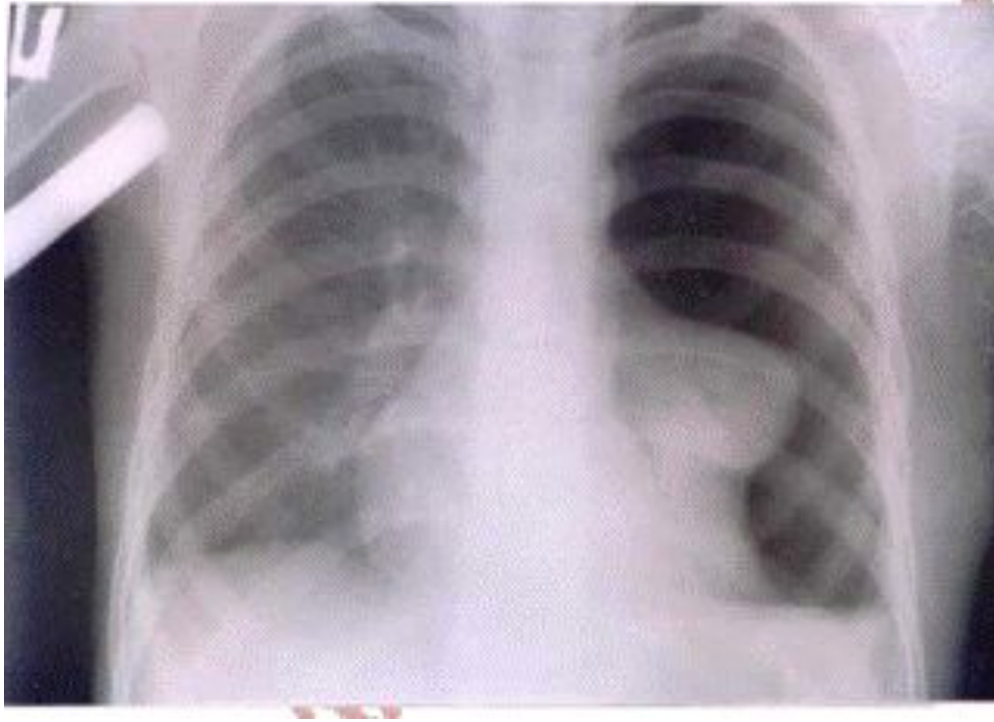




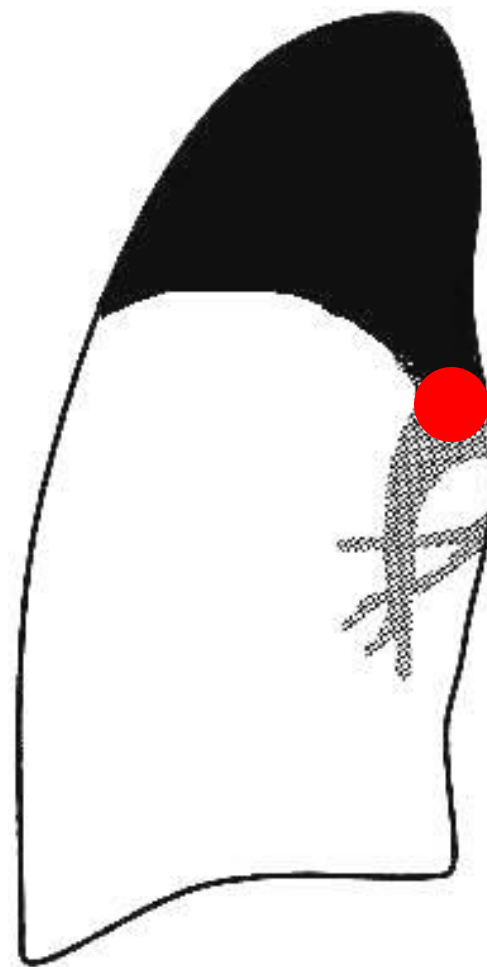


# Atelectasis - loss of