THE MINISTRY OF PUBLIC HEALTH OF UKRAINE
I.Ya. HORBACHEVSKY TERNOPIL STATE MEDICAL UNIVERSITY

TUBERCULOSIS

**By general editorship of Doctor of Medical Sciences,
Professor Pyatnochka I.T.**

*Approved by the Central Methodical Committee
for Higher Education of the Ministry of Health of Ukraine
as a textbook for students of the medical higher educational establishments
of III-IV accreditation levels*

Ternopil
"Ukrmedknyha"
2005

ВВК 55.4я 73
Т 81
UDK 616-002.5(075.8)

Reviewers: **M.I. Shved**, Doctor of Medical Sciences, Professor, Head of the Faculty Therapy Department with Endocrinology Course, I.Ya. Horbachevsky Ternopil State Medical University;
V.M. Freit, Doctor of Medical Sciences, Professor, the Phthisiology and Pulmonology Department, D. Halytsky Lviv State Medical University;
I.A. Prokop, Docent of the Foreing Language Department, I.Ya. Horbachevsky Ternopil State Medical University.

Т 81 **TUBERCULOSIS:** A teaching manual in English / I.T. Pyatnochka, S.I. Kornaha, L.A. Hryshchuk, V.I. Pyatnochka. – Ternopil: Ukrmedknyha, 2005. – 248 pp., bibliogr.: 18 entr.
Drawings 33, tables 13.
ISBN 966-673-016-2

The principal items of pulmonary and extrapulmonary tuberculosis, the basics of diagnostics, clinic, treatment, prophylaxis and organization of the fight against tuberculosis under present conditions have been elucidated in the concise and simple form.

The manual is assigned to students of medical institutions of higher education, in particular foreign ones, teachers conducting classes in English, doctors-phthisiologists, pulmonologists and other medical specialists.

ВВК 55.4я 73
UDK 616-002.5(075.8)

Translated from Ukrainian by **H. Pidperyhora**

Approved and recommended for publishing at the central medical committee of I.Ya. Horbachevsky Ternopil State Medical University

ISBN 966-673-016-2

CONTENTS

A LIST OF ABBREVIATED TERMS

ATK – alt tuberculin Koch
BCG – bacillus calmette-Guerin
BK – bacillus of Koch
FDTB – first diagnosed tuberculosis
WHO – World Health Organization
HINA – hydrazide of isonicotine acid
RC – respiration capacity
RI – respiratory insufficiency
LC – lung capacity
CO_2I – coefficient of oxygen intake
CRR – coefficient of respiration reserve
MCC – medicinal consultative committee
MBT – mycobacterium of tuberculosis
LMV – lung maximum ventilation
MPH – Ministry of Public Health
MVV – momentary volume velocity
MSCE – medico-social commission of experts
ISDC – international statistical classification of diseases
FEV_1 – forced expiration volume per 1 second
PASA – paraaminosalicylatis acid
PPD – purufied protein derivative
PVVexpir – peak volume velocity of expiration
PTM – pneumotachometry
IAMV – index of the air movement velocity
TRB – tuberculosis relapse
SG – spirography
AIDS – acquired immunodeficiency syndrome
AVV – average volume velocity
TU – tuberculin unit
USE – ultrasound examination
FEV – forced expiration volume
CLH – chronic lung heart
CULD – chronic unspecific lung diseases
MRV – minute respiration volume
CTB – chronic tuberculosis
RR – respiration rate
ERS – erythrocyte sedimentation rate

TO THE MEDICAL STUDENT AND DOCTOR

The tuberculosis is one of the oldest diseases, which is characterized by the damage of all organs and systems. The disease without any mercy punishes millons of people of different age and sex by the grave every year. Nevertheless, it is possible to evercome this dangerous, sometimes betrayable sickness by deep knowledge and aimed creative work.

The authors

PREFACE

The World Health Organization (WHO) proclaimed tuberculosis to be the global danger. According to its forecasts there will be 90 million new tuberulosis cases in the world during the decade. Of those who will fall ill approximately 30 million people may die in the current decade unless the reaction to this global problem radically improves.

Nowadays the world scientists distinguish threeunion tuberculosis epidemic: the first is the epidemic of typical tuberculosis that is treated well; the second is the epidemic of chemioresistant tuberculosis and the third one is the epidemic of tuberculosis and the AIDS.

According to the WHO criteria from 1995 tuberculosis epidemic has been registered in Ukraine in so far as tuberculosis patients comprise over 1 % of the total number of the population. The statistics of sickness in all the forms of tuberculosis in 2003 was 77,5 persons per 100 thousand of the population at the average planetary sick rate of 70,7 per 100 thousand of the population. In Ukraine tuberculosis kills over 80,7 % patients every year of the total number of deaths caused by infectious and parasitic illnesses. Moreover, if tuberculosis was registered not by appealing but by active revelation, the morbidity would increase 1,5 – 2-fold. Alarming is the fact that tuberculosis "has turned younger", its number among children, able-bodied and reproductive ages increases. Cases of family tuberculosis have become more often, besides that from year to year a larger number of patients with severe, dissiminated, neglected tuberculosis is noted. In general, 82 new cases of tuberculosis are registered in Ukraine and 30 patients die. About 10000 of our compatriots die yearly from tuberculosis. Much more frequent tuberculosis is registered among medical workers. In the period from 1990 to 2002 the rate of tuberculosis among the medical employees increased more than 1,5 times. Within 10 last years tuberculosis morbidity among the workers of dispensaries increased 26 times – from 30 (in 1990) up to 787 (in 2002) persons.

Epidemiological situation as to tuberculosis of agricultural animals also remains menacing. Up to 27 thousand cattle with tuberculosis are revealed in Ukraine every year, which is also a serious source of infection in Ukraine since morbidity range in animals is 2,7 times higher than in people.

Thus, the problem of the fight against tuberculosis in the world and particularly in Ukraine is too urgent and considerable efforts are needed for its solving, first of all on the state level, the community and the medical service.

That is why the knowledge of phthisiology is absolutely necessary for the doctors of any speciality. Besides, the authors hope the manual to be a useful up-to date sourse of information of phthisiology for students, first and foremost foreign ones, and a definite stimulus for learning and popularization of the Ukrainian phthisiology abroad.

HISTORICAL REVIEW

Tuberculosis, as an illness, is known since ancient times. The principal clinical manifestations of tuberculosis are described still by Hippocrate, Gallen, Avizenna. The fact that tuberculosis is infectious disease was confirmed by Fracastoro in the 16th century. It was Morton who published the first monography "Phthisiology or a treatise on the phthisis" (R. Morton, 1689) and named a science of tuberculosis "phthisiology" (from the Greek word "phthisis" – which means exhaustio. In the 17th century the French anatomist Sylviy, describing the hurt lungs of patients who had died of phthisis, used the word "hump" (tuberculum). However, it was only in the 19th century in France that pathologists and therapeutists G. Bayle, and then R. Laennec proved the hump and caseous necrosis to be specific morphological substratum of tuberculosis. In 1865 the French physician B. Villemin experimentally proved the infectious nature of tuberculosis, though he could not reveal the pathogene.

In 1882 the German bacteriologist Robert Koch (fig. 1) discovered the pathogene of tuberculosis, which was named bacillus of Koch (BK). He was also the first who obtained tuberculin with the hope to successful treatment of tuberculosis patients. These expectations of the scientist did not come true, nevertheless for the purpose of diagnostics tuberculine has been used for over 100 years.

Fig. 1. **R. Koch (1843-1910)**

M.I. Pyrohov studied clinico-morphological properties of tuberculosis of various localization and for the first time described typhoid form of miliar tuberculosis, histologic structure of tuberculous granuloma. Further study of pathomorphological alterations at lungs tuberculosis was proceeded by A.I. Abrykosov and A.I. Strukov.

In 1887 R. Philip in Edinburgh (Scotland) founded the world first antituberculosis dispansery. This new institution offered the patients not only medical but also social help, which later on laid the foundation of the organization of antituberculosis service also in this country.

In 1882 in Rome C. Forlanini offered artificial pneumothorax for treating lung tuberculosis patients.

In 1895 Wilhelm Kondrat Roentgen discovered X-rays, which have been widely used in medicine up to today. Actually, it's known well enough that X-rays were discovered by Ukrainian scientist Ivan Pulyuy (1845-1918) from Halichina 17 years earlier. However, he made his announcement about the discovery 7 days after Mr. Roentgen had made his one, thus the preference was given to Mr. Roentgen who received Nobel Prize.

In 1909 the first free hospital for tuberculosis patients was opened in Moscow.

An important achievement of the start of the 20th century was the creation by the French scientists Calmette and Guerin (1919) of the antituberculosis vaccine BCG (Bacilles Calmette, Guerin). Since 1935 mass vaccination began. At the same time in 1924 Abre in Brazile introduced the method of fluorographic observation of the population for active revealing lung tuberculosis patients.

In 1944 the American bacteriologist from Odesa S. Waksman obtained streptomycin, for which he was awarded the Nobel Prize (1952). PASA, tibon, GINA preparations (the most effective of them – isoniazidum, synthesized in Fox's laboratory. GB, 1951) came into practice somewhat later, and since 1965 rifampicinum, the most effective antimycobacterial medicine has been used.

Fig. 2. **F.G. Yanovsky (1860-1928).**

A noted contribution into the theory and practice of the national phthisiology belongs to F.G. Yanovsky (fig. 2), who organized the first bacteriologic laboratory in Kyiv and the first health resorts, improved the clinical methods of examination. In 1922 Kyiv Tuberculosis institute was founded on the basis of the 9th city tuberculosis hospital (Kyiv, Otradna Str. 32, today Manuilsky

street). Prof. F.G. Yanovsky was the initiator of its foundation and the institute scientific council head.

Our countrymen A.A. Kysel, O.S. Mamolat, M.M. Amosov, M.S. Pylypchuk, B.P. Yaschenko, Yu.I. Feschenko, V.M. Petrenko, V.M. Melnyk (Kyiv), B.M. Khmelnytsky, A.H. Khomenko (Kharkiv), I.T. Stucalo, Y.V. Kulachkovsky (Lviv) may be rightly named the coryphaei of phthisiology.

THE WORLD TUBERCULOSIS EPIDEMIOLOGICAL SITUATION

More than 6 billion people live on our planet now. More than 2 billion of them suffer from various diseases. Every fifth earthman lives in extreme need and poverty, which has become the main death reason in the world. Today tuberculosis is the most widely spread infectious disease which ranks first as to the deathrate among the people from infectious pathology. Moreover, new misfortunes are added. In 2001 A.D. there are 30-40 million carriers of the human immunodeficite virus in the world and 10 million AIDS patients, who increase the number of tuberculosis patients considerably.

According to the data of the World Health Organization half of the globe population is infected with tuberculosis mycobacteria. In some countries infectiousness of the population with tuberculosis reaches 80-90 %. This is also true about Ukraine. Every year each tuberculosis patient can infect 10-15 and more persons of which 5-10 % will catch the disease.

Every year 7-10 million people fall ill with tuberculosis all over the world, including 4-4,5 mln. – with bacterial secretion and about 3 mln. adults die of it (of these 97 % – in the developing countries) and approximately 300 thousand children. The total number of tuberculosis patients reaches 50-60 mln.

Nowadays tuberculosis is the most menacing illness for the whole mankind. It kills more patients worldwide than all the infectious and parasitic illnesses taken together. Present tuberculosis epidemic has acquired the global scales. In many parts of the world tuberculosis epidemic is beyond the control.

The highest tuberculosis statistics of sickness is noted in African and Asian regions, in the countries of the Pacific Ocean coast. Tuberculosis epidemic situation got worse in the countries of Europe too, especially in the countries of the former Socialist community.

In 1998 the lowest tuberculosis index was registered in the highly developed countries, such as Malta (4,2), Sweden (5), Norway (5,5), Iceland

(6,2), Italy (8,4 per 100000 of the population), the highest – in Romania (114,6), in the former Soviet Union, as in Kyrgystan (127,8), Kazakhstan (126,4), Georgia (124,4), Turkmenistan (86,1 per 100.000 of the population) (fig.3).

Fig. 3. **World map of infection TB incidence rates, 2001** (Source:WHO)

TUBERCULOSIS EPIDEMIOLOGICAL SITUATION IN UKRAINE

If one looks into the past, he will see that from 1965 to 1990 the morbidity of all clinical forms of tuberculosis decreased 3,6-fold or from 115,4 per 100 thousand population to 32,0 per 100 thousand population; the death-rate for these years decreased 3,3-fold or from 27,1 per 100 thousand population to 8,1 per 100 thousand population. However, starting from 1990 a crucial moment occurred in tuberculosis epidemiological situation, it started to grow, which is vividly reflected in epidemiological indices.

The epidemiological situation of tuberculosis is assessed according to the following indices: statistics of sickness, morbidity, death-rate and infication.

Statistics of sickness is the number of first revealed active tuberculosis patients during a year counted per 100 thousand population.

The statistics of morbidity in all forms of tuberculosis in Ukraine from 1990 to 2003 increased from 32 to 77,5 per 100 thousand population or 142,2 %. In 1999 there were 679671 tuberculosis patients in Ukraine, or 1,4 % of the whole population.

Tuberculosis process is subjected to the general laws of the epidemiological process, it appears and is supported only under the condition of interconnected three main links: the pathogene source, the mechanism of its transmission and the organism's receptivity to tuberculosis.

Prevalence (sickliness) is the total number of active tuberculosis patients registered at medicative institutions by the end of the year, estimated per 100 thousand population.

Mortality is the number of persons who have died of tuberculosis during a year, estimated per 100 thousand population.

The infestation index is used for the essessment of tuberculosis epidemiological situation. *Infestation of tuberculosis is the per cent of persons who positively react to tuberculine, compared to the number of examined patients, except the persons with aftervaccine allergy*.

In Ukraine under present conditions of tuberculosis epidemic the tuberculosis infestation of children aged 7-8 is 9 % and those of 13-14 – 20 per cent. In the age group under 40 the infestation is 80-90 per cent. Thus, tuberculosis infestation of population differs and it increases from year to year. It depends upon many factors: the level of the population tuberculosis sickliness, living conditions, general and sanitary culture of the population, active tuberculosis fight in the country.

At the same time, the WHO experts dream and suggest the following criteria of liquidation of tuberculosis as a wide-spread illness: revealing not more than one patient with bacterial extraction per ten millions population per year, the total statistics of sickness up to 20 per 100 thousand population and infestation of 14-yearolds – not more than 1 per cent.

ETIOPATHOGENESIS AND PATHOLOGICAL ANATOMY OF TUBERCULOSIS

The stimulus of tuberculosis belongs to the wide group of mycobacterium, related with lower organisms such as actinomyces (from Greek words *actis*– ray and *myces* – fungus). There are different names of the stimulus of tuberculosis: Koch's bacillus, mycobacterium of tuberculosis.

Tuberculosis is an infectious disease and its stimulus is mycobacterium of tuberculosis (MBT): genus Mycobacterium, kind Mycobacteriacea, class Actinomycetales.

To the genus Mycobacterium, kind Mycobacteriacea there belong aerobe stiff gram-posirive lineal or curved mycobacterium steadfast to acid and spirit. They grow slowly or very slowly (saprophytic quite quickly).

Mycobacterium are widely spread in the surrounding: water, ground, plants, animals. Nowadays approximately 50 classes of them are found out, a class includes approximately 200 kinds: typical is Mycobacterium tuberculosis. According to the mark proper pathogenic and saprophytic kinds are distinguished. Atypical mycobacterium (by classification of Runyon, 1959), depending on a color of colonies and speed of growth they are divided into 4 groups:

1) photochromogenic – cause pigmentations of colonies at light (M.kansasii, M.marinum);

2) scotochromogenic – the most widely spread group, cause yellowish and orange pigmentations in the dark (M.aquae, M.flavescens, M.scrofulaceum, M.gordonae and M.paraffinicum);

3) nonphotochromogenic – not causing pigmentations or cause it in a small amount (M.xenopi, M.avium, M.intracellularae, M.gastri, M.nonphotochromogenicum, M.terrae, M.triviale);

4) quickly grown – (M.phlei, M.smegmatis, M.fortuitum, M.marinum).

Among the pathogenic mycobacterium, depending on their pathogenicity for humanums and animals there are distinguished the following kinds:

M.tuberculosis – human tubercle bacillus,

M.bovis – bovine tubercle bacillus,

M.africanum (African) – found in western tropic Africa: it has the qualities typical for the previous kinds.

M.tuberculosis – thin or slightly curved bacillus measuring 1,0-10,0 x 0,2-0,6 mkm with slightly curved tips, in cytoplasm there are granulose formations, without spores and capsules (fig. 4, 5). Gram-positive aerobes. Their main feature is steadfastness to acid, alkali and spirit, which is caused by the presence of lipid fraction, mycolyc acid, in particular. They reproduce fissiparity, approximately in 14-18 hours. Under the influence of environment, changes of living the morphological, cultural and biological qualities of mycobacterium tuberculosis change. They sometimes produce coccal, granules, filterable and L-form formations – the process is called *persistence*. The recurrence from persisting forms to bacterial is called *reversion*. Usage of antimycobacterium medicine leads to medicamental steadfastness to MBT.

The infection of fetus usually occurs in two ways: hematogenic, transplacental or within aspiration and swallowing amniotic waters, mucus

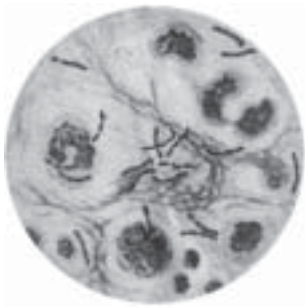


Fig. 4. **Mycobacterium tuberculosis**
Mag. 70. Coloured according to Tsil-Nilsen

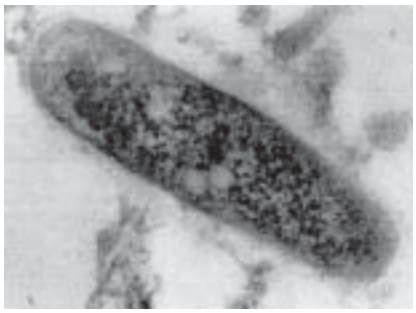


Fig. 5. **Mycobacterium tuberculosis under electron microscope**

of genitals if a pregnant woman is ill. In hematogenic way of infection MBT penetrate from a mother to a child through umbilical vein, piercing to liver or Auranti venosus duct to heart and lung. In hematogenic way of infection primary affect is formed in the liver of fetus.

There are three types (species) of pathogenic MBT: human (M. tuberculosis), bovine (M. bovis) and African (M. africanum). All of them are very stable in the environment, in particularly, they are preserved in the soil for 1-2 years, in basins – up to 5 months, in the road dust – up to 10 days, in premises at the dissipated sunlight – up to a month and a half, in excrements and on pasture-grounds up to a year, in butter, cheese kept in a fridge – 8-10 months, on books'pages – 3 months. At the temperature of 200 C MBT preserve their vital activity during 7 years. Boiling liquid sputum kills MBT in 5 minutes. Under the action of the sun rays MBT die in an hour and a half, and that of ultraviolet radiation – in 2-3 minutes.

Atypical (conditionally pathogenic) MBT under certain conditions can be pathogenic for a man and cause mycobacteriosis – an illness similar to tuberculosis.

Human tuberculosis in 85-97 per cent of cases occurs as a result of the infestation with human, in 2-15 per cent with bovine and very rarely – with avian MBT type.

Sick people and animals, secreting MBT, are the source of human tuberculosis infestation. A pathogene, depending on the organ hurt, is secreted into the environment with sputum, excrements, urine, milk, sperm etc. Infestation occurs most often by aerogenic (90 %), contact (5-6 %), rarelier alimentary (1-2 %) and extremely rarely by intrauterine way.

Principally those are children, rarely teenagers and adults who face tuberculosis infection for the first time. MBT, having penetrated into the respiratory tract, can by the system of mucocyliar clearance – gleaming epithelium, with mucus, be excreted out of bronchi, thus preventing their contact with alveolar macrophages. Otherwise, at initial infestation MBT encounter with polynuclears and phagocytes and undergo phagocytosis. Macrophages go to ruin and MBT and their fragments are excreted into the intercellular space, joined with J-proteine and enzymesmediators (interleikine-1) which activate T-lymphocytes. The latter, in their turn, excrete mediators – lymphokines (interleikine-2), which speed up the migration of macrophages, their fermentative activity according to MBT. The mediators mentioned above also activate B-lymphocytes, which are transformed into plasmatic cells, capable of producing immunoglobulins – specific antibodies against MBT antigens. However, the role of humoral immunity has not been fully elucidated yet. The mechanisms of cell immunity, carried out by sensibilized T-lymphocytes, particularly, their subpopulation and correlation (T-helpers activate macrophages, T-suppressors depress them, T-killers can stick to the cells that phagocytized MBT and destroy them together with the infect) are more important. The substances secreted at increased macrophage enzyme activity promote the development of inflammation reaction, and under the action of MBT phosphotides macrophages turn into epithelioid and gigantic Pyrohov-Langhance cells, a tuberculosis granuloma is formed (fig. 6). Alongside with it, the destruction of mycobacteria together with macrophages and the surrounding tissues by T-killers occurs, resulting in caseous necrosis.

Dry caseos is mainly formed in the center of the tuberculosis granuloma and is an unfavourable medium for MBT reproduction. Further dynamics of the infection process depends upon the scale of the bacterial population and the perfection of the immune systems of the organism.

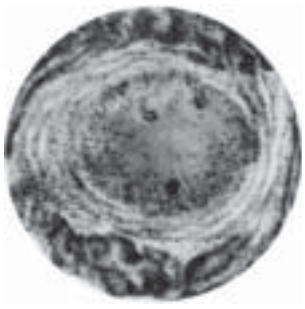


Fig. 6. **Tuberculosis granuloma**

At a small number of MBT, in the process of the development of the immunity, their multiplication slows down, the inflammatory reaction weakens, the specific granuloma sclerotizes, and mycobacteria transform into persisting forms, which maintain relative acquired immunity. Positive tuberculin reaction

is an indication of immunologic reconstruction, which manifests itself in 3-12 weeks after infestation and lasts to the end of one's life. Under certain unfavourable conditions, in months-years, persisting MBT forms can reverse into virulent ones, that results into reactivation of specific inflammation process and the development of the secondary forms of tuberculosis.

At intensive multiplication of a considerable population of mycobacteria the activity of T-helpers decreases, the activation of macrophages is inhibited and the number of T-suppressors increases, gradually tuberculosis process progresses and the primary forms of tuberculosis develop. The primary tuberculosis emerges after a veering of tuberculin reactions, it is characterized by an expressed hypersensitivity of an organism with an obligatory lesion of the lymphatic system and a bent to infection spread hematogenously and lymphogenously, not seldom with a hurt of cereous membranes and the presence of paraspecific reactions.

CONTROL QUESTIONS

1. Who discovered tuberculosis pathogene and when?
2. Where and whom was the first world antituberculous dispensary founded by?
3. An important achievement by the French scientists Calmette and Guerin in 1919
4. Who obtained streptomycin and when, for which he was awarded the Nobel Prise?
5. When were the most effective antimycobacterial preparations (isoniazidum and rifampicinum) synthesized?
6. The outstanding phthisiologists of Ukraine.
7. What part of the globe population is infected with tuberculosis mycobacteria?
8. What is yearly global tuberculosis morbidity, on what continents is it the highest?
9. What do you know about the present day tuberculosis epidemiological situation in Ukraine?
10. What is tuberculosis?
11. Tuberculosis pathogene, its properties and types.
12. The source of human tuberculosis infestation.
13. The ways of tuberculosis infection.
14. The structure of tuberculosis granuloma.

TESTS

1. When did Robert Koch discover the pathogene of tuberculosis?
   A. 1865
   B. 1882
   C. 1887

D. 1919
E. 1944

2. Who of Ukrainian scientists discovered X-ray earlier than Roentgen?
A. O.A.Kysel
B. B.M.Khmelnytsky
C. F.G.Yanovsky
D. I.Ya.Horbachevsky
E. I.P.Puluy

3.Who was the first to recommend artificial pneumothorax for treating tuberculosis patients?
A. R.Koch
B. R.Philip
C. C.Forlanini
D. A.Calmette and Guerin
E. S.Waksman

4. Isoniazidum was synthesized in the laboratory of:
A. S.Waksman
B. Fox
C. R.Koch
D. R.Roentgen
E. R.Philip

5. What percentage of the globe population is infected with tuberculosis?
A. 5 %
B. 10 %
C. 15 %
D. 30 %
E. 50 %

6. Each tuberculosis patient can infect annually:
A. 1-5 persons
B. 10-15 persons
C. 25-30 persons
D. 35-40 persons
E. 45-50 persons

7. What percentage of MBT infected become ill with tuberculosis?
A. 1-2 %
B. 3-4 %
C. 5-10 %
D. 15-25 %
E. 30-40 %

8. The total number of tuberculosis patients in the world is:
A. 3-5 mln

B. 10-15 mln
C. 20-30 mln
D. 40-45 mln
E. 50-60 mln

9. The world first antituberculosis dispansery was founded by:
A. R. Koch
B. R. Philip
C. A. Calmette and K. Guerin
D. Abre
E. F.G. Yanovsky

10. The antituberculosis vaccine BCG was produced by:
A. R. Koch
B. S. Waksman
C. A. Calmette and K. Guerin
D. F. Seibert
E. M. Linnykova

11. Who synthezided the streptomycin?
A. Fox
B. Waksman
C. A. Calmette and K. Guerin
D. K. Forlanini
E. Abre

12. What is the most probable distance at the infectioning by MBT by the aerogenic way?
A. To 1,5 m
B. To 3,5 m
C. To 4,5 m
D. To 6 m
E. To 10 m

METHODS OF INVESTIGATION OF A TB-PATIENT

The methods of investigation of respiratory (tuberculosis) patients are conveniently divided into three groups.

The First group *– compulsory (obligatory) methods, which embrace clinical examination of a patient (complaints, anamnesis, examination, palpation, percussion, auscultation), thermometry, X-ray investigation (fluorography, X-raygraphy, X-rayscopy), sputum analysis for MBT, Mantoux tuberculin test (with 2 TU), general blood and urine test.*

The Second group *– additional (supplementary) methods, which include repeated sputum analysis (bronchial lavage water) for MBT, tomography of the lungs and mediastinum, protein-tuberculin tests, immunologic tests, instrumental examinations (bronchoscopy, biopsy, bronchography, pleuroscopy).*

The Third group *– facultative (optional) methods: investigation of the outer breathing function, blood circulation, liver and other organs and systems.*

Tuberculosis is an infectious disease, caused by MBT, and is characterized by the development of specific inflammation in injured organs and polymorphism of clinical symptoms – intoxication and local syndromes.

Within the range of the likely evidences of the general TB intoxication, the most frequent are general weakness, indisposition, drop of the ability to work, sweating, appetite drop, weight loss, sleep disturbance, rise of body temperature. Body temperature in TB patients can vary – it can be normal, subfebrile, febrile and even hectic. However, the most often it is subfebrile, which is characterized with pronounced lability and the absence of monotony. Patients often endure the high temperature easily.

At the beginning of the illness the sweating is low. Profuse sweat, mainly at night, characterizes the pronounced of exudative, caseous specific processes.

The local manifestations of lung tuberculosis are: prolonged cough, sputum secretion, haemophthisis, chest pain, shortness of breath.

Cough is the most frequent symptom in patients with lung TB. At the initial stages of the process the cough is quiet, not frequent, in the form of light constant hacking cough. Persistent convulsive loud cough characterizes for patients with tuberculous bronchoadenitis and tuberculous endobronchitis.

At the beginning of the illness, the sputum can not be secreted or can be secreted only a bit. With the progress of the tuberculosis, in particular the distructive, process, the patient may secret up to 200 ml of the sputum, which can be mucous or mucous-purulent and can be without any unpleasant smell.

Chest pain is often present already at the beginning of the illness, which is caused by the extensive process in the lungs. Acute sudden pain appears at spontaneous pneumothorax.

Dyspnea is not characteristic for the initial forms of TB, except for the miliary TB and the exudative pleurisy. At the chronic extensive process, complicated with breathing or pneumo-cardial insufficiency, dyspnea can be brightly expressive.

Hemoptysis and bleeding may be present at any form and phase of the process, but more often – at destructive forms of TB, and more rarely – at

posttuberculous pneumosclerosis with bronchoectasia. Hemoptysis is characterized by the presence of veins, blood admixtures in the sputum and of separate blood spits. At pulmonary bleeding, much more of pure blood is coughed up in one time (over 10 ml), continuously or with breaks. Blood is usually bright-red, foamy, with tiny air bubbles; it doesn't have tendency to coagulation. After the bleeding or hemoptysis stops, blood clots are coughed up for several days more; and due to the blood aspiration, the boby temperature rises.

The beginning of tuberculosis illness may be without any symptoms, subacute and rarely – acute. While interviewing a patient it is very important to find out a fact about his contacts with tuberculosis patients. To the point, persons, living amidst nidi of tuberculosis infection (the patient, suffering from the tuberculosis, who excretes the mycobacteria, the place where he lives and people, who live with him), 5-10 times more often contacting tuberculosis. Of great importance is the information about endured in the past "flu", pneumonia, exudative pleurisy, under which mass tuberculosis can run; accompanying illnesses, working conditions, harmful habits etc.

The formal examination at initial forms of tuberculosis reveals no patient's visible abnormalities. However, in most patients, at the more advanced stages of the disease one can find manifestations of tuberculosis intoxication: eyes lustre, hectic blush on the background of a face pale skin; paraspecific tuberculosis manifestations (knotty erythema, keratoconjunctivitis, phlyctenae) enlarged peripheral lymphatic nodes, fistulas or scars after them, chest deformation. Palpably: often lowered skin turgor, muscles tone, micropolyadenite, positive "fork-shaped" symptom (putting 2 fingers above the sternum from the both sides of trahea, it is possible to feel its dislocation to the side of injury), which is observed at unilateral lung cirrhosis, atelectasis. Increased voice tremor above infiltration or cirrhosis zones, weakened – at exudative pleurisy, pneumothorax.

Percussively: shortened and dull percussion note is defined above the airless lung tissue or in the spheres of its lowered (weakened) pneumatization at infiltrates, nidus-fibrous transmutations (changes) and exudative pleurisy. Tympanic note occurs above the strenuous spontaneous pneumothorax, a gigantic cavity. However, more often shortening of percussion note is observed above the cavern.

The standing hight of the lungs apex and the width of Crening's spheres (fields) decreases as a result of nidus, infiltrating or fibrous changes in the upper sections of the lungs.

Auscultation should be performed consistently above the symmetrical sections of the lungs at quiet deep breathing with the patient's half-opened mouth. With a view to provoke crepitation, the patient should be asked to cough slightly at the end of the expiration. Herewith the doctor should stay at the patient's side to avoid infestation.

It is necessary to find out the type of breathing (vesicular, bronchial, mixed) and additional murmurs (moist, dry rales, crepitation, pleura friction murmur). Weakened vesicular breathing is defined at lung emphysema, exudative pleurisy, pneumothorax and high caloric diet; strengthened – at emaciation, cirrhosis and lung infiltration process. Rough or bronchial breathing may be heard above a thickened lung tissue (infiltrate, cirrhosis, fibrosis), amphoric respiration – above a large cavern with fibrous walls and a wide draining bronchus. Important from the diagnostic point of view are local moist rales, which are auscultated after the hacking in the "alarm zones": frontally, above and beneath the clavicle, from the behind above the lungs, near a scapula spine and between scapulae. Local small-bladdered moisty rales are the indication of the beginning of lung tissue destruction, while those of medium-and-great-bladdered – the indication of a cavern. In addition to this, medium-or-great-bladdered rales above the upper sections of the lungs is an essential indication of the decay cavity. Dry rales occur at bronchitis, whistling ones – at bronchitis with a bronchospasm. At dry (fibrinous) pleurisy the murmur of pleural rub is heard.

CONTROL QUESTIONS

1. Local and general manifestations of a TB-patient.
2. Peculiarities of the disease and life anamnesis of a TB-patient.
3. The importance of the contact with a tuberculosis patient in the development of the disease.
4. Peculiarities of a lung tuberculosis patient examination (face appearance, possible changes on the skin, the thoracic cage form).
5. Palpation of peripheral lymph nodes, determination of voice tremor and "fork-shaped" Rubinstein symptom.
6. Comparative and topographic percussion, lung limits, standing hight of the lungs apex, Crening's spheres.
7. Auscultation (types of breathing, dry and moist rales, pleura friction murmur).
8. Name the "alarm zones"in which auscultative changes are most frequently available at lung tuberculosis.

TESTS

1. Patient P. is ill with infiltrative tuberculosis of the upper part of the right lung, the decay phase, MBT (+). Which breathing murmurs do you hope to hear above the affected area?
   A. Dry sibilant rales
   B. Crepitation
   C. Pleura friction murmur
   D. Bronchial breathing
   E. Moist rales of various calibres
2. A lung tuberculosis patient. Over the upper part of the right lung – the percussive sound with tympanic inflection, auscultatively – amphoric respiration. What changes in lungs can one think about?
   A. Infiltration of lung tissue
   B. Cirrhosis of a lung
   C. Lung atelectasis
   D. Gigantic cavern
   E. Spontaneous pneumothorax
3. A 6-years old boy with primary tuberculosis complex; the pleura friction murmur is heard at the right above the lower part of the thorax. What pathological changes can you think about?
   A. Spontaneous pneumothorax
   B. Dry pleurisy
   C. Exudative pleurisy
   D. Pleuropneumonia
   E. Empyema pleurisy
4. The "fork-shaped" symptom is determinated in patient S. What pathological changes can you think about?
   A. Primary tuberculosis complex
   B. Spontaneous pneumothorax
   C. Lung cirrhosis
   D. Dry pleurisy
   E. Tuberculosis of intrathoracic lymphatic nodes
5. Mediumbladdered moist rales are heard between scapulas in a lung tuberculosis female patient. What do such changes testify about?
   A. Nidal shades on the lung tissue
   B. Bronchitis
   C. Presence of decay cavities
   D. Spontaneous pneumothorax
   E. Lung atelectasis

6. At what disease may the "fork-shaped" symptom be determined?
   A. Disseminated lung tuberculosis
   B. Lung tuberculoma
   C. Dry pleurisy
   D. Lungs cirrhotic tuberculosis
   E. Silicotuberculosis
7. The local manifestations of tuberculosis are:
   A. Subfebrile body temperature, cough, headache, shortness of breath, general weakness
   B. Haemophthisis, shortness of breath, chest pain, prolonged cough, sputum secretion
   C. Pain in the heart, subfebrile body temperature, cough, haemophthisis, shortness of breath
   D. Pain in the liver sphere, shortness of breath, cough, haemophthisis, subfebrile body temperature
   E. Vomiting, hoarse voice, cough, shortness of breath, sputum secretion.
8. How many times more frequent do "contacts" fall ill with tuberculosis than "noncontacts"?
   A. 2-4
   B. 5-10
   C. 15-20
   D. 25-30
   E. 31-35
9. During the provokation the crepitation is heard twice more frequent. Method of crepitation provokation.
   A. Deep breathing
   B. Breathing with open mouth
   C. Slight coughing at the end of the expiration
   D. Breathing through the nose
   E. Quiet breathing
10. What type of breathing is typical in the projection of the infiltrative lung tuberculosis?
   A. Vesicular
   B. Amphoric
   C. Mixed
   D. Bronchial
   E. Saccade
11. While interviewing a patient with the suspicion of tuberculosis, the most important is:
   A. Marital status

B. Profession
C. Life conditions
D. Contact with the patient suffering from tuberculosis
E. The presence in the private forms of a cattle injured with tuberculosis

METHODS OF THE X-RAY DIAGNOSTICS

Roentgenologic examination is one of the main methods of diagnostics of tuberculosis and unspecific respiratory diseases. The following methods of roentgenologic diagnostics are used: roentgenoscopy, roentgenography, fluorography, tomography, computer tomography, target roentgenography, bronchography, fistulography, angiopulmography and bronchial arteriography, pleurography, kymography and polygraphy.

Roentgenoscopy is performed in various positions of a patient, at various respiration phases that allows to study the function of the diaphragm, heart pulsation, to choose the optimum spot for the puncture as well as prior to a target roentgenography, at performing bronchography, fistulography, angiopulmography etc.

In general, nowadays, lung roentgenoscopy is rarely done, more often by means of apparatus with electron-optical transformer. First of all an examining roentgenoscopy is done, during which the chest form is defined, transparence and the width of the lung fields, localization and the sizes of the shade of the mediastinum and the heart, mobility of the cupolas of the diaphragm and the rib front sections. After the examining roentgenoscopy the screen field is narrowed by the diaphragm and a more detailed examination of the lung tissue structure and pathologic changes is done.

Roentgenography allows to discover and fix on a film such morphological lungs structures, which are not visible at roentgenoscopia, to keep roentgenograms, to compare them in dynamics; and the most important is the fact, that radiation doze of a patient is much less, than at roentgenoscopy.

The disadvantage of the roentgenography is its statics, that doesn't allow to judge about the organ function. However, the implication of the serial roentgenography and roentgenocinematography considerably level that shortcoming.

Normally the left lung is narrower and longer than the right one, mediastinum organs are localized between medial ends of clavicles at the background of the shadow of the sternum and the spine.

In the right lung there are 3 lobes (upper, middle and lower), in the left one – 2 (upper and lower). The lobes (upper and lower) are divided by the interlobular splits. Slanting interlobular split comes equally in the right and left lungs: from the level of the 4th thoracal vertebra sidelong down and forward to the cross with the 7th rib. On the right the horizontal split, that comes from the level of junction of the 4th rib and the sternum to the cross with the slanting interlobular split, divides the upper and middle lobes. Each lung has 10 segments. But sometimes there can be only 9 segments in the left lung (fig. 7).

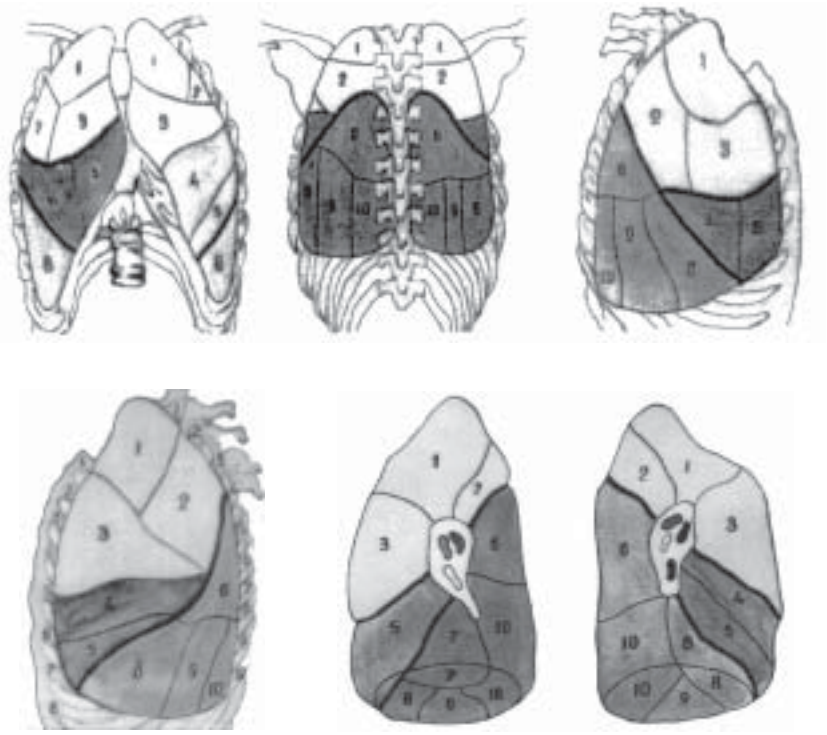


Fig. 7. **Lobe and segmental structure of the lungs.**
Segments of the right lung: 1 – upper, 2 – rear, 3 – anterior, 4 – exterior, 5 – interior, 6 – upper of the lower part, 7 – inferointerior, 8 – inferoanterior, 9 – inferoexterior, 10 – inferoposterior.
Segments of the left lung: 1 – uper, 2 – rear, 3 – anterior, 4 – upper-uvular, 5 – lower-uvular, 6 – upper of the lower part, 8 – inferoanterior, 9 – inferoexterior, 10 – inferoposterior.

The tuberculosis process is most often localized in the 1st, 2nd and 6th, sometimes in the forward and basal segments. To define the localization of the process more precisely the roentgenogram in the lateral proection has to be done.

Lungs roots. The roots of the lungs are localized in the medial parts of the lungs, next to the heart shadow along two intercostals from the 3d rib down, gradually shifting the lungs picture.

Anatomic substratum of roots – large arterial and venous vessels, bronchi, groups of lymph nodes, connective tissue with lymphatic vessels and nervous trunks. Roentgenologically three parts are distinguished in the root: the head, the body and the tail. The head of the root is formed by the arcs shadows of main branches of the pulmonary artery and is localized at the level of the 3d rib and the 3d intercostal. The body of the root is formed by the shadows of the descending part of the pulmonary artery trunk and other vessels. The lower tail portion is formed by the shadows of lower veins and shifts the lung picture of lower lung portions.

The lungs picture is caused by the branches of pulmonary artery and veins vessels, that's why it is also called vascular. During various pathological processes in the lungs, the picture may be intensified and indistinct. Sometimes a large vessel, having a transversal position, may form a shadow of round form resembling a fire. To specify the character of that shadow, the examination of the patient in various projections should be made.

The main roentgenologic shadows at lung tuberculosis are nidus (diameter to 1 cm), infiltrative (diameter over 1 cm), ringshaped and linear shadows. Shadows are distinguished according to their sizes as small (diameter to 2 mm), medium (3-5 mm) and large (6-10 mm) nidus ones and according to their compactness – of weak, medium and great intensity.

A shadow in diameter of over 1 cm is called infiltration or tuberculoma.

Before the analysis of the roentgenogram, the quality of its technical performance should be estimated. That should be done in the definite consequence: the completeness of the examined object scope (the whole thorax should be depicted on the roentgenogram – from the apex up to the phrenicocostal sinus); the patient's position during the roentgenogram execution (at the proper patient's position, the distance between the medial edges of the clavicles and the spines of the 3d dorsal vertebrae are located symmetrically, scapulae shadows are depicted outward beyond the lungs margins; preciseness and contrastness ("preciseness and contrastness" assume

nice outlining of every roentgenogram detail with different shades); and, at last, "strictness" (at optimal strictness of a roentgenogram, 3-4 upper dorsal vertebrae are clearly visible) of the roentgenogram.

Inspection roentgenography is carried out in the straight (right) (front and back), lateral and oblique projections. To define more accurately the localization and the character of the pathological process, a roentgenogram in a lateral projection is used.

The *target roentgenography* is done on a limited lung strip and in such a position of a patient as to get the most optimum picture of pathological changes, concealed behind the chest bone formations.

Tomography is the layer examination of a certain organ, in particular, the lungs. It allows to study in detail the structure of a pathologic formation at a respective optimum depth, chosen on the basis of the results of lateral roentgenography or roentgenoscopy .

Computer tomography is based on mathematical analysis of the intensity of absorption of the X-rays by tissues of various compactness and their transformation into the scheme, which reflects the pattern of diametrical layers of a human body on different levels (fig. 8). Computer tomography allows to make more precise the localization and the spread of the pathologic process of lungs and mediastinum, reveal minute changes in pleura, in intrathoracic lymphatic nodes.

Fluorography is the principal method of mass examination of population, with big productive capacity and high informativeness it being done in various projections.

However, the radiation dose of a person under examination is somewhat higher than that at roentgenography; that is why children undergo inspection roentgenography.

Bronchography is applied for examining the bronchial tree, for revealing bronchoectases, their number and form, as well as for revealing cavities. The procedure is made on an empty stomach, predominantly at the local anaesthesia, after which a contrast material (propiliodon, sulphoiodlipol etc.) is introduced through the catheter under the control of roentgenoscopy and roentgenography in two projections is done.

Fistulography. The method is applied for examining patients with various thoracic fistulas (thoracic and thoracobronchial). A contrast material (iodinelipol, propiliodon oil and water solutions) are introduced into the fistula and roentgenograms in necessary projections are performed.

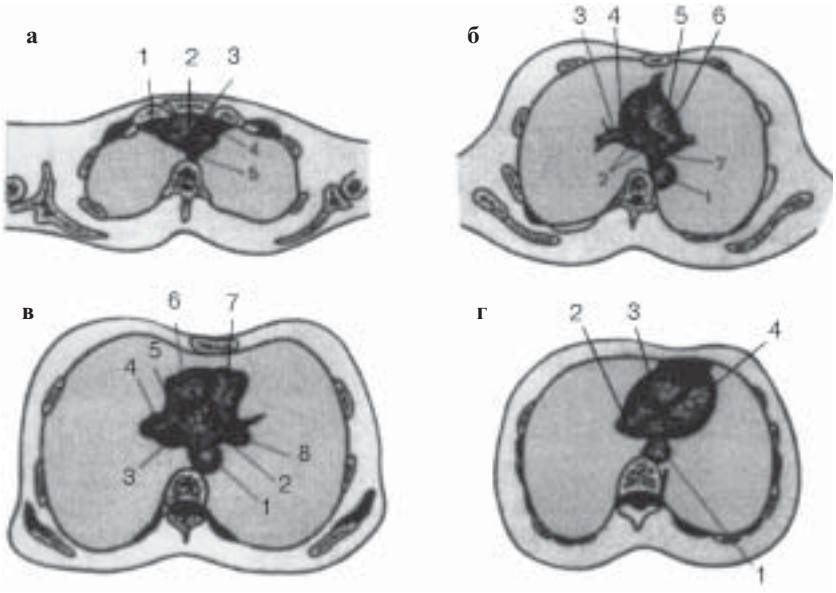


Fig. 8. **Normal computer tomograms of the chest cage (Gabunija R.I. etc., 1893)**

а – at a level sternoclavicular joints: 1 – right brachiocepalica vein; 2 – a trachea; 3 – common carotid atery; 4 – left brachiocepalica vein; 5 – esophagus;
б – at a level of trachea bifurcation: 1 – a descending aorta; 2 – the main bronchial tubes; 3 – a trunk right lung arteries; 4 – vein cava superior; 5 – lung trunk; 6 – lung artery; 7 – esophagus;
в – 2 cm is lower than bifurcation trachea: 1 – a descending aorta; 2 – the left main bronchial tube; 3 – the right main bronchial tube; 4 – right lung artery; 5 – vein cava superior; 6 – an ascending aorta; 7 – lung trunk; 8 – lung artery;
г – above a dome of diaphragm: 1 – a descending aorta; 2 – the right auricle; 3 – right ventricle; 4 – left ventricle.

Pleurography is predominantly performed to patients with pleural empyema to make its limits more precise. First the empyema contents is aspirated, then roentgen contrast material is introduced into the cavity (propiliodon, urographine, verographine) and roentgenograms in several projections are performed.

Angiopulmonography and bronchial arteriography are roentgenocontrasting methods of examining lung vessels of the small (angiopulmonography) and the large (bronchial arteriography) circles of blood circulation. Angio-

pulmonography: after catheterizing of the heart right sections and the lung artery under roentgenologic control a contrast material is introduced and a series of roentgenograms are performed. The aim of the examination is the diagnostics of thrombosis, the lung artery emboly as well as the study of pneumofibrosis degree.

Bronchial arteriography is catheterization, contrasting and roentgenography of bronchial arteries and their branches. The main indications are repeated lung haemorrhages and haemoptysis from the unknown source.

Kymography and polygraphy are applied for defining the mobility of the diaphragm and the heart.

Ultrasound examination (USE). At the respiration organs illnesses an ultrasound is applied, chiefly, for the examination of pleura, the function of the right ventricle of the heart and the pressure in the lung artery. USE is not applied for lung examination in so far as the filling of the lungs with air distorts the injures contours. The ultrasound method is applied for making pleura illnesses more precise, especially for the differentiation of a fluid and condensed (compact) elements.

Ultrasound examination, in particular, *bimeasured echocardiography* is applied to control the right ventricle index and the thickness of the fore-wall of the right ventricle, to define the time interval between closing the right auriculoventricular valve and opening the valve of the lung trunk. The data obtained show the degree of the correlation between hemodynamics and the parametres of the lung function.

Magneto-resonance examination. The method is applied for examining patients as it provides a sufficient contrast between fat tissue of the mediastinum, compact formations and vessel structures, allowing to indentify injures without intravenous introduction of a contrast material. The faults of the method: impossibility to define calcification, insufficient information about lung parenchyma.

CONTROL QUESTIONS

1. Methods of roentgenologic examinations of lungs and indications to their application. The criteria of the quality assessment of roentgenogram technical performance.
2. Advantages of roentgenography as compared to roentgenoscopy.
3. What is a lung pattern on a roentgenogram in a norm caused by?
4. The anatomic structure and a roentgenologic pattern of a lung root of a healthy person.

5. Partial and segmental lung structure and their localization on the right and lateral roentgenograms.
6. What four types of pathological shadows at lung tuberculosis do you know?
7. The most frequent localization of tuberculous process in lungs.

TESTS

1. The principal method of revealing lung tuberculosis at mass examination of population.
   A. Roentgenoscopy
   B. Computer tomography
   C. Bronchography
   D. Fluorography
   E. Target roentgenography
2. To confirm the presence of bronchoectases one should perform:
   A. Target roentgenography
   B. Inspection roentgenography
   C. Fistulography
   D. Tomography
   E. Bronchography
3. What is the nidus shadow?
   A. The darkening with the diameter to 2 mm
   B. The darkening 2-4 mm in diameter
   C. The darkening 5-10 mm in diameter
   D. The darkening with the diameter to 1 cm
   E.The darkening from 1 cm to 2 cm in diameter
4. A pathologic shade about 1 sm in diameter of small intensity with vague contours has been found in patient P., 29 years of age, at roentgenologic examination, to the right above the clavicle. Define the type of the pathologic shade.
   A. Nidus
   B. Infiltrative
   C. Nidus-infiltrative
   D. Ringshaped
   E. Linear shadow
5. The most frequent segmental localization of secondary forms of lung tuberculosis:
   A. I, II, III
   B. II, III, IV
   C. III, V, VI
   D. I, II, VI

E. II, III, X

6. To confirm the presence of fluid in the pleural cavity one should perform:
   A. Fluorography
   B. Tomography
   C. Bronchography
   D. Laterography
   E. Target roentgenography
7. When were X-rays discovered?
   A. In 1882
   B. In 1895
   C. In 1944
   D. In 1951
   E. In 1965
8. How many criteria are used to assess the quality of technical performance of survey roentgenogram?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
9. How many parts (roengenologically) does the lung roof consist of?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
10. How many segments may the left lung have?
   A. 8-11
   B. 8-12
   C. 9-10
   D. 9-11
   E. 9-12
11. To prove the small form of the tuberculosis bronchoadenitis it is necessary to carry out:
   A. Target roentgenography
   B. Bronchography
   C. Tomography
   D. Roentgenography in lateral projection
   E. Fluorography in the inspiration and expiration

12. The percent of the patients suffering from pulmonary tuberculosis in Ukraine, which were found at the mass fluorography examination.

A. 5 %
B. 15 %
C. 25 %
D. 35 %
E. 50 %

TASKS

1. A darkening to the right paracardially of a medium intensity with an enlightening in the centre has been revealed on an inspection roentgenogram of the thoracic cage organs of a ten-years old patient.

Define: a) the shade character, b) the process localization, c) what morphologic changes correspond to the given roentgenologic pattern.

The answer: a) infiltration, b) a roentgenogram in a lateral projection, c) infiltration with decay.

2. A pathologic shade about 1 cm in diameter of small intensity with vague contours has been found in patient Z., 25 years of age, at roentgenologic examination, to the right above the clavicle. The patient's general condition is good.

a) What type of pathologic shade is it?
b) What is expected activity of tuberculous process?

3. An extended tumour-like root of the left lung has been found on a roentgenogram of a boy aged 6.

a) What roentgenologic syndrome do the similar pathologic changes refer to?
b) What additional roentgenologic examinations should be performed?

4. A ring-shaped shade has been found on an inspection roentgenogram of a thoracic cage under the clavicle to the left.

a) Define the segmental localization of the pathologic process.
b) By means of what roengenologic method can one define the localization of this shade more accurately?

5. What pathologic formations in the lungs may a ring-shaped shade correspond to: 1... 2... 3...

6. An inhomogeneous darkening with vague contours and an enlightening in the centre has been revealed to the right under the clavicle at a fluorographic examination.

a) What roentgenologic syndrome does this pathologic shade correspond to?
b) Segmental localization.
c) Name 2-3 illnesses with a similar roentgenologic picture.

LABORATORY EXAMINATION

The source of infestation of human beings are tuberculosis human patients and animals secreting tuberculosis mycobacteria. The material for revealing MBT are sputum, bronchial lavage waters, faeces, urine, fistula pus (matter), pleural cavity exudate, spinal fluid, punctates and bioptates of various organs and tissues.

Sputum examination for MBT is of great epidemiological and clinical importance. When there is no sputum or it is scarce, expectorants, irritant aerosol inhalations, bronchi lavage are administered.

Methods of Revealing Mycobacteria: *1. Bacterioscopy* is one of the main methods of revealing MBT; it includes ordinary bacterioscopy, flotation and luminescent microscopy. An ordinary bacterioscopy is accessible to all, simple and quick to do. In smears, coloured according to Tsil-Nilsen, MBT are revealed when not less than 50000 microbic bodies are present in 1 ml of pathologic material. According to the "instructions for bacteriologic diagnosis of the tuberculous infection" of the Ministry of Health Protection of Ukraine, order № 45 dtd. 06.02.2002, MBT can be revealed if their quantity is 5000 – 10000 bacterial cells in 1ml of the pathologic material. Under the microscope MBT look like bacilli of the red colour on the blue background.

Flotation method (enrichment or concentration of MBT in a small volume, caused by droplets of benzine, benzole, xylol or toluene on the surface of a retort ring) is applied in cases when there is a small number of MBT in the pathologic material and at negative results of ordinary bacterioscopy. Flotation method provides for 10-15 % more often revealing MBT in comparison to direct bacterioscopy.

Luminescent microscopy is based on the ability of MBT, coloured with fluorochroms, to illuminate under the influence of ultraviolet rays and performing microscopy at small magnification, increasing by 15-30 % the sensitivity of the method in comparison to direct bacterioscopy and by 10 % in comparison to the flotation method.

2. Bacteriological method consists in the following: sputum or another material, after preliminary special treatment, is sown on nutritive media (hard, blood, semisynthetic) (fig. 9). More often hard egg Lewenstein-Yensen medium is used. 20-100 microbial bodies in 1 ml of sputum is enough for revealing MBT culture. The first colonies appear on the 14-30-th day of cultivation. The negative result is given only in 2,5-3 months from sowing. This method

of revealing MBT allows to define their vitality, virulence, group (differentiate from acid resistant saprophytes and atypical MBT) and species origin, as well as their resistance to antimycobacterial preparations. In addition to this, according to the data of bacteriological examination quantitative essessment of bacterial secretion is made: miserly-up to 20 colonies on a nutrient medium, moderate – from 20 to 100 and massive – more than 100 colonies.

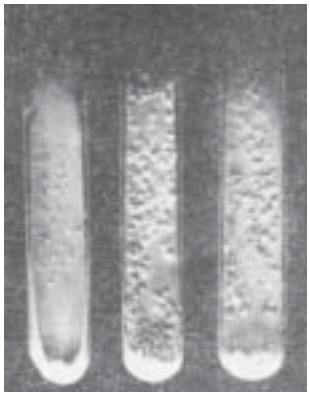


Fig. 9. **Culture of mycobacteria tuberculosis at hard egg medium**

Therefore, the culture result must depict not only the qualitative characteristics (positive or negative), but also a quantative evaluation (colonies №). For that it is recommended to use Table 1 (National Antituberculous Programme, 2000).

3. Biological method. It is infection with sputum or another pathologic material of guinea-pigs, which are highly sensitive to MBT. A biological testing is the most sensitive method of revealing MBT, so far as in laboratory animals tuberculosis develops after the introduction of the material in which there may be less than 5 microbial bodies in 1 ml. However, it should be noted that MBT are stable to chemical preparations, particularly to isoniazidum, avirulent for guineapigs. That is why various methods of microbiological examination should be used for revealing MBT in pathological material. Generally, before starting to treat a patient, he should undergo complex bacteriological examination: three times direct bacterioscopy of sputum or, when it is absent, three times examination of the material after provoking inhalations or bronchial rinsing waters; with negative results – three times examination by flotation method; three times sputum sowing on a nutritive medium, irrespective of the results of the previous examinations, with a view to define MBT sensitivity to antimycobacterial preparations the examinations are made in accordance with the recommendations of the World Health Organization.

The repeatedness of the patient examination for TB revealed for the first time in the dynamics of chemotherapy (acc. To WHO recommendations) is given in Table 2.

The usage of antimycobacterial preparations provokes the development of drug resistance to MBT. There are primary and secondary drug resistance.

Table 1

WHO scheme of the evaluation of the results of cultural examination for M.tuberculosis

Colonies quantity	Result evaluation	Characteristics
1-19 colonies	Positive	Individual colonies (miser bacterial emision); bacterioscopy of the pathologic material scarcely reveal individual mycobacteria
20-100 colonies	1+	Moderate bacterial emission; bacterioscopy of the pathologic material reveal individual mycobacteria in each field of vision or only single ones – in the preparation, but not less than five
100-200 colonies 200-500 colonies (almost universal growth) Over 500 colonies (universal growth)	2+ 3+ 4+	Massive bacterial emission; bacterioscopically – 10 and more mycobacteria in each field of vision
Germination of common microflora	Germination – repeat inoculation	

The primary drug resistance – is MBT stability, in the patients who were TB revealed for the first time; this stability is the result of the infection with stable MBT strains.

The secondary drug resistance appears in the process of continuous irrational antimycobacterial therapy.

According to WHO data, the frequency of the primary drug resistance to any preparation is 10,4 % average, and the secondary – 36 %. In Ukraine the primary drug resistance twice exceeds the average WHO index, and the secondary – 1,5 times.

Nowadays *immunologic and molecular-genetic methods* are applied for etiological identification of tuberculosis. The most promising of them are *immunoenzymic and radioimmune methods* of defining mycobacterial antigens which are based on the application of monoclonal antibodies. Molecular-genetic method of polymeraze chain reaction consists in revealing in biological material (sputum, tissues; lavage, pleural, spinal fluid etc.) of mycobacterial DNA. The examination results may be obtained in 3-4 hours.

Table 2

The repeatedness of the patient examination for TB revealed for the first time in the dynamics of chemotherapy

Period from the first of therapy (month)	Obligatory minimum		
	Bacterioscopy	Inoculation	Determination of drug resistance
0	x 3	x 3	x 3
At the end 2 (3)*	x 2	x 1	x 1
From the first 5	x 2	x 1	x 1
At the end 6 (8)**	x 2	x 1	x 1

Notes: * – if at the end of the second month of the treatment the results of bacterioscopy of MBT smear is (+), it's necessary to make bacterioscopy at the end of the third month;

** – if at the end of the sixth month of the treatment the results of bacterioscopy of MBT smear is (+), it's necessary to make bacterioscopy at the end of the eighth month.

