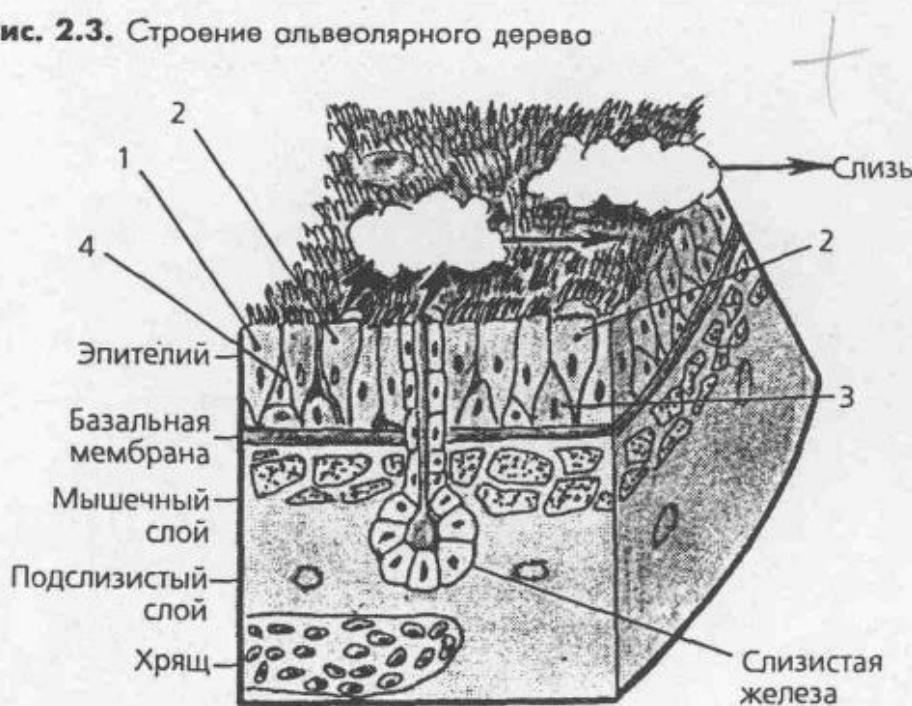


**CLINICAL PICTURE OF PNEUMONIA,
BRONCHIAL ASTHMA, PLEURISY. ADDITIONAL
RESEARCH METHODS**

Odessa National Medical University
Department of propaedeutics of internal
diseases

Рис. 2.3. Строение альвеолярного дерева



Mucociliar barrier

Ciliar epithelium

Secret of goblet, mucus cells -100ml/24 h,

Has lysozym, interferon, lactoferin

Normal function depend of temperature, concentration of oxygen, pH.

Immunological defense

- Secretory globulin A (SIgA) - product of bronchial plasmatic cells
- SIgA - present into main and big bronchi. Agglutination of bacteria, neutralization of toxins and viruses
- Prevent adhesion of microbes to bronchial wall,
- IgG – peripheral area of lungs

Alveolar macrophages, neutrophils

- Absorption and elimination of bacteria
- Phagocytosis and elimination of microbes

Syndrome of pulmonary consolidation

Significant decrease or exactly airless of pulmonary tissue of some part of lung

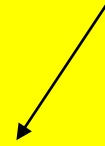
Inflammatory infiltration

No inflammatory infiltration



Pneumonia

Tbc infiltration



Pulmonary infarction

C-r, Atelectasis

Hypoventilation



Congestive heart insufficiency

Pneumonia-acute respiratory disease with focal consolidation and X-ray darkening, which before was absent and has not another reasons for its arising and obligatory presence of inflammatory intraalveolar exudation

Risk factors:

- Age (children, old people)
- Smoking
- Chronic diseases of lungs, heart, kidneys, gastrointestinal tract
- Immunodeficiency
- Contact with animals, birds
- Journey (trains, station, hotel, etc.)
- Overcooling

Classification of pneumonia

- Community acquired
- Hospital acquired
- Other

- Focal
- Lobar

Classification of pneumonia

Now adhere to etiopathogenetic classification

1. An out hospital pneumonia (**community acquired**) - makes the majority of pneumonia.

The diagnosis is put in case the patient was ill at home.

2. Intrahospital (**nosocomial** or **hospital acquired**) pneumonia. The reason - endogenous infection, pneumonia is diagnosed, at least, in 48 hours after admission to a hospital.

3. **An aspiratory** pneumonia (aspiration of gastric contents and flora, only not the petrol)

4. A pneumonia of persons with heavy defects of immunity (a congenital immunodeficiency, a HIV-infection etc.).

Causes

- **Viruses**
- **Bacteria**
- **Fungi**
- **Parasites**
- **Idiopathic**

Typical agent of a pneumonia

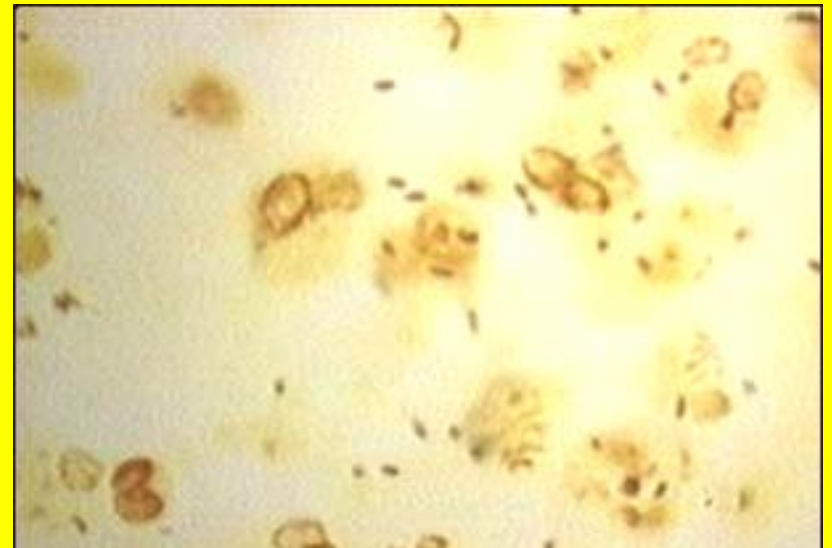
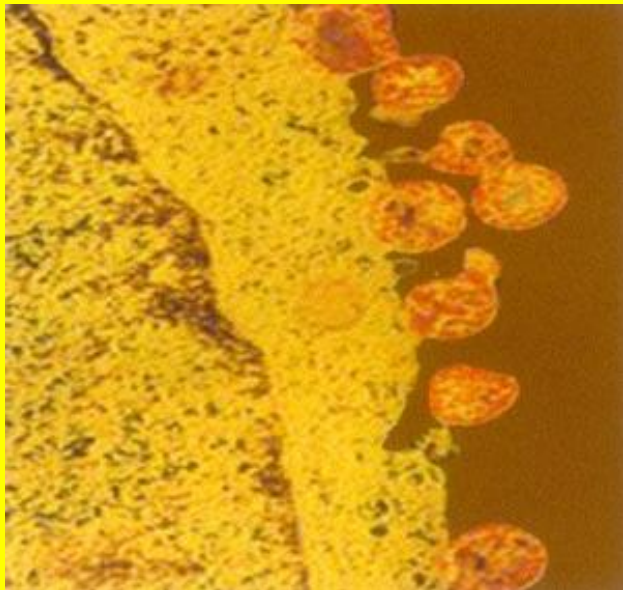
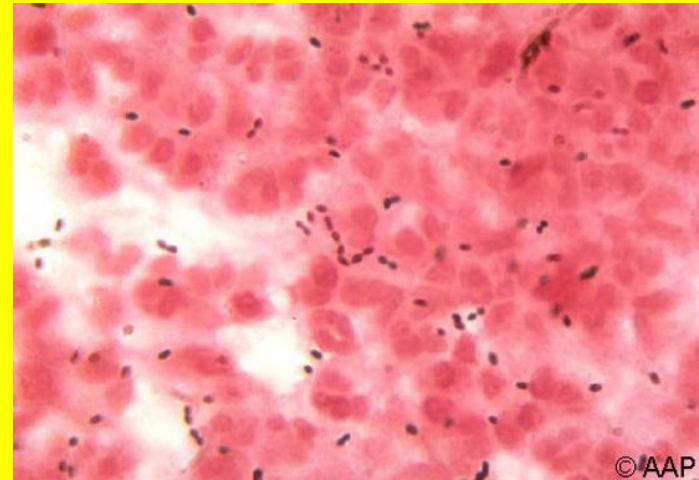
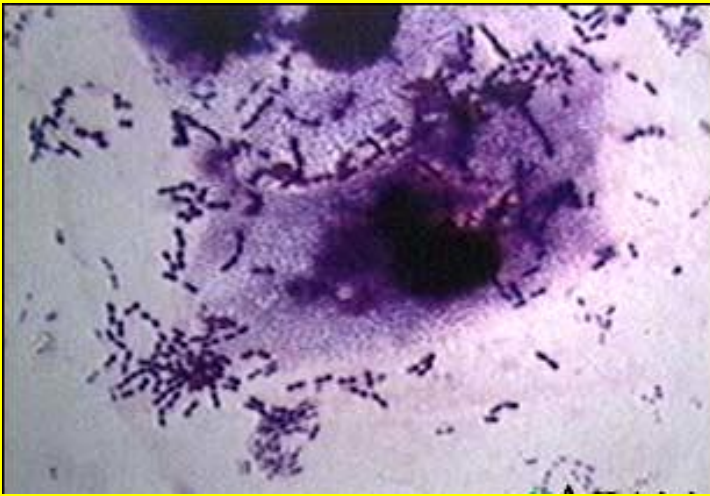
– ***Out hospital***

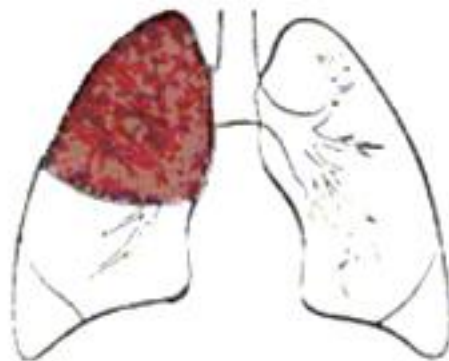
- The primary: *Streptococcus pneumoniae*
- The secondary: *Staphylococcus aureus*; *Haemophilus influenzae*; *Streptococcus pneumoniae*

– ***The intrahospital: gram negative etherobacteria; Staphylococcus aureus, etc.***

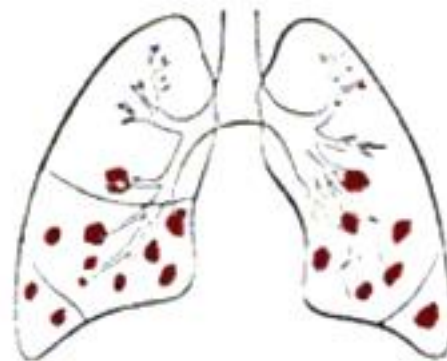
– ***Aspirative: anaerobes***

– ***Immunodeficiency: Pneumocystis carini***





Pneumonia lobar



Broncopneumonia

Hospital-acquired

Additionally, the microorganisms a person is exposed to in a hospital are often different from those at home. Hospital-acquired microorganisms may include resistant bacteria such as MRSA (methicillin resistance staph. Aur.), Pseudomonas, Enterobacter, and Serratia. Because individuals with hospital-acquired pneumonia usually have underlying illnesses and are exposed to more dangerous bacteria, it tends to be more deadly than community-acquired pneumonia. Ventilator-associated pneumonia (VAP) is a subset of hospital-acquired pneumonia. VAP is pneumonia which occurs after at least 48 hours of intubation and mechanical ventilation.

Atypical pneumonia

First time used this name Reimama (1938)

Cause:

- Mycoplasma pneumonie
- Legionella pneumophila
- Chlamydia pneumonie
- Chlamydia psittaci

Atypical pneumonia

- Affect young people
- Has character of epidemic
- Has significant common intoxication character: weakness, persistent headache, pain in muscles, joints, fever up to 38-39C
- Cough usually nonproductive
- Often pleural pain present

Mycoplasma pneumoniae pneumonia

- Onset often from pharyngitis, laryngitis
- Persistent tachycardia
- Often hypotension
- Loud fine bubbling rales
- Hepatosplenomegalia
- Sometimes vesicular - papular rash
- X-ray: nongomogenic infiltration in lower lobes

Legionelas pneumonia

- Patient had contact with earth, air-conditions
- Acute onset
- Dry cough, dyspnoe, pleural pain, cyanosis, transient diarrhea, disorders of consciousness, mialgias, arthralgias
- Bradycardia, moist rales, pleura murmur
- X-ray: lobar infiltration

Chlamydial pneumonia

- Patient often had contact with domestic birds, family or group outburst
- Acute onset
- High level of intoxication not correspond to damages of lungs
- Relative bradycardia, poor steto-acoustic pulmonary picture
- X-ray: focal or mergenal (fusional) infiltration

Pneumonia of old person

- Dyspnoe
- Cough with a few sputum
- Fever has 75-80% p-ts, subfebrile, often normal temperature
- Moist rales, crepitation (differentiate from pneumosclerosis, cardiac insufficiency, bronchial obstruction)
- CNS damages: appathy, drowsiness, cloudiness
- Decompensation of chronic diseases: diabetes, cardiac insufficiency, arrhythmia, hypotension, etc.

Initial descriptions of pneumonia focused on the anatomic or pathologic appearance of the lung, either by direct inspection at autopsy or by its appearance under a microscope.

Bronchial pneumonia affects the lungs in patches around the tubes (bronchi or bronchioles).

Interstitial pneumonia involves the areas between the alveoli, and it may be called "interstitial pneumonitis." It is more likely to be caused by viruses or by atypical bacteria.

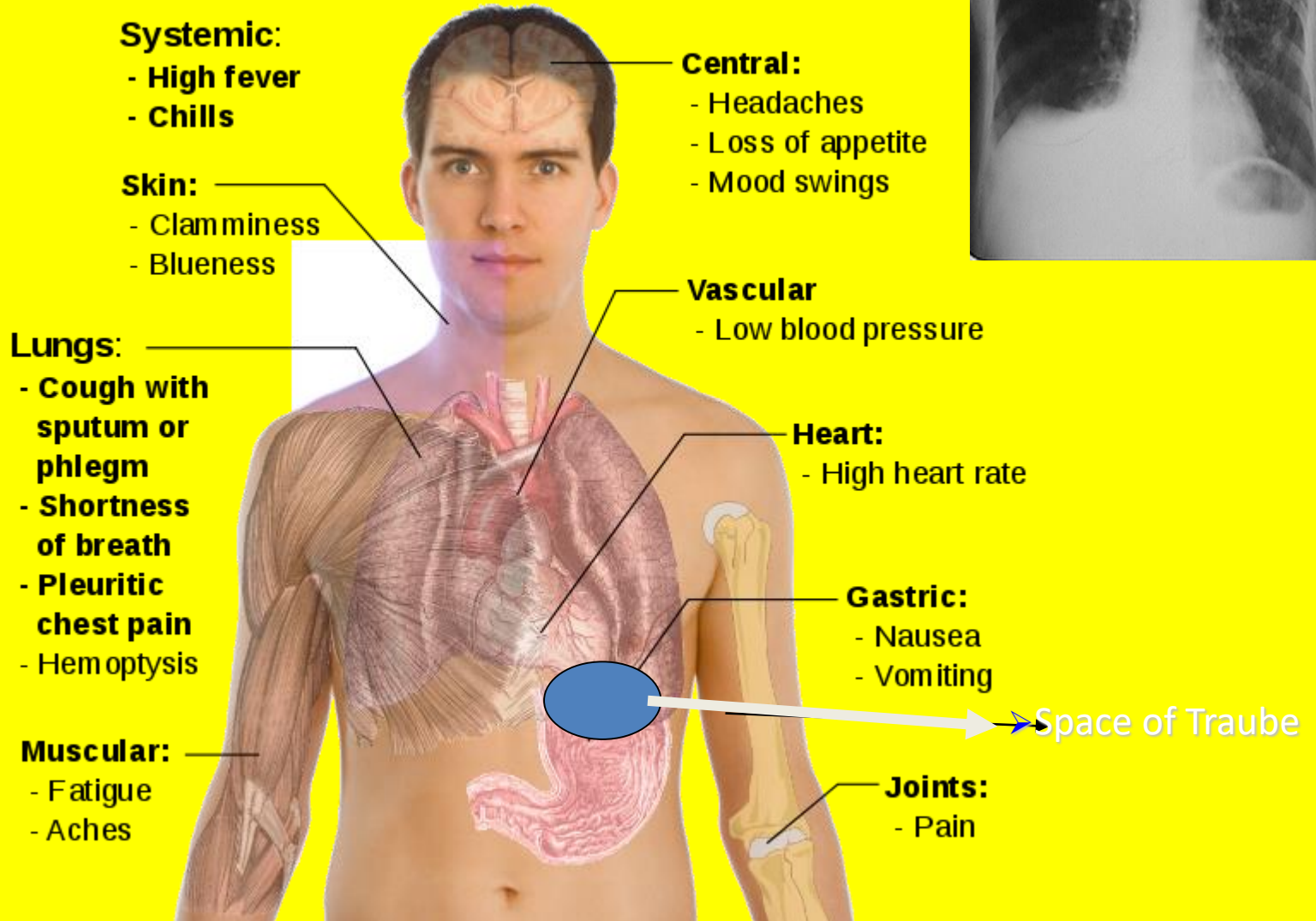
A lobar pneumonia

is an infection that only involves a single lobe, or section of a lung. Lobar pneumonia is often due to Streptococcus pneumonia (though Klebsiella pneumonia is also possible.)

Multilobar pneumonia

involves more than one lobe, and it often causes a more severe illness.

Main symptoms of infectious Pneumonia



Signs

Signs that consolidation may have occurred include:

- Expansion of the thorax on inspiration is reduced on the affected side
- Vocal fremitus is increased on the side with consolidation
- Percussion is dull in affected area
- Breath sounds are bronchial
- Possible medium, late, or pan-inspiratory crackles
- Vocal resonance is increased. Vocal resonance testing can be done with a stethoscope. Patient's voice (or whisper, as in whispered bronchophony) can be heard more clearly when there is consolidation, as opposed to in the healthy lung where speech sounds muffled.
- A pleural rub may be present
- Consolidated tissue is radio-opaque, so that it is clearly demonstrable in X-rays and CT (computer tomography) scans. Consolidation is often a middle-to-late stage feature/complication in pulmonary infections.

