

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ  
Харківський національний медичний університет

O.S. Shevchenko, S.L. Matvuyeva,  
O.I. Choporova  
Phthisiology

О.С. Шевченко, С.Л. Матвеева,  
О.І. Чопорова  
Фтизіатрія

Рекомендовано Центральним методичним кабінетом з вищої медичної освіти МОЗ України як навчально-методичний посібник для студентів вищих медичних навчальних закладів III-IV рівнів акредитації, які опановують навчальну дисципліну англійською мовою.

Харків  
2011

УДК 616.24–002.5(075.4)=111  
ББК 55.4я7

Рекомендовано ЦМК з ВМО  
МОЗ України  
Протокол № 1 від 17.03.2011

**Рецензенти:**

*А.Г.Ярешко*, д-р.мед.наук, проф. (Українська медична стоматологічна академія);

*А.К.Асмолов*, д-р.мед.наук, проф., (Одеський державний медичний університет)

Ф 53 **Фтизіатрія** : посібник для студентів

/ **О.С.Шевченко, С.Л.Матвєєва, О.І.Чопорова** – Харків: ХНМУ, 2011. – 108 с.

У посібнику представлені рекомендації до засвоєння питань профілактики, діагностики та сучасного лікування туберкульозу. Подана стисла інформація з кожної теми дисципліни, теоретичні питання, завдання для самостійної роботи (аудиторної та позааудиторної) сприятимуть вивченню та практичному засвоєнню матеріалу навчальної програми з фтизіатрії в процесі самостійної підготовки та на практичному занятті. Видання проілюстровано таблицями. Для студентів вищих медичних закладів IV рівня акредитації.

**Phthisiology**: hand book for students

/ **O.S. Shevchenko, S. L. Matveeva, A.I. Choporova** – Kharkiv: KNMU, 2011. – 108 p.

In the handbook has introduced recommendation for mastering question of prevention, diagnostic and timely treatment of tuberculosis. It has presented fill-in for every topics of discipline, theoretical questions, task for individual work (auditorium and extrauditorium), which can help along learning and practical mastering of educational program's data from phthisiology during individual training and on the practical class. The edition is illustrated by tables. For the students of higher medical foundation IV level of accreditation.

УДК 616.24–002.5(075.4)=111  
ББК 55.4я7

©Харківський національний  
медичний університет,2011

## PREFACE

The tremendous toll of tuberculosis is increasing in many countries due to the interactions of HIV and tuberculosis infections.

The World Health Organization calculates there are probably 8-10 million new cases a year in the world, and 3 million deaths. As patients in high prevalence countries who become with HIV virus are very likely to develop tuberculosis, it may be even more common where both infections are prevalent.

Tuberculosis remains the biggest killer in the world as a single pathogen; while it hits children as well as elderly, the worst affected are adults between 15 and 59 years of age i.e. the parents, workers and leaders in society. Tuberculosis accounts for 26 per cent of all avoidable deaths in Third World countries.

Tuberculosis is a challenging disease. Sometimes trying to make the diagnosis is like to solve a detective story. But if you succeed in solving the problem, you can be sure of a happy ending to the story. Modern treatment is highly successful in curing tuberculosis even in patients already infected with HIV (AIDS) virus.

This handbook contains the guidelines for the students who want to master the main principles of prevention, diagnosis and treatment tuberculosis. It will help to the students in their self-preparing for the practical classes on phthisiology.

The handbook contains short information about every topic of the discipline curriculum, theoretical questions, practical tasks and tests with the answers. It also refers to the literature for getting full information about every chapter of the phthisiology program.

We hope that our joint forces will bring closer the time when proper diagnosis and adequate management of cases will stop the perpetuation of the disease, thus paving the way to its elimination.

## **Topic # 1: Tuberculosis epidemiology and etiology. Pathogenesis of tuberculosis. Immunity against tuberculosis. Tuberculosis clinical classification.**

### **1. Currency of the topic**

Tuberculosis epidemiology is considered as a fundamental science which supports the social health care system. Knowing of the science is a basis to successfully inculcate the National fighting tuberculosis (TB) programme, starting from the moment of being infected to the moment of one's recovery or death.

There are several stages in TB running: 1) getting infected (contact MTB); 2) the beginning and running of the 1<sup>st</sup> process; 3) TB development, ending by either recovery or death.

In order to understand dynamics of TB spreading over population one has to single out 3 sorts of questions. They are analytical epidemiology, descriptional epidemiology and prognostic one. Main factors to define risk of a contact with MTB are as follows: a) general quantity of risk patients existing in society, b) contagiosis period duration, c) quantity and quality of 'healthy - invalid' contacts taking place per a unit of time.

It should be noted that risk of one being infected is higher under a prolonged contact period than that of under a short one. At the moment of MTB definition in an invalid' sputum, the number of infectious contacts equals to only 30% - 40%. That is, there might be a lot of people getting infected, if a correct diagnosis had not been set up or proper medical treatment hadn't been commenced.

Risk factors are as follows: population density, conditions of living, patient's conduct, and number of a patient's family, climate conditions, age, gender and sources of infection, illnesses such as diabetes mellitus, ulcer of the stomach, duodenum, alcoholism, pneumoconiosis, chronic unspecific disease of lungs).

Thus, knowing of TB etiology, epidemiology and pathogenesis would allow us

1) to better understand mechanism of the disease evolution, that is a processes of healing and pathomorphosis (changes which are due to MTB inculcation, chemo-therapy and evolution of drug stability of MTB), 2) to come down overall number of TB cases as well as level of TB mortality, risk of getting infected etc.

**2. General goal:** to master of the knowledge about general questions of tuberculosis.

**3. The concrete aims:**

- to find out TB development risk factors
- to find out TB stimulus peculiarities
- to find out ways of infecting by TB mycobacterium
- to analyze the main chapters of clinical classification of TB and to define a diagnosis according to that analysis.

**4. The tasks for student’s independent work during the preparation for the class.**

-to have shown one’s ability (skills) to practically apply physical methods for examining a patient and then to prove correctness of one’s resume to be presented as a diagnosis.

-to evaluate data received under a patient observation from the point of their correspondence to either norm or pathology, being able to unite a disease signs into some well grounded clinical cases (syndromes).

-to be able compare likeness and difference of real clinical TB cases with those ones to be considered as theoretically possible.

-to have selected and well grounded a patient oriented observation scheme aiming to prove or expel a lung TB diagnosis.

-according to the plan (scheme) to collect data pertinent to a patient, evaluate whether such data is sufficient to answer the questions regarding:

- a) type of the TB case ;
- b) TB whereabouts;
- c) TB clinical form;
- d) TB phase;
- e) Bacterium allocation presence;
- i) MBT drug sensitiveness;
- f) TB category;
- j) TB cohort;
- h) possible complications.

**4.1. The list of the main terms, parameters and characteristics which a student has to master during the preparation for the class.**

The term	The definition
MTB (acid- fast bacterium-AFB)	Mycobacterium tuberculosis / acid- fast bacterium – pathogen of the disease; Gram-positive, acid fast micro-organisms: obligatory anaerobes and facultative intracellular parasites, related to the genus Micobacteriaceae of Actinomycetales family. Human being pathogenic ones (bacterium), which used to be tinted - according to Zheel-

	<p>Nelsen - by a rosy color over the blue background.</p> <p>-Mycobacterium tuberculosis (it is human type in 90-97% cases), human being TB stimulus.</p> <p>-M.bovinus (in 2-8% cases), large size horny cattle stimulus.</p> <p>-M.africanum (0.1-2%) - medium type.</p> <p>-M.avium and M. intracellulare are not pathogenic as far as a healthy organism is concerned, but they can cause TB among HIV-infected ones (in AIDC related cases - from 15% to 24% cases )</p>
Infection rate	<p>It's the percentage of positive tuberculin skin test cases divided by the total number of the examined, excluding persons with post-vaccination immunity. This parameter characterizes the reservoir of tuberculosis infection and reflects overall epidemic situation on TB. According to statistics, infection rate is 8.5 % in children of 7-8 years, 19.5 % in children aged 13-14 years, 80-90 % in adults for age before 40 years.</p>
Infection risk	<p>Infection risk is the accretion of infection cases in a given year. This parameter should not exceed 1%. If infection risk exceeds 2%, then 90% population will be infected by the age of 70.</p>
Infectiousness parameter	<p>This is a number of persons, who can be infected by one patient with the clinically active disease. With well-organized infection control infectiousness parameter should not exceed 10.</p>
MBT pathogenicity	<p>It is the capability of mycobacteria species to cause diseases. The basic factor of pathogenicity is toxic glyco-lipid- cord factor, which invokes MBT growth in a nutrient medium, resulting in MBT getting shape of plaits. Saprophytes are not characteristic of the cord factor.</p>
MTB virulence	<p>It is the degree of pathogenicity and capability of Mycobacteria to grow and multiply in human body causing specific (cheesy or caseous necrosis of epithelioid-cellular granulomas with Pirogov-Langhans' cells) pathological changes. Mycobacterium strain is said to be virulent if 0.1-0.01mg of it causes clinical symptoms of tuberculosis and death of a 250-300g guinea pig in 2 months.</p>
MTB variability	<p>It is their capability to gain new or regain their</p>

	<p>properties. MTB morphological structure alteration means: appearance of different forms such as granular ones, coccal ones, filtrating, in capsulated ones, atypical strains and L-form. Filtrating forms are tiny fragments of MBT used to appear under adverse environment and being capable of reversing.</p> <p>L –form of MTB is weakly virulent one that either completely lost its shell or got a shell defect. That is a form to acquire shell changed morphology and decreased metabolism. L-forms are not tapped by a bacterioscopy method.</p>
MBT persistence	Loss of MTB virulence due to either environmental influence or antituberculous drugs, combined with MTB variability (7) [meaning transition MTB - L-forms, filtrating ones, granular ones, comminuted ones].
MBT reversion	Restoration of virulence and structure of MBT, having been in a persistent state for 2-15 years, return MBT to a bacterial form.
MBT drug resistance	MBT resistance with regard to anti-tubercular drugs
MDR (multi drug resistance)	Type of multiple resistances against the combination of isoniazid and rifampicin (H+R).
WDR (wide drug resistance)	Type of multiple resistances, including H+R + other medications of the 1 <sup>st</sup> line.
EDR (extreme drug resistance)	Type of multiple medication MBT resistance with regard to all drugs of the 1 <sup>st</sup> line+ drugs of the 2 <sup>nd</sup> line.
Atypical MBT	<p>Mycobacterium, which are not pathogenic with people and animals (saprophytes) plus relatively pathogenic MTB, being able in some cases to cause mycobacteriosis, similar to TB. Saprophytes don't contain cord-factor. According to E.H.Runyon, next kinds of atypical MTB are as follows:</p> <ol style="list-style-type: none"> <li>1. photochromogeneous (M. Kansasii M. marium)</li> <li>2. scotochromogeneous (M. aguae M.scrofulocum)</li> <li>3. non photochromogeneous (M.avium M.intracellulerae. M.xenopii M.haemophilum)</li> <li>4. rapidly growing MBT (saprophytes): (M.phlei M.smegmatis M.fortbitum).</li> </ol>

Sensitin	Atypical mycobacterium vital activity product, which having been intradermal injected, leads to a positive reaction (papule).
Dispensary follow up category	Dispensary observation group being defined by both 1) a type of TB (revealed for the 1 <sup>st</sup> time, relapse TB, chronic TB) and 2) presence or absence of destruction and bacteriological excretion. There are 4 categories (N1, N2, N3, N4) related to currently ill TB patients and one (N5) for those related to a group of risk illnesses or relapse.
Cohort	A group of patients to be registered within 3 current months. There are 4 cohorts shown in diagnosis, that is : Coh1, Coh2, Coh3, Coh4 .
New case of TB	First diagnosed TB used to be made for either a human being never being infected before or one taking drugs for no more than a month.
RTB	Relapse of TB, activation of the disease amidst people which got through a course of antimicrobial therapy and were considered to become cured [thus, they were transferred to Cat.5 1group].
CTB	Chronic TB, that is diagnosed for patients which either 1)have not reached a state of TB process radiological stabilization or 2)have shown radiological deterioration when a cavern remains [regardless of whether MBT is taking place or it isn't] during 2 year season of observation and treatment.
Destruction (Destr+)	Specific pathological inflammatory process taking place in any organ, to be characterized by TB affected tissue necrosis and disintegration. That is to say: at the place of destruction one can radiologically observe both tissue disintegration and a cavity appearing in the result of TB tissue melting down. Such diagnosis is denoted as (Destr+).

#### 4.2. Theoretical questions for the class:

1. Meaning of classical works by Hippocrates, Avicenna, R.Laennec, R.Koch in TB studies.
2. Role of N.I.Pirogov, Calmette и Guerin, S.P Botkin, F.G.Yanovsky in TB study development.
3. Role of A.A.Kysil, Z.Waxmann, N.S.Pilipchuk, A.S.Mamolot, B.M. Chmelnitsky, M.G.Ivanovich, A.G.Homenko in TB study development.

4. TB infecting agent, its kinds, forms of existence (L-forms) and qualities. MBT persistence, MBT reversion.
5. Atypical mycobacterium. Mycobacteriosis classification.
6. Main epidemiology indexes and extension of TB disease. TB indexes evaluation.
7. Sources of TB infection. MBT excretion into environment.
8. TB pathogenesis. Ways of MBT contamination and its multiplication inside an organism.
9. TB immunity.
10. TB pathogenesis.
11. TB clinical classification, its sections. TB diagnosis structure.
12. To make a thematic plan of lectures and conversation for TB patients
13. To enumerate ethic and deontological points to be considered: 1) at a patient newly observation; 2) during a conversation with the patient's relatives.
14. To carry out an objective inspection of a TB case and prescribe a plan of proper treatment.
15. According to objective inspection results one has to make a diagnosis, to specify a TB type, its localization, clinical form, having presence of destruction and bacterium excretion, MBT drug sensibility, diagnosis histological confirmation, category, cohort, complication.

#### **4.3. Practical work (tasks) which are doing within the class:**

##### **TB PATIENT? DIAGNOSTIC STUDY**

1. **What are typical complaints of those suffering from TB undependable on its locality?**
  - A. Weakness, sweating, loss of weight, enhanced temperature.
  - B. Fits of dyspnea dependent on weather changes.
  - C. Upsetting of sensibility, hands / feet numbness.
  - D. Short-lived swoons.
  - E. Head ache, stomach ache without clear localization
2. **What usual temperature curve at TB cases might be?**
  - A. Constant.
  - B. One-day.
  - C. Hectic
  - D. Three-day.
  - E. Wrong.
3. **What is the most likable kind of expectoration while a simple form of pulmonary TB?**
  - A. Mucous transparent

- B. Bright yellow
- C. Green-yellow
- D. Green with pungent smell
- E. Rusty

4. A 30-year-old patient has been registered high temperature up to 37.1-37.3<sup>0</sup>C, loss of appetite, enhanced fatigue, night sweating. He has got alcohol abuses. Impartial assessment: malnutrition, over lungs rigid breath is heard. Blood analysis is L-9,5x10<sup>9</sup>/l, ESR-27 mm/h. X-ray picture shows multiple locus shadows, size from 3mm to 8mm in diameter, with small/average intensity. It looks like disseminated pulmonary TB.

**What clinic syndromes are registered in this case?**

5. A 10-year-old child has complaints with strong ache at the right side, that used to enhance while coughing, having deep take in. Temperature runs up to 38-38.5<sup>0</sup>C. There is dyspnea. Ache has lessened for the last 2 days. There is dullness, placed to the right under/below of the 2<sup>nd</sup> rib. Heart limits have moved to the left. Breathing over the right lung is much weakened, but above lower part of right lung isn't heard. X-Ray picture shows: 1) right lung homogeneous darkening, placed to the right under/below of the 2<sup>nd</sup> rib; 2) mediastinum organs have shifted to the left. Tuberculin test "range" was revealed. **What diagnostic method should be firstly applied to prove liquid presence in the pleural cavity?**

**Patterns of answers:**

1.A. 2.E. 3.A. 4.Intoxication syndrome, bronchial-pulmonary affection syndrome; 5. Diagnostic pleural puncture.

## **TB CLINICAL CLASSIFICATION**

**1. What phases of progressing TB do exist?**

- A. Infiltration, dissemination, cavitation
- B. Resorption, consolidation
- C. Incrustation, mineralization, alkalization
- D. Hyperemia, exudation, resorption.
- E. Proliferation, degeneration.

**2. What changes in biopsy material are the basic ones to prove TB character of inflammation by histology?**

- A. Pirogov-Langhans cells, caseous necrosis
- B. Foreign body cells
- C. Great number of neutrophils, caseous necrosis
- D. Lymphocytes proliferation, LE – cells.

E. Proliferation of low-grade cells.

**3. What organs used to be infected by TB in Ukraine mostly?**

- A. Lungs
- B. Sexual organs
- C. Kidneys
- D. Bones and joints
- E. Eyes

**4. What is definition of the primary TB?**

- A. Primarily diagnosed TB
- B. Primary signs of TB
- C. Nondestructive TB
- D. TB to appear right after infecting
- E. TB located in only one organ or a system

**5. What is definition of the secondary TB?**

- A. Multisystem TB
- B. Destructive TB.
- C. TB which appears in long term after patient being infected.
- D. TB with overall clinical pattern.
- E. Generalized TB.

6. A 31-year-old patient has revealed a primary TB case with infiltrate in the right lung II segment, MBT (-).

**Which category the patient should be concerned to?**

7. A 36-year-old patient's X-Ray showed newly discovered low intensity nodular shadow of average size with unclear contours. No complaints. The formal examination: no pathology. Blood test is normal. Looks like pulmonary TB.

**What should be a correct diagnosis according to clinic classification?**

8. A 25-year-old patient has low intensity nodular shadow with unclear contours.

**What phase of TB process is it?**

**What should be a correct diagnosis according to clinic classification?**

9. A 5-year-old child complains of having dry cough. Body temperature is 37.1-37.4<sup>0</sup>C. There is some bluntness over the right lung upper part. Much weakened breath without rales is heard. Blood analysis is leucocytes -  $9,1 \times 10^9$ /liter, ESR – 21 mm/hour. X-Ray picture shows that the right lung upper part is homogeneously darkened, lessened in size. The lung root is dilated, unstructured, its camber turned outside. Mantoux reaction is 2 TU of PPD-L – infiltrate diameter of 17 mm. 4 years ago the child was Mantoux test negative.

**What should be a correct diagnosis according to clinic classification?**

10. There is a 25-year-old patient who has got a diagnosis of TB meningitis. The lungs X-Ray picture showed alkalized lymphatic nodes. No MBT in liquor appeared.

**What should be a correct diagnosis according to clinic classification?**

**The patterns of answers:**

1.A. 2.A. 3.A. 4.D. 5.C. 6.Category 3,

7. New case of TB (date of diagnosis) of the right lung II segment (nodular), Destr-, MBT-M- C0 Resist0, HIST 0, Cat 3, Coh.( a year quarter # of diagnosis).

8. Infiltration,

9. New case of TB (Date of ) of the right intrathoracic lymph nodes, Destr-, MBT-, M0, C0, Resist0, HIST 0, atelectasis of upper part of right lung, Cat 3., Coh.(a year quarter # of diagnosis).

10. New case of TB (Date of diagnosis) of meningeal membrane.

**Recommended reference:**

**Main literature:**

1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.

2. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

**Additional literature:**

1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.

2. Palomino Tuberculosis 2007. From Basic Science to Patient Care. Medical textbook/ Palomino, Leao, Ritacco, 2007. – 700 p.

**Topic # 2: General approaches to TB diagnostics. Special methods to reveal and diagnose a TB case (microbiology diagnostics, X-Ray investigations, tuberculin test).**

**1.Currency of the topic**

In all sorts of diagnosis methods, applied to reveal TB cases, the most important ones are as follows: microbiology diagnostics, X-Ray inspection, laboratory methods, tuberculin test.