The determination of MBT sensitivity to antimycobacterial preparations is of paramount importance for the treatment tactics, correction of antimycobacterial therapy and the illness prognosis. MBT sensitivity to antituberculous preparations is defined by the preparation minimum concentration, which inhibits MBT growth on the nutritive medium. MBT are considered to be sensitive to either preparation if less than 20 colonies have grown in a test-tube, with abundant growth in the control. The culture is supposed to be stable if more than 20 colonies have grown. MBT are considered to be stable if they grow at the concentrations of the preparation in 1 ml of the nutrient medium: for isoniazidum – 1mkg, rifampicinum – 20 mkg, streptomycini – 5 mkg, ethambutolum – 2 mkg, all other preparations – 30 mkg.

Blood examination. The main reasons of changes in peripheral blood of tuberculosis patients are intoxication and hypoxia. At initial forms of tuberculosis a hemogram is normal or with inconsiderable deviations. In recent years hypochromic anemia is more and more often observed, however at chronic lingering course of the spread specific process, with the intensification of the phenomena of lung insufficiency and hypoxia, compensatory increase of erythrocytes number and hemoglobin is possible. In general, for more serious clinical forms of tuberculosis slight leucocitosis ($9,0\text{-}15,0\times10^9$/l) is characteristic, percentage of bacillarnuclear neutrophiles, lymphopenia, monocytosis, eosinopenia increase, ESR is speeded up, as well as the decrease of albumin-globulin coefficient sets in with the relative increase of alpha-2 and gammaglobulins.

Urine examination. In patients with expressed tuberculosis intoxication, proteinuria, erytrocytes and leucocytes in urine may be observed. With intoxication decrease the pathological changes in urine disappear. However, if there is amiloidosis of internal organs, in particular kidneys, hypoisosthenuria is typical, stable proteinuria, increased number of erythrocytes, leucocytes in urine, as well as emergence of cylinders.

CONTROL QUESTIONS

1. Tuberculosis pathogene, its properties and types.
2. Forms of variability of tuberculosis mycobacteria, their clinical significance.
3. Reversion of tuberculosis mycobacteria and its clinical significance.
4. Atypical mycobacteria, their properties, clinical significance.
5. Methods of revealing tuberculosis mycobacteria, their diagnostic value.
6. The most characteristic changes in blood and urea at lung tuberculosis.

TESTS

1. What biochemical components of MBT cause their resistance to acids, alkalis and spirits?
   - A. Proteins
   - B. Carbohydrates
   - C. Lipides
   - D. Polysaccharides
   - E. Mineral salts
2. The main carriers of antigenic peculiarities of MBT are:
   - A. Proteins
   - B. Carbohydrates
   - C. Lipides
   - D. Polysaccharides
   - E. Mineral salts
3. The L-form of mycobacteria is:
   - A. Vaccine strain of MBT
   - B. Avisual forms of MBT
   - C. Atypical MBT
   - D. MBT which have partially lost the cellular wall
   - E. Filtrating forms of MBT
4. The reason of MBT primary stableness appearance is:
   - A. Untimely revealed tuberculosis
   - B. Lately revealed tuberculosis
   - C. Irregular taking of antimycobacterial preparations

D. Treatment with lowered doses of chemodrugs
E. Infection with stable MBT strains

5. Frequency of primary MBT stability in tuberculosis patients:
A. 0,5- 1 %
B. 2-5 %
C. 1-14 %
D. 15-20 %
E. 25-30 %

6. Frequency of secondary MBT stability to antimycobacterial preparations in TB-patients:
A. 1-5 %
B. 5-10 %
C. 10-20 %
D. 20-40 %
E. 50-60 %

7. What is the primary MBT stability?
A. MBT stability in the firstly diagnosed patients, who were not treated with antimycobacterial preparations
B. MBT stability in patients with primary form of tuberculosis
C. MBT stability in patients with chronic forms of tuberculosis
D. MBT stability in patients with tuberculosis relapses
E. MBT stability in patients with "small" forms of lung tuberculosis

8. What MBT type is the most pathogenic for the human being?
A. M.africanum
B. M.avium
C. M.bovium
D. M.tuberculosis
E. M.kansacii

9. Mycobacteriosis is an illness, caused by:
A. L-forms of mycobacteria
B. M.tuberculosis
C. Acidicstable saprophytes
D. Atypical mycobacteria
E. MBT stable to antimycobacterial preparations

10. The colonies appeared on the 3-rd day after sputum sown on solid medium with the aim of revealing the MBT. That testifies to:
A. The growth of quickly multiplying mycobacteria
B. Growth of highly virulent mycobacteria
C. Growth of atypical mycobacteria
D. Growth of nonspecific microflora

E. Growth of L-forms of mycobacteria

11. The most characteristic sputum for pulmonary tuberculosis patients:
    A. Slime-purulent, inodorous, 10-50 ml per day
    B. Purulent with sharp unpleasant odor, of rusty colour, up to 500 ml per day
    C. Purulent indorous, up to 300 ml per day
    D. Slime-watery, 50-100 ml
    E. Purulent-bloody with unpleasant odor, 100-150 ml per day
12. Terms of emergence of tuberculosis mycobacteria growth on solid media:
    A. On the 2-3rd day
    B. On the 7-14th day
    C. In 3-4 weeks
    D. In 3-5 months
    E. In 6 months
13. In how many percents of people has tuberculosis caused by M.bovis?
    A. 1-2 %
    B. 3-5 %
    C. 10-20 %
    D. 25-30 %
    E. 35-50 %
14. To the third group of atypical mycobacterium, according to the Runyon classification, belong:
    A. M.bovis
    B. M.africanum
    C. M.aque
    D. M.avium
    E. M.humanum

TASKS

1. A patient S., aged 6 has been delivered to an antitubercular dispensary with a preliminary diagnosis primary tuberculous complex of the lower part of the right lung.

Make out a plan of: a) roentgenologic, b) immunologic, c) laboratory, d) bacteriologic examination of the patient for making the clinical diagnosis more precise.

Answer: a) tomogram on the level of trachea bifurcation, b) Mantoux test with 2 TU, c) general blood and urea analysis, d) bacterioscopy and sputum sowing not less than three times.

2. Tuberculosis mycobacteria stableness to isoniazidum (1 mkg/ml) and to streptomycini (10 mkg/ml) has been revealed in a firstly diagnosed lung tuberculosis patient.

a) What is such a stableness called?

b) What is the treatment tactics?

3. A nidal tuberculosis of the apex segment of the upper part of the right lung in infiltration phase has been diagnosed in a patient. He does not secrete sputum.

Make out a plan of: a) sputum collection; b) bacteriologic examination.

4. A patient has been delivered to a hospital, he has been suffering from tuberculosis for a decade, has been treated irregularly, he testified the stableness of mycobacteria to isoniazidum (1 mkg/ml) and to rifampicinum (20 mkg/ml).

a) What is such a stableness called?

b) What are the reasons of its origin?

c) What is the tactics of further treatment?

5. A sputum sowing has been done on a solid medium.

a) In what time can colonies of tuberculosis mycobacteria appear?

b) How long should one wait for the laboratory final reply?

TUBERCULINODIAGNOSTICS

Tuberculin testings are a specific diagnostic test, based on tuberculin property to cause in a human body, sensibilized by MBT, inflammatory reactions of dilatory type. They are used for mass examination of children and teenagers for tuberculosis, as well as for diagnostics, differential TB-diagnostics and the definition of the process activity.

It was Robert Koch who obtained tuberculin for the first time (1890) which was later named old Koch's tuberculin (Alt Tuberculin Koch – ATK). It is manufactured in ampules as 100 % solution and is a liquid of dark-brown colour, which contains, in addition to specific active substances (tuberculoproteins), products of MBT vitality, elements of their cells and the medium on which they grew.

In 1934 F.Seibert obtained a more specific (dried) tuberculin preparation – Purified Protein Derivative (PPD-S) – purified tuberculin protein derivate, for which bacteria were grown on a synthetic protein-free medium. In the former USSR in 1939 M.A.Linnykova obtained an analogical tuberculin preparation, named PPD-L. One ampule contains 50000 TU of dry rectified tuberculin. The solvent is isotonic solution of sodium chloride with the addition of 0,25 % carbolic acid. Preservation time is 5 years, in a dark place at the temperature of +40 °C.

In Ukraine PPD is manufactured as a solution ready for use, the sterility of which is guaranteed by the presence in it of 0,01 % chinozol. The solution is packed in ampules of 3 ml (30 doses) or in bottles of 5 ml (50 doses). Each

dose – 0,1 ml contains 2 TU. According to the WHO standard, 1 TU contains 0,00006 mg of PPD-L or 0,00002 of PPD-S.

Tuberculin is an incomplete antigen and therefore it does not cause the formation of antibodies, but it calls forth a reaction in a sensibilized organism with a complete antigen (MBT, vaccine strain of BCG).

Depending on the mode of tuberculin introduction, cutaneous Pierquet test (Pierquet, 1907), intracutaneous – Mantoux (Mantoux, 1910; Mendel F., 1909) and subcutaneous Koch test (Koch, 1890).

Mantoux test is applied at mass examinations for tuberculosis, while Koch test is applied under the conditions of a clinic with a view to diagnose and define the activity of tuberculosis process. Pierquet test has lost its diagnostic value and is extremely rarely applied nowadays.

In the basis of an organism's reaction to tuberculin is an immunologic reaction of increased sensitivity and slow type (ISST). After MBT infecting (vaccination or revaccination) hypersensitiveness to tuberculin appears in about 6-8 weeks. The reaction intensity to tuberculin depends on the degree of the organism specific sensibilization and its reactivity as well as on various endogenic and exogenic factors.

Mass and individual tuberculinization is distinguished.

The aim of mass tuberculinization:

1. Early tuberculosis revealing,
2. Revealing persons with an increased risk of tuberculosis illness,
3. Contingent selection for BCG revaccination,
4. Determination of infestation index of MBT population,
5. Differential diagnostics between infectious and pastvaccinal allergy.

Mantoux testing of 2 TU of purified tuberculin in standard solution is applied in solving these tasks. 1 g. sterile syringe and a simultaneous needle are used for this purpose. 0,2 ml of tuberculin is taken with a long needle, which is then changed to a small one and tuberculin is released to 0,1 ml mark. The skin of the midle third part of the inner surface of the forearm is rubbed with 700 spirits, fixed and, turning the face of the needle up, 0,1 ml (2 TU) of tuberculin solution is injected intracutaneously.

The results of Mantoux testing, which are estimated in 72 hours, may be as follows:

1. Negative – absence of an infiltrate or only a sign after an injection to 1 mm,
2. Doubtful – a 2-4 mm infiltrate or only hyperemia,
3. Positive – a 5 mm or more infiltrate (fig. 10),

4. Hyperergy – with children and teenagers an infiltrate of 17 mm and more, with adults – 21 mm and more, and also for various age groups, reactions with the availability of vesicules, necrosis or lymphangoitis, irrespective of the papule size.

At the needleless method the size of the papule is 2 mm less than that of tuberculin needle injection and the reaction interpretation is corresponding.

With a view of early revealing of tuberculosis, the intensity of tuberculin reaction or tuberculosis intoxication, the Mantoux test with 2 TU is made to all children and teenagers starting from 12-months age, is annually repeated irrespective of the previous result. On twin years the test is made on the right, on add ones – on the left forearm, at the same time (preferably in autumn).

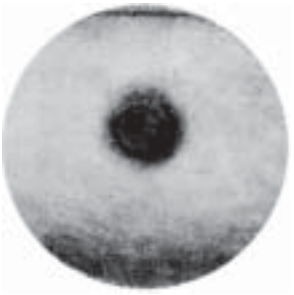


Fig. 10. **Positive of Mantoux test**

Contraindications for mass Mantoux test are skin diseases, acute and chronic infectious diseases (not less than two months after clinical symptoms disappearance), allergic states, bronchial asthma, idiosyncrasy with marked skin manifestation, rheumatism in acute and subacute phases, epilepsy. Mantoux test is not performed in children collective bodies during infections quarantine. By the way, the interval between various prophylactic inoculations and Mantoux test should be not less than a month.

The following information should be taken into account for differential diagnostics of infectious and postvaccinal allergy:

1. A child's health state, information about the contact with a tuberculosis patient;

2. Whether BCG vaccine innoculation was done, the term of the last vaccination;

3. Tuberculin reaction intensity during the last examination and in previous years.

The most distinctive features for postvaccinal allergy are: negative, doubtful or positive reactions with the infiltrate size of 5-11 mm; rarely the infiltrate of the size of 12-16 mm (in children and teenagers with postvaccinal scar of 6-9 mm size); the reaction is at most expressed in 1-1,5 years after vaccination, onward it gradually decreases.

Infectious allergy: first positive reaction (5 mm and more) in children not vaccinated the preceding year; stable preservation during a few years of

tuberculin reaction with an infiltrate size of 12 mm and more; increase of intensivity of previously doubtful or positive tuberculin reactions for 6 mm and more; hyperergic reactions (Tabl.3).

A contact with a tuberculosis patient, combining first registered positive Mantoux test with the availability of clinical illness symptoms testifies of the primary MBT infestation (intensivity of tuberculin reaction), tuberculosis intoxication or even a local specific process.

Tuberculin intensifier is the appearance of first positive tuberculin reaction after a negative one within a year or its increase in persons vaccinated with BCG vaccine at 6 mm and more.

All children with tuberculin reactions intensification should be thoroughly examined for tuberculosis as well as children and teenagers with hyperergic tuberculin reactions infestated long ago or at tuberculin sensitivity increase (6 mm and more).

Individual tuberculin diagnostics. Depending on the indications at individual tuberculin diagnostics Mantoux test with 2 TU is applied, as well as with various tuberculin doses. Generally, Mantoux test with 2 TU is of importance for children and teenagers; for adults, in separate occasions, hyperergic results of Mantoux test testify of the active tuberculosis, while the negative ones of tuberculosis absence, therefore sometimes the necessity arises to apply *Koch test* (10-100 TU). A negative reaction to 100 TU of tuberculin

Table 3

Characteristics of infectious and postvaccinal tuberculin reactions

Postvaccinal allergy	Infectious allergy
1. Negative, doubtful or positive reactions with 5-11 mm dimension infiltrate 2. Rarely 12-16 mm dimension infiltrate (in children and teenagers with postvaccinal scar of big dimensions) 3. Maximum expressed reaction in 1-1,5 years after vaccination (rarely in 2 years) onward it gradually decreases.	1. First positive reaction (5 mm and more) in children not vaccinated the preceding year 2. Stable preservation during a few years of tuberculin reaction with an infiltrate size of 12 mm and more 3. Increase of intensivity of previously doubtful or positive tuberculin reactions for 6 mm and more or increase of reaction less than for 6 mm, but with infiltrate formation of 12 mm and more diameter 4. Hyperergic reactions

with the probability of 97-98 % allows to exclude tuberculosis infestation. *Koch's testing* is done with a view of diagnostics and differential diagnostics of tuberculosis, the definition of the activity of tuberculosis process. Before the Koch testing, Mantoux test with 2 TU is done for ascertaining the tuberculin titre. After this near the lower angle of a shoulder-blade or in the upper third of the outer surface of the shoulder, after rubbing the skin with 70° ethylic alcohol, tuberculin is injected subcutaneously in the dose from 20 to 100 TU. Two or three days before the procedure the clinical blood analysis is done every day, the intake of lavage waters of bronchi for MBT, measuring the body temperature every 4 hours; a day prior to Koch's test the protein fractions of the blood serum are defined. In 24-48-72 hours after subcutaneous tuberculin injection the examinations analogous to those before the tuberculin injection, are done. Roentgenological examination before and after Koch's testing (in 48 hours and on the 7th day) is performed depending on the process localization.

Koch test results are evaluated in 24, 48 and 72 hours, based on the results of local, nidal and general reaction. The local reaction is supposed to be positive at the formation of subcutaneous infiltrate of the 15 mm size and more; the nidal – at the availability of the intensification of inflammatory reaction in the site of specific wound; the general (overall) is characterized by the worsening of the general state of the person under examination, the rising of the body temperature (not less than 0,5 °C), joint aches, headache, increased disposition to perspire, as well as changes of the formula and protein fractions of the blood serum etc. (each index, which has deviated not less than 20 % from the initial figure is taken into account). Simultaneous changes of not less than 3-4 indices are of diagnostics importance.

CONTROL QUESTIONS

1. What is tuberculin, its composition, forms of issue, a concept of a tuberculin unit (TU).
2. A concept of a "range" of tuberculin testings.
3. Kinds of tuberculin tests.
4. Mantoux test, the technics of its performance and the results assessment.
5. A concept of a mass and individual tuberculinodiagnostics, its aim, what tuberculin tests are applied at it performance?
6. Contraindications for Mantoux test performance.
7. Koch test, indications for its performance, performance technics, the results assessment.

8. What reactions of an organism can one observe at subcutaneously tuberculin infusion?
9. The distinctions between postvaccinal and infectious reactions to tuberculin.

TESTS

1. What tuberculin and at dose is used at mass tuberculinization?
   A. 100 % Koch alt tuberculin
   B. PPD-L in standard dilution in 2TU dose
   C. PPD-L in standard dilution in 5TU dose
   D. PPD-L in standard dilution in 10TU dose
   E. 25 % dilution of purified dry tuberculin
2. The sensitivity of organism to tuberculin may be intensified with:
   A. Senile age
   B. Lymphogranulomatosis
   C. Lymphosarcoma
   D. Treatment with immunodepressants
   E. Bronchial asthma
3. Koch's testing is used for:
   A. Prophylaxis of tuberculosis
   B. Early tuberculosis revealing
   C. Determination of infection index of population with tuberculosis
   D. Differential diagnostics of infectious and postvaccinal allergy
   E. Revealing the persons with the increased risk of tuberculosis illness
4. A 2-years old child reaction to Mantoux test with 2 TU – 7 mm infiltration, at the age of 4 – 3 mm. Postvaccinal seam of 4 mm. Define the character of tuberculin reaction.
   A. Infectious allergy
   B. A "range" of tuberculin testing
   C. The child is ill with tuberculosis
   D. Postvaccinal allergy
   E. Doubtful Mantoux reaction
5. From what age and in what terms is mass tuberculinization performed:
   A. From 12-months age, annually
   B. From 12-months age, once in 2-3 years
   C. At 7 and 14 years of age only
   D. From 7 up to 14 years annually
   E. From 7 and each 5 years up to 30-years old age
6. What is the "range" of tuberculin reactions?
   A. Transition of negative reaction to tuberculin to a positive one after BCG vaccination

B. Transition of negative reaction to tuberculin to a positive one after BCG revaccination
C. Sensitivity change to tuberculin due to the primary infection with tuberculosis mycobacteria
D. Appearance of hyperergy reaction to tuberculin in patients infected with tuberculosis
E. Negative reaction to tuberculin in seriously ill tuberculosis patients

7. What is the aim of mass tuberculinization:
A. For prophylaxis of MBT infection
B. For prophylaxis of tuberculosis illness
C. For early tuberculosis revealing among children
D. For early tuberculosis revealing among adults
E. For revealing the persons with the increased risk of tuberculosis illness

8. A 6 years old boy K., had a "range" of tuberculin reaction. What examinations should be done?
A. General clinical examination, inspection roentgenogram of the thoracic cage organs, general blood and urine test
B. Koch's testing, general blood and urine test
C. Fluorography, general blood and urine test
D. Tomography, smear examination from pharynx for MBT
E. Fibrobronchoscopy, examination of contents from bronchi for MBT

9. A "range" of tuberculin reaction was discovered in girl B. aged 9. Clinico-roentgenological and laboratory examinations revealed no pathological changes. Your tactics regarding with the girl.
A. To repeat Mantoux test with 2 TU in a year
B. To hospitalize to an antituberculous hospital
C. To perform chemoprophylaxis with isoniazidum and vitamin B6 within 3 months
D. The observation in an antituberculous dispensary for 1-2 years
E. To consider the girl healthy and not to take any prophylactic measures

10. While carrying out the differential diagnostics between infectious postvaccinal reactions on the tuberculin is not taken into account:
A. The contact with the tuberculosis patients
B. The intensiveness of the reaction on the Mantoux test of previous years
C. A presence of postvaccinal scar
D. The time of the carrying out of the vaccibation BCG
E. The poisoning by the carbon oxide some yars ago

11. If there is the positive reaction on the tuberculin with 2 TU on the skin of antebrachium there can be visible:
A. Infiltrate by the size of 5 -16 mm

B. Infiltrate with a vesicle in the centre
C. Hyperemia more than 5 mm
D. Infiltrate by the size more than 16 mm
E. Infiltrate by the size of 2-4 mm

12. Which one from the mentioned diseases can decrease the sensibility of an organism to tuberculin?
A. Cataral otitis
B. Allergic rhinitis
C. Bronchial asthma
D. Hypertonic disease
E. Measles

TASKS

1. A child of five reacts to Mantoux test with 2 TU – 6 mm infiltrate. The child had never earlier been vaccinated. A year ago a tuberculin test was negative.

a) The tuberculin reaction character, b) its nature, c) a pediatrician's tactics in conformity with the child.

The answer: a) positive Mantoux reaction; b) infectious ("range"); c) to direct to a phthisiologist.

2. A boy Z., at 4 and 5 Mantoux test with 2 TU – 7 and 4 mm infiltrate. At 6 – 12 mm infiltrate in diameter. He was vaccinated at a maternity home.

a) Define the nature of tuberculin positive reaction.

b) On what ground has the conclusion been given.

c) A phthisiologist's tactics in conformity with the child.

3. A girl of 16, Mantoux test reaction with 2 TU – 8 mm infiltrate. She was BCG revaccinated at 14. Her general state is good.

a) Define the nature of tuberculin reaction.

b) Prove your conclusion.

4. A child K., 7 years of age, reacts to Mantoux test with 2 TU – 11 mm infiltrate. Vaccinated at a maternity home. Postvaccinal seam of 3 mm. At the age of six tuberculin reaction was 4 mm. There are no TB patients in the family.

a) What does the positive Mantoux test testify about?

b) May one perform BCG revaccination?

5. A "range" of tuberculin reaction was established in a child aged 4 during the performance of tuberculinodiagnostics.

a) Where should the child be directed to?

b) What is the scope of examination?

c) Is it expedient to examine the members of the child's family?

6. 360 children study at a school and they should undergo tuberculinodiagnostics.

a) Calculate the need to tuberculin for tuberculinodiagnostics.

b) Who makes out a demand for tuberculin?

c) Where is it directed to and who provides the school with tuberculin?

7. A child of 4, Mantoux test reaction with 2 TU – 18 mm infiltrate. Vaccinated at a maternity home. At the age of 3 tuberculin reaction was 5 mm.

a) Define the nature and the character of tuberculin reaction.

b) Specify a doctor's tactics in conformity with the child.

8. Of 30 children: one suffers from bronchial asthma, two pupils underwent measles a month ago, another one underwent appendectomy 6 months ago, three other children suffer from rhinitis and subfebrile temperature.

a) Point out concretely the children who are due to mass tuberculinodiagnostics.

b) To whom it is contraindicated.

c) A doctor's tactics in conformity with the children, to whom tuberculinodiagnostics is contraindicated.

9. At performing Mantoux test with 2 TU to 30 students of the 4th course, in one of them 12 mm infiltrate with a vesicle in the centre and a lymphangitis up to the elbow lymphatic nodes.

a) Specify the nature of tuberculin reaction.

b) A doctor's tactics in conformity with the student.

INSTRUMENTAL METHODS OF EXAMINATION AND TREATMENT

With a view of diagnostics, differential diagnostics of tuberculosis laryngoscopy, mediastinoscopy, thoracoscopy, laparoscopy, puncture biopsy of peripheral lymphatic nodes, pleura and lungs are applied and, first of all, bronchoscopy, which is performed for the purpose of both diagnostics and treatment. In some cases the final stage of the diagnostic process is thoracotomy.

In the general complex of diagnostics, differential diagnostics of lung diseases, one of the prominent places belongs to tracheobronchoscopy. It allows immediately to examine various strips of trachea and bronchi, to perform the necessary diagnostic examination and medicative manipulations.

Certainly, bronchologic examination can not and should not substitute or exclude other generally accepted examination methods. Modern diagnostics of lung diseases is based on three principal methods – clinical, roentgenologic, endoscopic which are supplemented by bacteriological, cytologic and histological examination of the material taken from bronchi at biopsy (fig. 11), which allows most accurately to diagnose the lung pathology and to prescribe the optimum treatment.

Indications to bronchoscopy are diseases of lungs and respiratory tract or revealed uncertain pathologic changes on roentgenograms. Usually fibrobronchoscopy under local anesthesia is applied. Rigid bronchoscopy under the general anesthesia is done in children age, at massive lung haemorrhages or the risk of their outbreak, for spreading at stenoses, laser recanalizations, extractions of big solid foreign objects. Rigid bronchoscopy under the local anesthesia even today has not completely lost its importance. It is expedient to be employed in patients with lowered coughing reflex, at the extraction of foreign objects out of the tracheobronchoscopial tree, tamponade of some bronchi at lung haemorrhage and spontaneous pneumothorax, sometimes also for the selective introduction of a catheter with a view to perform bronchography and at other manipulations (fig. 12).

Contraindications to bronchoscopy with rigid (metallic) bronchoscopes:

1. Severe cardiovascular diseases (aortic aneurism, decompensated heart failure, recently, up to 6 months, survived myocardial infarction, hypertensive disease of the 3-rd stage).

2. Injuries and ankyloses of the lower jaw, skull and neck vertebrae, mouth cavity illnesses, deviation of trachea with sharp displacement of mediastinum, kyphoscoliosis, diseases of mediastinum organs.

3. Active tuberculosis of larynx.

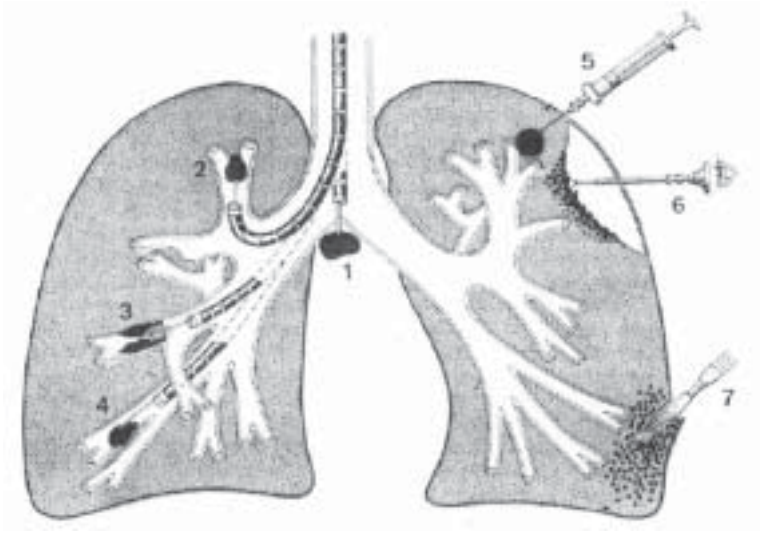


Fig. 11. **Kinds of biopsy**

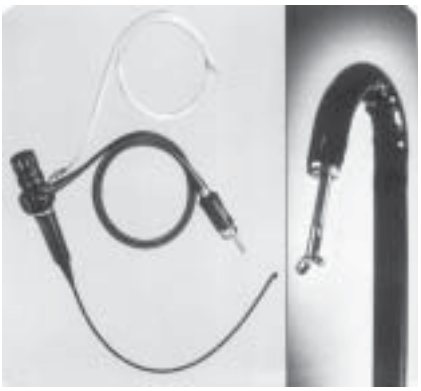


Fig. 12. **The fibrobronchoscope**

4. Acute and subacute intercurrent diseases.

5. Menstrual flux and pregnancy (second half).

6. Thromboembolism.

Contraindications to fibrobronchoscopy under the local anesthesia: profuse lung haemorrhages, epilepsy, severe asthmatic status, a big foreign object balloting or fixed in the trachea, passive aspiration of stomach content with bits of food, respiratory insufficiency with hypercapny of over 50 mm m.c. and hypoxemy, which is not subjected to correction (below 70 mm m.c.), expressed stenoses of larynx and trachea, absence of a patient's contact, intolerance of local anaesthetics and a patient's general difficult state.

Thoracoscopy (pleuroscopy) – is the examination of the pleural cavity with the thorascope help and rarely – of bronchofibroscope. The diagnostic thoracoscopy is used at pleuritis and other illnesses of pleura, spontaneous pneumothorax, diffuse lung diseases. Before the thoracoscopy, an artificial pneumothorax is applied, collaborating the lung by 1/2-1/3 of its volume. At tuberculous affection, the pleura is hyperemized with pronounced edema and multiple milletshaped eruptions. Sometimes tubercles are 2-3 mm high and localize along the projection of the intercostal space in the kind of sago grains. After the examination of pleural leaves and the lungs, the forceps or puncture biopsy is performed according to the indications. In case the thoracoscopy procedure is violated, such complications as bleeding, cutaneous emphysema, etc. are possible.

Mediastinoscopy is performed with the aim of the differential diagnosis of tuberculosis of intrathoracic lymph nodes with sarcoidosis, lymphogranulomatosis, early and metastatic cancer of mediastinum. Mediastinoscopy is performed under anesthesia with a small incision above the jugular incisure of the sternum; along the trachea the tissues are separated up to the trachea bifurcation. Then with the help of mediastinoscope, the puncture or biopsy of the altered lymph nodes is made for the further histologic examinations. Mediastinoscopy may provoke such complications as bleeding, pneumothorax or the affection of the turning or larynx nerve.

Prescale (transcervical) biopsy implicates the surgical extraction of the subcutaneous fat and lymph nodes located at the front surface of the serratus anterior muscle. It is performed under local anesthesia through a 4-6mm long incision above the clavicle or parallely to it.

The transthorax needle biopsy is used to get the material from the pleura and the lung for the histologic and cytologic identifications with the help of a syringe needle and other surgical improvements. The aspiration biopsy is performed with fine needles, and the trophine biopsy – with thick or special needles. These types of biopsy are used in case of injuries of the external lungs segments. The place for thorax puncture is being chosen in such a way, that it is on the shortest distance from the aim. Diagnosis verification with the help of the transthorax needle biopsy is reached in 80-90% of the cases.

The *open biopsy* implicates the obtaining of the bioptate from lungs, pleura, lymph nodes by usual surgical intervention under visual control. It is used at diffuse and disseminated lung diseases and also at the absence of expected results in case of other biopsy types. Thoracotomy is made under narcosis, and then the open biopsy is performed. The main advantage of biopsies is the opportunity to get large bioptates from one or several spots.

Puncture biopsy of periferal lymph nodes can be of aspiration or trophine type. A conventional syringe with a needle is used for tissues aspiration of a lymph node. After a lymph node puncture, 2-3 aspirations are performed with the disconnection of the syringe with the needle after the procedure. Before taking the needle out of the node, the syringe is to be taken off the needle to avoid the sucking-up the material into the syringe. Then with the help of the syringe the obtained material is blown out of the needle onto a microscope slide, is processed and is given for cytologic identification. The trophine biopsy is performed with a special needle, which allows to obtain a small piece of a lymph node tissue for histologic examination.

EXAMINATION OF THE FUNCTION OF EXTERNAL RESPIRATION

It is accepted to classify respiration into external and internal. The principal function of the lungs is respiratory one, that is such a living process which consists in maintaining stable gas exchange, in particular of oxygen and carbon dioxide, between the environment and an organism. This process is called the external respiration. In physiological meaning, speaking about

external respiration (lung respiration), gas exchange between the air, which entered the lungs (alveolar air) and the blood of the small blood circulation circuit is meant. The internal respiration (tissue respiration) is meant as the gas exchange between the blood of capillaries of the big blood circulation circuit and the tissues and cells of the organism.

Respiration is accomplished by means of the respiratory apparatus, to which belong the upper respiratory tract (nasal cavity, nosopharynx, larynx), trachea and bronchi, lungs, pleura, thoracic cage with respiratory muscles and the innervation apparatus. Generally, respiration takes place by means of the interaction of the system of respiratory organs, blood circulation and blood and encompasses three main processes.

External respiration – gas exchange between the environment and the blood. Here belongs lung ventilation – the air exchange between the environment and the lung alveolae.

Diffusion – gas exchange between alveolar air and the blood of lung capillaries, which takes place by means of a diffusion.

Perfusion – microcirculation (alveole ablution with blood). The gases defund through the aerohematic barrier in the direction, that is defined by the difference of gas partial pressures. Respiratory disturbances may arise at any one of these stages.

The examination of the function of external respiration, in particular, its final results enable to differ between the normal physiological state and the pathological state of the respiratory system, to define the character and the degree of respiratory insufficiency, to evaluate the results and effectiveness of treatment and prophylactic measures and the patient's prognosis. However, functional examination cannot substitute other conventional methods of examination, as it is only allround, complex application of all methods that will enable to evaluate objectively the functional state of an organism.

The examination of the function of external respiration in a tuberculosis clinic is performed with a view to control the effectiveness of the treatment, to solve the question about the possibility of operative procedure, to evaluate the patients' capacity to work.

Methods of evaluating the function of external respiration: spirometry, spirography, pneumotachometry, pneumotachography, general plethysmography and examination of gas content and acidic-basic blood state.

Spirometry is the simplest method of measuring lung capacity (LC). The average LC equals 3,5 l (from 3 to 5 l for males, from 2 to 3,5 l for females).

Spirography is the method of examining lung functional state and consists in registration of ventilation values (respiratory vibrations) in the coordinate system "volume" and "time" on a moving millimeter strip. Knowing the range scale of the spirograph and the movement speed of a paper strip, one can calculate the main lung volumes and capacities. Oxygen intake and its usage are defined according to the spirogram rise level.

Of spirographic indices the main are the forced expiration volume per 1 second (FEV_1), lung capacity (LC) and the Tyffno index (FEV_1/LC %). The other indices: lung maximum ventilation (MVL), the index of the air movement velocity (IAMV), respiration rate (RR), respiration capacity (RC), minute respiration volume (MRV), coefficient of oxygen consumption (CO_2C) and others are of secondary importance.

Spirography is done by means of a closed type spirograph of various models: SG-1, "Metatest-1", "Metatest-2", which consist of a spirometer and a printer. At breathing the air of the device respiratory system the pen of the printer moves and writes down a spirogram on a paper. Thus, spirography is a graphic method of examining the function of the external respiration by means of a closed type apparatus – a spirographer.

The analysis of the results of spirographic examination consists in conversion of the obtained physiological information from graphic into a figured digital form in accordance with the derivative functional indices and adducing the gaseous volumes obtained to the standard conditions. The following data are necessary for this: sex, height, weight, age of a patient, barometrical pressure, the environment temperature at the moment of examination, humidity.

The factual spirographic indices obtained are compared to the proper value (individual norm). The proper quantity in each separate case is taken for 100 %, and the factual one, obtained at the examination, is expressed in percentage to the proper quantity. It is accustomed to take the value with ±20 % deviation from the proper quantities for the norm. The lowering of FEV_1, LC and MVL from 79 to 60 % of the proper value is considered to be insignificant, the lowering from 59 to 40 % as significant, and the lowering from 39 % and lower – as sharply marked.

As to the diagnostics of the character of ventilation disturbances, so the lowering of FEV_1/LC % is interpreted as the evidence of the availability of bronchial obstruction, while the lowering of LC at the absence of the lowering of the FEV_1 to LC expressed in percentage – as a diagnostic indication of restriction; simultaneous lowering of VC and FEV_1/VC % may be conditioned

by the availability of combination of obstructively-restrictive pathology and the manifestation of expressed bronchial obstruction.

The shortcoming of spirography is the absence of possibilities of diagnostics of small bronchi permeability disturbances.

In recent decades spirography is substituted for computer apparatuses. Most of computer apparatus during examination draw a graphic spirogram and provide digital of its deciphering or figured charac-teristics of bronchial ventilation and permeability. The most effective methods of studying bronchial permeability are pneumotachometry and pneumotachography.

Pneumotachometry (PTM) is a simple and sensitive method of investigating bronchial permeability. By means of a pneumotachometre the maximum speed of the air course at the inhalation and expiration is defined. The expiration power in males ranges from 5 to 8 l/sec., in females – from 4 to 6 l/sec.

Pneumotachography is an objective and rather precise method of investigating the function of external respiration and respiration mechanics. At this the volume velocities of the air course of inhalation and expiration are graphically registered. Hence, pneumotachography is a method of measuring the volume velocity and pressure in various respiration phases (calm and forced). It is conducted by means of a universal pneumotachographer. The principle of the method is based on the registration in various points of the air course movement of pressure, which change in connection with the respiration cycle. Pneumotachography allows to define the volume velocity of the air course during inhalation and expiration (in norm at calm respiration it equals 300-500 ml/sec., at forced – 5-8 l/sec.), the duration of respiratory cycle phases, MRV, intraalveolar pressure, respiratory tract resistance to the air course, lung expansion and that of the thoracic wall, respiration work, analyse the relations "pressurevolume", "pressure-flow" and "flow-volume".

Special computerized analysers ("Pneumo-screen", "Ultrascreen" (FRG) et al.) provide various criteria of respiration mechanics (static and dynamic volumes, "flow-volume" criteria, respiratory resistance etc.) and compare them to the proper values, contained in the computer memory.

The "flow-volume" curve of forced expiration is registered on the pneumotachogram. For this, as at FLC recording during a spirogram, a pattent after a maximum deep calm inhalation makes a very fast strong deep expiration. The procedure is repeated till two similar in intensity results are obtained.

Modern computer analysers devices register "flow-volume" curve together with the results of its changes, expressed in percentage to the proper value.

The forced expiration volume (FLC), which is taken for 100 %, is put aside on the abscissa axis and the air course in litres per second – on the ordinate axis. Herewith peak, momentary and average values of the flow on the level of 25, 50, 75 % of FLC are calculated – peak volume velocity of expiration (PVV_{expir}), MVV_{25}, MVV_{50}, MVV_{75}, FVV_{25-75}. As to the form the "course-volume" curve is rather stable and little depends on the age and sex.

To the point, the shortcoming of spirography is long duration and complexity of the procedure accomplishment, impossibility to diagnose permeability disturbance of tiny bronchi. The investigation of high-speed indices of forced expiration allows to define more accurately the level of bronchial obstruction, including small bronchi.

In the norm the "flow-volume" curve has a rather stable form, which resembles a triangle, horizontally it is divided into 4 equal segments, corresponding to 25 %, 50 %, 75 % and 100 % of FLC volumes. The initial volume velocity of the air current depends, on the whole, on the muscle exertion and reflects the movement of the air in trachea and large bronchi; the volume velocity of the air on the level of 25-75 % of FLC depends on its movement in segmental dronchi, while on the level from 75 % and to the end of expiration – in small bronchi. The peak volume velocity, that is the apex of the curve approaches the beginning of expiration with the intensification of obstructive changes.

The conclusion about the localization of bronchial obstruction is given with regard for the results of FEV_1 measurements. Lowering of FEV_1, PVV and MVV_{25}, at normal MVV_{50}, MVV_{75} and FVV_{25-75} – allows to suspect the availability of obstacles in the upper respiratory tract, trachea and large bronchi. The decrease of MVV_{50}, MVV_{75}, FVV_{25-75} at the normal FEV_1, PVV and MVV_{25} testify to the obstruction of the periferal, i.e. small bronchi. Simultaneous lowering of FEV_1, PVV, MVV_{25}, MVV_{50} and MVV_{75} indicate, to the presence of the generalized obstruction.

One should consider 60 % to the proper value to be the lower limit of the norm for the average velocity of the middle part of forced expiration (FVV_{25-75}) and momentary velocities of forced expiration (PVV, MVV_{25}, MVV_{50}, MVV_{75}).

The lowering of velocity indices to 40 % of the proper value is astimated as inconsiderable, from 39 % to 20 % – as considerable, 19 % and lower – as sharp.

General plethysmography is based on the utilization of barometric principle. It is accomplished in the body plethysmograph – a large hermetic chamber

with a constant volume, where a patient is placed and changes of his thoracic volume during respiration are registered. Plethysmography enables to estimate lung expansion and bronchial resistance under the conditions of calm breathing and the general lung capacity (GLC) without applying a bulky helium method.

Pharmacological tests with broncholithic means allow to reveal concealed disturbances of bronchial permeability, to differentiate their reversibility and to apply adequate means of their correction.

The integral index of the function of external respiration is the content of gases, acidic-basic blood state. They are usually defined by Astroop's micromethod. The determination of gaseous content and the function of respiration in the state of calmness and after a dosed loading is enough for solving the question about the availability of the respiratory insufficiency. Based on the results of this investigation, the differentiation of restrictive and obstructive types of *respiratory insufficiency* (RI) is made.

Radionuclide (radioisotope) methods are of decisive importance for the evaluation of regionar ventilation and lung blood circulation. They are based on inhalational or, more often, intravenous introduction of radiopharmaceutical preparations, marked with gamma-radiating radionuclides. Registration of the distribution of the introduced preparation is done by means of a scintillating gamma-chamber with a computer.

A promising method of functional diagnostics of disturbances of the respiratory system is the determination of parameters of oscillatory mechanics of respiration (extension and inertiality of the respiratory tract, lung tissue and a thoracic wall).

Respiratory insufficiency is the state of an organism under which the maintenance of the normal gaseous blood composition is not secured or it is reached as a result of intensive work of the external respiration apparatus and intensive work of the heart, resulting in the decrease of the functional capabilities of an organism.

Proceeding from the mechanisms underlying the function of external respiration, *three types of disturbances are distinguished, which result in respiratory insufficiency: ventilational, diffusive and perfusive.*

Ventilational disturbances are one of the first signs of respiratory insufficiency and are characterized by the disturbance of alveolar ventilation. The reasons are: decrease of lung tissue elasticity, disturbance of bronchial permeability, various changes of thoracic cage skeleton, respiratory muscles, pleura, diaphragm etc.

Diffusive disturbance are observed at the worsening of the conditions of gaseous diffusion through the alveolar-capillary membrane owing to its thickening (oedema, swelling, expansion of connective tissue).

Circulatory (perfusive) disturbances occur as a result of the disturbance of correlation between the volume of lung ventilation and blood circulation.

Thus, the examination of respiration is expedient to be done according to the following parameters: lung ventilation, lung blood circulation and gaseous exchange. At the disturbance of the respiratory function at one of the stages (parameters), compensatory mechanisms in the form of intensive function of other systems of external respiration aparatus are switched on, due to which arterial circulation of blood may not be disturbed. In neglected cases compensatory mechanisms may prove insufficient and then the blood will contain insufficient content of oxygen and surplus of carbon dioxide.

Depending on its expressiveness respiratory insufficiency is divided into three stages: I – concealed respiratory insufficiency, at which pant is observed at physical loading. At the state of rest all the indices of the external respiration function are in the norm. It is only at the examination with a loading that MRV, oxygen intake, at decreased MVL, CRR (coefficient of respiration reserve), CO_2I (coefficient of oxygen intake). Blood gaseous contents is normal.

II – a pant sets in at an inconsiderable physical loading. Respiration in the state of rest is frequent, respiration depth, MVL and CRR are decreased, while MRV is increased. After a dosed physical loading the restoration of all the indices to the norm is observed, auxiliaries of respiration also participate in respiration.

III – a pant is in the state of rest. Cyanosis is expressed. Respiration is frequent and superficial. Lung volumes are sharply decreased (Tabl. 4).

In late period lung insufficiency is joined by heart (right-ventricular) insufficiency, as a result of the development of hypertension in a small circle of blood circulation, dystrophic changes in myocardium due to its constant overload and insufficient supply with oxygen. Increased load on the right ventricle myocardium gradually results into its insufficiency, which is expressed by stagnation phenomena in a small circle of blood circulation (lung heart).

Depending on the reasons and the mechanism of the origin of respiratory insufficiency, **three types of the disturbance of lung ventilation are discriminated:** *obstructive, restrictive and mixed (obstructive-restrictive)*.

Obstructive type of respiratory insufficiency is caused by the complexity of the air passing through the bronchi, is clinically expressed (manifested) by

Table 4

Stages of respiratory insufficiency (according to V.G.Boksha, 1991)

Indices	Normal values		RI stages (%)		
	Absolute	% to proper	I	II	III
LC (l)	2,5-7,5	90-85	84-70	69-50	less than 50
FEV_1 (l/sec.)	2,4	75-80	74-55	54-35	less than 35
MVL (l/min.)	70-170	85-75	74-60	59-40	less than 40
MRV (l/min.)	6-8	90-100	100-150	150-200	200
Tyffno index	–	65-70	64-60	59-40	less than 40

a pant at physical load, later a prolonged inhalation, and, first of all, expiration, i.e. expiratory pant. MVL, FLC, FEV_1, Tyffno index (<70 %) are decreased, at LC inconsiderable decrease.

Restrictive type of respiratory insufficiency is caused by the restricted ability of the lungs to increase and decrease in volume (pneumosclerosis, hydro- and-pneumothorax, massive pleural adhesions etc.). LC and MVL are sharply decreased at normal Tyffno index.

Mixed type of respiratory insufficiency incorporates the signs of the two previous types, often with the predominance of one of them. This type is observed at prolonged lung and heart diseases. All functional indices are decreased, first of all, equally decreased LC and Tyffno index, or with the predominance of the former one.

At lung tuberculosis the disturbances of the activity of cardio-vascular system are caused, for the most part, by tuberculous intoxication and changes of haemodynamics of the small circle of blood circulation.

Tachycardia and hypotension, extrasystolia, in the first place of the ventricular type, signs of auricular ventricular blockade, deflection changes, characteristic for right are often observed in lung tuberculosis patients. Deflection voltage as a result of myocardial dystrophy in the majority of patients is lowered (in particular R and T), P deflection in II, III standard ducts and aVF is sometimes increased (>2,5 mm). A high P deflection in II,III, aVF is one of the indications of a lung heart.

The diagnostics of a lung heart is based on direct and indirect ECG signs of a lung heart, offered by H. Widimsky.

The direct signs are referred to as: R in V_1>5 mm; R/S in V_1>1; the internal deflection of the right ventricle is within 0,03-0,05 sec.; RV_1+SV_5>10,5 (Sokolov index); qR complex in V_1; an incomplete blockade of His's bundle

right stalk, if rSR' in V_1 from R'>10 mm; a complete blockade of His's bundle right stalk, if rSR' in V_1 from R'>15 mm.

The indirect signs are: R in V_5<5 mm; S in V_5>5 mm; R/S in V_5<1; S in V_1<2 mm; a complete blockade of His's bundle right stalk, if rSR' in V_1 from R'<15 mm; an incomplete blockade of His's bundle right stalk, if rSR' in V1 from R'>10 mm; the ratio R/S in V_5 to R/S in V_1<10 (Salazar index).

By combining two and more direct signs or one direct and some indirect ones the diagnosis of the lung heart is considered to be trustworthy; by combining one direct sign and one indirect one – doubtful.

Let us remark, that ECG far from always enables us in revealing lung hypertension and hypertrophy of the right ventricle. Extensive information about the state of the right heart is provided by echocardioscopy – with it one can estimate with the highest precision the walls thickness and the cavities sizes of the heart right sections, define the tension in the lung artery and particularly tension gradients on the valve of the lung artery. Invasive determination of the lung artery tension, though the most precise, is rarely employed due to complexity of the manipulation and danger to a patient.

CONTROL QUESTIONS

1. The principal function of the lungs. External and internal respiration.
2. The stages of external respiration (ventilation, diffusion, perfusion).
3. Apparatus for examining the function of external respiration.
4. Methods of examining the function of external respiration.
5. Types of ventilational disturbances (restrictive, obstructive, mixed).
6. The most informative indices according to the data of spirography and the stream-volume curve.
7. Stream-volume curve indices, testifying the lesion of large, medium and small bronchi.
8. Degrees of respiratory insufficiency according to the data of spirography and according to Dembo.
9. Indications to the examination of the function of external respiration at a tuberculosis clinic.

TESTS

1. Obligatory examination at the suspicion of larynx tuberculosis:
   A. Bronchoscopy
   B. Laryngoscopy
   C. Fibrobronchoscopy

D. Examination of the mouth cavity
E. Back rhinoscopy

2. The main method of diagnostic of bronchi tuberculosis is:
A. Pneumotachometry
B. Fibrobronchoscopy
C. Bronchography
D. Computer tomography
E. Target roentgenography

3. The main method of morphological verification of lung tuberculosis:
A. Transthoracic puncture biopsy
B. Fibrobronchoscopy
C. Cytological sputum examination
D. Computer tomography
E. Thoracotomy with biopsy

4. Anatomical dead area makes up:
A. 10-25 ml
B. 50-100 ml
C. 140-150 ml
D. 1400-1600 ml
E. 3500-500 ml

5. The vital lung capacity in healthy people makes up:
A. 500-800 ml
B. 1000-3000 ml
C. 1500-3500 ml
D. 3500-5000 ml
E. 6000-8000 ml

6. Tyffno index – is a ratio of:
A. LMV and MRV
B. FEV_1 and LC
C. FEV and LMV
D. LC and LMV
E. LC and MRV

7. The most informative noninvasive method of lung hypertension determination is:
A. Roentgenoscopy
B. ECG
C. Phonocardiography
D. Ballistocardiography
E. Echocardioscopy

8. What indices of external respiration function are the most informative?
A. LC and LMV

B. FEV and Tyffno index
C. LC, FEV_1 and Tyffno index
D. LMV and Tyffno index
E. MVV_{25}, PVV and Tyffno index

9. Infiltrative tuberculosis of the right lung, sowing and decay phase, MBT (+) has been diagnosed in patient Z., 45. Complaints on cough with insignificant sputum expectoration, lack of breath. Pneumotachometry revealed the drop of PVV and MVV_{75} at normal indices of MVV_{50} and MVV_{25}. Define the level of bronchial tree affection.
A. Large bronchi
B. Middle bronchi
C. Large and middle bronchi
D. Middle and small bronchi
E. Small bronchi

10. The final stage of the diagnostic process at the pulmonary diseases in complex cases is:
A. Fibrobronchoscopy
B. Computer tomography
C. Intrathoracal punctional byopsy of a lung
D. Thoracotomy
E. Bacteriological and cytological examination of bronchial content

CLINICAL CLASSIFICATION OF TUBERCULOSIS

According to the International statistical classification of diseases (ISCD) and of related problems connected with health state of the X review recommended by the WHO (1993), tuberculosis is attributed to the class of infectious and parasitic diseases, having separated five headings:

A 15. Tuberculosis of respiratory organs confirmed bacteriologically or histologically.

A 16. Tuberculosis of respiratory organs not confirmed bacteriologically or histologically.

A 17. Tuberculosis of the nervous system and cerebral membranes

A 18. Tuberculosis of other organs and systems.

A 19. Miliary tuberculosis.

In Ukraine somewhat modified clinical classification of tuberculosis was accepted and approved by the order of the Ministry of Health Protection of Ukraine of 28.10.2003, No 499.

This classification is adapted to international and allows to adhere to uniform sights, concepts and mutual understanding between experts of the world community from the various countries. Classification includes all cycle of supervision over the patient " diagnosing of a tuberculosis and the indication of a method of its confirmation and a choice of a category of treatment – a choice dispensary categories – an estimation of efficiency and results of treatment ".

I. TYPE OF TUBERCULOUS PROCESS

1. First diagnosed tuberculosis – FDTB (date of its ascertainment):
2. Tuberculosis relapse – TBR (date of its ascertainment):
3. Chronic tuberculosis – CTB (date of its ascertainment).

II. CLINICAL FORMS OF TUBERCULOSIS (ICD CIPHER CODES – REVISAL D)

A 15.-A 16. –	**Lung tuberculosis (LTB)** (from a facultative designation of the form of injury)
A 15.-16. –	Primary tuberculous complex
A 19.- part	Disseminated lung tuberculosis
A 15-16. –	Nidus lung tuberculosis
A 15-16. –	Infiltrative lung tuberculosis
A 15-16. –	Caseous pneumonia
A 15-16. –	Lung tuberculoma
A 15-16. –	Lung fibrous-cavernous tuberculosis
A 15-16. –	Lung cirrhotic tuberculosis
A 15-16./J65	Tuberculosis of respiratory organs combined with dust professional lung diseases (coniotuberculosis)
A 15.-A 18. –	**Extrapulmonary tuberculosis (EpTB)** (with the indication of localization)
A.15.-A.16. –	Tuberculosis of the bronchi, trachea, larynx and other upper respiratory tract
A.15.-A.16. –	Tuberculosis of intrathoracic lymphatic nodes
A.15.-A.16. –	Tuberculous pleurisy (empyema)
A.17	Tuberculosis of the nervous system and cerebral membranes
A.18.0	Bone and joint tuberculosis
A.18.1	Tuberculosis of genitourinary organs
A.18.2	Tuberculosis of peripheral lymphatic nodes

A.18.3	Tuberculosis of intestine, peritoneum and mesenteric lymphatic nodes
A.18.4	Tuberculosis of skin and subcutaneous connective tissue
A.18.5	Eye tuberculosis
A.18.6	Otologic tuberculosis
A.18.7	Tuberculosis of adrenal glands
A.18.8	Tuberculosis of other specified bodies and systems
A 18	Tuberculosis of unstated localization
A.19	Miliary tuberculosis

III. CHARACTERISTIC OF TUBERCULOUS PROCESS

1. Localization of defect

Localization of defect in lungs according to the numbers (names) of segments, names of lung sections, and in other organs and systems – according to anatomical names of localization of a failure.

2. Presence of destruction

(Destr +) destruction is present

(Destr –) destruction is not present

facultatively it is necessary to specify a phase of tubercular process:

- infiltration, decay (Destr +), sowing;
- suction, condensation, scarring, calcination.

3. Etiologic confirmation of tuberculosis diagnosis

(MBT +) it is confirmed by the results of bacteriological analysis (code A 15), in this case to specify:

(M +) positive result of sputum analysis on acid-resisting bacteria (ARB);

(C 0) cultural analysis was not done;

(C –) negative result of cultural analyses;

(C +) positive result of cultural analyses, in that case to specify:

(Resist 0) MBT resistance to preparations of I line was not analysed;

(Resist –) resistance to preparations of I line has not been established;

(Resist +) (abbreviation of antitubercular preparations of I line) resistance MBT to preparations of I line has been established (in brackets to list all the preparations of I line to which resistance has been determined).

(Resist II0) MBT resistance to preparations of II line was not analysed;

(Resist II–) resistance to preparations of II line has not been established;

(Resist II+) (abbreviation of antitubercular preparations of II line) resistance MBT to preparations of I line has been established (in brackets to list all the preparations of I line to which resistance has been determined).

(MBT–) is not confirmed by the results of bacteriological analysis (the code A16), in this case to specify:

(S 0) sputum was not investigated;

(S –) negative result of sputum analysis on acid-resisting bacteria (ARB);

(C 0) cultural analysis was not done;

(C–) negative result of cultural analysis;

(Hist 0) histologic analysis was not carried out;

(Hist –) is not confirmed by the results of histologic analysis (the code A 16);

(Hist +) it is confirmed by the results of histologic analysis (the code A 15).

IV. COMPLICATIONS OF TUBERCULOSIS

It is necessary to count complications and to provide the date of their diagnosing in brackets.

Complications of lung tuberculosis (LTB): haemoptysis, lung haemorrhage, spontaneous pneumothorax, lung insufficiency, chronic lung heart, atelectasis, amyloid disease etc.

Complications of extrapulmonary tuberculosis (EpTB): bronchus stenosis, pleura empiema, fistulae (bronchial, thoracic), renal (adrenal) insufficiency, sterility, commissure, ankylosis, amyloid disease etc.

V. CLINICAL AND DISPENSARY CATEGORY OF THE REGISTRATION PATIENT

Category 1 (Cat 1) First diagnosed tuberculosis with bacterial excretion (FDTB MBT+), and also other grave and wide-spread forms of the disease without bacterial excretion (FDTB MBT-)

Category 2 (Cat 2) Relapses of tuberculosis (RTB MBT+) and (RTB MBT-) and first diagnosed tuberculosis inefficiently treated (FDTB IT MBT+) and (FDTB IT MBT-)

Category 3 (Cat 3) First diagnosed tuberculosis with the limited process, without bacterial excretion (FDTB MBT-) and tuberculosis of unstated localization in children (tubintoxication)

Category 4 (Cat 4) Chronic tuberculosis (CT) of various localizations MBT + and MBT-

Category 5 (Cat 5) Risk groups to tuberculosis or its reactivation

Group 5.1 residual changes of cured tuberculosis,

Group 5.2 contact persons,

Group 5.3 adults, tuberculosis patients of doubtful localization,

Group 5.4 children and teenagers with latent tubinfection, persons from risk group, and also children who were not vaccinated in the neonative period and with postvaccinal complications.

Group 5.5 children and teenagers whose etiology of sensitivity to tuberculin it is necessary to specify, or character of changes in the lungs with the purpose of difdiagnosis.

VI. EFFICIENCY OF TREATMENT OF TUBERCULOSIS PATIENTS

1. Effective treatment:
   1.1. Recovery
   1.2. Discontinuance of bacteriological excretion
2. Completed treatment
3. Inefficient (failure) treatment
4. Interrupted treatment
5. Treatment proceeds
6. Transferred/Leave
7. A lethal consequence

VII. TUBERCULOSIS CONSEQUENCES (B90)

Residual changes after healed lung tuberculosis: fibrous, fibrous-nidus, bullous-dystrophic, calcinates in lungs and lymphatic nodes, pleuropneumosclerosis, cirrhosis, consequences of surgical intervention *(with the indication of the type and the date of an operation)*, etc.

Residual changes after healed tuberculosis of extrapulmonary localisation: cicatricial changes in various organs and their consequences, calcinosis, consequences of surgical intervention (with the indication of the type and the date of an operation).

THE FORMULATION OF THE DIAGNOSIS OF TUBERCULOSIS

It is necessary to formulate the diagnosis of tuberculosis in such a consequence: type of tubercular process (as an abbreviation with a designation of date of its establishment), the clinical form, localization of a defect, destruction (a phase of the process), a method of confirmation of the diagnosis (MBT+ or MBT-, HIST+ or HIST-), complications. Examples of diagnosis formulation:

1. FDTB (22.06.1999) of the lung upper sections (disseminated), Destr+, MBT+M+C+, Resist0, HIST0, lung haemorrhage, Cat1Coh2 (1999).

Here the mistake of the doctor is, that at presence of MBT+M+C+ medicamentous resistance of MBT was not investigated .

2. CTB (12.01.1999) of the upper section of the right lung (fibrous-cavernous), Destr +, MBT+M+C+, Resist+ (H, R, S) Resist II+ (K, Eth, Amic, Zip), HIST0, RI II, Cat4 Coh1 (1999), right-hand top lobectomy (27.05.1999), sharp cardiopulmonary insufficiency (28.05.1999), death (29.05.1999).