Signs and symptoms

- cough with greenish or yellow sputum
- high fever accompanied by shaking chillss
- Shortness of breath
- pleuritic chest pain
- cough up blood
- decreased expansion of the chest on the affected side
- bronchial breathing
- rales (or crackles)
- Percussion may be dulled
- Increased vocal fremitus

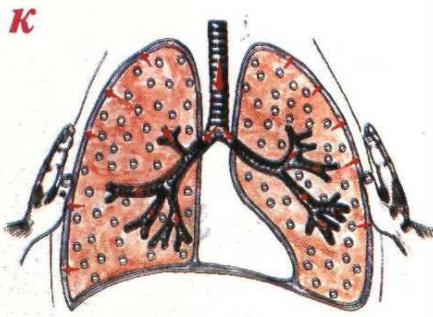
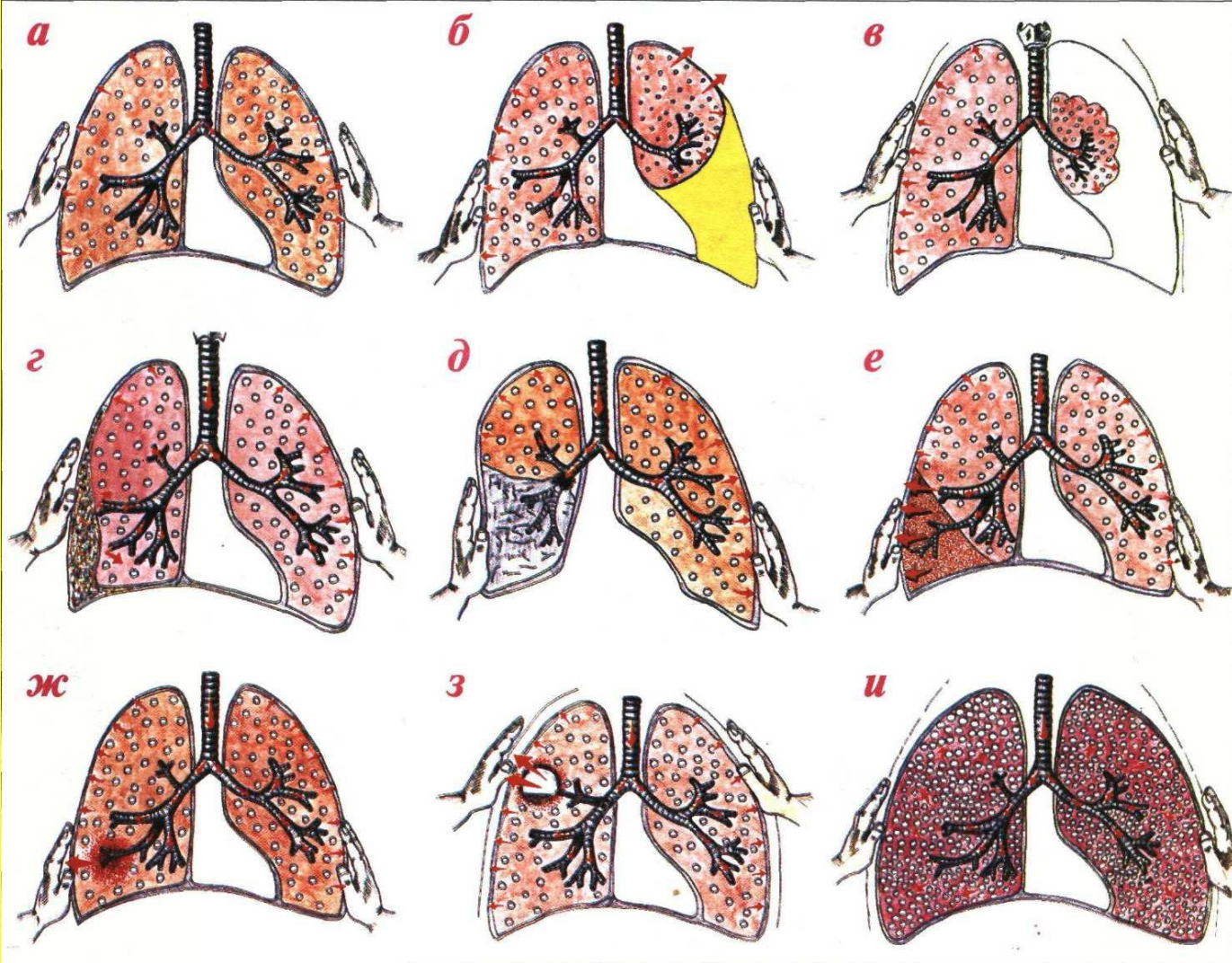
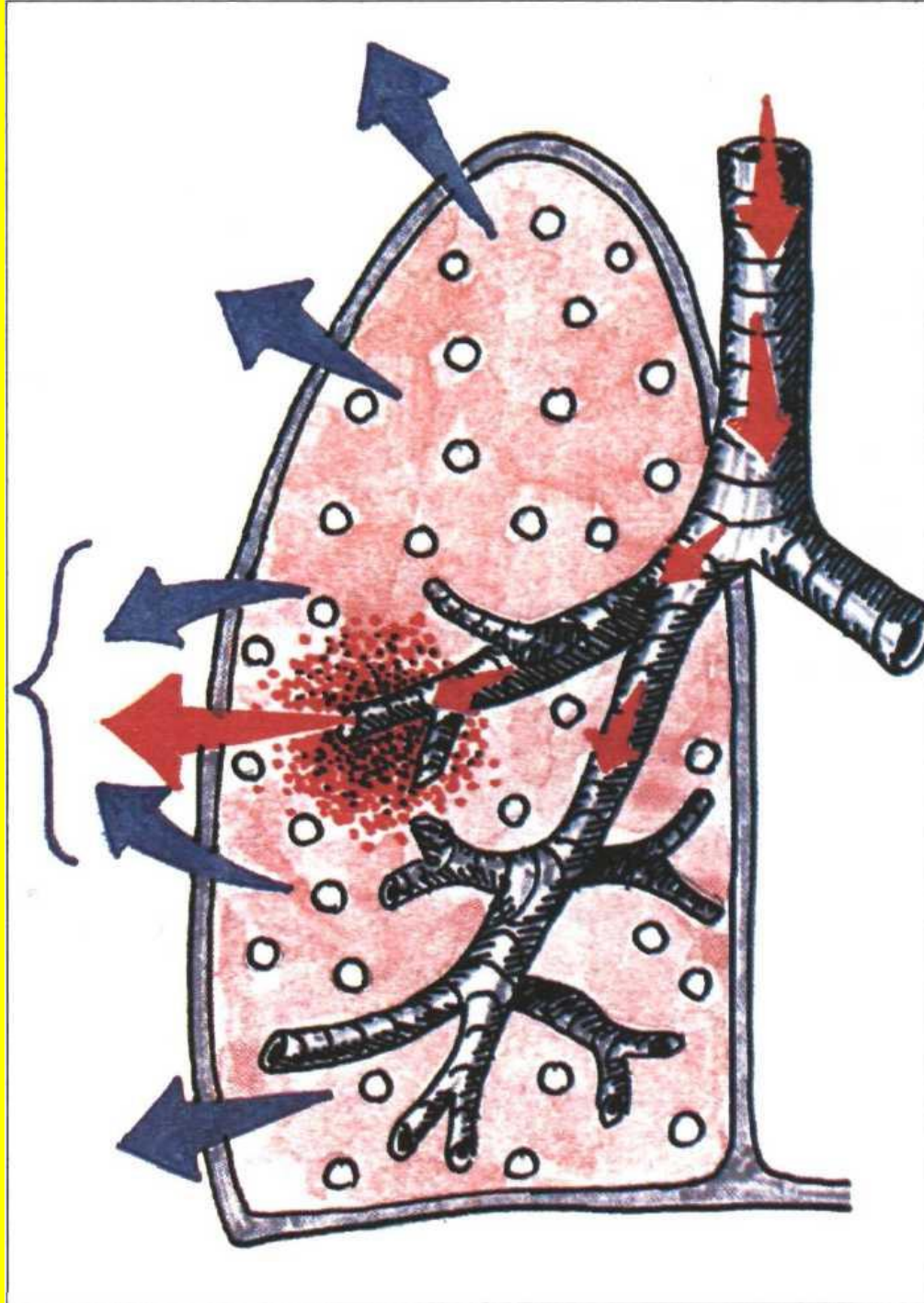
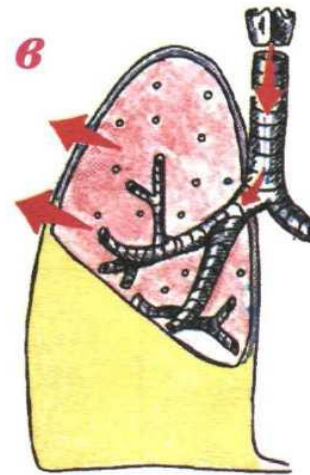
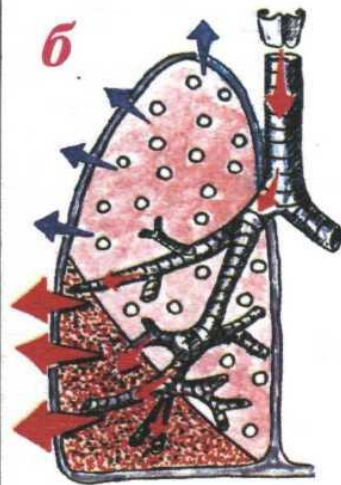
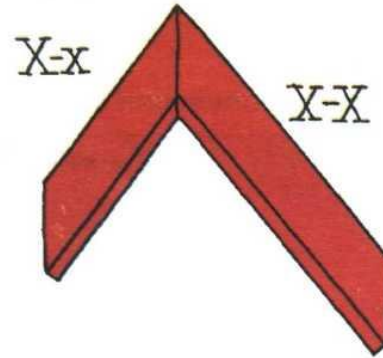


Рис.2.52. Изменение голосового дрожания при основных бронхолегочных синдромах:
 а - норма;
 б - плевроторакс;
 в - пневмоторакс;
 г - фиброторакс;
 д - обструктивный ателектаз;
 е - долевое уплотнение;
 ж - очаговое воспалительное уплотнение;
 з - полость в легком, соединенная с бронхом;
 и - эмфизема легких;
 к - сужение бронхов.



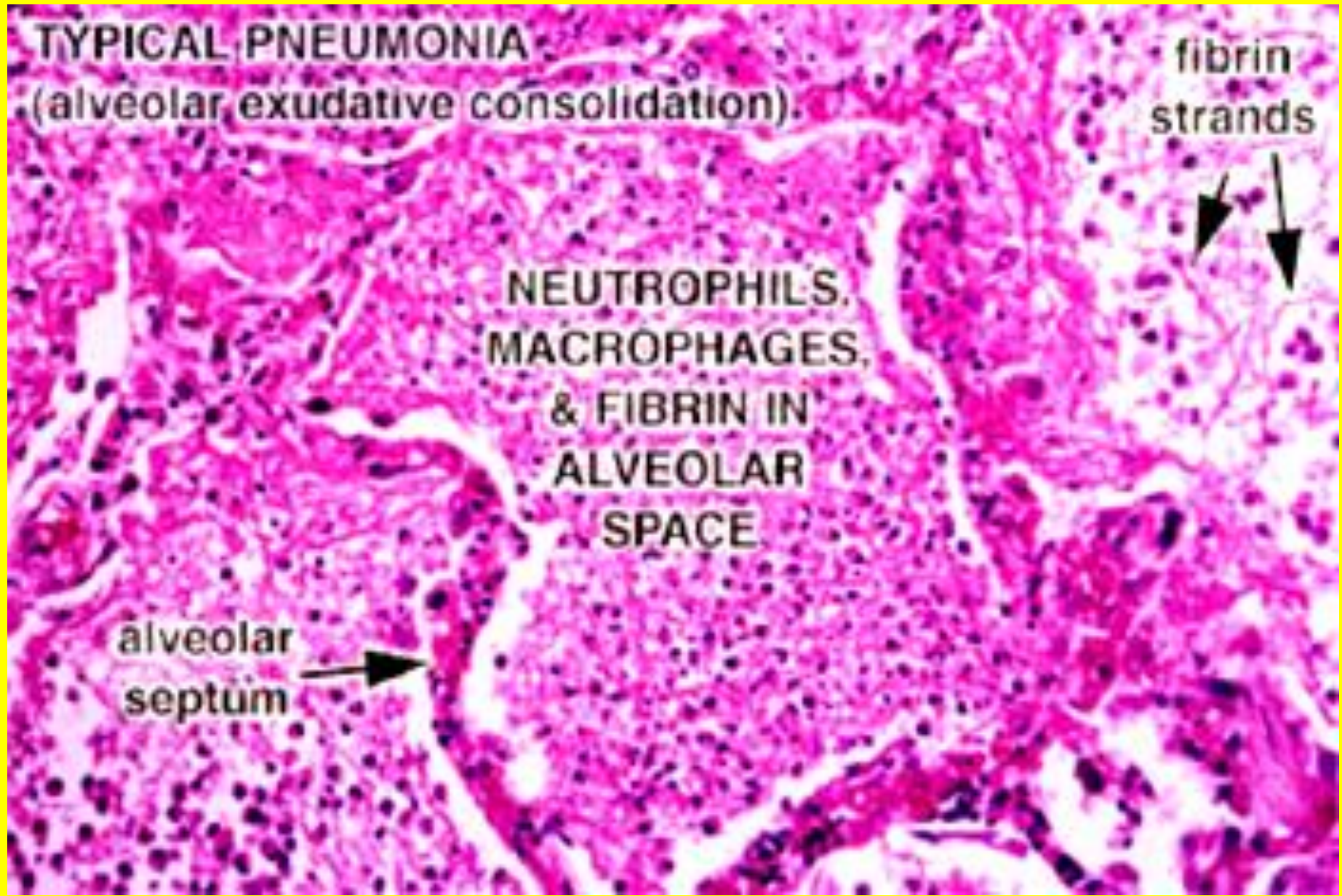


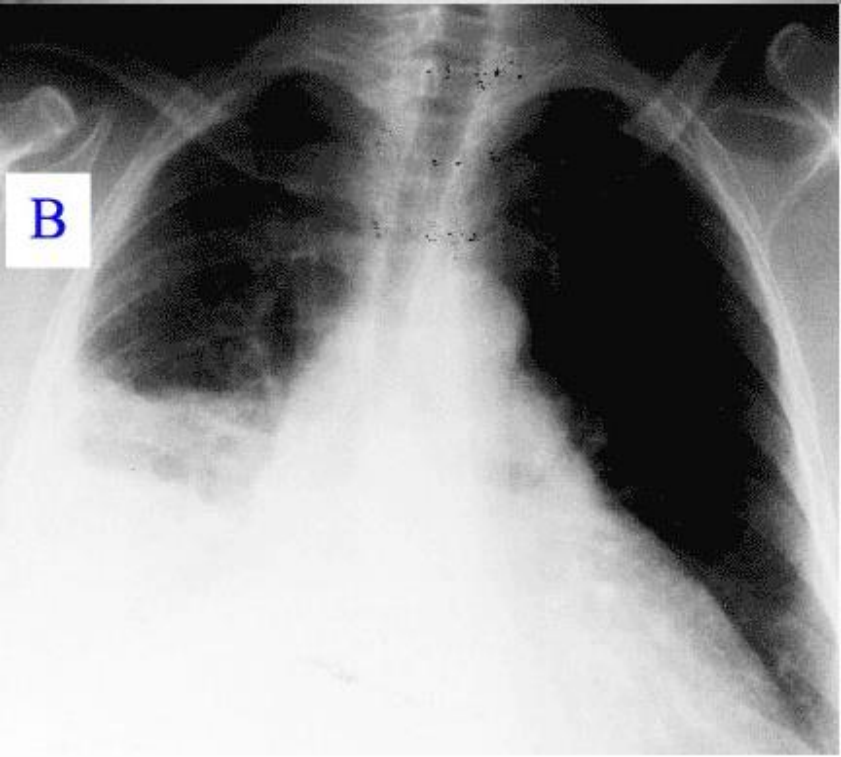
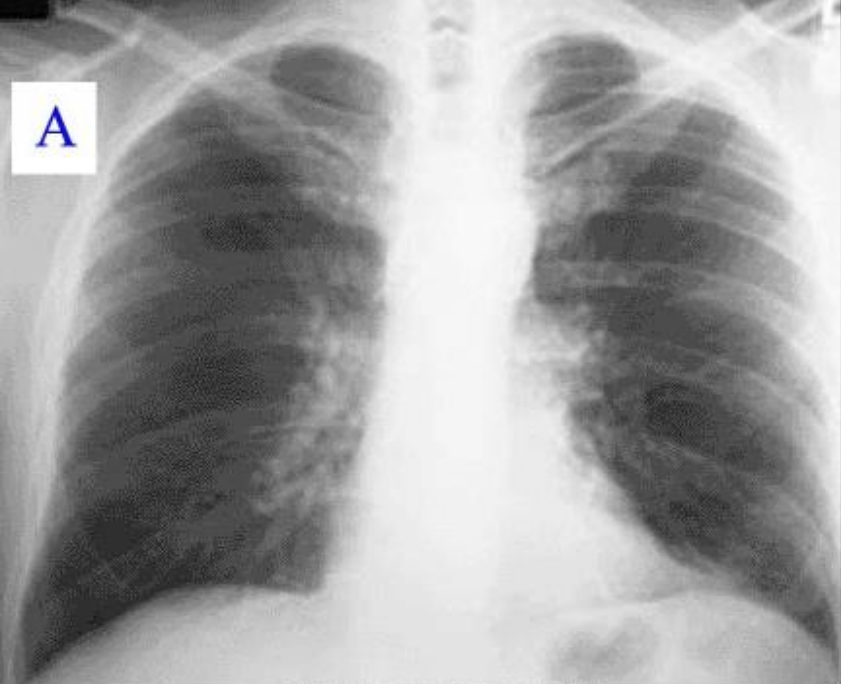
TYPICAL PNEUMONIA
(alveolar exudative consolidation).