Tuberculin test is a key method to timely reveal TB cases among children and youngsters, giving an opportunity -1) to find out a fact of being infected and 2) define a probability of being infected.

X-Ray investigation is a key method to timely reveal TB cases among adults, making it possible for a doctor to get to knowing of clinical cases different implications as well as their morphological essence.

Laboratory methods to analyze sputum or some other material, as far as mycobacterium (MTB) presence is concerned, allow a doctor to finally confirm a TB diagnosis. They are as follows: simple microscopy, culture method, biological test (guinea pig inoculation), amplification methods (polymerase chain reaction).

Histological analysis is a procedure meant to reveal cheesy or caseous necrosis of epithelioid-cellular granulomas with Pirogov-Langhans' cells. It can morphologically define if a specific TB inflammation in an affected organ is taking place.

These instructions to follow are intended to help a student systemize his/her knowledge, having got in the course of self preparatory work, as well as apply it in practice (practical studies).

### **TUBERCULIN TEST**

**2. General goal** is 1) to have learned indications for tuberculin test to be proceeded;

2) to appreciate tuberculin tests clinic and epidemiological values.

**3. Basic knowledge and skills are necessary for topic studying (interdisciplinary integration)**

The title of preliminary discipline	The skills which were obtained
1. Department of pathological physiology	To be able to understand essence of allergic response of time-lagged kind (that's cell-mediated immunology reactions of the IV sort: hypersensitivity of time-lagged kind)
2. Department of microbiology	To know biological properties of BCG, dates of vaccination and revaccination to be made. To know all sorts of tuberculin and tuberculin tests.

### **4. The concrete aims:**

- To explain essence of the tuberculin reaction.
  - To define objective and indications for mass / individual tuberculin test.
  - To be able to get through with Mantoux reaction as well as with that of Koch.
- One should also be able to interpret and evaluate these reaction results.

- To carry out comparative diagnosis of the results of two different tuberculin reactions, which are defined as 1) tuberculin infectious one and 2) tuberculin posvaccinal one.
- To make use of tuberculin test results so as 1) to define the groups of ones susceptible to get TB infected, 2) to be able to reveal TB cases in time.

## 5 The tasks for student's independent work during the preparation for the class.

5.1. The list of the main terms, parameters and characteristics which a student has to master during the preparation for the class.

The term	The definition
Tuberculin	is a product of MTB metabolism, incomplete glycolipoprotein complex (hapten), which elicits its antigen activity only in sensitized (an infected or BCG vaccinated) body.
IIU (1international unit of tuberculin) of PPD-L	is tuberculin quantity, containing in 0.00006 mg of a dry substance, capable to elicit positive reaction in previously sensitized body.
Tuberculin test "conversion"	is either -1) the 1 <sup>st</sup> appearance of positive tuberculin test comparing with the last year detected as negative one or -2) just positive tuberculin test amplification over, at least, 6 mm for a year term among those vaccinated by BCG.
Anergia	is the case of getting no reaction at injected tuberculin
Positive anergia	is the case of getting no reaction at tuberculin injected into a healthy (uninfected) human being.
Negative anergia	is the case of getting no reaction at tuberculin injected into a TB-infected patient.
Vaccine BCG	is alive but attenuated vaccine, having got brisk immunifacient qualities of a bull kind MБТ. It was received by Nocard in 1902 year from a TB infected cow udder. Being recultivated 230 times for 13-year season on potato-glycerin growth medium, containing 5% of bull gall, it had lost its virulence. Vaccine BCG developers, a French microbiologist A.L.Ch.Calmette and a child Doctor C.Guerin, have finished their work in 1919.
PPD	purified protein derivative

## 5.2. Theoretical questions for the class:

1. What is the idea of tuberculin test? What is its essence or the key idea in? Mechanism and time necessary for tuberculin allergy to be developed.

2. What is tuberculin in itself? What sorts of tuberculin are there?
3. What is the objective to make use of tuberculin?
4. Kinds of tuberculin tests.
5. Local reactions on tuberculin injections. 4 types of Mantoux test reactions.
6. General reaction at tuberculin injection, its clinic implications.
7. Indications for a Mantoux test being in need. Tuberculin doses necessary. What should be a correct procedure of getting a testing result. Its registration and clinic interpretation.
8. What is a tuberculin test “conversion”? What could be told when the range was revealed? What are postvaccinal and infectious allergy differential diagnostics?
9. What local reaction on tuberculin should be named as hyperergic one? What information can we get from its taking place?
10. Who of tuberculin -positive patients are considered as dangerous in view of becoming a source of contagious TB infection, thus to be in need of additional medical survey?
11. Indications to Koch test carrying out. What are proper procedure, registration and clinic evaluation?
12. What are positive/negative anergia? What factors might increase or decrease tuberculin tests?

## **X-RAY INVESTIGATIONS**

**1. General goal** is 1) to have learned radiology changes, typical for pulmonary TB; 2) find out TB location, main radiology syndrome and his elements.

### **2. Concrete aims:**

1. To recognize various pathologic changes seen in the X-ray picture, unite them into some radiological syndromes; define their locality by naming the lung sides, lobes, segments.
2. To recognize main radiology implications of pulmonary TB cases different forms and make use them (implications) to prove TB process clinic forms and phases.

### **3. Basic knowledge and skills are necessary for topic studying (interdisciplinary integration)**

Radiology Department	To evaluate an X-ray picture of thorax organs seen in various projections. To know- 1) lung segment constitution and 2) lobe/segment projections, seen in direct and side roentgenograms. To know main lung illnesses radiology syndromes. To find out, draw and describe pathology changes in a thorax roentgenogram. To make out protocol describing a
----------------------	--

#### **4. Practical work (tasks) which are doing within the class:**

1. Having received 3 roentgenograms one should -1) find out the main radiology syndromes (locus, focal, coil shadows), 2) describe roentgenograms and, making use of instruction- 3) formulate one's own conclusions about syndromes in question and proper phase of TB processes presented in the pictures.

A student should be able to:

-diagnose focal shadowing syndrome;

-define a syndrome of focal shadow and differentiate limited, widespread, oval blackouts without affected lung volume alteration;

- allocate a syndrome of lung dissemination;

- characterize a coil shadow syndrome.

2. Amidst few roentgenograms, one should -1) choose pictures with a syndrome of local focal shadowing that may show at a TB-like disease (upper lobe location, locus polymorphism, signs of lung tissue fibrosis, pleural reactions, lung roots calcinations'); 2) describe roentgenograms.

3. Amidst few roentgenograms, one should- -1) choose the pictures of patients having syndrome of localized, widespread and oval shadowing; 2) note indications that indirectly specify nature of a disease (upper lobe location, inhomogeneous structure, lung tissue cavitation, lung hilum calcification); 3) describe roentgenograms.

4. Having got few roentgenograms, one should -1) choose the pictures of patients having syndrome of lung dissemination; -2) find out symptoms indicating a TB case (a tendency to upper lobe location, locuses cortical displacement, forming of focus, infiltration, destruction); -3) describe roentgenograms.

5. One has to -1) analyze roentgenograms, -2) choose pictures with an annular shadow syndrome, -3) describe roentgenograms, -4) notice signs indicating at the cavities tubercular origin (upper lobe location, dissemination, a path to a root, old calcification).

#### **LABORATORY METHODS OF TB DIAGNOSIS (microbiological, cytological, biochemical, functional ones)**

##### **1. The concrete aims:**

1. To define indications for laboratory and functional survey of pulmonary TB patients.

2. To be able to evaluate results of microbiological survey procedures such as direct and luminescent bacterioscopy, floatation, pathologic

material sowing into nutrient liquor, defining of tubercular mycobacterium (MTB) drug resistance. It is necessary to make use of the results to - 1) establish and formulate a diagnosis, -2) proceed with proper treatment.

3. To evaluate the results of - (1) cytological study of sputum, (2) study of pleural exudate (3) peripheral lymphatic nodes punctuate study - needed for differential diagnostics of TB and some other illnesses.

4.To evaluate the results of clinical analyzing of -1) blood test, 2) sputum [its quantity, color, smell, microscopy, etc], 3) urine - to define: pathologic changes taking place in organism, TB process gravity, its difference from other lung illnesses.

5. To evaluate the results of biochemical analyzing of blood indexes [ meaning bilirubin, transaminase, other hepatic tests ] as to define contra-indications to implement hepatotoxic drugs, reveal their toxic action and the treatment proper correction.

6.To evaluate results of spirometry, plain X-ray picture and ECG to find out a patient state gravity, making up expertise of work capacity and indication to a surgical lung intervention.

## 2. Basic knowledge and skills are necessary for topic studying (interdisciplinary integration)

The title of preliminary discipline	The skills which were obtained
The Department of introduction into internal diseases	To know methods of laboratory and functional investigation and be able to evaluate minimal amount of methods needed for a concrete patient
Microbiology Department	To master methods intended to reveal TB mycobacterium presented in pathological tissue. To be able to make up a negative dab, paint it by Zheel-Nilsen and find out TB mycobacterium in it. To make sowing of a pathological material sample into dense nutrient medium
Department of histology	To master methods of histological and cytological investigations. To be able to make up a dab of pathologic material, to proceed with its microscopy and differentiate cell structure typical for various diseases
Department of normal and pathology	To master investigation methods of

physiology and Department of introduction into internal diseases	such materials as blood, urine, excretion. To be able to differentiate pathological changes in samples from normal ones
Department of	To master methods of blood biochemical analysis and reveal pathological changes in proper samples
Department of normal/pathological physiology, Department of propedeutics	To master methods of lung and heart disease functional diagnostics. To be capable to differentiate pathological indexes from normal ones

### 3. Practical work (tasks) which are doing within the class:

1. To examine a newly coming patient and prescribe all needed sorts of laboratory survey. Justify an objective for every survey to be prescribed.

2. Making use of results (1), one has to formulate and justify one's clinic diagnosis. Role of the laboratory survey should be pointed out.

3. Making use of a TB patient's case history, one should complete the table of disease laboratory signs, having evaluated diagnostic importance of every sign.

4. To have analyzed data of three kinds of probing (X-ray picture, laboratory, clinical) related to a patient, pointing out the significance of laboratory data.

5. A 63-year-old patient (K) entered a hospital, having complains of dry cough, common weakness, poor appetite, dyspnea, with diagnosis: infiltrative pulmonary TB of the right lung upper lobe, being in the phase of decay.

1) Make a plan of the patient survey in order to specify the diagnosis and prescribe a complex treatment.

2) What should be waiting periods for getting 3 kinds of the patient excretion MBT testing results – direct bacterioscopy, flotation, sowing into a dense nutrient medium ?

6. A 55-year-old patient (N) entered a hospital after a regular professional survey, having no complains. His roentgenogram shows oval shadow with clear contour, size 3\*4 cm, placed at the level of III rib. There is no excretion.

1) Make a plan of the patient survey in order to specify the diagnosis and prescribe a complex treatment.

2) What additional survey (instrumental one, in particular) might be recommended to N, should laboratory and radiological ones don't bring up correct diagnosis?

7. A 27-year-old patient (P) has got infiltrative pulmonary TB of the right lung upper lobe, being in the phase of decay, MBT (+).

What of two analyses, presented below, may most likely belong to P:

-A. erythrocytes- $4,5 \cdot 10^{12}/l$ ; Hb-150 g/l; leucocytes- $10,5 \cdot 10^9/l$ ; eosinophils-1%, band neutrophils-4%, segmented neutrophils-73%. Lymphocytes-15%, monocytes.-7%, ESR – 25 mm/h

-B. erythrocytes  $-4,0 \cdot 10^{12}/l$ ; Hb-136; leucocytes  $-23,5 \cdot 10^9/l$ ; eosinophils.-2%. band neutrophils -9%, segmented neutrophils -75%. Lymphocytes-8%, monocytes.-6%, ESR – 50 mm/h.

8. A 19-year-old patient (H) has complaints of aches in the field of her right lung, related with breathing. Objectively: right part of her thorax lags behind the right one while breathing. Voice vibration is weakened. There is some sound dullness, taking place in the low part of her right lung, where breathing is sharply weakened under auscultation.

1) What sort of illness is it? Make a plan of the patient survey in order to specify the diagnosis and prescribe a complex treatment.

9. A 4-year-old child has got enlarged neck lymphonoduses with fistula in one of them. Roentgenogram shows a black-out placed at the level of the right side IV rib, related to the lung root enlargement.

1) Set up preliminary diagnosis.

2) Make up a plan of the patient clinic-laboratory observation intended at the diagnosis correction.

10. In order to reveal MBT a patient has been gotten through procedure of sowing into dense nutrient medium by Lovenshtein-Yensen.

1) What are minimal/maximal seasons for the MTB to commence growing?

2) Since what time can laboratory bring its resume, should there is no growing?

#### 4. Materials for self - control

##### TUBERCULINODIAGNOSTICS

1. **What test is used under massive surveys of children/youngsters in Ukraine to reveal TB positive ones?**

A. Koch test.

B. Mantoux reaction with 2 IU of PPD-L.

C. Mantoux reaction with 100 IU of PPD-L .

D. Eosinophyl – tuberculin test.

E. Graduated skin test.

E. since 1 hour.

2. **Which contingent remains out of phthisiology control, in regard with results of screening tuberculin diagnostics?**

A. Children and youngsters, who were infected a long ago.

- B. Youngsters with tuberculin test “conversion”.
- C. Persons, who have been infected long ago, having hyperergic sensibility towards Mantoux reaction with 2 IU of PPD-L.
- D. Persons with enlarging of [previously] doubtful or positive reaction towards tuberculin with 6 mm or more.
- E. Children and youngsters, which were infected long ago, regardless of a papule diameter by Mantoux reaction with 2 TU PPD-L, should there is information about their getting in touch with a TB infected patient.

3. A 5-year-old child was infected by BCG vaccine at a maternity home. Since being vaccinated has index of 5 mm. Tuberculin sensibility dynamics is as follows: 1-year-old - infiltrate of 8 mm in diameter; 2 years – 5 mm, 3 years – 3 mm, 4 years – hyperemia, 5 years – 10 mm.

**What conclusion has to be made according to these data?**

- A. The child is quite healthy, no TB case.
- B. The child has got after-vaccination allergy.
- C. There is a “conversion” of a TB reaction.
- D. The child is ailing with TB.
- E. The child is TB-infected with allergic response at Mantoux reaction.

4. A 11-year-old child, being vaccinated by BCG-M at the age of 7, has a scar of 6 mm. As a result of tuberculin test one could reveal hyperemia without a papule. Previous reaction (response) was positive.

**What conclusion about the child shall be right?**

- A. A TB positive patient, which is in need of phthisiologist’ consulting.
- B. This is posvaccinal allergy.
- C. This is a tuberculin reaction “conversion”. Phthisiologist consultation is necessary.
- D. This is a healthy non-infected child.
- E. This long ago TB infected patient needs no specified consultation.

**5. What is objective to make hypodermic test by Koch?**

- A. To investigate a specific process activity.
- B. To find out people who are risky to get TB infected.
- C. To study percentage of TB infected ones, being [amidst population], as an epidemiology index.
- D. To determine TB infected ones as early as possible.
- E. To study a limit of sensibility against tuberculin.

6. What is the waiting period /term since various sorts of vaccinations, which “allows” to get Mantoux test with 2 TU of PPD-L.

- A. Since a year
- B. Since 6 months.
- C. Since 2 weeks.
- D. Since 3 days.
- E. Since 1 month.

**7. What is the right place to inject tuberculin for getting a Mantoux probe with 2 TU PPD-L?**

- A. Inner surface of a forearm middle third part.
- B. Border between upper and low thirds of the outer middle of a forearm.
- C. Over a blade.
- D. Under a blade.
- E. Upper third of the inner part of a forearm.

**8.** A child is vaccinated by BCG in a maternity home. His father suffers with TB in its active form. How often should a Doc make survey of the child by Mantoux reaction?

**9.** A 5-year-old child was intradermally vaccinated by BCG-1 at a maternity home. Tuberculin test was carried out yearly. Size of Mantoux test papule is of 14 mm in diameter. Last year it was 3 mm. Vaccinating sign is 3 mm. No complaints. There is no pathology. Radiology method shows no pathology in lungs.

**How should one interpret this TB - test dynamics?**

**10.** A 5-year-old child was intradermally vaccinated by BCG-1 in a maternity home. Tuberculin test was carried out yearly. Size of Mantoux test papule is of 14 mm in diameter. Last year it was 3 mm. Vaccinating sign is 3 mm. No complaints. There is no pathology. Radiology method shows no pathology in lungs.

**What is the reason for the Mantoux reaction to become positive?**

**The pattern of answers:** 1.B. 2.A. 3.C. 4.B. 5.A. 6.E. 7.A. 8. Once a year. 9. A tuberculin test “conversion”. 10. Getting infected.

## **X-RAY METHODS OF TB DIAGNOSIS**

**1. What radiology method is made use of for population screening survey in order to reveal cases of breathing organs TB?**

- A. Plain X-ray picture.
- B. Computer tomography
- C. Fluorography

- D. Roentgenophotography
  - E. Bronchography
- 2. What diagnosis method will be the most appropriate one to keep in check dynamics of the pulmonary TB patient's treatment efficiency?**
- A. Roentgenography
  - B. Roentgenkymography
  - C. Fluorography
  - D. Roentgenophotography
  - E. Bronchography
- 3. What method will be the most effective one to localize a shadow, placed somewhere in the lung tissue? What is the shadow's disposition if to compare it with adjacent tissues such as ribs, spine, etc?**
- A. Plain X-ray picture
  - B. Computer tomography
  - C. Fluorography
  - D. Roentgenophotography
  - E. Bronchography
- 4. What method is used to reveal destruction in a lung tissue?**
- A. Plain Z-ray picture
  - B. Tomography
  - C. Side roentgenography
  - D. Roentgenophotography
  - E. Bronchography
- 5. What sort of radiology method should be made use of to commence an additional survey, if - under preventive fluorography observation – there were focal shadows in the 1<sup>st</sup> and 2<sup>nd</sup> lung segments?**
- A. Plain Z-ray picture
  - B. Computer tomography
  - C. Side roentgenography
  - D. Roentgenophotography
  - E. Bronchography
- 6. What is normal shape for a lung root?**
- A. Obtuse angle, opened towards a lung field
  - B. Triangle top of which is turned towards a middle shadow.
  - C. A circumference segment
  - D. A Rectangle
  - E. A complex polycyclic figure.

7. A 40-year-old patient, under radiological survey, have shown a spherical darkening sized 5 cm in diameter placed in the left lung VI segment.

**What radiological syndrome is revealed in this case?**

8. A 35-year-old patient, having got through flu-survey, revealed many focal shadows of different intensity, placed along all lung fields.

**What radiological syndrome would be correct to register in this case?**

9. A 35-year-old patient, having got through flu-survey, revealed a spherical cavity sized up to 5 cm in diameter with thin walls, placed in the 1<sup>st</sup> and 2<sup>nd</sup> left lung segments.

**What radiological syndrome would be correct to register in this case?**

10. A 50-year-old patient worked as a miner for 25 years. For the last 3 years he registers progressive dyspnea while walking. Hard breathing is been heard. Heart tones are dull. There is 2<sup>nd</sup> tone accent (increase?) heard over a lung artery. Blood analyzes is normal. X-ray diagram shows small multiple intensive focal shadows, placed in lungs middle and low parts, both having deformed lung drawing.

**What radiological syndrome is revealed in this case?**

**The patterns of answers:** 1.C. 2.A. 3.B. 4.B. 5.A. 6.C. 7. A spherical shadow, 8. Dissemination, 9. Ring-shaped shadow syndrome, 10. Syndrome of dissemination.