Here the mistake of the doctor is, that antimycobacterial therapy was not carried out a chronic tuberculosis patient according to 4 category during 18-24 months and undercured patient with presence of RI II was operated, that has resulted in complications and death.

3. FDTB (12.06.1999) miliary lung tuberculosis, Destr-, MBT-M-K-, HIST+, Cat1 Coh3 (1999), has left from supervision (13.10.1999).

Here the mistake of the doctor is, that the improper cohort choice as the tuberculosis is diagnosed for the patient on 12.06.1999, so he should have begun treatment at once and to be referred to the second cohort (Coh2), but the doctor had attributed the patient to a cohort with delay – in III quarter (Coh3). Probably, tuberculosis was diagnosed in the patient in II quarter, and the treatment was begun in III one. It testifies to the absence of cooperation of the doctor and the patient or the doctor's ignorance of cohorts.

Diagnosis alteration during treatment. At the modern level of medicative possibilities a need arises of making timely alterations to the diagnosis, especially, if at the beginning of treatment of the patient the results of microscopic sputum analysis were negative, and during the treatment (in 1,5-2 months) positive results of cultural analyses were received. For those who will write down clinical forms and phases of tubercular process facultatively, their change during treatment is also possible.

The phase process alteration can be made at any stage of a patient observation depending on his condition. The diagnosis alteration (tuberculosis

clinical form) is necessary at once after diagnosing in the patient of another clinical form of tuberculosis.

Concerning the patients who have suffered a surgical intervention in connection with lung tuberculosis, it is recommended:

a) persons with no lung changes of tuberculous character after the operation should be diagnosed: "Condition after operative procedure (the character and the date of the procedure should be indicated) in connection with this or that form of tuberculosis";

b) when in the lung tissue that is left or is in collabic state or those or other tuberculous changes are preserved in another organ, the tuberculosis form in ques-tion is taken into account. Besides, the character of the operative procedure in connection with tuberculosis is indicated.

CONTROL QUESTIONS

1. The principal headings of the classification of tuberculosis.
2. The clinical forms of tuberculosis of respiratory organs.
3. What comes into the concept "characteristic of tuberculosis process",
4. Stages of tuberculosis process.
5. Complcations of tuberculosis of respiratory organs.
6. Diagnosis formulation of tuberculosis of respiratory organs.
7. Diagnosis alteration during treatment.

TESTS

1. Primary forms of tuberculosis comprise:
   - A. Nidus
   - B. Disseminated
   - C. Tuberculosis intoxication
   - D. Caseous pneumonia
   - E. Infiltrative
2. Specific complications comprise:
   - A. Haemophthisis
   - B. Chronic lung heart
   - C. Lung atelectasis
   - D. Larynx tuberculosis
   - E. Amyloidosis disease
3. The characteristic phase of tuberculous process progression is:
   - A. Suction
   - B. Sowing

C. Condensation
D. Scarring
E. Calcination

4. Formulating the clinical diagnosis of lung tuberculosis, first of all should be defined:
   A. The process phase
   B. The clinical form
   C. Bacterial secretion
   D. Localisation process
   E. Type of tuberculuos process
5. Single nidal shades of small intensity with vague contours were revealed on the apex of both lungs of a 19-years old woman patient during the prophylactic fluorographyc examination. What is the clinical form of tuberculosis?
   A. Infiltrative
   B. Lung tuberculoma
   C. Nidus
   D. Caseous pneumonia
   E. Disseminated
6. A 25-year-old patient fell ill acutely. Complaints for headache, dry cough, dyspnea, temperature rise up to 39,0° C. Objectively: general condition is grave, lips cyanosis, rales are not heard. Blood analysis: leuk. – 12×10^9/l, ESR – 16 mm/hour. Plain roengenogram: the whole length of both lungs is full with multiple, small focal shadows of low intensity. Mantoux test – 5 mm infiltrate. What clinical form of lungs tuberculosis does this patient have?
   A. Nidus
   B. Infiltrative
   C. Disseminated
   D. Miliary tuberculosis
   E. Caseous pneumonia
7. A 10-year-old patient M. is diagnosed with tuberculin "turn", Mantoux test with 2 TO – 16 mm infiltrate. Complaints for general asthenia, increased sweating. Blood analysis: leuk. – $9,2\times10^9$/l, ESR – 26 mm/hour. Roentgenogram examination did not reveal pathologic alterations in the lungs. What diagnosis is the most probable one?
   A. Primary tuberculous complex
   B. Tuberculosis of intrathoracic lymphatic nodes
   C. Nidus lung tuberculosis
   D. Tuberculosis intoxication
   E. Infiltrative lung tuberculosis

8. Patient N., 26. Roentgenologic examination showed multiple focal shadows in upper and medial lungs segments of low and medium intensity. Sputum contains MBT. Blood analysis: ESR – 38 mm/hour. What diagnosis is the most probable one?
   A. Infiltrative lung tuberculosis
   B. Nidus lung tuberculosis
   C. Disseminated lung tuberculosis
   D. Caseous pneumonia
   E. Lung fibrous-cavernous tuberculosis
9. Patient K., 53. Roentgenologic examination showed in the upper segment of the left lung a ringlike shadow with a diameter of 5cm with thick walls and fibrous heaviness and focusness. Sputum contains MBT. What clinical picture is the most probable one?
   A. Lung cirrhotic tuberculosis
   B. Infiltrative lung tuberculosis
   C. Disseminated lung tuberculosis
   D. Lung tuberculoma
   E. Lung fibrous-cavernous tuberculosis
10. Indicate the incorrect formulation of clinical diagnosis of lung tuberculosis
   A. FDTB (16.06.2003) of the lungs upper sections (disseminated), Destr+, (infiltration), MBT +M+C+, Resist-, Hist 0, Cat1 Coh2(2003).
   B. CTB (12.01.2000) the upper section of the right lung (fibrous-cavernous), Destr+, (infiltration), MBT+M-C+ Resist I (S, H) Hist0. Lung haemoptysis. RI II, Cat 4 Coh1(2000).
   C. FDTB (20.03.2001) of the lower part of the right lung (tuberculoma), Destr+, MBT- M-C-, Hist 0, Cat1 Coh1(2001).
   D. FDTB (20.09.2003), (nidus tuberculosis), (infiltration), MBT-M-C-, Hist 0, Cat3 Coh3(2003).
   E. RTB (20.06.2003) of the upper part of the right lung (infiltrative), Destr-, MBT- M-C-, Hist 0, Cat2 Coh2(2003).
11. To the primary forms of tuberculosis belong:
   A. Disseminated
   B. Nidus
   C. Infiltrative
   D. Tuberculoma
   E. Tuberculosis of intrathoracic lymphatic nodes
12. The patient of 52 years old, during 9 months was treated because of the infiltrative tuberculosis of the upper part of the right lung, decay phase, MBT (+). At X-ray examination: the upper part of the right lung became smaller in

volume, under the clavicle there's a decay cavity 3 cm in diameter, the trachea is moved to the right, MBT (-). Define the form of tuberculosis.

A. Cyrrhotic
B. Caseuos pneumonia
C. Fibrous-cavernous
D. Infiltrative
E. Nidus

PRIMARY TUBERCULOSIS

Primary is considered tuberculosis that develops in firstly infected persons and comprises not more than 1 % among all patients of firstly diagnosed tuberculosis. It is predominantly observed in infantine and juvenile age.

The period from the moment of the intensity of tuberculin reaction during one year without signs of intoxication is called the period of early tuberculous infection.

Latent microbism is the condition of an organism under which MBT are found in tissues, predominantly in lymphatic nodes, but they do not contain specific changes, characteristic to tuberculous granuloma.

Characteristic signs of primary tuberculosis: the intensity of tuberculin reactions, organism hypersensibilization to MBT, injury of lymphatic system (lymphatic nodes) with the susceptibility to caseous necrosis, susceptibility to lymphogenous and haematagenous dissemination, possibility of spontaneous recovery, availability of paraspecific reactions.

Three principal clinical forms of primary tuberculosis are discriminated: tuberculous intoxication in children (tuberculosis without established localization), primary tuberculous complex, tuberculosis of intrathoracic lymphatic nodes.

LUNG TUBERCULOSIS

PRIMARY TUBERCULOUS COMPLEX

The clinical form of primary tuberculosis, which is characterized by specific inflammation in lungs (by primary affect), lesion of intrathoracic lymphatic nodes (lymphadenopathy) and lymphangitis (fig. 13).

Lung localization occurs in 90 %, abdominal – in 10 % of primary tuberculous complex cases.

Pathogenesis. After the penetration of MBT into the lungs, primary lesion (primary affect), of the size from a millet grain to a section of a lung, is predominantly localized subpleurally in the II, III, VIII, IX segments. From the primary affect the infection spreads along lymphatic vessels to intrathoracic lymphatic nodes. However, lymphadenopathy may also be primary or develop simultaneously with the lung affect.

Pathomorphism. Primary tuberculous complex consists of three components: primary affect (pneumonitis), lymphadenitis (lesion of intrathoracic lymphatic node) and lymphangitis (a "path" which joins the primary affect with lymphadenitis). Specific inflammation spreads to pleura and causes pleurisy.

The clinic of primary tuberculous complex depends on spreading pathomorphologic lung changes, intrathoracic lymphatic nodes, as well as on various complications. There may be asymptomatic, little

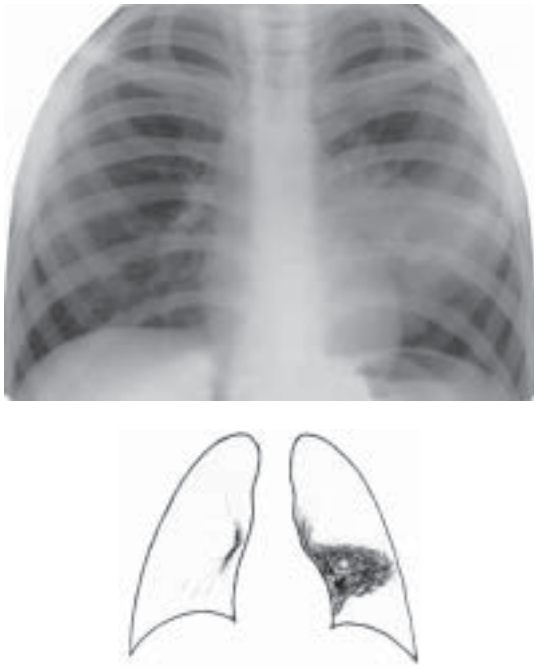


Fig. 13. **Primary tuberculosis complex (infiltration phase) of the left lung. Observation roentgenogram of the thoracic cage organs in the direct projection.**

symptomatic, pneumoniasimilar, influenzasimilar variants of the clinical course of primary tuberculous complex. However, more often it develops and proceeds like tuberculous intoxication.

Roentgenologically four phases (stages) of primary tuberculous complex are discerned: pneumonic (infiltrative), suction (bipolarities), scarring and calcification (petrification). At preantibacterial period calcification processes started in a year and lasted for 2-3 years; under present day antimycobacterial therapy they set in considerably earlier and rather rarely, because suction and scarring processes prevail.

Complications: pleurisy, lympho-hematogenic dissemination, decay (primary cavern on the site of lung component), bronchi tuberculosis, atelectasis of a segment or a particle,caseous pneumonia, primary tuberculosis with a chronic course, that develops as a result of considerable complications or inferior treatment.

The diagnostics is based on the anamnesis (contact), tuberculin test intensity, hyperergic reaction to Mantoux test, availability of intoxication symptoms and paraspecific reactions, roentgenologic picture (primary affect, lymphangitis, lym-phadenitis), changes of haemogram (little leucocytosis with an insignificant shift to the left, lymphopenia, monocytosis, speeded up ESR), MBT are rarely to be found.

The differential diagnostics is performed, first of all, with pneumonia, eosinophilic infiltration, peripheral or central cancer.

Treatment starts at a hospital and is done with 3 or 4 antimycobacterial preparations (isoniazidum, rifampicinum, streptomycini). In 2-3 months, after disappearance of intoxication signs, streptomycini is cancelled, the treatment proceeds with 2 remedies (isoniazidum with rifampicinum or ethambutolum) for 4-6 more months. At the same time vitamins B_1, B_6, C, desinsibilizing and symptomatic means are applied.

CONTROL QUESTIONS
(see "Tuberculous intoxication in children" and "Tuberculosis of intrathoracic lymphatic nodes")

1. Ways of penetrating and spreading tuberculosis mycobacteria in a human body.
2. The definition of primary tuberculosis and its peculiarities (characteristic).
3. What is the "range" of tuberculin test (possible consequences, prophylactic measures).
4. Tuberculous intoxication in children (definition, clinic, diagnostics, differential diagnostics, treatment).

5. What groups of intrathoracic lymphatic nodes may be injured at tuberculosis?
6. The definition of tuberculosis of intrathoracic lymphatic nodes (pathogenesis, pathomorphism, clinico-roentgenologic versions, clinic and diagnostics).
7. The main illnesses with which the differential diagnostics of tuberculosis of intrathoracic lymphatic nodes is made.
8. Primary tuberculous complex, its pathogenesis, pathomorphism, clinico-roentgenologic characteristic, diagnostics, differential diagnostics.
9. Complications of primary forms of tuberculosis (primary tuberculous complex and tuberculosis of intrathoracic lymphatic nodes).
10. Treatment of primary forms of tuberculosis.
11. Methods of timely revealing of primary forms of tuberculosis.

TESTS

1. The most informative method of roentgenologic examination at the diagnostics of a small form of tuberculosis of intrathoracic lymphatic nodes:
   A. A target roentgenogram
   B. A fluorogram
   C. A tomogram on the level of trachea bifurcation
   D. Observation roentgenogram of the thoracic cage
   E. Bronchogram
2. What is meant by the diagnosis "tuberculous intoxication in children"?
   A. A symptom complex of functional and objective signs of intoxication as a result of primary infestation with tuberculosis mycobacteria with unestablished localization.
   B. An intoxication syndrome at a small form of tuberculosis of intrathoracic lymphatic nodes.
   C. An intoxication syndrome at a primary tuberculous complex.
   D. An intoxication syndrome at a primary tuberculous complex of ileocecal section of intestine.
   E. Subfebrile body temperature, perspiration appeared, cough, voice hoarseness.
3. Paraspecific manifestations of primary tuberculosis:
   A. Micropolyadenitis, nodual erythema, phlyctenuar keratoconjunctivitis
   B. Tuberculosis of skin and tonsils
   C. Amiloidosis of internal organs, pleural empyema
   D. Tuberculosis pleurisy and pericarditis
   E. Tuberculous peritonitis and tuberculosis of intestine
4. What is the primary tuberculosis?
   A. First diagnosed tuberculosis
   B. Tuberculosis that develops in firstly infected persons.

C. Tuberculosis what has developed after the primary tuberculous complex.
D. Tuberculosis revealed during the prophylactic examination.
E. Tuberculosis caused by mycobacteria of beef type.

5. Phtisiologist tactics to a 7-year-old child with a diagnosis of tuberculous intoxication.
   A. To observe in a tuberculous dispensary for 2 years.
   B. To undergo treatment with 3 antimycobacterial preparations within 4-6 months assuming the follow of sanatoric-hygiene regime.
   C. To observe in a children's out-patient department up to the age of 14.
   D. To make chemioprophylaxis with isoniazide within 3 months.
   E. To improve the health in a recreation camp.
6. The most common complication for the primary tuberculous complex.
   A. Chronic lung tuberculosis
   B. Lung haemophtisis
   C. Spontaneous pneumothorax
   D. Pleurisy
   E. Amiloidosis of intestinal organs
7. To detect the "small" form of tuberculous bronchoadenitis, it's necessary to perform:
   A. Inspection roentgenography
   B. Target roentgenography
   C. Fibrobronchoscopy
   D. Tomography on bifurcation trachea
   E. USE
8. A boy of 6 complains for cough, poor appetite, sweating, temperature rise up to 37,5 °C. Roentgenogram – on the left: enlarged bronchopulmonary lymph nodes with illegible exterior contours. Mantoux test with 2 TO – 15 mm infiltrate. Blood analysis: leuk. – $9{,}0\times10^9$/l, ESR – 30 mm/hour. The most probable diagnosis.
   A. Unspecific pneumonia
   B. Central cancer
   C. Sarcoidosis
   D. Tuberculosis of intrathoracic lymphatic nodes
   E. Lymphosarcoma
9. Prophylactic examination of a 17-year-old boy revealed bilateral enlargement of bronchopulmonary lymph nodes. General condition – satisfactory, no complaints. No pathologic alterations were found at physiacal examination. Mantoux test with 2 TO – negative. General blood analysis – without any pathologic deviations. The most probable diagnosis.

A. Lymphogranulomatosis
B. Unspecific adenopathy
C. Sarcoidosis
D. Tuberculosis of intrathoracic lymphatic nodes
E. Lympholeucosis

10. The most frequent segmental localization of the primary lung affect:
A. I, II, III, IV segments
B. I, II, IV, VII segments
C. II, III, VIII, IX segments
D. I, II, IV, VI segments
E. I, II, VI, VII segments

11. A girl of 7 years old, 2 months ago suffered from "influenza", after which coughing, general weakness, decreased appetite, sweating appeared, the body temperature rose up to 37,5 °C. At the percussion and auscultation pathological changes are not found. On the X-ray: the enlarged tracheobronchial and bronchopulmonal lymphatic nodes on the left side. Blood: leuc. $9{,}0\times10^9$/l, ESR – 22 mm/hour. Mantoux test with 2 TU – infiltrate of 17 mm. What is the most probable diagnosis?
A. Sarcoidosis
B. Lymphogranulomatosis
C. Lymphosarcoma
D. Tuberculosis of intrathoracic lymphatic nodes
E. Central cancer

12. At the 5 years old boy, who suffers from the tuberculosis of intrathoracic lymphatic nodes suddenly appeared coughing, pain behind the stern, shortness of breath, mild cyanosis of lip mucose. Body temperature is 38,4 °C. Upon the upper part of the right lung there is the dulling of the percussion note, in the same place there is the weakened breathing. The most probable complication of the tuberculosis of intrathoracic lymphatic nodes.
A. Exudative pleurisy
B. Spontaneous pneumothorax
C. Atelectasis
D. Tuberculosis of bronchi
E. Pleural empyema

TASKS

1. At revealing a range in a child of 3 years of age an observation roentgenogram of the thoracic cage was made, on which a widened tumorous right root was revealed.
a) At what illnesses can a similar roentgenologic syndrome be observed?

b) What investigations should be carried out for the confirmation or exclusion of tuberculosis?

2. In a child of 7 Mantoux test with 2 TU – an infiltrate of 19 mm in diameter. During the previous 2 years Mantoux test was negative. BCG vaccinated in a maternity home, there is a postvaccinal seam. The parents are healthy.

a) Specify the nature of tuberculin reaction.

b) Prove your conclusion.

c) A doctor's tactic in conformity with the child.

3. A girl S., 6 years of age, feels herself healthy and well. Her father was FDTB (12.07.2002) of the lung upper sections (disseminated), Destr +, MBT+M-C+, Resist-, HIST0, Cat1Coh3(2002).

a) A doctor's tactics in conformity with the girl.

b) The scope of the child's examination.

c) Your tactics in case she will have no data testifying for tuberculosis.

4. A six-years old child's mother suffers from a plain form of lung tuberculosis. Vaccinated in a maternity home, there is a postvaccinal seam. The intoxication syndrome in the child is moderately expressed. Roentgenologically to the right in the 3rd segment there is an infiltrative shade, which blends with the lung widened infiltrated root. The blood analysis is within the norm.

a) What illness can one think about?

b) What illnesses should one differentiate from?

c) A treatment plan.

5. In a three-years old child, vaccinated in a maternity home, Mantoux test with 2 TU during the last 2 years has grown from 6 to 20 mm. For over 3 months the child eats poorly, is naughty, often complains of stomach-ache, the body temperature is sometimes subfebrile. No pathologic changes have been revealed on the inspection roentgenogram of the thoracic cage organs.

a) What illness can be suspected?

b) What illnesses should one differentiate from?

c) The plan of additional examination and treatment.

DISSEMINATED LUNG TUBERCULOSIS

Disseminated lung tuberculosis is a clinical form of tuberculosis that arises as a result of lympho-haematogenous spreading of infection and is characterized by bilateral, symmetric nidal injury with predominant localization in upper, subcortical lung sections.

At present time, among firstly diagnozed lung tuberculosis patients, disseminated form is found in 23 % of cases.

Pathogenesis. The following conditions are necessary for the disseminated lung tuberculosis to break out: availability in an organism of a nidus of tuberculous injury, bacteriemia, hypersensibility of an organism and first of all the increase of permeability of the lung vessels wall, as well as the decrease of the body's resistance to various provocative factors. The nidus of specific injury is predominantly tuberculous injury of intrathoracic lymphatic nodes, from which through thoracic duct, subclavian vein MBT get into the right half of the heart, and further into the lung artery and the lungs.

Besides lympho-haematogenous spreading of infection, disseminated tuberculosis can arise as a result of MBT dispersion by bronchogenic or mixed ways, by what symmetry or asymmetry of lung injury is explained. *Depending on the massiveness, virulence of the infection, the state of the macroorganism as well as various negative provocative factors, acute, subacute or chronic disseminated lung tuberculosis may develop.* These forms of disseminated tuberculosis, depending on the way of MBT spreading, may be of haematogenous or lymphobronchogenous genesis.

Acute disseminated tuberculosis of haematogenous genesis is most often manifested as miliary one. It stands out for a separate clinical form in connection with the increase of its frequency under present conditions, the worsening of tuberculosis epidemiological situation.

Subacute disseminated tuberculosis *develops at lowering of the body resistance, it has a severe progressing course, sometimes of caseous pneumonia type, with lethal outcome in 6 and more months* (fig. 14)

Pathomorphism. The main components of subacute disseminated tuberculosis is a specific granuloma (tubercle), vasculite and alveolite, that is the basis for the formation of large nidi of exudative character in upper and middle sections or throughout all the lung fields. On the background of the nidi thin-walled caverns with perifocal inflammation may form. More often caverns are found on symmetric sections of the lungs. There may be extralung injuries.

Clinic. The main syndromes are: intoxicating, bronchopulmonary, as well as indications of injuries of other organs.

At laboratory examination, expressed pathologic changes of haemogram are typical. MBT are often revealed in sputum. Mantoux test with 2 TU is positive, however, at the patient's grave state it may be negative.

Roentgenologically nidi are large in size, symmetrically located, of medium and small intensity, with vague contours, inclined to confluence (the "falling

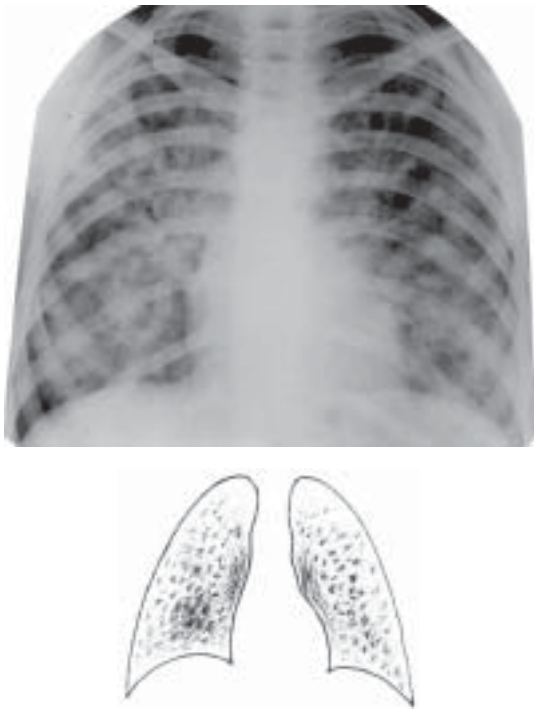


Fig. 14. **Disseminated lung tuberculosis (subacute). Observation roentgenogram.**

snow" picture) and the formation of decay cavities, from which "stamped caverns" are formed.

Differential diagnostics is performed with lung illnesses, similar by roentgenologic symptoms, accompanied by dissemination syndrome, stagnation phenomena in lungs (they are over 200). They are, first of all, bilateral nidus pneumonia, sarcoidosis (II stage), carcinomatosis, silicosis, lung stagnation phenomena, idiopathic fibrosing alveolite, Goodpasturer's syndrome, mucoviscidosis, lung toxoplasmosis etc.

Treatment. The principal method of treating patients with lung subacute dis-seminated tuberculosis is antimycobacterial therapy, lasting for 8-12 months, the first 2-3 months – 4, and then 3 antituberculous preparations, up to decay cavities closure. The further treatment is done with isoniazidum and rifampicinum (or ethambutolum) (see "Treatmet of tuberculosis").

CHRONIC DISSEMINATED LUNG TUBERCULOSIS

It is the most frequent form of lung disseminated tuberculosis, first of all of haematogenous genesis, and more often develops as an independent form or on the background of ineffective treatment of lung subacute disseminated tuberculosis. It is characterized by apicocaudal spreading of the process. Successive injury of various organs and systems is possible. *Chronic disseminated tuberculosis has an undulatory course, at which intoxication*

symptoms at the remission period are partially extinct, and at the process outbreak they increase with the appearance of fresh lung and extra-lung local injuries. Roentgenologically polymorphic nidus shades are revealed in the lungs on the background of deformed lung picture, fibrosis and emphysema (fig. 15). At any stage of the disease caverns may arise in one or both lungs. Thus, in time at durable progress of disseminated tuberculosis, as a result of periodic outbreaks and remissions of the process, repeated waves of dissemination, formation of pneumosclerosis and emphysema, chronic lung heart develops.

Data about the present contact with a person secreting bacteria, primary tuberculosis, pleurisy, extra-lung tuberculosis, suffered in the past, protracted undulatory progress of illness are of great importance at the diagnostics of chronic disseminated tuberculosis. Roentgenologically: polymorphous nidus shades predominantly in the upper and middle sections on the background of deformed lung picture and fibrosis, not seldom with decay cavities of irregular form. MBT revealing is the confirmation of the specific nature of illness.

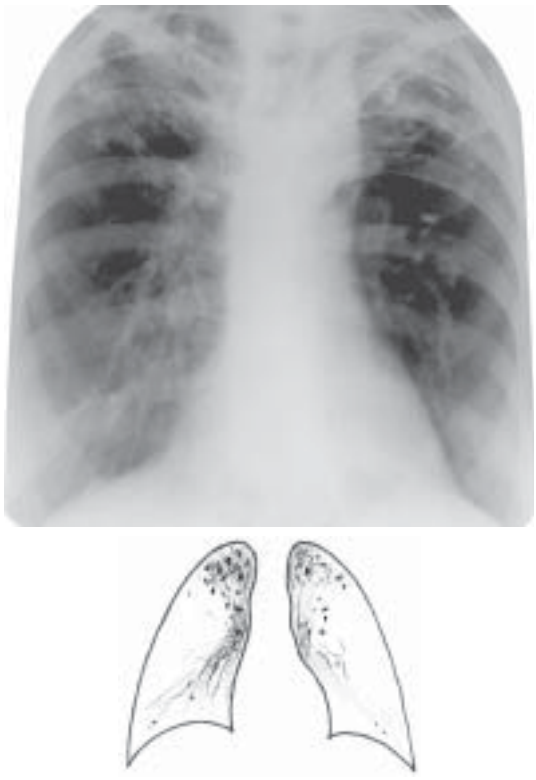


Fig. 15. **Disseminated lung tuberculosis (chronic). Observation roentgenogram.**

Differential diagnostics of chronic disseminated tuberculosis is performed with illnesses like the differential diagnostics of subacute disseminated tuberculosis and, first of all, with those that are characterized by a protracted course.

The main method of *treatment* is prolonged

antimycobacterial therapy with taking into account MBT sensitivity to preparations, their tolerance, complications (see "Treatmet of tuberculosis").

CONTROL QUESTIONS
(see "Miliary tuberculosis")

1. The definition of disseminated lung tuberculosis, its pathogenesis and pathomorphism.
2. Clinico-roentgenologic varieties of disseminated lung tuberculosis.
3. Miliary lung tuberculosis, its roentgenologic picture and clinical forms.
4. Differential diagnostics of miliary lung tuberculosis.
5. Subacute disseminated lung tuberculosis, clinic, roentgenologic picture, course and complications.
6. Chronic disseminated lung tuberculosis, clinic, roentgenologic picture, course and complications.
7. The main illnesses from which one should differentiate subacute and chronic disseminated lung tuberculosis.
8. Treatment of miliary and disseminated lung tuberculosis patients.

TESTS

1. In how many days after the beginning of the illness can one reveal the pathologic changes on a roentgenogram at miliary lung tuberculosis.
   A. 1-2 days
   B. 3-5 days
   C. 7-14 days
   D. 21-30 days
   E. 1-2 months
2. The atypical form of clinical progress of miliary tuberculosis is:
   A. Pulmonary
   B. Meningeal
   C. Typhoid
   D. Septic (Landuzi disease)
   E. Renal
3. Patient D. is diagnosed with FDTB (10.12.2002) miliary tuberculosis of lungs, Destr-, MBT-M-C-, Resist0, HIST0, Cat1Coh4(2002). Four antimycobacterial preparations were prescribed. What means of pathogenetic therapy are most advisable for this patient?
   A. Thymus preparations
   B. Corticosteroids
   C. Noncorticosteroids anti-inflammatory means

D. Electrophoresis of calcium chloride
E. Tissue preparations (plasmol, aloe extract)

4. Patient K. is diagnosed with FDTB (23.10.2003) miliary tuberculosis of lungs, Destr-, MBT-M-C-, Resist0, HIST0, Cat1Coh4(2003). Which of antimycobacterial preparations combination is most optimum at the 1st stage of the treatment?
   A. Isoniazidum + rifampicinum + ethambutolum
   B. Isoniazidum + rifampicinum + ethionamidum
   C. Isoniazidum + rifampicinum + streptomycini + pyrazinamidum
   D. Isoniazidum + streptomycini + ethambutolum + pyrazinamidum
   E. Isoniazidum + kanamycini + ethambutolum + pyrazinamidum
5. Patient L., 35. The illness started acutely – with body temperature rise up to 39 °C, cough with sputum secretion. Received antibiotics during a week time – no effect. Not numerous moist fine bubbling rales between the scapulae. Roengenogram: focuses of various dimensions with illegible contours along the whole extent of both lungs. Blood analysis: leuk. – $13,2\times10^9$/l, ESR – 45 mm/hour. Which is the most probable diagnosis?
   A. Disseminated lung tuberculosis
   B. Bilateral nidal pneumonia
   C. Infarction-pneumonia
   D. Stagnation phenomшna in lungs
   E. Caseous pneumonia
6. A man of 48. The photoroengenologic examination showed multiple focuses of various dimensions of low and medium intensity with illegible contours in the upper segments of both lungs. The patient does not feel himself worse. Blood analysis: $8,2\times10^9$/l, ESR – 20 mm/hour. Which form of lungs tuberculosis does the patient have?
   A. Miliary
   B. Disseminated
   C. Nidus
   D. Disseminated (chronic)
   E. Infiltrate
7. A man of 46. Two months ago was dismissed from a prison. Has been falling ill gradually: cough, dyspnea, temperature rise up to 38 °C. Roentgenogram: focal shadows of low intensity with illegible contours in the upper lungs segments. Which diagnosis is the most probable?
   A. Carcinomatosis
   B. Disseminated lung tuberculosis
   C. Nidus pneumonia
   D. Nidus lung tuberculosis

E. Chronic bronchitis

8. Patient, 35. Has been a drift miner for 10 years. Complains for dyspnea during physical load, cough with little of sputum. Normal body temperature. Rales in the lungs are not heard. Blood analysis: leuk. – $7,8\times10^9$/l, ESR – 8 mm/hour. Mantoux test with 2 TO – 10 mm infiltrate. Roentgenogram: small focal shadows of high intensity with distinct contours on both sides, especially in the medial-lateral segments. What is the preliminary diagnosis?
   A. Small-nidal pneumonia
   B. Miliary tuberculosis
   C. Disseminated lung tuberculosis
   D. Carcinomatosis
   E. Pneumoconiosis
9. Patient, 62. Complaints of accessive cough, dyspnea, drop of appetite, weight loss for 10 kg. Contacted with his brother who is ill with tuberculosis of lungs. 6 months ago had a surgical operation because of cancer of the prostatic gland. Blood analysis: anemia, ESR – 65 mm/hour. Roentgenogram: multiple focal shadows (5-6 mm) with distinct contours in medial and especially in lower lungs segments. Your preliminary diagnosis.
   A. Disseminated lung tuberculosis
   B. Carcinomatosis
   C. Nidus lung tuberculosis
   D. Tromboembolism of branches of lung arteria
   E. Bilateral nidus pneumonia
10. The main roentgenological indications of disseminated (subacute) lung tuberculosis:
   A. Bilateral total small-nidus lung lesion
   B. Bilateral symmentrical nidal lesion, mainly in the upper and the medium parts of lungs
   C. One-side nidal lesion
   D. Bilateral nidal lesion
   E. Bilateral nidal-infiltrative process in the upper part of the both lungs

TASKS

1. Dry cough, shortness of breath, perspiration appeared in a 19-years old patient after artificial pregnancy interruption, the body temperature up to 38,5 °C. Frequency of breathing was 32 per 1 minute. Rough respiration above the lungs. Small-nidal shades of little intensivity are observed throughout the whole lung length on the inspection roentgenogram. A year ago Mantoux test with 2 TU was 19 mm, now it is negative. Haemogram: leucocytes 9×10^9/L, e – 2 %, p – 4 %, s – 74 %, l – 12 %, m – 8 %, ESR – 11 mm/hr.

a) Formulate the diagnosis.

b) What illnesses, first of all, should one differentiate from?

c) The treatment.

The answer: a) miliary lung tuberculosis, infiltration phase. b) Nidal pneumonia. c) Isoniazidum 0,3 g, rifampicinum 0,6 g, streptomycin 1,0 g in/m, pyrazinamidum 2,0 g a day, desensitizing means, vitamins of B gm, hepatoprotectors, symptomatic therapy.

2. A patient Z., 29, in 3 weeks after influenza cough with sputum expectoration, shortness of breath, general weakness, perspiration appeared, the body temperature was up to 39 °C. 2 years ago the patient was treated for 2 weeks in connection with the right-side exudative pleurisy. On roentgenogram throughout the whole length of both lungs-nidi of medium and big sizes with vague contours.

a) Formulate the preliminary diagnosis.

b) The plan of the patient examination.

c) With what the most similar illnesses should one differentiate from?

d) The treatment plan.

3. After a fluorographic examination, nidi of various sizes and intensivity have been revealed in the lung upper parts of a woman aged 35. She often suffered from "influenza". Last time she underwent roentgenologic examination 7 years ago, no changes were revealed. The patient's general state is satisfactory.

a) Formulate the preliminary diagnosis.

b) The plan of the patient examination.

c) What treatment centre will you direct the patient to?

4. A patient P., 20, has fallen ill acutely after catching cold with the body temperature rising up to 39,5 °C, general weakness, perspiration, considerable shortness of breath, dry cough. Above the lower part of the lungs dry and wet rales. Roentgenologically in the lower parts of the lungs thick nidi of average intensivity are observed on the background of the strengthened lung picture.

a) Formulate the preliminary diagnosis.

b) What treatment centre will you direct the patient to?

c) Examination and treatment plan.

5. A patient K., 30 years of age. He consideres himself to be ill during the last 7 months. The illness developed gradually. At the present time the general weakness is expressed, perspiration, cough with sputum expectoration, shortness of breath. The patient has lost 12 kg of his weight. Roentgenologically throughout the whole length of the lunds massive nidal-infiltrative changes with multiple decay cavities of various caliber.

a) Formulate the preliminary diagnosis.

b) Work out the plan of examination?

c) The illness prognosis.

NIDUS (FOCAL) LUNG TUBERCULOSIS

The small form of tuberculosis that is characterized by the presence of a nidus (a specific injury up to 1 cm in diameter) or a group of nidi within not more than two segments of one or both lungs (fig. 16). Among first diagnosed lung tuberculosis patients the nidus form makes up 18,9 %.

Pathogenesis. The nidus lung tuberculosis may develop as a result of exogenous superinfection or endogenous MBT spreading from concealed tubercu-lous nidi in intrathoracic lymphatic nodes, bones, kidneys, more often – from old encapsulated or calcified nidi in lungs at aggravation. The third way of forming nidus tuberculosis is the involution of other forms – infiltrative, disseminated tuberculosis.

Clinic. Phenomena of intoxication at nidus tuberculosis are weakly expressed or absent. However, it should be noted, that only processes with an active, uncompleted specific process are attributed to nidus tuberculosis.

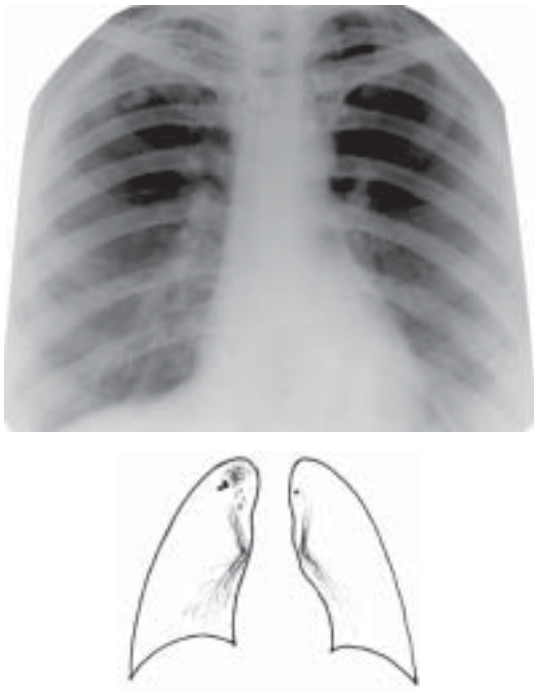


Fig. 16. **Nidal tuberculosis of the right lung upper part. Observation roentgenogram.**

Mild-nidus (inphiltration phase) and fibrous-nidus (scarring phase) lung tuberculosis are discriminated.

Mild-nidus lung tuberculosis is always a fresh and active specific process. *Fibrous-nidus lung (chronic)* tuberculosis is manifested by the presence of compact nidi with inclusion of lime, sometimes also caseose, fibrous changes in the form of traces and sections of hyperpneumatosis. At revealing fibrous-nidus changes by the method of roentgenofluorography it is necessary to perform a thorough examination of a patient with a view to ascertain the process activity.

Nidus lung tuberculosis is predominantly revealed during prophylactic fluorographic examinations, as clinical symptoms are weakly expressed or absent.

It is only in 1/3 of patients that intoxication symptoms or complaints, connected with the injury of broncho-pulmonary system, are observed. Intoxication symptoms are more often observed at mild-nidus tuberculosis, while the symptoms of injury of respiratory organs – at that of fibrous nidus one.

Percussion and auscultation at nidus tuberculosis are of no great importance. The haemogram in the predominant majority of patients is without changes. Mycobacterial secretion is scanty and does not exceed 15 % of thoroughly examined patients.

Roentgenologic examination is the principal and the most informative method of revealing nidus lung tuberculosis. With this aim in view fluorographic examination at inhalation and expiration, target roentgenogram, tomograms on optimum microscopic sections are applied. *Roentgenologic signs of nidus tuberculosis are: nidi within not more than two segments; at mild-nidus form – nidi of small and middle intensity with vague contours on the background of strengthened vessel picture of an injured section of the lung; at fibrous-nidus form – nidi of big intensity with distinct contours on the background of deformed lung picture and fibrous traces.* Sometimes at fibrous-nidus tuberculosis there arises the necessity of determining the process activity (i.e. when the specific process is not yet completed and dynamics towards progression or regression is possible).

The activity of tuberculous process is defined on the basis of the following criteria:

1. Clinical (bronchopulmonary or intoxication symptoms are present);
2. Roentgenologic (nidi of small intensity, with vague contours, a considerable number of nidi and of big sizes);
3. Bacteriological (revealing of MBT);
4. Changes in haemogram (leucocytosis, shift of leucocytic formula to the left, lymphopenia, accelerated ESR);
5. Tuberculin tests (hyperergic Mantoux test with 2 TU, positive local, nidus and general reactions after subcutaneous transfusion of tuberculin (Koch test);
6. If preliminary tests do not allow to settle the problem as to the activity of lung pathologic changes, experimental treatment is applied, which consists in administering 2-3 antituberculous preparations (isoniazidum, ethambutolum

and (or) streptomycini (no more than 2 months)) during 3-4 months. Afterwards roentgenologic examination is repeated; positive roentgenologic dynamics testifies about active tuberculous process and the patient's treatment proceeds. At stable roentgenologic picture – the process in inactive and antimycobacterial therapy discontinues. However, it should be noted, that the most informative tests of the activity of tuberculous process are roentgenologic, bacteriological and experimental treatment.

Differential diagnostics. Unspecific pneumonia, neoplasms or metastatic lung injuries may have clinico-roentgenologic symptomatics similar to that of lung nidus tuberculosis.

Treatment of lung active nidus tuberculosis patients should be started with three antimycobacterial preparations: isoniazidum, rifampicinum and pyrazinamidum during 2 months. Afterwards the treatment is continued with isoniazidum in combination with rifampicinum during to 6 months. Illness progressing is possible in 2-5 % of lung nidus tuberculosis patients. In these cases indications to a partial lung resection may arise.

CONTROL QUESTIONS

1. The definition of nidal tuberculosis.
2. Pathogenesis and pathomorphism of nidal tuberculosis.
3. Clinico-roentgenologic variants of nidal tuberculosis.
4. Clinic, diagnostics, differential diagnostics of nidal tuberculosis.
5. Criteria of activity of nidal tuberculosis.
6. The essence of an individual tuberculinodiagnostics and test treatment at the definition of the activity of tuberculous process.
7. Treatment of nidal tuberculosis patients.

TESTS

1. What reontgenologic signs convincingly testify about the activity of focal tuberculosis?
   A. Focuses of medial intensity with distinct exterior contours.
   B. Group of focuses, different in size, of high intensity.
   C. Focuses of low intensity with illegible contours.
   D. Gohn's focus.
   E. Focuses of medium intensity on the background of limited pneumosclerosis.
2. What medical preparations are advisable for the usage for a trial treatment of a patient with the aim of differential diagnosis of the local tuberculosis and pneumonia?

A. Streptomycini and sulfaleni
B. Streptomycini and isoniazidum
C. Penicillini and sulfaleni
D. Penicillini and rifampicimun
E. Penicillini and streptomycini

3. The prophylactic photoroentgenographic examination of a 25-year-old patient showed in segments 1-2 of the left lung focal shadows of low intensity without distinct contours. Mantoux test with 2 TO – 7 mm infiltrate. Blood analysis: leuk. – $9,9\times10^9$/l, ESR – 26 mm/hour. Which is the most probable diagnosis?
A. Nidus lung tuberculosis
B. Infiltrative lung tuberculosis
C. Nidus pneumonia
D. Lung cancer
E. Eosiniphil infiltration

4. Maximum size shadows at nidus lung tuberculosis is:
A. 1 mm
B. 1,5 mm
C. 5 mm
D. 10 mm
E. 25 mm

5. The most trustworthy criteria of nidal tuberculosis activity.
A. Intoxication syndrome
B. Changes in haemogram
C. Revealing of micobacteria tuberculosis
D. Nidus shadow of medium intensity with distinct contours
E. Positive Mantoux testing of 2 TU

6. Maximum number of segments affected at nidus lung tuberculosis.
A. 1
B. 2
C. 3
D. 4
E. 5

7. A female patient of 45 is disturbed with cough, temperature rise up to 37,5 °C. Got ill six weeks ago after "the flu". In a 2 weeks treatment course for focal pneumonia, focal shadows in the upper segment of the right lung remained without any changes. In blood: eosinophilia – 6 %. What is the most probable diagnosis?
A. Aspergilosis
B. Lung cancer

C. Eosiniphil infiltration
D. Nidus tuberculosis
E. Lingering pneumonia

8. Patient, 27. Underwent 4-months treatment in a hospital because of infiltrate tuberculosis of the upper segment of the left lung in the phase of destruction. He is achieved, but in the place of the infiltrate a round 2 cm hole of medium intensity and with distinct exterior contours is formed. What treatment method is most advisable at this phase?
   A. To recommend sanatoric treatment
   B. To continue the treatment with antimycobacterial preparations
   C. To use surgical intervention
   D. To carry out 1,5-2th months course of hormonotherapy
   E. To use means of popular medicine
9. Patient, 35. Five years ago was ill with infiltrate tuberculosis of the upper segment of the right lung, MBT (-). Now complains for dry cough, sweating. Fine bubbling moist rales after coughing above the upper segment of the right lung. During the last three years the roentgenologic picture has been stable (individual focal shadows of high and medium intensity in the upper segment of the right lung). To what group of dispensary observation should this patient be refered to?
   A. 5.1
   B. 5.2
   C. 5.3
   D. 5.4
   E. 5.5
10. A man of 43, smoker, complains of cough with little sputum secretion, subfebrility, weight loss. With the suspect for the abcess-forming pneumonia was hospitalized into a diagnostic department. Roentgenogram: in the upper segment of the right lung – 4×4 cm shadowing with distinct exterior contour and a sickle-shaped enlargement. Blood analysis: leuk. – $9{,}0\times10^9$/l, ESR – 19 mm/hour. Sputum analysis: leuk. – 8-12 in the vision field. Mantoux test with 2 TO – 22 mm infiltrate. What is the most probable diagnosis?
   A. Peripheral lung cancer
   B. Abscess of lung
   C. Lung tuberculoma
   D. Non-malignant tumor
   E. Aspergiloma
11. A man of 38 complains of pain in heart area, subfebrility, sweatness, weight loss. Pulse: 82 strokes/min., AP 110/75 mm m.c. Systolic murmur over the

heart apex. Roentgenogram: focal shadows up to 5 mm in diameter on both lungs apexes. What disease is the most probable one?

A. Sarcoidosis
B. Eosinophil infiltration
C. Nidus pneumonia
D. Nidus lung tuberculosis
E. Peripheral lung cancer

12. Which tuberculin test has the most informative meaning for defining the activity of the tuberculous process:

A. Pirquet's test
B. Mantoux test
C. Koch test
D. Moro test
E. Pirquet's graduated test.

TASKS

1. Nidal shades of medium intensity with vague contours were revealed on the left apex of a 20-years old youth during fluorographic examination. His general state is good. Mantoux test with 2 TU – 19 mm infiltrate.

a) Your preliminary diagnosis.
b) What treatment institution should the patient be directed to?
c) What additional methods of examination are expected to be made?

The answer: a) nidal tuberculosis of the upper part of the left lung. b) To an antitubercular dispensary. c) An inspection and target roentgenogram, tomogram; 3-times bacterioscopic and bacteriologic examination of sputum for MBT.

2. A group of shadows of small and medium intensity of 3-8 mm in diameter has been revealed in the upper part of the right lung in a patient of 25 years old on a fluorogoram. The patient's state is satisfactory. Mantoux test with 2 TU – 16 mm infiltrate.

a) Formulate the preliminary diagnosis.
b) The plan of examination.

3. Small and average nidi of little intensity have been revealed on the apex of the right lung during fluorographic examination of a man aged 30. During the last month he notes the decrease of the appetite, perspiration, inconsiderable cough.

a) What illness can be suspected?
b) What treatment institution should the patient be directed to?
c) The plan of the examination.

LUNG INFILTRATIVE TUBERCULOSIS

Lung infiltrative tuberculosis is a specific exudative-pneumonic process, of the size over 1 cm, inclined to quick progressing and decay (fig. 17). At present time it is the most widely spread form of lung tuberculosis and it comprises 54,9 % among firstly diagnosed patients.

Pathogenesis. Infiltrative lung tuberculosis develops as a result of perifocal inflammation around old tuberculous nidi, or as a result of mild-nidus tuberculosis progressing. The development of infiltration is the result of hyperergic reaction of lung tissue to a great number of virulent MBT, that multiply rapidly. Here of essential importance are the superinfection solidity, presence of various illnesses, psychological traumas and other factors, which lower body resistance.

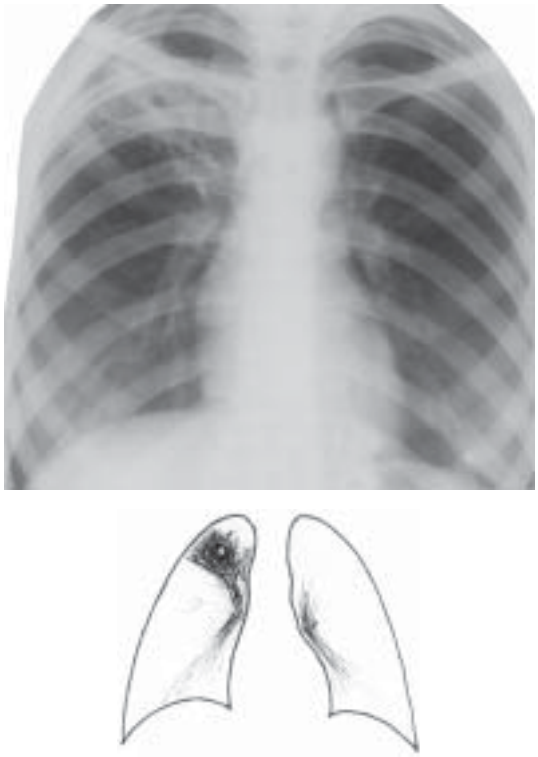


Fig. 17. **Infiltrative tuberculosis of the right lung upper part, decay phase. Artefact above the diaphragm left cupola. Observation roentgenogram.**

Pathomorphism. One or a few sections, a subsegment, a segment, a part may be injured at lung infiltrative tuberculosis. The nidus, around which infiltration is formed, is exudative or productive inflammation inclined to caseous necrosis, which under the influence of proteolytic enzymes, results into liquefaction, break through the injured draining bronchus and formation of decay cavity, appearance of fresh nidi around the infiltration. Further on, under the influence of the treatment, cicatricial, nidus changes, Pool nidi (a nidus, in which centre there is caseose), tuberculoma, indurative

field and even limited cirrhosis are formed in the site of infiltration, considerably rarelier – full suction. At ineffective treatment lung infiltrative tuberculosis may develop into fibrous-cavernous lung tuberculosis.

Clinic. Infiltration and caseous pnuemonia are discriminated (the latter is classified into a separate clinical form). *Clinico-roentgenologically the following variants of lung infiltrative tuberculosis are discriminated:*

1. *Cloudsimilar* infiltration is characterized by the presence of tender, weak intensity of inhomogeneous shade with vague washed off contours and inclined to rapid desrtuction.

2. *Rounded* infiltration – almost homogeneous shade of average intensity of rounded form with distinct contours (Assman-type).

3. *Lobular* infiltration looks like an inhomogeneous shade, which is a nidi conglomerate, which coalesced.

4. *Lobar* infiltration (lobit) is a spread infiltrative process, which embraces a whole part of a lung, often of inhomogeneous character and with the presence of individual or some decay cavities.

5. *Periscysurite* is an infiltration, disposed along interpartial fissure, as a result this contour is distinct, and the opposite one is washed off.

Clinical course of infiltrative tuberculosis depends on the morphological structure, sizes of infiltration and caseose. More often infiltrative tuberculosis begins acutely or subacutely and as to the clinical course it resembles influenza, an acute respiratory virus infection or pneumonia. One of the symptoms of infiltrative tuberculosis may be haemoptysis under the patient's general satisfactory condition. Sometimes the progress of infiltrative tuberculosis is asymptomatic (inaperceptive), though here too insignificant signs of intoxication may be revealed at thorough examination. Physical data depend on the process sizes and phase. If the infiltration exceeds 4 cm in diametre, the percussion note dullness is noted, rough respiration, damp rale at infiltration destruction.

Roentgenologically infiltrative tuberculosis is characterized by: a shade of over 1 cm in diameter, of inhomogeneous character, of average or weak intensity, connected by a "path" with a root, predominantly localized in I, II or VI segments, the decay cavity in the infiltration centre, and around or in other lung sections – nidi of bronchogenic dissemination.

In haemogram – leucocytosis, not exceeding $15{,}0\times10^9$/l in the predominant majority of patients, shift of the leucocytic formula to the left, lymphopenia, accelerated ESR. Reaction to Mantoux test with 2 TU is positive (normergic).

In 40-50 % of cases infiltrative tuberculosis of lungs is accompanied by bacterial excretion, while at infiltration destruction – in 95 % of patients.

Differential diagnostics of lung infiltrative tuberculosis is done first and fore-most with unspecific pneumonia, eosinophil infiltration, lung cancer, lung infarction.

The treatment of patients comes to conducting uninterrupted anti-mycobacterial therapy during 6-9 months. The first 2-3-months antituberculous preparations in optimum doses (isoniazidum, rifampycinum, streptomycini, ethambutolum or pyrazinamidum) are administered against the background of desensitized, vitamine – and symptomatic therapy. Often the course of glucocorticoid therapy is expedient at the first phase of the treatment. In 2 months streptomycini is cancelled, the treatment is proceeded during 4 months with isoniazidum, rifampycinum, ethambutolum (or pyrazinamidum) to the decay cavity closure. In cases of ineffective treatment during 3-6 months, surgical intervention – a partial lung resection, is indicated.

CASEOUS PNEUMONIA

Caseous pneumonia is an acute specific pneumonia, which is characterized by considerable caseous-necrotic changes in the lungs, sharply expressed indications of intoxication, grave progressing course and frequent lethal result (fig. 18). During the recent 5-8 years its frequency has increased 3-5-fold and it comprises 20-25 % in the general structure of lung infiltrative tuberculosis.

Pathomorphism. Caseous pneumonia breaks out in patients with sharply decreased body resistance, called forth by various factors, at high MBT virulence as well as their resistance to antimycobacterial preparations.

Caseous pneumonia, as primary independent form of tuberculosis, occurs extremely rarely. In recent years *secondary caseous pneumonia* is more often observed, which develops on the ground of lobite, a cloudsimilar infiltration, after lung haemorrhages, against the background of aspirational pneumonia or grave progressing form of tuberculosis – fibrous-cavernous, subacute disseminated lung tuberculosis.

Depending on the form of pathomorphologic changes, *lobar and lobular caseous pneumonia are discriminated.*

At lobar caseous pneumonia the process captures all the lung particle, and infiltrative-pneumonic form of the process is rapidly changed in caseous-destructive one. The reason of such a violent formation of caseous necrosis and spreading the process to the whole particle is probably sharp decrease of

body resistance, high degree of macroorganism sensibilization, high virulence and massiveness of the infection. At this form of tuberculosis, in addition to big sections of caseous necrosis, multiple decay cavities or a big cavern are always formed, as a result of putrefaction.

Lobular caseous pneumonia more often develops as a result of aspirational pneumonia after haemorrhages, as a complication of disseminated lung tuberculosis etc.

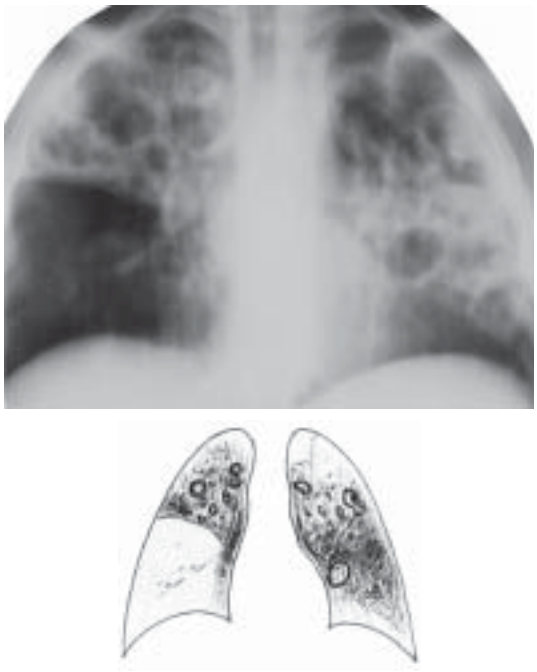


Fig. 18. **Caseous pneumonia of both lungs. Tomogram.**

Clinic. An acute sudden beginning with high body temperature, rapidly increasing intoxication symptoms, profuse perspiration, shortbreathing, pain in chest, cough with excretion of a big amount of sputum with blood admixtures. The skin is pale, mucous are of cyanotic tint. Tachycardia and hypotonia are expressed. Percussively – the blunting of a percussion note over the injured sections, auscultatorily – a great number of sonour damp rales of various calibers.

In roentgenogram at lobar pneumonia – massive dark of a lung part without distinct limits with the presence of decay cavities, subsequently a large cavern is formed; at lobular caseous pneumonia – big dark focuses of flood character, multiple decay cavities appear at progressing, as well as fresh nidi of bronchogenic dissemination.

All this is accompanied by sharply expressed changes of haemogram, in particular by hypochromic anemia, expressed leucocytosis, eosinopenia, increase of the number of bacillarnuclear neutrophiles, lymphopenia, sharply accelerated ESR (up to 70 mm/hr.). MBT are found in the sputum. Tuberculin test may be negative (negative anergia).

Differential diagnostics of caseous pneumonia is performed to distinguish croupous and staphylococcal pneumonia.

Treatment of caseous pneumonia consists in applying maximum tolerated doses of isoniazidum, rifampycinum, streptomycini, ethambutolum, pyrazinamidum with simultaneous administering of desintoxicating, symptomatic therapy and vitamin means, as well as fluorinechinolones (ofloksacini, cyprofloksacini) with a view to suppress the secondary infection. However, full recovery occurs extremely rarely; more often fibrous-cavernous or cirrhotic lung tuberculosis is formed. Taking all this into account, the plan of treatment of caseous pneumonia patients should envisage a surgical intervention, like a lung resection or its part, after the operation antimycobacterial therapy is proceeded during 6 months.

CONTROL QUESTIONS

1. The definition of lung infiltrative tuberculosis.
2. Pathogenesis and pathomorphism of lung infiltrative tuberculosis.
3. Clinico-roentgenologic variants of infiltrates.
4. Roentgenologic sinsg of tuberculous infiltrate.
5. Illnesses, with which differential diagnostics of lung infiltrative tuberculosis is most frequently made.
6. Complications of lung infiltrative tuberculosis.
7. The main principles of the treatment of lung infiltrative tuberculosis patients.
8. The definition of caseous pneumonia.
9. The reasons of the origin of caseous pneumonia.
10. Pathomorphism of caseous pneumonia.
11. Clinic and differential diagnostics of caseous pneumonia.
12. The treatment of caseous pneumonia patients.
13. Possible consequences of caseous pneumonia.