fibrin
strands

NEUTROPHILS,
MACROPHAGES,
& FIBRIN IN
ALVEOLAR
SPACE

alveolar
septum





PNEUMONIA CROUPOSA

S. LOBARIS, S.FIBRINOSA, PLEUROPNEUMONIA

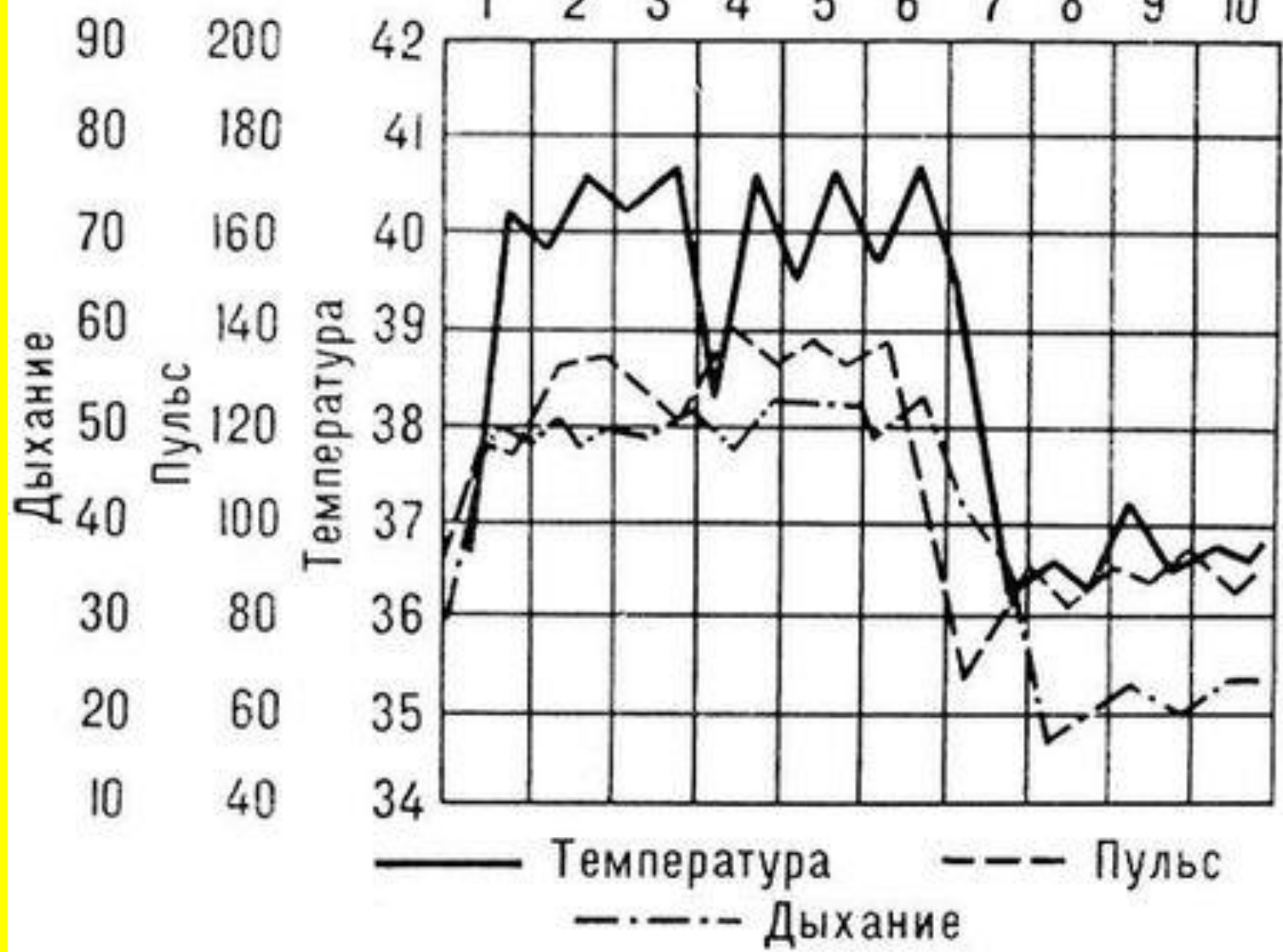
Stage	Type of effusion	General condition	Percussion	Auscultation	Palpation	Sputum
Hyperemia		Chills, Temp-40'		Normal vesicular respiration		
Exudation	Solution	Febris continua	Slightly dull with tympanic tinge	Crepitatio indux		Rusty sputum
Hepatisation	Gel	Febris continua	Hip sound	Bronchial respiration	Vocal fremitus increases	Rusty sputum
Resolution	Solution	Crisis, profuse sweating	Slightly dull with tympanic tinge	Crepitatio redux, moist rales		
Resorbtion	Solution		Clear lung sound	Vesicular respiration & moist rales		Mucopu-rulent

Clinical picture of lobar pneumonia

- **Syndrome of pulmonary tissue consolidation:** strengthening of vocal fremitus, dullness of percussion sound, harsh breathing, X-ray confirms - infiltration
- **Inflammation signs:** a fever, intoxication signs, acute onset
- **The painful syndrome:** is caused by interest of a pleura, (strongly pronounced)
- **The phenomena of a bronchitis and respiratory insufficiency:** expiratory dyspnoe, cough, sputum (mucous, mucopurulent, sometimes "rusty")

День болезни

1 2 3 4 5 6 7 8 9 10



Clinical picture of focal pneumonia

- The painful syndrome is expressed not significantly
- The intoxication is expressed moderately (disease develops gradually)
- The bronchitis phenomena are expressed (from bronchitis development of the given disease begins)
- The probability of revealing of a syndrome of consolidation of a pulmonary tissue depends on the sizes of the centre and its depth (crucial importance has X-ray)

CHRONIC OBSTRUCTIVE PULMONARY DISEASES (COPD)

- •ASTHMA
- •CHRONIC BRONCHITIS
- •EMPHYSEMA
- •COR PULMONALE (due to obstruction of pulmonary circulation)

Эмфизематозный тип
больного ХОБЛ



«Розовые пытельщики»

Бронхитический тип
больного ХОБЛ



«Синие отечники»

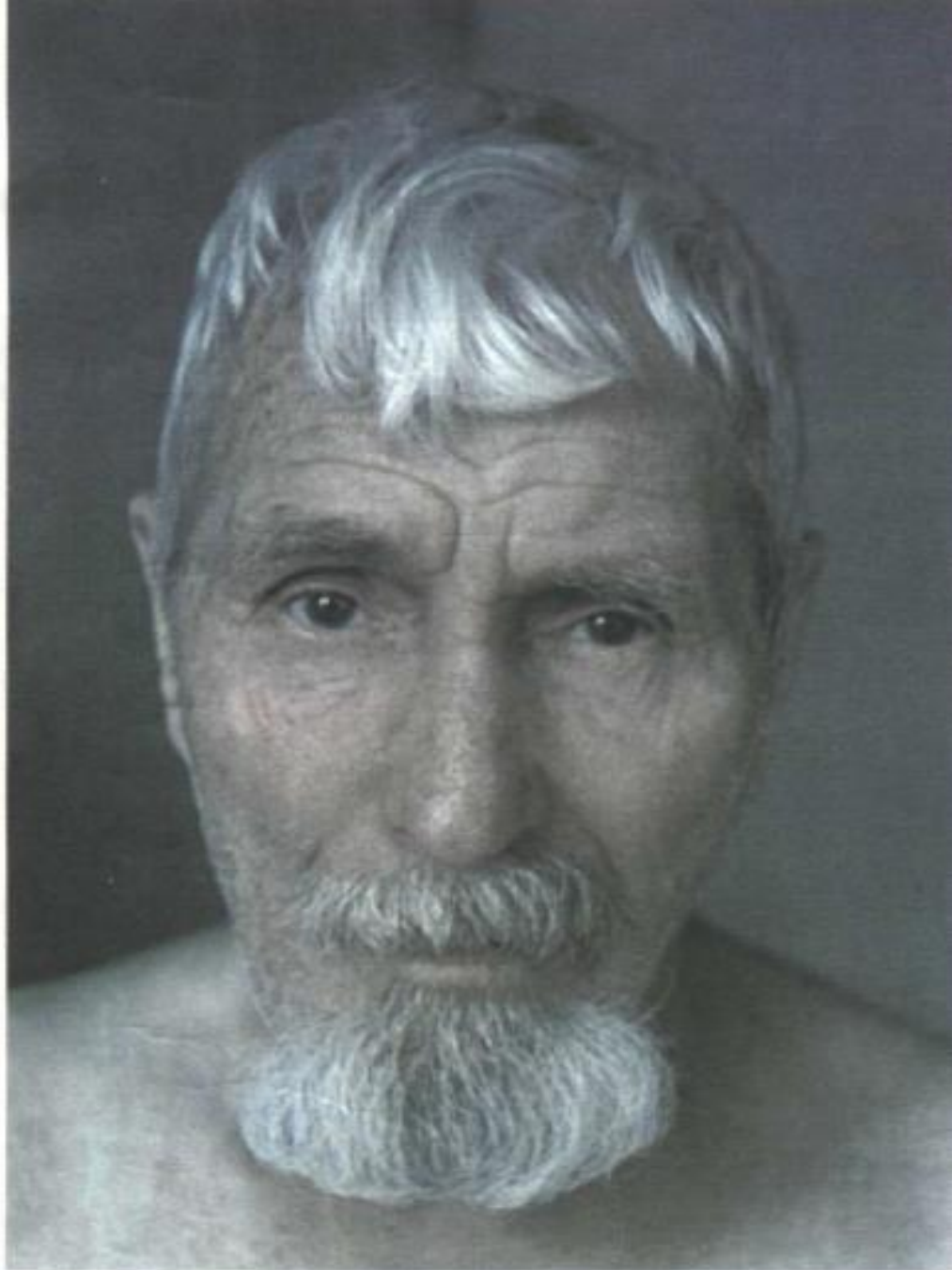


Рис. 1.24. Центральный диффузный цианоз у больного с хроническим обструктивным бронхитом, эмфиземой легких и выраженной дыхательной недостаточностью.

Three components of normal gases exchange into lungs are:

1. Ventilation of lungs
2. Gases diffusion through alveoli – capillary membrane
3. Alveolar blood perfusion into lungs

Types of RI (respiratory insufficiency)

- Extra lungs dysfunctions:
 1. damages of central regulation of respiration
 2. damages of respiratory muscles and nerves
 3. damages of chest

Types of RI (respiratory insufficiency)

- Intra lungs dysfunctions:
 1. disorders of gases diffusion
 2. disorders of ventilation
 3. disorders of blood perfusion into lungs

Types of RI

- Ventilational:

disorders of external respiration

1. Hypoxemia
2. Hypercapnia

- Parenchymatous:

Disorders of diffusion, perfusion

1. Hypoxemia without hypercapnia

Clinical symptoms of RI

- Dyspnoe
- Central (diffuse) cyanosis
- Intensification of respiratory muscles work
- Intensification of blood circulation
(tachycardia, bigger MV of blood)
- Changes of respiratory volumes and capacities

Spirometry (Breathing recording)

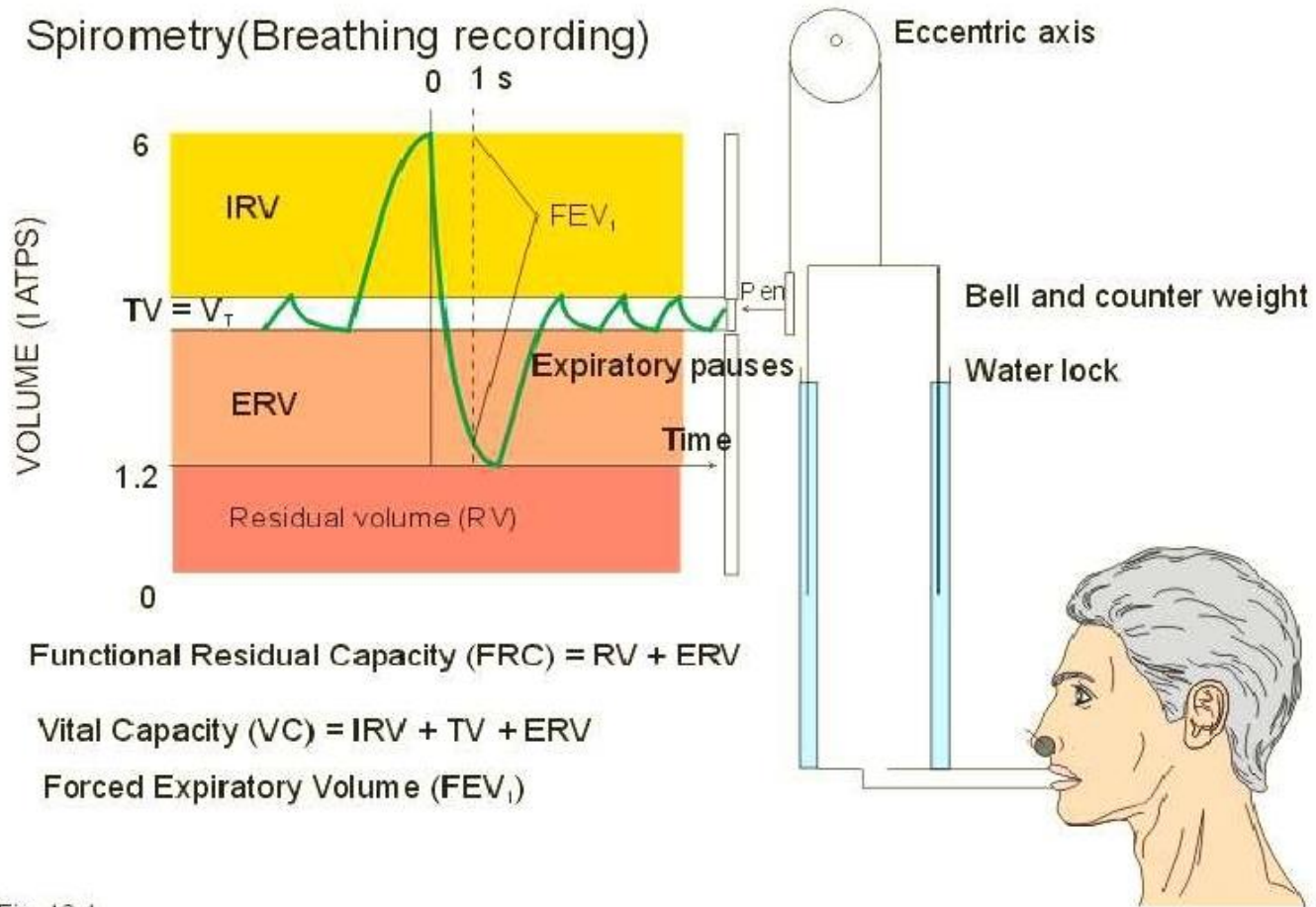


Fig. 13-1

KMc

FEV₁ IS 8-11 % lower than VC in healthy person

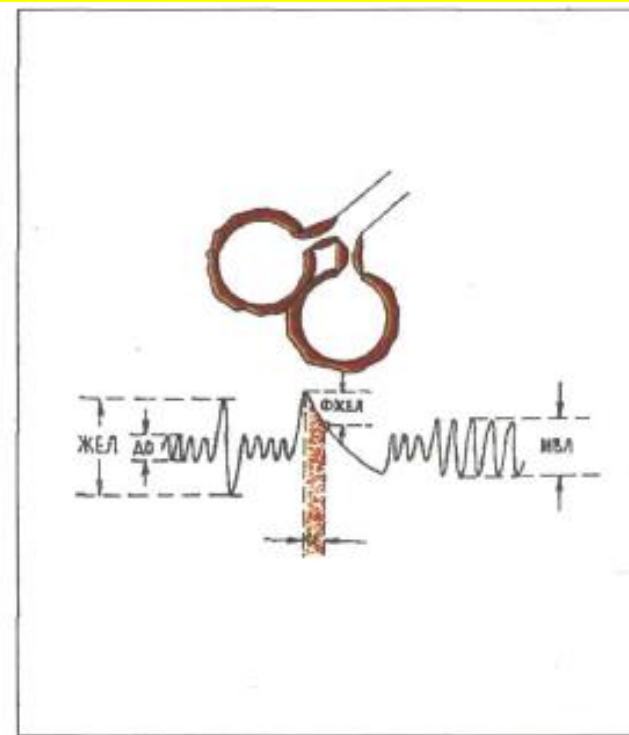
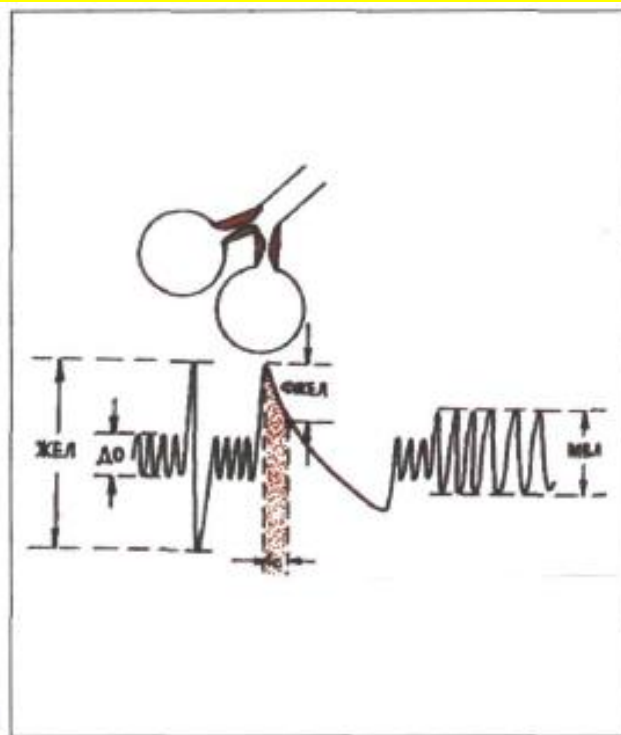
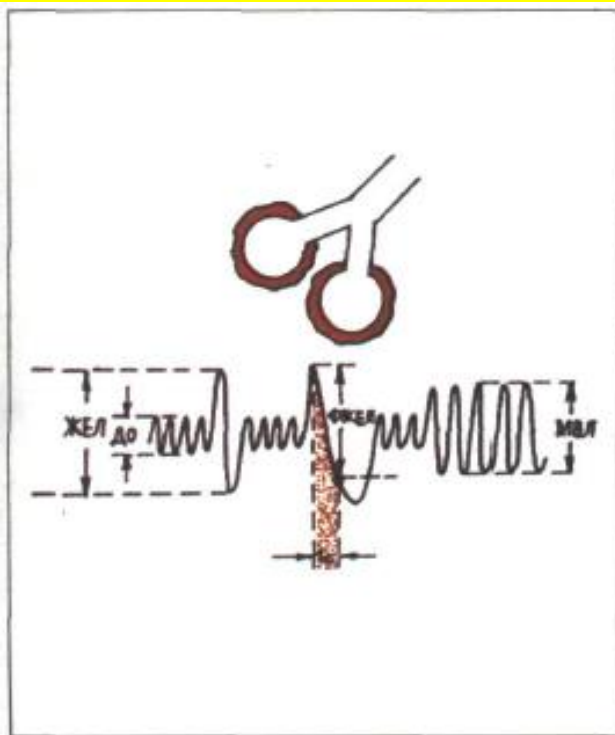


Рис. 2.95. Легочные объемы и емкости при рестриктивной ДН.

Рис. 2.96. Легочные объемы и емкости при обструктивной ДН.

Рис. 2.97. Легочные объемы и емкости при смешанной ДН.