### **LABORATORY METHODS OF TB DIAGNOSTICS, methods of revealing of MBT. Atypical MBT and their clinic values.**

**1. What method of MBT revealing is the most economic?**

- A. Direct microscopy
- B. Cultural investigation
- C. Biology testing
- D. Polymerase chain reaction (PCR).
- E. IFA.

**2. What method of MBT revealing is the most sensitive and specific?**

- A. Direct microscopy
- B. Cultural investigation
- C. Biology testing
- D. Polymerase chain reaction (PCR).
- E. IFA.

**3. What coloring is necessary to reveal MBT?**

- A. By Gram.
- B. By Zheel-Nilsen.
- C. By Romanovskiy-Gimza.
- D. Fucine
- E. Methylene blue

**4. What changes of leukocyte number, while uncomplicated TB case, are the most typical?**

- A. Leucocytosis with much band displacement, leukemic test.
- B. Changes aren't typical.
- C. Moderate Leucocytosis with low band displacement.
- D. Leucopenia
- E. There might be as leucopenia as leukocytosis.

**5. What changes of ESR, when uncomplicated TB, are the most typical?**

- A. Increase over 60 mm an hour.
- B. There are no changes.
- C. Decrease.
- D. Increase up to 30 mm an hour.
- E. Increase among women.

**6. What are the most representative changes in pulmonary TB cases, when those run with expressed intoxication signs?**

- A. Moderate proteinuria, Moderate leukocyturia, total gross hematuria.
- B. Moderate leucocyturia, single erythrocytes.
- C. Considerable proteinuria without change in amount of leukocytes.
- D. Pyuria, cylindruria, microhematuria.
- E. Total gross hematuria with pain syndrome.

7. A 28-year-old patient has complaints of high temperature (up to 39°C), weakness, hemorrhage, loss of weight. X-ray picture shows the right lung VI segment' black-out and its (segment) diminishing in size. There also is the right lung root increase on account of enlarged intrathoracic lymphatic nodes.

**What additional investigation should be made to specify the diagnosis?**

**Patterns of answers:** 1.A. 2.D. 3.B. 4.C. 5.D.6.B.

7. Excretion analyzes on MBT by bacterioscopic and bacteriological methods, excretion analyzes on cancer cells, overall blood/excretion analyzes, survey and side roentgenogram, the right root tomogram, bronchoscopy.

## FUNCTIONAL RESPIRATORY TESTS in pulmonary TB cases

- 1. What data can't be received under functional respiratory tests for a TB patient?**
  - A. Value of work disability
  - B. Possibility of surgical intervention
  - C. Presence of an bronchial obstruction
  - D. Treatment efficiency
  - E. Presence of a destructive lung process
- 2. What bronchial obstruction criterion is used presently?**
  - A. Decrease of forced expiratory volume<sub>1</sub>.
  - B. Increase of vital capacity.
  - C. Decrease of coefficient of breathing reserve.
  - D. Rise of one minute volume of ventilation.
  - E. Decrease of maximal lung ventilation.
- 3. What a lung restriction criterion is used presently?**
  - A. Decrease of forced expiratory volume<sub>1</sub>.
  - B. Increase of vital capacity.
  - C. Decrease of coefficient of breathing reserve.
  - D. Rise of one minute volume of ventilation.
  - E. Decrease of maximal lung ventilation.
- 4. What index is investigated under pneumotachometry?**
  - A. maximal expiratory flow.
  - B. forced expiratory volume per 1s.
  - C. vital capacity.
  - D. one minute volume of ventilation.
  - E. maximal lung ventilation.
- 5. What can one witness by detecting of vital capacity?**
  - A. Infringement of small bronchus pass ability.
  - B. Having got obstructive type of ventilation insufficiency.
  - C. Having got restrictive type of ventilation insufficiency.
  - D. Infringement of gas diffusion.
  - E. Having got ventilation insufficiency of mixed type.
- 6. Under what illness should breathing parameters [such as velocity of breath] become the main criteria of that illness complexity?**
  - A. Pneumonia
  - B. Pulmonary TB.
  - C. Fibrous alveolitis.
  - D. Exudative pleuritis.
  - E. Chronic obstructive bronchitis.

**7. What clinical sign does help to reveal external breath function infringement?**

- A. Coughing.
- B. Dyspnea.
- C. Wet rales in a field of lungs.
- D. Sound under the percussion.
- E. Voice vibration reducing.

**8.** A 50-year-old patient was originally revealed infiltrative TB of the right lung upper part and the left lung VI segment being in the phase of decay. MBT+, BH of the 2<sup>nd</sup> degree by obstructive type with damages of possibility of breathing ways middle and upper parts. Indexes of functional of external breathing, afore making a functional test with broncholytic drug, are as follows: forced expiratory volume per 1s -59%, maximal expiratory flow<sub>25</sub>-30%, maximal expiratory flow<sub>50</sub>-59%, maximal expiratory flow<sub>75</sub>-86%. Analogical ones, received 40 minutes after making a functional test with broncholytic, are as follows: forced expiratory volume per 1s -91%, maximal expiratory flow<sub>25</sub>-45%, maximal expiratory flow<sub>50</sub>-72%, maximal expiratory flow<sub>75</sub>-108%.

**How can one evaluate broncholytic influence at state of bronchi possibility by means of spirotest?**

**The pattern of answers:** 1.E. 2.A. 3.B. 4.A. 5.C. 6.E. 7.C.  
8. Functional test with making use of broncholytic drug is positive.

**Recommended references**

**Main literature:**

- 1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka– Ternopol.: Ukrmedknyha, 2002. – 257 p.
- 2. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

**Additional literature:**

- 1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
- 2. Harryes A. TB. Clinical manual for South East Asia / Harryes A., Maner D. Uplecar M. – Biella.: WHO, 1997 – 145 p.

**Topic # 3: Prophylaxis against tuberculosis. Social prophylaxis. Sanitary prophylaxis. BCG vaccination and revaccination. Chemoprophylaxis.**

**1. Currency of the topic**

Prophylaxis of tuberculosis is one of the main measures of antituberculosis ones at every stage of the struggle with tuberculosis. Prophylactic measures can be divided in three groups.

1. The measures which are spent among the whole population (BCG vaccination and revaccination, sanitary measures for the defense of the most treatable contingents against infection and super infection).
2. The measures carried out in groups of population with high risk to develop tuberculosis (a registration and dispensary follow up, sanitation, chemoprophylaxis).
3. The measures undertaken in the nidus of infection (a sanitation, disinfection, isolation of the patient, supervision of the TB-contacts, chemoprophylaxis).

It must be emphasized that a performance pf prophylactic measures including sanitary and specific prophylaxis demands clearly worked out organize forms. In case of ignoring of this point preventive measures can be ineffective.

All prophylactic measures must be carried out with taking into consideration of the reservoir of TB-infection and possible ways of its transmission. The main reservoir of TB-infection is of patients suffering from tuberculosis (TB). In some regions diseased cattle can be the source of infection, other animals are of less epidemic danger.

Concrete prophylactic measures of these three directions must be entered in annual plan of antituberculosis work.

It is necessary because pr5ophylactic measures are provided not only by medical serves workers but also by administration. The realization of above mentioned measures on the prevention of tuberculosis will allow decreasing significantly the morbidity of tuberculosis and to strength the struggle against this infection.

**2. General goal:** to create the conditions for students supplying the obtaining of the knowledge and skills allowing to master of the main principles of antituberculous measures for the prevention of tuberculosis.

**3. Concrete aims:**

1. To analyze different kinds of antituberculous prophylaxis.

2. To define the indications and contraindications for BCG vaccination and revaccination.
3. To diagnose the complications of BCG vaccination and revaccination.
4. To define the epidemic dangerous of TB infection nidus.
5. To use the complex of prophylactic measures in TB infection nidus.
6. To learn to carry out secondary prophylaxis (chemoprophylaxis) of tuberculosis.

#### **4. Initial level of knowledge and skills.**

To reach the concrete aims of the topic a student have to muster of knowledge and skills as followings:

1. To know about measures preventing tuberculosis.
2. To know about BCG vaccine, the history of its creature.
3. To know the composition of BCG vaccine.
4. To explain the development of BCG immunity.
5. To know about other kinds of prophylaxis of TB.
6. To know the terms of BCG vaccination and revaccination.
7. To define TB infection nidus.

#### **5. Tasks for independent student’s work during doing the preparation for the class.**

5.1. The list of main terms, parameters, characteristics which a student have to master during the preparation his home task.

1. BCG vaccine	Bacilli of Chalmette – Guerin.
2. Social prophylaxis	Prophylactic measures making for the increasing the level of life of an population.
3. Primary prophylaxis	Primary prophylaxis prevents the TB infection of human body.
4. Secondary prophylaxis	Secondary prophylaxis prevents the reactivation of TB changes in the body.
5. Chemoprophylaxis	Chemoprophylaxis prevents the development of TB infection or its relapse.

## 5.2.Theoretical questions for the class

1. The definition of term “Prophylaxis of tuberculosis”	Phthisiology. Textbook for students/ V.I.Petrenko, p.263-271	Phthisiology. Teaching manual/I.T.Pyatnochka, p.224-238
2. Specific prophylaxis. Indications and contraindications for BCG vaccination. Complications of vaccination: cold abscess, ulcer, lymphadenitis, keloid scar, disseminated BCG infection. Differential diagnostics of infectious and post BCG vaccination tuberculin allergy.	p.266-270	p.229-235
3. Chemoprophylaxis. Primary and secondary chemoprophylaxis. Chemoprophylaxis in TB infection nidus. Sanitary prophylaxis.	p.270-271	p.235-238
4. TB infection nidus. Classification of the nidus. The measures performing in the TB infection nidus (complex of measures to sanitation of the TB nidus: current and conclusive disinfection. Chemical and physical methods of disinfection.	p.263-266	p.224-229

## 5.3. Practical tasks which are doing within a class.

1. To work out the plan of TB- infection nidus observation taking in account its category.
2. To define the necessity of the patient’s hospitalization taking in account epidemic dangerous of TB nidus.
3. To made chemoprophylaxis to the members of tuberculous patient’s family.
- 4.To made sanitation of TB infection nidus.

## 6. Contens of the topic.

The prevention of tuberculosis includes social, sanitary, specific (BCG vaccination and revaccination) and chemo prophylactic measures. Social prophylaxis direct on the sanitation of an environment, increasing

of the level of life of a population, enhancing of its health, performing of the measures against the alcoholism, drug-abusing, tobacco-smoking, HIV-infection.

Specific prophylaxis includes BCG-vaccination and revaccination and is obligate in Ukraine and many other countries. It is performed according the calendar of prophylactic vaccinations/ BCG vaccine was suggested in 1919 by french microbiologist A.Calmette and pediatric S.Guerin/ BCG strain survives I the body, vegetates in it stimulating the development of antituberculosis immunity. During two weeks after vaccination BCG begin to transform into L-shaped form of organisms. In this form BCG can survive in the body during 7 and more years, supporting antituberculosis immunity. Nowadays BCG vaccination is performed in 118 countries of the world and in 64 countries vaccination is obligate in accordance with laws. BCG vaccination in 4-9 times decreases TB morbidity of newborns and their mortality caused by tuberculosis; in 1,5-2 times vaccination increases TB infection among vaccinated children. BCG vaccination blocs hematogenous dissemination of MBT and also significantly diminishes the quantity of MBT in lungs, shortening the terms of TB infection presence in the body, stopping the generalizing of the infection and as a result of this improve the running of primary TB infection in vaccinated persons. Antituberculosis vaccination significantly decreases a development of such severe forms of TB as tuberculous meningitis, military tuberculosis and caseous pneumonia.

Chemoprophylaxis implies the prescribing of anti -TB-drugs to healthy persons aiming to prevent tuberculosis. Chemoprophylaxis is given to persons who are in close contact with “open case” of tuberculosis, to children with ‘conversion” of tuberculin test or with increasing the intensity of tuberculin reaction or with hyperergic tuberculin reaction and to HIV-infected persons.

One of the important types of antituberculosis prophylaxis is sanitary prophylaxis, including sanitary and veterinary supervision, sanitary information of population about TB, reducing the reservoir of TB infection by the sanitation of TB infection nidus.

TB infection nidus is TB patient’s home and place of job. There are three categories of TB infection nidus:

1category which is of most epidemically dangerous is a residence of TB patient with copes bacilli excretion or a residence of TB patient with scanty bacilli excretion where the children live;

2category which is of less epidemically dangerous is a residence of TB patient with scanty bacilli excretion and the adults live only. Besides the factors worsening epidemic situation are absent;

3category which is only potential epidemically dangerous is a nidus where are TB patients with “formalistic” bacilli excretion, adult contacts living only and the factors worsening epidemic situation are absent.

The factors worsening the epidemic situation are:

- poor crowding housing;
- low level of sanitary-hygiene culture of patient and members of his family;
- alcoholism or drug-abusing of patient and members of his family.

“Formalistic” bacilli excretion – MBT are absent now in the sputum, but less than 12 months (during this period TB patient is under supervision as “open case” by the epidemiologist and phthisiologist) passed after last bacilli excretion.

Sanitary information and medical education of the population, including TB patients and members of their family are very important. Population must know about possible ways of TB transmission, main rules of personal and social hygiene. The patient should refuse from harm habits (smoking, drinking alcohol). Besides TB patient must be encouraged and supported to be sure in positive result of the treatment.

## **7. Materials for self-control**

1. To enumerate the types of antituberculosis prophylaxis.

Answer: social, specific (primary), chemoprophylaxis (secondary), sanitary.

2. The patient with the consequence of TB (fibrosis and calcification in the lungs) falls ill with non-specific pneumonia.

Which kind of antituberculosis prophylaxis one must to carry out? primary; 2) secondary.

Answer: 2)

## **8. Tasks for student’s self-control of the initial knowledge level**

**1. What is understood under primary chemoprophylaxis against tuberculosis?**

A. The prescription of antituberculous drugs to TB - uninfected children and adolescents.

- B. The prescription of antituberculous drugs to a person with “conversion” of tuberculin test.
- C. The prescription of antituberculous drugs to a person made recovery after tuberculosis.
- D. The prescription of antituberculous drugs to previously TB-infected person at the presence of some factor of higher risk to develop tuberculosis.
- E. In all these cases primary chemoprophylaxis is prescribed.

**2. What is understood under secondary prophylaxis against tuberculosis?**

- A. The prescription of antituberculous drugs to TB-uninfected contacts with TB-patient.
- B. The prescription of antituberculous drugs to TB-uninfected children if they were not BCG-vaccinated.
- C. The prescription of antituberculous drugs to TB-infected persons or to persons who made a full recovery after tuberculosis at a presence of factors of higher risk to develop tuberculosis.
- D. The prescription of antituberculous drugs to all children who were born from mother suffering from tuberculosis.
- E. The prescription of antituberculous drugs to persons with BCG-induced tuberculin allergy defined by Mantoux test with 2 TU (IU) PPD-L.

**3. Which dose of BCG vaccine is correct?**

- A. 0,025 mg
- B. 0,5 mg
- C. 0,25 mg
- D. 0,05 mg
- E. 0,005mg

**4. Which of these contraindications to BCG vaccination is a constant one?**

- A. Low bodyweight of newborn (less than 2 kg)
- B. Purulent and septic diseases.
- C. Any acute disease.
- D. Postnatal trauma with neurological disorders.
- E. Generalized BCG-infection in other children of the family.

**5. Which contraindication to BCG vaccination is a temporary one?**

- A. TB infection or TB in the past.
- B. Positive or doubtful reaction towards Mantoux test with 2 TU of PPD-L

- C. Complication of previous BCG vaccination.
- D. Malignant blood diseases or a cancer.
- E. Temporary contraindications are absent among above mentioned ones.

**9. Tasks for the control of current knowledge level on the topic.**

1. The healthy infant with body weight of 3 kg is born. His state was estimated as 8 balls according to Apgar's scale. His father suffering from "open case" of TB is at home.

**What is the pediatrics' management of this case?**

- A. To vaccinate the child with BCG-1 and discharge him from maternity home.
- B. To vaccinate the child with BCG-1, discharge him from maternity home and carry out a course of chemoprophylaxis.
- C. To vaccinate the child with BCG-1 and delay the discharge of the child in maternity home for 1 month.
- D. To vaccinate the child with BCG-M and discharge him from maternity home.
- E. To vaccinate the child with BCG-1, discharge him from maternity home and to send father to anti-TB hospital.

2. The adolescent at the age of 14 years old resides with his parents and his grandfather. The grandfather suffers from an "open case" of TB. The adolescent is in a persistent contact with his grandfather. The adolescent undergoes BCG-vaccination.

**Which BCG vaccine dose of ones below mentioned has to be done?**

- A. 0,5 mg.
- B. 0,05 mg.
- C. 0,25 mg.
- D. 0,025 mg.
- E. 0,001 mg.

3. There are five children in different three families. They were tested with Mantoux test with 2 TU of PPD-L. The results obtained are as following: first child – papule with the diameter of 10 mm, second one – 4 mm with the vesicle in the centre, third one – 3 mm, fourth one – hyperemia only, fifth one – injected reaction only.

**Which child can be BCG-revaccinated?**

- A. The child with the reaction - papule of 10 mm.
- B. The child with the reaction - papule of 4 mm with the vesicle in the centre.

- C. The child with the reaction - papule of 3 mm.
- D. The child with the presence of hyperemia only.
- E. The child with injected reaction only.

**10. Tasks for the control of the final knowledge level on the topic.**

1. There are 5 members of the family. The father suffers from pulmonary infiltrative tuberculosis of upper right lung, phase of cavitation, MBT +. The mother is under dispensary follow up because of sequence of pulmonary tuberculosis which she suffered from in the past. The adolescent at the age of 15 years old has the result of Mantoux test with 2 TU as infiltrate with the diameter 20 mm, the child at the age of 10 years old has the result of Mantoux test as 15 mm and the child at the age of 6 years has negative result of Mantoux test.

**Who from this family submits primary chemoprophylaxis?**

- A. Mother.
  - B. Adolescent of 15 years old.
  - C. Child of 10 years old.
  - D. Child of 6 years old.
  - E. Nobody.
2. A female of 35 years old had subacute disseminative pulmonary tuberculosis, MBT+. As a result of treatment several solid lesions are remained lobe. She submits chemoprophylaxis in a year after recovery.

**Which of below mentioned drugs must be used?**

- A. Streptomycin + ethambutol.
  - B. Ethambutol + pyrazinamide
  - C. Isoniazid + ethambutol.
  - D. Rifampicin + ethambutol.
  - E. Isoniazid + PAS.
3. In a family a father was determined as a new case of pulmonary infiltrative

tuberculosis of upper right lung in the phase of cavitation, MBT+. In child of 5 years old positive Mantoux test with 2TU was detected – infiltrate with the diameter of 15 mm. Last year Mantoux test was 5mm.

**Which kind of chemoprophylaxis must be performed?**

- A. Primary.
- B. Secondary.
- C. Repeated.
- D. Careful.
- E. Intensive.

## 11. Tasks for the conclusive module control on topic.

### 1. Who is considered as bacilli excretory TB patient (“open case of TB”)?

- A. Bacilli excretory TB patient is a patient in whose sputum MBT were found thrice bacteriologically and there are clinical and x-ray signs of active TB are present.
- B. Bacilli excretory TB patient is a patient in whose sputum MBT were found by any method once and the clinical and x-ray signs of active TB are present.
- C. Bacilli excretory TB patient is a patient in whose sputum MBT were found by any method and the clinical and x-ray signs of active TB are absent.
- D. Bacilli excretory TB patient is a patient in whose sputum MBT were found obligatory twice and the clinical and x-ray signs of active TB are present.
- E. Bacilli excretory TB patient is a patient in whose sputum MBT were found bacterioscopically even once and the clinical and x-ray signs of active TB are present.