TESTS

1. Frequency of infiltrative tuberculosis in the general structure of firstly diagnosed lung tuberculosis patients is:
   A. 5-10 %
   B. 13-24 %
   C. 25-35 %
   D. 45-55 %
   E. 65-85 %.
2. The illness, with which differential diagnostics of caseous pneumonia should be made most frequent:

A. Staphylococcal pneumonia
B. Central cancer
C. Eosinophilic pneumonia
D. Nidal pneumonia
E. Bronchoectasia

3. On the background of what complications of lungs tuberculosis is the caseous pneumonia most frequent?
A. Pulmonary haemoptysis
B. Spontaneous pneumothorax
C. Larynx tuberculosis
D. Amyloidosis of kidney
E. Atelectasis of particle lung

4. The predominant segmental localization of tuberculosis infiltration
A. I, II, III segments
B. I, III, IV segments
C. I, IV, V segments
D. I, II, VI segments
E. II, VI IX segments

5. Under the mask of what diseases is tuberculosis infiltrate the most frequent?
A. Peripheral lung cancer
B. Retention cyst
C. Pneumonia
D. Eosinophile infiltrate
E. Aspergiloma

6. Female patient Z., 39. Got ill with diabetes mellitus six years ago. The roentgenologic examination showed infiltrate shadow with enlightment in the center in the lower segment of the left lung. General condition of the patient is satisfactory. Blood analysis: leuk. – $10{,}5\times10^9$/l, ESR – 25 mm/hour. Mantoux test with 2 TO – positive. What is the most probable diagnosis?
A. Lung cancer
B. Pneumonia
C. Infiltrative tuberculosis
D. Abscess of a lung
E. Primary tuberculosis complex

7. Patient K., 36. Got ill acutely after a surgical operation for a stomach ulcer. Roentgenogram: massive infiltration of pulmonary tissue with several hollows of destruction in the upper segment of the right lung. Mantoux test with 2 TO – doubtful. Blood analysis: leuk. – $17{,}0\times10^9$/l, ESR – 52 mm/hour. MBT are found in sputum. What is the most probable form of lungs tuberculosis?
A. Infiltrative

B. Nidus
C. Fibrous-cavernous
D. Caseous pneumonia
E. Cirrhotic

8. The most characteristic blood analysis in patients with the infiltrative lung tuberculosis.
A. Leuc. – 25,0×10⁹/l; e – 3, p – 6, s – 51, l – 23, m – 7 %; ESR – 6 mm/hour.
B. Leuc. – 9,8×10⁹/l; e – 5, p – 6, s – 65, l – 13, m – 11 %; ESR – 36 mm/hour.
C. Leuc. – 4,0×10⁹/l; e – 2, p – 2, s – 60, l – 26, m – 9 %; ESR – 6 mm/hour.
D. Leuc. – 16,5×10⁹/l; e – 10, p – 10, s – 64, l – 14, m – 2 %; ESR – 21 mm/hour.
E. Leuc. – 6,0×10⁹/l; e – 4, p – 3, s – 60, l – 26, m- 6 %; ESR – 7 mm/hour.

TASKS

1. A cloud-like darkening of the upper part of the right lung with a lightening in the centre, to the left paracardially a group of small intensity nidi have been revealed during fluorographic examination of a female patient, 30, suffering from a stomach ulcer.

a) A preliminary diagnosis.
b) What treatment institution should the patient be directed to?
c) The plan of the examination.

The answer: a) infiltrative tuberculosis of the upper part of the right lung, the decay and sowing phase. b) To an antitubercular dispensary. c) Inspection and target roentgenogram, tomogram; 3-times bacterioscopic and bacteriologic examination of sputum for MBT; general analysis of blood and urine.

2. Haemoptysis appeared in a day after hyperinsolation of a girl of 17. No pathologic changes were found in the lungs of fluorography six months ago. Damp middle-blistered rales are heard beneath the right clavicle, Mantoux test with 2 TU – 23 mm infiltrate.

a) Preliminary diagnosis.
b) Emergency medical care.
c) Examination plan.

3. A darkening of medium intensity with a lightening in the centre and a path to the root has been revealed to the right beneath the clavicle of a patient B., 40, during fluorographic examination. He feels well.

a) Formulate the preliminary diagnosis.
b) What treatment institution should the patient be directed to?
c) The plan of the examination.

4. Plan a specific treatment to a patient with FDTB (03.03.2001) of the upper part of the right lung (caseous pneumonia), Destr+, MBT+M+C+, Resist-, HIST0,

Cat1 Coh1(2001). The patient is 45, weight – 46 kg. His general condition is difficult. There is no accompanying pathology.

a) Antimycobacterial preparations.

b) The drugs doses.

c) The average duration of the treatment.

5. A female patient K., 35, hospitalized into an antitubercular dispensary on the reason of pulmonary haemoptysis, which appeared in a fortnight after a delivery. In her childhood the patient suffered from the primary tuberculous complex.

a) The preliminary diagnosis.

b) Emergency medical care.

c) Examination plan.

LUNG TUBERCULOMA

Lung tuberculoma is a distinct by genesis encapsulated caseous formation exceeding 1 cm in diametre and having a chronic torpid course (fig. 19).

In firstly diagnosed lung tuberculosis patients tuberculomas occur in 0,5-1 % of cases, and they are formed in the process of antimycobacterial therapy in 4-5 % of cases.

Pathogenesis of tuberculomas is various, as different injuries according to morphology and the development period are attributed to this form. Tuberculomas are most frequently formed from infiltrative, nidus; rarelier from disseminated tuberculosis and primary tuberculosis complex.

Formation of tuberculomas is linked up with high resistance and expressed antituberculous immunity of a human body, as well as, to some extent, durable treatment with streptomycini, BCG vaccination and revaccination.

Pathomorphism. Some versions of tuberculomas are discriminated according to their pathomorphologic structure:

1. *Homogenous* tuberculoma is an encapsulated caseous focus, that most frequently breaks out from infiltrative tuberculosis.

2. *Layer-by-layer* tuberculoma consists of concentric layers of necrosis, marked off from one another by rings of connective tissue, breaks out as a result of frequent aggravations of tuberculous nidus.

3. *Conglomerate* tuberculoma unites a conglomerate of caseous nidi, surrounded by a general connective tissue capsule, has a round or irregular polycyclic form.

4. *Infiltrative-pneumonic* tuberculoma is a circular focus of specific pneumonia with parts of caseose and inclined to a productive reaction.

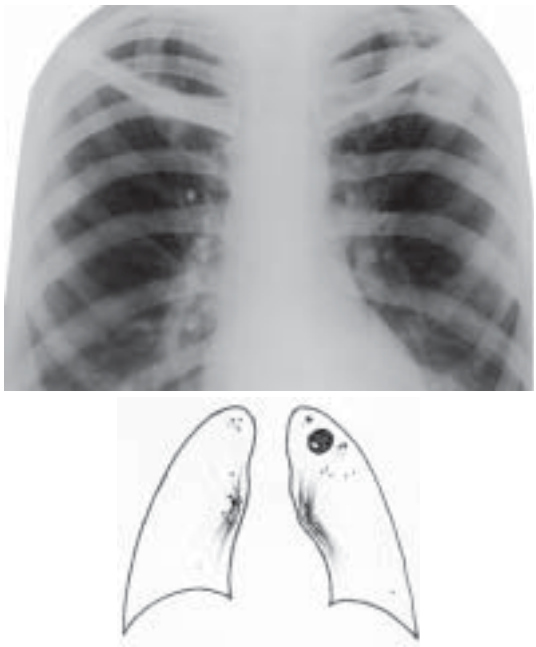


Fig. 19. **Tuberculoma of the left lung. Observation roentgenogram.**

5. *Pseudotuberculoma* (blocked cavern) is formed at the disturbance of permeability of the draining bronchus and blocking the cavern, is a circular homogeneous focus with a capsule, characteristic for the cavern, and the content is represented by a thick or thin mass of caseous necrosis.

Small (1-2 cm), medium (2-4 cm) and large (over 4 cm) tuberculomas are discriminated. They are predominantly localized in I, II or VI segments of the lungs.

Clinic. Asymptomatic or slight-symptomatic course. Symptoms of intoxication and haemoptysis are possible at progressing. Percussively the note dullness is defined only in case when a tuberculoma is over 4 cm in diameter, rales – at progressing and decomposition. Haemogram in the predominant majority of patients is without any deviations from the norm. MBT are revealed at the decay of tuberculoma. Tuberculin sensivity is high.

Progressing, stable and regressing versions of tuberculoma progress are dis-criminated according to the clinical progress of the illness.

Diagnostics. Important signs of tuberculoma are an isolated rounded or of an oval form, intensive, though not quite homogeneous shade (with excentric crescentic decay, calcinates inclusions), of the size from 1 to 8 cm with distinct contours, with predominant localization in I, II and VI segments and the presence in the surrounding tissue of intensive nidi and pneumosclerosis, calcinates in the root.

Differential diagnostics of tuberculomas is performed with periferal cancer, solitary metastases of a malignant tumour, aspergilloma, filled with a cyst,

echinococcus, benign tumours, arteriovenous aneurism, unspecific pneumonia, encapsulated pleurisy.

Treatment of first diagnosed lung tuberculoma patients starts with applying antimycobacterial preparations, first of all those that possess good penetrating property into tissue (isoniazidum, rifampycinum, pyrazinamidum). When there is no tendency to reversal development of tuberculomas during 2-3 months from the beginning of the treatment, at tuberculoma big size (over 3-4 cm), presence of decay and bacterial secretion, uncertainty in the diagnosis (tumor is not excluded), and also when a patient can't continue his proffessional activity in connection with active tuberculous process (teachers, workers of children's establishments, etc.) a sparing lung resection is indicated. After the operation chemotherapy is proceeded for 4-6 more months (isoniazidum+ rifampicinum or ethambutolum).

CONTROL QUESTIONS

1. The definition of lung tuberculoma.
2. Pathogenesis of tuberculomas, the reasons of their becoming more frequent among other clinical forms of tuberculosis.
3. Pathomorphism of tuberculomas, their division according to the sizes and pathomorphological structure.
4. Clinic, objective and laboratory data at tuberculoma.
5. Roentgenologic indications of tuberculoma.
6. The illnesses with which differential diagnostics of tuberculomas should be made.
7. Methods of treating of lung tuberculoma patients and their indications.
8. Indications to surgical treatment at tuberculomas.
9. Prophylaxis of lung tuberculomas.

TESTS

1. What segments are tuberculomas most often localized in?
   A. I, II, III
   B. I, II, VI
   C. I, VI, X
   D. I, II, VIII
   E. II, IV, V
2. What illness is the most expedient to differentiate tuberculoma with?
   A. Aspergilloma
   B. An air-cyst

C. Central cancer
D. Eosinophilic infiltrate
E. Chronic abscess

3. Female patient, 29. During the last five years has noted general weakness, cough, subfebrility; menstruations absence for three months. General roentgenogram: in the 2nd segment of the left lung – a round hole above 3cm in diameter of medium intensity. Mantoux test with 2 TO – 23 mm infiltrate. What is the most probable diagnosis?
   A. Aspergiloma
   B. Peripheral lung cancer
   C. Lung tuberculoma
   D. Filled with a cyst
   E. Chondroma
4. The most rational combination of antimycobacterial preparations at the initial stage in patients with lung tuberculoma, MBT (-).
   A. Isonoazidum + streptomycini + rifampycini
   B. Isonoazidum + rifampycini + pyrazinamidum
   C. Isonoazidum + streptomycini + pyrazinamidum
   D. Isonoazidum + pyrazinamidum + PASA
   E. Rifampycini + ethionamidum + kanamycini
5. How many versions of tuberculomas are distinguished regarding pathomorphologic structure?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
6. How many versions of tuberculomas clinical progress do you know?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
7. What clinical form of tuberculosis is tuberculoma formed from most frequently?
   A. Disseminated
   B. Fibrous-cavernous
   C. Cirrhotic
   D. Nidus
   E. Infiltrative

8. At the absence of positive treatment dynamics during 2-4 months the patients with lungs tuberculosis are prescribed for:
   A. Economical resection of a lung
   B. Pneumonectomy
   C. Decortication of a lesion of lung
   D. Hormonotherapy
   E. Antimycobacterial therapy up to 6-8 months
9. Tuberculoma rate in patients firstly diagnosed with lungs tuberculosis.
   A. 0,5-1 %
   B. 3-4 %
   C. 5-6 %
   D. 7-9 %
   E. 10-15 %

TASKS

1. A patient R., aged 32. During the last four months – dry cough, general weakness, perspiration, subfebrile temperature. There is a round formation of over 2 cm in diametre, of medium intensity in the second segment of the upper part of the right lung on a fluorogram. At the age of 20, the patient suffered from the infiltrative lung tuberculosis. The general blood analysis is within the norm. Mantoux reaction with 2 TU – 15 mm infiltrate.

a) A preliminary diagnosis.

b) The plan of the examination.

c) What illness, first of all, can be suspected?

The answer: a) a tuberculoma of the second segment of the right lung, b) an inspection roentgenogram, tomogram; sputum examination to MBT and cancer cells (5-6 times), a bronchoscopy, c) peripheral cancer.

2. A female patient Z., 35. A shadow with vague contours sized 4 cm, MBT(-) has been found in the right lung (1st segment) at a roentgenologic examination. After 3 months of antimycobacterial therapy a round focus, 2 cm in diametre, of homogeneous structure with clear contours formed.

a) Formulate a diagnosis before the treatment.

b) A diagnosis after 3-months treatment

c) A plan for further treatment.

3. A round shadow with wave-like outer contours was found in the 3-rd segment of the left lung of a man of 60 during a fluorographic examination. There were single calcinates in the roots. ESR – 62 mm/hr.

a) What illness can be suspected?

b) Is test treatment expedient?

c) The plan of the examination.

4. A female patient Z., 29, has been coughing for 2 years, with a small quantity of sputum, sometimes subfebrilitet. She did not apply for a medical care. A week ago a heterogeneous darkening 2,5×3,0 cm with clear contours and a strip of excentric lightening was found in the sixth segment.

a) A preliminary diagnosis.

b) The plan of the examination.

c) The treatment plan.

5. In a patient S., 17, suffering from diabetes, a round shadow of 2,5 cm in diameter, of medium intensivity with vague outer contours and a path to the root was found in the second segment of the upper part of the right lung during fluorography. Mantoux test with 2 TU – 24 mm infiltrate.

a) A preliminary diagnosis.

b) The plan of the examination.

c) The treatment plan.

FIBROUS-CAVERNOUS LUNG TUBERCULOSIS

Fibrous-cavernous lung tuberculosis is a chronic destructive process, characterized by the presence of an old fibrous cavern, expressed fibrosis and nidi of bronchogenic dissemination in lung tissue, surrounding the cavern, or in other parts of the lungs; protracted undulant course with aggravations and remissions periods, constant or periodic bacterial secretion. In the social aspect fibrous-cavernous lung tuberculosis patients are invalids, predominantly of the 2-nd group (fig. 20).

The frequency of fibrous-cavernous tuberculosis among the persons of firstly diagnosed lung tuberculosis comprises 1,2 %, among the contingents of antituberculous dispensary about 10 %. Fibrous-cavernous tuberculosis is the death main reason of lung tuberculosis patients.

Pathomorphism. Fibrous-cavernous tuberculosis is formed at the unfavourable course of infiltrative, disseminated, nidus lung tuberculosis. Lung changes spreading may be various and the progress is both unilateral and bilateral with the presence of one or several caverns, as well as pneumosclerosis, emphysema and bronchoectases.

The cavern wall has a three-layer structure: inner-piogenous, middle-granulation, outer-fibrous.

Clinic. Clinical manifestations of fibrous-cavernous tuberculosis are varied. They are caused both by tuberculosis itself, the process spreadness and phase, changes in lung tissue and complications.

Several clinical variants of fibrous-cavernous lung tuberculosis course are discriminated:

1. Limited fibrous-cavernous lung tuberculosis with a stable course (progress);

2. Limited or wide-spread fibrous-cavernous lung tuberculosis with a progressing course;

3. Fibrous-cavernous lung tuberculosis with complications.

At the first variant a limited process with a cavern and fibrosis takes place, as well as an inconsiderable number of nidi in the surrounding lung tissue. Intoxication symptoms, bronchopulmonary syndrome are weakly expressed. There may be no MBT in the sputum. Patients are relatively able to work. Such a state may be observed for a long time. However, at unfavourable factors, unsatisfactory medical service, progressing of fibrous-cavernous lung tuberculosis sets in.

Progressing variant of fibrous-cavernous lung tuberculosis is characterized by an undulant course. Feebly marked intoxication symptoms and bronchopulmonary syndrome are intensified. During the aggravation period perifocal infiltration, fresh nidi and even fresh decay cavities appear around the cavern. MBT are revealed in the sputum. Changes in the blood are marked, as well as functional disturbances.

Fibrous-cavernous lung tuberculosis with compli-

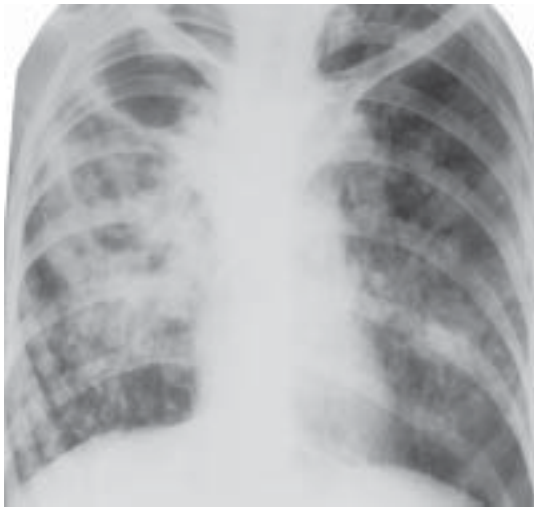


Fig. 20. **Fibrous-cavernous tuberculosis of the right lung upper part, infiltration and sowing phase. Observation roentgenogram.**

cations progresses predominantly analogically to the second variant, however complications of specific and unspecific character may appear additionally.

Specific complications: tuberculosis of larynx, bronchi, pleura (tuberculous pleurisy), bowel, kidneys, genitals and other organs.

To unspecific complications belong: haemoptysis and haemorrhages, spontaneous pneumothorax, chronic lung heart, amyloidosis of internal organs, lung atelectasis, unspecific inflammatory and fungous complications (aspergillosis, candidomycosis).

The *diagnostics* is based on the anamnesis data, roentgenologic picture (presence of caverns, fibrosis and nidi), deformity of thoracic cage, physical data, blood changes, MBT presence in sputum.

The *differential diagnostics* is done with chronic abscess, polycystosis, cancer in the decay phase, bronchoectasia.

Treatment. Over 95 % of fibrous-cavernous lung tuberculosis patients were previously treated on the pretext of one of the forms of tuberculosis, therefore antituberculous preparations are administered strictly individually, depending on MBT sensitivity to them, tolerance, presence of complications, accompanying illnesses and patients' ages. The aim of the treatment is cancelling of intoxication, resolution of fresh nidi and infiltrations, cavern sanitation, cessation of mycobacterial secretion. In addition to chemotherapy which promotes cavern healing in 5-10 % of fibrous-cavernous lung tuberculosis patients, pathogenetic means, surgical intervention are applied. Thus, the treatment should be complex, i.e. include antimycobacterial preparations, pathogenetic means and surgical methods, enabling to increase the treatment effectiveness, in particular, to cease mycobacterial secretion in 50-60 % of patients.

CONTROL QUESTIONS

1. The definition of fibrous-cavernous lung tuberculosis.
2. The reasons of forming fibrous-cavernous lung tuberculosis.
3. Clinico-roentgenologic versions of fibrous-cavernous lung tuberculosis course.
4. Complications of fibrous-cavernous lung tuberculosis.
5. Differential diagnostics of fibrous-cavernous lung tuberculosis.
6. The main regimens of chemotherapy at fibrous-cavernous lung tuberculosis.
7. Pathogenetic therapy in fibrous-cavernous lung tuberculosis patients.
8. Indications and contraindications to surgical treatment of fibrous-cavernous lung tuberculosis patients.

TESTS

1. The frequency of fibrous-cavernous tuberculosis in patients firstly diagnosed with lungs tuberculosis.
   A. 1,2 %
   B. 6,2 %
   C. 8 %
   D. 10 %
   E. 12 %
2. From what clinical form of tuberculosis is the fibrous-cavernous lungs tuberculosis formed?
   A. Lung tuberculoma
   B. Primary tuberculosis complex
   C. Infiltrative
   D. Nidus
   E. Cirrhotic
3. The most frequent unspecific complications of fibrous-cavernous lung tuberculosis.
   A. Chronic lung heart
   B. Tuberculosis of larynx
   C. Spontaneous pneumotorax
   D. Lung atelectasis
   E. Amyloidosis of internal organs
4. The most frequent specific complications of fibrous-cavernous lung tuberculosis.
   A. Tuberculosis of larynx
   B. Tuberculosis of bowel
   C. Tuberculous pleurisy
   D. Tuberculosis of genitals
   E. Tuberculosis of kidneys
5. Patient K., 35. Complains of cough with sputum secretion, weakness, dyspnea at poor physical load. Three months ago returned from a prison. Examination: the right half of the thorax is narrowed; lagging in breathing act. MBT are revealed bacterioscopically. What clinical form of lungs tuberculosis is this?
   A. Lung tuberculoma
   B. Nidus lung tuberculosis
   C. Tuberculous pleurisy
   D. Disseminated lung tuberculosis
   E. Fibrous-cavernous lung tuberculosis
6. Female patient K., 36. Fibrotic-cavernous lungs tuberculosis is diagnosed for the first time. MBT are stable to ethambutol and streptomicine. Prescribe the most optimal combination of antimycobacterial preparations.

A. Rifampicinum + isoniazidum + kanamycini + pyrazinamidun
B. Rifampicinum + isoniazidum + thioacethazonum + pyrazinamidun
C. Isoniazidum + kanamycini + PASA + ethionamidum
D. Rifampicinum + ethionamidum + kanamycini + phthivazidum
E. Isoniazidum + kanamycini + cycloserinum + protionamidum

7. Most frequent mortality reason of patients with fibrotic-cavernous lungs tuberculosis.
A. Lung atelectasis
B. Chronic lung heart
C. Lung haemorrhage
D. Amyloidosis of kidney
E. Progressing of tuberculosis

8. Pathologic-anatomic alterations at cirrhotic lungs tuberculosis.
A. Pronounced bullous-dystrophic alterations
B. Massive growth of rough connective tissue in lungs and pleura with specific active focuses in lungs.
C. Incapsulated tuberculous focuses.
D. Old caverns with pronounced fibrosis.
E. Multiple caverns, fibrous and polymorphic focusness.

9. What illnesses should fibrotic cavernous lungs tuberculosis be differentiated with:
A. Eosinophilic infiltrate
B. Chronic bronchitis
C. Chronic abscess
D. Bronchoectasis
E. Polycystic lung

10. With what diseases is it the best reasonable to carry out the differential diagnostics of fibrous-cavernous tuberculosis?
A. Chronic abscess
B. Central cancer
C. Polycystosis
D. Chronic bronchitis
E. Bronchoectasia

11. The parient X., 45 years old, was hospitalized into the phthisiatrical clinic because of the pulmonary haemoptysis. During the last two years the patient suffered from coughing with excretion of sputum, the shortness of breath, rising of body temperature to 37,5 °C. She didn't have the X-ray examination during the last 5 years. At the examination – the left half of the thorax is narrowed, it lates in the act of breathing. Upon its upper part there are different wet rales. What is the most probable clinical form of pulmonary tuberculosis?
A. Tuberculoma
B. Disseminated

C. Fibrous-cavernous lung tuberculosis
D. Cyrrhotic
E. Caseous pneumonia

12. Differential diagnostics of the cyrrhotic tuberculosis is carried out with:
A. Carcinomatosis
B. Peripheral cancer
C. Aspergilloma
D. Eosinophilic infiltration
E. Lung agenesia

TASKS

1. A patient Z., 37 (the weight is 65 kg) has been treated at a hospital for 5 months in connection with infiltrative tuberculosis of the upper part of the right lung, the decay phase, MBT (+). MBT are stable to isoniazidum. The treatment was done with streptomycin – 0,5 g, isoniazidum – 0,3 g, ethambutolum – 0,8 g. He took in chemodrugs irregularly. At the present time there is a narrowing of the upper part of the right lung on the roentgenogram, a ring-like shadow of 3 cm in diametre beneath the clavicle, around which there are fibrous traces and single nidal shadows. MBT (-).

a) Possible reasons of inefficient treatment.
b) Prove the present time diagnosis.
c) The plan for further treatment.

2. A patient K., 45, felt ill with fibrous-cavernous tuberculosis of the upper part of the right lung 6 years ago. After an intensive antimycobacterial therapy during the first two years, bacterial excretion stopped altogether. The acuteness of the illness during the last three years was not noted. Roentgenologically there is a thin-walled cavity of irregular form in the upper part of the right lung. There are no signs of tuberculous process activation. There are three children in the family.

a) Formulate the diagnosis.
b) The doctor's further tactics.

3. A decay cavity with thick uneven walls and with the liquid horizontal level has been found in the upper part of the left lung in a patient of 50 years old. There are no nidi of bronchogenic sowing, complaints to the pain in the upper part of the thoracic cage to the left, shortness of breath, blood spitting. The body temperature is up to 380 C. The patient considers himself to be ill during 5 months, ESR – 65 mm/hr.

a) Formulate a preliminary diagnosis.
b) The plan of examination.

CIRRHOTIC LUNG TUBERCULOSIS

Cirrhotic lung tuberculosis is a clinical form, that is characterized by the development of connective tissue in lungs and pleura as a result of involution of various clinical forms of lung tuberculosis or specific pleurisy, with the preservation of signs of tuberculous process activity, inclination to periodic aggravations and meagre mycobacterial secretion, but without the presence of an active cavern (fig. 21).

In patients with firstly diagnosed lung tuberculosis cirrhotic tuberculosis is observed very rarely, somewhat more frequently among the contingents of antitu-berculous dispensaries (up to 1 %).

Pathomorphism. Cirrhotic tuberculosis develops as a result of involution of fibrous-cavernous, chronic disseminated, infiltrative tuberculosis of lung, pleura, tuberculosis of intrathoracic lymphatic nodes complicated with atelectasis. Cirrhotic tuberculosis may be segmental and lobar, limited and prevalent, unilateral and bilateral; it is characterized by the development of bronchoectases, lung emphysema, symptoms of lung and lung-cardiac insufficiency are marked.

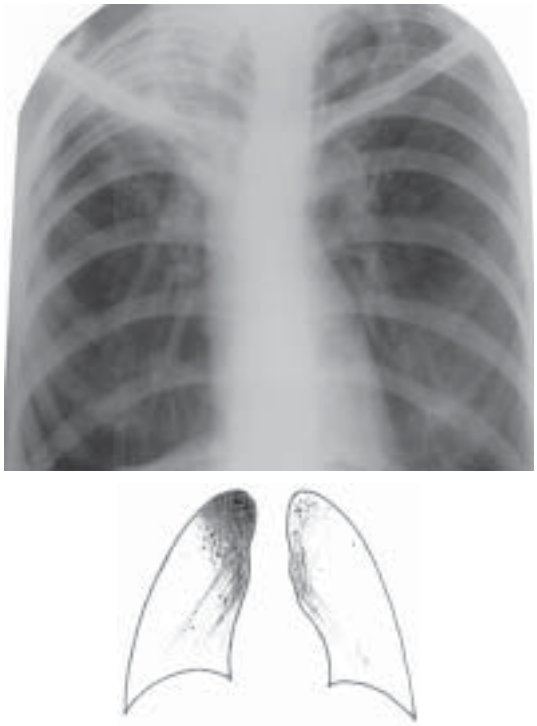


Fig. 21. **Cirrhotic tuberculosis of the right lung upper part. Observation roentgenogram.**

Generally, according to pathogenesis, cirrhotic lung tuberculosis may be: pneumogenic, bronchogenic (postatelectatic) and pleurogenic.

Clinic. According to pathomorphologic picture of cirrhotic tuberculosis, its clinical manifestations are caused by respiratory insufficiency, chronic unspecific inflammation and the activity of tuberculous process.

Five clinical variants of cirrhotic lung tuberculosis are discriminated:

1. Limited cirrhotic lung tuberculosis with small symptomatic course;

2. Limited or prevalent cirrhotic lung tuberculosis with frequent aggravations;

3. Cirrhotic lung tuberculosis with bronchoectases and periodic haemoptysis;

4. Cirrhotic lung tuberculosis, complicated with pulmonary heart;

5. Total lung injury with progressing tuberculosis and various manifestations of metatuberculous syndrome.

Patients complain of quick fatigue, pant, cough with excretion of sputum, sometimes haemoptysis, rising of body temperature. After some time lung contraction and constriction of one part of the thoracic cage develops, its straggling at respiration and dislocation of mediastinum organs to the injured side. Palpatory dislocation of trachea (forked symptom) and the apex impulse of the heart to the side of the injury are defined. Sometimes the pulsation of the pulmonary artery is seen in the II intercost. Above the cirrhotically changed lung tone trepidation is louder, percussively dullness is revealed, auscultatosrily – damp rales of various calibers, sometimes creaking and cracking against the background of bronchial respiration.

Diagnostics is based on the data of anamnesis, clinical, roentgenological picture, laboratory and functional examination.

Differential diagnostics is performed with inactive posttuberculous, postpneumonic cirrhosis, pneumoconioses of the III stage, III stage sarcoidosis, lung development anomalies (agenesia, lung aplasia, part hypoplasia).

Treatment. During the aggravation of tuberculous process, as well as with the purpose of aggravation prophylaxis, antimycobacterial preparations are administered, to which MBT are sensitive. During the aggravation of unspecific inflammatory process – antibiotics, mucolytics, expectorants, postural drainage. The treatment and prophylaxis of complications (chronic pulmonary heart, pulmonary haemorrhages and expectoration of blood, kidney amyloid disease). At limited unilateral cirrhoses with periodic outbreaks of specific and unspecific character, expectorations of blood and at satisfactory functional indices, a resection of damaged segment, a part or a lung is performed.

Prophylactic courses of antimycobacterial treatment and sanation of bronchial tree are expedient to be done in spring and in autumn. Medicative physical culture.

CONTROL QUESTIONS

1. The definition of cirrhotic lung tuberculosis, its pathogenesis and pathomorphism.
2. What does cirrhotic tuberculosis differ from metatuberculous cirrhotsis with?
3. What clinical forms of pulmonary tuberculosis can cirrhotic tuberculosis develop from?
4. Clinic of cirrhotic lung tuberculosis (five clinical variants).
5. Complications of cirrhotic lung tuberculosis.
6. Diagnostics and differential diagnostics of cirrhotic lung tuberculosis.
7. Peculiarities of specific therapy of cirrhotic lung tuberculosis patients. Indications to surgical treatment.

TUBERCULOSIS OF RESPIRATORY ORGANS COMBINED WITH DUST PROFESSIONAL LUNG ILLNESSES (CONIOTUBERCULOSIS)

Tuberculosis and dust professional illnesses of respiratory organs is the combination of one of the clinical forms of tuberculosis and pneumoconiosis, owing to which a new illness – pneumoconiotuberculosis is forced, with peculiar pathomorphological, roentgenologic and clinical pattern (fig. 22).

Tuberculosis, combined with dust professional illnesses, among firstly diag-nosed tuberculosis patients occurs in 0,3-0,5 %, and among contingents observed in antituberculous dispensaries – in 1-1,5 % of cases.

As to etiology pneumoconioses are divided into five groups: 1. Silicosis, 2. Silicatosis (asbestosis, cementosis, talcosis, coalinosis), *3. Antracosis, 4. Pneumoconiosis of mixed type* (silicosilicatosis, antracosilicosis, siderosilicosis), and *5. Pneumoconioses of another etiology* (siderosis, aluminosis, apatitosis, amidosis).

Persons with silicosis most often develop tuberculosis.

Silicosis *is a professional illness which is caused by inhaling dust containing free silicon dioxide.* Three stages of silicosis are discriminated. Frequency of tuberculosis to a certain degree depends on pneumoconiosis stage. Among persons with the 1st stage of silicosis tuberculosis is observed approximately in 20 %, of the 2nd stage – in 40 %, of the 3rd stage – in 80 %.

Pathogenesis of silicotuberculosis is a result of the interaction of two etiologic factors – free silicon dioxide and MBT. Tuberculosis develops as a result of endogenic reactivation of residual posttuberculous changes in lungs or intrathoracic lymphatic nodes, of considerably less importance is exogenous

superinfection. Pathogenesis of silicosis itself is complex and has not been completely revealed. The factors promoting its development are a high level of dustiness, the size of the dusty particles in the air (silicon dioxide), considerable duration of the contact, an organism state (inflammatory processes of the upper respiratory tract and the lungs, weakness of mucociliary apparatus).

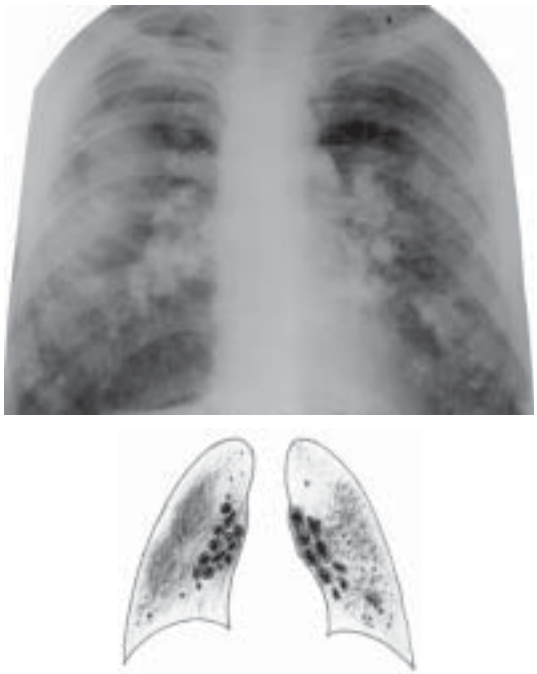


Fig. 22. **Silicotuberculosis: III stage silicosis, disseminated lung tuberculosis, inphiltration phase. Observation roentgenogram.**

Pathologic anatomy of silicotuberculosis is polymorphous, which is caused by the clinical form and the phase of tuberculosis, the form and the stage of pneumoconiosis. Pneumoconioses are divided as to the character and the site of the development of the process into such forms: interstitial, diffusive, sclerotic, nodular and tumorous similar.

Beside the typical forms of lung tuberculosis, which are often joined to silicosis (nidus, infiltrative, disseminated and fibrous-cavernous), the following atypical forms of silicotuberculosis are discriminated: silicotuberculous bronchoadenitis, nodal silicotuberculosis, silicotuberculoma, massive silicotuberculosis and destructive silicotuberculosis.

Clinic of silicotuberculosis is multiform, it is defined by the stage and the progress of silicosis as well as by the form and the phase of lung tuberculosis. The course of silicosis may be rapid, gradual and remote.

Clinical manifestations, which indicate tuberculosis joining lung silicosis: appearance of intoxication syndrome and local damp rales in lungs, moderate leucocytosis with bacillinuclear displacement of leucogram, lymphopenia, accelerated ESR, MBT revealing in sputum.

Roentgenologically the 1st stage of silicosis is characterized by the strengthening and deformation of the lung pattern small nodal patches, predominantly in the middle sections, extended and condensed lung roots and appearance of emphysema indications.

For the 2nd stage of silicosis typical are the increase of sizes and the number of nidal patches, first of all in the middle and lower sections of the lungs, the lung pattern is not differentiated, bullous-emphysematous changes increase.

At the 3rd stage of silicosis the nodal patches blend, forming massive conglomerates against fibrosis background, lung roots look like "cut round", sometimes reveal edge calcification of root lymphatic nodes.

Diagnostics of silicotuberculosis is based on the data of clinical, roentgenologic, laboratory and tracheobronchoscopic examinations.

Forming the diagnosis it is expedient to write "Silicotuberculosis" first, and then provide an extensive characteristics of silicosis and further on a characteristic of tuberculous process.

For example: Silicotuberculosis: silicosis of the 1st stage (nodal form), nidus tuberculosis of the left lung upper part, infiltration phase, MBT (-).

Treatment of silicotuberculosis patients must be intensive and protracted (not less than 1 year) with the application of 3-5 tuberculostatics, often, in conjunction with glucocorticoids during 2-4 months. At destructive forms of silicotuberculosis antimycobacterial preparations are expedient to be introduced intravenously, endobronchially. At attendant unspecific endobronchites broncholitics, mycolitics and antibiotics of the broad action spectrum are applied alongside with antimycobacterial preparations, by the process liquidation. Surgical treatment (partial lung resection) is done rather rarely at silicotuberculomas or fibrous-cavernous lung tuberculosis in patients with undisseminated silicosis.

CONTROL QUESTIONS

1. The definition of silicotuberculsis.
2. Pathogenesis and pathomorphism of silicotuberculsis.
3. Clinic of silicotuberculsis.
4. Roentgenologic picture of silicotuberculsis depending on the stage of the illness.
5. Diagnostics of silicotuberculsis.
6. Treatment of silicotuberculsis patients.

EXRTAPULMONARY TUBERCULOSIS

TUBERCULOSIS OF THE BRONCHI, TRACHEA, LARYNX AND OTHER UPPER RESPIRATORY TRACT

Tuberculosis of the bronchi, trachea, larynx and other upper respiratory tract (nose, mouth cavity, gullet) and occur as complications of primary and secondary tuberculosis of lungs and intrathoracic lymphatic nodes. These lesions are rarely isolated.

In patients of various forms of intrathoracic tuberculosis specific endobronchitis is diagnozed in 6-19 %, and larynx tuberculosis – in 1-2 % of cases.

Pathomorphism. Tuberculosis of the upper respiratory tract, trachea and bronchi emerges as a result of haemotogenous, lymphogenous or sputogenous spreading of the infection from a specific lesion nidus in lungs or intrathoracic lymphatic nodes.

As to larynx tuberculosis (fig. 23.) pathogenesis, two of its forms are discriminated: haematogenous, which develops in disseminated lung tuberculosis patients, and sputogenous, which most often is a complication of fibrous-cavernous lung tuberculosis. Passing through the larynx, sputum is partly kept on the vocal cords and they are injured (the larynx inner ring). In such a case voice hoarseness is the first indication of larynx specific lesion. At disseminated form of tuberculosis it is the outer ring of the larynx that is injured first of all (epiglottis, scoop-similar cartilages) and therefore the first symptom of the lesion is pain at swallowing, dysphagia and only later voice hoarseness appears.

As to the character of pathomorphologic changes tuberculous process in the larynx is infiltrative, productive and ulcerous, that is verified at laryngoscopy.

Fig. 23. **The larynx tuberculosis**

Tuberculosis of trachea and bronchi may occur at all forms and phases of pulmonary tuberculosis, in particular at tuberculosis of intrathoracic lymphatic nodes and fibrous-cavernous lung tuberculosis. *Infiltrative, ulcerous and fistula (lymphobronchial, bronchopleural fistulas) forms of bronchi tuberculosis with*

predominantly exudative or productive character of inflammation are discriminated (fig. 24). Complications: fistulae, stenoses of various degrees, bronchoectases, granulations, bronchiolites.

Clinical pattern depends on the form and phase of trachea and bronchi tuberculosis. An asymptomatic course is also possible. Generally abrupt, attackable cough, sternal and interscapular pain, pant, which often does not correspond to the prevalence of the lung process, are characteristic for this lesion form. Sometimes the cough is accompanied by the excretion of sputum with caseous content or blood admixtures.

Diagnostics. Clinical, roentgenologic, laboratory and first of all bronchologic methods of examination are of great importance.

Differential diagnostics of specific endobronchites is performed with unspecific ones, which occur twice as often as the former in lung tuberculosis patients as well as with malignant and benign tumours of tracheobronchial tree.

Treatment. Antimycobacterial therapy is conducted according to the clinical form of lung tuberculosis, which is supplemented by the local application of tuberculostatics in the form of aerosols or intratracheal infusions, first of all, of 2% solutizon solution in combination with hydrocortizon. The

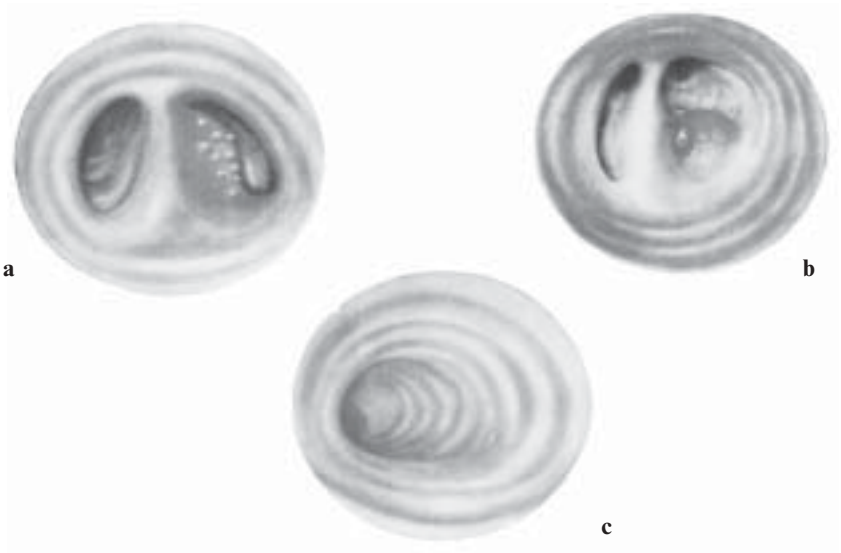


Fig. 24. **The forms of bronchi tuberculosis:**
a – infiltrative; b – ulcerous; c – fistula.

course is 30-45 procedures. During bronchoscopy the sanation of bronchial tree is carried out by various methods depending on the lesion character.

CONTROL QUESTIONS

1. Frequency of tuberculous endobronchitis in patients with lungs tuberculosis.
2. At which clinical forms of lungs tuberculosis the larynx tuberculosis is most frequent?
3. Pathogenesis of larynx tuberculosis.
4. Clinical manifestations of larynx and bronchi tuberculosis.
5. Pathomorphologic forms of larynx and bronchi tuberculosis.
6. The main method of tuberculous endobronchitis diagnosis.
7. Complications of bronchi tuberculosis.
8. Treatment of patients with larynx and bronchi tuberculosis.

TUBERCULOSIS OF INTRATHORACIC LYMPHATIC NODES

It is one of the most frequent clinical forms of primary tuberculosis, that is characterised by specific injury of intrathoracic lymphatic nodes (lungs root and mediastinum) (fig. 25).

Pathogenesis. Infestation generally takes place by the air-droplet-dust way, through the mucous membrane of tonsils and bronchi MBT penetrate into lymphatic vessels, nodes, where a specific process develops. Depending on the state of micro- and macroorganism, infiltrative-inflammatory or necrotic changes in lymphatic nodes prevail.

Pathomorphism. One or some groups of lymphatic nodes may be injured at tuberculosis. Paratracheal, tracheobronchial, bronchopulmonary, bifurcating and other lymphatic nodes are hurt. The process may be uni- or bilateral, predominantly asymmetric.

According to the character of pathomorphological changes, hyperplastic and caseous forms of tuberculosis of intrathoracic lymphatic nodes are discerned. Caseous form is characterized by a severe course and is harder to treat.

The clinic of uncomplicated tuberculosis of intrathoracic lymphatic nodes is analogous to that of primary tuberculous complex.

Clinico-roentgenologically three forms of tuberculosis of intrathoracic lymphatic nodes are discerned: "small", infiltrative and tumoursimilar, depending on the morphological substrate, first of all caseose. The "small" form is characterized by a symptom-free or small symptomatic course. The

peculiarity of infiltrative bronchoadenitis is a small enlargement of lymphatic nodes with perifocal inflammation in lung tissue, that roentgenologically is manifested by the root shade dilation, bulging and obscure contours; clinically – by intoxication symptoms. For tumoursimilar bronchoadenitis the enlargement of one or some groups of intrathoracic lymphatic nodes of mediastinum or lungs root with polycyclic distinct outer contours is characteristic. Signs of intoxication are more expressed, disposition to a complicated course.

The "small" form of tuberculosis is diagnosed on the basis of indirect signs of enlargement of intrathoracic lymphatic nodes, in particular, of local enrichment, deformation of the root lung picture, lowering of the root shade structure, double contour of the middle shade at a certain level, disappearance of the shade of the interstitial bronchus.

The course and complications of tuberculosis of intrathoracic lymphatic nodes are almost analogous to those of primary tuberculous complex and are connected with a specific affection of lymph nodes with certain clinical-roengenologic signs: hematogenic and lymphogenic dissemination, exudative pleuritis, affection of an adjacent bronchus with further bronchogenic dissemination or the violation of bronchial passability and atelectasis.

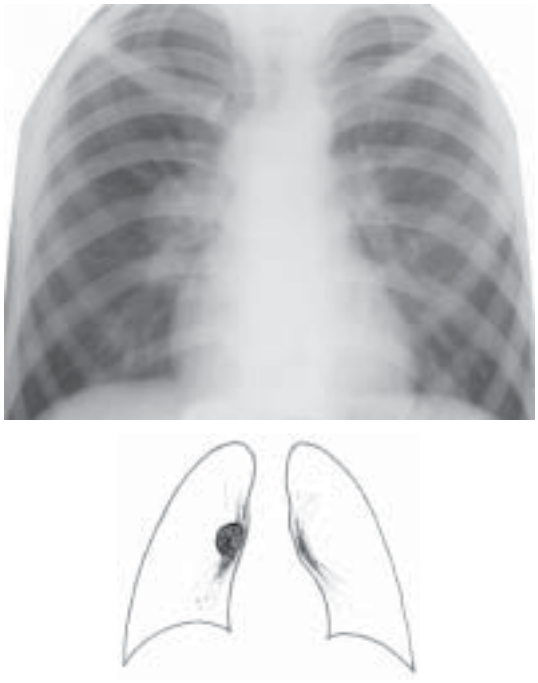


Fig. 25. **Right-side tumorous bronchodenitis. Observation roentgenogram.**

The diagnostics is made on the basis of anamnesis, clinico-roentgenologic picture in the period of intensity of tuberculin reaction, laboratory, bacteriological and instrumental examination.

The differential diagnostics is made with sarcoidosis (I phase), lympho-

granulomatosis, lymphosarcoma, lympho-leucolysis, central cancer, unspecific adenopathies.

For this the following procedures are performed: roentgenograpgy in right and lateral projections, tomography on bifurcation level (middle microscopic section), tuberculin tests, bronchoscopy as well as punctured or operative biopsy.

Treatment. 3-4 antituberculosis remedies are prescribed: isoniazidum, rifampicinum, pyrazinamidum, streptomycin. After two months of effective che-motherapy – isoniazidum + rifampicinum (ethambutolum) daily or every other day. The duration of chemotherapy is 6-9 months. Unspecific therapy: vitamins B_1, B_6, C, desensibilizing, hormonal and symptomatic means.

Relevantly, primary tuberculosis may sometimes have chronic undulatory course, with expressed phenomena of tuberculous intoxication during the aggravation of specific process in lymphatic nodes or other organs. Chemo-therapy not always results in stable clinical recovery.

Primary tuberculosis may also be found in adults, in particular in an old age, with characteristic signs of primary period, torpid course, difficult at diagnostics and treatment.

TUBERCULOUS PLEURISY (EMPYEMA)

Tuberculous pleurisy is a specific inflammation of pleura that develops as an independent form or as a complication of lung or extra-lung tuberculosis (fig. 26).

Among the patients of firstly diagnosed tuberculosis of respiratory organs tuberculous pleurisy comprises 3-6 %.

Pathomorphism. Most often pleurisy is a complication of primary tuberculous complex, tuberculosis of intrathoracic lymphatic nodes and disseminated lung tuberculosis. Sometimes pleurisy is an independent form of tuberculosis, without evident lesions of other organs. MBT can penetrate into pleura by lymphogenic, hematogenic or contact ways.

According to the development mechanism they discriminate between allergic, periphocal pleurisy and pleural tuberculosis.

Allergic pleurisy most often occurs at primary tuberculosis and is the manifestation of pleura hypersensibilization by MBT decay products. Provoking factors are injuries or thoracic cage cooling.

Periphocal pleurisy breaks out as a result of tuberculous inflammation spreading to pleura and it may have a limited character.

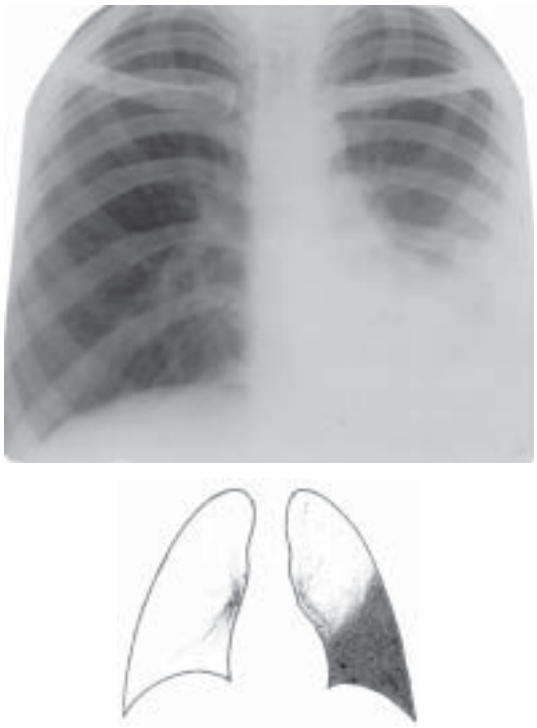


Fig. 26. **Left-side exudative pleurisy. Observation roentgenogram.**

Tuberculous pleurisy more often arises as a complication of primary, disseminated lung tuberculosis. MBT penetrate into pleura by lymphogenic and hematogenic ways. Tuberculous tubercles and exudate appear on the pleura.

Tuberculosis of pleura, that is accompanied by the accumulation of purulent exudate, with a protracted course, is called pleural empyema. Pleural empyema sets in at its broad caseous lesion, and also as a result of perforation of subpleurally located nidus or cavern. Pleural chronic empyema is characterized by an undulant course. The pleura is considerably thickened as a result of inflammatory, necrotic-caseous process, development of specific granulation tissue and scar changes, and its function is lost.

Depending on the inflammation character tuberculous pleurisy is divided into two main forms: dry (fibrinous) and exudative (respiratory). Depending on the character of exudate pleurisy may be serous, purulent, haemorrhagic, mixed and chillous. According to localization tuberculous pleurisy may be costal, costodiaphragmatic, diaphragmatic, mediastinal. intrapartial and apexial.

Clinic. Tuberculous pleurisy pattern is diverse. Dry pleurisy begins gradually, the worsening of a patient's general state is accompanied by the pain in the thoracic cage, dry cough, unstable subfebrile body temperature. Pain localization depends on the site of pleural lesion. Left-side costal pleurisy sometimes stimulates cardiac neuralgia; at apexial pleurisies the pain irradiates

toward the neural humeral plexus; at interlobar – into interscapular space. At low costal or above – diaphragmatic pleurisies – pain like the one that emerges at calculous cholecystitis or renal-cakulus disease. Straggling of the damaged half of the thoracic cage is observed at examination and pleural rub murmur at auscultation.

Exudative pleurisy more often starts acutely with expressed signs of intoxication. The appearance of exudate in pleural cavity is accompanied by the pain in the chest, pant, cough, rising body temperature. Patients prefer to lie on the injured side. The damaged half of the thoracic cage lays behind in a respiratory act, above the exudate there is a dull percussive tone, vocal fremitus and respiration are sharply weakened.

Pleurisy acute period lasts for 2-4 weeks, and then the process grows calm and signs of resolution appear or, more rarely, exudate organization.

For diagnostics exudate examination is of great importance. At tuberculous pleurisy the exudate is predominantly of light-yellow colour, the relative density is over 1015, the protein content is over 30 g/l, positive Rivalt test. At the beginning of the illness neutrophils prevail in the exudate (50-60 %), at the extinction of the process – lymphocytes (90-95 %). At specific etiology of exudate glucose concentration is increased (up to 0,8 g/l), which may be a diagnostic sign.

Changes of peripheral blood are characterized by moderate leucocytosis, the increase of the number of bacilli-nuclear neutrophilis, lymphopenia and considerably speeded up ESR. Revealing MBT in exudate or histological examination of pleura bioptate are indisputable for verifying tuberculous pleurisy diagnosis taken during the pleuroscopy (see "Instrumental methods of investigations"). Mantoux test reaction is positive or hyperergic.

On roentgenogram intensive homogenous darkening of a certain form, depending on exudate localization and the patient's position, is characteristic.

Differential diagnostics of tuberculous pleurisy is performed with pleurisies of other origins (parapneumonic, tumour), pneumonic fever, interrib neuralgia, cardiogenic transsudate (or another origin).

Treatment of tuberculous pleurisy must be complex with applying antimycobacterial preparations (isoniazidum, rifampicinum, streptomycini during 2 months, further – up to 4 months – isoniazidum and rifampicinum or ethambutolum), vitamins B_1, B_6, C, desensitizing, corticosteroid and symptomatic therapy. Pleural punctures are performed systematically with the following introduction into the pleural cavity of kanamycini (or streptomycini)

with hydrocortizon. At purulent effusion, aspiration by means of a puncture or the pleural cavity drainage are to be done daily; in case of progressing into a chronic form – surgical treatment (pleurectomy, decortication).

CONTROL QUESTIONS

1. Pathogenesis and pathomorphism of tuberculous pleurisy.
2. Classification of tuberculous pleurisies depending on localization and the character of exudate.
3. Clinic and diagnostics of tuberculous pleurisy.
4. The importance of pleural puncture and pleuroscopy in diagnostics of tuberculous pleurisy.
5. Differential diagnostics of tuberculous pleurisy.
6. Treatment of tuberculous pleurisy.

TUBERCULOSIS OF CENTRAL NERVOUS SYSTEM AND CEREBRAL MEMBRANES

Tuberculous meningitis is the inflammation of the membranes of cerebrum and (or) spinal cord, caused by tuberculous mycobacteria. Specific lesion of cerebral membranes and substances is tuberculous meningoencephalitis.

In Ukraine during the ninetines of the 20th century statistics of tuberculous meningitis sickness was stably low and comprised 0,08-0,13 per 100 thousand population, and the death-rate was relatively high (0,053-0,086 per 100 thousand population). In recent years these indices are getting worse.

Pathogenesis. Tuberculous meningitis may be primary (in 20 %) and secondary (in 80 %), as children and teenagers primary tuberculosis complication and predominantly disseminated lung tuberculosis in adults. MBT penetrate into submembranous space of cerebrum and (or) spinal cord by haematogenous, lymphogenous and rarely – by perineural way.

Pathological anatomy. The specific process is predominantly localized in the soft membrane of cerebral base, in which connection cranial nerves, located here, are injured. The illness may progress as meningoencephalitis (64-70 %) – inflammation of cerebral membranes and substance, as basal meningitis (20-30 %) – inflammation of cerebral membranes and as spinal meningitis (4-6 %) – inflammation of spinal cord membranes.

Exudate, tubercles, tender fibrin threads appear on soft cerebral membrane at tuberculous meningitis. Pathologic changes are also observed on the vessel membrane of cerebral ventricles.

Clinic. Tuberculous meningitis usually begins gradually, with *a prodromic period* of the duration from 1 to 4 weeks. Patients feel general weakness, irritability, sleeplessness, lability, unstable headache, often subfebrile body temperature, predisposition to stopping of diarrhoea. Later on, *obvious clinical manifestations* of soft cerebral membrane inflammation set in; the body temperature rises to febrile, the headache of sharp intensity, joined by vomiting and meningeal syptoms develop gradually: rigidity of cervical muscles, Kernig's and Brudzinsky's symptoms. At the inflammation of the soft membrane of cerebral base, eye motional and drain cranial nerves are injured. Oedema of cerebral substance causes pareses according to the central type of the VII, IX, X, XII pairs of cranial nerves. Owing to the injure of diencephalic section, vegetovascular disturbances in the form of vasomotor reactions develop, stable red dermographism, Trusso spots, relative bradycardia, disturbance of sleep and appetite. The illness may develop as meningoencephalitis and in these cases nidal sings of cerebral lesion – hemipareses, hemiplegias are observed. At the involving into the process of membranes of the spinal cord and its roots, pain appears in thoracic, lumber cords of the spinal column, peripheral pareses and paralyses. Further on, at meningitis progressing, the low paraparesis appears, disturbances of the function of pelvic organs, accompanied by hampered excretion of urine, stopping of diarrhoea, irretention of urine and excrement.

In the third, terminal period of tuberculous meningitis (the period of pareses and paralyses) an expressed adynamy is peculiar, apathy to all surrounding, consciousness blank, later on soporose state develops, coma. And all this may be accompanied by a patient's recumbent position on a side with his head recumbent and his legs close to his stomach.

In general, 5 components (syndromes) are discriminated in the clinical picture of tuberculous meningitis:

I. *Intoxicating syndrome.*

II. *Meningeal syndrome: headache, vomoting, hyperestasis.*

Meningeal symptoms: rigidity of cervical muscles; Kernig's, Brudzinsky's, Gylene's, Lessage's positive signs; boat-shaped abdomen, "trigger" position.

III. *Symptoms of cranial nerves lesions (III, VI, VII, XII) and the spinal cord roots.*

Lowered tendinous and periosteal, as well as disproportionate from both sides abdominal reflexes.

IV. *Changes of spinal fluid:* liquor is usually transparent or opalescent, flows under increased pressure (at norm up to 60 drops per minute); greater

number of cells (100-300 in 1 ml, at norm – up to 10), increased protein content (0,6-1,0 g/L and more, norm – 0,2-0,4 g/L), lowered sugar concentration (1,5 mmol/L and less, norm – 2,22-3,88 mmol/L), lowered chlorides concentration (110 mmol/L and less, norm 120-130 mmol/L), Pandi and None-Apelta's positive reactions, in liquor a weblike film is formed in 24 hours, in which in 10-20 % of cases MBT are revealed.

To the point, on the first days of illness neutrophil granulae prevail in the liquor, however pleocytosis rapidly changes into lymphocytic.

V. Symptoms of irritation and prolapse of functions owing to cerebral tissue lesion: pareses and paralyses of central origin, violation of pronunciation (aphasia, alalia), disturbance of psychics (black out, sopor and coma).

Depending on the site of predominant lesion of cerebral membranes three forms of tuberculous meningitis are discriminated: basal, spinal and meningo-encephalitis. *Basal meningitis* is characterized by meningeal symptoms and often by signs of cranial nerve lesions, first and foremost eye-motional, drain, facial and sublinqual. At spinal form of tuberculous meningitis the first manifestations are the symptoms of lesion of spinal cord membranes and roots, in particular – pain in lumber and thoracic spine, disturbances of the functions of pelvic organs, paresthesia and pareses of the lower extremities and later on a picture of typical meningitis develops. Meningoencephalitis is characterized by meningeal symptom complex, signs of lesion of cranial nerves and nidal cerebral lesion, central hemipareses and paralyses.