1. Restrictive: VC and MLV decreased, FEV_{1sec} almost normal

2. Obstructive: significantly decreased FEV_{1 SEC}

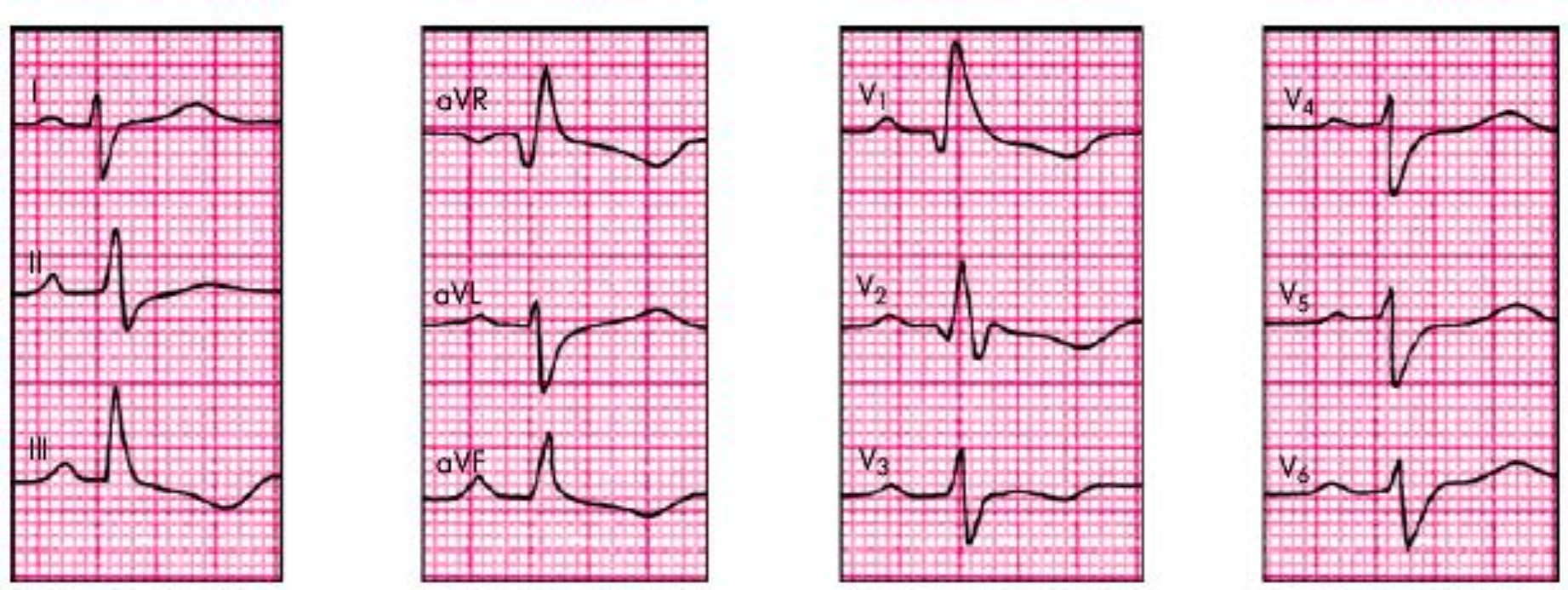
and MVL

For definition of character of obstructive damages it is necessary to measure volume of the forced exhalation for 1 sec (FEV1), the forced vital capacity of lungs (FVCL)

FEV1/FVCL a key sign in diagnostic of ChOPD

Decrease FEV1/FVCL less than 70 %, defined in illness remission, testifies to obstructive damages irrespective of severity level of ChOPD

Electrocardiogram research



**Signs of a hypertrophy and overload of the right departments of heart
(R - "pulmonale", R V1-2 > 7 mm, S electrocardiogram type)**

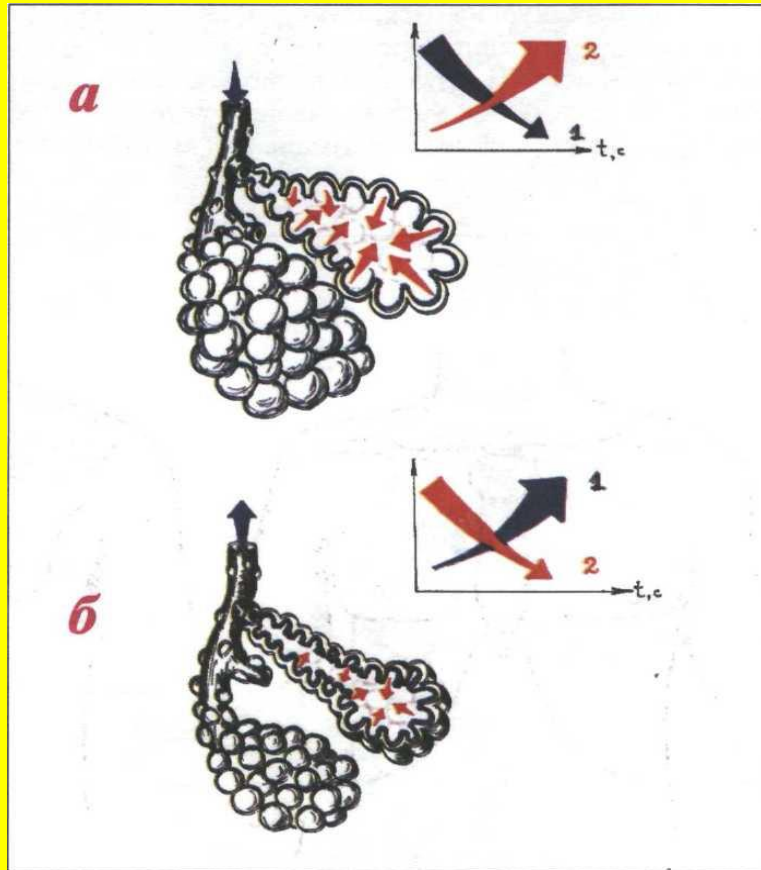
Asthma is a chronic inflammatory respiratory disease characterized by periodic attacks of wheezing, shortness of breath, and a tight feeling in the chest.

DEFINITION OF THE BRONCHIAL ASTHMA

- **disease characterized by an inflammation of respiratory ways with development of hyperreactance, bronchospasm, infiltration of mucous with cells of inflammation and edematous liquid**
- **The big symptoms: cough, rales, difficulty of breath, asthma attacks.**
- **Simplification of symptoms with β 2 agonists**

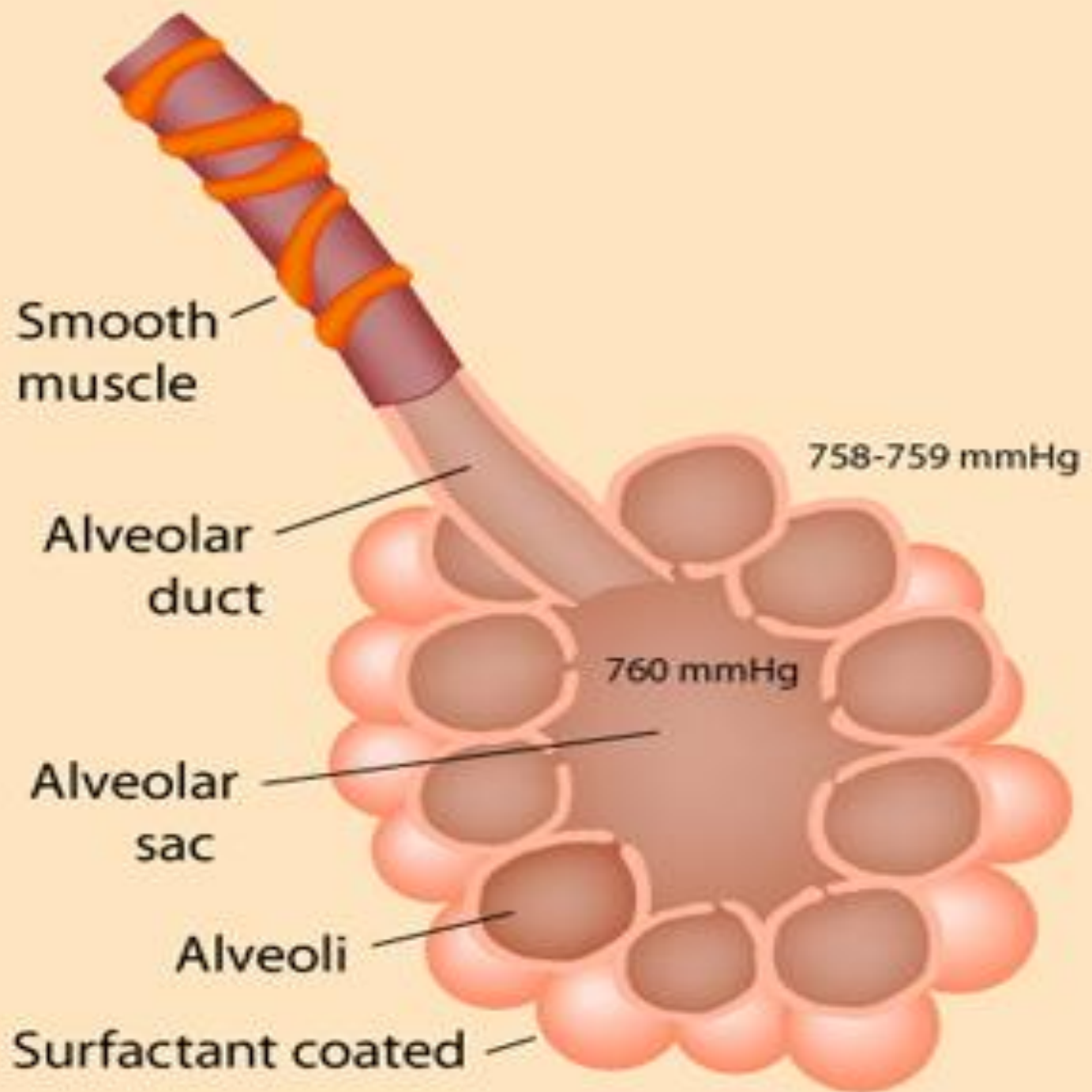
Changes of surfactant activity and power of alveolar superficial tension during respiration: a- inspiration; б- expiration.

1 – surfactant density and activity (blue needles); 2 – power of superficial tension (red needles)



P







**Cilia,
seen
from
within
the
airway**

**Goblet
cells
produce
mucus**

Asthma - CAUSE

According to the etiology, bronchial asthma is divided in the following groups:

- 1. **Allergic** (extrinsic/ atopic) - This type of asthma usually starts in childhood and is often preceded by eczema. But most of the young adults (<35 yrs) developing asthma also fall in this category. Genetic factors also play a significant role in this. In this type of asthma the allergen leads to production of excessive (IgE) immunoglobulins.
- 2. **Infective or Intrinsic** - This is not hereditary or allergic, but may be caused by, or at least associated with upper respiratory tract or bronchial infection which is usually viral.
- 3. **Psychological factors** (like anxiety, emotional stress etc) are often considered to be the sole cause of some asthmatic attacks, but it is still not certain whether it can be the sole cause or is only a precipitating factor.
- 4. **Occupational asthma** - This can occur in certain industries in which there is exposure to metallic dusts (esp. platinum salts), biological detergents, toluene diisocyanate, polyurethane, flour and dust from grains etc.

What Triggers an Allergy

- It's easy to come in contact with allergens. Chasing after dust bunnies, playing with your pets, or just walking out the door during allergy season can do it. An allergic reaction is set in motion by touching, swallowing, or inhaling an allergen.

Immune System Reacts

- Pollen (magnified above) can get caught in the lining of nose and trachea, or windpipe. Once an allergen, such as pollen, enters your body, your immune system reacts and starts making antibodies that help look for and then get rid of the pollen.

Allergic Response: Histamine Release

- When antibodies find an allergen, they alert mast cells. These specialized blood cells release chemicals such as histamine, which plays a key role in inflammation and allergy symptoms. A runny nose, swelling in the nasal passages, and congestion can result.

Bronchial Asthma Triggers

Bronchial asthma triggers may include:

Tobacco smoke

Infections such as colds, flu, or pneumonia

Allergens such as food, pollen, mold, dust mites, and pet dander

Exercise

Air pollution and toxins

Weather, especially extreme changes in temperature

Drugs (such as aspirin, NSAID, and beta-blockers)

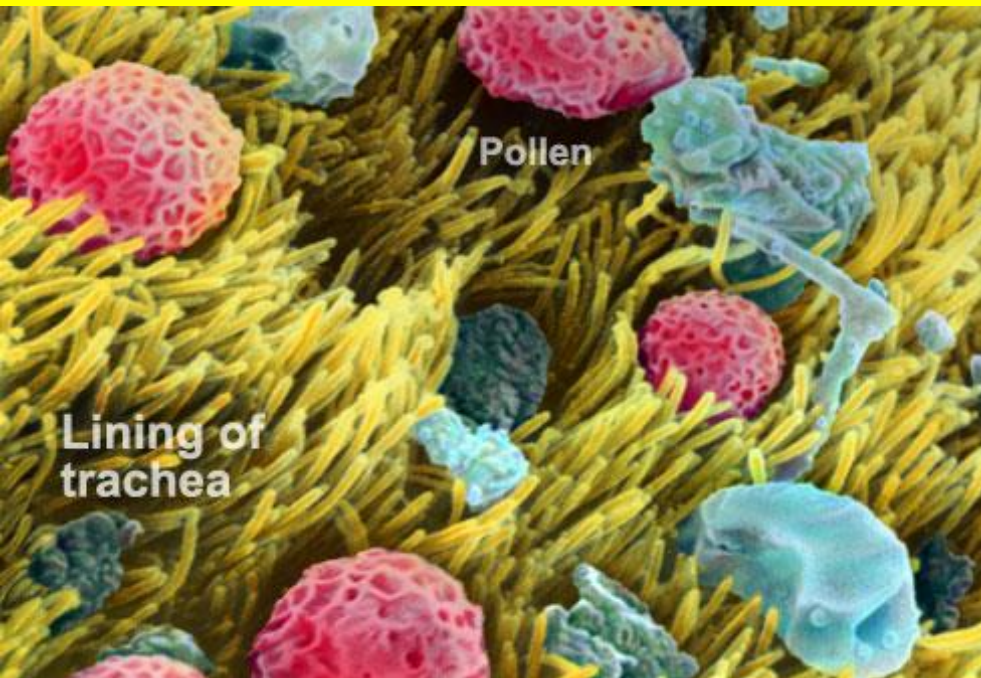
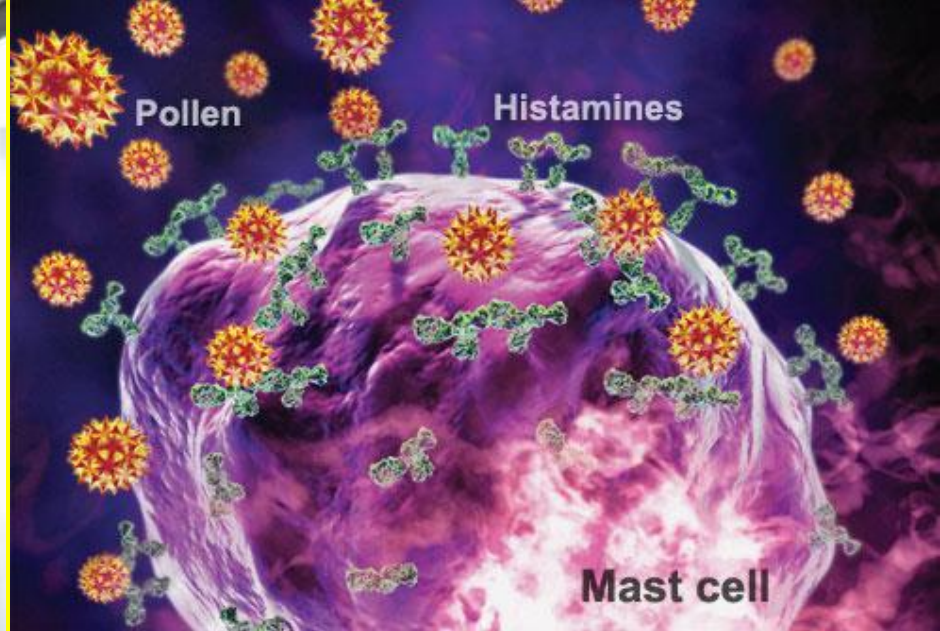
Food additives (such as MSG)

Emotional stress and anxiety

Singing, laughing, or crying

Smoking, perfumes, or sprays

Acid reflux



Signs and Symptoms of Bronchial Asthma

With bronchial asthma, you may have one or more of the following signs and symptoms:

Shortness of breath

Tightness of chest

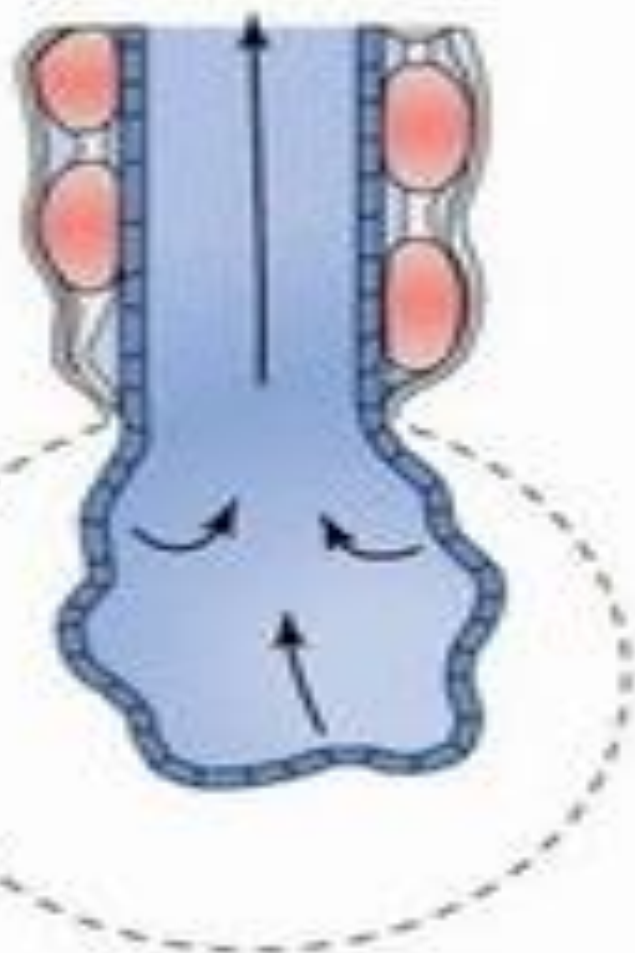
Wheezing

Excessive coughing or a cough that keeps you awake at night



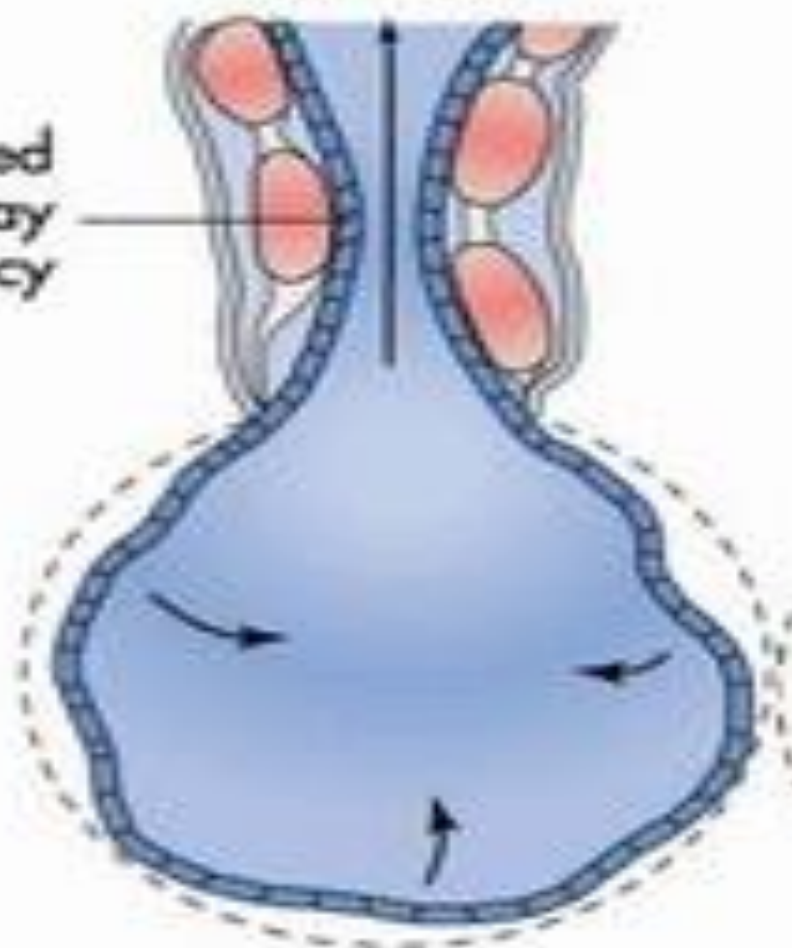
Рис. 2.33. Вынужденное положение больного во время приступа бронхиальной астмы.