### 2. How many groups of TB-infection nidus do you know?

- A. Five.
- B. Two.
- C. Three.
- D. Four.
- E. TB-nidus is not divided in groups.

**Pattern of answers: 8:** 1.A; 2.C; 3.D; 4.E; 5.E. **9:** 1.E; 2.B; 3.E.  
**10:** 1.D; 2.C; 3.B. **11:** 1.B; 2.C.

### Recommended reference:

#### Main literature:

- 1. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.
- 2. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.

#### Additional literature:

- 1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.

2. Palomino Tuberculosis 2007. From Basic Science to Patient Care. Medical textbook/ Palomino, Leao, Ritacco, 2007. – 700 p.

#### **Topic # 4: Main principles of TB patient treatment.**

#### **Antituberculosis drugs. Standardized chemotherapy regimens of TB patient treatment.**

##### **1. Currency of the topic**

Positive treatment response of TB patient depends on two factors: an inhibition of mycobacterium colonization by antituberculosis drugs (anti-TB drugs) and regression of TB changes in affected organs with reparation of their structure and function.

As tuberculosis is an infectious disease the main method of its treatment is anti-mycobacterium drugs. Treatment response is conditioned by direct bactericidal or bacteriostatic action of anti-TB drugs on *Mycobacterium tuberculosis* resulting in its elimination. Regression of TB changes in affected organs and reparation of them occur due to anti-TB drugs. Adjacent therapy is also of value.

That is why a student has to master of the main methods of TB treatment knowledge and the skills to use it in medical practice.

**2. General goal:** to master of the knowledge and the skills of the main methods to treat TB patient and to use it in medical practice.

##### **3. The concrete aims:**

- To master of the main principle of TB patient treatment;
- To study the questions connected with the performance of specific treatment;
- To define standardized chemotherapy regimens depending on treatment category;
- To master of the combinations of anti-TB drugs;
- To understand the duration of chemotherapy course and multiplicity of administration of anti-TB drugs for every of chemotherapy regimens.
- To diagnose side-effects of anti-TB drugs;
- To master of the methods of prevention of possible adverse reactions, induced by anti-TB drugs and complications which can be appear during the treatment; to be able to delete side effects of anti-TB rugs in case of their appearance;
- To define the criterions of TB patient recovery;

- To study epidemiological, clinical, radiological and other criterions evident for regression and recovery of TB;
- To have a clear understanding about residual changes which are almost always accompany the recovery of tuberculosis and their significance for possible reactivation (exacerbation or relapse of TB in the future).

**4. Basic knowledge and skills are necessary for topic studying (interdisciplinary integration)**

The title of preliminary discipline	The skills which were obtained
1. Pharmacology department	To classify anti-TB drugs, doses, ways and multiplicity of the anti-TB drugs intaking. To be able to prescribe a recipe of anti-TB drugs.  To know physical and chemical properties of anti-TB drugs, pharmacology dynamic, doses and ways of the drugs intaking. To know possible side effects of drugs and the methods of their deletion.
2. The department of introduction of internal diseases.	To apply the methods of physical examination of TB patient, laboratory and functional investigations and to define the volume of TB patient examination in the presence of side effects of the drugs. To be able to distinguish pathological changes from normal results of the investigations.

**5. The tasks for student’s independent work during the preparation for the class.**

5.1. The list of the main terms, parameters and characteristics which a student has to master during the preparation for the class.

The term	The definition
DOTS – strategy (directly observed treatment short-course)	The program of TB patient treatment carrying out under the direct control after the standardized chemotherapy regimens depending on treatment and dispensary follow up category.
DOTS + program	This is standardized 5-components chemotherapy regimen for patients suffering from multi-drug-resistant tuberculosis (MDR) (TB with multiple drug resistance towards two drugs of the

	first line: isoniazid and rifampicin): 2 drugs of first line – Ethambutol + Pyrazinamide and 3 drugs of second line – fluoroquinolones + Ethionamide + Kanamycin must be administered before the obtaining of the results of drug sensitivity with using of individual scheme of treatment subsequently.
Complex treatment	This is combination of specific (etiologic) and non-specific treatment and also using of surgical methods of treatment.
Combinative treatment	This is an administration of no less than 4 anti-TB drugs in the initial phase for every patient.
Control of treatment	This is a taking of drug at a presence of medical workers, close relatives or voluntaries with a purpose to supply taking drugs regularly.
Two phases of treatment	First intensive phase is directed to inhibit the multiplication of Mycobacterium tuberculosis, its significant reducing and part sterilization of a zone of specific inflammation. In second, continuative phase daily or intermittent chemotherapy is provided for clinical recovery of patient (persistent stopping of bacilli excretion, resolving of infiltrates and healing of caverns) or for treatment before surgical intervention.
Anti-TB drugs	Antituberculosis drugs
Treatment category	This is a group of patients defined on 4 determinants: type of TB (defined on the ground of the disease history), site of TB, severity of the disease and presence of TB bacilli in examined material (sputum).
New case of tuberculosis (NCTB)	A patient with newly diagnosed tuberculosis, who never was treated with anti-TB drugs or was treated less than 1 month.
Relapse of TB (RTB)	A case of repeated diagnosis of active tuberculosis in patient who in the past successfully completed a full course of chemotherapy and was considered as made a full recovery.
Chronic TB (CTB)	A patient with positive result of microscopic or cultural examination of the sputum after the

	course of supervised treatment approximately after 2 years of unsuccessful treatment.
The drugs of first line (essential drugs)	The drugs (isoniazid, rifampicin, pyrazinamide, streptomycin, ethambutol, thioacetazone) which are administered to NCTB or RTB who excretes drug bacilli (patient of 1- 3 categories).
The drugs of second line (reserved drugs)	The drugs (kanamycin, ampicillin, capreomycin, ofloxacin/ciprofloxacin, ethionamide/prothionamide, PAS, cycloserin) which are used in individual schemes of chemotherapy in patients of category 4 with the resistance towards the drugs of first line and also in patients of other categories with the resistance of MBT towards the drugs of first line or with adverse reactions induced by drugs.
Intermittent regimen	The taking of daily dose of anti-TB drugs 2-3 times a week.
Extensive forms of TB	Tuberculosis involved two and more segments of lungs or 2 and more organs.
Intensive phase	The stage of TB patient treatment directed on the inhibition of MBT multiplication, removing acute manifestation of the disease and part sterilization of specific inflammation zone.
Continuation phase	The stage of TB patient (daily or intermittent chemotherapy) carrying out to reach clinical recovery of the patient (persistent stopping of bacilli excretion, resolving infiltrates and healing of cavern) or to prepare the patient for surgical intervention).
Undeleted adverse reactions	Adverse reactions which could not be to delete after reducing of the drug dosage and administration of adjacent therapy.
Deleted adverse reactions	Adverse reactions which characterized by insignificant symptoms and organs function disturbances and could be deleted by reducing of the drug dosage and administration of adjacent therapy.
Criteria of TB patient recovery	The batch of signs of good treatment response (completed and adequate main course of chemotherapy; persistent stopping of bacilli excretion, confirmed by microscopy and culture examination of the

	sputum; healing of caverns in lungs and resolving (or induration) of infiltration and lesions; deleting of clinical and laboratory signs of TB inflammation; restoration of functional abilities and capability of work).
The treatment is completed	The patient with positive sputum smear at the start of treatment completed full course of treatment and no more than one negative result of sputum smear on 5 <sup>th</sup> month and later is recorded. The patient suffering from pulmonary or extrapulmonary tuberculosis with negative sputum smears after full course of the treatment.
Treatment failure	New case of TB with smear sputum still positive during 5 months or more after starting chemotherapy or the patient interrupted the treatment from 2 up to 5 months after starting chemotherapy with positive sputum smear.
Interrupted treatment	The patient interrupted the treatment for 2 or more months.
Recovery	The patient completed full course of the treatment with recorded negative sputum smear in two or more sequent specimens after 5 months of the treatment and at the end of the treatment.

### 5.2. Theoretical questions for the class:

1. Enumerate the main principles of TB patient treatment.
2. Characterize the main methods of anti-TB drugs taking.
3. To indicate single and daily dosage of main anti- TB drugs.
4. What is the main method of TB patient treatment?
5. Why combinative anti-TB chemotherapy is used?
6. What does individual treatment mean?
7. What factors are conditioned the necessity of prolonged and non-interrupted anti- TB treatment?
8. What phases of TB patient treatment are defined? What are their aims?
9. What is the classification of anti-TB drugs?
10. Name the main clinical indications for using of combinative anti-TB drugs.
11. Enumerate the indications for administration of fluoroquinolons.

12. Name the criteria of TB patient recovery.
13. Enumerate the types of adverse reactions induced by the chemotherapy with anti-TB drugs.
14. Explain the difference between the adverse reaction and side effect of the drug.
15. Which adverse reactions are classified as serious ones?
16. What is the classification of side effects of drugs appearing as a result of prolonged anti-TB chemotherapy?
17. What is the mechanism of adverse reactions appearing?
18. Describe clinical signs of toxic reactions.
19. What is the management in case of allergic reactions?
20. What is the cause of disbacteriosis?
21. Clear the meaning of Yarith-Gerxgaimer reaction?
22. What are the kinds of drug-resistance of MBT?
23. What is the mechanism of drug resistance?
24. What factors most frequently are the causes of drug resistance development?
25. Formulate a doctor's and patient's roles in the development of drug resistance?
26. What are the principles of modern anti-TB chemotherapy supplying the prevention of drug resistance?
27. Give the characteristic of bacilli excretion depending on the quantity of growing colonies of MBT during drug resistance test?
28. Why single used of daily dosage of anti-TB drugs is considered as the main one in Phthisiology?
29. What is the peculiarity of intermittent way of anti-TB drugs administration?
30. What ways of taking drugs are used in Phthisiology?
31. What is the advantage of intravenous method of taking anti-TB chemotherapy?
32. Which drugs are taken intravenously?
33. What are the indications for intravenous chemotherapy?
34. Enumerate the contraindications anti-TB chemotherapy?
35. What data is taken in account during the distribution of TB patients among treatment categories?
36. Which cases of TB are concerns to Category 1?
37. What tuberculosis disease is considered as extensive one?
38. Which cases of TB are concerns to Category 2?
39. Which cases of TB are concerns to Category 3?
40. Which cases of TB are concerns to Category 4?
41. What are standardized schemes of TB treatment in adults?

42. What is the peculiarity of TB patient treatment in Category 4?
43. Which standardized treatment regimen is used in multi-drug-resistant (MDR) TB patients?

**Practical work (tasks) which are doing within the class:**

**1. Which drug of mentioned below ones has anti-TB action?**

- A. Nitroxoline.
- B. Ciprofloxacin.
- C. Co-trimoxazole.
- D. Amoxicillin.
- E. Doxycyclin.

**2. Which drug of mentioned below ones acts only on extracellular MBT?**

- A. Isoniazid.
- B. Ethambutol.
- C. Pyrazinamide.
- D. Streptomycin.
- E. Rifampicin.

**3. Which drug of mentioned below ones can induce a neuropathy?**

- A. Isoniazid.
- B. Ethambutol.
- C. Pyrazinamide.
- D. Streptomycin.
- E. Rifampicin.

**4. Which disease is a contraindication for isoniazid administration?**

- A. Chronic obstructive bronchitis.
- B. Rheumatic fever.
- C. Epilepsy.
- D. Chronic pancreatitis.
- E. Ulcer disease.

**5.** The patient P., 33 years old, is in the inpatient department of anti-TB dispensary. Diagnosis "Tuberculous meningitis" was confirmed by MBT found in cerebrospinal fluid. The administered treatment: isoniazid (intravenously) + PAS (intravenously) + rifampicin (per os) + streptomycin (intramuscular) + pyrazinamide (per os).

**Which drug is of rational taking during lumbar puncture?**

- A. Rifampicin.
- B. PAS.

C. Streptomycin.

D. Amicacin.

E. Chlorine calcium complex of streptomycin.

6. The patient, 46 years old suffers from newly diagnosed fibrouse-cavernose tuberculosis. MBT resistant to isoniazid and kanamycin were found in the sputum.

**What etiologic chemotherapy is necessary to administer in intensive phase of patient treatment?**

7. The patient, 39 years old suffers from pulmonary fibrouse-cavernose tuberculosis during 6 years. Chemotherapy failed. Surgical methods of treatment are not indicated. The patient visited a doctor with the complaints on febrile fever, weakness, cough with sputum and haemoptysis. MBT resistant towards streptomycin were found in the sputum.

**What treatment is necessary?**

8. Primary tuberculous complex of moderate lobe of the right lung (phase of infiltration) was diagnosed in a child of 10 years old. MBT are not found.

**What treatment is necessary for the patient in intensive phase?**

9. Right sided caseous pneumonia was newly diagnosed in patient of 26 years old. MBT sensitive towards every of all anti-TB drugs are found in the sputum.

**What treatment is necessary for the patient in chemotherapy intensive phase?**

10. The diagnosis of right sided caseous pneumonia was made in a patient of 47 years old. The patient's state is severe. Fever is 39-40° C. Cough with the sputum, breathlessness in the rest are present. The patient is HIV-infected person. Dullness is heard over the right upper lobe of lungs during the percussion. The breathing is of bronchial one. Little number of moist rales of different calibers is auscultated. Blood test: leucocytes –  $12,4 \times 10^9/l$ , ESR – 38 mm/hour. X-ray picture: total shadowing of the right upper lobe with multiple parts of translucency. Nodular lesions of slight intensity with vague contours are in the lower lobes of both lungs. MBT are found in the sputum.

**What kind of adjacent therapy is necessary to apply with anti-TB chemotherapy?**

**The patterns of answers:** 1.B. 2.D. 3. A. 4. C 5.E. 6. Isoniazid, rifampicin, ethambutol, pyrazinamide.

7. Isoniazid, rifampicin, ethambutol, pyrazinamide, ofloxacin

8. Isoniazid, rifampicin, pyrazinamide, vitamins of B group, hepatoprotectors
9. Isoniazid, rifampicin, pyrazinamide, streptomycin
10. Steroids, immune-correctors

### **Materials for the self-control:**

#### **A. The variants of independent student's task doing during the practical class:**

1. To compose the table of the main principles of TB patient treatment using the references (1. - P.205-210, 2. – P.207-209)
2. To enumerate the main methods of TB patient treatment.
3. To compose the table of possible adverse reactions induced by essential anti-TB drugs using the references (1. – P.195-205, 3. – P.22-25)
4. To compose the table of the main anti-TB drugs and indicate their single and daily dose using the references (1. - P.195-205, 2. – P.2-9-221, 3.- P.7-17)
5. To compose the table of possible methods of taking anti-TB drugs.
6. To compose the table of the main criterions of TB clinical recovery and indicate the diagnostic methods used to prove the recovery.

#### **B. The variants of situate task doing during the practical class:**

1. To administer the chemotherapy regimen for new case of small form of TB.
2. To administer the chemotherapy regimen for new case of cavitory form of TB.
3. To administer the chemotherapy regimen for a patient suffering from cavitory form of TB with treatment failure at previous stage of chemotherapy.
4. To administer the chemotherapy regimen for a patient suffering from chronic cavitory form of TB.

### **Recommended references:**

#### **Main literature:**

1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.
2. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

3. Zaytceva S.I. Treatment of tuberculosis. Manual for practical lessons for students./ S.I.Zaytceva – Kharkiv.: HNMU, 2009.– 40 p.

**Additional literature:**

1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
2. Treatment of tuberculosis. Guidelines for national programmes/ World Health Organization, 1997. – 77 p.

**Topic # 5: TB patient adjacent (non-specific) treatment. Antituberculosis drugs. Hygienic regimen, diet, pathogenic, symptomatic treatment). Surgical treatment. Sanatorium treatment.**

**1. Currency of the topic**

The main components of TB patient therapy are etiologic and non-specific therapy. Non-specific TB patient treatment consists of hygienic and dietary regimen using and pathogenic and symptomatic kinds of therapy. The using of pathogenic therapy allows shorting the time of TB changes in affected organs regression and enhancing repairing of their function. Thus the adjacent therapy increases treatment effect in 3-4 times.

**2. General goal** To master of kinds and methods of TB patient non-specific (adjacent) treatment.

**3. Concrete aims:**

- To master of the methods of pathogenic treatment.
- To know the indications for applying of physiotherapeutic procedures, collapse therapy, surgical intervention and to be able determine the volume and the methods of these kinds of treatment.
- To use hygienic and dietary regimens in TB patient treatment.
- To know the indications for sending TB patient to sanatorium.
- To examine TB patient working capacity.

**4. Basic knowledge and skills which are necessary for the topic studying.**

Preliminary discipline	Obtained knowledge and skills
Pharmacology department	The knowledge of the classification of anti-TB drugs, doses, methods and multiplicity of their taking in the patient's body; physical and chemical anti-TB drugs abilities, their pharmaco- logical dynamics; possible

	side effects of the drugs and the methods of their deletion. The skill of recipe prescribing.
Normal and pathological physiology and introduction of internal diseases department	The skill to apply laboratory and functional investigations to define the volume of non-specific treatment or surgical intervention necessities. The knowledge of normal and pathological determinates of these investigations results.

## 5. The tasks for independent student's work during the preparation for the class.

5.1. The list of the main terms, parameters and characteristics which the student has to know during the preparation for the class.

The term	The definition
Artificial pneumothorax	Artificial air entering into the pleural cavity to collapse the affected lung.
Pneumoperitoneum	Artificial air entering into the abdominal cavity to raise and limit moving diaphragm.
Pneumonectomy	Surgical removal of the lung.
Lobectomy	Surgical removal of the lung lobe.
Segmentectomy	Surgical removal of the lung segment.
Cavernotomy	The dissection and subsequent open treatment of the cavern.
Extra pleural thoracoplasty	Surgical operation removing the parts of ribs to collapse the affected lung.
MCC	Medical consulting commission
MSEC	Medical social expertise commission
Invalid	A person with persistent functional disorders of some organ conditioned by some disease, trauma, or inborn defects which lead to life capacity decreasing and needs social help and defense.
Invalid of 3 group from TB	A person with the lowering of work capacity due to the disturbances of body functions caused by tuberculosis.
Invalid of 2 group from TB	A person with persistent lost of work capacity due to functional disorders caused by TB who does not need in

	help or care after him (her).
Invalid of 1 group from TB	A person suffering from a severe form of TB with the full lost of work capacity needed in persistent help and care after him (her).
Partial lost of work capacity	The kind of persistent lost of work capacity when a patient can not work in his (her) specialty but can do some other work without any harm for the health.
Full lost of work capacity	The kind of persistent lost of work when a patient needs a persistent special regimen and treatment.
Temporary lost of work capacity	The lost of work capacity with benign clinical and working prognosis (with a possibility to return professional activity).
Persistent lost of work capacity	The lost of work capacity with persistent disorder of the health in spite of the treatment which prevent the possibility of professional activity.
Indelayed indications for surgical intervention.	The indications connected with the direct threaten of patient's life (profound lung hemorrhage, tension spontaneous pneumothorax)
Urgent indications for surgical intervention.	The indications connected with the necessity to relief a patient's state.
Planned indications for surgical intervention.	The indications determined by the character of pathological changes in the lungs, duration of the disease and general patient's state.

## 5.2. Theoretical questions for the class:

1. What is the aim of TB patient pathogenic treatment?
2. What is the theoretical ground of hygienic-dietary regimen using in anti-TB treatment?
3. Characterize dietary regimen of patient suffering from pulmonary T.B.
4. What groups of drugs act mainly on the mechanisms of pathogenesis of TB inflammation?
5. Enumerate the indications and contraindications for steroids therapy?
6. What are the main criterions of differential correction of TB patient immunity system?
7. What methods of TB patient pathogenic therapy do you know?