Diagnostics. The most important method of diagnostics of tuberculous meningitis is the examination of liquor. Normalization of spinal fluid during treatment occurs not earlier than in 2-4 months. If its normalization occurs during a month, so the tuberculous etiology of meningitis becomes doubtful, in other words it is not tuberculous meningitis. In case that a doubt appears as to the etiology of meningitis and at the slightest suspicion of tuberculous meningitis, the question is always solved in favour of tuberculosis and treatment with 3-4 antituberculous preparations is administered, herewith two of them are obligatory rifampicinum and streptomycin.

Differential diagnostics of tuberculous meningitis is more often performed with meningococcal, viral, secondary purulent meningitis and "meningism", developing at illnesses with sharply expressed intoxication.

The meningococcic meningitis starts and progresses acutely. It is accompanied with the pronounced intoxication, loss of consciousness, sometimes with herpetic eruptions, high leukocytosis in peripheral blood. Cerebral nerves

are seldom affected. Spinal liquor is turbid, cytosis – 1000 and more in 1 ml, mainly neutrophilic, sedimentation results in the formation of thick film, albumen content is increased, glucose level is decreased. The diagnosis is being confirmed at bacteriologic examination of the spinal liquor, where meningococci are found. Under the influence of intensive antibiotics therapy the sanation of the liquor and the clinical recovery take place quickly.

The secondary purulent meningitis is often caused by metastasation of purulent processes, most often from ears (otitis), circumnasal cavities (maxillary sinusitis, frontitis), by septimia development (pneumonia, abscess, osteomyelitis, carbuncle, etc.). The etiology of the secondary purulent meningitis is staphylococcous or pneumococcous. History and total examination are very important from the differential-diagnostic point of view. The absence of the primary purulent focus does not exclude the diagnosis of the secondary purulent meningitis. The start of the meningitis is acute, in 1-2 days appear focal affections of the central nervous system. Frequent are loss of consciousness, generalized clonic-tonic cramps, affection of cerebral nerves, frequent are also hemiparesis and paraparesis. The diagnosis is being confirmed at the bacteriologic examination of the liquor.

At leptospirosis meningitis, the meningeal syndrome more frequently appears at the 3^{d}-6^{th} day of the disease at the background of the clinical symptoms characteristic for this illness (pain in the lumbar area, in sacrum, shin muscles, enlargement of liver and spleen, high temperature within 5-7 days, leukocyteosis in peripheral blood). Also the body temperature rises repeatedly, the headache intensifies, vomiting, general hyperestesia, skin and sclera ictericity appear. Anamnesis stimulates the in-time identification of the leptospirosis meningitis (contact with animals, bathing in rivers, swamped water places, fishing, etc.). Leptospirosis meningitis may proceed both with purulent and serous inflammation of the meninges. The liquor is mainly opacitated, pleocytosis is in the range of 800-4000 cells in 1 mm^3 neutrophilic or mixed. The etiology of the illness is confirmed in the first day of the disease by leptospira identification in blood, urine and spinal liquor.

Cetrtain difficulties may happen at the differential diagnosis of the tuberculous meningoencephalitis with serous meningoencephalitis. Among the primary serous meningoencephalitis, the most frequent are lymphocytic serous choriomeningitis, and rare – meningitis of other virus etiology. Acute serous lymphocytic choriomeningitis is characterized with the acute start without any prodromal symptoms. The headache is abrupt, sometimes vomiting

is present, shivering, sometimes pain in the extremities, the waist, the back, temperature rise in the first days up to 40 °C. Sharply pronounced meningeal symptoms. Fever duration is from 5-7 up to 10-12 days. There are moderately pronounced alterations of inflammatory character in the spinal liquor, sometimes the deposition of fibrinal film and sugar level drop, cytosis from 50 up to 1000 cells in 1 ml, the lymphocytic one. The illness course is favourable. Meningeal symptoms disappear within several days. Spinal liquor normalizes within 15-30 days.

Secondary serous meningitis and meningoencephalitis may occur at various infections, such as flu, epidemic parotitis, poliomyelitis, infectional jaundice, chickenpox, shingles, typhoids, etc. In practice the most common is influenzal meningitis or meningoencephalitis and meningitis at epidemic parotitis. The clinical picture has got the signs of the main illness with meningal syndrome features and pathologic changes of the liquor resembling those occurring at the primary serous meningitis.

In some cases meningism occurs as a result of toxic irritation of brain membranes, caused by poisoning with medical preparations, by kidneys illnesses, by worm invasion, various intercurrent infections. At meningism, the lumbar puncture may intensify the signs of brain membranes irritation, however at the tuberculous meningoencephalitis it brings the patient the release. The liquor flows out under the elevated pressure, the albumen-cellular composition of the liquor is without any changes or the changes are minor. The phenomena of meningism quickly disappear after a toxic stimulator stops its action.

The treatment is performed in a specialized hospital till the liquidation of clinical symptoms and liquor sanation, but not less than 6 months. 4 anti-mycobacterial preparations (isoniazidum, rifampicinum, streptomycin, pyrazinamidum) are administered in optimum maximal daily doses. At the disturbance of swallowing the preparations are introduced parenterally, intrarectally. At the grave course of tuberculous meningitis, endolumbar infusion of calcium chloride complex of streptomycin (0,1-0,2 g daily during 10-14 days), as well as glucocorticosteroids (25-30 mg/day during 1,5-2 months) are applied. To decrease cerebral oedema and hydrocephaly patients are administered dehydrating therapy (lazyx, hypothiazid, 10 % solution of manit, albumin). At cramps – chloralhydrate in enemas, 25 % solution of magnesium sulfate intramuscularly, depakin, sibazon. Vitamins B_1, B_6, C. After the extinction of a sharp period of meningitis, in case of pareses, paralyses,

dibazol 1-3 ml 1 % subcutaneously, prozerin 1 ml 0,05 % solution subcutaneously 1-2 times/day or 0,015 g orally 2-3 times/day are administered.

After clinical treatment patients are sent to an antituberculous sanatorium, where they continue chemotherapy with two antimycobacterial preparations, as well as rehabilitation measures not less than 4 months. Later patients are under the observation at antituberculous dispensaries and during 2-3 years they are administered prophylactic treatment course with isoniazidum.

CONTROL QUESTIONS

1. The defenition of tuberculous meningoencephalitis.
2. Pathogenesis and pathomorphism of tuberculous meningoencephalitis.
3. Clinical forms of tuberculous meningoencephalitis, its clinic in various periods of the illness.
4. Five clinical syndromes of tuberculous meningoencephalitis.
5. The most characteristic changes in the hospital at tuberculous meningoencephalitis.
6. Differential diagnostics of tuberculous meningitis with meningitis of other etiologies (virus, meningococcal, secondary purulent meningitis and "meningism").
7. The treatment of tuberculous meningoencephalitis.
8. Complications of tuberculous meningoencephalitis.

TESTS

1. A female patient K., 30, two years ago underwent treatment on the occasion of the FDTB (16.09.2002) of the first segment of the right lung (nidal tuberculoisis), Destr-, (infiltration), MBT-M-C-, HIST0, Cat3 Coh3(2002). 10 days ago a right-side purulent otitis was diagnosed. At the present time she complains of a terrible headache, vomiting, general weakness. She has difficulty in making a contact. Roentgenologically there are two nidal shadows of more than medium intensity in the first segment of the right lung. The liquor analysis: turbid, cytosis – 650 cells in 1 ml, neutrophiles – 85 %, lymphocytes – 15 %, sugar – 3,1 mmol/L, chlorides – 115 mmol/L. Your diagnosis.
   A. Serous meningitis
   B. Tuberculous meningitis
   C. Meningo-coccal meningitis
   D. Secondary purulent meningitis
   E. "Meningism"
2. The most rational combination of antimycobacterial preparations at treating tuberculous meningoencephalitis.

A. Isoniazidum, rifampicinum, ethambutolum
B. Isoniazidum, rifampicinum, streptomycini, pyrazinamidum
C. Isoniazidum, streptomycini, pyrazinamidum, ethambutolum
D. Isoniazidum, rifampicinum, kanamycini, ethionamidum
E. Pyrazinamidum, ethionamidum, streptomycini, thioacetazon

3. The most frequent beginning of tuberclosis meningoencephalitis.
A. Gradual
B. Acute
C. Without any symptoms
D. Relapsing
E. Sudden

4. The frequency of primary tuberculous meningitis (isolated lesion of cerebral membranes).
A. 2 %
B. 5 %
C. 20 %
D. 40 %
E. 50 %

5. The results of which examination are more informative for the confirmation of the tuberculous meningitis?
A. Mantoux test
B. Koch's test
C. General blood test
D. Examination of spinal liquor
E. Examination of albumen fractions in blood serum

6. Which pairs of cranial nerves are mainly affected at tuberculous meningitis?
A. III, VI, VII, XII
B. I, II, III
C. I, II, X, XII
D. V, VI, X
E. II, III, VII

7. The average duration of the prodromic period in patients with tuberculous meningitis.
A. 1-7 days
B. 5-10 days
C. From 1 to 4 weeks
D. 2-3 months
E. 4-6 months

8. What is the most probable content of glucose in spinal liquor in the patient with tuberculous meningitis?

A. 1,5 mmol/l
B. 2,4 mmol/l
C. 3,9 mmol/l
D. 5,5 mmol/l
E. 6,5 mmol/l

9. At the grave stage of the tuberculous meningitis besides isoniasid, ryphampicin, pirasinamid and streptomycin sulphate, one should also prescribe:
   A. ATA, cocarboxilasa, inhalation with 2 % solution of solutison
   B. Endolumbal administration of calcium chlorine complex of streptomycin, glucocorticosteroids, dehydration therapy
   C. Intrarectal administration of isoniazid, vitamins B_1, B_6 and C
   D. 10 % solution of manit, albumin, dibazol
   E. Sibason, 25% solution of magnium sulphate, prozerin
10. A patient, 45 years old, is diagnosed with tuberculous meningitis for the first time. The general condition is grave, the meningeal symptoms are sharply pronounced, the consciousness is shadowed. What is the total duration of the treatment of this patient?
   A. 1 month
   B. 3 months
   C. 5 months
   D. 7 months
   E. 12 months
11. The patient M., 19 years old, got sick gradually: general weakness, the body temperature up to 37 °C. She had been in contact with a patient suffering from tuberculosis. The tuberculous meningitis was suspected. Say, which one from the present symptoms is not typical for the tuberculous meningitis?
   A. Dyplopia
   B. Headache
   C. Gradual development of the disease
   D. Normal body temperature
   E. Vomiting
12. In the patient suffering from tuberculous meningoencephalitis the right-side ptosis, midriasis, divergent strabismus, were found. The damage of what cranial-brain nerve is present?
   A. III
   B. IV
   C. VI
   D. VII
   E. X

TASKS

1. A doctor's tactics in case, when meningitis etiology cannot be defined at the present time:

1... 2...

2. In a patient Z., 35 years old, the body temperature rose to 39,2 °C, he had a terrible headache. Antiinflammatory therapy and analgetics gave no positive effect. Roentgenologically there was total small-nidal sowing of both lungs. The blood analysis: leucocytes $10,0\times10^9$/L, ESR – 15 mm/hr.

a) Formulate a preliminary diagnosis.

b) The examination plan.

c) The treatment.

3. Tuberculous meningoencephalitis with a stable vomiting and a terrible headache has been diagnosed in a patient P., 36.

What treatment regimen will you administer?

BONE AND JOINT TUBERCULOSIS

In the general structure of sickness statistics tuberculosis of bones and joints comprises 5-7%. Among the bone-joint apparatus spinal column (fig. 27) is most frequently injured (30-40%), coxofemoralis (fig. 28) and knee-joints (20% each), considerably rarelier talocrural joint, footbones and those of upper extremities.

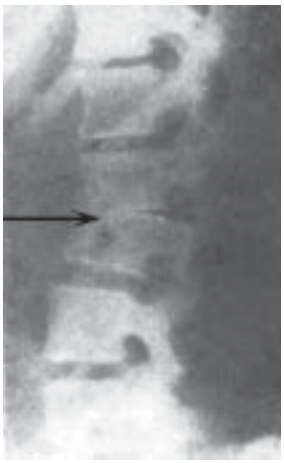


Fig. 27. **Spinal column tuberculosis**

Pathomorphism. MBT penetrate into the bones and joints haematogenously in the period of primary infestation or as a result of late generalization at reactivation of healed tuberculous nidi. Traumas, overcooling, etc. may be provoking factors.

The specific process starts at a bone sites possessing the most developed vessel net (vertebrae, metaphyses and epiphises of long bones). Typical tuberculous granules form in bones and joints, which in time fuse, forming nidi of caseous necrosis. The spread of the process results into the joints lesions, exudate accumulation, as well as soft tissues. As a result the influx (cold) abscesses may form, which rather often accompany spine tuberculosis.

Clinic. Three phases of bone-joint tuberculosis course are discriminated:

I phase – prearthritic, which is characterized by forming a specific nidus in an unaltered bone tissue. Clinical signs of the sickness are inconsiderable, joint pain appears and slightly expressed intoxication phenomena.

II phase – arthritic, which is characterized by the spread of the process to the joint surfaces, cartilage and joint capsule. Destructive changes arise in the joint, intoxication phenomena and pain strengthen, joint oedema appears, muscular tension, later their partial atrophy.

III phase – postarthritic, which is characterized by the process stabilization with the formation of stable skeletal deformations.

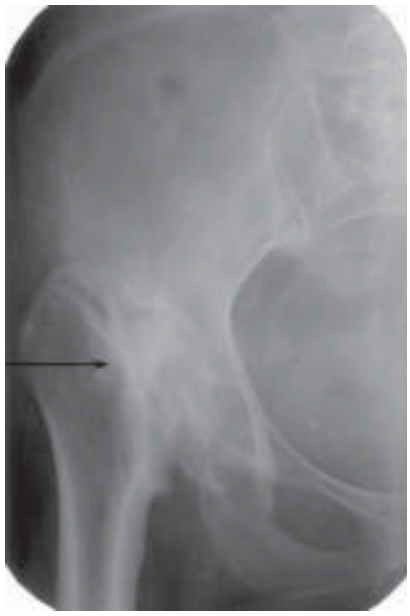


Fig. 28. **Coxofemoralis tuberculosis**

In arthritic phase of bone-joint tuberculosis complications may appear: destructive processes in bones and joints, cold (influx) abscesses, fistulae and as the result – amyloid disease of internal organs. In addition to these complications, at tuberculous spondylitis, pareses and paralyses may arise as a result of spinal cord squeeze.

For diagnostics of bone-joint tuberculosis roentgenographic and tomographic examination is used. The diagnosis is verified by means of histological, cytologic and microbiological examination of the content of the abscess, joint cavities, punctates and bioptates of lesioned joint and bone tissue.

Differential diagnosis should be performed with chronic osteomyelitis, infec-tious and traumatic arthritis, bone tumours.

The treatment of bone-joint tuberculosis, first and foremost, consists in applying protracted (not less than 6-12 months) combined antimycobacterial therapy of 3-4 preparations against the background of the desensitizing, vitamin and general strengthening therapy. At untimely diagnostics radical or reconstructively – regenerating operations are often applied on joints and the spinal column. Of great importance at the treatment are orthopedic measures and,

first and foremost, mobilization of the injured organ in physiological position prior to the stabilization of tuberculous process.

TUBERCULOSIS OF GENITOURINARY ORGANS

Among firstly diagnosed patients tuberculosis of genitourinary organs comprises 2,2 %, while among patients with extrapulmonary forms – over 35 %. Kidneys are most frequently injured, with males-testicular appendage, testicle, rarelier – prostate and seminal vesicles, with females – uterine tubes, endometrium, rarelier – ovary, cervix of the uterus and vagina.

Tuberculosis of genitourinary organs is more often observed among persons of young and middle age, besides that in combination with tuberculosis of lungs, bones and joints, though it may develop isolatedly.

Pathomorphism of kidney tuberculosis. MBT get into kidneys haematogenously or lymphogenously. In the organs of genitourinary system infection more often proliferates lymphogenously, rarelier urinogenously. The first specific changes are tubercles in crust layer, which coalesce into separate infiltrations with their further caseous necrosis and formation of caverns. In time the specific process spreads to ureter, and then to urinary bladder as well.

Tuberculosis of kidney parenchyma, kidney papillae (papillite), cavernous kidney tuberculosis and tuberculous pyonephrosis are discriminated. In ureter, urinary bladder, urethra nidi, ulcers and scars may develop.

Under unfavourable conditions tuberculosis of genitourinary organs may result into generalization of infection and the development of miliary lung tuberculosis.

The clinical picture of tuberculosis of kidneys and urinary tract is in the direct dependance upon the localization and the phase of the specific process.

The diagnostics is based on the data of the anamnesis, clinic, laboratory, roentgenologic, ultrasound and radioisotope examinations.

The treatment of kidney and urinary tract tuberculosis patients is carried out according to the generally accepted principles of antimycobacterial therapy, with average duration of 6-12 months. The treatment is expedient to start by intravenous infusion of the preparations. At cavernous kidney tuberculosis a resection of kidney segment is often performed, nephrectomy, cavernectomy. At ureter strictures plastic operations are performed, at tuberculosis of urinary bladder – sometimes resection and coloncystoplasty.

Tuberculosis of male reproductive organs is often combined with disseminated pulmonary tuberculosis, tuberculosis of kidneys or bones, whence

MBT get haematogenously or lymphogenously. The testicle appendage is lesioned, then prostate gland, seminal vesicles and testicle, later it penetrates lymphogenously or contactly into opposite appendage and testicle. Predominantly the illness has a chronic and little symptomatic course, rarelier the beginning is acute and is accompanied by moderately expressed intoxication phenomena, locally – with pain and the increase of appendages or testicle, reddening and oedema of scrotum. Dropsy of testicle membranes may arise, as well as fistulae on the scrotum skin. Later on, in the course of exudate organization, in appendage region, a painful compact conglomerate is palpated. T*uberculosis of prostate gland and seminal vesicles* may have a protracted asymptomatic course or with feebly expressed local and general signs. In cases of infiltrate or a cavern in the prostate gland, pain appears in the sphere of perineum and rectum, sometimes – dysuriac phenomena.

The diagnosis of male reproductive organs tuberculosis is based on the data of anamnesis, examination, palpation and cytouretrography.

The treatment of patients must be complex with the application of commonly accepted regimens of antimycobacterial therapy, in combination with symptomatic, desensitizing and vitamin therapy. In case of ineffective treatment, sometimes epididimectomy and other surgical interventions may be applied.

Tuberculosis of female reproductive organs. MBT penetrate into female genital organs haematogenously, lymphogenously and considerably rarelier contactually, first and foremost in the period of primary tuberculous infection. Uterine tubes are most frequently lesioned (up to 90%), endometrium, rarely – ovaries, uterine neck and vagina. Female teenagers and young women are more often sick.

Clinical symptomatics depends upon the form of genital tuberculosis. At chronic forms with productive changes the clinical signs are absent or are slightly expressed, sterility is the result. Subacute and caseous forms of tuberculosis are ac-companied by expressed intoxication symptoms and local signs of inflammatory process (pain in low abdomen and in lumbar region, disturbance of menstrual cycle).

For diagnostics of genitalis tuberculosis of great importance are anamnestic data about the contact with tuberculosis patients, tuberculosis of any localization suffered in the past, positive or hyperergic tuberculin tests (as well as Koch's test), results of vaginal smear for MBT examination, cytologic and histological examinations at punctional biopsy or uterine

curettage, as well as roentgenography and hysterosalpingography. The final stage of diagnostic process is laparoscopy with biopsy of the lesioned organ.

The treatment of genital tuberculosis patients consists in performing protracted (6-9 months) combined antimycobacterial therapy. Local application of chemopreparations is also possible. At ineffective conservative treatment and particularly at pyosalpynx – surgical intervention.

TUBERCULOSIS OF PERIPHERAL LYMPHATIC NODES

Tuberculosis of peripheral lymphatic nodes is predominantly a manifestation of primary tuberculosis, but it may be the result of an exogenous superinfection, which is more peculiar for adults. The pathogene more often is MBT of bovine type. The inlet gate may be the mucous membrane of a mouth cavity, pharynx, tonsils. Neck and submaxillary nodes are most frequently injured, rarelier – groin, ulna and inguinal ones.

Pathomorphologically three forms of lymphadenoid are discriminated: infiltrative, caseous and indurative. At infiltrative form, hyperplasia of lymphoid tissue prevails in the injured nodes. Caseous form has more severe course, often with lesions of a few groups of lymphatic nodes, with massive caseous nodes necrosis, not seldom complicated by suppuration with the formation of fistulae and ulcers. Indurative or fibrous form of lymphadenoids is less severe by its clinical course, however it is more protracted. This form is the completion of a lingering course of caseous and rarelier – infiltrative, at its unfavourable course.

Clinic. The beginning of the illness is more often gradual, rarelier it is acute with expressed intoxication phenomena, the course of the illness is undulatory. The inflammatory process from lymphatic nodes can spread to the surrounding subcutaneous connective tissue and the skin. Big not mobile, painful conglomerates are formed, the skin over which is hyperemic. Without treatment these packages suppurate, fluctuation begins, a fistula is formed, through which pus is extracted. Later on, under the influence of antimycobacterial preparations, inspissation and diminution in size of lymphatic nodes occur, and on the site of the fistula, scars of irregular form are formed, the nodes inspissate, sometimes with signs of incrustation. The changes of haemogramm depend on the phase and acuteness of the specific process.

For diagnostics a contact with a tuberculosis patient, lymphadenoids in childhood, paraspecific reactions, often hyperergic tuberculin tests matter.

Elements of tuberculous granuloma and MBT in punctate or in fistula extractions.

Differential diagnostics of tuberculosis of peripheral lymphatic nodes is performed with unspecific limphodenoids, lymphogranulematosis, malignant and benign tumours.

Treatment should be complex, with the application of isoniazidum, rifampicinum, pyrazinamidum (streptomycini). Local application of solutions of isoniazidum, rifampicinum and solutyson in particular. Vitamins B_1, B_6, C, desensitizing means. If conservative treatment is ineffective at caseous fistula forms of lymphadenoid, surgical removal of injured lymphatic nodes is indicated, followed by antimycobacterial therapy during 3-4 months.

TUBERCULOSIS OF INTESTINE, PERITONEUM AND MESENTERIC LYMPHATIC NODES

Tuberculosis of mesenteric lymphatic nodes (mesadenite) (fig. 29) is the most frequent form of tuberculosis in abdominal cavity, though generally, it is found rather rarely. The illness is more often observed among children and teenagers, which coincides with the primary period of tuberculous infection, however it can develop at secondary forms of tuberculosis too. *In mesadenite pathogenesis* of great importance is alimentary way of infestation, often with MBT of bovine type.

Infiltrative, caseous and indurative (fibrous) forms of mesadenite are discriminated.

The clinical picture of tuberculous mesadenite is characterized by various manifestations. The illness starts gradually and has a protracted chronic course. More often patients complain to unstable pain in abdomen, to the right of the umbilicus. The pain increases at

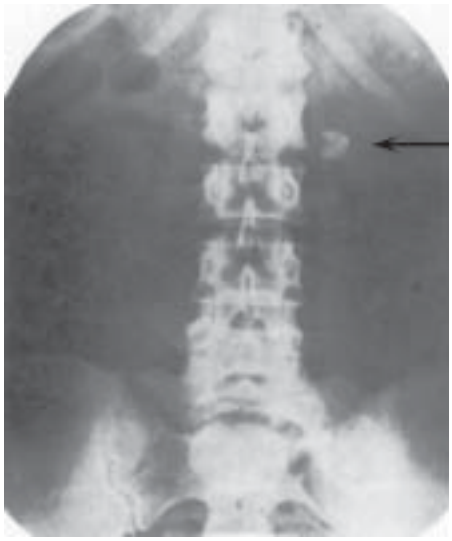


Fig. 29. **Tuberculosis of mesenteric lymphatic nodes (calcination)**

physical load, after meal, at abdomen palpation. Not seldom the pain in abdomen is combined with other dyspeptic disturbances (nausea, vomiting, meteorism, disturbances of evacuation) against the background of moderately expressed phenomena of tuberculous intoxication.

Diagnostics. During examination of patients flatulence is observed, stress of the abdominal wall and pain at palpation at the injure area. Sometimes it is possible to palpate a conglomerate of mesenteric lymphatic nodes. In case of a prolonged illness course, petrifaction may form, which is seen on the abdomen roentgenogram. A reliable method of revealing the increase of lymphatic nodes is ultrasound examination and computer tomography and, in the first place, laparoscopy with biopsy.

The treatment of patients is carried out with antimycobacterial preparations (isoniazidum, rifampicinum, pyrazinamidum, streptomycin) during 6 months. Sometimes – laparotomy and surgical removal of lesioned lymphatic nodes.

Tuberculosis of intestine usually develops as a result of pulmonary tuberculosis progressing, mesadenite or other organs, i. e. at primary and secondary tuberculosis. MBT penetrate into the bowels haematogenously, lymphagenously and rarelier sputogenously at swallowing infestated sputum. In recent decades tuberculosis of intestine occurs rarely.

Anatomicopathological changes at intestinal tuberculosis are predominantly observed at the terminal section of ham, caecum, and ascending colon. Tubercles, infiltrates and ulcers appear on the intestinal wall, and after healing scars remain. Ulcer perforation into the abdominal cavity is possible.

The clinic of intestine tuberculosis is atypical, the diagnostics is complex. Dyspeptic disturbances, inconstant pain most often occur in ileocecal region. Excrement is with admixtures of slime, sometimes – blood. MBT are often found in slime. Roentgenologic examination is of great diagnostic importance (the region of an injured intestine is spasmatic with the filling defect in the form of serrate contours, contrastive spots etc.).

The treatment. At timely diagnostics it is well susceptible to the therapy with antimycobacterial preparations (isoniazidum, rifampicinum, pyrazinamidum or ethambutolum). The average duration of chemotherapy is 6-9 months. At intestine ulcer perforation or its occlusion – surgical treatment.

Peritoneum tuberculosis arises haematogenously, lymphogenously and contactually at tuberculosis of the organs of abdominal cavity or more remote organs. Peritoneum tuberculosis as an independent illness is a rarity.

Exudative and fibrinous (plastic) forms of peritonitis are discriminated. At exudative form exudate is accumulated in abdominal cavity, peritoneum is thickened, hyperemic, covered with tubercles and caseous platelets.

Plastic form of peritonitis arises as a complication of mesadenitis, intestine tuberculosis and is characterized by multiple joints and encapsulated exudate islets.

The clinic of peritoneum tuberculosis combines the syndrome of tuberculous intoxication and dyspeptic disturbances.

The diagnosis of tuberculous peritonitis is based on the results of cytologic and microbiologic examination of abdominal cavity exudate, and, if necessary, – peritoneum biopsy at laparoscopy. Of great importance for elucidating the illness etiology are tuberculin tests, in particular Mantoux test.

The treatment. The principal method of treating tuberculous peritonitis is protracted (up to 12 months) antimycobacterial therapy in combination with desen-sitizing means, vitamins, often also glucocorticoids. At considerable amount of exudate in abdominal cavity – its evacuation, at intestine impassability – surgical methods of treatment.

TUBERCULOSIS OF SKIN AND SUBCUTANEOUS CONNECTIVE TISSUE

Tuberculosis of this localization is rarely found. Tuberculosis pathogene pe-netrates lymphogenously and haematogenously, rarelier contactually from the nidi of tuberculous lesion. In 15-20 % of patients skin tuberculosis is combined with that of other internal organs.

Skin tuberculosis is a group of illnesses – different as to the clinical course and histopathologic features. One and the same form of skin tuberculosis may be caused by various types of a pathogene. The reaction of the skin is different, depending on the fact whether MBT penetrate into the body for the first time or repeatedly. If MBT penetrate into the skin for the first time, so the primary tuberculous affect (tuberculous shancr) appears on the spot. *Depending on the spread of the process, localized and disseminated forms of skin tuberculosis are discriminated. To the localized forms belong: primary skin tuberculosis, lupus (lupous skin tuberculosis), warty (corpse tuber), coliquative (scrofuloderma), ulcer and inspissated tuberculosis (indurative erythema, Bazin's disease). The group of disseminated skin tuberculosis includes miliary, lichenoid (lichen) and papulonecrotic tuberculosis.*

Lupus is the most frequent form of skin tuberculosis. Skin tuberculosis is confirmed by histological examination, bioptate of the lesioned skin strip.

The treatment is performed with antimycobacterial preparations (isoniazidum, rifampicinum, streptomycini) during 6 and more months, immunostimulators, vitamins (D_2, E, A, C, B group), physiotherapy. Later on antirelapse courses are applied.

EYE TUBERCULOSIS

Eye tuberculosis is not a rare form of extrapulmonary tuberculosis. Children, teenagers and adults suffer from it.

MBT get into the eyeball membranes haematogenously. Herewith inflammation in the form of tubercles arises in the vessel membrane. Specifically – allergic leison is possible, at which in the outer membranes of the eyeballs the inflammation acquires diffusive character without specific granulomas. Thus, allergic and nidus tuberculous process is discriminated. The allergic process often accompanies primary forms of tuberculosis. It predominantly occurs in child and young age. Flicktens appear on the conjunctiva, there may be surface keratitis. On the conjunctiva and sclera flicktens look like grey-yellow nodules, surrounded by a small area of hyperemia. The nodules may transform into small ulcers which heal in 2-3 weeks.

The surface allergic keratitis is characterized by the appearance of infiltrates of grey colour, widening of the vessels near the cornea. All forms of allergic tuberculous process are accompanied by the positive tuberculin test.

At haematogenous form it is the vessel membrane that is more often lesioned, though all eye sections may be injured too. In 70-80 % of cases choroiditis – tuberculosis of the back section of an eye vessel membrane is observed. In case of the process spreading to the retina, chorioretinitis develops.

Tuberculous scleritis, keratitis, iridocyclitis occur rarely.

The diagnostics of eye tuberculosis is often complicated. Alongside with the clinical picture one should take into account a positive tuberculin reaction, presence of tuberculosis in other organs. Koch's test often contributes to diagnostics – at active eye tuberculosis one can visually reveal the appearance of the nidus reaction.

The principal *method of treatment* is antimycobacterial therapy, duration of 6-9 months, intravenously, parenterally and locally, in combination with vitamins, desensitizing and stimulizing means.

OTOLOGIC TUBERCULOSIS

Laryngitis and otitis media are the most frequent ear, nose, and throat (ENT) diseases of tuberculous origin. Tuberculous otitis media and tuberculous mastoiditis occur together as a single disease process.

Pathogenesis and pathology. Pathogenesis of tuberculosis of the middle ear may be a primary focus in the area of the shorter and large-bored eustrachian tube in neonates who have aspirated infected amniotic fluid or in older patients who have ingested and regurgitated tuberculous materials such as contaminated milk. Most cases occur secondarily, however, when organisms are coughed into the nasopharynx from pulmonary lesions or as the result of hematogenous spread. Preauricular or anterior cervical lymphadenopathy and facial nerve paralysis occur infrequently but are more likely with tuberculous than other types of bacterial otitis media.

Pathologically, the disease always involved the mucosa first, with extensive oedema, infiltration by round and giant cells, granuloma formation, and finally caseation. Thickening of the tympanic membrane is followed by perforation with associated destruction of the ossicles and purulent discharge. Secondarily, the periosteum becomes involved, followed by bone necrosis with resultant complications that are similar to those occurring with other infections of the middle ear and mastoid. The labyrinth appears to be at greatest risk in adults, and the facial nerve and meninges are the greatest risk areas in children. Hearing loss is frequent in all patients.

Diagnosis. The history and physical findings in both primary and secondary tuberculous otitis media are frequently nonspecific. Secondary tuberculous otitits the classic findings of profuse otorrhea, absence of pain, and profound hearing loss are never well defined because of supra-infection with other bacteria. An exception is damage to the facial nerve, paralysis of which is usually associated with tuberculosis. Tympanic membranes are often extencively damaged, with one or more perforations. Older patients may complain of tinnitus and "funny noises".

Tuberculous otitis media has to be considered in the differential diagnosis of chronic otitits media in tuberculous patients as well as in those who have no evidence of tuberculosis elsewhere and whose otitis does not improve with the usual medical treatment. A history of tuberculosis in family member should arouse suspicion and lead to confirmatory studies. Tuberculous otitis media may be masked by suprainfection with other bacteria as well as

antituberculous therapy. The diagnosis of tubercolous otitis media is confirmed by culture of M.tuberculosis from the local discharge. Histopathologic study of tissue as well as improvement following specific anti-tuberculous therapy may support the diagnosis.

Primary tuberculosis of the middle ear is most difficult to diagnose. The tympanic membrane before perforation is swollen, yellowish and hyperemic. Perforation follows in the untreated patient and multiple perforations follow in 20 % to 30 %. In tuberculous otitis media of both primary and secondary types, abnormalities on X-ray films of the mastoid are less common than with other types of chronic otitis media. Propagation to the inner ear may occur in older children and adults when the disease is subacute and manifest by slowly progressive hearing loss, first of the high tones, as a result of cochlear destruction. Extension and hematogenous dissemination from tuberculous otitis media are rare, as evidenced by the frequent chronicity of the disease for many years without such spread. The dura mater usually resists direct extension to the brain; however, tuberculous meningitis is definitely associated with chronic tuberculous otitis media.

Differential diagnosis is broad, including histoplasmosis, syphilis, midline granuloma (lethal), Wegenerÿs granulomatosis, histocytosis X, nocardiosis, necrotizing external otitis, lymphoma, nontuberculous bacterial otitits media and cholesteatoma.

Treatment. Once the diagnosis of tuberculous otitis media is confirmed, the combined talents of the primary care physician, an ENT surgeon and an infectious disease specialist are required for optimum therapy. Isoniazid plus rifampin is the preferred antituberculous therapy with pyrazinamide added for the first 2 months. Ethambutol is usually added until multidrug-resistant M.tuberculosis is ruled out. Final therapy is based on in vitro susceptibility studies. Because there have been only a few cases of tuberculous otits media treated with short-course therapy and data are insufficient, the continued use of therapy for 12 months is recommended. This is also recommendation for tuberculous meningitis in infants and children. Fortunately, most patients described anecdotally in recent years have responded to medical therapy within 6 months.

In addition to obtaining tissue for diagnosis, the surgeon may have a role in therapy by removing a nidus of infected debris. Complications mandating surgical approach include facial nerve paralysis, subperiosteal abscess, labyrinthitis, persistent postauricular fistula and extension of infection into

the central nervous system. After therapy is completed, reconstructive procedures may improve hearing in certain patients.

CARDIOVASCULAR TUBERCULOSIS

Cardiovascular tuberculosis is an uncommon extrapulmonary manifestation of mycobacterial disease. Pericardial tuberculosis is the disease present in the greatest percentage of patients with cardiovascular tuberculosis. Tuberculosis of the aorta and myocardium are reported but extremely unusual forms of cardiovascular tuberculosis.

Pericardial tuberculosis (fig. 30) is defined as pericardial tissue or fluid culture positive for M.tuberculosis, pericardial biopsy specimen demonstrating acid-fast organisms, caseating granuloma, or both, extrapericardial bacteriologic or histologic evidence of active tuberculosis in conjunction with a major pericardial effusion or pericardial thickening by echocardiography, or a combination thereof. Tuberculosis of the pericardium arises from contiguous, lymphgenous, or hematogenous spread from areas of tuberculosis separate from the pericardium. The acute manifestations are associated with a polymorphonuclear followed in about 3 to 5 days by a lymphocytic, exudative pericardial effusion. In the subacute stage, there is caseation necrosis with the laying down of a fibrinous exudate. Later in the course of the disease, organisation occurs and constrictive pericarditis can occur.

Pericardial tuberculosis is rare, occurring in less than 1 % of cases of tuberculosis, and may be life-threatening. Pericardial tuberculosis is associated with a 14 % to 40 % mortality rate with most treatment regimens.

There are two major reasons for the high death rate in pericardial tuberculosis. First, there is often difficulty in establishing the diagnosis of tuberculous pericarditis. Second, pericardial inflammation often has dire effects on the mechanical efficiency of the heart.

The individual clinical features of tuberculous pericarditis are nonspecific. When they are analyzed together, however, they often suggest the diagnosis. Most patients are middle-aged men.

The most common symptoms are weight loss, cough, dyspnea, orthopnea, chest pain, and ankle swelling. The last four symptoms serve as diagnostic cluers because they occur more frequently in tuberculous pericarditis than in pulmonary tuberculosis without pericarditis.

The most prevalent signs are fever, tachycardia, cardiomegaly, and signs of a pleural effusion. Distant heart sounds, pericardial friction rub, and

paradoxal pulse, which are more specific signs of pericarditis and possible tamponade, occurred in a minority of patients.

The chest radiography is frequently characterized by cardiomegaly, particularly in the presence of a pericardial effusion. A "water bottle" configuration to the cardiac silhouette may be visible. Various studies have found cardiomegaly in up to 95 % of patients.

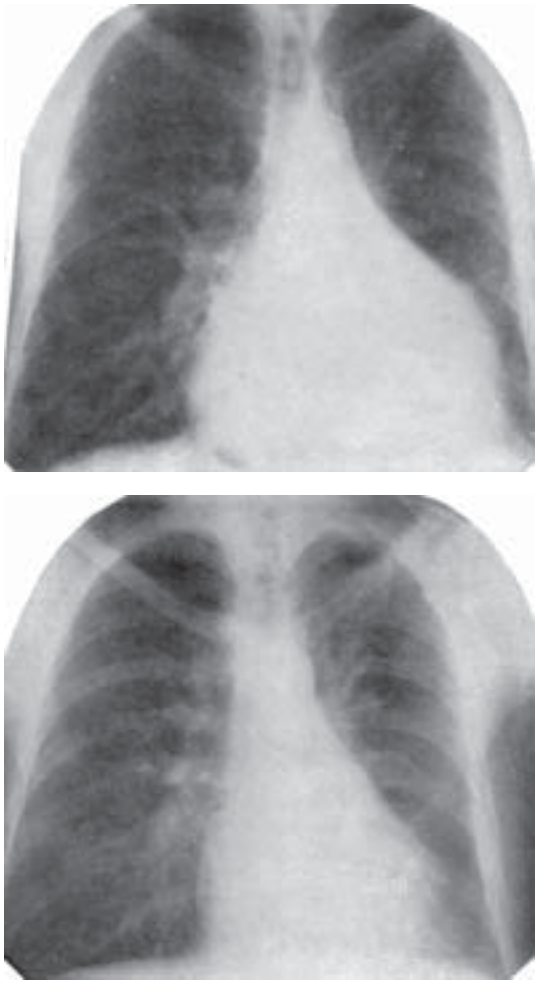


Fig. 30. **Exudative pericardial tuberculosis (before and in three months after the treatment)**

Pericardial effusion in common finding in tuberculosis of the pericardium. A pericardial effusion is clinically manifested by distant heart sounds, a friction rub that may disappear or become clearly audible, and an apical pulse that ceases to be palpable. If the pericardial effusion is large, percussion may reveal an area of dullness and auscultation may reveal an area of tubular breathing at the angle of the left scapula (Ewart's sign), which are likely caused by compression of the underlying lung.

The most feared complication of pericardial effusion is cardiac tamponade wherein the accumulated fluid seriously obstructs the inflow of blood into the ventricles. The result is a fall in cardiac output and systemic venous congestion that are clinically manifested in falling arterial

pressure, a rising venous pressure, distended cervical veins on inspiration (Kussmaul's sign), and a paradoxal pulse (a>10 mm Hg fall in systolic arterial pressure on inspiration). Although a paradoxal pulse is a hallmark of cardiac tamponade, it is not pathognomonic because it can occur in various forms of restrictive cardiomyopathy, hypovolemic shock, chronic obstructive airway disease, and severe bronchial asthma. Various investigators have reported pericardial tamponade in 10% to 40% of patients with tuberculosis pericarditis.

The procedure of significant value in diagnosing and following pericardial effusion is the echocardiogram, which is safe, rapid, noninvasive, and most sensitive in detecting even smallamounts of fluid. An echo-free space may occur, most often posteriorly and frequently anteriorly as well. The echocardiography was 100% accurate in diagnosing pericardial effusion. Angiocardiography is also an effective means of localising a pericardial effusion, but it is time-consuming, invasive, often uncomfortable, and at times associated with significant morbidity. Radionuclide angiography shows a gated blood pool and a fluid-filled pericardial space when a pericardial effusion is present. Magnetic resonance imaging (MRI) can directly image the pericardium and thereby demonsrate abnormal thickening of the pericardium.

Other procedures of significant value in diagnosis are electrocardiogram findings, purified protein derivative (PPD) intermediate skin testing, pericardial aspirate culture, and pericardial biopsy. Electrocardiographic T-wave inversion consistent with but not diagnostic for pericarditis in a common abnormality. Low-voltage QRS waves may also be visible. PPD of intermediate strength (PPD intermediate) yields positive results in vost patients.

Pericardial fluid is obtained via pericardiocentesis that is performed to establish an etiology, relieve tamponade, or both. In tuberculous pericarditis, the effusion is usually a lymphocytic exudate that may be bloody or blood-tinged. It usually has a high protein content and a low sugar level. Culture of pericardial fluid was positive for tuberculosis in up to 50% of patients in three studies. This percrntage could not be duplicated in other studies.

Pericardial biopsy has also been advocated in the diagnosis of pericarditis.

Therapy. Treatment included INH, rifampin, streptomycin and pyrazinamide (PZA) for 6 months (see "Tuberculosis treatment ").

Because current anti-tuberculosis treatment is most effective in eradicating mycobacteria, prompt diagnosis and institution of therapy are imperative. Difficulty in diagnosis of pericardial tuberculosis often results in the late institution of therapy and theretore is, in part, responsible for the high mortality

in this disease. Another major cause of high mortality is that the pericardial inflammation interferes with the mechanical efficiency of the heart, particularly when pericardial tamponade occurs.

Mycobacteria grow slowly, and therefore there is a lag time between institution of antituberculous medication and elimination of the organisms. Abortion of the inflammatory response is not immediate. This interval or lag time is critical in terms of mortality. The pericardial inflammation that occurs is a potential risk because the rapid accumulation of fluid with tamponade and the induction of arrhythmias may compromise cardiac performance.

In order to suppress a pericardial reaction and minimize its sequelae, corticosteroids have been introduced. These drugs have been found to be efficacious in the treatment and control of pericardial effusions in many different varieties of pericarditides. In pulmonary and pleural tuberculosis, the addition of corticosteroids together with anti-tuberculosis drugs results in a more rapid resolution of disease. The corticosteroids may be withgrawn over the next 6 to 8 weeks without recrudescence of symptoms in pericardial tuberculosis as well as in most other forms of tuberculosis. At the same time the mycobacteria, which evoke the inflammatory reaction in this disease, are being eradicated by the concomitant use of anti-tuberculosis drugs. Upon withgrawal of corticosteroids, occasionally pulmonary tuberculosis may be aggravated transiently, which abates quickly with continuous anti-tuberculosis therapy. Corticosteroid treatmentis not a panacea in the management of tuberculous pericarditis and does not always eliminate the necessity for pericardiocentesis, ancillary agents to control heart failure, or ven pericardiectomy. The need for the latter is dictated by close evaluation of the clinical response to treatment.

If no change in the heart size is observed by the 12th week of therapy, pericardiectomy is reccomended. Similarly, if the heart size regresses but the venous pressure rises, the operation is performed. In patients whose heart size has decreased but in whom elevated venous pressure is stable, observation is continued until the venous pressure returns to normal. If heart failure supervenes or the venous pressure is not normal after 6 months, pericardiectomy is performed. Patients whose heart size has decreased but has not reached normal are maintained on anti-tuberculosis chemotherapy and followed as long as their venous pressure remains normal and they are asymptomatic.

Tuberculosis of aorta and myocardium. About half of patients with tuberculosis of the aorta experience aneurysmal dilation of the thoracic or

abdominal aorta. Most of this patients re diagnosed on postmortem examination. Those with aneurysm formation usually die from rupture and axsanguination.

The mechanism of development of aortic tuberculosis is believed to be via contiguous spread from tuberculous lymph nodes, pulmonary tuberculosis, vertebral tuberculosis, pericardial tubrculosis, pleural tuberculosis, or a combination thereof. Hematogenous spread to the aortic intima or vasa vasorum is throught to be uncommon. The rarity of aortic tuberculosis in patients with miliary tuberculosis seems to support this contension. Tuberculosis usually spreads from a contiguous focus into the aorta, usually creating a false aneurysms is rupture, especially into the gastrointestinal tract.

Whenever signs and symptoms suggestive of an aortic aneurysms are present in a patient with active tuberculosis elsewhere in the body, particularly in the thorax, tuberculous aortitis must be considered. Aorthography must be performed immediately for an early definitive diagnosis becaisethe arterial wall can necrose rapidly.

Treatment should include anti-tuberculous drugs. With the diagnosis of an aortic aneurysm, management also involves resection of the aneurysm to prevent repture.

Another form of cardiovascular tuberculosis that has been described recently is tuberculosis of the myocardium. It has usually been diagnosed postmortem, although with the advent of endomyocardial biopsy, antemortem diagnoses have been made. Treatment of myocardial tuberculosis is via anti-tuberculosis chemotherapy.

Unless there is vigilance in seeking out patients ho have tuberculosis and cardiovascular disease, the mortality rate will remain high. Proper management and prevention of complications requires early diagnosis as well as early treatment.

TUBERCULOUS INTOXICATION IN CHILDREN (tuberculosis without established localization)

Tuberculous intoxication – is a clinical form of primary tuberculosis, which is characterized by a symptom complex of functional failures, but without established local manifestations of a disease.

Pathomorphism. At tuberculous intoxication minimum specific and paraspecific changes, first of all in enlarged lymphatic nodes, as well as in spleen, interstitial lung tissue, liver and other organs are observed.

Clinic. A child's behaviour often changes, it becomes irritable, labile, loses cheerfulness, gets tired quickly, the ability to concentrate attention decreases, the appetite deteriorates, the memory weakens, disposition to perspire appears, sometimes subfebrile body temperature, dyspeptic failures.

Pallor, skin turgor decrease, sometimes paraspecific reactions (nodal fever, keratocojunctivites, blepharites, phlyctenaes), increase of peripheral lymphatic nodes are observed at objective examination.

Diagnostics. The diagnosis of tuberculous intoxication is based on the fact of availability of the intensity of tuberculin reactions, intoxication symptoms, the absence of changes on roentgenogram and tomogram, under the condition of exclusion of intoxication of another etiology. In doubtful cases it is recommended to apply test treatment with antituberculous preparations during up to 3 months.

Differential diagnostics is applied to the following illnesses: chronic tonsillitis, helminth infestation, hepatocholecystitis, pyelonephritis.

Treatment. Prophylaxis with isoniazidum is done to children and teenagers with the intensity of tuberculin reactions during 3 months and they are observed in the VI group of dispensary system survey not less than one year.

At tuberculous intoxication they are treated with isoniazidum combined with ethambutolum or rifampicinum during 4-6 months assumingthe follow of sanatorium-hygienic regime.

MILIARY TUBERCULOSIS

Acute disseminated tuberculosis of haematogenous genesis is the most often manifested as miliary (from Latin milae – millet), separated into an individual clinical form due to its rising frequency under present-day conditions as well as its diverse clinical manifestations (fig. 31).

Miliary tuberculosis is predominantly generalized with forming nidi in lungs, liver, spleen, intestine, brain tunics. It is rarelier that only lungs are injured at this form.

Miliary tuberculosis is characterized by an acute course and appearance in interstitial tissue of various organs of tubercles or their conglomerates – tiny tuberculous nidi. It arises as a result of haematogenous spreading of MBT at sharply reduced body resistance. More often with children and teenagers.

As to clinical progress miliary tuberculosis is conditionally divided into lung, typhoid, meningeal and septic (Landuzi disease) forms.

At lung form of miliary tuberculosis eruption of tubercles occurs predominantly in lungs, in addition to sharply expressed intoxication, pant, dry cough and cyanosis prevail. Respiration rate is over 40 per minute, tachycardia is expressed.

Data of physical examination are scanty. At percussion, as a result of an acute emphysema, tympanitic percussion note. Breathing may be weakened or rough, with dry and tiny-bladdery rales.

No pathologic changes are observed on the roentgenogram on the first days of the illness or they are manifested in the form of a tender net as a result of a more intensive blood supply of the lung vessels; it is only in 7-14 days of the illness that bilateral total millet-like lung eruption is revealed.

Typhoid form of miliary tuberculosis. Tiny-nidal eruption is observed in all organs and tissues. The clinical course of the illness is similar to typhoid fever. Ho-wever, typhoid fever begins gradually, while miliary tuberculosis sharply. The body temperature at typhoid fever is more stable, and at tuberculosis it is of irregular type, remittent. Typhoid fever patients may develop bradycardia, meteorism, diarrhea, which are not typical for miliary tuberculosis. Typhoid fever is accompanied by leucopenia and relative lymphocytosis, and miliary tuber-culosis – by inconsiderable leucocytosis and lymphopenia. Psychic depression is characteristic for typhoid fever, as well as relative bradycardia, positive Vidal reaction and roseola eruption on the abdomen skin.

At meningeal form of miliary tuberculosis cerebrum and spinal cord and, first of all, their meninges are injured. This form of tuberculosis is diagnosed first and foremost according to meningitis symptoms and then lesions of other localisations are revealed.

For a*cute miliary sepsis*, as for the preceding forms, peculiar is haematogenous dissemination of

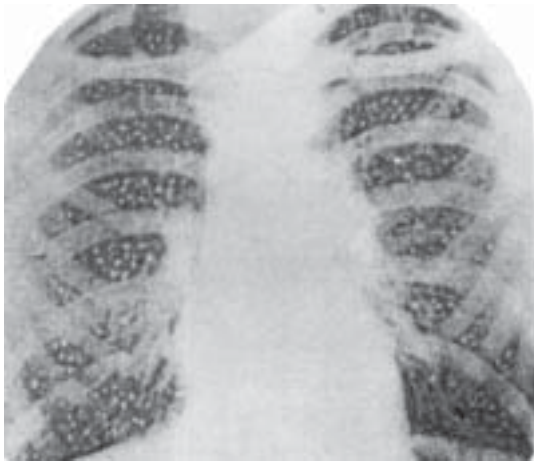


Fig. 31. **Miliary tuberculosis. Observation roentgenogram.**

highly virulent MBT with generalized tiny-nidal lesion of all organs and tissues of a weakened human body. Besides that, from the very beginning of the illness, specific tiny tubercles rapidly undergo purulent-caseous necrosis, where a great number of tuberculous mycobacteria can be revealed. The patient's general state is extremely severe. The illness is hard to discern from sepsis of nontuberculous etiology, with what high lethality of patients is connected. Surely, sepsis is connected with purulent processes of other organs, an abrupt outbreak, high hectic body temperature, rigors. Substantial leucocytosis (over 20×10^9/l with a considerable shift of the formula to the left). The diagnosis is confirmed by the blood culture for sterility, the growth of staphylococci or streptococci is revealed on the 2^{nd}-3^{rd} day, while the MBT on the nutrient media grow slowly, on the average, in 2-4 weeks.

Treatment of miliary tuberculosis patients consists in administering of 4 antimycobacterial preparations in optimum doses: isoniazidum and rifampycinum – 0,6 g per day, streptomycini 1,0 g intramuscularly and pyrazinamidum – 1,0 g twice a day or ethambutolum 1,6 g once a day, during 2-3 months. Afterwards streptomycini is cancelled. The duration of continual chemotherapy is 9-12 months. Simultaneously with antimycobacterial preparations vitamins B_1, B_6, C are administered; desensitizing and general restorative preparations; a course of glucocorticoids (1,5-2 months) in the first months of the treatment.

CONTROL QUESTIONS

1. Pathomorphologic forms of tuberculosis of peripheral lymph nodes.
2. Clinics, diagnosis of tuberculous lymphadenitis.
3. Treatment of patients with tuberculosis of peripheral lymph nodes.
4. Tuberculosis of mesenteric lymph nodes, clinics, diagnosis and treatment.
5. Bowels tuberculosis, pathologic anatomy, clinics, diagnosis and treatment.
6. Peritoneum tuberculosis, its forms, clinics, diagnosis and treatment.
7. Bones and joints tuberculosis. Clinics, diagnosis and treatment.
8. Urinogenital tuberculosis.
9. Pathomorphology of kidneys tuberculosis. Clinics, diagnosis and treatment.
10. Tuberculosis of female genital organs. Clinics, diagnosis and treatment.
11. Skin tuberculosis. Types. Treatment.
12. Cardiovascular tuberculosis. Clinics, diagnosis and treatment.
13. Eye tuberculosis. Pathogenesis. Clinics, diagnosis and treatment.
14. Otitis tuberculosis. Pathogenesis. Clinics, diagnosis and treatment.

TESTS

1. What organ of genitourinary system is most frequently injured by tuberculosis?
   A. Kidneys
   B. Ureter
   C. Urinary bladder
   D. Seminal vesicles
   E. Uterine tubes
2. The main confirmation etiology of urinary bladder tuberculosis is:
   A. USE
   B. Excretory urography
   C. Revealing of MBT in urine
   D. Roentgenography
   E. Radioisotope examination
3. Patient V., 36 years old. Fell ill with lungs tuberculosis when he was 30. His father had the cancer of prostatic gland. Three months ago his body temperature rose, the pain appeared, the swelling and scrotum became red. At palpation – hardening and enlargement of the right epididymis, slightly noticeable fistula on the skin of the testicle right upper pole. The most probable diagnosis is:
   A. Syphilis
   B. Cancer
   C. Actinomycosis
   D. Tuberculous epididymitis
   E. Purulent (non-infectional) inflammation of the epididymis
4. Prevailing localization of genital tuberculosis at females.
   A. Uterine tubes
   B. Endometrium
   C. Uterine neck
   D. Vagina
   E. Ovaries
5. Which age is the most common for the female genitalia tuberculosis?
   A. 16-30 years
   B. 30-35 years
   C. 36-40 years
   D. 41-45 years
   E. 46-60 years
6. At the active genitalia TB, the subcutaneous administration of tuberculin provokes.
   A. Calcination
   B. Scarring

C. Encapsulation
D. Dissuction of specific process
E. Excerbation of specific process

7. At the infection by beef type of mycobacteria, most frequently such lymph nodes are affected:
   A. Neck
   B. Above clavicle
   C. Paratracheal
   D. Mesenteric
   E. Groin
8. At the complicated diagnostic cases, for the confirmation of the tuberculous etiology of lymphadenitis, the decisive meaning has:
   A. Clinical blood test
   B. Mantoux test with 2 TU
   C. Koch's test
   D. Histological examination of the bioptate
   E. Trial therapy
9. The prevailing localization of the abdominal cavity organs tuberculosis is:
   A. Thick intestine
   B. Thin intestine
   C. Appendics
   D. Pancreas
   E. Mesenteric lymphatic nodes
10. A girl of 15 years old within last two years has noticed of pain in the abdomen, appetite drop, weight loss, subfebrility, irregular menstruations. She frequently drank fresh cow milk. Mantoux test with 2 TO – 18 mm infiltrate. At abdomen palpation a slightly movable tumorlike growth below the umbilicus is distinguished. Your preliminary diagnosis.
    A. Tumor
    B. Chronic appendicitis
    C. Tuberculosis mesadenite
    D. Chronic cholecystitis
    E. Partial intestinal obstruction
11. The duration of antimycobacterial therapy of tuberculosis of mesenteric lymphatic nodes patients is:
    A. 3-4 weeks
    B. 1-2 months
    C. 3-6 months
    D. 9-12 months
    E. 1,5-2 years

12. The main localization of tuberculosis of digestive canal.
    A. Gullet
    B. Stomach
    C. Duodenum
    D. Caecum
    E. Sigmoid flexure
13. The most frequent localization of bone-joint tuberculosis.
    A. Coxofemoralis joint
    B. Knee joint
    C. Spinal column
    D. Talocrural joint
    E. Brachial joint
14. A boy of 8 years old during the last two months after a trauma noticed a pain in the right knee joint. Body temperature is subfebrile, the joint is enlarged in volume, hot by touch, the skin is hyperemized, movements in the joint are limited. Mantoux test with 2 TO – 19 mm infiltrate. ESR – 30 mm/hour. The Alexandrov's symptom is positive. The most probable diagnosis.
    A. Tumor of joint
    B. Infectious arthritis
    C. Rheumatic monoarthritis
    D. Tuberculous gonitis
    E. Posttraumatic arthritis

PECULIARITIES OF RESPIRATORY ORGANS TUBERCULOSIS COURSE IN VARIOUS AGE GROUPS

According to the International classification it is considered: infantile age – up to 14 years, juvenile age – from 15 to 17, young – from 18 to 29, middle – from 30 to 45, mature – from 46 to 59, old age – from 60 to 74, senile age – from 75 to 89, long age – 90 and more years.

Children TB. Among various parameters, determining tuberculosis progress, age is an important factor. In infants tuberculous process tends to rapid progressing and generalization, development of miliary tuberculosis and meningitis. From 1 year to the period of sexual maturation primary nidi of tuberculous process predominantly heal, however they remain the source for the development of tuberculosis in an elder age. Infected persons in their mature age face a little risk of developing tuberculosis during a few next years from the infestation moment.

Children tuberculosis is characterized by a relatively benign course, without expressed local manifestations, and is only manifested by the symptom complex of tuberculous intoxication or only the range of tuberculin reaction.

Generally, classical signs of primary tuberculosis are the range of tuberculin reactions, a considerable lesion of lymphatic system (lymphatic nodes, vessels), frequent involving of bronchi and serous coats into the process; hypersensitivity of an organism, that is accompanied by the disposition to generalizing the process by haematogenous, lymphogenous and bronchogenic ways, as well as the appearance of paraspecific toxico-allergic reactions (blepharites, keratoconjunctivites, phlyctenae, nodular erythema etc.), inclination of specific process of lymphatic nodes to caseous regeneration, as well as to self-healing.

Among all children contingent of tuberculosis patients a great importance is attached to children of prepuberal age, inasmuch as at this age the main factors contributing to activizing endogenic tuberculous infection is endocrine reconstruction. The specific process is characterized by pronounced changes in lymphatic nodes, segmental and partial processes, bronchi lesions (in 14,7 %).

Big residual changes in the form of metatuberculous pneumosclerosis after complicated tuberculosis of intrathoracic lymphatic nodes may be the source of relapses and the background for the development of nonspecific illnesses in 17,6 % of children. Besides, the course of tuberculosis of prepuberal age children is greatly influenced by the acceleration factor. It is the increase of the body length and other parameters, early sexual maturity, lability of nervous processes. It has been found that in "accelerates", who outstrip their passport age, asymptomatic tuberculosis course is often observed and comparatively often (in 1/3) and the destruction of nidus and infiltrative processes sets in rapidly. Thus, it is only early diagnostics of primary infestation ("range"), tuberculin hypersensivity, initial local manifestations of tuberculosis and treatment of children results in a considerable reduction of roentgenpositive persons, who form the bulk of adult tuberculosis patients later on.