Normal expiration



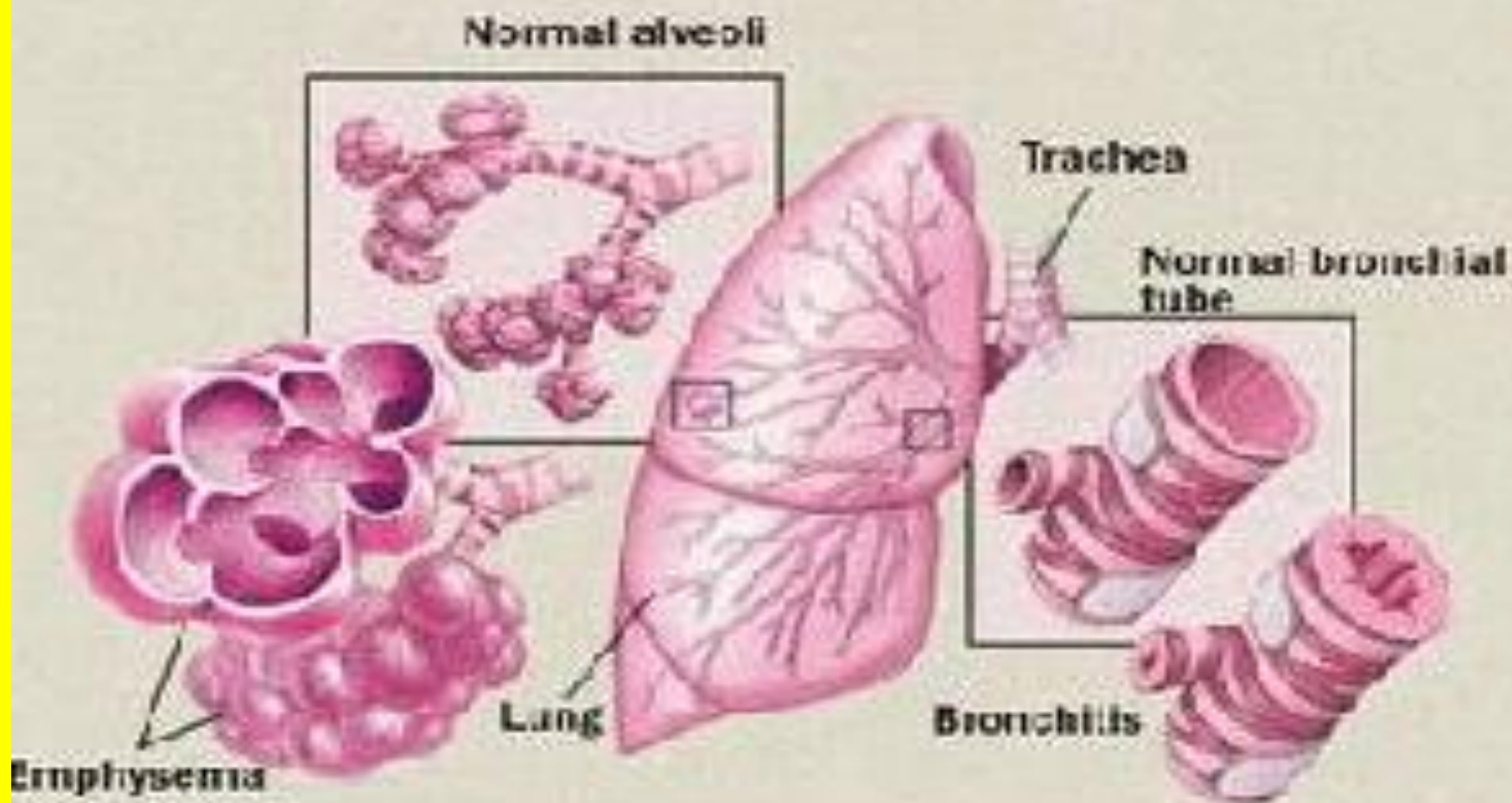
Impaired expiration

Reduced airway patency



Easy expiration due to normal elastic recoil of alveolus and open bronchiole

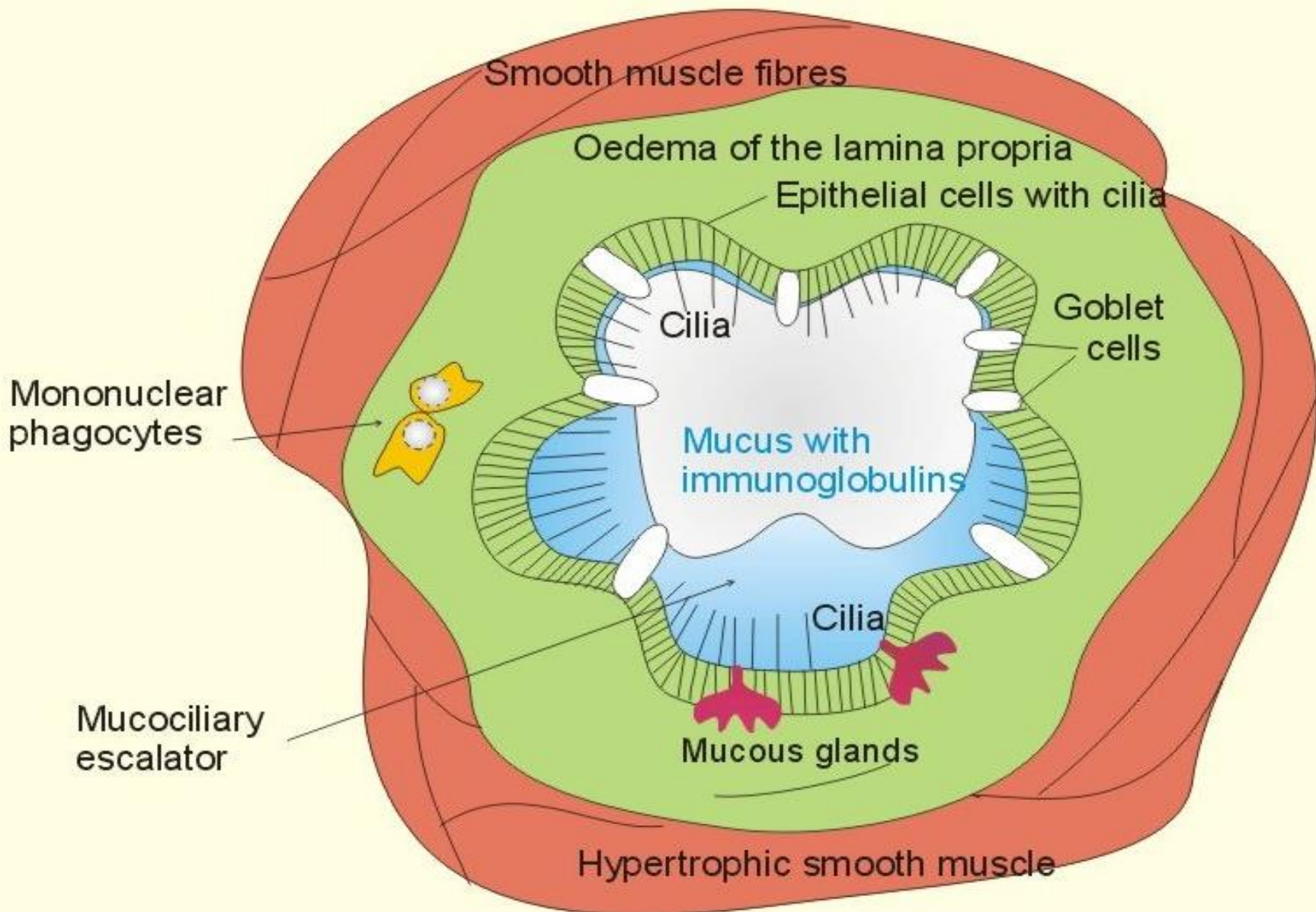
Difficult expiration due to decreased elastic recoil of alveolus and narrowed bronchiole



With emphysema, the walls of alveoli are damaged by inflammation. Alveoli can lose their natural elasticity, become overstretched and rupture. Several adjacent alveoli may rupture, forming one large space instead of many small ones.

Chronic bronchitis is a chronic inflammation and thickening of the walls of your bronchial tubes, which narrows them. It often induces coughing spells.

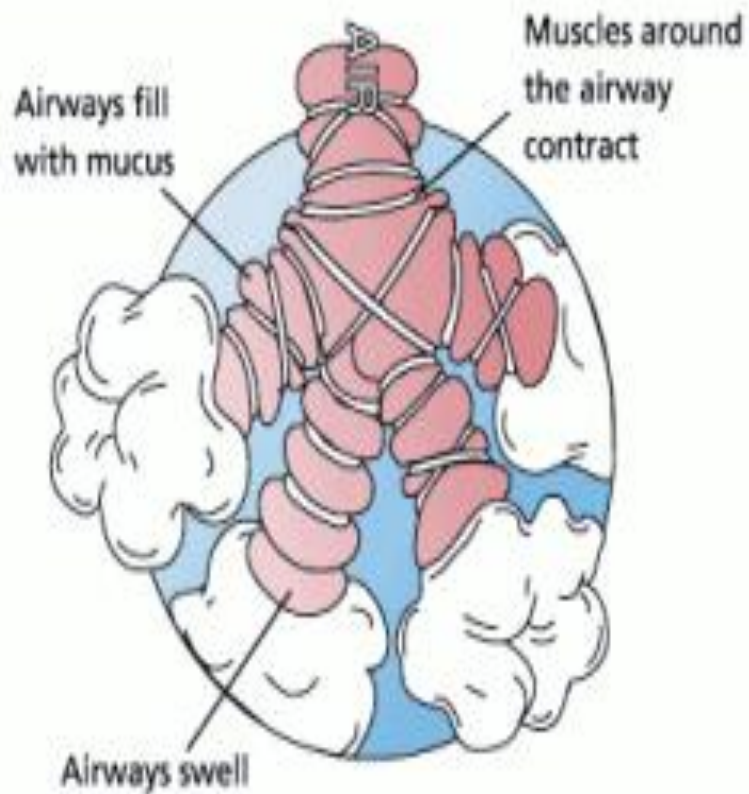
Abnormal Bronchial Wall & Lumen During An Attack Of Asthma



Before an Asthma Episode



After an Asthma Episode



Diagnose of Bronchial Asthma

Because asthma does not always happen at the doctor's visit, it's important to describe asthma signs and symptoms to doctor. You might also notice when the symptoms occur such as during exercise, with a cold, or after smelling smoke. Asthma tests may include:

Spirometry: A lung function test to measure breathing capacity and how well you breathe. You will breathe into a device called a spirometer.

Peak Expiratory Flow (PEF): Using a device called a peak flow meter, you forcefully exhale into the tube to measure the force of air you can expend out of lungs. Peak flow monitoring can allow you to monitor how well asthma is doing at home.

Chest X-Ray: Your doctor may do a chest X-ray to rule out any other diseases that may be causing similar symptoms.

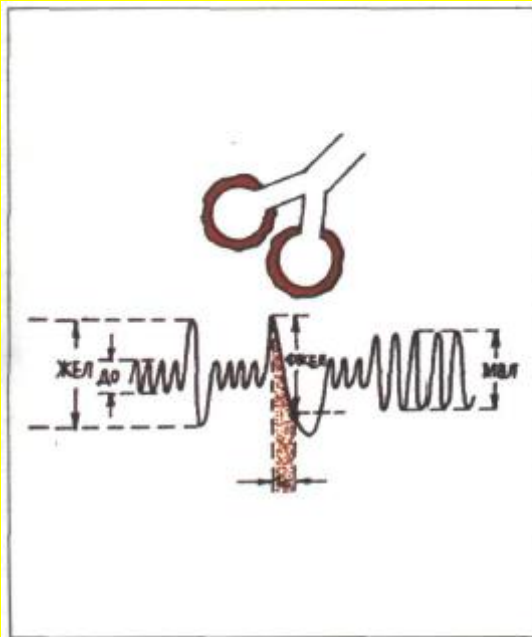


Рис. 2.95. Легочные объемы и емкости при рестриктивной ДН.

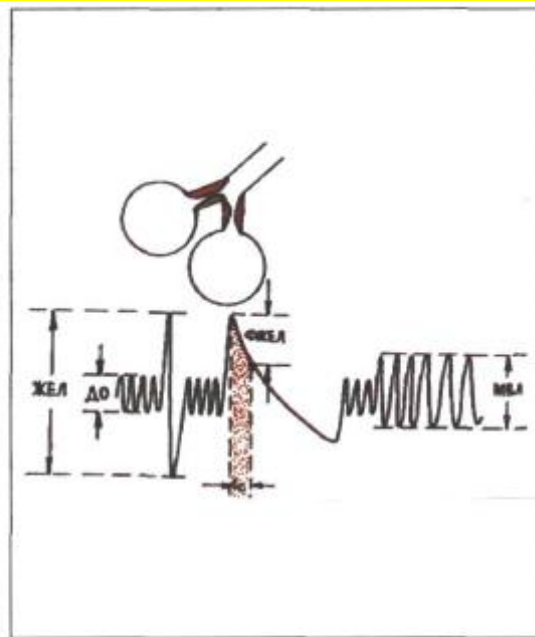


Рис. 2.96. Легочные объемы и емкости при обструктивной ДН.

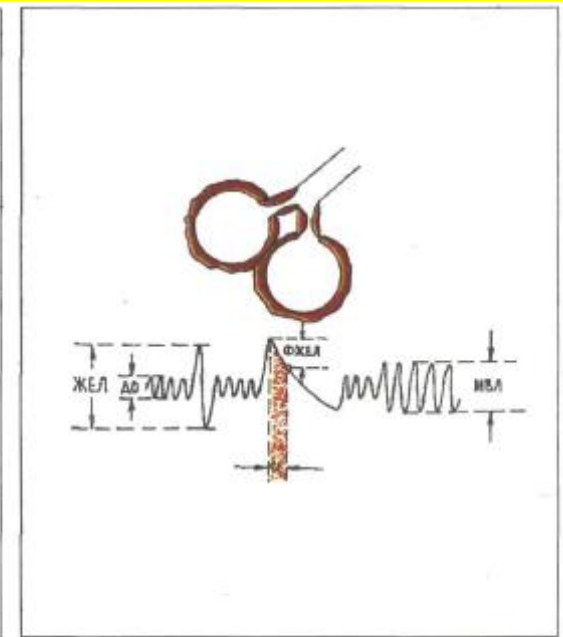


Рис. 2.97. Легочные объемы и емкости при смешанной ДН.

1. Restrictive: VC and MLV decreased, $FEV_{1\text{sec}}$ almost normal

2. Obstructive: significantly decreased $FEV_{1\text{sec}}$

and MVL

Types:

- 1 [Allergic Asthma](#)
- 2 [Exercise-Induced Asthma](#)
- 3 [Cough-Variant Asthma](#)
- 4 [Occupational Asthma \(Work-Related Asthma\)](#)
- 5 [Nocturnal Asthma \(Nighttime Asthma\)](#)
- 6 [Health Conditions That Mimic Asthma](#)

- **Child-onset asthma:** When asthma does begin in childhood, it often does so in a child who is likely, for genetic reasons, to become sensitized to common "allergens" in the environment (atopic person).

Adult-onset asthma: Adult-onset asthma develops after age 20. It is less common than asthma in children, and it affects more women than men. Allergenic materials may also play a role when adults become asthmatic. Asthma can actually start at any age and in a wide variety of situations. Although less common than asthma in children, adult-onset asthma can also be triggered by allergies. Between 30 percent and 50 percent of all adult cases are associated with allergies, but often allergic exposures don't seem to be the most important, driving factors. This nonallergic adult-onset asthma is sometimes called "intrinsic." Many adults who are not allergic do have such conditions as sinusitis or nasal polyps, or they may be sensitive to aspirin and related drugs. Another major source of adult asthma is exposure at work to animal products, certain forms of plastic, wood dust, or metals.

Exercise-induced asthma: Shortness of breath and/or wheezing occurring after strenuous exercise is called exercise-induced asthma. Although this phenomenon happens in up to 80% of people with recognized asthma, it frequently takes place as an isolated event without any other symptoms of asthma at any other time.

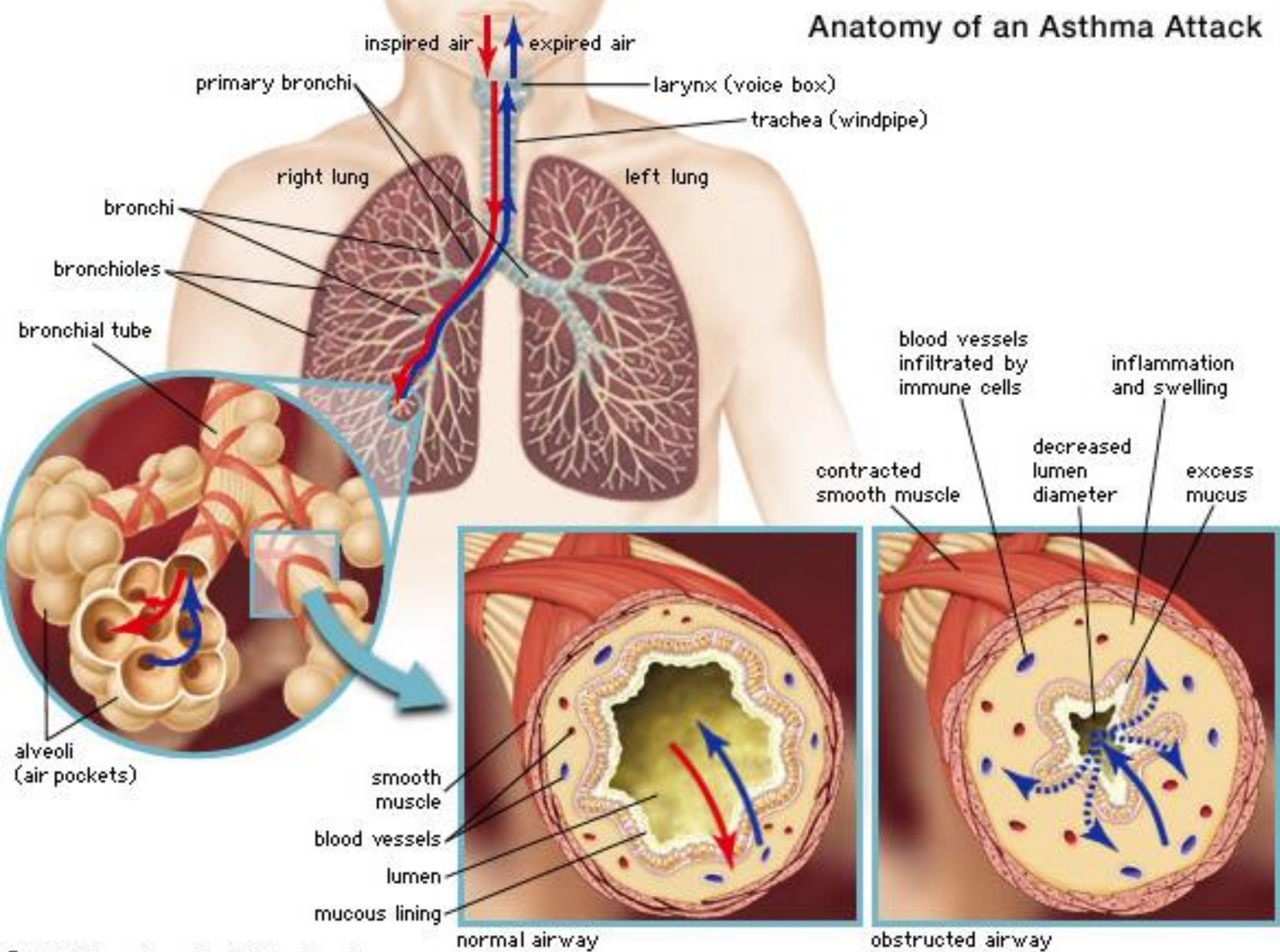
Cough-variant asthma: Coughing can occur alone, without the other symptoms of asthma that are usually present and recognized by the physician or patient. Cough variant asthma causes great difficulty for the physician to accurately diagnose the true underlying cause of the cough as being asthma because it can be easily confused with other conditions, such as chronic bronchitis and post nasal drip due to hay fever or sinus disease. Coughing can occur day or night. Nighttime coughing is most disruptive, interfering with sleep.