8. What are the indications and contraindications for physiotherapeutic methods of treatment (ultrasound, organic electrophoresis and laser irradiation), for surgery and for collapse therapy?
9. What is the role of hygienic-dietary regimen following for positive result of anti-TB treatment?
10. To indicate the main indications for the artificial pneumothorax and for pneumoperitoneum creature?
11. To characterize the main indications for the resection of lung in TB patient.
12. To enumerate the main kinds of TB patient pathogenic therapy and most spread drugs which are used in it.
13. The synthesis of what vitamin is inhibited by anti TB drugs?
14. Characterize active and passive sanitation of bronchial tree in complex TB patient treatment.
15. What is the mechanism of expectorate drugs action and what is their classification?
16. What way the positive action of artificial pneumothorax on TB running can be explained?
17. What are the indications for artificial pneumothorax creature?
18. Describe the method of artificial pneumothorax creature.
19. Classify surgical methods of TB patient treatment.
20. Enumerate the indications and contraindications for TB patient surgical treatment.
21. Enumerate the indications for pneumonectomy (resection of lung).
22. Enumerate the indications for lobectomy of lung.
23. Enumerate the indications for Segmentectomy of lung.
24. What are the peculiarities of postoperative period in TB patient after resection of lung?
25. Enumerate the types of anti TB sanatorium.
26. What is the peculiarity of seaside climate resort?
27. Which factors are the main acting ones in mountain resorts?
28. What is the main sanitize factor of forest and stepper resorts?
29. What are the sanitize methods of resorts for TB patient treatment.
30. What are the determinants of the therapy in health resorts using in TB patient treatment?
31. What climate regimens are defined and what factors are they depend on?
32. What are the indications for sending of pulmonary TB patient to health resort?
33. What are general contraindications for sending patient to health resort?
34. What are the contraindications for sending TB patient to health resort?

### **5.3. Practical work (tasks) which are doing during the class.**

- 1.** Intensive chemotherapy of patient suffering from caseous pneumonia must be combined with:
  - A. Tuberculin therapy;
  - B. Corticosteroids;
  - C. Ciprofloxacin;
  - D. Ultra sound;
  - E. Laser therapy.
- 2.** What kind of treatment is not related to non-specific TB patient treatment?
  - A. Hygienic dietary regimen;
  - B. Symptomatic treatment;
  - C. Surgical intervention;
  - D. Pathogenic treatment;
  - E. Chemotherapy.
- 3.** Name what pathology is not contraindication for surgical treatment of TB patient:
  - A. TB of kidney with renal insufficiency;
  - B. Hypertension;
  - C. Myocardial infarction;
  - D. Amyloidosis of internal organs;
  - E. Presence of the cavern in the lung with the diameter of 4 and more cm.
- 4.** Indications for artificial pneumothorax creature:
  - A. Primary or acquired resistance of MBT;
  - B. Exudative pleurisy;
  - C. Caseous pneumonia;
  - D. Lung hemorrhage;
  - E. Fibrous-cavernous TB.
- 5.** What method to prevent side effects, caused by isoniazid do you know?
  - A) A,E vitamins;
  - B) Carsil;
  - C) To replace the drug with ethambutol;
  - D) Prednisolon;
  - E) Vitamins of B group.
- 6.** The patient of 43 years old suffers from cirrhotic TB of the left lung with respiratory insufficiency of 1 degree. Bacilli excretion takes place periodically. What kind of treatment must be administered?
- 7.** Name the drugs of biological stimulation group using with the aim of maximum resolving of inflammation in the lungs.
  - A) Retabolil;
  - B) Decaris;

- C) Gordox;
- D) Aloe.

8. In the patient at the age of 24 years old 10 months ago the diagnosis was made: New case of pulmonary TB (14.02.2007) of upper right lobe (infiltrative), Destr. +, (phase of cavitation and dissemination), MBT +, M+, C +, Resist. + (H, R), Resist.11 -, Hist. 0, Cat.1. Coh.1 (2007). 6 months after chemotherapy was begun the patient failed the treatment. 4 months after he again was admitted at the hospital to prolong chemotherapy. The diagnosis: New case of PTB (14.02.2007) of upper right lung (fibrouse-cavernose), Destr. + (phase of infiltration and dissemination), MBT +, M +, C +, Resist. + (H, R, E, Z), Resist.II -, Hist 0, Cat. 2, Coh.1 (2007). X- Ray picture: giant cavern (6 x 7 cm) is present in upper right lobe. Surgical treatment was suggested.

Which kind of surgery is suggested?

- A) Cavernotomy;
- B) Pulmonectomy;
- C) Segmentectomy;
- D) Lobectomy;
- E) Cavernoplasty.

9. The patient of 36 years old was admitted at anti TB hospital with the diagnosis: new case of TB (4.11.2007) of lungs (disseminative), Destr. + (phase of infiltration and cavitation), MBT +, M +, C +, Resist. -, Resist. -, Hist.0, Cat.1, Coh.4 (2007). According to Category 1 the patient reserves isoniazid +rifampicin+streptomycin+pyrazinamide. The patient is alcoholic.

Which kind of non-specific therapy is valuable for the patient?

- A. Ambroxol; B. Carsil; C. Lidase; D. Trental; E. Almagel.

10. The patient of 39 years old is under the dispensary follow up during prolonged time with the diagnosis of pulmonary fibrouse-cavernose tuberculosis. MBT are present in the sputum during 5 years. X-ray picture: right upper lobe of lungs is destroyed. MBT is anti- TB drugs sensitive. What kind of treatment is necessary for the patient?

**The patterns of answers:** 1. C, 2. C, 3. E, 4. A, 5. E, 6. Surgical treatment, 7. D, 8. B, 9. B, 10. Resection of right upper lobe of lungs.

#### **6. The variants of student's independent work during practical class:**

1. To compose the table of the main kinds of TB patient pathogenic therapy.
2. To characterize PTB patient dietary regimen.

3. To name the main indications for artificial pneumothorax and pneumoperitoneum creature.
4. To compose the table of indelayed, urgent and planned indications for lung resection.
5. To administer stimulative therapy to a patient suffering from pulmonary TB.
6. To administer the course of desensitization to a patient suffering from pulmonary TB with adverse reactions caused by anti IB drugs.
7. To administer the course of immune modulate therapy to a patient suffering from pulmonary TB.
8. To administer the course of symptomatic therapy to a patient suffering from pulmonary TB.
9. To administer the physiotherapeutic course of treatment to a patient suffering from pulmonary TB.
10. To name the indications for the administration of:
11. corticosteroids; -tuberculin therapy; -ultrasound; -laser therapy; -organic electrophoresis.

#### **Recommended references:**

##### **Main literature:**

1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.
2. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.
3. Zaytceva S.I Treatment of tuberculosis. Manual for practical lessons for students. /S.I. Zaytceva – Kharkiv.: HNMU,2009.– 40 p.

##### **Additional literature:**

1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
2. Treatment of tuberculosis. Guidelines for national programmes/ World Health Organization, 1997. – 77 p.

**Topic # 6: Primary tuberculosis. Tuberculosis of non-established localization. Tuberculosis of intrathoracic lymphatic nodes. Primary tuberculous complex. Pathogenesis, path morphology, clinics, diagnostics, differential diagnostics, treatment, consequence.**

**1. Currency of the topic**

Nowadays the struggle against tuberculosis (TB) timely detection and treatment of earliest manifestation of primary tuberculosis has especial important significance because of preventing complications primary tuberculosis can follow by and a development of secondary tuberculosis subsequently. Primary tuberculosis more often manifests as tuberculosis of intrathoracic lymphatic nodes (75-80 % of all primary local forms of TB). So far as primary exogenous infection arrives mainly in a childhood the knowledge of methods of timely diagnosis, treatment and prophylaxis of primary tuberculosis would help a doctor to realize the diagnosis, treatment and prevention of tuberculosis timely in children.

**2. General goal** To create the conditions for students to master the methods of diagnosis and treatment of primary tuberculosis.

**3. The concrete aims:**

- 1) To analyze Mantoux test results for the diagnosis of primary TB-infection.
- 2) To explain the difference in pathogenesis between primary tuberculosis and secondary one.
- 3) To suggest the main methods the patients TB-supposed.
- 4) To classify different clinical forms of primary TB: tuberculosis of non-established localization, primary tuberculous complex, complications of primary tuberculosis on the ground of investigations and to formulate the diagnosis correctly according to the issues of clinical classification.
- 5) To interpret the data of the examination of the patient and carry out the differential diagnosis of primary forms of TB in children and adolescents.
- 6) To draw the schemes of the changes revealed in the x-ray pictures with tuberculosis of intrathoracic lymphatic nodes (tumour-like and infiltrative variants), primary tuberculous complex; the graph of higher risk to develop tuberculosis in primary infected children in different aged groups.

- 7) To analyze the patient's complains, history of the disease, past history, including epidemic anamnesis, data of physical examination and also the results of Mantoux test with 2 TU PPD-L, x-ray examination, bronchiscopy and micribiological investigations and to give proof of the diagnosis of different clinical forms of primary tuberculosis.
- 8) To compose the plan TB-supposed child's examination.

**3. Basic knowledge and skills are necessary for topic studying (interdisciplinary integration)**

Titles of preceding disciplines	Obtained skills
1. Microbiology	To define the causative organism of TB, it's types. To describe the main properties of mycobacterium tuberculosis (MBT), To use the methods of MBT identification
2. Pathological anatomy	To describe the peculiarities of path morphological charges in organs in tuberculosis
3. The introduction of pediatrics	To have the skills for examination the child suffering from TB (gathering the complains, history of the disease, past history , physical examination)
4. Radiology	To describe X-ray syndromes of primary TB in the lungs of children and adolescents
5. Pharmacology	To classify anti TB-drugs, to use them in patient suffering from primary TB

**4. Tasks for the independent work.**

- 4.1. The list of terms, parameters, characteristics which a student have to master during the preparation for the class

1. Primary tuberculosis	Primary tuberculosis a disease which develops in the body previously infected mycobacterium tuberculosis
2. Tuberculosis of non-established localization	Tuberculosis of non-established localization is a clinical form of primary tuberculosis characterized by the symptoms of functional disorders without local manifestation of the disease.
3. Primary tuberculous complex	Primary tuberculous complex is a clinical form of primary tuberculosis characterized by specific inflammation of

	the lung parenchyma (or other organ), regional lymphatic nodes and lymphogitis with the development of corresponding clinical picture
4. Tuberculosis of intrathoracic lymphatic nodes	Tuberculosis of intrathoracic lymphatic nodes is a clinical form of primary tuberculosis characterized by specific inflammation of lymphatic nodes of the roots of the lungs and mediastinum.

#### 4.2. Theoretical questions for the class:

Theoretical questions	Phthisiology. Textbooks /V.I. Petrenko, p.	Phthisiology. Manual / I.T.Pyatnochka, p.
1. The definition of primary tuberculosis	82	69
2. The main stages of the pathogenesis of primary TB	82-83	69
3. Clinical form of primary tuberculosis	83-95	69
4. Tuberculosis of non-established localization (Tuberculosis of unknown primary site)	83-84	70-71
5. Primary tuberculous complex: definition of the meaning, clinical and X-ray manifestations, the duration of the disease, outcomes, possible complications	86-91	71-74
6. Tuberculosis of intrathoracic lymphatic nodes: definition of the naming, clinical manifestations, X-ray variants, duration of the disease, outcomes, possible complications	91-95	74-78
7. The peculiarities of the treatment of patients suffering from different clinical forms of primary tuberculosis	226-227	209-210
8. Differential diagnosis of tuberculosis of non-established localization	84-86	71
9. Differential diagnosis of primary tuberculous complex and pneumonia, lung cancer and lung abscess	90-91	73
10. Differential diagnosis of tuberculosis of intrathoracic lymphatic nodes with sarcoidosis, lymphogranulomatosis and lung cancer	95-101	76
11. Prophylaxis of primary TB	266-271	229-236

### 4.3. Practical tasks doing within the class.

1. The boy at the age of 10 years old visited the doctor with the complains of an decreasing appetite, fatigue, night sweats. Mantoux test last year was negative. The child was BCG vaccinated at birth, but was not vaccinated at the age of 7 years old. A year ago a contact with an uncle suffering from tuberculosis took place. Physical findings: fever – 37,3<sup>0</sup>C, body weigh is lowered, the child is failed in physical development. The skin is pale. Cervical, sub- and supraclavicle, armpit lymphatic nodes are palpated with soft-elastic consistency and size of 0,3-0,7 cm. The lungs and the heart are without pathological changes. The liver and the spleen are slightly enlarged. Blood test: hemoglobin – 98 <sup>g</sup>/l, leucocytes - 9,7·10<sup>9</sup>/l, ESR – 20 mm / hour. Mantoux test with 2 TU – 12 mm. X-ray picture: pathological changes are absent.

Make the correct diagnosis

- A. Posvaccinal allergy.
- B. Conversion of tuberculin test.
- C. Tuberculosis of non-established localization.
- D. Tuberculosis of intrathoracic lymphatic nodes.
- E. Primary tuberculosis complex.

Answer: B

2. The child 6 years old from the contact with TB-patient complains of the cough, fever up to 38<sup>0</sup>C, absence of the appetite. Auscultation: there are moist small-bubbled rales and wreaked breathing at the corner of the right scapula. X-ray picture: there is an infiltrate fused with the shadow of the lung hilum in 5-th segment of the right lung.

Blood test: leucocytes - 12·10<sup>9</sup>/l, ESR – 36 mm / hour.

MBT in the sputum is not identified by microscopy.

Mantoux test with 2 TU – papule with the diameter of 15 mm.

Past history: first positive tuberculin test was registered 6 months ago.

Make the diagnosis.

Answer: New case of TB (date) of the moderate lobe of the right lung (primary tuberculous complex) Destr.- (phase of infiltration), MBT -, M-, Co, Resisto, O, Kat.1

### Content of the topic

Primary TB develops in the body not previously infected by Mycobacterium tuberculosis. Primary infection is confirmed by the conversion of tuberculin test from negative into positive one. Clinical manifestations of primary TB are different. More frequently it realizes in the forms of tuberculosis of non-established localization, primary tuberculous complex and tuberculosis of intrathoracic lymphatic nodes.

Chronic primary tuberculosis is also distinguished. It is possible for primary TB to arise in the form of focal, disseminative processes and also in the form of serousitis and extra pulmonary forms. Tuberculosis of non-established localization of children and adolescents is a clinical form of primary tuberculosis characterized by the symptoms of functional disorders without local manifestations of the disease. The main criterions of the diagnosis of this form of tuberculosis are:

- conversion of tuberculin test;
- presence of the syndrome of intoxication;
- absence of local changes;
- absence of other diseases capable to induce intoxicative syndrome.

Primary tuberculosis complex (PTC) is a clinical form of primary TB characterized by specific inflammation in the lungs, intrathoracic lymphatic nodes and lymphangitis with development of on the corresponding clinical picture. Clinical duration of the PTC can be plain and complicated. When plain duration of PTC clinical symptoms often can be absent. When complicated duration of PTC can start subacute. In acute variant of the disease intoxicative and bronchi-pulmonary syndromes are significant and bronchi-pulmonary syndrome can arise as cough, pain in the chest and breathlessness.

Complications are:

- lymph-hematogenous dissemination;
- tuberculous pleural effusion;
- tuberculous bronchitis;
- lymph bronchial fistula;
- segmental or lobar atelectasis of the lung.

Progression of the PTC can lead to primary caseous pneumonia. X-ray picture in PTC is characterized by the bipolar syndrome – a focal shadow in the lung and changing shadowing of the hilum due to enlarged intrathoracic lymphatic nodes. In most cases of spontaneous recovery or imperfect treatment residual changes such as fibrosis and calcification in the lungs are formed. Calcified tuberculous lesions can be seen at the hilum of the lungs due to calcification of the lymphatic nodes and in the lung parenchyma (Ghon's lesions). Clinical duration of PTC can be plain (uncomplicated) and asymptomatic. In this case diagnosis is made on the ground of tuberculin test (conversion negative reaction into positive one; hyperergic reaction and so on) and X-ray examination. Differential diagnosis of PTC is spent with pneumonia, eosinophylic infiltrate of the lung and lung cancer. The treatment when

plain PTC is carried out according to Category III, when complicated - according to Category 1.

Tuberculosis intrathoracic lymphatic nodes (TILN) is a clinical form tuberculosis characterized by specific inflammation of lymphatic nodes of the lung hilum and mediastinum.

So called "small" form of TILN, timorous (caseous-necrotic) and infiltrative (hyper plastic) variants. "Small" form is a clinical variant of TILN manifesting only X-ray signs of the changes of lung hilum shadowing (it's deformation, enriched and increased lymphatic nodes is confirmed by the revealing of enlarged lymphatic nodes during tomography investigation of the organs of the chest. The investigation reveals the enlargement of the mediastinum or hilum lymphatic nodes with clear polycyclic, curved contours. Morphologically caseous-necrotic lymphadenitis is characterized by alteration, sometimes by total necrosis of affected lymph node. When infiltrative variant lung hilum is widened and it's counters are unlearned as a result of the peripheral exudative inflammation reaction around enlarged lymph nodes (hyperplastic form of tuberculous lymphadenitis morphologically). Insignificant parts of caseous necrotic are revealed in the lymph nodes. Hyperplasia is dominant comparing with specific infiltration.

In complicated cases of TILN decay and formation of the cavern, lymph bronchial fistula, lymph hematogenous dissemination, tuberculous bronchitis, bronchial obstruction, and pleural effusion can appear. In a case of plain duration the activity of the inflammation gradually decreases and the resolving, indurations and calcification occur. The peculiarity of primary tuberculosis duration in adolescents realizes in infiltrative tuberculosis sometimes complicated by the formation of primary cavern and/or pleural effusion. The treatment of uncomplicated TILN is spent according to Category III, when complicated one - Category 1 is used.

### **The materials for the self-control**

1. To draw the scheme of pathological changes in the lungs in case of primary tuberculous complex in the right lung field.
2. Mark what sign of below mentioned list is characteristic for tuberculous infection of primary period?
  - a) an involvement of lymphatic system;
  - b) a formation of the cavern

Answer: a)

3. Chose such signs and syndromes which can be the ground for the diagnosis of tuberculosis of non-established localization:

1. a conversion of negative tuberculin test into positive one;
2. a shadow in the lung fusing with the shadow of widening lung hilum;
3. an irritation, fast fatigue;
4. intensification lung hilum shadowing.

Answer: 1, 3.

4. Chose the signs which are characteristic for X-ray manifestation of the pathology in below mentioned list of signs:

1. an intensive segmental shadowing in the lung, without lung hilum reaction;
2. a shadowing in the lung fusing with the of shadowing of widening lung hilum;
3. a round thin- walled cavity in the lung;
4. a round shadow.

Answer: 2.

5. What kind of residual changes is formed during the reducing of primary tuberculosis complex?

- 1) Ghon's lesion;
- 2) Calcification in the lung;
- 3) Ghon's lesion and calcification in the lung.

Answer: 3)

#### **A. Tasks for the self-control.**

1. The child 3 yearned old has lost his appetite, becomes capricious, lifeless. A cough appear fever up  $t - 37,4^0$ . Mantoux test was 5 mm a year ago. The girl is of lowered body weight. The skin is pale. Peripheral lymphatic nodes are palpable in 5 groups (small, soft, elastic, painless). BCG sign is 3 mm. The breathing is weakened and lung sound is shortened over the percussion. Blood test: leucocytes -  $12 \cdot 10^9/l$ , sticks. -6%, segm.-74,6%, lymph.- 20%, ESR – 36 mm / hour. Mycobacterium tuberculosis are found microscopically in gastric washings. Plain X-ray picture: right lung hilum widened with clear curved counters.
  - 1) Formulate the diagnosis according to classification;
  - 2) Which variant of TILN corresponds with X-ray picture?
  - 3) Which chemotherapy regimen the child needs?
2. The child is 11 years old. There are complaints of the fever, acute pain in the right side of the chest during breathing. The child was in the contact with his grand father, died from tuberculosis. There is the dullness from 3-th rib and down during the percussion over the right side of the chest.. The breathing is weakened there during the auscultation. Blood test: leucocytes –  $10,8 \cdot 10^9/l$ , ESR – 27 mm /

hour X-ray picture: right lung hilum 15 widened, it's structure is changed. Homogenous shadowing with slanting upper contour is seen in the lateral part of the right lung. At the age of 10 years Mantoux test was negative. Sputum smear negative (TB-bacilli are not found microscopically).