airiness of the lung tissue



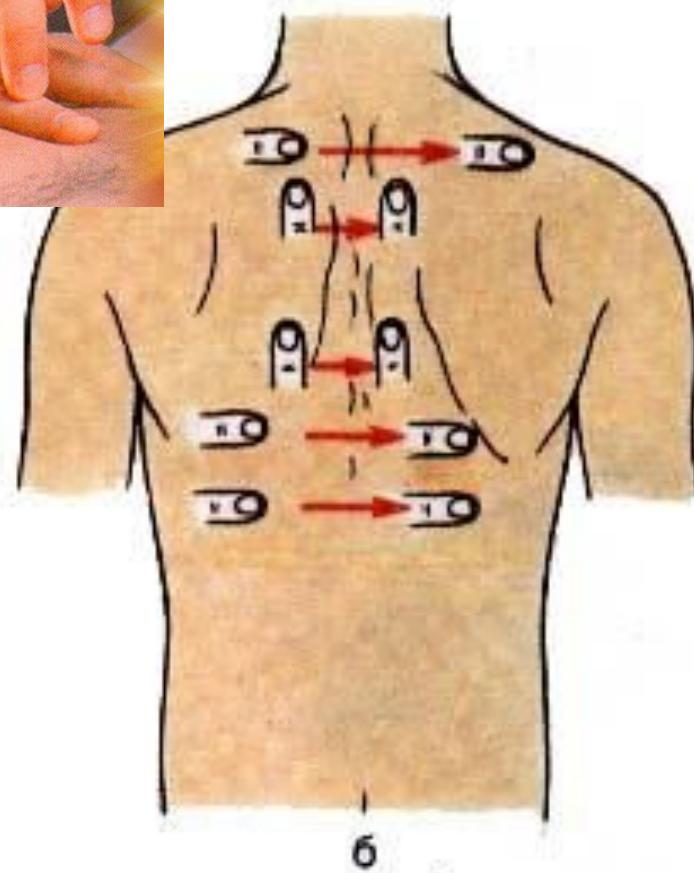
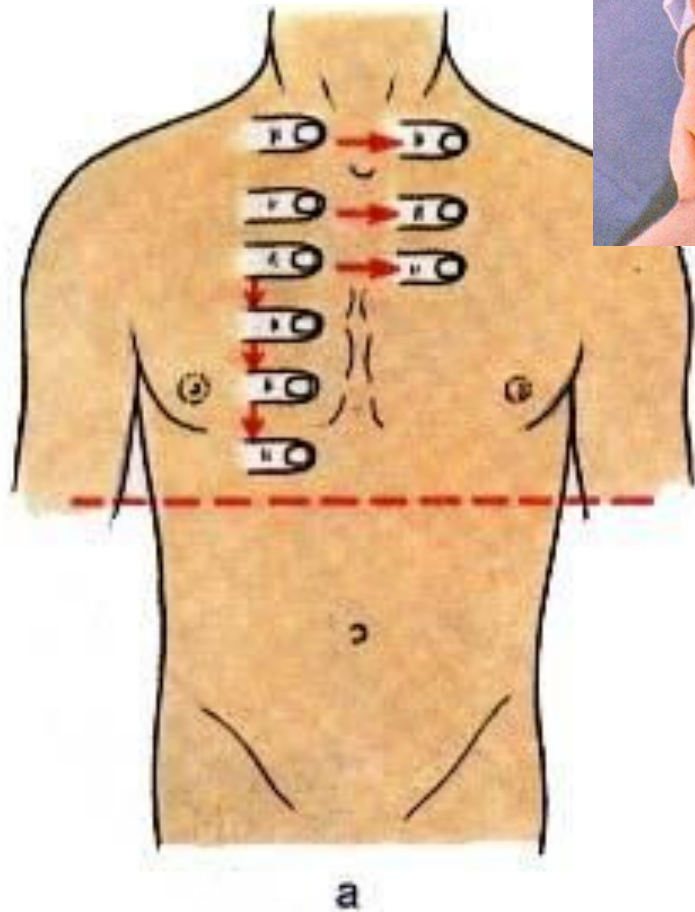