Occupational asthma: Occupational asthma occurs in response to a trigger in the workplace. Triggers include contaminants in the air, such as smoke, chemicals, vapors (gases), fumes, dust, or other particles; respiratory infections, such as colds and flu (viruses); allergens in the air, such as molds, animal dander, and pollen; extremes of temperature or humidity; and emotional excitement or stress. In most people with occupational asthma, the symptoms appear a short time after beginning work and subside after leaving work.

Nocturnal asthma: Nocturnal asthma occurs between midnight and 8 am. It is triggered by allergens in the home such as dust and pet dander or is caused by sinus conditions. Nocturnal or nighttime asthma may occur without any daytime symptoms recognized by the patient. This is called "nocturnal asthma." The patient may have wheezing or short breath when lying down or may not notice these symptoms until awoken by them in the middle of the night, usually **between 2 and 4am**. The cause (or causes) of this phenomenon is unknown, although many possibilities are under investigation.

Steroid-resistant asthma (severe Asthma): While the majority of patients respond to regular inhaled glucocorticoid (steroid) therapy, some are steroid resistant. Airway inflammation and immune activation plays an important role in chronic asthma. Current guidelines of asthma therapy have therefore focused on the use of anti-inflammatory therapy, particularly inhaled glucocorticoids (GCs). One of the major mechanisms by which glucocorticoids act in asthma is by reducing airway inflammation and immune activation. However, patients with steroid resistant asthma have higher levels of immune activation in their airways than do patients with steroid sensitive (SS) asthma. Furthermore, glucocorticoids do not reduce the eosinophilia or T cell activation found in steroid resistant asthmatics. This persistent immune activation is associated with high levels of IL-2, IL-4 and IL-5 in the airways of these patients.

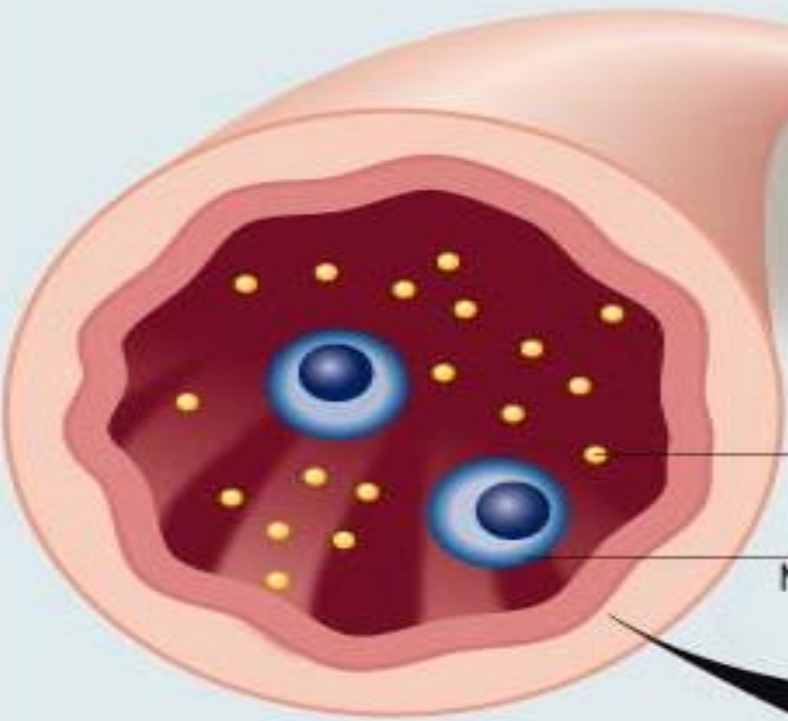
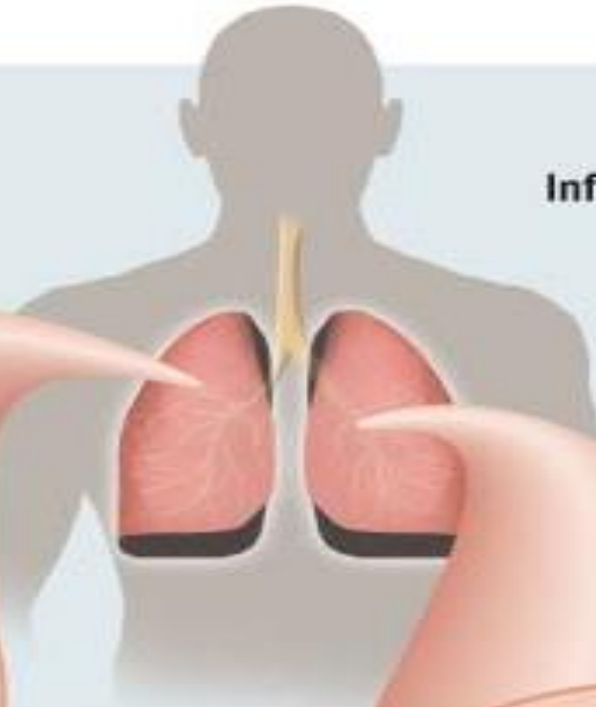
Anatomy of an Asthma Attack



ANOTHER ROUTE TO ASTHMA

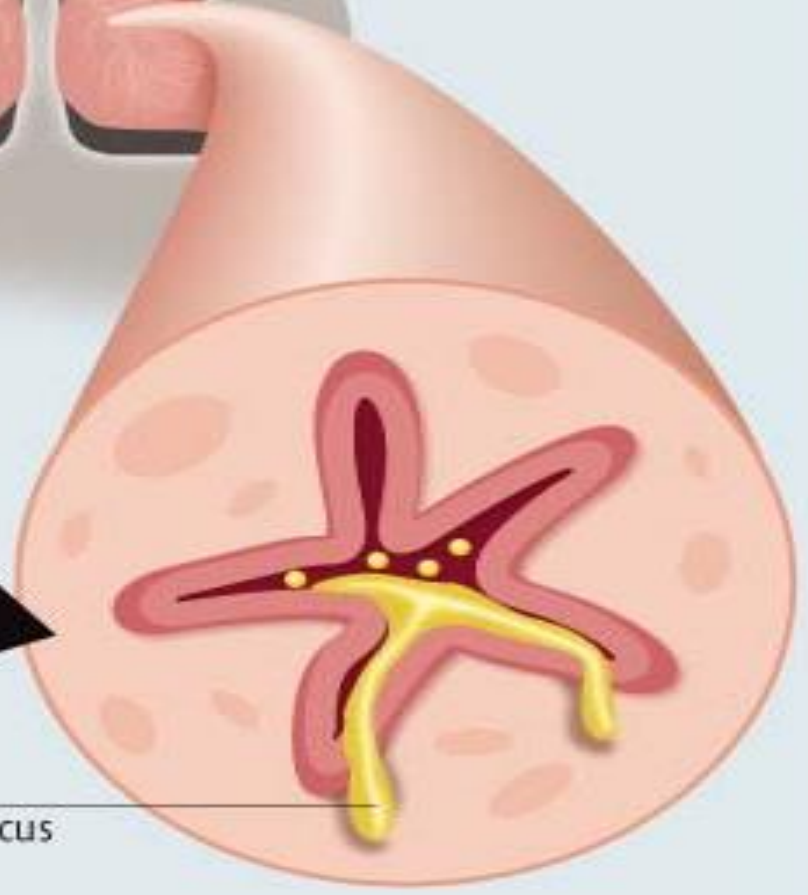
Bronchial tube in run-up to an asthma attack

Inflamed bronchial tube during an attack



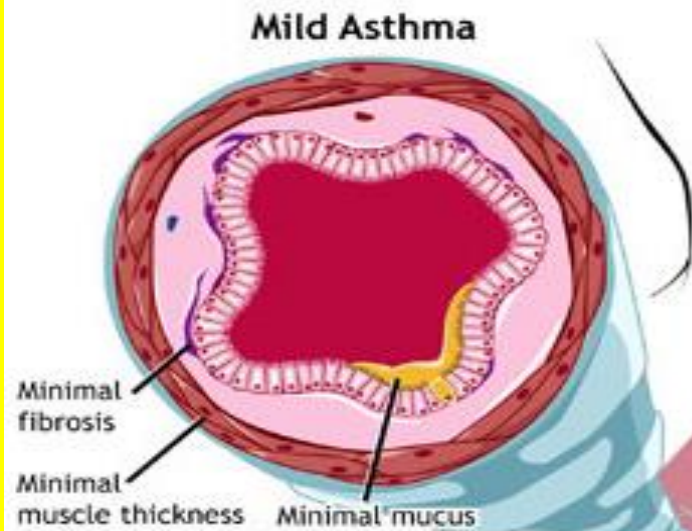
Cytokines

NKT cell

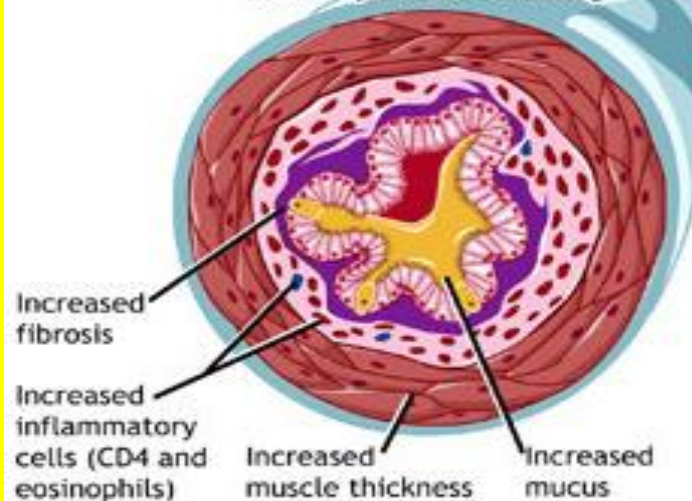


Mucus

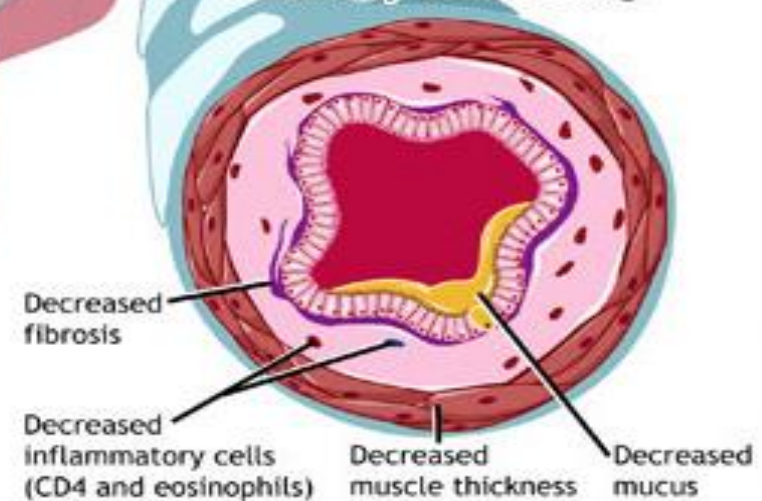
NKT cells release cytokines in response to allergens, triggering inflammation. The air passages become inflamed and mucus-filled



Chronic Asthma with Airway Remodeling



Effect of Inhibiting NF-κB on Airway Remodeling



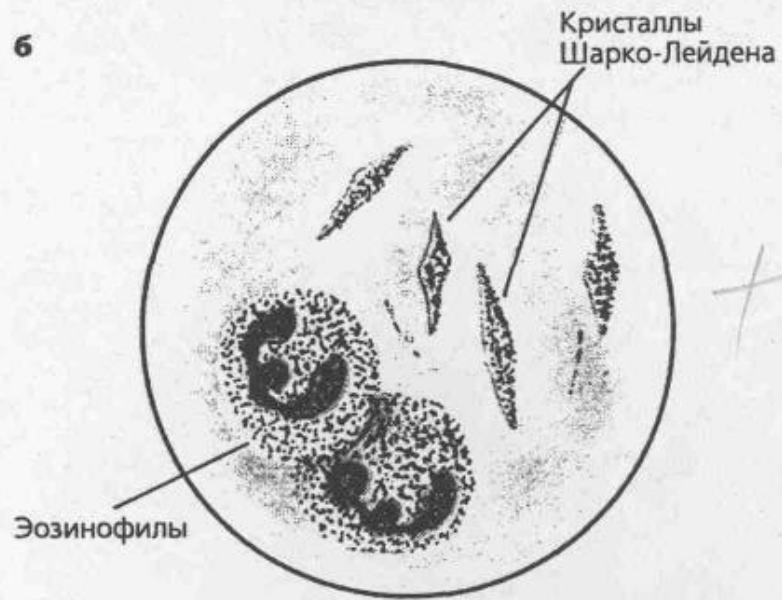
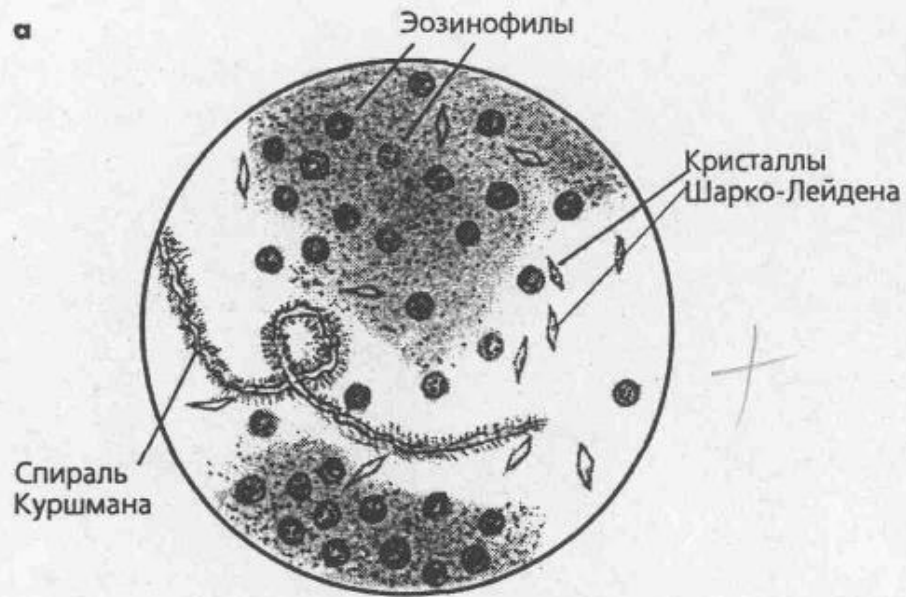


Рис. 2.24. Микроскопия мокроты больного с бронхиальной астмой: эозинофилы и кристаллы Шарко-Лейдена.

а — нативный препарат; б — окраска по Романовскому-Гимзе

STATUS ASTHMATICUS

Very heavy attack, which does not give in to therapy of β 2-agonists.

STATUS ASTHMATICUS

- Heavy aggravation
- Paradoxical pulse
- Participation of auxiliary muscles in breath
- Profuse sweating (diaphoresis)
- Orthopnoe
- Consciousness oppression
- Weariness (tiredness)
- Hypoxemia with respiratory and metabolic acidosis

Emphysema of lungs

Emphysema without destruction of interalveolar septums

- Involuntary or senile
- Hypertrophic or vicar (compensatory) after one side pneumonectomy
- Acute swelling of lungs

Emphysema with destruction of respiratory part of lungs

- Asthmatic type
- Bronchitic type

Classification

- Emphysema can be classified into **primary** and **secondary**. However, it is more commonly classified by location into panacinary and centroacinary (or panacinar and centriacinar, or centrilobular and panlobular).
- **Panacinar** (or *panlobular*) emphysema: The entire respiratory acinus, from respiratory bronchiole to alveoli, is expanded. Occurs more commonly in the lower lobes, especially basal segments, and anterior margins of the lungs.
- **Centriacinar** (or *centrilobular*) emphysema: The respiratory bronchiole (proximal and central part of the acinus) is expanded. The distal acinus or alveoli are unchanged. Occurs more commonly in the upper lobes.