- 1) Formulate the diagnosis according to classification;
- 2) What more accurate investigation is necessary to define the etiology of pleural effusion?
- 3) Which chemotherapy regimen must be prescribed to the child?

**The patterns of answers:**

1. 1) New case of TB (date of diagnosis) tuberculosis of intrathoracic lymphatic nodes in the right side. Destr.-, MBT -, M-C0, Resist.0, Hist.0, Cat.1, Koh. (№ of the quarter the and year of the detection).

2) Timorous one.

3) Category 1. Initial phase: 2 months

isoniazid+rifampicin+pyrozinamide+ethambutol (or streptomycin); continuation phase: 4 months isoniazid+rifampicin

2.1). New case of TB (date of diagnosis)(tuberculosis of intrathoracic lymphatic nodes in the right side. Destr.-, MBT -, M-C0, Resist.0, Hist.0, Right sided tuberculous pleurisy. Cat.1, Koh. (№ of the quarter the and year of the detection).

2) Aspiration the exudates from pleural cavity with the investigation for TB-bacilli.

3) Category 1: Initial phase 2 months

isoniazid+rifampicin+pyrozinamide+ethambutol (or streptomycin); continuation phase: 4 months isoniazid+rifampicin.

**Reference**

**The main literature:**

1. Phthiology. A teaching manual in Ukrainian and English/ P'atnochka I.T. – Ternopol, Ukrmedknyga, 2002, - 257 p.

2. Phthiology. A textbook/ Petrenko V.I. – Kyiv, Medicine, 2008, - 287 p.

**Additional literature:**

1. Primary tuberculosis. Manual for practical lessons for students having higher Medical education in English/ Zaytceva S.I., Matveeva S.L., Kharkiv, 2004 – 10 p.

**Topic # 7 : Focal and infiltrative pulmonary tuberculosis. Caseous pneumonia. Tuberculoma of the lung. Fibrous-cavernous tuberculosis and cirrhotic tuberculosis of the lungs. Pathogenesis, path morphology, clinics, diagnostics, differential diagnostics, treatment, consequence. Complications of tuberculosis: haemoptysis, lung hemorrhage, spontaneous pneumothorax, chronic cor pulmonale, amyloidosis of internal organs. Pathogenesis, clinics, diagnostics, treatment.**

### **1. Currency of the topic**

Nowadays tuberculosis is one of the most actual problem of the humanity because the increasing of the morbidity is marked all over the world. Everyday approximately 10 millions new cases of tuberculosis are found that's why WHO declared tuberculosis as a global danger in 1993. Tuberculosis is the most wide-spread infectious disease and takes the first place in the structure of mortality from the infectious pathology .The morbidity increases mainly due to secondary destructive forms of tuberculosis, including the cases with bacilli excretion. The frequency of drug- resistant tuberculosis also increases.

It' s well known that secondary forms of tuberculosis develop in previously infected body as a result of endogenous reactivation of old calcified tuberculous lesions. Reactivation of post- tuberculous changes is caused by the reversion of Mycobacterium tuberculosis (MBT) as a result of malnutrition, stress situations, hyper-solaration, debilitating diseases, HIV-infection and other medical and social provoked factors leading to the immunity decreasing.

Timely detection of secondary tuberculosis, adequate intensive treatment and the prevention of the disease allow decreasing the morbidity of tuberculosis.

**2. General goal** to create the conditions for students ensuring the successful getting of the knowledge and skills allowing to diagnose clinical forms of secondary tuberculosis and analyze obtained results.

### **3. The concrete aims:**

1. To generalize results of the interrogatory of a patient, data of physical examination and investigations with concrete clinical form of secondary tuberculosis.
2. To identify the main syndromes of different clinical forms of secondary tuberculosis.

3. To establish the diagnosis of secondary forms of tuberculosis on the ground of obtained results of the examination.
4. To formulate clinical diagnosis of secondary forms of tuberculosis according to classification.
5. To prescribe complex treatment in different clinical forms of secondary tuberculosis.
6. To diagnose the complications of secondary tuberculosis and to perform a first aid in urgent states of a patient.

#### **4. Basic knowledge and skills are necessary for topic studying**

To achieve the concrete aims the student has to muster following knowledge and skills:

1. To be able to perform the interrogatory of TB- patient.
2. To be able to carry out the inspection of the chest;
3. To define the chest's form;
4. To detect the chest's deformation, the lagging of one side during the breathing.
5. To be able to carry out the palpation, percussion and auscultation of the chest.
6. To give clinical estimation of the obtained data and to define the pathogenesis of revealed symptoms.
7. To be able to generalize obtained results.
8. To know the genesis of every clinical form of secondary TB.
9. To be able to define the concrete syndromes of the involvement of the lungs in secondary tuberculosis.
10. To identify the causative organism of tuberculosis, their types. To describe the main properties of Mycobacterium tuberculosis (MBT), to apply methods of the detection of MBT.
11. To describe the peculiarities of path morphological changes in internal organs in tuberculosis.
12. To classify antituberculous drugs and to use them in the treatment of secondary tuberculosis.

#### **5. The tasks for student's independent work during the preparation for the class.**

5.1. The list of the main terms, parameters, characteristics which a student has to muster during the preparation for the class.

The term	The definition
1.Secondary tuberculosis	Secondary tuberculosis is a disease developing in previously TB-infected body.
2. Focal	Focal pulmonary tuberculosis is a clinical form of

pulmonary tuberculosis	tuberculosis characterized by the formation of TB-lesions (less than 1 cm in the diameter) mainly of productive type localized in borders of 1-2 segments of the lung. Clinical picture usually asymptomatic or with a few symptoms.
3.Infiltrative pulmonary tuberculosis	Infiltrative pulmonary tuberculosis is a clinical form of tuberculosis characterized by the presence of the focus of specific inflammation more than 1 cm in the diameter mainly of exudative type tending to the fast formation of the necrosis and the cavern.
4.Caseous pneumonia	Caseous pneumonia is a clinical form of pulmonary tuberculosis characterized by an acute specific inflammation with fast increasing of caseous-necrotic changes involving the lobe of the lung or a whole lung, severe clinical duration frequent fatal outcome.
5.Tuberculoma of the lung	Tuberculoma is a clinical form of tuberculosis characterized by the isolated rounded focus of caseous necrosis more than 1 cm in the diameter usually encapsulate with chronic torpid clinical duration.
6.Fibrous-cavernous pulmonary tuberculosis	Fibrous-cavernous tuberculosis characterized by the presence of an old fibrous cavern, gross fibrosis changes in lung parenchyma around the cavity and lesions of bronchogenic dissemination. This clinical form is distinguished by chronic duration with periods of remission and exacerbation, persistent or periodical bacilli excretion.
7.Cirrhotic pulmonary tuberculosis	Cirrhotic pulmonary tuberculosis characterized by the extensive development of the connective tissue in the lungs due to the involution of different clinical forms of tuberculosis or tuberculous pleurisy with the remaining of clinical and laboratory signs of active tuberculous disease.

## 5.2. Theoretical questions for the class.

1. The definition of secondary tuberculosis	Phthisiology. A teaching manual in Ukrainian and English/ Pyatnochka I.T., p.80-127	Phthisiology. A textbook/Petrenko V.I., p.104-159
---	---	---

<p>2. Focal pulmonary tuberculosis. The definition of the meaning, pathogenesis, path morphology, clinics, diagnostics, differential diagnosis with focal pneumonia, peripheral lung cancer, metastasis, treatment, consequence of tuberculosis, possible complications. The examination of the patients.</p>	<p>87-92</p>	<p>116-120</p>
<p>3. Infiltrative pulmonary tuberculosis. The definition of the meaning, clinical and x-ray variants of infiltrative tuberculosis, pathogenesis, path morphology, clinics, diagnostics, differential diagnosis with pneumonia, lung cancer, treatment, consequence of infiltrative TB, possible complications. Examination of the patients.</p>	<p>92-96</p>	<p>121-132</p>
<p>4. Caseous pneumonia. The definition of the meaning, pathogenesis, path morphology, clinics, diagnostics, differential diagnosis with pneumonia, lung cancer, treatment, consequence of caseous pneumonia, possible complications. Examination of the patients.</p>	<p>96-101</p>	<p>132-134</p>
<p>5. Pulmonary tuberculoma. The definition of the meaning, pathogenesis, path morphology, clinics, diagnostics, differential diagnosis with benign and malignant tumor, echinococcus, lung abscess, aspergilloma lung cancer, treatment, outcomes, consequence of tuberculoma, possible complications. Examination of the patients.</p>	<p>101-106</p>	<p>135-141</p>

<p>6.Fibrous-cavernous tuberculosis. The definition of the meaning, pathogenesis, path morphology. Classification of the caverns, clinics, diagnostics. Differential diagnosis with lung abscess, bronchiectasis, lung cysts, cavernous form of the lung cancer. Possible complications and outcomes. Examination of the patients.</p>	<p>106-112</p>	<p>142-151</p>
<p>7.Cirrhotic tuberculosis.The definition of the meaning, pathogenesis, path morphology. Clinics. Clinical variants of cirrhotic tuberculosis. Diagnostics. Differential diagnosis with metapneumonic pneumosclerosis, pneumocirrhosis, sarcoidosis, aplasia of the lung, pneumoconiosis. Possible complications and outcomes. Examination of the patients.</p>	<p>112-116</p>	<p>152-157</p>
<p>8.Complications of secondary tuberculosis. Lung hemorrhage and haemoptysis. Pathogenesis, clinical picture, diagnostics, classification of lung hemorrhage. Treatment. Examination of the patients.</p>	<p>137-145</p>	<p>166-170</p>
<p>9.Spontaneous pneumothorax. Classification of spontaneous pneumothorax. Pathogenesis, clinical picture, diagnostics. Treatment. Examination of the patients.</p>	<p>145-148</p>	<p>170-171</p>
<p>10.Chronic cor pulmonale. Pathogenesis, clinical picture, the stages of the development of cor pulmonale. Amyloidosis of the internal organs. Pathogenesis, clinical picture, diagnostics, treatment. Examination of the patients.</p>	<p>148-154 152-154</p>	<p>159-165 172-173</p>

### **5.3. Practical tasks, which are doing withing the class.**

1. To work out the plan of the talk with the patient suffering from pulmonary tuberculosis; to reflect in it the cause of the disease, the peculiarity of the disease duration, the necessity of prolonged treatment, treatment response.
2. To put the questions for the examination of the patient: to analyze general and respiratory complains, the peculiarities of the start and further development of the disease in concrete patient.
3. To perform physical examination of the patient suffering from pulmonary tuberculosis and to work out the plan of patient's examination.
4. To make the diagnosis on the ground of the data of examination and investigations indicating the type of tuberculous process, localization, clinical form, presence of the cavern, bacilli excretion, drug sensitivity of MBT, results of histological confirmation of the diagnosis, category, cohort and complications.

### **Contents of the topic**

Secondary tuberculosis develops in body previously infected by MBT, clinical manifestations of secondary tuberculosis mostly depend on it's clinical form, phase of tuberculosis. Sometimes general and respiratory complains can be absent. When destructive and exudative changes are present manifestations of intoxication and respiratory complains take place.

Focal pulmonary tuberculosis is a clinical form of tuberculosis characterized by the presence of specific lesions up to 1 cm in diameter, proliferative inflammatory reaction and limited involvement of lung parenchyma with no more than 2 segments of the lungs manifesting as asymptomatic disease or a disease with scanty symptoms. There are two variants of the disease: soft-nodular and fibrous-nodular ones. Cavitation occurs seldom.

Infiltrative pulmonary tuberculosis is a clinical form of tuberculosis characterized by the prevalence of exudative inflammatory reaction and significant clinical manifestation with the tend to the cavitation. There are 6 types of infiltrates: round, lobar, lobular, cloud-like, false-tumorous ones and periscirritus. The progression of the infiltrate can lead to the cavitation and seeding tuberculous lesions both in lungs and in other organs and systems.

One of the most severe clinical form of secondary tuberculosis is caseous pneumonia presenting as an acute specific inflammation characterized by fast developing caseous-necrotic changes and sometimes leading to a fatal outcome.

Benign outcome of this clinical form can be its conversion into chronic fibrous-cavernous pulmonary tuberculosis.

Tuberculoma imply encapsulate foci of caseous necrosis of different genesis more than 1cm in the diameter with chronic torpid duration. The classification of tuberculoma suggested by Averbah M.M. is established on ground of morphological principle:

- a) solitary tuberculoma filled in by the caseous mass;
- b) flaky tuberculoma with the layers of caseous necrosis alternated with the layers of connective tissue ;
- c) conglomerated tuberculoma consisting of the group of lesions surrounded by common capsule, this usually takes place in the regression of the process.
- d) "blocked cavern" - is the cavern filled in by caseous mass when the wall of the cavern become the capsule of tuberculoma.

Clinical duration of tuberculoma can be of progressive, stable and regressive types.

The final stage of secondary pulmonary tuberculosis duration is fibrous-cavernous tuberculosis characterized by the presence of old fibrous capsule, gross fibrous changes in surrounded lung parenchyma, bronchogenous dissemination and chronic wavy duration. Clinical duration has 4 variants as following:

1. Self-limited and relatively stable process.
2. Slowly progressive process.
3. Fast progressive process.
4. Fibrous-cavernous tuberculosis followed by different complications: chronic cor pulmonale; amyloidosis of internal organs; haemoptysis; lung hemorrhage; spontaneous pneumothorax; pleural empyema.

Other clinical form of chronic secondary tuberculosis is cirrhotic tuberculosis characterized by extensive development of connective tissue as a result of involution of different clinical form of tuberculosis or specific pleurisy with the remaining of the clinical and laboratal sighs of active pulmonary tuberculosis. Scanty bacilli excretion periodically is present. There are bronchial deformation with bronchiectasis and emphysematous bullas within the cirrhosis. These changes frequently complicate the duration of the disease by spontaneous pneumothorax, haemoptysis, the hypertension in pulmonary circulation of the blood due to the reduction of the vessels with the formation of chronic cor pulmonale.

Clinical picture of cirrhotic tuberculosis is varied. There are 5 variants of cirrhotic tuberculosis:

1. Self-limited cirrhotic tuberculosis with a few symptoms.
2. Self-limited or wide-spread cirrhotic tuberculosis with frequent exacerbations.
3. Cirrhotic tuberculosis with bronchiectasis and periodical haemoptysis and lung hemorrhage.
4. Cirrhotic tuberculosis with the presence of “chronic cor pulmonale” and different manifestations of lung and pulmonary-cardiac insufficiency.
5. “Destroyed lung” with the progression of tuberculous process and different manifestations of metatuberculous syndrome.

The treatment of focal and self-limited infiltrative tuberculosis is carried out according to category 3, extensive infiltrative tuberculosis and tuberculoma with the cavitation – according to category 1, fibrous-cavernous and cirrhotic tuberculosis – according to category 4.

## 6. Materials for self-control

### A. Tasks for self-control of the initial level of the knowledge on the topic.

1. To draw the scheme of pathological changes in the lungs in secondary tuberculosis: focal, infiltrative (it’s variants: round, lobular, lobar, cloud-like, false-tumor ones and periscisuritis), tuberculoma, fibrous-cavernous, cirrhotic tuberculosis.
2. Give the definition of secondary tuberculosis.
  - A. Relapse of tuberculosis.
  - B. Destructive tuberculosis.
  - C. Tuberculosis appeared after a long period after primary TB-infection.
  - D. Tuberculosis with demonstrative clinical picture.
  - E. Generalized tuberculosis.

Answer: C.

## 7. Tasks for the control of initial level of the knowledge

1. Which combination of the drugs must be prescribed to the patient suffering from new case of pulmonary tuberculosis with cavitation?
  - A. Isoniazid, streptomycin, kanamycin, ethambutol.
  - B. Rifampicin, streptomycin, amocsiklav, pyrazinamide.
  - C. Isoniazid, rifampicin, pyrazinamide, streptomycin.
  - D. Isoniazid, ethionamide, PAS , ethambutol.
  - E. Streptomycin, viomycin, florimycin, kanamycin.
2. Which path morphological changes prevalent in focal pulmonary tuberculosis?

- A. Alterative inflammation.
  - B. Proliferative inflammation.
  - C. Necrosis.
  - D. Exudative inflammation.
  - E. Pneumofibrosis.
3. Which definition of infiltrative tuberculosis is the most exact one?
- A. Infiltrative tuberculosis is a zone of specific inflammation mainly of exudative character sized more than 1 cm with the tend to the progression and cavitation with possible bronchogenous dissemination.
  - B. Infiltrative tuberculosis is a focus of specific inflammation which obligatory follows by the cavitation and dissemination in pulmonary parenchyma.
  - C. It is a form of specific inflammation which is characterized by the presence in the lungs the cavern stable in size with significant infiltrated, sometimes fibrous changes in surrounded pulmonary parenchyma.
  - D. Infiltrative tuberculosis is a zone of specific inflammation with a chronic torpid duration.
  - E. Infiltrative tuberculosis is characterized by a lot of specific lesions in the lungs with the prevalence of exudative-necrotic reaction at the beginning of the disease and development of the proliferative inflammation subsequently.
4. Which definition of caseous pneumonia is a most exact?
- A. Caseous pneumonia is a clinical form of tuberculosis which is characterized by the presence of a lot of specific lesions in the lungs with the prevalence of exudative-necrotic reaction at the beginning of the disease and development of the proliferative inflammation subsequently.
  - B. Caseous pneumonia is a focus of specific inflammation which obligatory follows by the cavitation and dissemination in pulmonary parenchyma.
  - C. Caseous pneumonia is a clinical form of secondary tuberculosis with significant caseous changes in the lungs and an acute severe progressive clinical picture. During the fast liquefying of the caseous mass giant cavern or a lot of small caverns are formed.
  - D. Caseous pneumonia implies gradual development of the perifocal inflammation around the fresh tuberculous lesions which appear as a result of exogenous superinfection or endogenous reactivation.

- E. Caseous pneumonia is a clinical form of primary tuberculosis which is characterized by the severe state of the patient, significant symptoms of intoxication, respiratory symptoms and massive bacilli excretion.
5. What is the definition of tuberculoma?
- A. Tuberculoma is an incapsuled focus of caseous necrosis bordered by connective tissue with the size more than 1 cm in the diameter and chronic torpid duration.
- B. Tuberculoma is a focus of specific pneumonia with the size less than 1 cm in the diameter localized within 1-2 segments of lung parenchyma.
- C. Tuberculoma is a zone of specific inflammation mainly of exudative type the size more than 1 cm in the diameter and with the tend to the spontaneous recovery.
- D. Tuberculoma is a zone of specific inflammation of prevalently exudative character sized more than 1 cm inclined to the progression and cavitation.
- E. Tuberculoma is a development of the gross connective tissue in the lung as a result of the involution of different clinical forms of pulmonary tuberculosis.
6. What is cause the development of fibrous-cavernous tuberculosis?
- A. Drug-resistance of MBT.
- B. Untimely detection of the disease.
- C. Inadequate treatment.
- D. Unfavorable duration of the initial disease.
- E. Everything mentioned can be the cause of the development of fibrous-cavernous tuberculosis.