# Obstructive atelectasis





# Percussion of the lung



## Comparative Percussion:

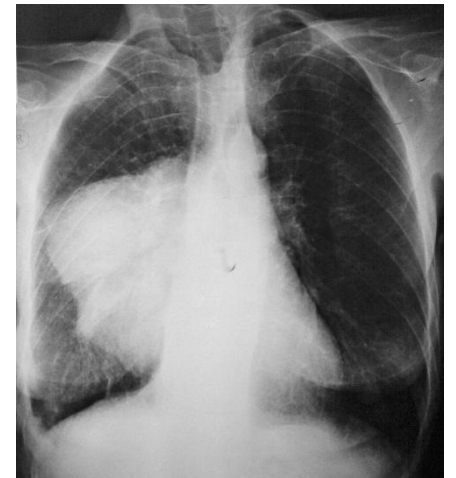
**Dullness** or shortening of the percussion sound occurs when the lung tissue is compacted or there is fluid in the pleural cavity.

**Total dullness** – obesity local unilateral dullness - pneumonia, hydrothorax, atelectasis

**Tympanitis** occurs when the airiness of the lung tissue increases.

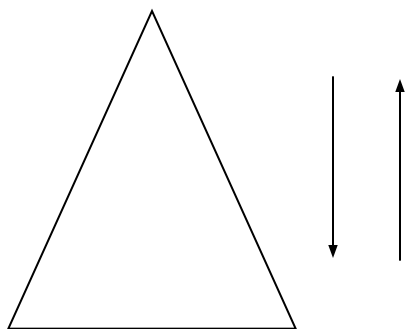