Juvenile tuberculosis. The juvenile age is a complex period of the development of an organism, which is characterized by the diversity and instability of mutual relations of functional parameters of the main physiological systems. It has been found that at an early pubertal period chronic illnesses with immunological, infectious-allergic genesis progress with marked exudative inflammatory reactions and clinically acute development, in the second part of pubertal period, at its completion, the inflammatory process

progresses with feebly marked exudative component with preferably productive character of tissue reactions, lingering latent course, inclination to the disease relapses.

In connection with physiological peculiarities, connected with hormonal re-construction, acceleration phenomena, teenagers are considered to be a "risk group", both in the general pathology and in phthisiology. They may develop primary and secondary forms of tuberculosis. At present time primary forms are more frequent among teenagers, and not only tuberculosis of intrathoracic lymphatic nodes, primary tuberculosis complex, but also nidal, infiltrative forms, that have more favourable course than the same forms of the secondary genesis. Besides, at feebly marked clinical manifestations the destruction of lung tissue is frequently observed, as well as mycobacterial secretion, marked tuberculin sensitivity. Menstrual cycle disturbance is often (48,7 %) observed among female teenagers tuberculosis patients as a result of tuberculous intoxication. Juvenile primary tuberculosis in most cases progresses with complications, the most frequent of which are endobronchitis (in 29 %) and exudative pleurisy (14,5 %).

Treatment. The main course of antimycobacterial therapy of 3-4 preparations should last for 6-9 months (hospital, sanatorium). In some cases surgical intervention is applied in cases of isolated caverns, big tuberculomas, cirrhoses with bronchoectases.

Teenagers with big residual changes are under observation in the 3rd group of dispensary examinations.

Tuberculosis of old and senile age persons. In Ukraine, as in many countries of the world, the increase of specific weight of old and senile age persons is observed. The portion of elderly people among firstly revealed patients has increased 2-3-fold. There are considerably more cases of chronic unspecific lung disease (CULD) among the old age people. During the mass examination of the population the CULD is revealed in 60 % of the examined people over 60 years old, and the combination of tuberculosis and CULD – in 48 % of cases. The morbidity of persons contacting with bacterioexcreting people of old and senile age, is 8 times as high as the morbidity of those who have contacts with patients of younger age.

Thus, the problem of tuberculosis among people of old and senile age is rather urgent. This is contributed by: high tuberculosis morbidity among people of this age group, late illness revealing because of the difficulties of their involvement in the examination, a big epidemiologic danger, peculiarity of

clinical manifestations and the course of the illness, difficulties in tuberculosis treatment at old age owing to accompanying illnesses, functional disorders, poor tolerance to medicines, particularly antimycobacterial preparations.

The clinical pattern of old and senile age persons tuberculosis is characterized by peculiarities, connected with age changes and accompanying illnesses. Involutional processes of old age people are observed in all elements of lung parenchyma, bronchi, blood vessels, lymphatic apparatus. Changes, developing here create, preconditions for inflammatory illnesses in bronchopulmonary system, in particular tuberculosis.

Clinical versions of old and senile age persons tuberculosis are:

1. "Old" tuberculosis. 2. "Senile" tuberculosis (typically secondary and with some features of primary one).

The old tuberculosis begins at a young, middle or mature age and lasts till an old or senile age, is characterized by a chronic undulant course, is predominantly manifested in the form of chronic disseminated, fibrous-cavernous or cirrhotic lung tuberculosis.

The senile tuberculosis breaks out in persons of the senile age first of all as a result of endogenic reactivation of primary and after primary nidi in lungs and intrathoracic lymphatic nodes. Predominantly senile tuberculosis has a typical course, characteristic for the secondary tubeculosis, sometimes with eroded atypical clinical course. It is rather rarely that senile tuberculosis progresses with some features of primary tuberculosis, in particular of tuberculosis of intrathoracic lymphatic nodes and pleurisy.

Treatment. At antimycobacterial therapy of patients aged over 60 side reactions are observed 1,5 times as often as in persons of younger age, complete intolerance – in 5,1 % of cases. In connection with poor tolerance to chemopreparations, patients of an extreme old age should be administered less daily doses (25-30 %) and less toxic preparations – rifampicinum, ethambutolum. After 2-3 months of antimycobacterial therapy it is better to turn to intermittent method of applying chemopreparations. In general, treatment regimens of elderly age patients are the same as those of younger age groups. Of great importance is pathogenetic therapy, aimed at improving metabolic processes, increasing adaptive capabilities of an organism (vitamins, expectorants, geriatric means, anabolics).

CONTROL QUESTIONS

1. Division of people by age groups accoring to the International classification.

2. Perculiarities of tuberculosis course in infants.
3. Perculiarities of children tuberculosis.
4. Classical sings of primary tuberculosis.
5. Perculiarities of tuberculosis course in teenagers. Treatment.
6. In what dispensary groups are teenagers with big residual changes under observation?
7. Tuberculosis of old and senile age persons, clinic, diagnostics and treatment.

COMPLICATIONS OF RESPIRATORY ORGANS TUBERCULOSIS

PULMONARY HAEMOPTYSIS AND HAEMORRHAGES

One of the frequent and dangerous complications of patients with bronchopulmonary pathology, needing an urgent aid, is pulmonary haemorrhage and haemoptysis. Patients, even with scanty haemoptysis, should immediately be taken to the hospital.

In clinical practice they discriminate between haemoptysis and haemorrhages but the difference here is for the most part quantitative. Haemoptysis is characterized by the presence of veinlets, blood admixtures in sputum and saliva, separate blood spits. At pulmonary haemorrhage, considerably more pure blood is spat momentarily (over 10 ml), continually or with intervals. Depending on the amount of exuded blood, they discriminate between small (up to 100 ml), medium (up to 500 ml) and profuse haemorrhages (over 500 ml).

As to pathogenetic features haemoptysis may schematically be divided into the following groups: pseudohaemoptysis, haemoptysis without lung illness, haemoptysis at nontuberculous lung illnesses and haemoptysis at lung tuberculosis. Haemorrhagic lung complications in respiratory organs tuberculosis patients may occur at any form and phase of the process, but more often at destructive forms of tuberculosis, rarelier at posttuberculous pneumosclerosis with bronchoectases. Moreover, most pulmonary haemoptyses and haemorrhages emerge from the vessels of the big blood circulation circle.

According to literature data, most frequently haemoptysis is a symptom of aspergiloma (in 55-85 %), adenoma (in 48-55 %), bronchogenic cancer (in 37-53 %); rarelier haemoptysis is observed at bronchoectatic disease (in 28-

53 %), abscesses (in 11-15 %) and lung tuberculosis (in 6-19 %). In recent years haemoptysis cases at chronic bronchitis became more frequent (in 30 %) and they are predominantly manifested by blood veinlets in the sputum. However, at present time in 10-15 % of cases the reason of pulmonary haemoptysis cannot be elucidated.

The immediate causes of pulmonary haemoptysis and haemorrhage at lung illnesses are, predominantly, a rupture of a blood vessel wall of a bronchial or pulmonary artery or their anastomoses as a result of hypertension in a small circle of blood circulation, disturbance in blood coagulation system, fibrinolysis stirring up, increase of a vessel wall permeability.

It is important to know, that the loss of 10 % of blood (on the average 500 ml) of its total volume is compensated by the organism, the loss of 10-20 % of blood is sublethal, the loss of 20-40 % of blood is critical and the loss of more than 40 % is fatal.

15 % of lung tuberculosis patients with complications of medium or profuse haemorrhages die. *The immediate causes of death are asphyxia, blood loss, aspira-tional pneumonia, tuberculosis progressing, lung and heart insufficiency and atelectasis.*

Clinic and diagnostics. Clinically pulmonary haemoptysis and haemorrhage are manifested by exuding foamy, usually bright-red blood through the mouth at slight cough impulses, sometimes in a continual spirt and with signs of an acute anemia. At a haemorrhage the blood is brightly-red, foamy, with tiny air vesicles. The blood has no tendency to coagulate. Still before the blood-flux, the feeling of tickling appears in the patient's larynx-gullet, sternal contraction, sometimes pain in a certain portion of the thoracic cage, the feeling of asthma, then – cough with a gurgling sound in larynx-gullet. The patient smells blood and tastes a salty smack. Peculiar to profuse pulmonary haemorrhage are anemia, collapse, marked pallor, vertigo, nausea, adynamy frequent soft thready pulse, lowering of arterial tension. After haemorrhage or haemoptysis cessation, blood clots are coughed out for some more days, owing to blood aspiration the body temperature rises. Auscultation findings testify of damp rales in the lungs lower sections, predominantly on the side of the haemorrhage, roentgenologically – a picture of atelectasis or aspirational pneumonia.

The diagnostics of pulmonary haemoptysis or haemorrhage consists in elucidating their source and ethiology. The principal methods of diagnostics are roentgenologic and bronchoscopic examinations.

In each specific case the following groups of haemoptysis and pulmonary haemorrhages should be excluded: 1. pseudohaemoptysis and pseudopulmonary haemorrhage (nose, nosopharynx, mouth cavity, guller or stomach bleeding).

2. Haemoptysis and pulmonary haemorrhage without lung illness (as a result of the cardiovascular disease, in particular at mitral stenosis).

3. Haemoptysis and pulmonary haemorrhages at unspecific and tumour lung illnesses.

4. Pulmonary haemorrhages and haemoptysis at lung tuberculosis.

At haemoptysis, pulmonary haemorrhage the blood from the lung is of brightred colour and foamy, the bleeding occurs during coughing, and not at fits of vomiting, as it occurs at aesophagus or stomach haemorrhage, when the blood is of the grounds colour and is deprived of air vesicles. At nosopharynx haemorrhage the blood is darkred, the bleeding is from the nose and the mouth and it takes place not during coughing, but at spitting.

With a view to make the recognition of the real source of haemorrhage easier, in particular, whether it is a nose, lung or stomach illness, the differential table 5 is offered.

The treatment of patients comes to three principal measures: 1. Preventing asphyxia. 2. Stopping haemorrhag. 3. Therapy of the main illness, which caused haemoptysis or haemorrhage. All these measures should be taken urgently, patients with pulmonary haemorrhage should be taken to the hospital immediately. However, it is not always possible to take the patient to the hospital immediately, that is why it is necessary to provide domociliary aid, which consists in:

1. Creating the conditions of maximum physical and psychic rest for the patient. The patient should be calmed. 2. The patient should stay in bed in semisitting posture (it makes coughing out sputum and blood easier). At scarce haemoptysis complete physical rest is not obligatory. 3. Cold (temperate) should be applied to the anticipated section of the haemorrhage or the heart portion, or the forehead. 4. The meal must be summerly, "pulpous", cold water, food, ice are for-bidden. 5. Hypertonic solution of the common salt (1 table spoonful per a glass of water) is recommended to be taken by small gulps during 30-60 minutes, which promotes the increase of osmotic pressure within the vessels and the influx of tissue liquid, rich in thromboplastine, into the blood vessels. 6. Apply tourniquets to the upper third part of both legs hips or in turn, at profuse haemorrhage – simultaneously also to the arm shoulders for 30 minutes

Table 5

Differentially-diagnostics features of pulmonary, nose and stomach haemorrhage

ON	Pulmonary haemorrhage	Nose haemorrhage	Stomach & oesophageal haemorrhage
1.	In anamnesis – lung illness, often respiratory distress and hypoxia.	In anamnesis – nose traumas, hypertensive disease, hemophilia.	In anamnesis – stomach illness, liver cirrhosis, oesophagus varicose veins, and alcoholism.
2.	Cough or stream bleeding.	Bleeding without cough or at small cough.	Bleeding at vomiting or at inclination to vomiting.
3.	Blood is expectorated but not eructated, of bright-red colour, foamy, sometimes in the form of black clots, often with sputum admixtures, alkaline reaction.	Dark blood, often coagulates, alkaline reaction.	Blood is eructated but not expectorated, in the form of black gruel-like or liquid matter, airless. Sometimes the vomited matter is of chocolate colour with food admixtures.
4.	At considerable haemorrhage simultaneous mouth and nose bleeding.	Nose bleeding, sometimes mouth bleeding.	Pharynx bleeding, rarely nose bleeding, sputum with blood veinlets is usually not observed.
5.	Pain in the side, gurgitation in the thoracic cage. Respiratory distress, rales auscultatively.	Lung anamnesis and lung lesion signs are absent.	Vomiting, pressing character pain feeling in the stomach.
6.	Faecal matter is usually colourless.	Faecal matter is colourless.	Black, fetid faecal matter, meal.
7.	Sputum blood veinlets are noted for some days after haemorrhage. Anemia is not observed prior to the haemorrhage.	Prior to the haemorrhage anemia is not observed.	Anemia signs frequently precede bloody vomiting.

with the coming release of the tourniquets for 10-15 minutes. The pulse in the extremities must be felt. The tourniquets applied deposit venous blood in the extremities and unload the small circle of blood circulation, also tissue thromboplastin, which promotes blood coagulation, enters the blood as a result of muscle compression. 7. Salt purgative and purgative enema promote unloading the small circle of blood circulation.

Specialized aid at pulmonary haemoptyses and haemorrhages includes conservative, and, if necessary, endoscopic and surgical methods of treatment. Insofar as the principal immediate causes of pulmonary haemorrhages is a blood vessel wall rupture as a result of hypertension in the small circle of blood circulation, fibrinolysis stirring up, distress in blood coagulation system and increase of a vessel wall permeability, *so first of all spasmolytics should be administered to patients* (eufilin 2,4 % – 10 ml intravenously, papaverin 2 % – 2 ml subcutaneously, atropine 0,1 % – 1 ml subcutaneously), ganglio-blockaders (benzohexony 2,5 % – 1ml intramuscularly, gangleron 1,5 % – 2 ml intramuscularly or subcutaneously, pentamin 5 % – 0,5-1 ml intramuscularly or intravenously to 20 ml of isotonic solution, apronad 5 % – 5 ml to 5 % solution of glucose intravenously drop by drop up to 4 times/day, at hemoptisis – orally per 5,0 g 4-5 times/day; amben 5 % – 5 ml intramuscularly, intravenously or per 0,25 g orally 1-2 times/day; contrical per 10-20 thousands of units intravenously drop by drop), preparations with procoagulation action (fibrogen soluted in water for injections, intravenously drop by drop from 1 to 10 g/day; tromboplasmin 30 % – per one tablespoon 3-4 times/day orally; dicinon (ethamsilate) 12,5 % – 2 ml intravenously or subcutaneously or per 0,25 g orally each 4 hours; hemofobin 1,5 % – 5-10 ml intravenously or 3% solution 1 tablespoon 3-4 times/day; transfusion of freshly frozen plasma 100-200 ml intravenously; vicasol 1 % – 1-2 ml intramuscularly or orally 0,015 g 3 times/day), preparations for decreasing the permeability of the vessel wall (ascorbic acid – 100 mg 4-5 times/day, ascorutin – 0,5 g 3 times/day, sodium ascorbinate 5 % – 5-10 ml intramuscularly or subcutaneously 1-4 times/day, calcium chloride or gluconate 10 % – 10 ml intravenously), antihistamine preparations (dimedrol 0,05 g or diprasin per 0,025 g 3 times/day), glucocorticoids (prednisolon 15-20 mg or dexametason 0,5-5 mg/day up to the achievement of the clinical effect).

Modern methods of hemostatic therapy are rather effective, almost in 95 % of patients. *In cases of ineffective conservative therapy, semiradical and radical methods of treatment are indicated*, in particular medicative

pneumothorax, pneu-moperitoneum, bronchoscopic arresting haemorrhage by means of bronchus occlusion with a hemostatic sponge, bronchoalveolar lavage with hemostatic preparations solutions, endovascular embolisation of bronchial arteries and radical surgical intervention. *The optimum is performing an operation after haemorrhage arrest and the patient's complete clinical examination.* Forced (urgent) operations, performed during thoracic haemorrhage, are frequently fraught with a great danger of postoperative complications. *After arresting pulmonary haemorrhage, two tasks face the doctor: combatting complications* (asphyxia, aspiration pneumonia, atelectasis, posthaemorrhagic anemia) and *tuberculous process progressing.*

After asphyxia symptoms have emerged (asthma and cyanosis) the respiratory tract should be immediately deprived of blood. A simple and fast method is blood aspiration from bronchi with a probe through the glottis. The stooping posture promotes the blood clots releasing.

The principal method of prophylaxis and treatment of pulmonary haemoptyses and haemorrhages is the treatment of the main illness, which caused the complication, and somewhat further on the prevention of its severity and relapses.

SPONTANEOUS PNEUMOTHORAX

Spontaneous pneumothorax is meant as partial or complete lung collapse as a result of the air entering the pleural cavity at the visceral pleura integrality violation (fig. 32).

Among all tuberculosis complications the lung spontaneous pneumothorax does not exceed 1-2 %.

Pathogenesis. Spontaneous pneumothorax breaks out more often in persons with a chronic lung process, including tuberculosis, as a result of a rupture of subpleurally disposed bullas at vicarious emphysema, very rarely – as a result of cavern wall rupture. The provoking factor of the emergence of spontaneous pneumothorax is the increase of intrapulmonary pressure, in particular in the zone of thin-walled bullas, during physical load, cough etc.

The clinic of spontaneous pneumothorax depends on the rate of receiving and the quantity of the air in the pleural cavity. They distinguish between total (complete lung collapse) and partial (1/3-1/2 lung collapse); depending on the pressure in the pleural cavity – closed, opened and valvate spontaneous pneumothorax. *Spontaneous pneumothorax variant is defined by the data of manometry: at closed pneumothorax the pressure in the pleural cavity is lower*

than that of atmospheric (-), at open – it equals to atmospheric (±) and at valvate – it is higher (+) than the atmospheric pressure. The clinic of spontaneous pneumothorax depends on the rate of its development, the collapse degree, dislocation of mediastinum organs, functional state of the lung-heart apparatus. Especially severe and dangerous form of spontaneous pneumothorax for the life is that of valvate, at which with each inhalation the amount of the air in pleural cavity increases, intrapleural pressure and lung collapse grow, the organs of mediastinum dislocate to the opposite side. Clinically – signs of acute respiratory insufficiency with hemodynamics disorders, sometimes – pleural shock with loss of consciousness and at the absence of therapeutic means it may be lethal. As to the clinical course, closed spontaneous pneumothorax is relatively mild.

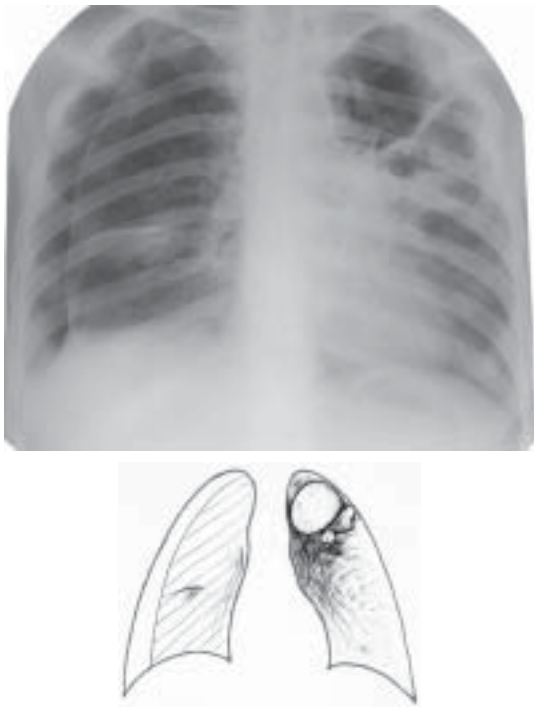


Fig. 32. **Right-side spontaneous pneumothorax. Fibrous-cavernous tuberculosis of the left lung. Observation roentgenogram.**

The diagnostics is based on the anamnesis data, in the vast majority – a chronic lung disease, frequenly spontaneous pneumothorax breaks out abruptly, which is connected with provoking factors (sharp coughing, physical load etc.) and is accompanied by the pain in the side, asthma, coughing, sometimes by cyanosis. The thoracic cage on the side of the injure is dilated and desists considerably in respiratory motions. At palpation – vocal fremitus is absent, tympanitic percussion note, and auscultatorily – weakened or absent breathing. Sometimes – subcutaneous emphysema. However, the most informative method of diagnosticis a roentgenological one (the edge of collabous lung is

clearly seen, beyond which the lung picture is absent, not seldom a horizontal level of liquid). The computer tomography is very helpful at differential diagnostics of spontaneous pneumothorax, cyst or big bulla. Thoracoscopy promotes making more precise a number of details of spontaneous pneumothorax.

Differential diagnostics of spontaneous pneumothorax is performed with traumatic, artificial pneumothorax, giant caverns, air cysts and big bullas.

Treatment is performed at a hospital, symptomatic means (sulfocamphocain 10 % 2 ml subcutaneous, cordiamin 2 ml subcutaneous or intramuscular, oxygen therapy); anticoughing preparations (dionin 0,015g internally 2 times a day, codterpin 1 tablet internally 2-3 times a day, ambroksol (lasolvan) 0,03 g internally 2-3 times a day) and pain-killers (omnopon or promedol 1-2 % 1 ml subcutaneous, analgin 50 % 2 ml intramuscular, baralgin of 5 ml intramuscular) are administered. At insignificant lung collapse and the patient's satisfactory general state – bed rest during 7-10 days. In case of the air being present of more than 1/3 of a hemithorax volume – periodic pleural punctures and air aspiration. If the punctures are ineffective, a tube for permanent air aspiration is inserted into the pleural cavity. Sometimes endoscopic occlusion of an appropriate segmental or partial bronchus with a hemostatic (rarelier porolon) sponge may be applied for aerostasis. If the conservative treatment, described above, does not produce positive effect, the question of thoracotomy and taking in the damaged lung or its resection is solved.

At tense (valvate) pneumothorax an urgent aid can be reached by the insertion into the pleural cavity of a thick needle or a trocar at the patient's semisedentary posture. If this method does not cause the lowering of intrapleural pressure and it is impossible to put an end to the direct menace of the patient's life, the drainage of the pleural cavity is done according to Byulau method: a plastic catheter is inserted into the pleural cavity by means of a trocar, which is fixed to the skin with a ligature, and the distal end of the catheter, with a rubber glove finger with a cut put on it, is dipped into a glass can with furacyline. The patient is taken to a specialized medical institution.

CHRONIC LUNG HEART

Chronic lung heart (CLH) is a hypertrophy and (or) dilatation of the right ventricle of the heart that develops as a result of hypertension in the small circle of blood circulation, conditioned by the lesion of the lungs or their vessels, or by the deformation of thoracic cage, restriction of its excursion.

In 70 % of chronic tuberculosis forms cases chronic lung heart develops and it is the principal reason of death of every second patient.

Reasons of chronic lung heart may be lung illnesses, vessel illnesses (embolisms, thromboses, endarterites of various etiology), illnesses of thoracic cage (spondylarthritis, kyphosis, scoliosis, thoracoplasty), illnesses of respiratory muscles, diaphragm, pleural inosculation.

Pathogenesis. Chronic lung heart in lung tuberculosis patients is formed during many years. The main factor is the distress of the external respiration function, giving rise to hypoxia. Tuberculous intoxication and hypoxia result into metabolic disturbance in myocardium and lowering its function. Besides, insufficient ventilation and hypoxia are the reason of the origin of the lung artery vessels spasm and this, in its turn, results into hypertension in the small circle of blood circulation. In addition, the reasons of hypertension are noted organic changes of lung tissue, as well as rheologic blood properties (fibrosis, pneumosclerosis, emphysema; increased blood viscosity and thromboxane synthesis). All this results into higher load on the right ventricle, its hypertrophy. At the first stage of the development of lung heart the right ventricle compensates hypetension in the small circle of blood circulation (in the norm the lung artery pressure does not exceed 21-25 mm of Hg) by means of the strengthening of its contractions, however, further it ceases to manage the increased load and its distension (dilatation) sets in, due to which the influx of the blood to the hollow veins becomes difficult.

Schematically the following stages of pathogenesis of chronic lung heart are discriminated: 1. Present lung insufficiency, though the pressure in the lung artery is normal. 2. Latent lung hypertension, but the pressure in the lung artery rises only at physical load, i.e. compensated chronic lung heart is already available. 3. The pressure in the lung artery is risen in a quiescent state (subcompensated CLH). 4. The right ventricle insufficiency has developed, i.e. decompensation of chronic lung heart, of the I, II, III stage.

Clinic. Respiratory (lung) insufficiency precedes heart insufficiency, i.e. the development of chronic lung heart. Lung insufficiency is meant as a state at which normal lung oxygenation is not reached and the adequate extraction of carbonic acid out of the organism is not provided. Three degrees of respirstory insufficiency are discriminated: I, II and III.

Lung-heart insufficiency is a symptom complex of lung and heart insufficiency, in particular insufficiency of blood circulation according to the right-ventricular type, that arises as a result of hypertension in the small circle

of blood circulation. Three degrees of lung-heart insufficiency are discriminated: I, II and III that corresponds to the three stages of chronic lung heart.

I. *Chronic lung heart in the compensation stage*,which is characterized by hy-pertrophy of the heart right ventricle, the stress of the II tone above the lung artery or its dissociation, epigastric pulsation.

II. *Chronic lung heart* with cardiac-pulmonary insufficiency of level I (decompensation of level I). Asthma at a physical load. Cyanosis, the right sub-costal pain and at a physical stress or lung tuberculosis gravity, scarce liver size increase.

III. *Chronic lung heart* with cardiac-pulmonary insufficiency of level II (decompensation of level II). Asthma at a little physical load, diffusive warm cyanosis. Constant pain in the liver sphere, its size increase, the lower extremities pastiness toward evening, oliguria, nicturia.

IV. *Chronic lung heart* with cardiac-pulmonary insufficiency of level III (decompensation of level III).Constant asthma in a quiscent state, diffusive warm cyanosis, heartbeating. A big liver, oedema on the lower extremities, ascites (not always), proteinurea.

Diagnostics of chronic lung heart is based on the data of general clinical examinations. ECG and polycardiography data, echocardiography, indirect and direct methods of the pressure measurement in lung artery, roentgenography (lung artery width is more than 15 mm). The most widespread method of chronic lung heart diagnostics is ECG. The direct criteria of CLH are supposed to be: R in V_1>7 mm; R/S in V_1>1; activation time of the right ventricle is within 0,03-0,05 sec.; qR complex in V1; incomplete blockade of the right pedicle of His's bundle, if rSR' in V1 with R'>10 mm; complete blockade of the right pedicle of His's bundle, if rSR' in V_1 with R'>15 mm rSR'; the signs of the right ventricle overload in V_1 (high R_1, depression S-T and inversion T); RV_1+SV_5>10,5 mm. The indirect criteria (P-pulmonale, deviation of heart electric exis to the right etc.) are late signs of CLH. At present time the most informative and safe method of defining the pressure in the lung artery is echocardioscopy. The method allows to define the thickness of the walls and the size of the cavities of the heart right sections accurately enough.

The treatment of chronic lung heart should be complex, include the treatment of the main illness (tuberculosis progressing), accompanying unspecific endobronchitis. With the appearance of signs of lung-heart insufficiency, heart glycozides are administered (corglycon 0,06 % 1,0 ml or strophantini 0,05 % 0,5-1,0 ml), in combination with diuretics (veroshpiron

100-400 mg, triamteren 50-150 mg, lasyx 1 % 2-6 ml a day; at late stages of heart insufficiency – furosemid 40-200 mg, carbonanhidrase inhibitors (diacarb in the dose of 0,5-0,75 g in courses of three days, fonuryt 0,25 g 1-3 times a day), peripheral vasodilatators of venous (nitrates, in particular nitrosorbid in the dose of 40-120 mg a day, of prolonged action – corvaton 5 mg 3-4 times a day), of arterial type (corynfar 30-120 mg, captopril 12,5-25 mg a day).

In general, complex therapy of lung tuberculosis cases, complicated with chronic lung heart with signs of lung-heart insufficiency, includes the treatment of respiratory insufficiency (elimination of hypoxemia, hypercapny – inhibitors of carboangidraza, acydose – intravenously drop by drop the 4 % solution of sodium hydrocarbonate – 100-200 ml), of pulmonary arteries spasm (spasmolysants – euphilin 2,4 % – 10 ml intravenously, papaverin 2 % – 2 ml intramuscularly, no-shpa 2 % – 2ml intramuscularly); ganglioblockaders in combination with anticoagulators – geparin 10000-15000 units in 200-250 ml of 5 % glucose intravenously drop by drop and with antiagregators – aspirin, tiklid 250 mg/day, plavix 75 mg/day) and treatment of cardiac decompensation (heart glycosides, in combination with diuretics and drugs which improve myocard metabolism).

AMYLOIDOSIS OF INTERNAL ORGANS

Amyloidosis is a systemic illness with the lesion of various organs and tissues, is characterized by the disturbance of protein metabolism and extracellular deposit of amyloid in them (protein polysugar complex), giving rise to the organs malfunction.

Ethiology of amyloidosis has not been determined. Among those who died of tuberculosis of lungs amyloidosis is diagnosed in 10-20 % of cases. Provoking and determining factors of development and progress of amyloidosis in lung tuberculosis patients, except for the widespread inflammatory-destructive process (secondary amyloidosis), is the deficit of antiproteinases, carriers of certain genes (M_3, S, Z) alpha 1-proteinase inhibitor (genetic amyloidosis), predominantly in persons of older age categories (senile amyloidosis).

Pathogenesis of amyloidosis has not been definitively ascertained. It most frequently develops at chronic destructive forms of lung tuberculosis, chronic pleural empyema etc.It is promoted by intoxication, hypoxia, avitaminosis. Amyloidosis predominantly injures spleen, liver, kidneys, adrenal gland, considerably rarelier – tongue, stomach, myocardium.

Four amyloidosis stages are discriminated: preclinical, proteinorous, oedemahypotonic, azothemic.

Morphologic diagnosis varyfying is of great importance insofar as no pathognomonic clinical features and laboratory tests of amyloidosis exist at present.

Preclinical stage of amyloidosis. Based on the clinical data one can only foresee the development of amyloidosis at chronic destructive forms of lung tuberculosis. The diagnosis is confirmed by the results of liver and kidneys biopsy.

For proteinorous stage stable proteinuria, inconsiderable haematuria, cylindruria are characteristic. For both stages (l and II) ERS increase, disproteinemy and fibrinogen rise are peculiar.

At oedema-hypotonic stage the disturbance of the kidneys concentration function is observed. Hypoisostenuria, cylindruria, oedemata on lower extremities, sometimes – ascites.

Azothemic stage of amyloidosis is a nephrosclerotic one. The kidneys are partially contracted, excretion of urine is disturbed, the level of nitrogen in blood increases, uremia develops.

The treatment of amyloidosis – complication of lung tuberculosis, consists in performing adequate antimycobacterial, sometimes surgical treatment. That can be accompanied with the reverse development of amyloidosis.

The diet of the patient ill with amyloidosis of kidneys is the same as at chronic glomerulonephritis. Besides that, the patient with amyloidosis is prescribed to eat fresh liver (100-120 g/day) for a long period of time. At amyloidosis of stages I-III, chemiotherapy should be combined with delagil (0,25 g once a day for a long period of time), contrical 10000-20000 units in 300-500 ml of isotonic solution of sodium chloride intravenously drop by drop once a day; with vitamin E (tocopherol acetate) – 2 capsules (0,5 ml of 20 % solution) 2-3 times/day, intramuscularly 1 ml of 5 %, 10 % or 30 % oil solution a day; with albumin per 100-200 ml intravenously drop by drop 1-2 times per week. Vitamins C, B_1, B_6; donators of sulphhydrilic groups (metionin 0,5-1 g three times/day, unitiol 5 % solution 5-10 units intramuscularly daily or in a day, treatment course – 25-30 weeks), hepatoprotectors (sirepar 2-4 ml once a day intramuscularly or intravenously (slowly), treatment course – 1,5-2 months; essenciale 2-3 capsules three times/day or 10-20 ml intravenously drop by drop on the basis of 5 % glucose solution, treatment course – 3 months; lipocain).

LUNG ATELECTASIS

Lung atelectasis is a complete falling of lung tissue (lung, a particle, a segment, a subsegment), as a result of the disturbance of elastic properties of bronchioles and alveoles, which in its turn may be the result of bronchus squeezing or embolism, insufficiency of surfactant system or nerve-reflective injures etc.

Incomplete falling of lung tissue is treated to be disatelectasis.

Partial and segmental atelectasis are more perculiar for tuberculosis and they are most frequently observed at tuberculosis of intrathoracic lymphatic nodes or within the first days after a lung resection.

Clinico-roentgenological picture of lung atelectasis depends on its size and rapidity of its development. At total lung atelectasis asthma sets in suddenly, the body temperature rises, respiration becomes more frequent, cyanosis appears. At partial atelectasis of lungs the symptoms are less expressed. Percussively dullness is defined above the atelectasis lung, auscultatively – weakened respiration. The darkening area is defined on roentgenogram, the rise of the diaphragm cupola and dislocation of mediastinum organs towards atelectasis are possible. Bronchologic examination is of great importance for the confirmation of lung atelectasis diagnosis.

Treatment. The success in lung atelectasis liquidation is dependent on the effectiveness of the treatment of causal illness, tuberculosis in particular.

CONTROL QUESTIONS

1. Pathogenesis of pulmonary haemoptysis and haemorrhages.
2. What pulmonary illnesses can haemoptysis and haemorrhages arise at?
3. What are pulmonary haemorrhages dangerous for patients with?
4. The first (before doctor) aid at pulmonary haemorrhages.
5. Specialized (medical) aid at pulmonary haemoptysis and haemorrhages.
6. An urgent medical aid at asphyxia, which arose on the ground of pulmonary haemorrhage.
7. The definition of spontaneous pneumothorax and its pathogenesis.
8. Clinical variants of spontaneous pneumothorax.
9. Clinico- roentgenologic picture at spontaneous pneumothorax.
10. An urgent aid at spontaneous pneumothorax.
11. Methods of treating patients with spontaneous pneumothorax.
12. The definition of chronic lung heart.
13. Treatment of patients of lung tuberculosis, complicated with chronic lung heart.

14. Prophylaxis of chronic lung heart.
15. The definition of amyloidosis. Stages of renal amyloidosis. The treatment.

TESTS

1. The method of the definition of a kind of spontaneous pneumothorax.
   A. Roentgenologic
   B. On the basis of the clinic data.
   C. The pressure measurement in the pleural cavity (manometry)
   D. Computer tomography
   E. USE
2. Which of those complications are specific?
   A. Larynx tuberculosis
   B. Atelectasis
   C. Pulmonary haemorrhage
   D. Spontaneous pneumothorax
   E. Chronic lung heart
3. Which of the illnesses are the most frequently complicated with pulmonary haemorrhages?
   A. Aspergilloma
   B. Lung cancer
   C. Bronchus adenoma
   D. Lung tuberculosis
   E. Pneumonia
4. An urgent aid at a valvate spontaneous pneumothorax.
   A. Fibrobronchoscopy
   B. Artificial lung ventilation
   C. Pleural cavity drainage
   D. Respiratory gymnastics
   E. Strict bed rest
5. The main method of chronic lung heart diagnostics
   A. Elecrocardiography
   B. Phonocardiography
   C. Balistocardiography
   D. Echocardiography
   E. Roentgenoscopy
6. Patient V. suffers from tuberculosis for 17 years. Recent dyspnea aggravation, cough, new pain in the right intercostal area, in heart area, drowsiness, edema in lower extremities. What is the most probable complication?
   A. Spontaneous pneumotorax

B. Lung atelectasis
C. Chronic lung heart
D. Amiloidosis of internal organs
E. Tuberculosis of bronchi

7. The frequency of lung haemorrage in lung tuberculosis patients.
A. 1-2 %
B. 3-5 %
C. 6-19 %
D. 20-25 %
E. 30-35 %

8. The main reason of the profuse pulmonary bleeding in patients with tuberculosis.
A. Blood vessel rapture
B. Pulmonary artery thrombosis
C. Varicose of blood pulmonary vessels
D. Activation of fibrinolysis
E. Violations in blood coagulation system

9. What is the most frequent immediate causes of death at pulmonary haemorrage in pulmonary tuberculosis patients?
A. Anemia
B. Aspirational pneumonia
C. Asphyxia
D. Atelectasis
E. Tuberculosis progressing

10. In order to lower the pressure in the system of the pulmonary artery, one should prescribe.
A. Penicyllin, camphorae, arphonad
B. Atropin, euphilin, ganglioblockers
C. Isoniazidum, atropin, uterics
D. Oxygen, camphor, trombin
E. Dicinin, epsilon-aminocapronic acid, nitrosorbid

11. Procoagulative action preparations.
A. Camphor
B. Dicinon
C. Benzohexoniy
D. Amben
E. Atropin

12. The most effective fibrinolysis inhibitor.
A. Trasilol
B. Contrycal

C. Epsilon-aminocapronic acid (EACA)
D. Amben
E. Albumin

13. Female patient Z., 29 years old, was brought by an urgent medical service car to a regional tuberculous dispensary. She complains on cough, dyspnea, pain in the right half of the thorax. Objectively – wooden sound at percussion, auscultatively – the absence of breathing above the right half of the thorax. What is the most probable diagnosis?
A. Lung infarction
B. Lung atelectasis
C. Exudative pleurisy
D. Spontaneous pneumothorax
E. Pleropneumonia

14. More frequently the spontaneous pneumothorax in patients with lungs tuberculosis appear:
A. At fibrobronchoscopy
B. During pleural puncture
C. At cavern wall rupture
D. At subpleural emphysematous bubbles rupture
E. At pneumotachometria

15. Amiloidosis is a system disease, it complicates the chronic purulent processes in the organism and is characterized by the violations of:
A. Carbon metabolism.
B. Albumen metabolism
A. Metabolism of fats
B. Vitamin exchange
C. Acid-alkaline equilibrium

16. How many stages of amyloidosis of kidneys are discriminated.
A. 2
B. 3
C. 4
D. 5
E. 6

17. The greatest importance for the confirmation of lung atelectasis diagnosis is:
A. USE
B. Pneumotachometry
C. Roentgenoscopy
D. Computer tomography
E. Bronchoscopy

TASKS

1. A patient Z., 45, brought to a clinic by an ambulance, complains of the cough, shortness of breath, pain in the left half of the thoracic cage. Roentgenologically the left lung has dropped to 2/3 of the volume, the mediastinum organs are partially dislocated to the left.

a) Formulate the diagnosis.

b) An urgent aid.

c) The treatment plan.

2. A patient with RTB (22.11.2000) of the upper part of the right lung (infiltrative), Destr+, MBT+M+C+, Resist-, HIST0, Cat2 Coh4(2000) all of a sudden after hard physical work felt a pain in the right half of the thoracic cage, shortness of breath and haemoptysis. The right-side spontaneous pneumothorax has been diagnosed. The pleural cavity manometry -2/-6 cm of water col.

a) Define the kind of spontaneous pneumothorax.

b) The treatment tactics.

3. You have been called to a patient with pulmonary haemoptysis.

a) What is your urgent aid?

b) Further tactics towards the patient.

4. A patient K., 43 years old. He felt ill with pulmonary tuberculosis 10 years ago, was treated with artificial pneumothorax, which has complicated with pneumopleurisy, and later on the left lung cirrhosis arose. In 5 years shortness of breath appeared at walking, a pain in the right subcostal sphere and a sternal pain.

a) Formulate a preliminary diagnosis.

b) The examination and treatment plan.

TUBERCULOSIS IN COMBINATION WITH OTHER ILLNESSES AND PREGNANCY

TUBERCULOSIS AND UNSPECIFIC ILLNESSES OF RESPIRATORY ORGANS

In recent years the incidence of chronic unspecific lung illnesses (CULI) is noted to increase worldwide; according to their frequency they take one of the prominent places after the diseases of cardio-vascular system. Certainly, CULI are combined with chronic forms of lung tuberculosis, and after its healing – with residual posttuberculous changes in the lungs.

Pathogenesis. Lung tuberculosis may arise against the CULI background or precede them. The development of unspecific lung illnesses in tuberculosis

patients is connected with fibrotic changes of lung tissue, deformation, disturbance of trophics and drainage function of bronchi, which is a favourable ground for the propagation of pathogenic agents. With the increase of tuberculosis incidence among old age people, much higher is the frequency of chronic bronchitis, protracted and recurrent pneumoniae, emphysema, bronchoectases, purulent lung illnesses.

The clinic of combination of tuberculosis and CULI is characterized by more expressed intoxication phenomena, features of broncho-pulmonary syndrome, catarrhal phenomena, as well as by notable pathologic changes in peripheral blood.

The clinical manifestations of chronic bronchitis and bronchoectases, that arose against the background of posttuberculous changes, are less expressed than those in other patients. The relative benignancy of their course is explained by the upper-particle localization of the process and better conditions for drainage and sputum expectoration. Protracted pneumonia is characterized by more expressed, than at chronic bronchitis, intoxication symptoms, obstructive disturbances, sometimes with abscess formation.

In patients with allergic alveolites, bronchial asthma and with ninactive posttuberculous changes in lungs, under the influence of durable corticosteroids intake, "steroid" tuberculosis may develop, which is characterized by the spreadness of the process and disposition to decay.

For diagnostics of great importance are the anamnesis, auscultative, laboratory and roentgenologic data, in particular, the comparison of roentgenograms in dynamics, and sometimes test therapy.

The treatment of active lung tuberculosis patients with CULI complication should be directed to both illnesses, in particular with 3-4 antituberculous preparations in combination with nonspecific antibiotics of wide action spectrum, sulphonilamides, expectorates, broncholytics, vitamins B_1, B_6, C.

TUBERCULOSIS AND DIABETES

Pulmonary tuberculosis among diabetes patients is noted 5 times as often as among the whole population, and in recent decade the number of patients in combination with diabetes has doubled. By the way, in tuberculosis patients latent diabetes is observed 8-10 times more often, which aggravates at tuberculosis progressing.

Pathogenesis. In most cases tuberculosis develops against the background of diabetes, which is the result of aggravation of old, not completely healed

nidi in lungs or intrathoracic lymphatic nodes and in the majority of patients it is of endogenic origin. Contributory factors of emerging and aggravated course of tuberculosis in diabetes patients is a deep disturbance of metabolism, giving rise to suppression of phagocytosis and other reactions. In addition, acidosis in tissues at decompensated diabetes speeds up MBT multiplication and decreases GINK preparations effectiveness.

Anatomic pathology. In many diabetes patients exudative forms of tuberculosis prevail, with the inclination to decay and bronchogenic sowing with frequent localization process in the lower parts of both lungs.

The clinical picture of tuberculosis depends on the sequence of development of diabetes and tuberculosis. Tuberculosis has a more severe course if it developed prior to diabetes. The course of tuberculosis, which has developed against diabetes background, depends on the form of specific process and may be acute, under the "mask" of pneumonia, influenza, gradual or asymptomatic. Limited forms of pulmonary tuberculosis in diabetes patients run with unexpressed clinical features, which is sometimes caused by sharply reduced reactivity of a severe diabetes form patient.

The diagnostics of tuberculosis depends to a considerable degree upon the regularity of X-ray examination of diabetes patients. In as much as diabetes patients belong to a risk group, they should be examined fluorographically not less than once a year.

Tuberculin sensitivity is often lowered, especially at severe diabetes form. Bacterial extraction is dependent on the availability of decay cavities in lungs.

Treatment of pulmonary tuberculosis patients in combination with diabetes must be directed first and foremost to the compensation of the metabolism disturbances by means of physiological diet and optimum insulin dosage. Antimycobacterial therapy is performed according to generally accepted schemes, taking into account possible side effect of the preparations.

TUBERCULOSIS AND ULCER OF THE STOMACH AND DUODENUM

Tuberculosis sickness rate among stomach and duodenal ulcer patients is 6-9 times as high, and the opposite sequence of these illnesses is observed 2-4 times as frequent as in the rest of the population. This combination of illnesses is more typical for males aged 30-50.

Pathogenesis. Pulmonary tuberculosis in most patients develops in a few years after ulceration or after stomach resection. It is contributed by the

malfunction of the cerebral cortex, neurohumoral disorders, indigestions and malnutrition resulting in the disturbance of metabolic processes and lowering of the body resistance. However, in a part of patients tuberculosis precedes ulceration.

Anatomic pathology of tuberculosis is represented by various forms, among which patients of pulmonary fibrous-cavernous tuberculosis prevail.

The clinic of combined illnesses is rather diverse, which is caused by the character of the development of both illnesses. In general, if tuberculosis develops against the background of stomach or duodenal ulcer, its course is gravier with an intestive pain syndrome, dispeptic phenomena and disturbance of acid-forming and motor function of the stomach. In patients of ulcerous illness, which has developed against tuberculosis background, its features are considerably less expressed and are often masked by dispeptic disorders, as manifestations of side effect of antituberculous preparations.

The diagnostics of tuberculosis is performed by traditional methods. Stomach and duodenal ulcer patients, like those operated (stomach resection) are a tuberculosis increased risk group, therefore they should undergo annual fluorographic examination.

The treatment of pulmonary tuberculosis in combination with stomach or duodenal ulceration is often accompanied by side toxic reactions of dyspeptic character to antituberculous preparations, therefore it is not desirable to use rifampicinum, pyrazinamidum, ethionamidum, thioacetazonum and PASA. For successful treatment of tuberculosis it is necessary, first of all, to cancel ulcerous process aggravation by administering antiulcerous and general-reinforcing therapy. To decrease the irritant action to the stomach mucosa, parenteral therapy is indicated: intravenously, intramuscularly, intratracheally. According to indications surgical treatment is also applied to such patients – for treating both tuberculosis and ulcer; under the condition of obligatory antimycobacterial therapy.

TUBERCULOSIS AND ALCOHOLISM

The most socially and epidemiologically dangerous group is made up by patients of pulmonary tuberculosis in combination with alcoholism. The sickness rate and morbidity of tuberculosis among alcoholics are respectively 18 and 21 times as high as in the rest of the population. The specific weight of alcoholics among the contingents of the antitubercular dispensary is rather high (25%), in particular among first diagnozed tuberculosis patients (15%).

Pathogenesis. Against the background of durable alcoholic intoxication general and specific body resistance decreases. In the lungs alcohol ruins alveolar epithelium, provokes the death of lung makrophages, inflammatory infiltration of bronchi walls, vessels, which results in the malfunction of mucociliary apparatus, surfactant solution. Functional and organic changes in the central nervous system, internal organs lead to a considerable disturbance of metabolism.

Tuberculosis of alcoholic patients more often develops as a result of endogenic reactivation of residual posttuberculous changes, but, taking into account asocial behaviour of patients, disregard of sanitary norms, so exogenous superinfection is of great importance in the development of tuberculosis.

Anatomic pathology. The course of tuberculosis process to a considerable degree depends upon the stage of alcoholism. Disseminated, severe forms of tuberculosis are more often observed in alcoholics, in particular fibrous-cavernous form, while polycavernous tuberculosis, which is often complicated with caseous pneumonia, is found among the 3rd stage alcoholism patients.

Clinic. The beginning and the course of tuberculosis process in alcoholics may be acute or gradual, often runs under the mask of the symptoms of chronic alcoholism. The character of the clinical picture of combined illnesses is strongly influenced by accompanying diseases of cardio-vascular system, stomach and intestinal tract etc. Chronic alcoholism combined with tuberculosis may acquire a malignant course (alcoholic psychosis, prolonged fits of hard drinking), which considerably aggravates the course of tuberculosis process.

The diagnostics of tuberculosis is based on the data of roentgenologic picture and sputum examination for MBT. With a view to timely reveal tuberculosis, chronic alcoholics are subject to compulsory fluorographic examination once a year. However, they often ignore prophylactic examinations and apply for medical aid to the institution of general treatment when it is too late.

The treatment of tuberculosis and alcoholism patients is carried out by applying a complex of antituberculous and antialcoholic means. After reaching remission of alcoholism, full value antimycobacterial therapy may be applied, and at its ineffectiveness – surgical interventions indications to which are widened with shor-tening the terms of preoperational antimycobacterial preparation. To the point, chemotherapy is expedient to be performed parenterally, endobronchially, as well as pathogenetic means, particularly

hepatoprotectors, antioxidants, vitamins to be widely used. In case of alcoholism of the 3rd stage cycloserin and other preparations are contraindicated, due to their negative influence on the central nervous system.

TUBERCULOSIS AND AIDS

Acquired immunodeficiency syndrome (AIDS) has acquired an urgent medico-social importance in connection with a steady growth of morbidity. The total number of infected persons around the world doubles annually. There are 40 mln people HIV-infected and AIDS patients. There are about 60 mln tuberculosis cases in modern world and each second their number increases. Every day 6000 persons are infected with AIDS virus world-wide, it being known that every third AIDS patient dies of tuberculosis. According to various literary data up to 90 % of AIDS patients may suffer from tuberculosis at the same time. Practically, the AIDS and TB epidemics has already begun, since average planetary sickness rate comprises 70,7 per 100 thousand population. Both AIDS virus carriers and AIDS patients suffer from tuberculosis, more often male drug addicts aged 30-50.

During the last 15 years (1987-2002) 52659 cases of AIDS infected persons have been registered in Ukraine, 4278 persons got ill with AIDS, 2378 of them died. In 2002 there were registered 8756 AIDS infected citizens of Ukraine, 1353 fell ill with AIDS, 834 persons died.

Pathogenesis. Tuberculosis in HIV-infected may develop as a result of reacti-vation of posttuberculous changes or fresh MBT contagiosity. This is caused first and foremost, by the lowering of immune defence against tuberculosis, the deficit of immune T-lymphocytes (T-helpers) and the disturbance of the "helpers-suppressors" correlation. The suppression of cell immunity promotes the reactivation of tuberculous changes, the active process progressing. In AIDS patients lung lesion arises as a result of MBT or atypical mycobacteria infestation, which under the conditions of immune deficit become pathogenic for a human being.

Anatomic pathology. In AIDS patients tuberculosis runs as severe generalized forms with the lesion of lungs, intrathoracic lymphatic nodes and other organs. Typical are nidi of extrapulmonary tuberculosis with atypical localization of lesions, beside the typical tuberculosis granulomas there may be granulomas without necrosis. At infestation with conditionally – pathogenic mycobacteria, diffusive interstitial inflammatory process without granulomas and decay cavities develops in the lungs.

Clinical picture is characterized by expressed durable intoxication, diffusive infiltrates in the lungs, increase of intrathoracic lymphatic nodes, various extrapulmonary lesions (central nervous system, marrow, liver, kidneys, pleura, lymphatic nodes). In a larger half of cases negative Mantoux test and MBT absence from the sputum are noted.

The diagnostics of tuberculosis by means of traditional methods may prove unsuccessful and therefore many patients before being diagnosed for tuberculosis are treated apropos of other illnesses.

The diagnostics of tuberculosis is complicated. To diagnose tuberculosis in AIDS patients it is often necessary to apply bronchoscopy, transthoracic punctional or open lung biopsy. At immunologic examination of patients, the disturbance of T-helpers and T-suppressors correlation to 1:1 and less (at the norm 2:1), characteristic for AIDS, is revealed. All HIV-infected and AIDS patients should undergo fluorographic examination not less than once a year.

Mycobacterioses are characterised by generalized lesion of all organs and by diffusive interstitial changes without granulomas and decay in the lungs. The clinical features: rise of body temperature, stomachache, chronic diarrhea obstructive jaundice, bilateral dissemination in middle and lower sections of the lungs.

The treatment of tuberculosis in AIDS patients is carried out according to the WHO standard schemes, by using 4-5 antimycobacterial drugs, during 9-12 months, and also with simultaneous AIDS treatment. The effectiveness of pyrazinamidum of 1500 mg daily combined with cyprofloksacin of 750 mg twice a day, during 4 months. At AIDS treatment the combined therapy of three drugs – indinavir, sakvinavir and ritonavir is preferred.

As far as mycobacterioses treatment is concerned, the effectiveness is rather low, and the mortality rate is high (up to 20 %), even at such optimum schemes: rifabutin combined with isoniazidum and ethambutolum or rifampicinum, ethambutolum and klofasimin.

TUBERCULOSIS AND CANCER

The problems of pulmonary oncology are closely interconnected with those of phthisiatry, first and foremost, if the fact of a considerable growth of frequency of tuberculosis and lung cancer combination is taken into account; in addition, the growth rate of the combined pathology leave behind the dynamics of the lung cancer growth.

The combination of these maladies is more frequently observed among males aged over 50 at lung nidus tuberculosis in inactive phase, at fibrous-cavernous and cirrhotic forms with a chronic course, with the predominance of productive type reactions, expressed sclerotic changes in lung tissue and bronchi. Cancer more often joins the tuberculous process. In 78 % of cases tuberculosis precedes the development of lung cancer 5-20 years and more. Besides, lung cancer in tuberculosis patients and persons with posttuberculosis lung changes is diagnosed with a great delay, more often in the 3rd-4th stages of the illness, though the patients were under the supervision of the antitubercular dispensary for a long time. In general, lung cancer with tuberculosis is observed 3-6 times as often as among the whole population.

Pathogenesis and pathomorphism. At present there is no common view about the interconnection of lung tuberculosis and cancer, however most of the authors recognize the pathogenetic interconnection between these illnesses. This interconnection is realized in that tuberculosis, as any chronic lung inflammation, promotes metaplasia and atypical growth of bronchial epithelium, the disturbance of their drainage function and accumulation of exogenic cancerogenes under appropriate unfavourable factors, can bring to the rise of a malignant neoplasm. The cancer, that rose against tuberculosis background, is more often localised in the upper lobe, but it may also be found in other parts and segments. A cancer tumor may rise immediately on the site of a tuberculous scar or in a cavern wall.

Clinic. The cancer rise against the background of pulmonary tuberculosis causes the aggravation of a patient's general state, weakness increases during the treatment with tuberculostatics, inadequate spread of the process in the lungs, asthma, prolonged cough, expectoration of blood, constant chest pain, adynamy, rising of body temperature. The patient's state aggravates considerably at endobronchial tumour growth, complicated with atelectasis. The shortening of percussion note is recorded above the lesion zone, weakened respiration, dry stenotic rales. In blood analysis speeded ESR is kept for a long time, lymphopenia, hypochromic anemia increases, tuberculin sensitivity in lowered and tuberculin reactions are often negative. Roengenologically at central cancer the lung root expansion is observed, enlargement of regionar lymphatic nodes, lung hypoventilation, and in the case of bronchus obturation – atelectasis. The appearance of an individual focus in the area of compact nidi or fibrosis indicates to possible development of lung cancer. The tumour decay is possible, however it is a late symptom.

The diagnostics of cancer in lung tuberculosis patients is based, first and foremost, on roentgenologic, bronchologic and cytologic methods of examination. The most informative method of diagnostics is a complex bronchologic examination. The diagnostic thoracotomy with the ablation of a lesioned lung part is both a diagnostic and at the same time medicative mean.

The treatment of combined lesions patients should be strictly individual, depending on the clinical form and phase of lung tuberculosis, as well as the form and spread of malignant process. Antituberculous therapy may be performed according to commonly accepted schemes or in the form of chemoprophylaxis courses. The treatment of lung cancer patients consists in applying cytostatics, radiation, surgical intervention or their combination. Thus, therapy of lung tuberculosis and cancer patients must be combined, i.e. with simultaneous usage of both anticancer and antituberculous drugs.

TUBERCULOSIS AND MATERNITY

Pregnancy and childbearing are factors of an illness increased risk, contributing to aggravation, recurrence and progressing of tuberculosis.

Pathogenesis. The influence of pregnancy on tuberculosis course is rather complex: in some cases pregnancy promotes tuberculous process progressing, while in others – its healing. Tuberculosis course at pregnancy and delivery depends upon a number of factors: the character of tuberculous process, period of pregnancy, antimycobacterial therapy, as well as social, living and family conditions.

Clinic. Inactive tuberculous process during pregnancy not always aggravates or recurs. However, tuberculosis, which arises during pregnancy, predominantly tends to progressing. At the same time, it is susceptible to specific treatment.

By the way, tuberculosis may arise and progress at any term of pregnancy and after delivery, but nearly 1/3 of all cases falls to the first three months of pregnancy and in 2/3 – to the first 6 months after the childbearing. During the first months of pregnancy the features of early toxicosis overlap the phenomena of tuberculous intoxication, therefore it is sometimes difficult to decide what the worsening of one's feeling, subfebrilitet, increased disposition to perspire etc. are called forth with. In the second half of pregnancy the patients' state improves and they may feel better than before the pregnancy. The course of tuberculosis with inconsiderable clinical features can mask tuberculosis

progressing and make an impression of an imaginary wellbeing. However, the greatest danger of progressing arises during childbearing.

The diagnostics of tuberculosis, its aggravations or recurrence is sometimes rather difficult. Roentgenologic examination is of great importance and if necessary a roentgenogram should be performed at any term of pregnancy, although it is better to perform it after the first month of the delivery. Roentgenoscopies and fluorographies should be avoided, only roentgenograms should be performed, if only under the condition of reliable protection with a rubber apron of the pregnant's bowel and pelvis from superfluous radiation.

The treatment should be performed immediately after revealing active tuberculosis with adequate antituberculous drugs and according to the WHO standard schemes. In case of an ineffective treatment or when there is a doubt in a positive result, at pregnancy up to 12 weeks, an early abortion may be made. Breaking the pregnancy after 3 months requires complex interventions, which are harder to endure than physiological accouchement, and therefore they are resorted to only in exceptional cases. Antimycobacterial preparations principally have no teratogenous influence, they do not disturb intrauterine development of the foetus and are not contraindicated during pregnancy. However, it is desirable to avoid using kanamicin, streptomycin (first and foremost dihydrostreptomycin), viomycin, ethionamid and protionamid, as well as PASA and thioacetazon.

The most expedient and harmless at present are isoniazidum, ethambutolum, rifampicinum.

In general, deliveries of lung tuberculosis patients have a normal course, delivery periods may be somewhat shorter, the babies are born in good health. It is extremely rarely that intrauterine infestation occurs. Most babies are infested from their sick mother after their birth, rarelier – during childbearing. All newborn infants are immediately isolated from their mothers and, when there are no contradictions, they are BCJ vaccinated. The infant is isolated from its sick mother for not less than two months, for the period of the immunity formation.

Breast-feeding of newly borns by a mother sick with active tuberculosis is categorically forbidden, though MBT are not transferred through the milk. Imfestation mainly occurs aerogenically or contactly.

Breast-feeding of newly borns is only permitted with precaution to mothers with inactive form of pulmonary tuberculosis.

CONTROL QUESTIONS

1. Peculiarities of the course, diagnostics and treatment of pulmonary tuberculosis in combination with CULI.
2. Frequency, pathogenesis, clinic and treatment of pulmonary tuberculosis in diabetes patients.
3. Pulmonary tuberculosis course in stomach and duodenal ulcer patients.
4. Clinico-roentgenological perculiarities of pulmonary tuberculosis course and treatment in chronic alcoholism patients.
5. Interrelation of tuberculosis with AIDS. Clinic, diagnostics and treatment of patients with these combination.
6. Frequency, pathogenesis, clinic, diagnostics and treatment of pulmonary tuberculosis patients in combination with bronchocarcinoma.
7. Perculiarities of diagnostics of pulmonary tuberculosis during pregnancy.
8. The influence of pregnancy and delivery on the development and the course of pulmonary tuberculosis.