**The patterns of answers:** 1.C, 2.B, 3.A, 4.C, 5.A, 6.E.

### 8. Tasks for self-control of the final level of student's knowledge

1. The patient at the age of 55 years old complains of the weakness, perspiration, lack of appetite, subfebrile fever ( $37^0$ ) in the evening. During physical examination pathological changes were not revealed. Sputum test: MBT + (microscopically and by culture method), sensitive towards the 1 line drugs. Plain x-ray picture: there are few lesions of slight intensity with vague counters sized by 5-8 mm with the part of the translucency in one large lesion in 1,2 segments of right lung.

#### Which diagnosis is made?

- A. New case of TB (27.01.2008) S 1,2 of right lung (focal), Destr. +, MBT -, M -, K-, Hist.0, Cat.3, Koh.1 (2008).

- B. New case of TB (27.01.2008) S 1,2 of right lung (focal), Destr. + , MBT - ,M - Hist.0, Cat.3, Koh.1 (2008).
  - C. New case of TB (27.01.2008) S 1,2 of right lung (infiltrative), Destr.+, MBT-, M -, Hist.0,Cat.3, Koh.1 (2008)
  - D. New case of TB (27.01.2008) S 1,2 of right lung (focal), Destr. + , MBT + ,M +,K +, Resist.-,Resist.11 0, Hist.0, Cat.1, Koh.1 (2008)
  - E. New case of TB (27.01.2008) S 1,2 of right lung (focal), Destr. + , MBT - ,M +, K+, Resist.- Resist.11 0,Hist.0, Cat.3, Koh.1 (2008)
2. X-ray investigation reveals round slightly intensive non-homogenous opacity with vague counters in the right upper lobe of the lungs in patient at the age of 30 ears old. It is also seen the cavity in the longitudinal tomogram (cut 6-7 cm) in this site. MBT drug-sensible are found in the sputum. Blood test: ESR – 22 mm/hour.

**Which diagnosis is correct?**

- A. Hospital pneumonia.
  - B. New case of tuberculosis (22.04.08) of S 1-2 of right lung (infiltrative), Destr.+, MBT+, M+,K+, Resist.- , Resist.11 0, Hist.0, Cat.1, koh.1(2008)
  - C. Lung cancer.
  - D. New case of tuberculosis (22.04.08) of S 1-2 of right lung (focal), Destr.+, MBT+, M+,K+, Resist.- , Resist.11 0, Hist.0, Cat.1, koh.1(2008)
  - E. Eosinophylic infiltrate.
3. The patient at the age of 42 years old was admitted at the antituberculosis hospital with the complaints of the fever up to 39,0<sup>0</sup>C, lack of the appetite, significant weakening, cough wit the sputum, pain in the chest, breathlessness. The onset of the disease was acute. Vocal phremitus is increased over the right lung during the palpation. Dull sound during the percussion and multi-calibrated moist rales with bronchial breathing during the auscultation are heard over the same site. Plain x-ray picture: massive subtotal non-homogenous opacity with the parts of the translucency is seen in right lung. There are the lesions of dissemination of moderate intensity in S1-2 of left lung. MBT are found in the sputum. Blood test: Leuc.- 18,0x10<sup>9</sup>/l, sticks – 15% , lymph.-17%, ESR-48mm/hour.

**Which clinical form of TB is revealed?**

- A. Infiltrative pulmonary tuberculosis (lobatis).
  - B. Caseous pneumonia.
  - C. Miliary tuberculosis.
  - D. Subacute disseminated pulmonary tuberculosis.
  - E. Primary tuberculous complex.
4. A patient of 37 years old was send to the phtisiologist to be consulted with newly diagnosed changes. The complaints are absent. Physical examination has not revealed any abnormalities. There is a round highly intensive homogenous opacity with clear regular counters sized 2,5x3,0 cm in the diameter in second segment of right lung detected by radiological investigation.

**Which clinical form of tuberculosis is revealed in the patient?**

- A. Infiltrative.
  - B. Tuberculoma.
  - C. Focal.
  - D. Subacute disseminated.
  - E. Primary tuberculous complex.
5. A patient at the age 42 years old suffers from fibrous-cavernous tuberculosis o f right upper lobe of lungs, MBT+ during 8 years. During 2 last years his state and capacity and were satisfy. X-ray picture: there is a thick-walled cavern with perifocal inflammation in upper right lobe of lungs. This lobe is reduced due to fibrosis. There are lesions of dissemination in both lungs. The mediastinum is shifted to the right.

**Which x-ray signs are characteristic for fibrous-cavernous pulmonary tuberculosis?**

- A. The presence of the cavern, significant fibrosis, lesions of dissemination.
  - B. The presence of the cavern, perifocal inflammation.
  - C. Perifocal inflammation, bronchogenic dissemination.
  - D. The shifting of mediastinum towards the affected side.
  - E. Intensive opacity, narrowing of the lung field.
6. A patient, female at the age of 50 years old was admitted at the hospital with complaints of the severe pain in the left side of the chest during breathing. She suffers from tuberculosis during more than 10 years. The treatment is not regular. The state is severe. Left side of the chest is lag during the breathing, intercostal spaces are

prominent. The breathing is sharply weakened over the left lung during the auscultation.

**Which kind of investigation is necessary in this case to make the diagnosis?**

- A. Laboratory investigation.
- B. Bronchoscopy.
- C. Tomogram.
- D. X-ray examination of the organs of the chest.
- F. Physical examination.

**The patterns of answers:** 1.D, 2.B, 3.B, 4.B, 5.A, 6.D.

### **Recommended references**

#### **Main literature.**

1. Pyatnochka I.T. Phthiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.
2. Petrenko V.I. Phthiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

#### **Additional literature.**

3. Zaytceva S.I. Nodular tuberculosis. Manual / S.I. Zaytceva, S.L.Matveeva – Kharkiv, KNMU, 2004. – 8 p.
4. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
5. Harryes A.TB. Clinical manual for South East Asia/ A.Harryes, D. Maner, M. Uplecar – Biella: WHO, 1997 – 145 p.

**Topic # 8: Disseminative pulmonary tuberculosis. Miliary tuberculosis. Tuberculosis of nerves system and menings. Pathogenesis, path morphology, clinics, diagnostics, differential diagnostics, treatment, consequence. Examination of the patients.**

#### **1. Currency of the topic**

Disseminative pulmonary tuberculosis in most of cases is regarded as evaluative form, more seldom – as small form of tuberculosis (in case of limited disease without cavitation). The part of disseminative tuberculosis in the total structure of morbidity of tuberculosis is 11-16%. If in some regions the rate of disseminative

tuberculosis increases it means that timely detection of tuberculosis in these regions is imperfect.

Disseminative tuberculosis can develop both in primary and secondary periods of the infection. Hematogenous and lymphogenous ways of development of tuberculous infection more often take place in it's primary period in young persons, adolescents and children. Nowadays disseminative tuberculosis became more frequent in elderly persons.

Taking into account the increasing of miliary tuberculosis during last years this disease was distinguished in separate clinical form, demanding meticulous approaching to it's diagnosis and treatment. The increasing of frequency of such serious disease as tuberculous meningitis also takes place last years. Tuberculous meningitis means the involvement of soft covers of brain in specific inflammation . It can be accompanied by the involvement of the stuff of the brain, then meningitis and encephalitis can occur.

Thus the increasing of frequency of disseminative forms of tuberculosis significantly makes the epidemic situation more worse. That' s why the early detection of disseminative tuberculosis and it's intensive treatment allow to improve epidemic situation in some region.

**2. General goal.** To create the conditions for students supplying getting the knowledge and the skills allowing to recognize different variants of disseminative pulmonary tuberculosis, miliary tuberculosis, tuberculosis of nerves system and meninges.

**3. The concrete aims:**

1. To generalize the results of the interrogatory of the patients, data of physical examination and investigations and interpret them for concrete form of tuberculosis.
2. To identify the main syndromes in different clinical forms of disseminated, miliary tuberculosis , tuberculosis of nerves system and meninges.
3. To establish the diagnosis of studying clinical forms of tuberculosis on the ground of obtained results of investigations.
4. To formulate clinical diagnosis of disseminated, miliary tuberculosis and tuberculosis of nerves system and meninges.
5. To prescribe complex treatment to patients with different studying forms of secondary tuberculosis.

#### 4. Basic knowledge and skills are necessary for topic studying

To reach concrete aims of the topic the student must have following knowledge and skills:

1. To be able to carry out the interrogatory of the patient suffering from pulmonary tuberculosis.
2. To be able to carry out physical examination of the organs of the chest: to define it's form, to reveal it's deformation and lagging of one side of the chest during the breathing.
3. To be able to carry out the palpation, the percussion and the auscultation of the chest.
4. To give clinical estimation of obtained data, to define pathogenesis of revealed symptoms.
5. To be able to generalize obtained results.
6. To know the genesis of studying clinical form of tuberculosis.
7. To define concrete clinical syndrome in disseminative and miliary tuberculosis.
8. To define causative organism of tuberculosis, it's types. To describe the main properties of mycobacterium tuberculosis (MBT), to apply methods of detection of MBT.
9. To describe the peculiarities of path morphological changes in the organs in tuberculosis.
10. To classify antituberculous drugs and to use them in the treatment of secondary tuberculosis.

#### 5. The tasks for independent student's work during the preparation for the class

5.1. The list of the main terms, parameters, characteristics which the student has to master during the preparation for the class.

1.Secondary tuberculosis	Secondary tuberculosis is a disease which develops in the body previously infected by mycobacterium tuberculosis
2.Disseminated tuberculosis	Disseminated tuberculosis is a clinical form of tuberculosis characterized by the generation of multiple lesions of different origin with acute, subacute and chronic duration.
3.Miliary tuberculosis	Miliary tuberculosis is an acute progressive form of tuberculosis with generalized involvement of different organs manifesting as tuberculous sepsis.
4.Tuberculosis of nerves system and meninges (TB meningitis)	Tuberculous meningitis is a specific inflammation of soft covers of the brain or cerebrospinal covers.

## 5.2. Theoretical questions for the class.

1. The definition of secondary tuberculosis	Phthisiology. Manual/Pyatnochka I.T., p. 80-87 p.127-131
2. Disseminated tuberculosis of the lungs. The definition of the meaning, pathogenesis, pathomorphology, clinics, differential diagnosis with bilateral pneumonia, metastasis, occupational diseases, sarcoidosis at 2d and 3d stages, fungi diseases, Hamman-Rich's idiopathic alveolitis . The treatment. Examination of the patients.	p.80-87
3.Miliary tuberculosis. The definition of the meaning, pathogenesis, path morphology, clinics, diagnostics, differential diagnosis with bilateral pneumonia, miliary carcinomatosis of the lungs, occupational diseases, sarcoidosis, fungi diseases, Hamman-Rich idiopathic alveolitis. The treatment. Examination of patients.	p.127-131
4.Tuberculosis of nerves system and tuberculous meningitis. The definition of the meaning, pathogenesis and pathological anatomy. Clinics, diagnostics, laboratal methods of investigation, differential diagnosis with meningitis of other ethiology: purulent (pneumo-, staphylo-, strepto- and meningococcus) and serous (viral) ones. The treatment. Examination of the patients.	p.158-165

## 5.3. Practical tasks which are doing during the class

1. To work out the plan of the talk with a patient suffering from TB reflecting in it the cause of the disease, peculiarities of it's duration, necessity and prolonged course of the treatment, the result of the treatment.

2. Put the questions for the examination of the patient: to analyze general and respiratory complaints, peculiarities of the start of the disease and it's subsequent duration in the concrete patient.
3. To perform the physical examination of tuberculous patient and work out the plan of the examination.
4. To make the diagnosis of tuberculosis indicating the type, localizartion, clinical form of TB, presence of the destruction, bacilliexcretion , drug sensitivity of MBT, result of histological confirmation of the diagnosis, category, cohort, complications on the ground of physical examination and investigations.

### **Contents of the topic**

Secondary tuberculosis develops in the body previously infected by *Mycobacterium tuberculosis*. Clinical manifestations of secondary tuberculosis depend on clinical form. Tuberculosis of nerves system and meninges depends on the localization of the process and period of the disease.

Disseminated pulmonary tuberculosis is a clinical form of tuberculosis characterized by the generation of multiple tuberculous lesions of different origin with acute, subacute and chronic duration. Multiple lesions of dissemination are generated as a result of hematogenous, lymphogenous, bronchogenous and mixed spreading of tuberculous infection. The lesions can be of different correlation between exudative and proliferative components of the inflammation. Disseminative pulmonary tuberculosis in the majority of cases is regarded as evaluative form of tuberculosis, more seldom – as small one. It takes from 11% to 16% in the total structure of morbidity of tuberculosis.

Miliary tuberculosis is an acute progressive form of tuberculosis with generalized involvement of different organs during as tubercular sepsis. miliary tuberculous lesions can appear in the lungs, liver, spleen, meninges, intestine and/or other organs.

In number of cases miliary tuberculosis is limited by only respiratory system. Depending on the prevalence of some clinical syndrome different clinical forms of miliary tuberculosis are distinguished: typhoid, pulmonary and meningeal ones. An execution of x-ray pictures plays an impotent role in the diagnostics of miliary tuberculosis because x-ray- scope method does not give necessitate information. Fluorography is also not informative enough

Tuberculous meningitis concerns to extrapulmonary tuberculosis and presents specific inflammation of brain or/and cerebrospinal covers. Specific inflammation of meninges can be accompanied by the affection of the brain – meningoencephalitis.

The disease has two stages: general hypersensitivity caused by TB-infection in lymphatic nodes or other organs develops at first stage, massive bacilliemia with discharging of the infection through hematoencephalic barrier and infection of the cerebral ventricles, arachnoid membrane and ependyma occurs at second stage. Clinical duration of tuberculous meningitis has three periods: prodromal (period of precursors) period, meningeal (irritation of meninges) period and terminal (period of paralyzes) one. Tuberculous meningitis is differentiated with purulent, serous, viral meningitis and “meningism” – toxic-allergic transient reactions of meninges.

The treatment of tuberculous meningitis is a prolonged complex antimycobacterial therapy using at least 5 antituberculosis drugs. Intensive chemotherapy lasts up to the normalization of the liquor.

Thus, disseminative processes of tuberculosis etiology are quite severe diseases inclined to repeated exacerbation and seeding of different organs and systems. That's why their treatment can be more prolonged for the prevention of new exacerbation of the disease.

## **6. Materials for self-control**

### **A. Tasks for self-control – the control of initial knowledge level of the topic.**

1. To draw the scheme of pathological changes in lungs in secondary tuberculosis:

disseminated TB (acute, subacute, chronic variants), miliary tuberculosis.

2. What is the definition of secondary tuberculosis?

- A. Relapse of tuberculosis.
- B. Destructive tuberculosis.
- C. Tuberculosis which has developed during the long period of time after the infection took place.
- D. Tuberculosis with developed clinical picture.
- E. Generalized tuberculosis.

The pattern of answer: C.

### **7. Tasks for the control of the initial level of the knowledge**

1. In which period of TB-infection disseminative tuberculosis can appear?

- A. In primary period.
- B. In secondary period.
- C. In third period.
- D. In primary and secondary periods.

- E. In secondary and third periods.
2. What character have the lesions of chronic disseminative tuberculosis?
- They are small ones and have exudative character without a tendency to a fusion and cavitation.
  - They are large and have exudative character with a tendency to a fusion and cavitation.
  - They are small ones and of productive character, indurate and calcified
  - They are polymorph ones.
  - Large calcifications.
3. What character have the lesions of miliary tuberculosis?
- Small lesions with exudative character without a tendency to a fusion and cavitation.
  - Large lesions with exudative character and a tendency to a fusion and cavitation.
  - Small lesions of productive character, indurate and calcified.
  - Polymorph.
  - Large calcifications.
4. Which method usually helps somebody to detect bacilli excretion in miliary tuberculosis?
- Microscopy.
  - Microscopy after using the method of flotation.
  - Culture method.
  - Biological test.
  - Usually they are not detected by any method.
5. What character of temperature reaction usually takes place in patient suffering from miliary tuberculosis?
- Subfebrile fever during first 3-5 days of the disease.
  - Prolonged recurrent subfebrile fever.
  - A fever during first 3-5 days of the disease.
  - Irregular fever
  - Normal temperature of the body.

**The patterns of answers:** 1.E, 2.D, 3.A, 4.E, 5.D

### **8. The control of final level of the topic mastering**

1. The patient of 35 years old. Two years ago he has a pleural exudate. After pleurisy x-ray examination was not done. During last year a cough, breathlessness during physical exertion, periodically fever up to  $37,5^{\circ}\text{C}$  troubled him. Now multiple polymeric and polymorph lesions

diffused asymmetrically over upper and mediate parts of the lungs on the field of pneumosclerosis are seen in the plane x-ray picture. The roots of the lungs are upward.

**For which disease these x-ray changes are characteristic?**

- A. Non-hospital pneumonia.
  - B. Idiopathic fibrous alveolitis.
  - C. Lung cancer.
  - D. Chronic disseminative tuberculosis.
  - E. Subacute disseminative tuberculosis.
2. The patient of 35 years old was admitted at the hospital with complaints of the weakness, malaise, cough with the sputum, breathlessness during physical exertion, periodical fever to  $37,2^{\circ}\text{C}$ . From past history it is known about frequent chills. Plane x-ray picture: there are asymmetric multiple lesions of different sizes intensity in upper and mediate parts of the lungs. The lung roots are upward. Lower parts of lungs are of increased translucency. Sputum test: MBT (+). Blood test; leukocytes –  $10,8 \times 10^9/\text{l}$ , sticks – 6%, lymphocytes – 25%, ESR – 30 mm/hour.

**Which scheme of the treatment must be prescribed in intensive phase?**

- A. Isoniazid + Rifampicin + Streptomycin + Pyrazinamide.
  - B. Isoniazid + Rifampicin + Pyrazinamide + Ethambutol.
  - C. Isoniazid + Streptomycin + Ethambutol + Pyrazinamide.
  - D. Isoniazid + Rifampicin + Streptomycin.
  - E. Rifampicin + Streptomycin + Ethambutol + Pyrazinamide.
3. The patient 37 years old during 3,5 months complains of the increased tiredness, subfebrile fever, periodical cough with the sputum, breathlessness during physical exertion, bad appetite. Last x-ray examination was done 3 years ago. Bronchial breathing and diffused dry rales are heard over the lungs. Plain x-ray picture: there are relatively symmetric multiple lesions of different density and sizes. Lung roots are shifted upward. Lower parts of the lungs are of increased translucency. Blood test: leukocytes –  $11,1 \times 10^9/\text{l}$ , sticks – 4%, lymphocytes – 21%, ESR – 33 mm/hour. MBT in the sputum are not found.

**Which clinical form of tuberculosis is diagnosed?**

- A. Chronic disseminative tuberculosis.
- B. Primary tubercular complex (complicated variant)
- C. Subacute disseminative tuberculosis.
- D. Miliary tuberculosis.
- E. Focal tuberculosis.

4. The patient of 36 years old was admitted at the hospital with severe state. The patient is unconscious. Previously severe headache took place. Now there are vomiting, fever up to 40,0<sup>0</sup>C, significant weakness, dry cough, breathlessness. Physical examination: the patient is in the forced position in the bed, the skin and visible mucous are pale. Pulse is 130 beats per 1 min. The shortening of the sound is heard over the lungs during the percussion. Weakened breathing is heard over the lungs during the auscultation. Neck-stiffness is revealed. Kernig's and Brudzinsky's symptoms are slightly positive. Plane x-ray picture: there are multiple small (1-2 mm in the diameter) lesions all over the lung fields. Their contours are vague. Lung markings are almost absent. A previous clinical diagnosis is made: New case of pulmonary tuberculosis (3.09.2008)(miliary), Destr. - , MBT-, K-, Hist. 0, Cat.1, Koh.3(2008).