**Symmetrical tympanitis** – EL

**Local unilateral tympanitis** - cavity in the lungs, pneumothorax

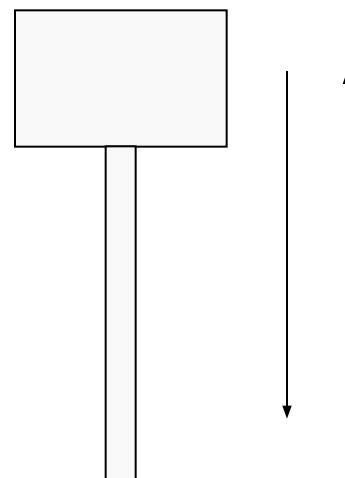


# Symbols

Voice vibration

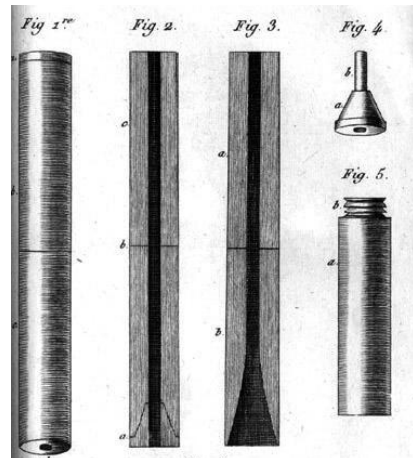


Percussion tone



# Lung auscultation

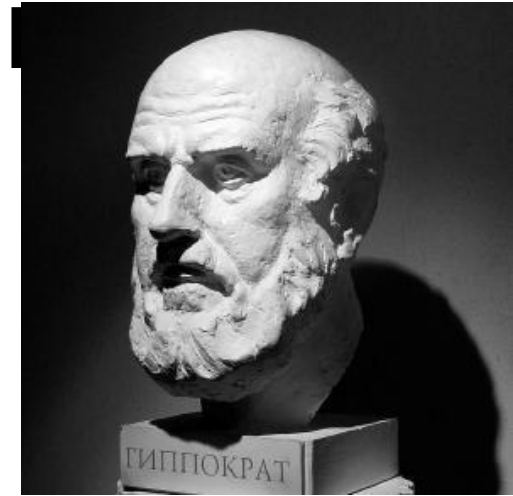
# АУСКУЛЬТАЦИЯ ЛЕГКИХ





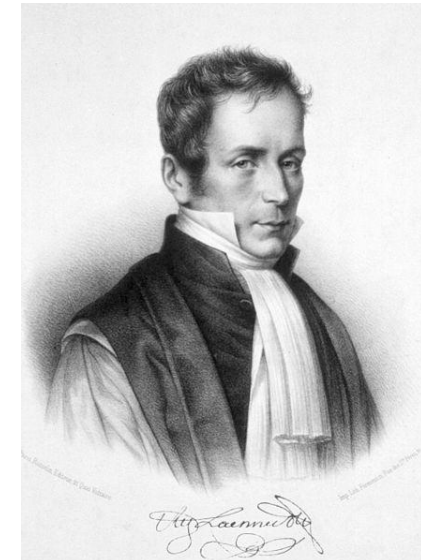
# History /История аускультации

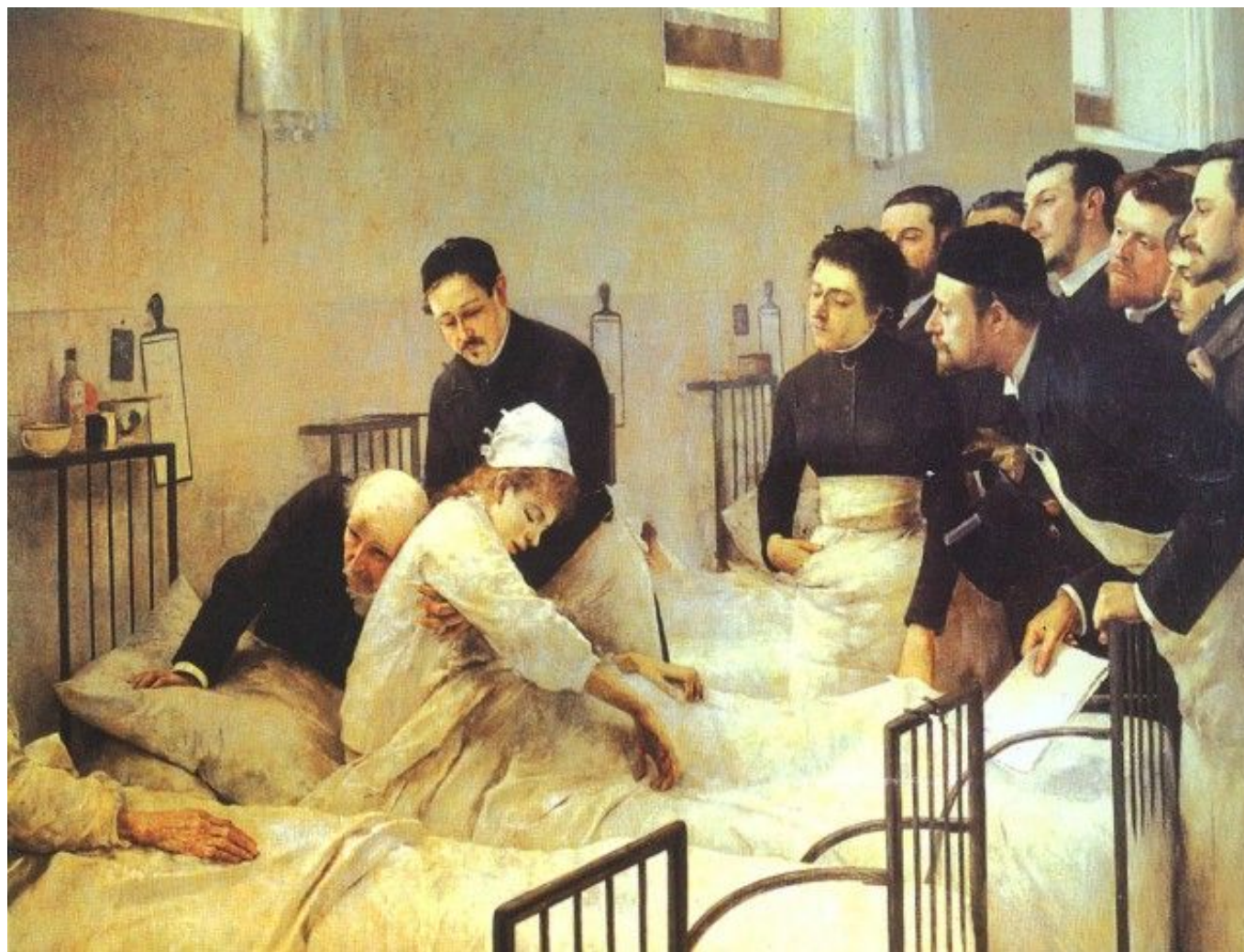
**Hippocrates / Гиппократ** –  
непосредственная аускультация ухом