TESTS

1. Female patient K., 35 years old. For the recent 4 years she has suffered from chronic bronchitis. Five months ago the hemoptysis appeared, the body temperature rose up to 38 °C. Roentgenogram of thorax organs – at the background of the emphasized pulmonary picture, there are focal shadows of small and medium intensity in the upper lungs segments, under the clavicles there are the enlighted fields. Mantoux test – 10 mm infiltrate. What diagnosis is the most probable?
   A. Carcinomatosis
   B. Nidus lung tuberculosis
   C. Disseminated lung tuberculosis
   D. Bilateral nidus pneumonia
   E. Sarcoidosis
2. Female patient Z. has been ill with diabetes mellitus for 6 years. For the last four months she has suffered from general weakness, thirst, cough, periodic temperature rise up to 38 °C, weight loss. Objectively: the left half of the thorax lates in breathing act, the shortening of the percussive sound close to the scapula lower angle, moist rales. Roentgenogram – nonhomogenic darkening with the enlightment in the lower segment of the left lung. Mantoux test with 2 TU – 11 mm infiltrate. What is the most probable diagnosis?
   A. Tuberculosis
   B. Central lung cancer
   C. Eosinophilic infiltration
   D. Exudative pleurisy

E. Lowerpart pneumonia

3. Patient K., 25 years old suffers from the AIDS and mycobacteriosis. Prescribe the optimal combination of antimycobacterial preparations.
   A. Kanamycin + cycloserinum + rifampicinum
   B. Rifampicinum + ethambutolum + PASA
   C. Isoniazidum + rifampicinum + ethambutolum
   D. Isoniazidum + streptomycin + kapreomycin
   E. Pyrazinamidum + ethambutolum + ethionamidum
4. Female patient who is ill with AIDS. Roentgenological examination showed the massive focal-infiltrative shadows in the lower segments of both lungs. Mantoux test reaction with 2 TU is negative. What is the most probable diagnosis?
   A. Bilateral lowerpart pneumonia
   B. Disseminated lung tuberculosis
   C. Carcinomatosis
   D. Bronchoectasia
   E. Mycobacteriosis
5. The morbidity from tuberculosis of persons suffering from the diabetes mellitus is much more frequent than among other people.
   A. In 1,5 times
   B. In 2,5 times
   C. In 5 times
   D. In 15 times
   E. In 25 times
6. In how many times is the sickness rate of tuberculosis among alcoholics higher than in the rest of the people?
   A. In 1,5 times
   B. In 5 times
   C. In 10 times
   D. In 18 times
   E. In 35 times
7. In how many times is the sickness rate of tuberculosis among ulcer patients higher than in the rest of the people?
   A. In 1,5-2 times
   B. In 3-5 times
   C. In 6-9 times
   D. In 10-15 times
   E. In 20-25 times
8. Bronchocarcinomas in pulmonary tuberculosis patients is observed most frequently.

A. In 1,5-2 times
B. In 3-6 times
C. In 7-10 times
D. In 12-15 times
E. In 17-20 times

9. Patient B., 58 years old. In the past was effectively cured because of the infiltrate tuberculosis of the upper segment of the right lung in the phase of destruction, MBT (+). The condition of the patient has worsened within the recent three months, the hemoptysis appeared, dyspnea, pain in the right half of the thorax. At the objective examination the enlarged dense lymph nodes are palpated above the right clavicle. Roentgenogram – massive darkening of the upper segment of the right lung. ESR – 65 mm/hour. Mantoux test – negative. What is the most probable diagnosis?
   A. Eosinophilic infiltration
   B. Croupous pneumonia
   C. Atelectasis of the upper part of the right lung
   D. Aspergilomatosis
   E. Central lung cancer
10. At women the lung tuberculosis more frequently arises and progresses.
   A. At the first two months of pregnancy
   B. At 3-6 months of pregnancy
   C. At 7-9 months of pregnancy
   D. At the first 6 months after the childbearing
   E. Through 1-2 years after labour
11. A pregnant woman was suspected of the lungs tuberculosis. Therefore in the first turn, there should be administered:
   A. Roentgenoscopy
   B. Fluorography
   C. Inspection roentgenografy
   D. Tomography
   E. Bronchography
12. Artificial breaking of the pregnancy is not recommended at:
   A. Nidus tuberculosis
   B. Infiltrative tuberculosis
   C. Tuberculoma
   D. Fibrous-cavernous tuberculosis
   E. Miliary lung tuberculosis
13. The most optimal combination of antimycobacterial preparations for the treatment of pregnant women sufferning from tuberculosis is:
   A. Isoniazidum + rifampicinum + ethambutolum

B. Isoniazidum + rifampicinum + ethionamidum
C. Rifampicinum + streptomycin + thioacethazonum
D. Kanamycin + isoniazidum + PASA
E. Cycloserinum + rifampicinum + prothionamidum

TUBERCULOSIS TREATMENT

The treatment of tuberculosis patients is the principal component of the combat measures aimed at the illness, as due to the patients' healing, the sources of infection are annuled and tuberculosis epidemiological situation improves. Under present conditions a prominent place is occupied by complex, differential treatment, starting from the moment of diagnosing an illness until reaching clinical recovery.

The complex treatment of pulmonary tuberculosis patients includes: antimycobacterial therapy, pathogenetic treatment, colapsotherapy and surgical methods of treatment, symptomatic therapy and urgent aid at tuberculosis complications.

ANTIMYCOBACTERIAL DRUGS

Antimycobacterial therapy is the principal method of treating tuberculosis patients of various organs and systems. According to their effectiveness antimycobacterial drugs are divided into three groups. Group I (A) includes the most effective drugs: isoniaizdum (and its derivatives) and rifampicinum. Group II (B) includes the drugs of average effectiveness: streptomycin, pyrazinamidum, kanamicini, florimycini, ethambutolum, ethionamidum and cycloserinum, morphazinamidum, ofloxacin, capreomycinum. Group III (C) includes the least effective chemodrugs: PASA and thioacethazonum. In general the most active antimycobacterial drugs are isoniazidum, rifampicinum, then streptomycin and pyrazinamidum. The effectiveness of the drugs is assessed for their bacteriostatic or bactericidal activity, ability to penetrate through cell and tissue membranes; their action to MBT of intracellular location and to MBT multiplying rapidly as well as to persisting forms. Bactericidal action in therapeutic doses is only characteristic of rifampicinum.

By the way, in our opinion, the optimal is distribution antimycobacterial preparations on lines (the table 6).

Table 6

Names of antitubercular preparations and their reductions

Antitubercular preparations	№	Names of antitubercular preparations	Symbol of antitubercular preparations
1 line	1	Isoniazidum	H
	2	Rifampicinum	R
	3	Streptomycin	S
	4	Ethambutolum	E
	5	Pyrazinamidum	Z
2 line	6	Amikacin	A
	7	Kanamycin	K
	8	Ethionamidum	Et
	9	Prothionamidum	Pt
	10	Cycloserinum	C
	11	Ofloxacin	Of
	12	Ciprofloxacin	Cf
	13	Capreomycin	Cp
	14	Natrii paraaminosalicylic acid	PASA
Others	15	Rifabutinum	Rb
	16	Clarythromycin	Cl
	17	Amoxicillin/clavulanic acid	Am
	18	Clofazimin	Clo
	19	Florimycin	F
	20	Phthivazidum	Ph
	21	Flurenizid	Fl
	22	Thioacetazonum	T

Isoniazidum – is the principal representative of hydrazide isonicotine acid group (HINA), the most effective among all antimycobacterial drugs, strictly specific only against MBT, penetrates through cell and tissue membranes and through haematoencephalic barrier well. Isoniazidum acts to the MBT located extra- and intracellularly, to MBT that multiply rapidly and to a less degree to those that multiply slowly. The action mechanism of the drug is conditioned by blocking or inactivation of enzymes and co-enzymes of a microbic cell, resulting in the disturbance of protein metabolism, DNA, RNA and phospholipids synthesis, as well as MBT oxidicreducing processes. Isoniazidum is rapidly absorbed after peroral intake and in 1,5-3 hours the maximum drug concentration in the blood is noted. During 12 hours isoniazidum is excreted with urine.

Isoniazidum is manufactured in tablets of 0,1 g, 0,2 g, 0,3 g, as well as in ampules of 5 ml of 10% solution. A daily dosage of the drug is 8-10 mg/kg, for adults 0,3-0,6 g, after meal, is administered to be taken at once or in two intakes. Isoniazidum may be introduced intravenously, intramuscularly and in aerosols.

Side effect and complications of isoniazidum: headache, vertigo, sleeplessness, euphoria, lowering of memory, cardialgy, arthralgia, hepatitis, peripheral neuritis, hypersensibility, psychosis, spasms, allergic eruption, gynecomastia, menometroragia. The prophylaxis of neurotoxic complications are vitamins B_1, B_6.

Isoniazidum derivatives: Phthivazidum, 0,5 g three times a day (30-40 mg/kg); Methazidum 0,3 g three times a day (20 mg/kg); Larusanum 0,5 g 2-3 times a day as well as Saluzidum of 0,5 g 2-3 times a day (20 mg/kg). Saluzidum is manufactured in ampules in the form of 10% or 5% solution, for endobronchial and intrapleural introduction.

Rifampicinum is a semisynthetic antibiotic with a wide action spectrum. The drug possesses an expressed bacteriostatic activity to MBT, which are distributed extracellularly and in the cells (intracellularly), as well as to the ones that multiply quickly and slowly. It penetrates well through hemato-encephalic barrier, into various tissues of an organism, areas of specific lesion, caseose. Rifampicinum concentration peak in the blood comes in 1,5-4 hours after its intake, and the drug bacteriostatic concentration in the blood is preserved for over 12 hours. Rifampicinum tuberculostatic action mechanism consists in depression the synthesis of ribonucleic acid of tuberculosis micobacteria, by blocking RNA-polymerase.

Rifampicinum is manufactured in capsules of 0,15 g, 0,3 g and in ampules. A daily dosage is 8-10 mg/kg, in average for an adult of 0,45-0,6 g at once perorally, 30 minutes before a meal. Rifampicinum may be introduced intravenously drop by drop and endobronchially.

Side effect and complications: hyperthermia, rhinitis, myalgia, arthralgia, dyspeptic disturbances, obstructive respiratory disturbances, skin eruptions, hae-matologic complications (erythrocyte hemolysis), hemorrhages, hepatitis, liver-renal insufficiency, anaphylactic reactions.

During treatment with Isoniazidum and Rifampicinum hepatotoxic reactions are possible. Hepatoprotectors (vitamins, carsil, essentiale, legalon. thiotriasolin), antioxidants (tocoferol acetat, galascorbin) and hypoxants (calcium manganat, pyracetam), vitamins B_1, B_6, C are prescribed with a prophylactic purpose.

At irregular dose of Rifampicinum, antibodies to the drug may form resulting in erythrocytes hemolysis, acute renal or renal-liver insufficiency. In such cases Rifampicinum is immediately cancelled, corticosteroid hormones are prescribed, hemodialysis is applied. Rifampicinum is contraindicated at hepatites, kidney diseases.

Streptomycini group: Streptomycini sulfas, Dihydrostreptomycini sulfas, Streptomycini et calcii chloridum. They are all antibiotics, of which Streptomycini sulfas is most often used. In therapeutic doses it acts bacteriostatically only on MBT, that rapidly multiply and are distributed extracellularly. Streptomycini inhibits oxidation process and protein synthesis in a bacterial cell due to transport RNA binding. In the processes of Streptomycini treatment phagocytosis activates, as well as forming of granulation tissue, while in the healing processes fibrotization and encapsulation of specific nidi prevail.

The peak of Streptomycini concentration in blood after intramuscular infusion comes in 2 hours. A daily Streptomycini dosage is 15-20 mg/kg (averagely for an adult – 0,75-1,0 g). Except for intramuscular infusion, the drug may be administered intrapleurally, endobronchially, in aerosols. For endolumbar administration only Streptomycini et calcii chloridum in the dose of 0,1-0,2 g is used.

Side effect and complications: analgesic action with hyperemia and skin and mucous membranes eruptions, Quincke's oedema, bronchospasm, anaphylactic shock, neurotoxicity, ototoxicity, nephrotoxicity, cardiotoxic action.

At anaphylactic shock noradrenalin, prednisolon are infused intravenously drop by drop; at bronchospasm – euphilin. With the purpose of ototoxic complications prophylaxis, calcii pantotenatum is prescribed of 0,4 g twice a day or 2 ml of 20 % solution twice a day intramuscularly.

Kanamycini sulfas belongs to aminoglycozide antibiotics. Bacteriostatic action on MBT is lower, in comparison to Streptomycini, and toxicity is higher. The mechanism of tuberculostatic action on MBT is analogous to that of Streptomycini, dosages and methods of administration, side effect and complications (ototoxicity and nephrotoxicity).

Florimycini sulfas or Viomycini sulfas is an antibiotic, close according to its properties to Streptomycini and Kanamycini, however its bacteriostatic activity on MBT is lower and toxicity higher. Florimycini acts on MBT, stable to Streptomycini and Kanamycini, however a bacterium, resistant to Florimycini, is at the same time insensitive to both antibiotics. Thus, these

antibiotics are administered in a certain succession: Streptomycini, Kanamycini, Florimycini.

Capreomycinum is an antibiotic produced by Streptomyces capreolus. Production form: 0,5 g or 1 g bottles. Pharmacological features. Capreomycinum effects tuberculous mycobacteria which are especially stable to other antibiotics preparations and is little active as regard other microorganisms. After the intramuscular administration the maximum content in the blood is observed in an hour, it remains for 2-3 hours and in 24 hours the preparation is totally eliminated.

It is prescribed at all clinical tuberculous forms and localizations. It is administered intramuscularly in 0,015-0,02 g/kg dose (about 1 g/day) daily for 2 months, after that – twice a week up to the completion of the treatment. For children it is administered on the basis of 0,015 g/kg dose.

Counterindications, warnings, side effects and complications are the same as for streptomycin.

Ofloxacin. Synonymes: tarivid, ofloxin, ciprofloxacin, zanocin. Production form: 0,2 g drugs. Pharmocological capacities. Ofloxacin is an antibiotic of the wide range of action, including tuberculosis mycobacteria. The period of semiwithdrawal – 6 hours. It is administered at all clinical forms and localizations of tuberculosis on the basis of 0,008-0,015 g/kg per day. Average doses: for one time – 0,5-1 g, daily – 0,5-1g.

Counterindications: elevated sensibility to ofloxacin, epilepsy; pregnant and breast-feeding women, children and teenagers with incomplete skeleton growth.

Warnings: it is not recommended to administer ofloxacin together with drugs which lower the acidity of stomach content (antacydes).

Side effect and complications: allergic reactions in type of skin eruptions, face swelling, swelling of vocal cords, shock is also possible. In individual cases there can be observed: abdominal pain, nausea, vomiting, diarrhea, headache, dizziness, sleep infringement, bilirubin level rise in blood serum.

Ethambutolum is a chemosynthetic antituberculous drug, which inhibits only the MBT, that multiply rapidly, distributed extra- and intracellularly. The mechanism of Ethambutolum action on MBT consists in blocking and exclusion from metabolic processes of Magnesium ions and suppression of nucleic acids synthesis. The drug absorbs well from the digestive canal into the blood, in which maximum of its concentration forms in 3-4 hours and bacteriostatic activity is maintained during 6 hours.

Ethambutolum is manufactured in tablets of doses 0,1 g, 0,2 g and 0,4 g. A daily dosage is 20-25 mg/kg, an average dose for an adult is from 0,8 to 1,8 g, at once after breakfast.

Side effect and complications: retrobulbar neuritis with lowering the sharpness and narrowing the visual field to the green and red light, pain and gripes in the eyes, paresthesias, giddiness, epileptiform phenomena, hepatite, rash.

Before administering and in the process of Ethambutolum treatment the function of visual analyser is systematically tested. If necessary tocoferol acetat is administered – 1 capsule (0,05-0,1) once or twice a day. The drug is contraindicated at eye diseases, first and foremost – neuritis and retinitis.

Pyrazinamidum is a specific chemodrug, which acts only on MBT, besides that in an acidic medium, i.e. in caseose. Pyrazinamidum is more active conformably to phagocytic MBT, in comparison to the ones distributed extracellularly. The drug being applied in the process of combined chemotherapy, the relapse risk decreases considerably, so as it acts on the MBT that multiply dilatorily in makrophages. The mechanism of tuberculostatic action of Pyrazinamidum consists in MBT oxygen intake suppression.

The drug absorbs well in the digestive canal, the maximum concentration in the blood comes in 3 hours after an intake; is has good diffusive properties; penetrates through hemato-encephalic barrier. The manufacturing form is in tablets of 0,5 g. A daily dosage is 25-30 mg/kg (for an adult – 0,5 g three times or 1 g twice a day) after meal.

Side effect and complications: dispeptic disturbances, arthralgia, disturbances of blood hemostatic function, allergic dermatites, hyperthermia, hepatotoxic action. To prevent toxic injures of liver hepatoprotectors, vitamins B_6, B_{12} are administered. Pyrazinamidum is contraindicated at severe diabetes, liver diseases, podagra.

Morphazinamidun 2-3 g/day. Pharmacological features, administration, indications, counterindications, warnings, side effects and complications are the same as with pyrasinamid.

Ethionamidum and Protionamidum are chemosynthetic drugs, similar as to the chemical structure and the action mechanism, which is manifested only as to MBT. Bacteriostatic activity of Ethionamidum is 10 times lower, comparing to isoniazidum.

The mechanism of Ethionamidum action consists in inhibiting the penetration of Sulphur, Phosphorus and Carbon into the protein and DNA of a microbic cell, the protein synthesis is disturbed, resulting in the MBT

multiplying impediment. The drug acts efficiently in the acidic medium, suppresses MBT, which multiply rapidly, distributed extracellularly and intracellularly. The concentration peak in the blood comes in 3-6 hours after peroral intake. The manufacturing form is in tablets of 0,25 g. A daily dosage is 10-12 mg/kg (for adults – 0,25 g three times a day) after meal. In bottles of 0,5 g Ethionamidum chloride, for intravenous drop by drop infusion.

Side effect: dyspeptic phenomena, headache, sleeplessness, neurities, depression, psychic discords, cardialgia, hepatite, endocrine disturbances (gynecomastia, impotence, uterine flooding), pellagrous phenomena, skin pigmentation and rash (shedding), hair shedding, allergic responses. To prevent Ethionamidum side effect, nicotinamid, group B vitamins, enveloping means are administered simultaneously.

Ethionamidum is contraindicated at hepatites, the digestive canal illnesses, during pregnancy (due to teratogenous action).

Cycloserinum is a synthetic antibiotic of a wide spectrum action, which inhibits the growth of the majority of Gram positive and Gram negative bacteria, rickettsiae, spirochetes. Bacteriostatic activity of Cycloserinum on MBT is 10 times as low as that of Streptomycini. Cycloserinum action mechanism consists in the violation of mycobacteria protein metabolism as a result of pyridoxalphosphate blocking. In addition to this, it binds a number of microelements, which play an important part as catalysts of oxidation processes. Cycloserinum acts on the MBT that multiply rapidly and those distributed intra- and extracellularly.

The drug is rapidly absorbed and its concentration peak in the blood comes in 3-4 hours, it efficiently penetrates into various organs and tissues. Cycloserinum is manufactured in tablets form of 0,25 g. A daily dosage is 10-20 mg/kg (for an adult – 0,25 g three times a day), before meals.

Side effect: functional disturbances of the central nervous system, nervous-psychonosis, headache, sleeplessness, depression, hallucinations, psychoses, cramps, peripheral neurities, cardialgia, dyspepsy.

With a view to prevent and suppress Cycloserinum side effect, glutamine acid, vitamins B1, B6 and ATP are administered.

Natrii paraaminosalicylatis or PASA is Natrum (Sodium) is a sodium-specific antituberculous preparation.

Production form: powder and 0,5 g tablets; 3 % solution in 250-500 ml bottles. PASA-sodium suppresses the growth of tuberculous mycobacteria. Concentration peak in blood in case of oral administration takes place in two

hours and in 8 hours only the medicine traces are observed. It is administered at all clinical forms and localizations of the process 0,15-0,2 g/kg a day. Average doses: per one time – 4-12 g, per day – 9-12 g. Intravenously 300-500 ml of the 3 % solution of PASA-sodium.

Counterindications: diseases of kidneys, liver, blood, hypofunction of thyroid gland, cardiovascular insufficiency of stage III, stomach and duodenum ulceric disease, elevated sensibility to PASA.

Side-effects and complications: dyspeptic disorders, allergy, anemia, hepatitis, agranulocytosis, pain in the heart area.

Bepasum is a para-benzoilaminosalicytate of calcium. Production form: tablets, powder – 0,5 g. Pharmacological features, administration, indications, counterindications, warnings, side effects and complications are similar to PASA.

At present time the preparation is applied very rarely because of its inconsiderable bacteriostatic activity conformably to MBT and its frequent side responses.

Thioacethazonum is a chemosynthetic drug with a weak bacteriostatic activity and rather high toxicity. Thioacethazonum action mechanism consists in aminooxidase activity suppression and the disturbance of microbic metabolic processes. The drug acts only on the MBT multiplying rapidly.

After peroral intake the drug is rapidly absorbed and the concentration peak comes in 2 hours. Thioacethazonum is the most effective at tuberculosis of mucous membranes, lymphatic nodes, skin. It is manufactured in tablets of 0,025 g and 0,05 g. A daily dosage is 2-2,5 mg/kg for an adult, 0,05 g three times a day. For endobronchial and aerosol intake, dissoluble Thioacethazonum – Soluthisonum in ampules of 2 ml of 2 % solution is used.

Side effect: hepatotoxicity and neurotoxicity, dyspeptic phenomena, allergic responses, giddiness; frequently suppresses blood formation, which may be manifested in the form of leucopenia, thrombocytopenia and agranulocytosis.

Thioacethazonum is contraindicated at the diseases of liver, kidneys, bloodforming organs, diabetes.

The following drugs are used for the treatment of tuberculosis patients at present time: *flurenizidum, rifabutin, rifapentin and also ofloxacin, ciprofloxacin, pefloxacin and lomefloxacin (of Fluarinechinilines group), roksitromycinum, azitromycini and clarytromycini (of Macrolides group), amikacinum (of Aminoglycoside group)*. Combined antimycobacterial drugs: rifater, mairini and macox.

Mairin is produced in tablets, each containing 225 mg of etambutol, 120 g of riphadin, 60 mg of isoniaside and 300 mg of pyrasinamid. The average daily dose for adults – 5 tablets.

Macox is produced in tablets, each containing 225 mg of rifampicinum, 750 mg of pyrasinamid, 150 mg of isoniaside. The average daily dose for adults – 2 tablets.

Ofloxacinum, cyprofloxacinum, pefloxacinum, lomefloxacinum, roksitromycinum, azitromycini and claritromycini are successfully used in combination with tuberculostatics, first and foremost rifampicinum and isoniazidum. Amo-

Table 7

Antimycobacterial preparations used for the treatment of patients with chemioresistant tuberculosis

Preparation name	Average dose for an adult, g	
	per one time	per day
Rifampicinum	0,6	0,6
Isoniazidum	0,3-0,6	0,45-0,6
Ethambutolum	1,2-2	1,2-2
Streptomycini	1	1
Pyrazinamidum	1,5-2	1,5-2
PASA-sodium	4-12	9-12
Ethionamidum	0,5-0,75	0,5-1
Cycloserinum	0,25	0,75
Kanamycini	1	1
Amikacinum	1	1
Rifabutin	0,45	0,45
Cefalosporinum	1	2
Cyprofloxacinum	0,5-0,75	1
Ofloxacinum	0,5-1	0,5-1
Pefloxacinum	0,4-0,8	0,4-0,8
Lomefloxacinum	0,4	0,4
Morphazinamidum	1,5-2	2-3
Roksitromycinum	0,3	0,4
Azitromycini	0,5	0,5
Claritromycini	0,5	0,5
Thienam	1	1
Amoxicilini/clavulanic acid	1,2	1,2
Capreomycinum	1	1

xicilini/clavulanic acid or thienam are applied at tuberculous process progressing against the background of the treatment with antimycobacterial drugs.

During the recent years the effectiveness of tuberculosis patients treatment has deteriorated. The frequency of bacterioemission and the healing of destruction cavities decrease. One of the reasons of that situation are resistant or stable forms of tuberculosis. It's proved that treatment schemes recommended by WHO are the most optimum and effective for the treatment of various categories of patients, including the patients with resistant tuberculosis. However, those schemes at various clinical tuberculosis forms, including the chemioresistant one, require essential correction; doctors may change them relating to the sensibility of MBT to antimycobacterial preparations and to the regimes of previous treatment.

From the clinical point of view, all antimycobacterial preparations are divided into main, "standard" preparations (isoniasidum, rifampicinum, streptomycini, ethambutolum, pirazinamidum) and reserve ones. Table 7 shows antimycobacterial preparations which are used for the treatment of patients with chemioresistant tuberculosis.

THE MAIN PRINCIPLES AND METHODS OF TUBERCULOSIS TREATMENT

Antimycobacterial therapy is the main method of treating tuberculosis patients of any localization, following herewith certain principles:

1. *Early and timely treatment,* which should be started at early stages of the development of tuberculosis and immediately after its revealing. At early diagnostics of tuberculosis recovery comes in 100 %, at timely one – in 95-100 %, at untimely – in 89 % and at late diagnostics – in 10-15 % of cases.

2. *The duration of treatment.* The effectiveness of tuberculosis patients treatment depends on its duration. The optimum duration of the main course is from 6 to 18 months. The action of antimycobacterial drugs, on the whole, is bacteriostatic and therefore untimely cessation of treatment results in the reversal of persisting MBT into their initial forms and the emergence of aggravations and relapses of the specific process.

3. *The continuity of treatment.* Pauses in antimycobacterial drugs intake result in the development of medicinal stableness of MBT.

4. *Multistage treatment includes:* stationary + sanatorium + dispensary treatment.Generally, in a hospital (antitubercular hospital) at first (2-3 months) intensive, daily treatment with 3-4 antituberculous drugs is performed. At the second

stage (4-8 months), when the MBT population has sharply decreased, the treatment may be proceeded with two drugs, in particular, by the intermittent method.

5. *Combined chemotherapy.* Perspectivelessness of monotherapy with any drug, resulting in rapid development of MBT stableness to it, has been proved. It is only the usage of 3-4 antituberculous drugs that can prevent the development of MBT medicinal stableness. The combination should include isoniazidum, rifampicinum, streptomycini or ethambutolum. These drugs are effective in 95 % of cases.

6. *Controlled chemotherapy.* The treatment of tuberculosis patients must be controlled since the patients often irregularly or arbitrarily terminate their treatment. At a hospital patients should take antimycobacterial drugs under the supervision of the medical staff, and during the ambulant intermittent therapy it is performed in a dispensary. All this enables 10-15 % increase of the treatment efficiency.

7. *Complex treatment.* It is a combined chemotherapy by means of antimycobacterial drugs, pathogenetic means as well as surgical intervention.

To pathogenetic means belong antihistamine and hormonal drugs, vitamins B_1 and B_6, antioxidants, proteinases inhibitors, tuberculin, immunomodulators, biogenic stimulators. In addition to this, phyto-, api- and phytoncidotherapy are applied.

Surgical treatment of tuberculosis patients includes the following methods:

1) *radical* (various kinds of lung resection, pleural ectomies); 2) *collapso-surgical* (thoracoplasty); 3) *collapsotherapeutic* (medicinal pneumothorax, pneumoperitoneum); 4) *intermittent* (cavernoplasticity, cavern drainage).

For treating a lung tuberculosis patient, the most effective regimen of chemotherapy should be applied, adequate to the process spreadness, availability of a decay cavity, bacterial excretion, as well as depending on the previous treatment and MBT sensitivity to antimycobacterial drugs.

An important criterion of the treatment efficiency is bacterial excretion termination and decay cavities healing.

At firstly diagnosed small forms of tuberculosis without MBT after two months (initial stage) intensive treatment with three antimycobacterial drugs (isoniazidum, rifampicinum, streptomycin or pyrazinamidum), during 4 more months (continual stage) two drugs are administered for daily usage or in the intermittent regimen. Thus, the main course of treatment lasts for 6-8 months.

At firstly diagnosed destructive lung tuberculosis, for the first two months the treatment is performed with four antimycobacterial drugs, later on, prior

to cavern healing, with three chemodrugs. After that patients are treated with two chemodrugs during 2-4 months. Hence, the main course of antimycobacterial therapy lasts for 6-12 months.

After successfully completed main course of antimycobacterial therapy, 2-months courses of antirelapse treatment with isoniazidum is performed for two more years in spring and autumn.

In patients with lung tuberculosis reactivation (aggravation, relapse), taking into account possible resistance of mycobacteria to one or a few drugs, 5 antimycobacterial drugs (isoniazidum, rifampicinum, streptomycin, pyrazinamidum, ethambutolum) are applied at the initial 3-months stage of the treatment. After the initial stage of antimycobacterial therapy has been successfully completed, the proceeding stage is started with two-three drugs (predominantly isoniazidum, rifampicinum, pyrazinamidum or ethambutolum), during 4-8 months.

Antimycobacterial therapy of previously treated chronic forms of lung tuberculosis patients is strictly individual (4-6 drugs), taking into account of various factors, first and foremost, drug sensitivity of mycobacteria, their tolerance, complications and accompanying pathology etc. The average duration of the treatment is 18-20 months.

In general, ethiothropic treatment of tuberculosis patients is performed differentially, depending on the clinical form of tuberculosis, drug tolerance and mycobacterial sensitivity to them. According to the data of world literature the most effective schemes are those recommended by the WHO, which have justified themselves on many thousands of patients in various countries of the world.That is why the regimens of chemotherapy mentioned above are recommended to be used here, since they are also provided for by the valid order of the MPH of Ukraine.

Antimycobacterial therapy, as has been noted, consists of two stages: initial (intensive) and proceeding stage (rehabilitation), and all patients are divided into four categories, for which the WHO recommends appropriate schemes of treatment.

Category 1.

Category 1 includes the firstly detected patients with bacterial tuberculosis of lungs and the firstly detected patients with grave tuberculosis forms. There are patients with tuberculous meningitis, tuberculous pericarditis, peritonitis, pleuritis, spinal tuberculosis with neurologic complications, lungs tuberculosis without bacterioemission with destructive affection of parenchyma, tuberculosis of digestive and urinogenital organs (Tabl 8).

Table 8

Treatment scheme for patients of category I

Recommended preparations	Treatment duration	Preparation dose depending on patient's body mass		
		under 33 kg	under 33 kg	over 50 kg
1. Initial stage:	2 months			
isoniazidum	2 months	0,2 g daily	0,3 g daily	0,3 g daily
rifampicinum	2 months	0,3 g daily	0,45 g daily	0,6 g daily
pyrazinamidum +	2 months	1 g daily	1,5 g daily	2 g daily
ethambutolum	2 months	0,8 g daily	0,8 g daily	1,2 g daily
or Streptomicin	2 months	0,5 g daily	0,75 g daily	1 g daily
2. Continual stage:	4 months			
isoniazidum +	4 months	0,2 g three times a week	0,3 g three times a week	0,4 g three times a week
rifampicinum	4 months	0,3 g three times a week	0,45 g three times a week	0,6 g three times a week

Category 2.

Category 2 includes patients with tuberculosis reactivation (exacerbation, recidivation) and those in whom treatment didn't yield the expected results and the bacterioemission continues (Tabl 9).

Table 9

Treatment scheme for patients of category II

Recommended preparations	Treatment duration	Preparation dose depending on patient's body mass		
		under 33kg	under 33kg	over 50kg
1. Initial stage	3 months			
isoniazidum	3 months	0,2 g daily	0,3 g daily	0,3 g daily
rifampicinum	3 months	0,3 g daily	0,45 g daily	0,6 g daily
pyrazinamidum	3 months	1 g daily	1,5 g daily	2 g daily
ethambutolum	3 months	0,8 g daily	0,8 g daily	1,2 g daily
Streptomicin[1]	2 months	0,5 g daily	0,75 g daily	1 g daily
2. Continual stage:	5 months			
isoniazidum +	5 months	0,2 g three times a week	0,3 g three times a week	0,4 g three times a week
rifampicinum +	5 months	0,3 g three times a week	0,45 g three times a week	0,6 g three imes a week
ethambutolum[2]	5 months	0,8 g three times a week	1,2 g three times a week	1,6 g three times a week

[1] Streptomicin should be administered during the first two months of the starting phase.
[2] If isoniazidum + rifampicinum + ethambutolum are administered for daily administration in the phase of continuity, then their doses are the same as in the initial phase.

Category 3.

Category 3 includes patients with firstly detected bacteriologically unconfirmed tuberculosis, lungs tuberculosis and with limited affection of lung parenchyma, and also patients with extralungs tuberculosis who don't belong to category 1 (Tabl 10).

Table 10

Treatment scheme for patients of category III

Recommended preparations	Treatment duration	Preparation dose depending on patient's body mass		
		under 33 kg	under 33 kg	over 50 kg
1. Initial stage:	2 months			
isoniazidum	2 months	0,2 g daily	0,3 g daily	0,3 g daily
rifampicinum	2 months	0,3 g daily	0,45 g daily	0,6 g daily
pyrazinamidum	2 months	1 g daily	1,5 g daily	2 g daily
2. Continual stage:	4 months			
isoniazidum +	4 months	0,2 g three times a week	0,3 g three times a week	0,4 g three times a week
rifampicinum	4 months	0,3 g three times a week	0,45 g three times a week	0,6 g three times a week

Category 4.

Category 4 includes patients with chronic lungs tuberculosis. The characteristic feature of those patients is tuberculosis mycobacteria resistivity to antimycobacterial preparations, low effectiveness of treatment despite the durable stational cure.

Patients with chronic forms of lung tuberculosis are treated individually with 4-6 drugs, with the consideration of MBT sensitivity and other factors, by the termination of bacterial excretion. In addition, the most effective regimens of chemotherapy are supposed to be: a) isoniazidum + rifampicinum + pyrazinamidum (or ethambutolum); b) isoniazidum + rifampicinum + pyrazinamidum + streptomycini + ethambutolum; c) isoniazidum + rifampicinum + pyrazinamidum + kanamycini + ethambutolum + thioacetasonum et al. In some cases of tolerance to isoniazidum, it may be injected intravenously as the 5-6th drug.

PATHOGENETIC TREATMENT OF TUBERCULOSIS

It is aimed at solving the following tasks:

1. Decreasing exudative pneumonic phenomena in a lesion nidus, speeding up its resolution and healing with minimum residual changes;

2. Correction of metabolic processes and disfunctions of various organs and systems disturbed by tuberculous intoxication and antimycobacterial drugs;

3. Strengthening of feebly-expressed inflammatory reactions and stimulation of repairing processes.

The following methods of rational therapy are applied to realize these tasks:

I. *Common means of pathogenetic therapy, which include:*

1. Hygienic-dietary regimen, which from strict bed care widens to spare diet, training and to labour adaptation regimen;

2. Rational high calory and vitaminized diet (№ 11 diet according to Peuzner);

3. Physical metods and LFA: aero-, helio-, hydrotherapy, climatotherapy;

4. Psychotherapy and autogenous training;

5. Means of metabolic detoxication and correction, in particular protein and water-electrolytic metabolism; oxidation-reduction processes, acidical-kaline equilibrium, regulation of hemodynamics and diuresis.

The following means are used for reaching these purposes:

a) preperations of anabolic action: insulinum – 4-5 UN intramuscularly in the morning; anabolic steroid preparations (metandrostenolon or dianobol 0,005 g 1-2 times a day orally, fenobolil or durabolin, nerebolin – 1,0 ml intramuscularly once a week, retabolil – 1,0 ml 5 % oil solution 1 time per 2 weeks, methyltestosteron – 0,005 g unde r the tongue 1-3 times a day);

b) energy metabolism stimulators (kokarboxylase hydrochloridum – 0,05 g intramuscularly once a day, ATA – 1,0 ml intramuscularly once a day, lipoyev acid 0,025-0,05 g orally 2-3 times a day);

c) polyvitamins, especially vitamin C 0,1 g orally three times a day, group B – pentovit 3 drugs orally three times a day, among them with microelements: vitamax or vitamaxplus – 1 caps. orally once a day, multitubs – 1 drug orally once a day, unicup – 1 drug orally once a day;

d) antioxidants (tokoferol acetat – 1 caps. (0,05-0,1 g) orally 1-2 times a day, sodium thiosulfate 30 % solution 5,0 ml intravenously once a day, galascorbinum – 0,5 g orally three times/day);

e) antihypoxantes (sodium oxibutyrat – 0,75 g orally 2-3 tjmes/day);

f) preparations of combined and immunotrophic action (riboxine – 0,2-0,4 g orally before meals three times/day);

g) electrolytic solutions (neohemodesis, neocompensan, glyconeodesis, Ringer-Lock solution, reopolyglucin – 200-400 ml intravenously once/day), panangin – 1-2 dr. orally three times/day, calcium pangamat – 0,05-0,1 g orally three times/day; at expressed acidosis – 4 % solution of sodium hydrocarbonate 100-200 ml;

h) blood, plasma – 200 ml intravenously drop by drop once a week; albumin, protein transfusions – 100-200 мл intravenously drop by drop 1-2 times a week;

i) means of correcting misfunctions of internal organs and systems.

II. *Immunocorrecting therapy*. It is performed after studying the function of T-lymphocytes system (cell immunity), B-lymphocytes (humoral immunity), unspecific defence factors. Among immunocorrectors the following drugs are used: thymalin 0,005-0,01 g intramuscularly daily, tactivin 0,01 % solution (1-2 mkg/kg) subcutaneously at night during 10 days, sodium nucleinat 0,5 g orally after meals 3-4 times/day, splenin 2,0 ml intramuscularly daily during three weeks, than – 1,0 ml in a day during two months; levamisol or decaris 0,15 g orally once a day during three days, than – once a week during three weeks; interferon – 5 drops in nose 1-2 times/day, prodigiosan – 0,005 % solution 0,5 ml intramuscularly once at 5-7 days, during 3-6 weeks; ethymisol – 0,1 g orally after meals three times/day, histaglobulin – 1,0 ml intramuscularly, than – 2,0-3,0 ml once at 3 days, course 5 – 10 injections.

Of unmedicamental treating methods for immunocorrection and as anti-inflammatory methods enterosorption, hemosorption, speleotherapy, magneto-therapy, laser-therapy etc. are applied.

Immunocorrecting therapy should be performed after a patient's intoxi-cation liquidation.

III. *Antiinflammatory drugs of unspecific action*, which decrease excessive exudative-pneumonic reactions. They include:

1) corticosteroids: 2% hydrocortison suspension per 1,0 ml together with antimycobacterial preparations for inhalations at larynx and bronchi tuber-culosis; prednisolon (starting with 0,02-0,04 g/day orally, having divided for 4-5 administrations, then the dose is decreased up to 0,005-0,01 g/day), dexamethason 0,002-0,003 g/day, triamcinolon 0,004-0,016 g/day orally in 3-4 administrations;

2) nonhormonal antiinflammatory means: pirasolon derivatives (butadion 0,15 g orally after meals 3 times/day, pirobutal 1 dragee orally after meals 3 times/day, bruphen 0,2 g orally after meals 3 times/day); phenotiasin derivatives (chlorochin, delagil 0,25 g orally after meals once a day); antihistaminic preparations (dimedrol 0,05 g orally 1-3 times/day, phencarol 0,025-0,05 g orally after meals 1-3 times/day, diprasin or pipolphen 0,025g orally after meals 2-3 times/day, diasolin 0,01-0,02 g orally 2-3 times/day, suprastin 0,025 g orally with meals 2-3 times/day, tavegil 0,001 g orally twice/day);

3) proteolitic enzymes (tripsin, chimotripsin 0,005-0,01 g intramuscularly 1-2 times/day or 0,005-0,01 g 5 ml of isotonic solution of sodium chloride or of the distilled water, for inhalations or endobronchial infusions);

4) inhibitors of proteolytic enzymes (contrical 10000-20000 units, gordox 100000-300000 units in 300-500 ml of the physiological solution of sodium chloride intravenously drop by drop once a day, EAKK, amben);

5) dimexid possesses an expressed antiinflammatory effect and is able to transport other drugs into the tissue the 5-10 % solution is administered 1,0-2,0 ml together with heparin, novokain, antibacterial and corticosteroid preparations for inhalations, rinsing of purulent pleural cavity and tracheobronchial tree;

6) a group of biologically active drugs has an inflammatory and antiallergic effect, in particular pirogenal – 25-50 MDP intramuscularly once per 3 days and increasing it up to the body temperature rise up to 37,5-38 °C, but not more than up to 1000 MPD of the preparation, and then the dose is gradually decreased up to the initial one; heparin – 5-10 thousand of units 2 times/day intramuscularly;

7) ethymisol – 0,1 g orally after meals 3 times/day within 1 month;

8) physiotherapy (electrophoresis, intraorganal electrophoresis, inhalations);

9) phytotherapy with medicinal plants infusions and tinctures of antiinflammatory (jointweed, knot-grass, greater celandine, st. John's wort, marigolds, onion, garlic etc.) and adaptogenous (eleutherococus, ginseng et al.) action; they are used internally and for inhalations;

10) psychotherapeutic methods (autogenous training, psychotherapy, musictherapy, hypnosis and meditation).

IV. *Stimulators of repairing processes and cavern healing.* They are generally applied in 3-4 months, in the second stage of antimycobacterial therapy. They they include tuberculin, desoxicortikosteron acetate – 0,0025-0,005 g under the tongue once/day or in a day, somatotropnin – 4 units

intramuscularly in the morning before meals once a day, biostimulators (vitreous body – 1,0-2,0 ml subcutaneously daily, plasmol – 1,0 ml subcutaneously daily or in a day, aloe extract – 1,0 ml subcutaneously, FIBS per 1,0 ml subcutaneously, placenta extract per 2,0 ml subcutaneously once – 7-10 days, antireticular cytotoxic serum (ACS) – 0,5-0,75 ml subcutaneously 2-3 times with the interval of 2-3 days; anabolic enzymes (nerobol, dianobol, retabolil, phenobolil), blood and its preparations (plasma, albumin, protein).

Skillful application of pathogenetic therapy alongside with antimycobacterial preparations increases the treatment effectiveness.

The tracheobronchial tree sanation occupies one of the most prominent places in a complex treatment of respiratory organs tuberculosis patients. The sanative methods may be passive and active. To the former belong postural drainage, administering expectorants, to the latter ones – all methods that consist in aspiration of the tracheobronchial tree contents and immediate administration of medicines into it.

With a view to increase sputum excretion the following preparations are applied:

1) preparations stimulating expectoration on account of passive secretion of bronchial glands, decreasing sputum tenacity, increasing activity of twinkling epithelium and peristalsis of bronchioles:

a) preparations of reflex action:sodium benzonat of 0,2-0,5 g internally 3-4 times a day, terpinhydrate of 0,25-0,5 g internally three times a day, Althea officialis L. root tincture (6,0:180,0) of one spoonful internally every three hours, Glycyrrhiza glabra L. root tincture (6,0:180,0) of one spoonful internally every three hours, Tussilago forfara L. leaves tincture (5,0-10,0:200,0) of one spoonful 4-6 times a day, licoryn of 0,0001 g internally 3 times a day.

b) preparations of resorptive (or direct) action: Potassium iodide 1-3 % solution, one spoonful internally 3-5 times a day, sodium iodide 0,3 g internally 3 times a day, ammonium chloride 0,2-0,5 g internally 3 times a day, sal ammoniacanis drops, 10-15 drops internally 3 times a day, anis oil, 3 drops internally 1-2 times a day etc.

2) mucolytic (secretomotory) preparations which promote expectoration on account of the sputum thinning and stimulating endobronchial contents production:

a) proteolytic enzymes: tripsin, chemotripsin, chemopsin, ribonuclease, desoxyribonuclease 0,2 % solution, of 3 ml for inhalations and endobronchial infusion;

b) synthetic preparations: acetylcystein 20 % solution, of 4 ml per inhalation 2-3 times a day or 10 % solution for endobronchial infusion; bromhexyn 0,016 g internally 3 times a day; lazolvan.

In addition to this, much warm drink (up to 1-1,5 l a day) is recommended (milk with soda and honey, mineral water "Borzhomi", "Luzhanska" etc.).

Active sanation methods include inhalations, intrabronchial pouring of antimycobacterial preparations, pathogenetic drugs. They are often combined with glucocorticosteroid preparations, stimulating regeneration (pentoxil of 0,3 g internally after meal, 3 times a day; methyluracil, 0,5 g internally during meal 3 times a day), antifungal (sodium salt of nistatine or levorine of 500000 AU internally 3 times a day, nisoral, 1 tablet a day, phungison etc.). At tuberculous endobronchitis expedient are inhalations of the mixture of euphylini 24 % – 0,5 ml; dimedrol 1 % – 0,5 ml, novocaini 0,5 % – 0,5 ml, isoniazidum 5 % – 5 ml, rifampcinum (0,15 g) – 1,0 ml, hydrocortizon hemysuccinate or prednisolon chloride (0,0125-0,025 g) 0,5-1,0 ml without cancelling herewith the basic antimycobacterial therapy. In case of haemoptysis haemostatic drugs are used (thrombin of 60-125 e.a. for inhalation, haemophobin – 5,0 ml per inhalation).

Specific allergenic immunotherapy (tuberculinotherapy) of tuberculosis is the usage of tuberculin with the medicative purpose. It possesses both stimulating and desensibilizing action and is used at pulmonary and extrapulmonary tuberculosis.

METHODS AND MEANS OF POPULAR MEDICINE IN COMPLEX TREATMENT OF TUBERCULOSIS

The interest for the popular and nontraditional medicine is growing worldwide, and first and foremost in Ukraine. In 1992 for the first time the Kyiv Medical Institute of the Ukrainian association of popular medicine was founded, in which, in addition to the classical programme of state medical institutions of higher education, the teaching of trends of popular and nontraditional medicine was additionaly introduced (homeopathy, phytotherapy, manual and bioenergoinformational medicine, reflexotherapy, iridodiagnostics etc.).

Phytotherapy is therapy by means of medicinal plants. Here are some of them, recommended for treating lung tuberculosis patients: Aloe arhorescens Mill., Acorus calamus L., Veronica officinalis L., Geum urbanum L., Capsella bursa pastoris (L.) Medic., Achillea millefolium L., Delphinium consolidum L.,

Urtica dioica L., Artemisia absinthium L., Polemonium coeruleum L., Pinus silvestris L., Polygonum Aviculare L., Equisetum arvense L., Pulmonaria officinale L., etc.

Fresh or tin aloe juice is used in phthisiology, which patients take – 1 tea spoonful 2-3 times a day, in courses 3-4 times a year.

Phytoncidotherapy (Gr. phyton + Lat. caedo – kill + heal) is a variant of phytotherapy, when biologically active substances are used with a medicinal purpose; they are formed by plants and they kill or suppress the growth and propagation of microorganisms.

The following means are used with a medicinal purpose: horse-radish roots (Cochleria armoracia) (it contains Lisocine, phytoncides, vitamin C etc.); fresh onion leaves and bulbs (Allium cepa), garlic (Allium sativum L.) (it contains antibiotic alicin, vitamins A and B, iodine), in the form of fresh juice, water-spirit tincture of peroral and inhalation methods of infusion.

Apiotherapy (Lat. apis – a bee + therapia – treatment) is the application of bee vital activity factors (honey, propolis, poison) with a medicinal purpose. Honey is composed of approximately 300 various substances, including hydrocarbons, enzymes, aminoacids, organic acids, microelements, aromatic compounds. Honey possesses bactericidal properties, which are higher in honey of burstine and dark-burstine colour.

Propolisotherapy is a variant of apiotheapy. Propolis is composed of plant resins, bees-wax, volatile oils, pollen, excretions of bee salivary glands and microelements. Propolis possesses antimicrobic, antitoxic, antiinflammatory, biogenously stimulating, pain-killing action. The preparation stimulates the organism's defence reaction against infection.

Propolis is used at tuberculosis in the forms of: extract (it is taken 20 drops, three times a day, 1 hour before meals, during 4-10 months); oil (1 tea spoonful three times a day, 1 hour before meals, during 4-10 months); spirit solution (20-40 drops three times a day, 1 hour before meals, with warm milk), inhalations during 10 min. in the morning and in the evening (phytoncidic action).

COLLAPSOTHERAPEUTIC METHODS OF TREATMENT

They occupy an intermediate place between conservative and operative treatment. Their revival is observed nowadays. It concerns to artificial pneumothorax and pneumoperitoneum.

Artificial pneumothorax is introduction of the air into the pleural cavity with a medicinal purpose. Indications for applying artificial pneumothorax

are limited forms of lung tuberculosis in a decay stage (infiltrative, nidal, limited disseminated), as well as in cases of:

1) intolerance to antimycobacterial preparations or MBT polyresistance;

2) patients of asocial behaviour (alcoholism, drug addiction);

3) patient's refusal from surgical intervention;

4) unfavourable epidemiological conditions, first and foremost contact with children;

5) haemorrhages of fresh decay cavities and caverns, when haemostatic therapy has exhausted itself and surgical intervention is impossible;

6) combination of tuberculosis with pregnancy, diabetes.

At primary application of artificial pneumothorax about 250-350 ml of air is introduced. During the first 10 days the insufflation of air is performed at the interval of 2-3 days at constant roentgenologic control. After forming a gasbubble (collapse of the lung not less than 1/3), the intervals between air insufflations is 5-7 days, and the volume of the air comprises 400-500 ml.

Pneumoperitoneum is the introduction of the air into the abdominal hollow with a medicinal purpose, with a view of limiting the diaphragm excursion and pressing the lungs. Indications:

1) bilateral infiltrative and disseminated processes in the decay phase with a disposition to haemorrhages;

2) the same clinical forms of tuberculosis of females immediately after delivary;

3) retarding of lung expansion and a residual pleural cavity after phtisio-surgical interventions.

Technic: to the left and 2 cm lower from the umbilicus, a puncture of the abdominal hollow wall is made with a needle, keeping to all the rules of asepsis and antisepsis. Predominantly 400-600 ml of air is introduced. At the succeeding insufflations – 800-1000 ml with an interval of 7-10 days.

SURGICAL METHODS OF TREATMENT

Surgical treatment of lung tuberculosis patients is a component of complex treatment. At present conditions of continual rise of the epidemy of tuberculosis, the role of surgical treatment will increase.

The absolute indications to surgical treatment are:

1) stable bacterial excretion after 6-months antimycobacterial therapy with cavern presence;

2) incurable residual changes – bronchoectases, ruined (lung) part, pronounced bronchostenosis;

3) suspicion of tuberculosis combination with a malignant growth;

4) large fibrous-caseous nidi (tuberculoma, caseoma) without bacterial excretion;

5) life-threatening haemorrhages;

6) thin-walled caverns without bacterial excretion of epidemiological considerations (children institutions employees).

Optimum terms for surgical treatment of lung tuberculosis patients against the background of intensive ethiopathogenetic therapy comprise 3-9 months. Hence, the patients have a chance to undergo a complete course of antimycobacterial therapy, which ineffectiveness serves as an indication to a surgical intervention. Besides, patients with satisfactory indeces of their general state, without phenomena of cardiac decompensation, absence of pronounced respiratory violation and nonreversible disturbances of the function of other internal organs and systems are due to surgical treatment. It is desirable to perform surgaical interventions in the phase of remission and compensation of tuberculous process. At urgent indications (pulmonary haemorrhages, tense pneumothorax etc.) an acute phase of tuberculous process should not be an obstacle to a surgical liquidation of the symptoms threatening a patient's life.

Surgical methods of treating pulmonary tuberculosis patients are divided into radical, collapsosurgical and intermediate operations. *Radical operations include:* segmental resection, combined resection, lobectomy, pneumonectomy, pleurectomy. *Collapsosurgical operations include* extrapleural pneumolysis and thoracoplasty. *To the intermediate group belong* operations of immediate action on a cavern (cavernotomy, cavernoplastics), bronchus or branch of pulmonary artery ligature.

In addition to this, indications to surgical treatment of tuberculosis patients may be planned or urgent ones.

CLINICAL RECOVERY

It is a stable healing of a tuberculous process, confirmed by clinico-roentgenologic and laboratory methods during differentiated terms of observation. The terms are determined with taking into account two main parametres: 1) the volume of the residual changes (small and big) and 2) availability of aggravating factors (unfavourable life conditions, chronic grave accompanying illnesses, steroid and ray therapy).

The main criteria of clinical recovery are the absence of general and local signs of tuberculous intoxication, stable cessation of bacterial excretion (MBT

absence during a year after the main course), absence of roentgenologic signs of tuberculosis activity, restoration of the respiratory function, blood circulation and other organs and systems, restoration of the ability to work (complete or partial). In case of small residual changes one can speak about clinical recovery after a year, while at big posttuberculous changes or at small ones, but with aggravating factors present – in two years of observation after a successful completion of the treatment course.

CONTROL QUESTIONS

1. Classification of antimycobacterial preparations.
2. Characteristic of antimycobacterial preparations of the I, II and III groups.
3. The main principles of treating pulmonary tuberculosis patients.
4. The schemes of antimycobacterial therapy, recommended by the WHO for treating patients of four categories (firstly revealed patients with MBT (+) and MBT (-), with tuberculosis recurrences and with chronic forms of pulmonary tuberculosis).
5. The principal means of pathogenetic therapy in pulmonary tuberculosis patients.
6. Methods and means of popular medicine in a complex treatment of pulmonary tuberculosis patients.
7. Collapsotherapeutic methods of treating pulmonary tuberculosis patients.
8. Surgical treatment and indication to it in pulmonary tuberculosis patients.
9. Criteria of pulmonary tuberculosis patients treatment.

TESTS

1. The WHO recommends appropriate schemes of treatment of tuberculosis patients, depending on the categories they treat.
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
2. What are the most effective antimycobacterial drugs among the mentioned?
   A. Streptomycini and pyrazinamidum
   B. Isoniazidum and rifampicinum
   C. Ethambutolum and kanamycin
   D. Ethionamidum and cycloserinum
   E. Thioacethazomun and PASA
3. The optimum duration of the main course of the antimycobacterial therapy of the patient with FDTB (09.09.1999) of the upper part of the left lung (nidal) (infiltration), Destr-, MBT-M-C-, HIST0, Cat3 Coh3(1999) is:

A. 1-2 months
B. 3-4 months
C. 4-6 months
D. 7-8 months
E. 9-10 months

4. FDTB (01.01.2001) miliary lung tuberculosis, Destr-, MBT+M-C+, Resist-, HIST0, Cat1 Coh1(2001) has been diagnosed in a patient. The duration of the main course of the antimycobacterial therapy of this patient is:
   A. 2-3 months
   B. 4-5 months
   C. 6-7 months
   D. 8-12 months
   E. Over 1,5 years
5. A patient with FDTB (17.04.2003) of the upper part of the right lung (tuberculoma), Destr-, MBT-M-C-, HIST0, Cat3 Coh2(2003). Choose the optimum scheme of antimycobacterial therapy on the initial stage.
   A. Isoniazidum + rifampicinum + streptomycin
   B. Isoniazidum + rifampicinum + pyrazinamidum
   C. Isoniazidum + pyrazinamidum + streptomycin
   D. Rifampicinum + streptomycini+ ethambutolum
   E. Pyrazinamidum + kanamycin + ethambutolum
6. What antimycobacterial preparation has the ototoxic action due to which is not posible to prescribe it to pregnant?
   A. Ethambutolum
   B. Rifampicinum
   C. Streptomycin
   D. Pyrazinamidum
   E. Isoniazidum
7. What combination of antimycobacterial preparations ennumerated is rational?
   A. Streptomycin + kanamycin + viomycin
   B. Streptomycin + kanamycin + isoniazidum
   C. Isoniazidum + rifampicinum + pyrazinamidum
   D. Isoniazidum + phthivazidum + PASA
   E. Ethambutolum + thioacethazomun + PASA
8. To prevent the neurotic action of isoniazidum is prescribed:
   A. Vitamin C
   B. Vitamin A
   C. Vitamin B_6
   D. Vitamin B_{12}
   E. Diasolin

9. At what form of lung tuberculosis and its complication is it the most reasonable to prescribe prednisolon?
   A. Infiltrative lung tuberculosis, that has been complicated by exudative pleurisy
   B. Chronic disseminated lung tuberculosis, chronic lung heart
   C. Fibrous-cavernous lung tuberculosis, amyloidosis of internal organs
   D. Tuberculoma of the upper part of the right lung, specific colitis
   E. Lung cirrhotic tuberculosis, lung aspergiloma
10. The duration of antimycobacterial therapy after the successfully realized resection of the upper part of the right lung in connection with tuberculoma:
   A. 1-2 weeks
   B. 3-4 weeks
   C. 2-3 months
   D. 4-6 months
   E. 7-10 months
11. A patient R., 48, has fallen ill a year ago with RTB (03.05.2003) of the upper part of the left lung (infiltration), Destr+ (sowing), MBT+M+C+, Resist0, HIST0, Cat2 Coh2(2003). He is not disciplined. Antimycobacterial preparations (isoniazidum, rifampicinum, streptomycin, pyrazinamidum) were taken irregularly with intervals. General weakness, fever, pain in the side and legs, vomiting. At the examination the scleras, mucosas are icteric, the hepar is magnified and morbidity. Urine is with red tent from blood hemolysis. The most probable cause of such condition.
   A. Tuberculosis development
   B. Virus hepatitis
   C. Side effect of pyrazinamidum
   D. Immunologic reaction caused by rifampicinum
   E. Toxico-allergic reaction caused by isoniazidum
12. During the treating of a patient with pulmonary tuberculosis by isoniazidum, rifampicinum, pyrazinamidum, ethambutolum, ofloxacini the decreasing of the sharpness of vision and the sense of colours appear. Which medicine may cause such complication?
   A. Ofloxacinum
   B. Pyrazinamidum
   C. Ethambutolum
   D. Rifampicinum
   E. Isoniazidum

TASKS

1. A sensation of intoxication, head noise and hearing loss appeared in a patient with FDTB (09.10.2003) of the upper part of the right lung (infiltration), Destr+,

MBT+M-C+, Resist0, HIST0, Cat1 Coh4(2003) on the third week of the treatment with isoniazidum, rifampicinum, streptomycini and ethambutolum:

a) What are the indicated phenomena conditioned by?

b) Your tactics.

The answer: a) by streptomycini, b) instead of streptomycini, pyrazinamidum should be prescribed; glucose, vitamins B1, B6, glutamic acid and diuretics – for a short time.