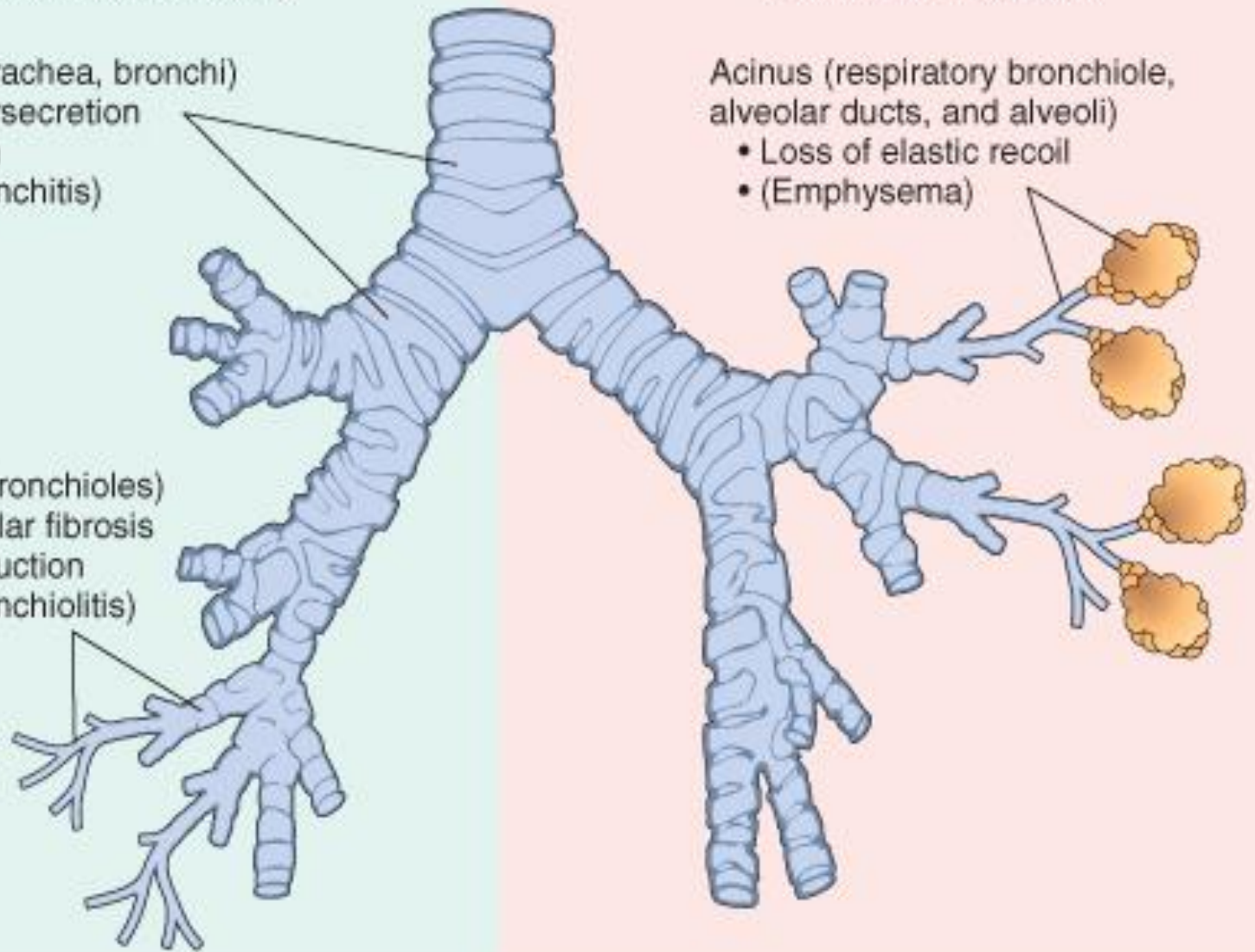
PURE CHRONIC BRONCHITIS

Large airways (trachea, bronchi)

- Mucus hypersecretion
- Inflammation
- (Chronic bronchitis)

Small airways (bronchioles)

- Peribronchiolar fibrosis
- Airway obstruction
- (Chronic bronchiolitis)



PURE EMPHYSEMA

Acinus (respiratory bronchiole, alveolar ducts, and alveoli)

- Loss of elastic recoil
- (Emphysema)

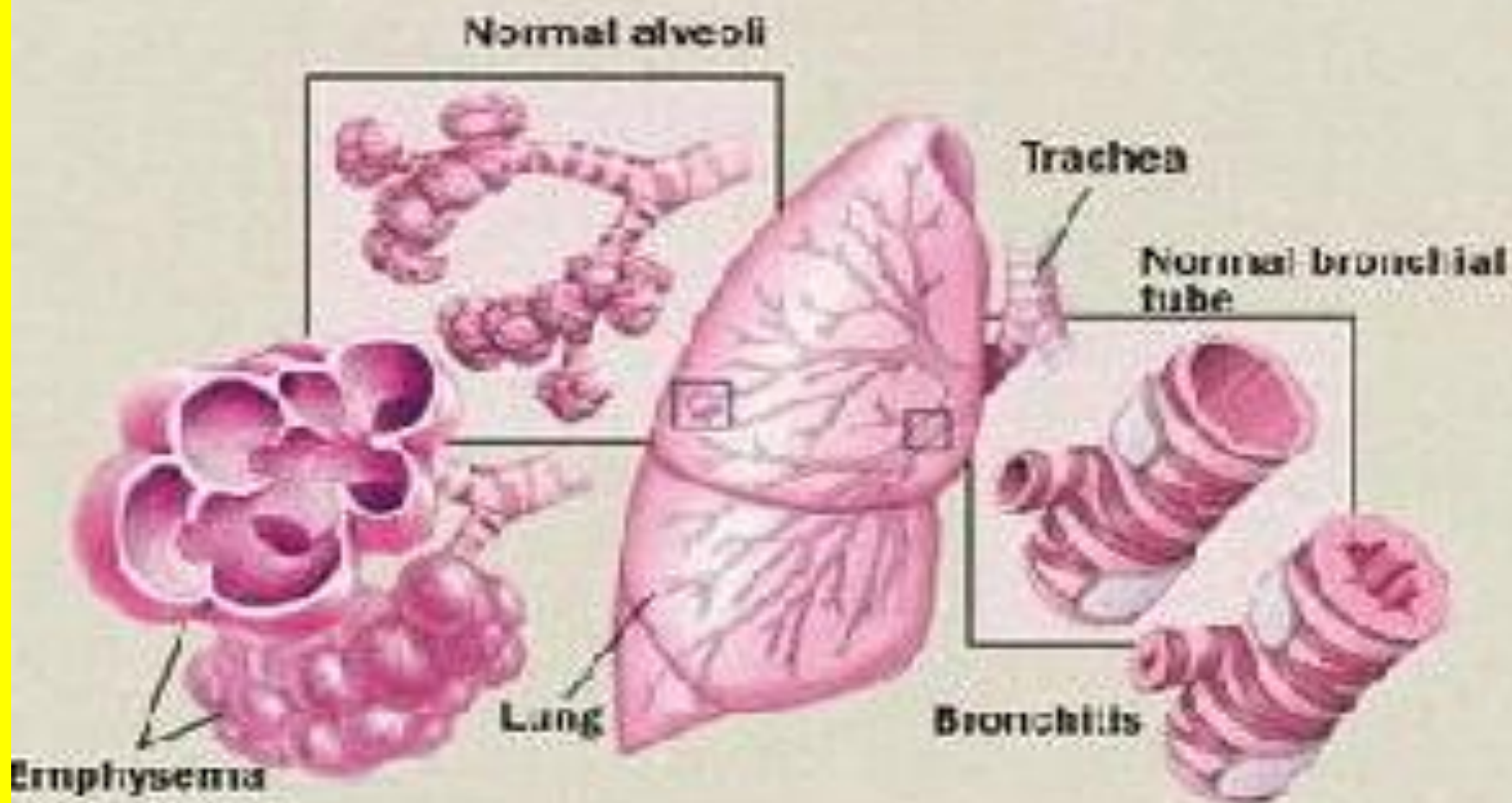
Congenital lobar emphysema

- CLE results in overexpansion of a [pulmonary lobe](#) and resultant compression of the remaining lobes of the ipsilateral lung, and possibly also the contralateral [lung](#). There is bronchial narrowing because of weakened or absent bronchial cartilage. There may be congenital extrinsic compression, commonly by an abnormally large [pulmonary artery](#). This causes malformation of bronchial cartilage, making them soft and collapsible. CLE is potentially reversible, yet possibly life-threatening, causing respiratory distress in the neonate.

Paraseptal emphysema

- **Paraseptal** emphysema is a type of emphysema which involves the alveolar ducts and sacs at the lung periphery. The emphysematous areas are subpleural in location and often surrounded by **interlobular septa (hence the name)**. It may be an incidental finding in young adults, and may be associated with spontaneous [pneumothorax](#). It may also be seen in older patients with centrilobular emphysema. **Both centrilobular and paraseptal emphysema may progress to bullous emphysema.** A bulla is defined as being at least 1cm in diameter, and with a wall less than 1mm thick. Bullae are thought to arise by [air trapping](#) in emphysematous spaces, causing local expansion.





With emphysema, the walls of alveoli are damaged by inflammation. Alveoli can lose their natural elasticity, become overstretched and rupture. Several adjacent alveoli may rupture, forming one large space instead of many small ones.

Chronic bronchitis is a chronic inflammation and thickening of the walls of your bronchial tubes, which narrows them. It often induces coughing spells.

- There is a genetic predisposition to emphysema. The relatively rare condition known as [alpha 1-antitrypsin deficiency](#) is the genetic deficiency of a chemical that protects the lung from damage by proteases.
(Primary emphysema)



Рис.2.39. Эмфизематозная грудная клетка: а - вид спереди; б - вид сбоку.

Эмфизематозный тип
больного ХОБЛ



«Розовые пытельщики»

Бронхитический тип
больного ХОБЛ



«Синие отечники»

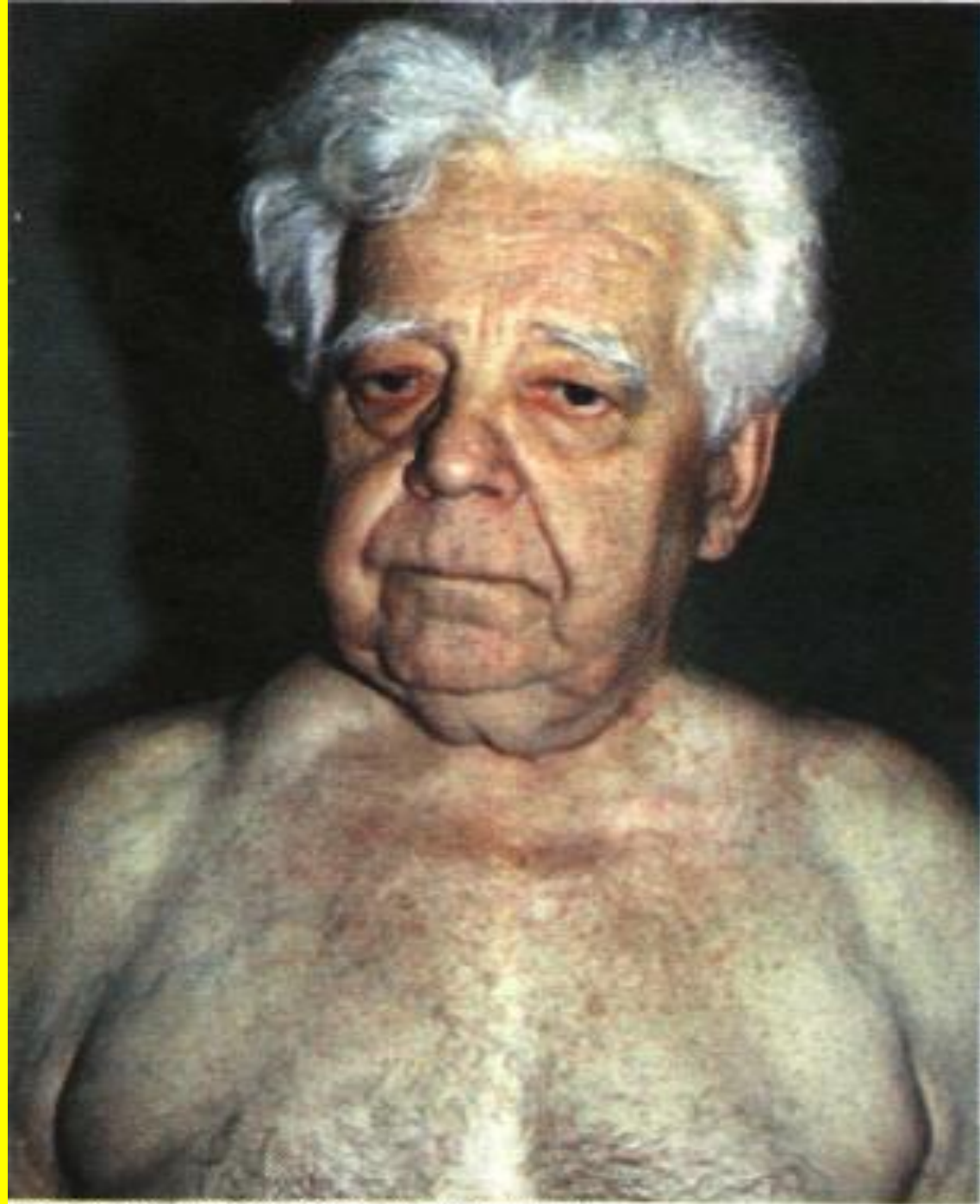
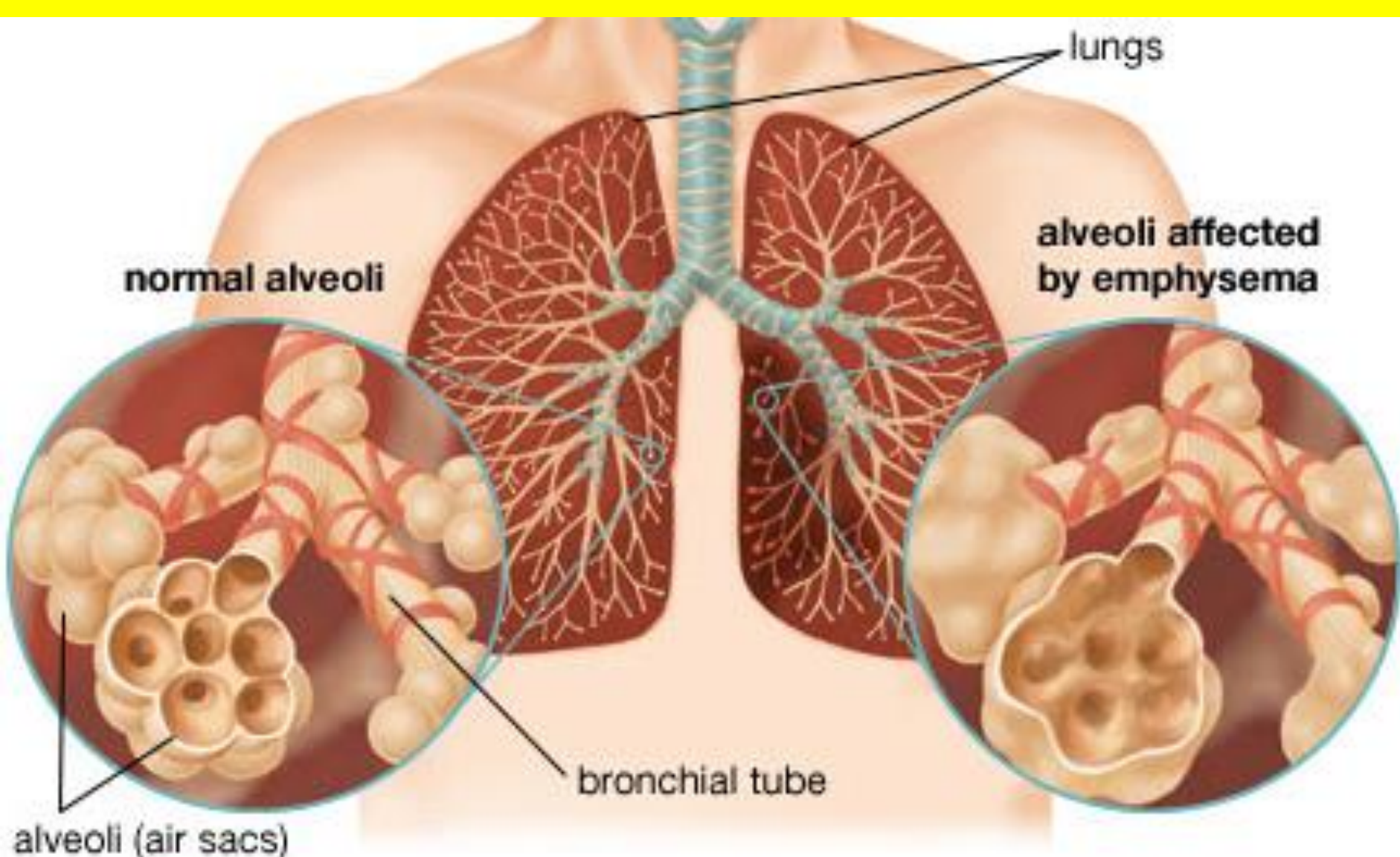


Рис.2.40. Эмфизематозная грудная клетка.



lungs

normal alveoli

alveoli affected by emphysema

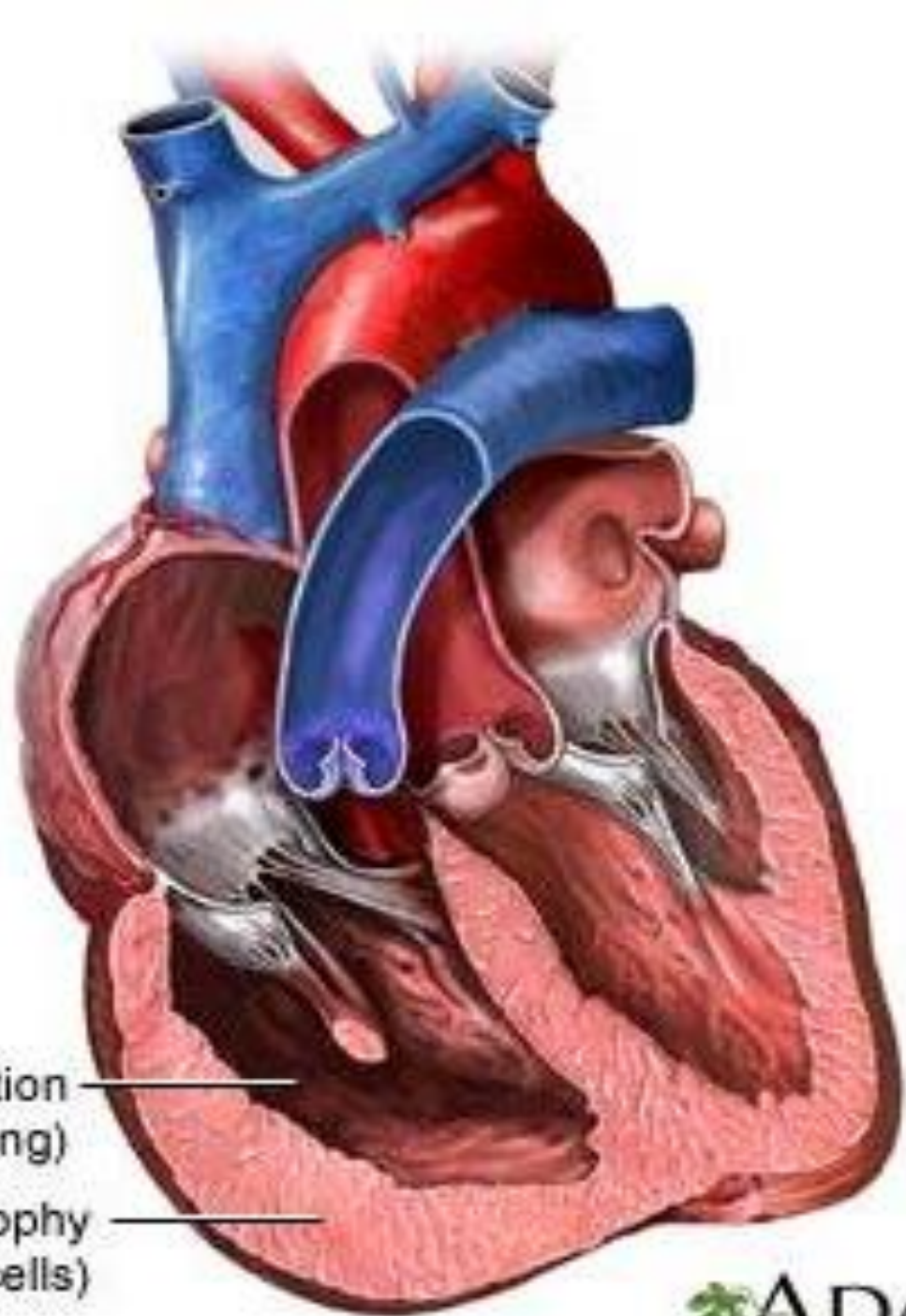
bronchial tube

alveoli (air sacs)