**René-Théophile-Hyacinthe Laennec**<sup>1</sup> (1781–1826) was a French physician and musician. His skill of carving his own wooden flutes led him to invent the stethoscope in 1816.

He pioneered its usage in diagnosing various chest conditions.







# Conditions for auscultation/ Условия проведения аускультации

The patient in a sitting or standing position, breathing through the mouth, listen to 1-2 respiratory movements at one point. The doctor asks to breathe a little deeper, but not forcedly, and not too often. The sequence is like percussion.

/

больной в положении сидя или стоя, дыхание ртом, выслушивают 1-2 дыхательных движения в одной точке. Просят дышать чуть глубже, но не форсированно, и не слишком часто. Последовательность - как при перкуссии.

# Purposes / Цели аускультации



1. Recognize the basic breath sound /  
оценить основной дыхательный шум
2. Recognize adventitious (additional) breath sounds/  
оценить наличие побочных дыхательных шумов
3. Check the voice conduction (bronchophony) / оценить  
проведение голоса на грудную стенку

# Basic breath sounds

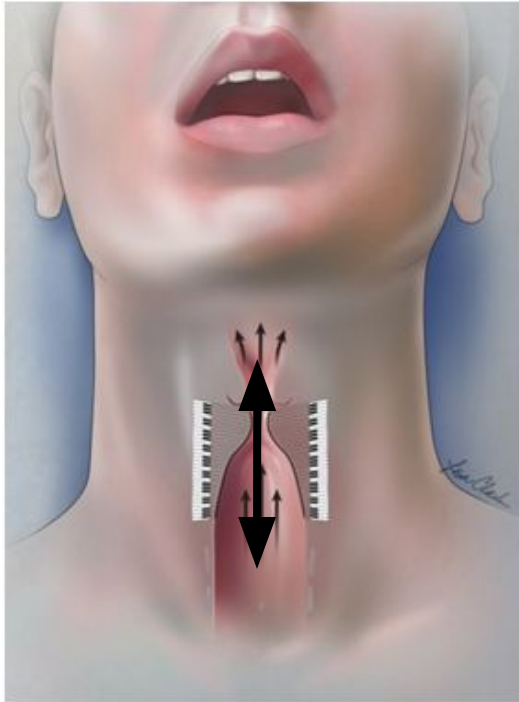
For lungs normal sound – **vesicular sounds**

Origin: 1 step: sound is generated when air passes through the glottis of the larynx and trachea

We can hear rough noise like: **h-h-h-h-h** larynx/грубый шум

2 step: in the lungs, this noise is softened by air in the alveoli  
**f-f-f-f-f-f**