2. Prescribe a combination of antimycobacterial preparations to a patient with disseminated pulmonary tuberculosis in the phase of infiltration and decay, whose MBT are stable to isoniazidum and streptomycini. Prove the prescription.

3. Prescribe a combination of antimycobacterial preparations to a sick child, weight – 25 kg, with a FDTB (14.12.2003) right lung (primary tuberculous complex), Destr+, MBT +M+C+, Resist-, HIST, Cat1 Coh4(2003).

4. FDTB (26.03.2004) of the upper part of the left lung (nidal), Destr+ (infiltration), MBT +M+C+, Resist0, HIST0, Cat1 Coh1(2004) in a patient Z., 21.

a) Make up a plan of antimycobacterial therapy.

b) Prescribe a pathogenetic treatment.

5. A female patient V., 45, is ill with FDTB (22.10.2003) of the right lung (caseous pneumonia), Destr+, MBT +M+C+, Resist+(S), HIST0, Cat1 Coh4(2003).

a) Make up a plan of antimycobacterial therapy.

b) Prescribe unspecific medicinal means.

6. A patient K., 35, three months ago was hospitalized into an antitubercular dispensary on the occasion of FDTB (05.06.2004) of the upper part of the right lung (infiltration), Destr+, MBT+M+C+, Resist+(S), HIST0, Cat1 Coh2(2004). In the process of the treatment the general state of the patient has considerably improved, the infiltrative changes in the lung have resolved, excretion of bacteria has ceased, but a decay cavity of 3 cm in diametre is preserved.

What is the tactics of the further treatment?

PROPHYLAXIS OF TUBERCULOSIS

Prophylactic principle of health protection generally and, as far as tuberculosis is concerned, in particular should be a priority. Prophyaxis of tuberculosis consists of a complex of various measures. *Social, sanitary, specific (inoculation and revaccination) and chemoprophylaxis are discriminated.*

Social prophylaxis *is carried out by means of performing prophylactic measures of social-economic character of the national scale.* These are

allnation measures, since they should be organized not only by the state organs, but also by a wide range of antitubercular institutions, civic and other organizations. *The social prophylaxis is aimed at organizing the people's healthy way of life by improving the environmental conditions, increasing the population's material well-being, strengthening its health through the development of mass physical culture, sports, rest homes, sanatoriums, improvement of nourishment and home living conditions, as well as fighting alcoholism and other harmful habits.*

Sanitary prophylaxis *is a systematic organization and performance of a system of sanitary-hygienic and prophylactic measures, aimed at warning healthy people against infecting and catching tuberculosis.* Essentially, sanitary prophylaxis is a component part of social prophylaxis of tuberculosis. *It is aimed at the improvement of sanitary conditions of the nidi of tuberculous infection, performance of sanitary – educative work, veterinary control, early and timely detection as well as treatment of tuberculosis patients.* Sanitary prophylaxis is generally performed in the centre of tuberculous infection. *An epidemiologic nidus of tuberculosis is meant as a tuberculosis patient, who excretes mycobacteria, his dwelling and the people sharing it with him.* To antiepidemic measures in the cenrte of tuberculous infection belong disinfection, contacts investigation, their chemoprophylaxis, isolation of children from the bacteriocarrier, sanitary-hygienic education of a patient and the members of his family, improving the living conditions as well as the patient's treatment. The prophylactic work is realized in the centre according to its epidemiological danger defined jointly by a phthisiologist and an epidemiologist, taking into account the following factors: 1) the volume of bacterial excretion; 2) presence of children and teenagers in the family; 3) sanitary conditions under which a patient and his family live.

Thus, the criteria of epidemiological danger of a nidus of tuberculous infection are the mass scale and continuity of MBT excretion by a patient, his family life conditions, behaviour, general culture and sanitary enlightenment of the patient and his surrounding.

Depending on the mass scale and the term of bacterial excretion, it is discriminated as: A. *massive*, when over 100 colonies of MBT are revealed at a simple bacterioscopy or by a sowing method; B. *moderate*, if 20-100 colonies are revealed; C. *scanty (meagre)*, if MBT are revealed only by bacteriological research, not more than 20 colonies; D.*conditioned (formal)*: 1) at firstly diagnosed tuberculosis, when the cessation of bacterial excretion

is reached as a result of treatment and is confirmed by double negative result of bacterioscopic and cultural methods with 2-3 months intervals (during 10-12 months from the moment of the examination negative result); 2) at chronic pulmonary tuberculosis, when the cessation of bacterial excretion as a result of treatment is confirmed by repeated examinations with bacterioscopic and cultural methods with 2-3 months intervals during 1,5-2 years from the moment of the first negative result.

According to these conditions *the nidi of tuberculous infection are divided into 3 groups.*

To the first, the most dangerous, group belong nidi, where patients with abundant or meagre bacterial excretion live, but there are children and teenagers in the family or aggravating circumstances exist: poor living conditions, violation of hygienic rules, abuse of alcohol. An epidemiologist and a district phthisiologist should visit such a nidus once a quarter, a district nurse – not less than once a month.

To the second group, epidemiologically less dangerous, belong nidi of tuberculous infection, in which patients with meagre bacterial excretion live and the unfavourable factors, enumerated above, or patients, considered to be conditional bacterial excretors, are absent, but there are children and teenagers in the family or there exists at least one of the aggravating factors mentioned above. A doctor pays a visit to these nidi once half a year, and a medical nurse once every two months.

To the third group belong the nidi, where only adults live and the patients are formal bacterial excretors and any aggravating circumstances are absent. To this group belong families in whose private farms there is cattle injured with tuberculosis. A doctor visits these nidi once a year, a medical nurse – once half a year.

The complex of prophylactic measures in a centre of tuberculous infection includes performing a current and conclusive disinfection, isolation of children from the bacterial excretor by means of his hospitalization or sending the children to specialized children's institutions, vaccinization of newly borns and revaccinization of noninfected contactual with BCG vaccine, regular examination of contactuals, performing chemoprophylaxis for them, sanitary-hygienic education of patients and the members of their families, improving their living conditions, intensive treatment of a patient in a clinic, followed by controlled chemotherapy at the dispensary stage.

After the hospitalization of the firstly diagnosed bacillar tuberculosis patient a conclusive disinfection of the patient's dwelling is performed by a

local epidemiological station or disinfecting station. *The conclusive disinfection* is made in all cases of the patient's temporary or constant departing (hospitalization, change of the dwelling place, after death at home). Objects of small value are desirable to be burnt. The ceiling, the walls, the floor, the furniture (except polished one) are irrigated with 5% solution of chloramine and the lodging is tightly closed for 2 hours. Afterwards it is aired and tidied. An effective method of disinfestation of lodgings is ultraviolet radiation. This pertains, first and foremost, to expensive objects, which are easily spoilt with disinfectant solutions; they are radiated with bactericidal lamps.

Before a patient's hospitalization or when he stays at home for various reasons, *current disinfection* is systematically done by the patient himself or by the members of his family which consists in the following:

1) Daily airing and wet tiding of the lodging and objects of home use. The bacterial excretor should use only his personal table utensils, towels, bedding which are systematically disinfestated.

2) Sputum collection into an individual sputum flask, which is filled to a quarter of the volume with 5% chloramine solution and its disinfestation, as is done with the table utensils and meal remnants.

3) Collection, putting into sacks, isolated keeping of used underclothes and its future disinfestation.

Generally, disinfection is done by means of physical methods (boiling, autoclaving, chamber disinfestation, burning, quartzing, insolation, airing, hot ironing) and chemical means (chlorinated lime, chloramine, benzylphenol etc.)

After a tuberculosis patient hospitalization all persons, who contacted him, are examined. Adults and teenagers have to undergo fluorography of the thoracic cage, children undergo roentgenography, children and teenagers also undergo Mantoux test with 2 TU. The contactual persons are registered into the IV group of dispensary observation and chemoprophylaxis is administered to them.

Many species of mammals and birds suffer from tuberculosis. However, most often the greatest danger for a human being is the cattle, rarelier – fowl, goats, pigs, cats, dogs. It is the veterinary service that is responsible for preventing tuberculosis revealing among animals. The examination of the cattle is done by means of tuberculinodiagnostics. Farmworkers undergo fluorographic examination every year. Tuberculosis patients are not permitted to work at farms.

A successful solution of the main tasks of phthisiological service (prophylaxis, timely revealing, treatment, measures in a nidus of tuberculous infection)

to a considerable degree depend on the sanitary enlightenment work among medical personnel, population and patients.

Antituberculous vaccination and revaccination. *The most efficient method of specific prophylaxis of tuberculosis is vaccination and revaccination with BCG vaccine or vaccinoprophylaxis.* In 1921 Calmette and Guerin used BCG vaccine for a baby from bacillar surrounding. In 1923 the Hygienic Committee of the Nations League took a decision as to the wide use of the BCG vaccine for vaccination against tuberculosis in all the countries of the world.

In Ukraine a *tuberculous vaccine* (BCG) is used for active specific prophylaxis of tuberculosis – dry for intracutaneoud transfusion. *These are live mycobacteria of vaccine strain, lyophilicly dried in 1,5 % solution of sodium glutaminate.* It looks like a white dried mass. It is manufactured in ampullas of 1 mg of vaccine, which contains 20 doses, each of 0,05 mg of the preparation. BCG vaccine is used intracutaneously in a dose of 0,05 mg in the volume of 0,1 ml. The primary vac-cination is done to healthy, delivered at the right time newly borns on the 3-5th day of their life.

In addition to BCG vaccine, BCG-M vaccine is manufactured in a half dose (0,5 mg in an ampulla, which contains 20 doses, each of 0,025 mg of the preparation), which is meant for vaccinating prematurely newly borns and children who were not immunised at birth in connection with contraindications, as well as for vaccination and revaccination of children, who live in the territories (areas) contaminated with radionuclides (III-IV zone).

For each inoculation one should have 1-gram syringes valid for use once and a suitable vaccine. The dry vaccine (1 ampulla) is dissolved in 2 ml of isotonic solution and the cultivation is the result, i.e. 1 dose in 0,1 ml of the solution. The vaccine is used during 2-3 hours, the remnant is destroyed by boiling. 0,2 ml of the dissolved vaccine is taken into 1-gram syringe after mixing, the air and part of the preparation up to 0,1 ml mark is evacuated through the needle. The vaccine is injected strictly intracutaneously on the limit between the upper and the middle third part of the shoulder, having previously rubbed the skin with 70° spirit. At the proper technic a whitish papule of 5-6 mm in diameter is formed, which resolves in 15-20 minutes. In 3-4 weeks a small infiltration is formed in the site of the injection – a nodule of cyanotic colour, in which in 50 % of cases a small fistula with cereous secretion is formed. Later on a crust of brown colour is formed, which drops off in 2-4 months and a pink seam (of 4-10 mm in diameter) appears, which

gradually undergoes depigmentation (fig. 33). At the proper vaccination technic the seam is formed in 90-95% of cases, testifying the efficiency of inoculation.

Contraindications for BCG vaccination are:

1) a prematurely born child, when the body mass at birth is less than 2000 g;

2) intrauterine infection;

3) purulent-septic illnesses;

4) hemolytic disease of newly-borns (moderate and severeforms);

5) severe puerperal traumas with neurologic symptomatics;

6) generalized skin wounds;

7) any acute illnesses;

8) generalized BCG infection of other children in the family.

Children (babies), not immunised at a maternity home, in connection with contraindications are vaccinated after recovery at a children's polyclinic or hospital-assistant's health station with BCG-M vaccine during 1-6 months. However, if a baby has reached a 2-months age and more, the Mantoux test with 2 TU should be done before inoculation. Children with negative tuberculine reaction are vaccinated. The interval between Mantoux test and vaccination must be not less than 3 days and not more than 2 weeks.

The immunity after vaccination develops in 6-8 weeks, therefore vaccinated children from the family of tuberculosis patient are isolated from bacterial excretor for the period of the immunity formation, i.e. not less than 2 months.

In children BCG vaccinated at birth *the immunity is preserved during 5-7 years*. After this *the necessity of revaccintion arises*, which is obligatory on the territory of Ukraine at *the age of 7 and 14*. Only healthy persons with negative Mantoux test are revaccinated. Vaccination and revaccination of BCG is an effective means of prophylaxis and it allows to prevent the illness five

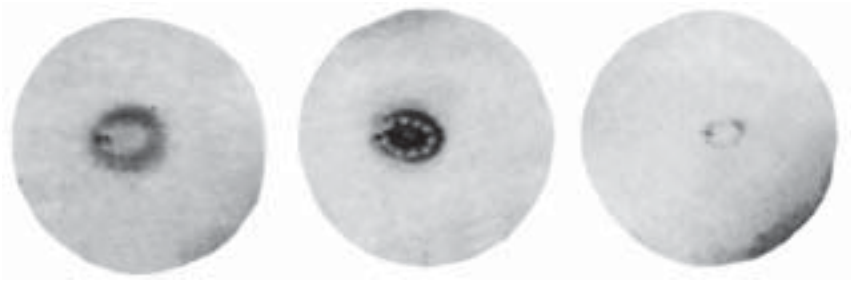


Fig. 33. **Postvaccination seams**

times more, and if it develops, then its course is much milder and has a restricted character. The revaccination technic is the same as that of BCG vaccination. Tuberculin diagnostics (selection for revaccination) is realized by trained medical specialists, members of specialized teams, headed by a pediatrician.

Contraindications for revaccination of children and teenagers:

1) tuberculosis infestation or previously suffered tuberculosis;
2) acute and chronic illnesses in the aggravation period;
3) complication to previous BCG vaccine injection;
4) allergic illnesses in the aggravation stage;
5) malignant blood diseases and neoplasms;
6) immunodeficite states, treatment with immunodepressors;
7) HIV-infestated children.

Other prophylactic inoculations may be done not earlier than in 2 months after revaccination.

In revaccinated persons the local reactions begin to develop earlier, already in a week, but their reverse development also lasts for 2-4 months. Tuberculin allergy develops in vaccinated children – positive tuberculin reactions (2 TU) in 55-65 %, while at using 100 TU – in 90 % of immunized children and teenagers. Postvaccine seam and a positive tuberculin reaction are the criteria of vaccination quality and formation of antituberculous immunity. A local pediatrician does the observation for the development of local postvaccinal reaction and writes it down in the medical documentation in 1, 3 and 12 months after inoculation. The post-vaccinal seam being absent and at negative tuberculin reaction the immunisation is considered to be ineffective. Under unfavourable conditions the inoculation of such children and teenagers should be repeated, but not earlier than in 2 years after vaccination and in a year after revaccination.

The application of BCG vaccine may result into various complications. The frequency of complications after vaccination and revaccination varies within 0,02 – 4,0 %. Most frequently complications occur after inoculation, BCG revaccinations have a local character and are rarely observed (0,02 %).

The WHO International Union of Fighting Tuberculosis classifies *postvaccinal complications according to 4 categories:*

1 category – local skin lesions (cold abscesses, ulcers, keloid seams, regional lymphadenites);

2 category – persisting and disseminated BCG – infection without a lethal result (lupus, ostites etc.);

3 category – disseminated BCG – infection, generalized lesions with a lethal result, which are noticed at a marked immunodeficiency;

4 category – post-BCG-syndrome (an illness, that arises immediately after BCG vaccination, mainly of allergic character, nodal fever, eruption, keloid seams).

The most frequently observed are: subcutaneous cold abscesses, surface ulcers of 10 mm and more in diametre on the spot of intracutaneous injection of BCG vaccine; lymphadenites of regional lymphatic nodes (groin, neck, supra- and subclavian), the size of 1,5 cm and more; keloid seams of 10 mm and more in diametre.

Chemoprophylaxis. Specific prophylaxis is aimed not only to the increase of the body resistance to tuberculous infection by means of active immunisation (vaccination, revaccination), but also by using antimycobacterial means (chemo-prophylaxis).

If effectiveness of BCG vaccination and revaccination sets in after 1-1,5 months, so chemoprophylaxis is viewed as an urgent prophylaxis of tuberculosis, as its preventive action develops from the first hours after taking an antimycobacterial drug. Chemoprophylaxis is recognized to be the most efficient of all methods of tuberculosis prophylaxis.

The primary and the secondary chemoprophylaxis are discriminated. The primary chemoprophylaxis is performed to noninfected persons, who react negatively to tuberculin. *The secondary chemoprophylaxis* is performed with a view to prevent the development of tuberculosis of persons infestated earlier, the ones who react positively to tuberculin and in whom active clinico-roentgenological manifestations of tuberculosis are absent.

Persons undergoing chemoprophylaxis:

1) clinically healthly children, teenagers and persons of young age up to 30, who are firstly MBT infestated;

2) persons with stable hyperergic reactions to tuberculin or their 6 mm and more increase comparing to the previous results;

3) children, teenagers and adults, who are in contact with epidemiologically dangerous tuberculosis patients;

4) persons, who have nonactive tuberculous changes, pregnancy or unfavou-rable factors being present (acute illnesses, operations, traumas), capable of provoking tuberculosis relapse;

5) persons with traces of previously suffered tuberculosis, their illnesses being present (bronchial asthma, collagenose, sarcoidosis,stomach ulcer),

which are treated with various drugs, including corticosteroid hormones, which may provoke complications or tuberculosis relapse.

Among the persons, who underwent chemoprophylaxis, the number of tuberculosis cases is 5-7 times less in comparison to the corresponding groups of people, who did not receive it.

Chemoprophylaxis is performed with isoniazidum or phtivasidum during 2-3 months, and, at the preservation of epidemiological danger, it is repeated twice a year. For adults and teenagers a daily dose of isoniazidum, when used every day, is 0,3 g, for children – 8-10 mg/kg of a body mass. A complex of vitamins is administered in 30 minutes after the intake of the drug with an obligatory inclusion of vitamin B_6 (30-50 mg daily) and vitamin C.

CONTROL QUESTIONS

1. Prophylaxis of tuberculosis and its kinds.
2. The essence of the social prophylaxis of tuberculosis.
3. The definition of the sanitary prophylaxis of tuberculosis.
4. What is meant by a nidus of tuberculous infection and its division into groups.
5. Specific prophylaxis of tuberculosis, characteristic of BCG and BCG-M vaccine.
6. Indications and contraindications to BCG vaccination.
7. Methods of performing vaccination. Terms of developing immunity, its duration, effectiveness criteria.
8. Indications and contraindications to revaccination, terms of its performance.
9. Chemoprophylaxis and its kinds, indications (for children, teenagers, adults).
10. Antituberculous drugs (preparations) used for chemoprophylaxis, their doses, duration.

TESTS

1. Patients with firstly diagnosed tuberculosis of lungs may receive sick leaves with the term up to:
   A. 1 month
   B. 4 months
   C. 6 months
   D. 10 months
   E. 14 months
2. Particularly risk for the human comes from ill with tuberculosis:
   A. Cows
   B. Horses
   C. Hens

D. Goats
E. Dogs

3. What is BCG and BCG-M vaccine?
A. Killed mycobacteria culture
B. Mycobacteria vital activity products
C. Mycobacteria live weakened culture
D. Compound of purified tuberculin and killed mycobacteria
E. Insufficient by purified dry tuberculin

4. What is the value of BCG vaccine?
A. Tuberculosis lighter course
B. Prevents infestation
C. Guarantee from an illness
D. Less chance of catching tuberculosis
E. Prevents tuberculosis relapse

5. In what time after BCG-vaccination does the immunity develop?
A. In 6-8 days
B. In 6-8 weeks
C. In 6-8 months
D. In 9-12 months
E. In 5-7 years

6. In what cases is revaccination with BCG vaccine done?
A. To infestated persons
B. To noninfected persons
C. To contractual persons with doubtful reaction on Mantoux test with 2 TU
D. To tuberculosis patients
E. To persons who had previously been ill with tuberculosis

7. The terms of BCG revaccination performance in Ukraine.
A. On 3-5th day after birth
B. On 3-5th week after birth
C. At 3, 5 years of age
D. At 7,14 years of age
E. At 17, 30 years of age

8. A healthy child was born weighing 3200 g. On what day after the birth is the BCG vaccination done?
A. 1-2
B. 3-5
C. 7-11
D. 13-15
E. 25-30

9. Vaccination and revaccination with BCG vaccine is done:

A. Cutaneously
B. Intracutaneously
C. Subcutaneously
D. Intramuscularly
E. Perorally

10. In a seven-years-old girl in 5 months after the revaccination, in the place of vaccine injection of BCG a swelling with cyanotic touch of skin appeared, at palpation – fluctuation. What is the postvaccinal complication?
A. Lymphodenit
B. Cyst
C. Keloid seam
D. Ulcer
E. Cold abscesse

11. What does a 5 mm seam formed in 4 months after BCG vaccination testify?
A. To high reaction of vaccine
B. To complication – keloid seam
C. To violation of vaccine injection techniques
D. To the lack of antituberculous immunity
E. To the presence of postvaccinal immunity

12. What antimycobacterial preparation is prevalently used to make the chemoprophylaxis?
A. Streptomycinum
F. Rifampicinum
C. Pyrazinamidum
D. Isoniazidum
E. Ethambutolum

13. The chemoprophylaxis is performed during:
A. 3 days
B. 3 weeks
C. 3 months
D. 6 months
E. 9 months

14. After realized BCG vaccine inoculation some not used vaccine remained. What is to be done with it?
A. In 2-3 hours after dilution the not used vaccine has to be destroyed by boiling
B. In 24 hours the not used vaccine has to be destroyed
C. To preserve 2-3 days. Then to destroy
D. To preserve during one week in a refrigerator
E. To preserve during one year in a refrigerator

TASKS

1. A healthy child of 3 months old. The child has not been inoculated by BCG vaccine because he was born with haemolytic disease of medium severe stage.

a) May the vaccination of the child be done?

b) In what conditions?

c) What is the preparation of the vaccine?

2. A girl of 7 years old. Mantoux test reaction with 2 TU is negative. Her mother has the FDTB (04.04.2003) of the upper part of the right lung, Destr+ (infiltration), MBT+M-C+, Resist-, HIST0, Cat1 Coh2(2003).

a) May the BCG revaccination be done?

b) May the chemoprophylaxis be done?

c) In what sequense is it done?

3. An educator of a kindergarten with FDTB (03.12.2002) of the upper part of the right lung (nidal), (infiltration), Destr-, MBT-M-C-, HIST0, Cat3Coh4(2002). Her general state is good.

a) May the educator be allowed to work?

b) Your tactics conformably to children, who are to visit the kindergarten.

4. In a mother of a family of seven children and husband, FDTB (14.02.2004) in the lower part of the right lung (tuberculoma), Destr+, MBT+M-C+, Resist+(S,R), HIST0, Cat1Coh1(2004) has been revealed.

a) Your tactics conformably to the sick woman

b) May the chemopropylaxis to contactual persons be done and for how long?

5. May revaccination and chemoprophylaxis be done simultaneously?

a) Yes. b) No.

6. A child Z., 8, from a centre of tuberculous infection. At the age of 7 she was BCG revaccinated, there is no postvaccinal sign.

What is your tactics?

7. A baby A. was BCG vaccinated on the 3rd day of birth. In 3 months an ulcer of 12 mm in diametre formed on the spot of the vaccine injection.

a) What does it testify of?

b) Your tactics.

8. A female patient K., 25, has been suffering from FDTB (01.11.2001) (disseminated), Destr+, (infiltration), MBT+M+C+, Resist-, HIST0, Cat1 Coh4(2201) during the last four months, has given a birth to a child.

a) Your tactics conformably to the woman recently confined.

b) May the child be vaccinated?

ORGANIZATION OF ANTITUBERCULOUS ACTIVITY IN THE PERIOD OF TUBERCULOSIS EPIDEMY

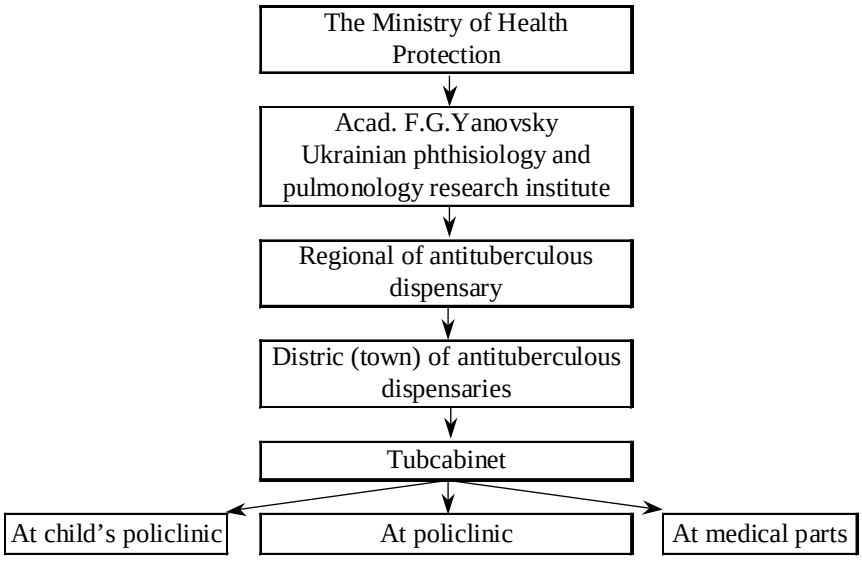
Tuberculosis is a social disease and is a mirror of social-economic prosperity of the state and the well-being of its people, therefore antituberculous measures under present conditions must be taken on the national level by the government of the country.

At present time, the principal task in fighting tuberculosis in Ukraine is to take the epidemy of the illness under control (I stage), to stabilize the epidemiological indices (infestation, morbidity, sickliness and death rate) of tuberculosis (2 stage), and then their gradual decrease (3 stage).

For the successful organization of antituberculous measures close cooperation of the medical system, sanitary-epidemiological service and the organs of the state power is necessary. The general organization and methodological guidance of antituberculosis activity in this country is realized by the Ministry of Health Protection of Ukraine and Acad. F.G.Yanovsky Ukrainian phthisiology and pulmonology research institute (scheme 1).

Scheme 1

Structure of antituberculosis service in Ukrainian



Antituberculous dispensary (Engl. dispensation – distribution) *is a specialized medicative-prophylactic institution, which work is aimed at lowering morbidity, sikliness, infestation with tuberculosis and death rate caused by it as well as at conducting a complex of organizational and methodical, prophylactic antituberculous measures among the district population.*

The main tasks of an antituberculous dispensary are:

1) prophylaxis;
2) early revealing;
3) treatment of tuberculosis patients;
4) registration of groups of tuberculosis patients and contingents of persons with an increased risk of its development and their observation.

Additionally, the decisive in the organization of those main tasks is their active administration and, in the first turn, by the general medical net (prophylaxis and tuberculosis detection) and by antituberculous service (treatment and observation).

One of the priorities in the work of an antituberculous dispensary is conducting prophylactic antituberculous measures.

Other very important tasks of an antituberculous dispensary are revealing, registration and treating tuberculosis patients. The results of treating tuberculosis patients to a considerable degree depend on the disease being timely revealed. In this connection, *firsty diagnozed tuberculosis patients are divided into three groups: timely, untimely and lately revealed.* For children and teenagers the fourth group is separated – *early revealing.*

The main criteria of dividing patients into groups are the character of a specific process, the presence or absence of destruction (cavern) and bacterial excretion, peculiarities of the prognosis at treatment, the degree of a patient's danger for healthy persons.

Children and teenagers, in whom the following factors are diagnosed, compose *a group of early revealed:*

1) tuberculin test range;
2) primary tubinfestation;
3) hyperergic Mantoux test;
4) tuberculous intoxication.

To the first group – timely revealed belong patients with uncomplicated forms of primary tuberculosis: primary tuberculous complex, tuberculosis of intrathoracic lymphatic nodes, restricted (1-3 segments) forms of secondary

tuberculosis: nidal, infiltrative, disseminated without decay; exudative pleurisy. Revealing MBT, the lung destruction being absent, does not exclude the possibility for a patient to belong to a group of timely revealed. At treating such patients the recovery reaches 100 %.

To the second group – untimely revealed – belong patients with complicated forms of primary tuberculosis, primary tuberculosis with a chronic course, nidal, infiltrative, tuberculoma, disseminated tuberculosis with a decay and MBT. Under conditions of modern antimycobacterial therapy the cessation of bacterial excretion sets in 88 % of cases, while the healing of decay cavities – in 76 %. The clinical recovery in such cases is frequently accompanied by the formation of big residual changes.

The third group – lately revealed (neglected tuberculosis) patients with fibrous-cavernous, cirrhotic, chronic disseminated with a cavern, pleural empyema. It is the most unfavourable group of patients with respect to clinic, prognosis and epidemiology. The reasons of untimely revealing of tuberculosis are peculiarities of the illness course (asymptomatic course, presence of accompanying maladies), inattentive and careless patient's treatment of his health (alcohol and drug addiction, low sanitary competence), a doctor's diagnostic errors (lowering the attention of doctors of general medical system to tuberculosis).

The principal ways of revealing tuberculosis:

1. Prophylactic examinations (children – tuberculinization; teenagers – tuber-culinization, and from the age of 15 – additionally fluorography; adults – fluorography).
2. Revealing at the application for medical aid.
3. Observing persons with higher risk of catching tuberculosis.

The principal methods of revealing tuberculosis are roentgenologaical, tuberculinodiagnostics and microbiological ones.

The principal method of early revealing of tuberculosis in children aged up to 14 is yearly mass prophylactic examinations with making Mantoux test with 2 TU. Teenagers (from 15 years of age), in addition to tuberculino-diagnostics, are examined fluorographically. The examination of persons aged before calling for service takes place at military registration and enlistment offices, if over 6 months have passed since the previous examination.

The complete (massive) examination of the population is performed from 18 years of age, once in two years. However, in areas, where tuberculosis statistics does not exceed 30 for 100000 of the population and the percentage

of firstly diagnosed fibrous-cavernous tuberculosis does not exceed 0,5, the massive fluorographic examination is done once in 3 years.

During prophylactic fluorographic examinations special attention is paid to the socalled *"obligatory contingents"*. These are persons, who are in a direct contact with children and teenagers: 1. workers of medicative, health, educational institutions for children and teenagers up to 18 years of age, and maternity homes personnel;

2. workers of public catering, alimentary blocks, dairy farms, trade, i.e. persons who deal with foodstuffs;

3. workers of institutions of sanitary-hygienic population service, hotels, hostel tenants, students during the period of study at secondary special and higher educational institutions in professions that belong to the "obligatory contingents". All these contingents are due to fluorographic examination while getting a job, and then – once a year. Prisoners, who stay in solitary confinement cells, are examined twice a year.

Tuberculosis revealing at applying for the medical aid reaches 50 % of cases. Their revealing, for the most part, depends on phthisiological attention of the general medical network, first and foremost, on therapeutists.

Groups with increased risk of catching tuberculosis. In polyclinics of general profile the object of observation are persons with stomach and duodenal ulcer, after operation due to these maladies; diabetes, dust professional pulmonary illnesses, LCI, after suffered exudative pleurisy, chronic insufficiency of adrenal glands, chronic unspecific illnesses, alcohol and drug addiction; persons who underwent protracted courses of corticosteroid and ray therapy; with small posttuberculous lung changes, as well as with extensive residual changes after unspecific pulmonary illnesses.

Pregnancy, postnatal period, AIDS are classified to the group of increased tuberculosis risk.

Persons, belonging to the risk group, are examined fluorographically once a year at medical institutions of the general profile.

The following groups of increased tuberculosis risk are under observation at antitubercular dispensaries.

DISPENSARY CATEGORY

Contingents of antitubercular dispensaries are divided into categories, which enables to examine them differentially, define the treatment tactics, perform prophylactic and rehabilitation actions.

Table 11

Dispensary supervision over the persons subject to prophylactic medical examination at the doctor – phthisiatrician

Categories and groups of dispensary supervision		Control terms of inspection	Term of supervision	Medical and dispensary actions	Criteria of efficiency of treatment and prophylactic medical examination
№	Definition				
1	2	3	4	5	6
Cat 1	Firstly diagnosed tuberculosis with bacterial excretion, and also other grave and disseminated (with defeets of more than two segments or two and more bodies) forms of disease without bacterial excretion: miliary, disseminated, meningoencephalitis, exudative pleurisy, pericarditis, peritonitis, tuberculosis of intestine, tuberculosis of spine with neurologic complications, genitourinary tuberculosis	Not less than once a month in intensive and once in two months in supporting phases of treatment. Volumes and terms of radiological inspection, research sputum analysis are given for adults in the table 12, for children in table 13	Before treatment or the end of the basic course of treatment, or exclusion from a category because of various reasons: inefficient treatment, death, transference to an other clinic. A deadline of supervision – 2 years	Complex etiologic and pathogenetic treatment, under indications surgical intervention	Recovery discontinuance of bacterial excretion, completion of the basic course of treatment
Cat 2	Relapses of tuberculosis with bacterial excretion and without bacterial excretion and firstly diagnosed tuberculosis, inefficient therapy with and without bacterial excretion, and also patients with interrupted treatment more than for 2 months (with and without bacterial excretion)	Analogically	Analogically	Analogically	Analogically

Table 11

1	2	3	4	5	6
Cat 3	Firstly diagnosed tuberculosis without bacterial excretion, with the limited process in lungs (with defets in not more than two segments) and extrapu-lmonary tuberculosis which is not referred to the 1st category; a tubercular intoxication in children and tuberculosis of intrathoracic lymphatic nodes or primary tuberculous complex in calcination phase at the preservation of activity of the process.	Not less often than once a month in an intensive phase and once in two months in supporting phase of treatment	Analogically	Analogically	Healing, the completion of the basic course of treatment
Cat 4	Chronic tuberculosis of various localization with bacterial excretion and without bacterial excretion	Not less often than once a month in an intensive phase and once in two months in supporting phase of treatment. After the end of the basic treat-ment at the process remission once in 3-6 months	Without time restriction	Complex etiologic and pathogenetic treatment, under indications sur-gical intervention	Healing, end of the basic course of treatment, liquidation of an aggravation of tuberculosis, preservation of life

Table 11

1	2	3	4	5	6
Group 5.1	Residual changes after healing of tuberculosis (RCTB) of various localization	In the first year of supervision not less than once in 6 months. The next years of supervision it is carried out not less than once in 12 months	Small residual changes of tuberculosis – 3 years, big residual changes of tuberculosis – 10 years, tuberculoma in the size of more than 4 cm, prevalent cirrhosis of lungs – life supervision. Children and teenagers with RCTB are observed till 18 years of age	At presence or occurrence of factors which reduce resistibility of an organism to carry out antirelapse courses with antitubercular preparations during 2-3 months	Absence of relapses
Group 5.2	Contacts – the persons who are in contact with bacterial excretors (for children and teenagers also with active tuberculosis patients) or with tuberculous agricultural animals	Not less often than once in 6 months. In the period of antirelapse treatment it depends on a technique of its realization	During all time of contact, and also 12 months after removal from the observation, death or departure	The actions directed to the improvement of the center of tubercular infection and the increase of the resistibility of an organism contacting will be carried out chemoprophylaxis, revaccination of non-infected children BCG	Absence of relapses of tuberculosis disease

Table 11

1	2	3	4	5	6
Group 5.3	Adults with tubercular changes of organs of breath of uncertain activity who are notunder supervision of an antitubercular establishment	At out-patient treatment depend on a technique of its realization	3 months	High-grade inspection. In case of need, realization of trial chemotherapy about 3 months	Putting under observation in 1 or 5 category, depending on the activity of tuberculosis
Group 5.4	Children and teenagers infected with tuberculosis, from groups of risk (tuberculin test range, hyperergy reaction on tuberculin, increase of tuberculin sensitivity 6 mm for one year, and also children with chronic somatic diseases	Control inspections twice a year. During chemopro-phylaxis 3 times a month	At favourable course of an infection during one year, at preserva-tion of hyperergy re-actions on tuberculin, and also infected with the chronic centers of a nonspecific infec-tion during 2 years	Disposable three-months course of con-trolled chemoprophy-laxis under observation. At preservation of hy-perergy the course of chemoprophylaxis is appointed during 3 months	Absence of tuberculosis cases
	Children who were not BCG inoculated in neonate period	Nonvaccinated children before BCG vaccinati-on are subject to obser-vation once in 3 months by phthisio-pediatrists and respective experts in children's polyclinics	Before realization of vaccination	Chemoprophylaxis and improvement are carried out in sanato-rium conditions, in a sanatorium day nursery, kindergartens, boarding schools, wood schools, and also in children's and teenagers establish-ments of the general type	

Table 11

1	2	3	4	5	6
	Children with postvaccinal BCG complications	Under medical indications, but not less often than once in 3 months	1 year	Chemoprophylaxis is carried out in differentiation, according to the condition of the child and dissemination of medicamentous MBT resistance in the region and the centers of an infection	
Group 5.5	Children and teenagers, in whom it is necessary to specify the etiology of sensitivity to tuberculin (postvaccination or infectious allergy), or the character of changes in lungs and other organs with the purpose of differential diagnostics. Children and teenagers with tubercular changes in organs of breath of uncertain activity	Under indications. During chemotherapy owing to postvaccinal complications 3 times per one month	About 6 months	Tuberculinodiagnostics and clinic-radiological inspection in a clinic, in necessary cases in a hospital for differential diagnostics with the purpose of revealing a tubercular infection. Treatment from 2 to about 4 months with repeated clinic-radiolo-gical inspection for the decision of a question to etiology or the activity of the process	Transferred to 1, 3 categories or to 5.4 group

Table 12

Volumes of observation of contingents of the adults who are on dispensary registration at a doctor – phthisiatrician

Categories and groups	Roentgenological observation	Laboratory analysis	Analysis of sputum, bronchial lavage water, gastric, bioptates (bacterioscopy and inoculation)	Tuberculin tests
1	2	3	4	5
Cat 1, 2, 3	At registration or receipt in a hospital – inspection roentgenography and in lateral projections, the subsequent examinations are repeated each 2 months. The tomogram of the injured sites of the lungs is carried out at receipt in the clinic, and then each 2 months before the healing of cavities, and also at an extraction. Under indications – computer tomography of lungs. After cavities healing of examination once in 3-4 months	Registration take the general analysis of blood and urine, in blood a level of bilirubin, alanine aminotranspherase. At receipt in a hospital in addition it is necessary to define a group of blood, a Rhesus factor, sugar in blood and urine, inspection of blood analysis on Hbs-Ag, AIDS, Wassermann reaction. During the application of antituberculous preparations monthly to carry out the analysis of blood, urine, biochemical analysis (bilirubin, aminotranspherases).	At registration triple sputum analysis (washout from bronchial tubes) on MBT by method bacterioscopy, and triple analysis of the material by a method of crop on nutrient media with obligatory definition of medicinal sensitivity of MBT, further each month two-multiple analogical analysis before the termination of bacterial MBT excretion and healing of cavities in lungs. The termination of MBTexcretion proves to be true by not less than two consecutive negative bacterioscopic and bacteriological ranalyses during 2-3 months	Registration Mantoux test with 2 TU PPD-L

Table 12

1	2	3	4	5
Cat 4	At an aggravation examination is carried out as in patients of the 1st category. During remission once in 3-6 months	During treatment in a hospital similarly to the volume and terms of examination of the 1-st category patients. During remission not less than once in 3 months to make the general analysis of blood and urine	During treatment by antitubercular preparations once a month microscopy and crop of a material on MBT, with obligatory research of medicamental resistance to preparations of 1 and 2 lines. During remission of once in 3 months	Similarly
Group 5.1	In the first year of supervision the roentgenogram (fluorogram) once in 6 months, further not less than once per one year before removal from observation. The tomogram under indications	Once in 6 months the first year, further once a year	Once in 6 months the first year of supervision, further under indications	Under indications
Group 5.2	Not less than once in 6 months, and in the period of chemoprophylaxis they are defined by a technique of its realization	Once in 6 months	At suspicion of tuberculosis	Once a year
Group 5.3	The roentgenogram and the tomogram if registered; further on once in 2 months	The general analysis of blood and urine once a month	At registration, further – once in 2 months	At registration

Table 13

Volumes of observation of children and teenagers who are on dispensary registration at the doctor-phthisiatrician

Categories and groups	Roentgenological observation	Laboratory analysis	Analysis of sputum, bronchial lavage water, gastric, bioptates (bacterioscopy and inoculation)	Tuberculin tests
1	2	3	4	5
1, 2, 3	At local forms of tuberculosis in an intensive phase of treatment roentgenograms, tomograms not less often than once in 2 months, in a supporting phase once in 3 months. At an early tubercular intoxication 2 times per one year. At indications – computer tomography of lungs	At registration and in a hospital in an intensive phase of treatment each month to make the general analysis of blood and urine to define a level of bilirubin, in blood, alanine aminotransphera-se; ureas, residual nitrogen, the general fiber. At the receipt in a hospital it is necessary to define a group of blood and a Rhesus factor, sugar in blood and urine, analysis of blood on Hbs-Ag, AIDS, Wassermann reaction. In supporting phase of treatment not less often than 1 time in 2 months to make the general analysis of blood and urine to define a of level bilirubin, alanineaminotrans-pherase	At registration thrice analysis of sputum (washout from bronchial tubes) on MBT by a method of bacterioscopy, and thrice research of the material by crop on nutrient media with obligatory definition medicinal sensitivity MBT, the further each month two-single analogical research before the termination of allocation MBT, then during 3 months each month two-single analogical research. At revealing MBT obligatory research medicamentous them resistance up to antitubercular preparations	At the beginning of treatment and after its ending

Table 13

1	2	3	4	5
4	Roentgenograms, tomograms at local forms of disease in an intensive phase of treatment not less often than once in 2 months, in supporting phase once in 3 months. In a phase of remission once in 6 months	During treatment in a hospital analogically to volume and terms of observation of 1-st category patients. During remission not less than 1 time in 3 months to make the general analysis of blood and urine	At registration thrice analysis of sputum (washout from bronchial tubes) on MBT by a method of bacterioscopy, and thrice analysis of the material by crop on nutrient media with obligatory definition medicinal sensitivity of MBT, further each month twice analogical research before the termination of MBT excretion, then during 3 months each month twice analogical research. During remission analysis of the material on MBT once a month by a method of microscopy, and if necessary – by the cultural method	During the realization of the basic course at the beginning of treatment and after its ending. During remission once a year
5.1	The roentgenogram 2 times per one year in the first year of supervision, once a year before removal from registration	The analysis of blood and urine once half-year in the first year, at antirelapses courses – monthly	1 time in 6 months in the first year, further – under indications by a method of microscopy and crop	Once a year

Table 13

1	2	3	4	5
5.2	The roentgenogram once to not infected and 2 times per one year to infected (to children till 3 years of age once a year)	The analysis of blood and urine once 3-6 months, at chemoprophylaxis monthly	To not infected and infected children - 1 time in 6 months by a method of microscopy	Once a year
5.4	The roentgenogram, the tomograms at a registration and removal from registration	The analysis of blood and urine once in 6 months, at chemoprophylaxis monthly	At registration and removal from the registration by a method of microscopy	Once a year
5.5	The roentgenogram, the tomograms at a registration and removal from registration	The analysis of blood and urine once at registration and removal from registration	At registration 3 analysis by a method of microscopy and 2 analysis by a cultural method	At registration

Contingents of adult persons, children and teenagers due to being observed at an antitubercular dispensary, are divided into 5 dispensary categories: 1, 2, 3, 4 and 5 (Tabl 11, 12, 13).

To 5 categories (Cat 5) are referred dispensary contingents of risk to disease to a tuberculosis and its relapse.

WORKING CAPACITY EXAMINATION

The working capacity examination of a pulmonary tuberculosis patient starts from the moment of a diagnosis establishment. *In practical activity the two principal kinds of losing one's working capacity are possible – temporary and steady ones. Furthermore, the loss of one's working capacity may be partial or complete.*

Temporary disabled or invalid patients are considered the one for whom real prospects for reviving their working capacity, during regulated by respective resolutions terms, exist. The examination of temporary invalidism is done by *medicinal consultative committees (MCC)*, which specify the duration of invalidism, relegate patients to *MSCE (medico-social commission of experts)* with a view to prolong the sick leave for the maximum permitted term; relegate to MSCE for establishing the group of invalidism and issue a patient references with recommendations of rational employment.

Temporary disabled patients with firstly diagnosed tuberculosis, relapse or the process aggravation are issued sick leavels from 2 to 10 months (with MSCE agreement up to 12 months) depending on the character of tuberculous process and its dynamics under the influence of the treatment. Patients of chronic forms of tuberculosis as well as tuberculosis working invalids at the process aggravation or progressing are entitled to getting a sick leave for up to 4 months uninterruptedly or with intervals not more than 5 months during a calendar year.

The steady loss of one's working capacity is specified when, in spite of treat-ment, the disturbance of the body functions has acquired a stable character and a patient is unable of doing his daily professional duties, i.e. he becomes an invalid.

The partial invalidism or disability is established in cases, when a patient temporarily cannot work according to his speciality, but without any harm for his health he can do another job.

The complete invalidism or disability is meant as a state, when a patient is in need of constant special regimen and treatment.

In dependence with the degree of the working capacity loss MSCE establishes the *III, II (for a year) and the I (for 2 years) group of invalidity.* The III group of invalidity is established at inessential loss of working capacity; at a more essential loss of working capacity, when a patient at the presence of essential (considerable, marked) disturbances as a result of tuberculosis, which have become an obstacle for his labour activity, but there is no need in outside supervision – the II group of invalidity. The I group of invalidity is established at complete stable and protracted (durable) loss of working capacity of patients who need outside care.

Permanent invalidity is established for males aged 60 and for females aged 55 with severe chronic irreversible tuberculosis, as well as after pulmonectomy and at essential deformations of the thoracic cage.

MSCE is obliged to give invalids specific recommendations pertaining to their employment, having analyzed the conditions of work and real possibilities of their improvement. The renewal of working capacity of a person, who suffered and recovered from tuberculosis, is an important task of medicine. *Medical, professional and social rehabilitation after a patient's recovery are discriminated. The medical rehabilitation is the renewal after treatment of the lost or weakened functions of an organism.*

The aim of the professional rehabilitation is returning of persons recovered from tuberculosis, to their previous work or their retraining and mastering new accessible professions and skills. The social rehabilitation consists in rational profiting by residual working capacity of sick people and invalids. It positively influences the psychics and the emotional state of a man, makes him useful for the society.

CONTROL QUESTIONS

1. An antitubercular dispensary. The essence of the dispensary method of population and patients care.
2. The main tasks of an antitubercular dispensary.
3. The structure of phthisiatric service and types of antitubercular institutions in Ukraine.
4. The principal ways of revealing tuberculosis.
5. The division of firstly diagnosed patients into 3 groups.
6. The notion of a tuberculous infection nidus, its division into groups and sanitary-prophylactic work in them.
7. Disinfection and its kinds at tuberculosis.
8. Obligatory contingents, which are due to regular examination for tuberculosis.

9. Groups with increased risk of catching tuberculosis.
10. Groups of dispensary observation of adults.
11. Dispensary registration of children and teenagers.
12. Working capacity examination: temporary and steady loss of one's working capacity, groups of invalidity. The duration (maximum permitted term) for issuing the sick leave and conditions of relegating a patient to MCC and MSCE.

TESTS

1. Principal method of revealing tuberculosis among children.
   A. Bacterioscopy of sputum
   B. Fluorography
   C. Tuberculinodiagnostics (Mantoux test with 2 TU)
   D. Bronhoscopy
   E. Tomography on bifurcation level
2. From what age is fluorographic examination performed?
   A. 5 years
   B. 7 years
   C. 14 years
   D. 15 years
   E. 17 years
3. To timely revealed of tuberculosis belong:
   A. Primary tuberculosis complex, ph. decay, MBT (+)
   B. Nidus lung tuberculosis, ph. infiltration, MBT (-)
   C. Lung cirrhotic tuberculosis, MBT (-)
   D. Infiltrative lung tuberculosis, ph. decay, MBT (-)
   E. Disseminated lung tuberculosis, ph. decay, MBT (-)
4. To lately revealed lung tuberculosis belong:
   A. Lung tuberculoma, MBT (+)
   B. Tuberculosis pleurisy
   C. Miliary tuberculosis, MBT (+)
   D. Infiltrative lung tuberculosis, ph. decay, MBT (-)
   E. Lung fibrous-cavernous tuberculosis, MBT (+)
5. The complete fluorographic examination of the population beginning with 18 years of age is performed.
   A. Once in 6 months
   B. Once a year
   C. Once in 2 years
   D. Once in 3 years
   E. Once in 5 years

6. The group with the increased risk of catching tuberculosis includes patients with:
   A. Chronic tonsillitis
   B. Diabetes
   C. Inguinal hernia
   D. Hypertonic disease
   E. Ascaridosis
7. What dispensary registration category will the patient with FDTB (22.02.2202) of the upper part of the left lung (infiltration), Destr+, MBT+M+C+, Resit+ (S, R), HIST0 be observed in?
   A. 1
   B. 2
   C. 3
   D. 4
   E. 5
8. Patient K., 25, died from lung fibrous-cavernous tuberculosis, MBT (+). For how long must members of his family be observed at antitubercular dispensary?
   A. 3 months
   B. 6 months
   C. 12 months
   D. 2 years
   E. 5 years
9. Prophylactic fluorographic examinations rate of "obligatory contingents":
   A. Once in 6 months
   B. Once in 9 months
   C. Once a year
   D. Once in 2 years
   E. Once in 3 years
10. Permanent invalidity is established for males and females consequently at the age of:
   A. 45 and 35 years
   B. 50 and 40 years
   C. 55 and 45 years
   D. 60 and 55 years
   E. 65 and 60 years
11. The patient, 34 years old, 8 years ago was treated because of the infiltrative tuberculosis of lung. Her state became much better. During the last 6 years the X-ray picture was stable (on the right side under the clavicle there was the region of pneumosclerosis and two calcinates). To what group of dispensary observation does she belong?
   A. 5.1

B. 5.2
C. 5.3
D. 5.4
E. 5.5

12. The teacher O., 28 years old, was treated during 10 months because FDTB (05.05.2003) of the upper part of the right lung (infiltration), Destr+, MBT+M-C+, Resist-, HIST0, Cat1 Coh2(2003). The state became much better (the absence of MBT, the closing of the cavity of decay). What is the tactics for the employment?
    A. To be let to the previous work
    B. To continue the list of uncapacity to work up to 12 months and then to be let to work
    C. To direct to the MSEC to indicate the III invalid group
    D. To direct to the MSEC to indicate the II invalid group
    E. To propose another job

TASKS

1. In a patient of 35, RTB (23.07.2003) of the right lung in the phase (infiltration), Destr+ (sowing), MBT+M+C+, Resist-, HIST0, Cat2 Coh3(2003) has been revealed. Contacts: wife and seven-years-old child.
    a) What measures will be taken in a center of tuberculosis infection?
    b) May BCG revaccination be performed and at what condition?

2. An kindergarten teacher with FDTB (18.08.2003) at the upper part of the right lung (nidal), Destr+, MBT+M-C+, Resist-, HIST0, Cat1 Coh3(2003).
    a) Quality revealing will be estimated.
    b) Tactics in conformity with the patient and children.

3. FDTB (16.06.2002) of the upper parts of both lungs (disseminated), Destr+, MBT+M+C+, Resist+(S), HIST0, Cat1 Coh2(2002) has been .
    a) To qualify the category of dispensary observation.
    b) For how long will the patient you think excrete mycobacteria.

ANSWERS

Pp. 16-18
1.B 2.E 3.C 4.B 5.E 6.B 7.C 8.E 9.B 10.C 11.B 12.A

Pp. 22-24
1.E 2.D 3.B 4.C 5.C 6.D 7.B 8.B 9.C 10.C 11.D

Pp. 30-32
1.D 2.E 3.D 4.A 5.D 6.D 7.B 8.D 9.C 10.C 11.C 12.E

Pp. 37-39
1.C 2.A 3.D 4.E 5.E 6.E 7.A 8.D 9.D 10.D 11.A 12.C
13.C 14.D

Pp. 45-47
1.B 2.E 3.D 4.D 5.A 6.C 7.C 8.A 9.C 10.E 11.A 12.E

Pp. 59-61
1.B 2.B 3.E 4.C 5.D 6.B 7.E 8.C 9.A 10.D

Pp. 67-70
1.C 2.D 3.B 4.E 5.C 6.D 7.D 8.C 9.E 10.D 11.E 12.C

Pp. 73-75
1.C 2.A 3.A 4.B 5.B 6.D 7.D 8.D 9.C 10.C 11.D 12.C

Pp. 80-82
1.C 2.E 3.B 4.C 5.A 6.B 7.B 8.E 9.B 10.B

Pp. 86-89
1.C 2.C 3.A 4.D 5.C 6.B 7.D 8.C 9.A 10.C 11.D 12.C

Pp. 94-96
1.D 2.A 3.A 4.D 5.C 6.C 7.D 8.B

Pp. 99-101
1.B 2.A 3.C 4.B 5.E 6.C 7.E 8.A 9.A

Pp. 105-107

1.A 2.C 3.A 4.A 5.E 6.A 7.B 8.B 9.C 10.D 11.C 12.E

Pp. 125-127

1.D 2.B 3.A 4.C 5.D 6.A 7.C 8.A 9.B 10.E 11.D 12.A

Pp. 147-149

1.A 2.C 3.D 4.A 5.A 6.E 7.D 8.D 9.E 10.C 11.D 12.D
13.C 14.D

Pp. 166-168

1.C 2.A 3.A 4.C 5.D 6.C 7.C 8.A 9.C 10.B 11.B 12.C
13.D 14.D 15.B 16.C 17.E

Pp. 179-182

1.C 2.A 3.C 4.E 5.C 6.D 7.C 8.B 9.E 10.D 11.C 12.E
13.A

Pp. 204-206

1.D 2.B 3.C 4.D 5.B 6.C 7.C 8.C 9.A 10.D 11.D 12.C

Pp. 215-217

1.D 2.A 3.C 4.D 5.B 6.B 7.D 8.B 9.B 10.E 11.E 12.D
13.C 14.A

Pp. 235-237

1.C 2.D 3.B 4.E 5.C 6.B 7.A 8.C 9.C 10.D 11.A 12.C

INDEX

LITERATURE

1. Александрова А.В. Рентгенологическая диагностика туберкулёза органов дыхания. – М.: Медицина, 1983. – 192 с.
2. Бліхар Є. Фтизіатрія: Підручник. – Тернопіль: Укрмедкнига, 2002. – 372 с.
3. Васильев Н.А. Туберкулёз (учебное пособие). – М.:Медицина, 1989. – 206 с.
4. Иванюта О.М., Пилипчук Н.С., Назаренко В.Г. и др. Туберкулёзный менингоэцефалит. – К.: Здоров'я, 1987. – 128 с.
5. Кулачковский Ю.В. Хроническое легочное сердце при туберкулёзе. – К.: Здоров'я, 1981. – 213 с.
6. Лайт Р.У. Болезни плевры (Перевод с англ.). – М.: Медицина, 1986. – 376 с.
7. Перельман М.И., Корякин В.А., Протопопова Н.М. Туберкулёз: Учебник. – М.: Медицина, 1990. – 304 с.
8. Пилипчук М.С., Петренко В.І. Фтизіатрія. – К.: Вища школа, 1998. – 255 с.
9. Струков А.И., Соловьева И.П. Морфология туберкулёза в современных условиях: 2-е изд. – М.: Медицина, 1986. – 232 с.
10. Товстуха Є.С. Фітотерапія: Вид. друге. – К.: Здоров'я, 1993. – 350 с.
11. Туберкулёз органов дыхания /Под ред. А.Г. Хоменко. – М.: Медицина, 1988. – 576 с.
12. Туберкулёз у детей и подростков: Руководство для врачей / Под ред. Е.Н. Янченко, М.С. Греймер. – Изд. 2-е, перераб. и доп. – СПб.: Гиппократ, 1999. – 336 с.
13. Фещенко Ю.І., Ільницький І.Г., Мельник В.М., Панасюк О.В. Туберкульоз позалегеневої локалізації. – Київ: Логос, 1998. – 376 с.
14. Фещенко Ю.І., Мельник В.М. Туберкульоз легень в період епідемії: епідеміологічні, клініко-діагностичні, лікувально-профілактичні та організаційні аспекти. – К.: Логос, 1998. – 284 с.
15. Фещенко Ю.І., Мельник В.М. Сучасні методи діагностики, лікування і профілактики туберкульозу. – Київ: Здоров'я, 2002. – 904 с.
16. Фтизіатрія: навчальний посібник / Ільницький І.Г., Мельник В.П., М'ясников В.Г., Панасюк О.В., П'ятночка І.Т., Фещенко Ю.І. // Київ:

ЦМК з ВМО МОЗ України. Національний медичний університет ім. О.О.Богомольця, 1996. – 250 с.
17. Фтизіатрія: Навчальний посібник українською та англійською мовами / І.Т. П'ятночка, С.І. Корнага, В.І. П'ятночка. – Тернопіль: Укрмедкнига, 2002. – 260 с.
18. Яблоков Д.Д., Галибина А.И. Туберкулёз лёгких в сочетании с внутренними болезнями. – Томск: Изд-во Томского ун-та, 1976. – 551 с.
19. Ященко О.М. Фтизиогериартрия. – Киев, 1991. – 208 с.

Authors:

Pyatnochka Ivan Teodorovych, Doctor of Medical Sciences, Professor of the Phthisiology Department, I.Y.Horbachevsky Ternopil State Medical University;

Kornaha Svitlana Ivanivna, Candidate of Medical Sciences, Assistant of the Phthisiology Department, I.Y.Horbachevsky Ternopil State Medical University;

Hryshchuk Leonid Andrijovych, Candidate of Medical Sciences, Docent, Head of the Phthisiology Department, I.Y.Horbachevsky Ternopil State Medical University;

Pyatnochka Volodymyr Ivanovych, Candidate of Medical Sciences, Docent of the Surgery Department, the Post-Graduate Study Faculty, I.Y.Horbachevsky Ternopil State Medical University.

With the participation of:

Hryhoriy Stepanovych Pidperyhora – Senior Lectures of the Practical English Department, V. Hnatyuk Ternopil State Pedagogical University.

Оформлення обкладинки *Павло Кушик*
Технічний редактор *Світлана Демчишин*
Комп'ютерна верстка *Наталя Нижегородова*

Підписано до друку 2.03.2005. Формат 60×84/16. Папір офсетний.
Гарнітура Times. Друк офсетний. Ум. др. арк. 14,42. Обл.-вид. арк. 12,00.
Наклад 500. Зам. 5.

Оригінал-макет підготовлено у відділі комп'ютерної верстки
видавництва "Укрмедкнига"
Тернопільського державного медичного університету ім. І.Я. Горбачевського.
Майдан Волі, 1, м. Тернопіль, 46001, Україна.

Надруковано у друкарні видавництва "Укрмедкнига"
Тернопільського державного медичного університету ім. І.Я. Горбачевського.
Майдан Волі, 1, м. Тернопіль, 46001, Україна.

Свідоцтво про внесення до державного реєстру суб'єктів видавничої справи
ДК № 348 від 02.03.2001 р.