Cor pulmonale, or right-sided heart failure, is an enlargement of the right ventricle due to high blood pressure in the arteries of the lungs usually caused by chronic lung disease

Dilatation
(stretching)

Hypertrophy
(overgrowth of cells)



Pleurisy

- The pleura inflammation (infectious or not infectious) with formation of effusion (exudative) or – is more rare – with deposition of fibrin (dry)
- As a rule – it is secondary
- According to some authors pleural adhesions, which are the certificate of the had previous pleurisy are found out at autopsy in 48 % of accidents victims

Syndrome of presence of a liquid in a pleural cavity

Transudate

Circulatory insufficiency

Cirrhosis

Nephrotic syndrome

Exudates

Pneumonia

Tuberculosis

Lung infarction

Tumours primary

Tumours secondary

System diseases of connective tissue

ETIOLOGY

- The infectious: a tuberculosis (20-50 %) bacterial, fungous, parasitic
- The aseptic: carcinomatous (40 %), fermentative (a acute pancreatitis), allergic, system diseases of a connective tissue, posttraumatic, burn, uremic, radiological therapy

CLASSIFICATION

On an etiology:

- **The infectious**
- **Not infectious**

- **On character of effusion: fibrinous, serous--fibrinous, serous, purulent, putrefactive, hemorrhagic, eosinophils, chylous**

- **On a course: acute, subacute, chronic**

- **On spreading: diffuse, encapsulated**

CLASSIFICATION

On an etiology:

- **The infectious**
- **Not infectious**

- **On character of effusion: fibrinous, serous--fibrinous, serous, purulent, putrefactive, hemorrhagic, eosinophils, chylous**

- **On a course: acute, subacute, chronic**

- **On spreading: diffuse, encapsulated**

CLINIC

- Syndrome of a dry pleurisy
- Syndrome of exudative pleurisy
- Syndrome of pleural empyema
- Syndrome of the basic disease

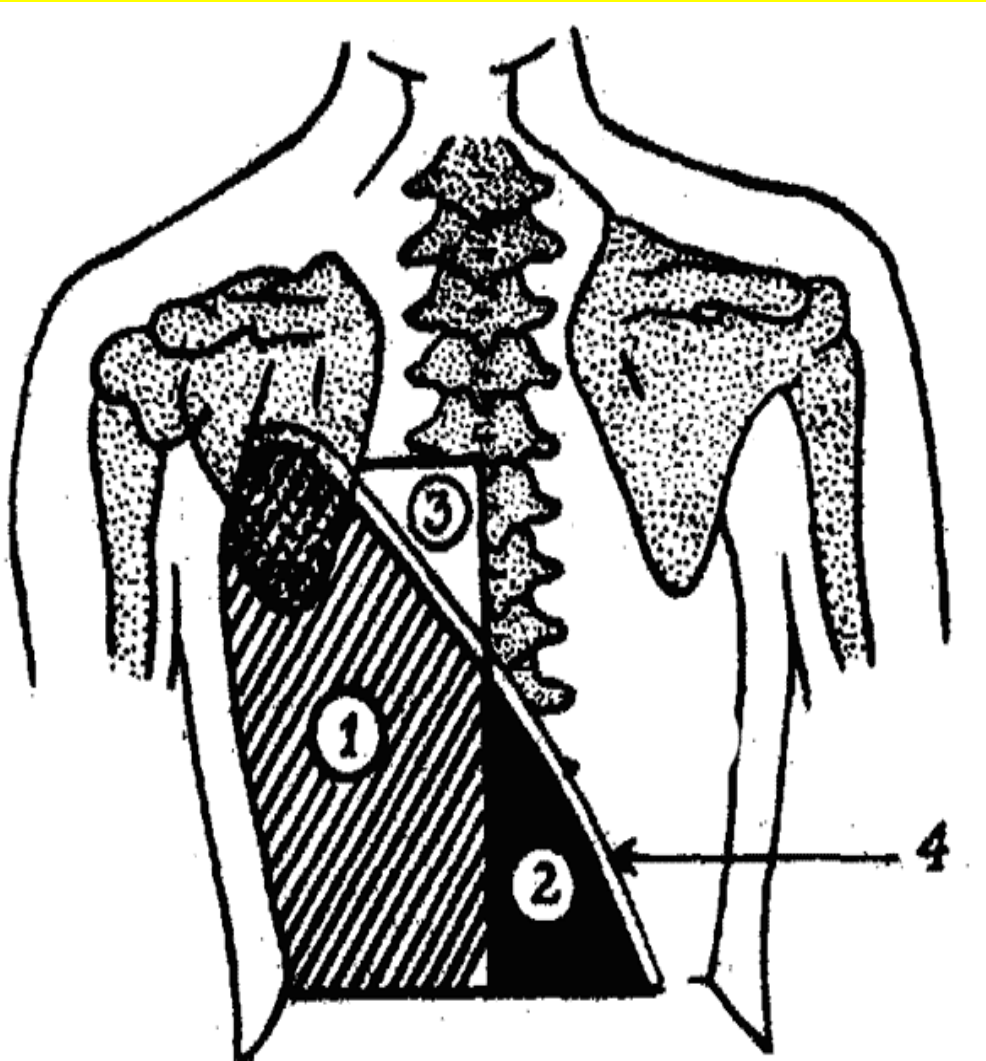
Clinic of a dry pleurisy:

- Pains at breath, cough, at an inclination to the opposite side
- subfibrile fever especially in the evenings; sweating
- Objectively: breath is superficial, speeded up, position of patient is forced (lies on the affected side to reduce a pain).
- At physical research along with symptoms of the basic disease the localized or extensive noise of a pleura friction will be listened.

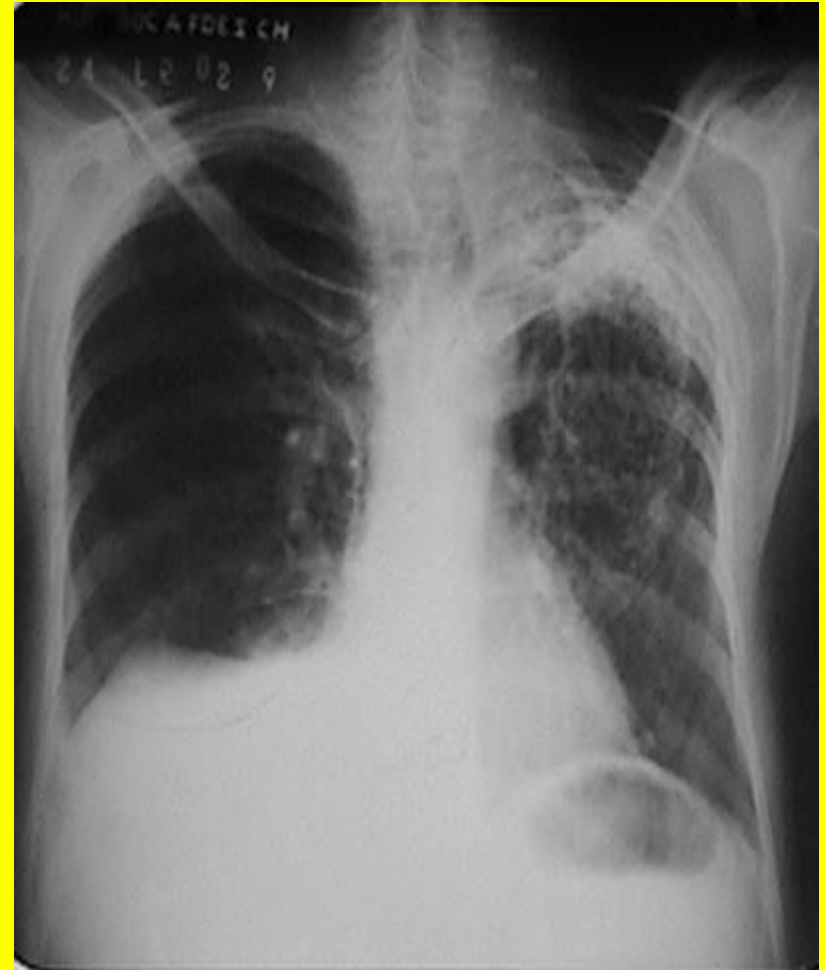
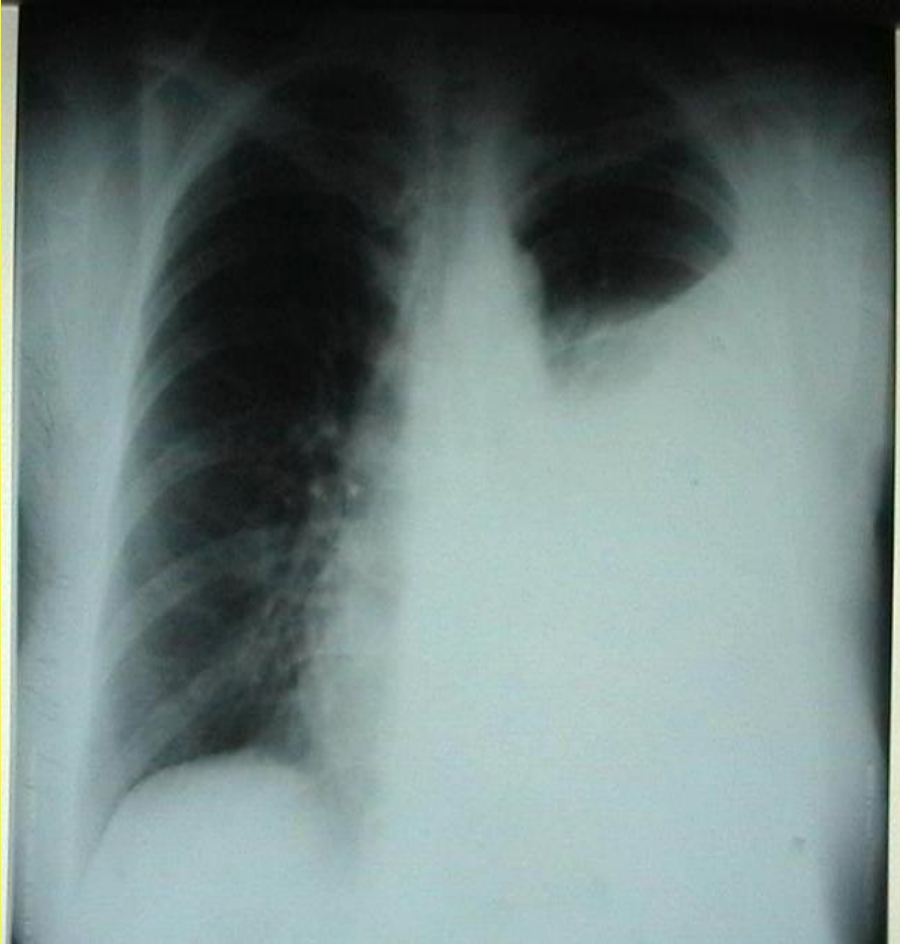
Exudative pleurisy

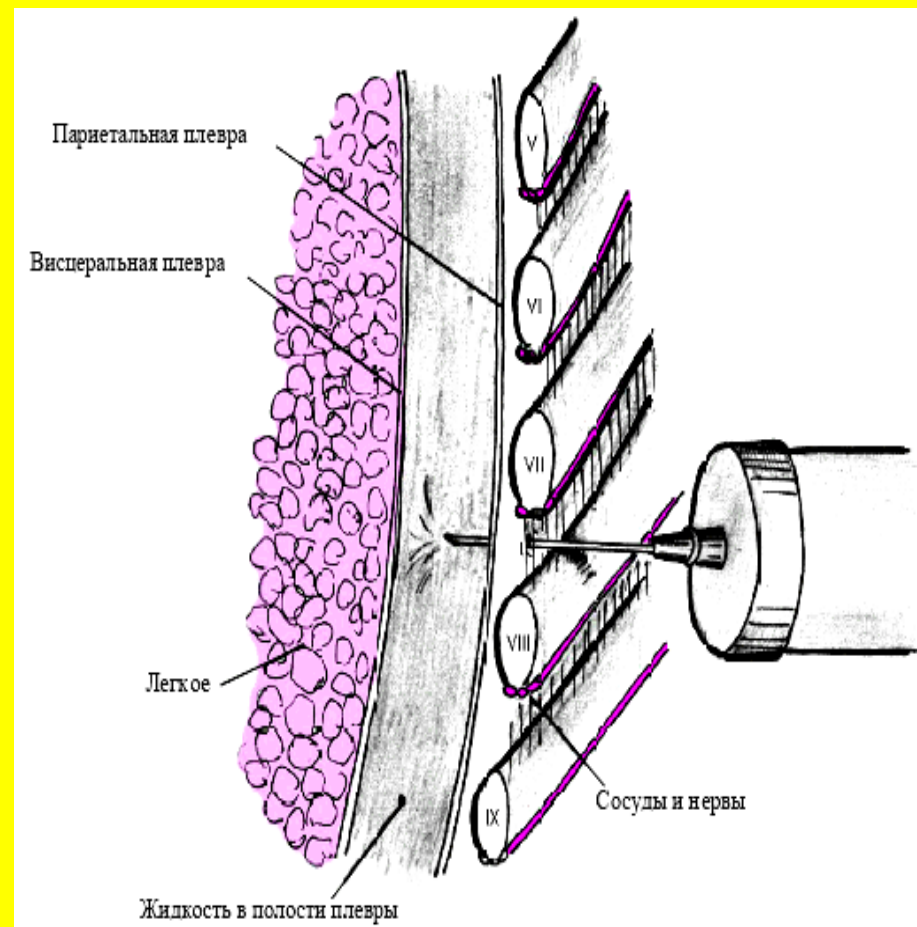
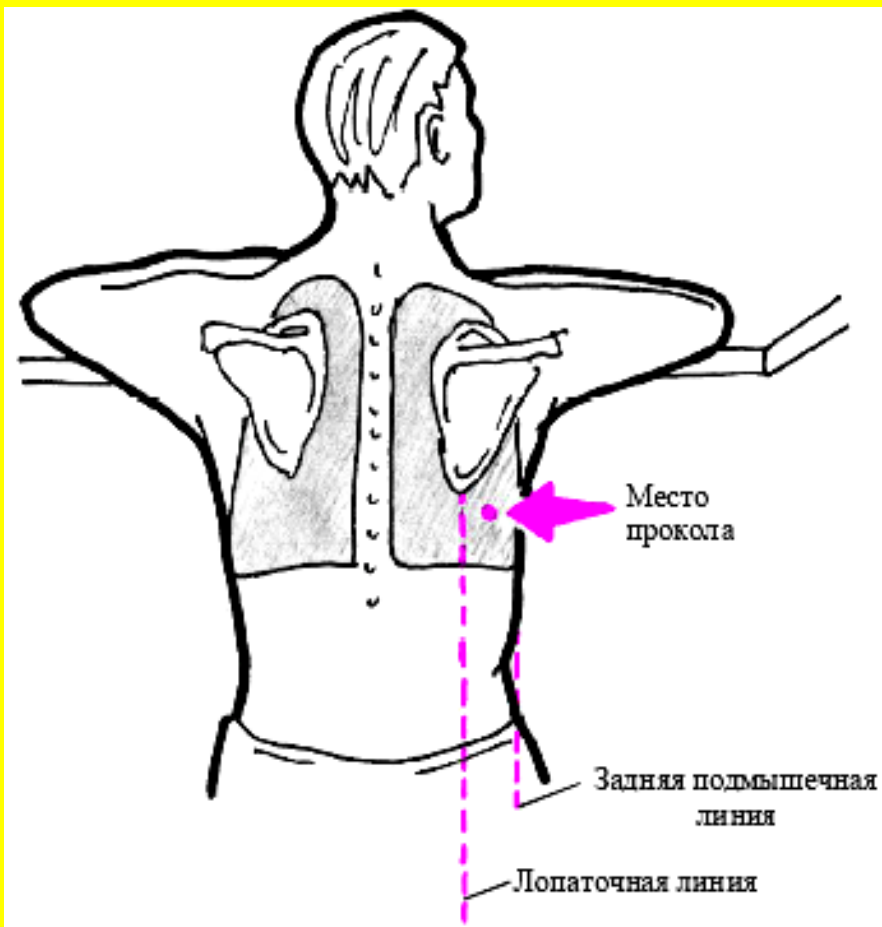
- Dyspnoea, dry or with poor sputum cough (reflectory)
- Feeling of weight in affected half of thorax
- At inspection: cyanosis, the bulked up veins of a neck, protrusion of intercostals spaces, the affected half lags at breath.
- At a palpation excursion is limited, vocal fremitus is not conduct.
- At percussion femoral dullness
- At auscultation breath is not conduct

- 1- exudates (dulling a pulmonary sound up to absolute "femoral" dullness);
- 2-triangle Rauhfus - Grokko (dulling a pulmonary sound);
- 3 - triangle of Garland (deaden-tympanic percussion sound);
- 4 - the top border of effusion has a kind of a parabolic line (a line of Sokolov- Elis- Damuazo).



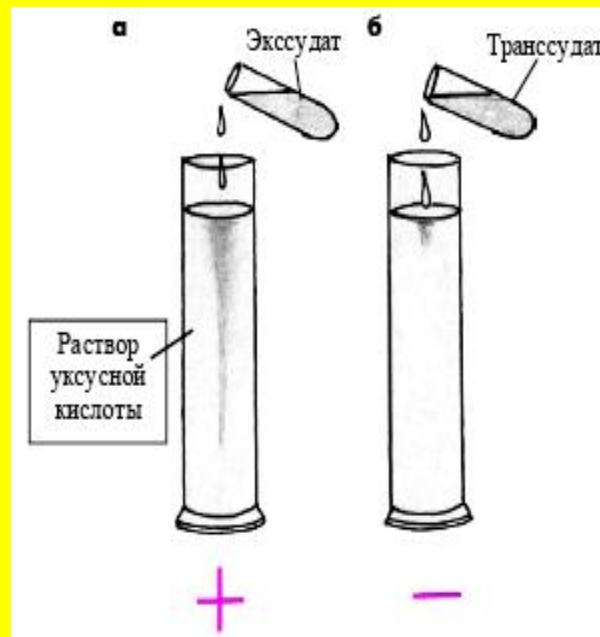
Research methods of pleurisy





Research of pleural contents

- **Definition of physical and chemical properties: quantity, color, a transparency, relative density, quantity of fiber, (test of Rivalt), glucose level**
- **Cytologic research**
- **Immunologic**
- **If necessary — microbiological**



Differences of transudate from exudates:

1. Specific density: transudate <1015
exudates >1015 .
2. Protein: transudate $<2,5 - 3,0 \%$,
exudates $>3,0\%$.
3. Test of Rivalt: in 100 ml distilled water 2-5 drops vinegar are dripped. If deposit is formed - exudates(due to serosomucin).
Exudates is richer with protein, in transudate it is not enough protein.