Laryngotracheal  
sounds

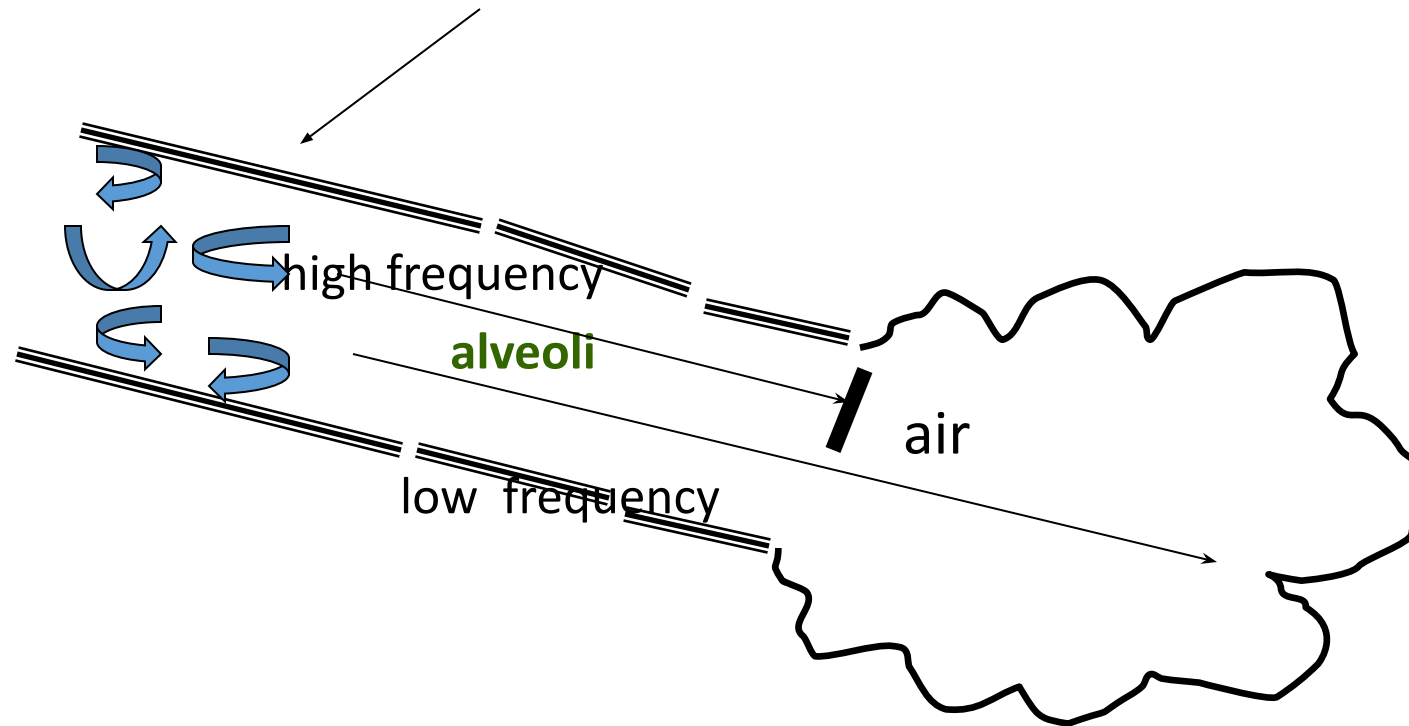
→ Vesicular sounds



# Vesicular sounds / Везикулярное дыхание

Mechanism / Механизм образования:

*Larynx, trachea* – rough turbulent noise / грубый тубулярный шум

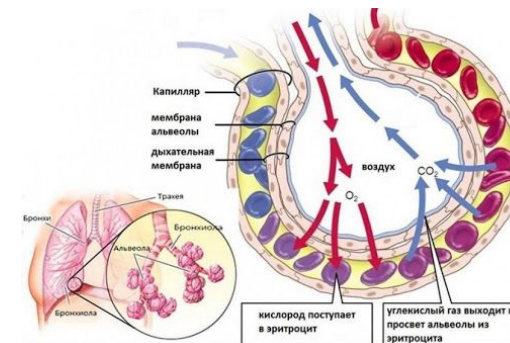
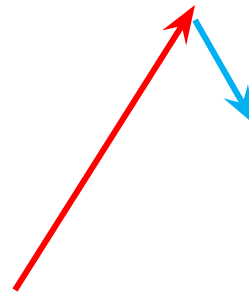
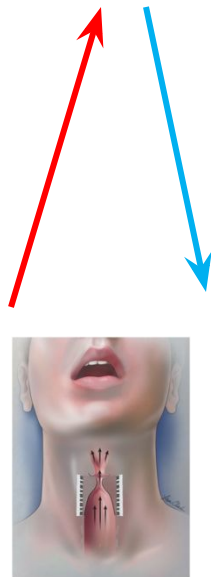




Vesicular sounds - normal for the lungs auscultation

Laryngotracheal sounds – normal for the ....

But it's sign of pathology if you hear this sound over lungs



# Auscultation depends on:

1. Upper respiratory tracts condition
2. Bronchial condition (patency)
3. Status alveoli
4. Condition of the interstitium
5. Pleural condition

# Evaluation of the vesicular sound

Vesicular breath sounds are soft and low pitched with a rustling quality during inspiration and are even softer during expiration. These are the most commonly auscultated breath sounds, normally heard over most of the lung surface.

They have an inspiration/expiratory ratio of 3 to 1 or I:E of 3:1.

# Evaluation of the vesicular sounds

Attenuation / Ослабление

A. Diffuse / Диффузное

Reasons: - hyperinflation / эмфизема легких

- obesity / ожирение

- shallow breathing / поверхностное дыхание

B. Local

Reasons: : - obturation of the bronchus / обтурация бронха

- HT and PT

# Laryngotracheal sounds

! Pathological laryngotracheal sound always local

- Reason – consolidation of lung tissue due to filling of alveoli with exudate or their compression (pneumonia, hydrothorax with compression atelectasis)
- Amphoric sound is a variety of laryngotracheal sound

Reason - lung cavity connected with bronchus

# Adventitious (additional) breathing sounds / Дополнительные дыхательные шумы

## Crackles

- **Fine crackles** are brief, discontinuous, popping lung sounds that are high-pitched. Fine crackles are also similar to the sound of wood burning in a fireplace, or hook and loop fasteners being pulled apart or cellophane being crumpled.

Late inspiratory crackles (fine) may mean pneumonia, CHF, or atelectasis.

# Adventitious breath sounds

- **Coarse crackles**

are discontinuous, brief, popping lung sounds. Compared to fine crackles they are louder, lower in pitch and last longer. They have also been described as a bubbling sound.

Early inspiratory and expiratory crackles (usually coarse) are the hallmark of chronic bronchitis. A patient's cough may decrease or clear these lung sounds.

Early inspiratory crackles suggest decreased FEV1 capacity and are characteristic of COPD.

# Adventitious breath sounds

## Wheezes

are lung sounds that are continuous with a musical quality. Wheezes can be high or low pitched.

- High pitched wheezes may have an auscultation sound similar to squeaking (писк).
- Lower pitched wheezes have a snoring (храп)

Origin- airway vibration in the place of **obstruction**

The proportion of the respiratory cycle occupied by the wheeze roughly corresponds to the degree of airway obstruction.



# Adventitious breath sounds

- Monophonic **wheezes** (rhonchi) are loud, continuous sounds occurring in inspiration, expiration or throughout the respiratory cycle.

The constant pitch of these sounds creates a musical tone. The tone is lower in pitch compared to other adventitious breath sounds. The single tone suggests the narrowing of a larger airway.

# Adventitious breathing sounds

- Polyphonic **wheezes** are loud, musical and continuous. These breath sounds occur in expiration and inspiration and are heard over anterior, posterior and lateral chest walls. These sounds are associated with COPD and more severe asthma.

# Pleural rubs

- are discontinuous or continuous, creaking sounds.

The sound has been described as similar to walking on fresh snow or a leather-on-leather type of sound.

Coughing will not alter the sound.

They are produced because two inflamed surfaces are sliding by one another, such as in pleurisy.

- Pleural rubs stop when the patient holds her breath. If the rubbing sound continues while the patient holds a breath, it may be a pericardial friction rub.

# Bronchophony

- Ask the patient to say "99" several times while auscultating the chest walls. Over healthy lung areas, "99" is not understandable. This is because sound is impeded in normal lungs.

Over consolidated areas "99" is understandable

- Egophony: ask the patient to say "Eeee" several times and auscultate the chest walls. Over healthy lung areas, the sound is understandable as an "E". Over consolidated lung areas, the sound is heard as an "A" (aaay).

# Internet sources

- <https://www.practicalclinicalskills.com/rales>
- <https://www.easyauscultation.com/course-contents?courseid=201>
- <https://www.youtube.com/watch?v=tEHnZpWQAbM>