**For what clinical form of miliary tuberculosis such clinical picture is characteristic?**

- A. Acute miliary sepsis.
- B. Meningeal form.
- C. Lung form.
- D. Typhoid form.
- E. Subacute form.

5. The patient at the age of 23 years old was admitted at antituberculosis hospital with the complaints of the fever up to 39,0<sup>0</sup>C, severe headache, vomiting, weakness, chills, vision disturbances. In the past the patient suffered from fibrose-cavernose tuberculosis. Now the patient has squint, diplopia, asymmetry of the face, neckstiffness, Kernig's and Brudzinski's symptoms. The content of glucose in the blood is %, % mmol/l. Cerebrospinal fluid test: the CSF is transparent, the cytosis is 155/ml (lymphocytes - 60%), proteins - 0,66 g/l, glucose - 2,2 mmol/l, chlorides - 80,0 mol/l, in 24 hours tiny fibrin film appeared, in which MBT were found. The diagnosis is made: tuberculous meningitis.

**Which treatment regimen must be prescribed in intensive phase?**

- A. Isoniazid + Rifampicin + Streptomycin + Ethionamide.
- B. Isoniazid + Rifampicin + Streptomycin + Pyrazinamide.
- C. Isoniazid + Rifampicin + Streptomycin + Pyrazinamide + Ethambutol (three times a week).
- D. Isoniazid + Streptomycin + Ethambutol + Pyrazinamide.
- E. Rifampicin + Streptomycin + Ethambutol + Pyrazinamide.

**The patterns of answers: 1.D, 2.B, 3.A, 4.E, 5.B.**

## Recommended reference

### Main literature:

1. Phthisiology A teaching manual in Ukrainian and English / Pyatnochka I.T., Ternopol, - Ukrmedknyga, 2002. - 257 p. (p.80-87; 127-131; 158-165)
2. Phthisiology. Textbook / Petrenko V.I., Kyiv – Medicine, 2008 - 288 p (104-120; 196-201; 202-206)

### Additional literature:

1. Zaytceva S.I. Disseminated tuberculosis. Manual for practical lessons for students having higher Medical education in English /S.I.Zaytceva, S.L.Matveeva – Kharkiv: Medical National State University,2004.– 8 p.
2. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
3. Harryes A.TB. Clinical manual for South East Asia/ A.Harryes, D. Maner, M. Uplecar – Biella: WHO, 1997 – 145 p.

## **Topic # 9: Tuberculous pleurisy (including empyema). Pathogenesis, path morphology, clinics, diagnostics, differential diagnosis, treatment, residual changes.**

### **1. Currency of the topic**

Diseases of pleura are known to be the most frequent lesions of serous membranes of the organism. Complications of pleural cavity can cause more than 70 various diseases, including extra-thoracal and even system processes. In the last years, tuberculous pleurisy in structure of initial patients tends upwards from 6 up to 10,5%.

The course of tuberculosis from primary infection to chronic destructive forms development is characterized by its fairly frequent involvement in reactive inflammatory process of pleura. Pleural effusion syndrome (PES), being complication of various diseases, including malignant diseases of lungs, mediastinal organs, abdominal cavity, demands early diagnostics and treatment.

### **2. General goal:**

To create for students the appropriate terms, which provide knowledge gaining, and abilities, allowing to recognize the clinical forms of secondary tuberculosis and analyse the results obtained.

### 3. The concrete aims:

1. To generalize the results obtained from patient examination, data of physical and instrumental examination of patients with tubercular pleurisy (including empyema).
2. To identify the basic syndromes of tubercular pleurisy (including empyema).
3. To diagnose tubercular pleurisy (including empyema).
4. To formulate the clinical diagnosis of tubercular pleurisy (including empyema) according to the classification.
5. To institute complex therapy of various forms of tubercular pleurisy (including empyema).
6. To diagnose complications of tubercular pleurisy (including empyema), and to render urgent aid in emergency cases.

### 4. Basic knowledge and skills are necessary for topic studying

For achievement of the specific objects of a topic, the student should possess the following knowledge and skills:

1. To be able to interview patients with tuberculosis of lungs.
2. To be able to conduct chest examination: to define form, to reveal deformations, respiration act lagging of any halves of the thoracic cage.
3. To be able to lead palpation, percussion, auscultation of the thoracic cage.
4. To evaluate finding, to define pathogenesis of the revealed symptoms.
5. To be able to generalize the results obtained.
6. To know the genesis of the target clinical form of tuberculosis.
7. To be able to define a concrete syndrome of lesions.
8. To define the infectious agent of tuberculosis, its types. To describe the basic properties of mycobacteria tuberculosis (MBT), to apply methods of revealing MBT.
9. To describe features pathomorphological changes in lungs caused by tuberculous pleurisy (including empyema).
10. To classify antitubercular preparations, to apply them in treatment of secondary tuberculosis.

### 5. The tasks for independent student's work during the preparation for the class.

5.1. The list of the main terms, parameters, characteristics which the student has to master during the preparation for the class.

1.Secondary tuberculosis	Secondary tuberculosis – the disease developed in the previously infected organism by mycobacteria tuberculosis.
--------------------------	--

2.Pleurisy (including tubercular)	Pleurisy (including tubercular) represents the syndrome of hyperpermeability of blood and lymphatic vessels of the subpleural zone of lungs and connective-tissue of pleural membranes which includes a large group of the pathological processes with different etiology, patogenesis and research results.
3. Purulent tubercular pleurisy (empyema)	Purulent tubercular pleurisy (empyema) – the tuberculosis of pleura, following by the purulent effusion accumulation, is the special form of exudative pleurisy. This disease develops against the background of widespread caseous necrosis of pleura, owing to disintegration and progressing of the large focuses on pleura or the focuses located subpleurally, involving pleura in inflammatory process with subpleural localization of the cavity.

### 5.2. Theoretical questions for class

1. Definition of secondary tuberculosis.	Phthisiology. Manual/Pyatnochka I.T.,Ternopol, 2002
2. Tuberculous pleurisy. Definition of concept, pathogenesis, pathomorphology, clinical picture, diagnostics, differential diagnostics of pleurisies in oncological diseases, with hydrothorax at cardiovascular diseases, with nonspecific pleurisy, with traumatic pleurisies. Treatment. External examination of patients.	p.116-120
3. Purulent tuberculous pleurisy (empyema). Definition of concepts, pathogenesis, pathomorphology, clinical picture, diagnostic, differential diagnostics with pleurisies in oncological diseases, with nonspecific pleurisies, with traumatic pleurisies.	116-120

### 5.3. Practical tasks which are doing during the class

**Task № 1.** To develop the plan of conversation with tuberculosis patients in which to carry out a research into the causes of tuberculosis, features of its course, need for treatment, duration and results of therapy.

**Task № 2.** To put questions, carried on external examination: to carry out analysis of general intoxication and chest complaints, features of the beginning and further development of disease in the patient.

**Task № 3.** To carry out the objective examination of pulmonary tuberculosis patient and elaborate the plan of the examination.

**Task № 4.** According to objective examination, instrumental methods of investigation, to diagnose, indicating the type of tuberculous process, localization, clinical form, destruction, excretion of bacteria, medicinal susceptibility MBT, results of histologic confirmation of the diagnosis, a category, a cogort, complications.

### **Contents of the topic**

Diseases of pleura are known to be the most frequent lesions of serous membranes of the organism. Complications of pleural cavity can cause more than 70 various diseases, including extra-thoracal and even system processes.

In the last years, tuberculous pleurisy in structure of initial patients tends upwards from 6 up to 10,5%.

Course of tuberculosis from primary infection to chronic destructive forms development is characterized by its fairly frequent involvement in reactive inflammatory process of pleura.

Inflammatory reaction of pleura is stipulated by mycobacteria tuberculosis penetrated through lymphogenic, hematogenic or contact ways, and hypersensitization of pleural leaves by products of mycobacteria tuberculosis activity.

Initiating agents, promoting development of pleurisy, are considered the supercooling, physical overloads, malnutrition, hyperinsolation. Tuberculous pleurisy seldom occurs as independent display of tuberculosis; as often as not it occurs as a combination of disseminated, nodular, infiltrative tuberculosis, and primary tuberculosis.

In the course of exudative pleurisies, 3 stages can be discriminated:

- 1) increase of clinical manifestation and accumulation of exudate;
- 2) stabilization;
- 3) resorption effusion and absence of clinical manifestation.

The clinical course of pleurisy is characterized by general intoxication symptoms, as well as the chest ones.

Diagnostics of pleurisies includes obligatory diagnostic minimum and a pleural puncture with the purpose of diagnostics, pleuroscopy and needle biopsy as needed.

Purulent tubercular pleurisy (empyema) is tuberculosis of the pleura, following by accumulation of purulent exudate, develops in

widespread caseous necrosis of pleura owing to disintegration and progress of the focuses on pleura or the focuses located subpleurally.

The clinical picture of the disease in most patients is characterized by heavy intoxication, febrile temperature, nocturnal perspiration, body weight loss, sudden weakness, and tachycardia. The dyspnea and stitches gradually develop.

Revealing purulent exudate is possible by a pleural puncture and evacuation of the liquid. If not evacuated promptly, the purulent exudate can cause complications such as formation of bronchopleural or thoracical fistula.

In tuberculosis of pleura, especially in serous neutrophilic or purulent exudate accumulation, besides chemotherapy, the basic method of treatment is repeated aspiration of exudate with creation of negative pressure in the pleural cavity for as quick as possible straightening of a lung and obliteration of pleural leaves.

In regular aspirations, the purulent exudate gradually turns serous and hemorrhagic. The aspiration should be continued up to the full spread of the lung and obliteration of pleural cavity.

However, some patients undergone aspiration can experience difficulties under the influence of systematic aspiration, especially those with bronchopleural fistula which prevents from creation of negative pressure in the pleural cavity, therefore the patients mentioned above can experience difficulties with straightening of the lung; such cases demand surgical intervention.

## **6. Materials for self-control**

### **A. Tasks for self-control – the control of initial knowledge level of the topic.**

1. To sketch the scheme of pathological changes in secondary tuberculosis: localization of effusion in pleurisies (apical, interlobar, osteodiaphragmatic, costal, paramediastinal, supradiaphragmatic).

2. To sketch the scheme of localization of changes of pleural cavity in empyema.

### **3. Definition of secondary tuberculosis?**

A. Relapse of tuberculosis.

B. Destructive tuberculosis.

C. Tuberculosis discovered in a long run after infection?

D. Tuberculosis with the full-scaled picture.

E. Generalized tuberculosis.

The standard of the answer: C.

**4. How can tubercular etiology of pleurisy be proved?**

- A. Changes of the tubercular nature in lungs or other organs
- B. Revealing MBT in the pleural liquid or sputum
- C. The apparent reaction to Mantoux test or recent conversion of tubercular tests
- D. Needle biopsy of pleura
- E. All of mentioned above is of importance for confirmation of etiology of pleurisy.

**5. Define a mechanism of development of pleural inflammatory reaction caused by mycobacteria tuberculosis?**

- A. Lymphogenic only.
- B. Lympho-hematogenic.
- C. Sputogenic.
- D. Bronchogenic.
- E. Hematogenic only.

**6. Which kind of exudate has small quantity of free liquid, being quickly organized, producing sheet-anchors?**

- A. Purulent.
- B. Serous.
- C. Fibrous and serous-fibrous.
- D. Hemorrhagic and serous-hemorrhagic.
- E. Serous-purulent.

**7. Complication of which form of pulmonary tubercular process can be development perifocal pleurisy?**

- A. Fibrous-cavernous.
- B. Infiltrative
- C. Subacute disseminated
- D. Chronic disseminated
- E. All the forms specified can be complicated by perifocal pleurisy.

**8. What measures should be taken on a priority basis in treatment of accumulation of purulent exudates in tuberculosis of pleura?**

- A. Increase of quantity of antitubercular preparations
- B. Repeated aspiration of exudate with formation of negative pressure in the pleural cavity
- C. Prescription of corticosteroids
- D. Prescription of disintoxication therapy
- E. All above-mentioned

**9. What complications can follow tubercular empyema?**

- A. Bronchopleural fistula.
- B. Thoracical fistula
- C. Amyloidosis of inner organs

- D. Pneumopleurisy
- E. All mentioned above.

**The patterns of answers:** 4. E. 5. B 6. C. 7. E. 8. B 9.E

### **7. The control of final level of the topic mastering**

1. A 47-year-old patient complains of weakness, fatigue, loss of appetite, raise of temperature up to 38,5C, blunt pain in the right half of the thoracic cage. Objectively: the patient lies on the right side, respiratory rate 40 per minute, the right half of the thoracic cage lags behind in respiration. In the middle and bottom third of the right half of the thoracic cage, vocal fremitus is not observed, dullness is defined percussively, respiration is not heard. Above the top border of dullness, pulmonary sound with tympanic shade is heard. For the last half a he has contacted a patient with open form of tuberculosis, initial diagnosis: tuberculosis.

**Which form of tuberculosis can display the above-mentioned physical data?**

- A. Infiltrative tuberculosis of lungs.
  - B. Cirrhotic tuberculosis of lungs.
  - C. Exudative pleurisy.
  - D. Caseous pneumonia.
  - E. Fibrinous pleurisy
2. During a week, a 27-year-old patient complains of the pain in the right half of thoracic cage, subfebrile temperature, weakness, loss of appetite, dyspnea.

On the survey X-ray in the right lung homogeneous darkening of high intensity is observed – from III rib up to the dome of diaphragm.

The top border of a shadow represents a slanting line, the lower one – runs into the dome of the diaphragm.

After carrying out of a pleural puncture and research of the pleural liquid, the diagnosis is: FDTB (22.03.2005) right side pleurisy (exudative), MBT+ M+ C+ Resist I (0), Resist II (0), Hist 0, Cat 1 Cog 1 (2005).

**What changes of the pleural liquid will be characteristic for exudative pleurisy tubercular etiology in the patient?**

- A. Specific weight 1,012, protein 20g/l, cytosis 20 neutrophil, Rivalt's reaction-negative.
- B. Specific weight 1,025, protein 50g/l, cytosis 90 neutrophil, Rivalt's reaction -positive, MBT-

- C. Specific weight 1,020, protein 40g/l, cytolysis 50 neutrophil, Rivalt's reaction-positive, MBT-
  - D. Specific density – 1,020, protein 40g/l, cytolysis 60 lymphocytes, Rivalt's reaction -positive, MBT+
  - E. Specific weight 1,020, protein 40g/l, cytolysis 60 neutrophil, Rivalt's reaction-positive, MBT-
3. A 15-year-old teenager. A week ago felt pain in the right half of thoracic cage, weakness, dyspnea, raise of temperature up to 38,8C. Objectively: intercostal intervals projected from the right side. In the middle and bottom portions of the right lung, voice tremor is absent, percussively – shortening of percussive sound on shoulder-blade and axillary lines, auscultatively – respiration is sharply weakened. On X-ray: intensive darkening of the right pulmonary field from III rib up to the diaphragm is observed. Heart shadow is dislocated to the left. When he was 14 years old, revaccination did not spend owing to the infestation. Current Mantoux test with 2 TU PPD-L – infiltrate 22 mm in diameter.

**The most likely diagnosis of the teenager is?**

- A. Right side exudative pleurisy of tubercular etiology.
- B. Atelectasis of the right lung.
- C. Right side caseous pneumonia.
- D. Nonspecific right side exudative pleurisy
- E. Right side pleuropneumonia

4. A 34-year-old patient complains of the pain in the right half of thoracic cage during a week, subfebrile temperature, weakness, dyspnea. Objectively: the right half of thoracic cage lags behind in respiration act. On the posterolateral portion of the right lung, below the angle of the shoulder-blade, absence of voice trembling, shortening percussive sound, the weakened breath are marked. The survey roentgenogram shows homogeneous darkening of high intensity in the right lung – from III rib up to the dome of the diaphragm. The top border of the shadow represents a slanting line, lower – runs into the dome of the diaphragm. After carrying out of a pleural puncture and research of the pleural liquid, the diagnosis is: FDTB(12.04.2005) right side pleurisy (exudative), MBT+ M+C+ Resist 0, Resist II (0), Hist 0, Cat 1 Cog 2 (2005).

**What therapy should be instituted in the intensive phase?**

- A. Isoniasid+Rifampicin+Streptomycin+ Pyrazinamid.
- B. Isoniasid+Rifampicin+Pyrazinamid.
- C. Isoniasid+ Rifampicin+Streptomycin.
- D. Isoniasid+Rifampicin+Ethambutol.
- E. Rifampitsin+Streptomycin+Ethambutol+ Pyrazinamid.

5. During a week, a 37-year-old patient complains of weakness, raise of temperature up to 38.5C, pain in the left half of the thoracic cage, dyspnoea. Objectively: the left half of thoracic lags behind in the respiration act. In the posterolateral portion of the left lung, below the angle of the shoulder-blade, absence of vocal tremor, shortening of percussive sound, weakened breath is marked. At the survey roentgenogram: in the left lung, from IV rib up to the diaphragm, massive homogeneous darkening is defined. Heart shadow is dislocated to the right. The tubercular etiology of exudative pleurisy can be diagnosed.

**Which research of the patient will confirm the etiology of pleurisy?**

- A. Bronchoscopy.
- B. Roentgenoscopy.
- C. Research of the pleural liquid.
- D. The biochemical analysis of blood
- E. General analysis of blood.

**The patterns of answers:** 1.C. 2. D. 3.A. 4.A. 5.C.

### **Recommended reference**

#### **Main literature:**

1. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.
2. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.

#### **Additional literature:**

1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.
2. Harryes A.TB. Clinical manual for South East Asia/ A.Harryes, D. Maner, M. Uplecar – Biella: WHO, 1997 – 145 p.

**Topic # 10: Pulmonary tuberculosis and occupational diseases. Tuberculosis in HIV/AIDS patients. Clinical picture. Diagnostics. Clinical features and treatment.**

**1. Currency of the topic.**

Occupational diseases of lungs arise owing to influence of harmful factors of the environment on the organism during production activity. Occupational hazards include vibration, inhalation of chemical agents, high level of gas contamination, influence of ambient temperature fluctuation, increase of pressure, pressure reduction and air humidity. The most spread and studied are the diseases related to dust inhalation – pneumoconioses.

Pneumoconiosis is characterized by development of fibrosis, connective tissue nodules and their conglomerates which breaks pulmonary ventilation and causes respiratory insufficiency.

Perilous complication of dust diseases is development in tubercular patients endogenous reactivation of residual changes in pulmonary tissue and lymphatic nodulars. Therefore carrying out of antituberculous treatment will allow silicotubercular patients to warn the progress or stabilize it.

The problem of combination of HIV/AIDS and tuberculosis is of international significance. The tuberculosis is one of the most frequent infectious cause of death in HIV-infected and AIDS patients. According to some statistical data, there are more than 4.000.000 patients with combination of HIV-infection and active tuberculosis in the world. Tuberculosis can affect both HIV-infected and AIDS patients.

Early treatment of tuberculosis in HIV-infected and AIDS patients by antitubercular means allow to receive encouraging results. Therefore it is important to know specified pathology and methods of its treatment.

**1. General goal:**

To create for students the conditions which provide learning opportunity and skills, allowing to distinguish combination of pulmonary tuberculosis with occupational diseases, features of course of tuberculosis in HIV-infected and AIDS patients.

**3. The concrete aims:**

1. To sum up the results of examination of patients affected with pulmonary tuberculosis combined with dust diseases, HIV-infection and AIDS.

2. To identify the basic syndromes in the combined course of tuberculosis with dust diseases, HIV/AIDS.
3. To diagnose the studied forms of tuberculosis, dust diseases and HIV/AIDS.
4. To formulate a diagnosis according to classification in combination of dust diseases and HIV/AIDS.
5. To institute holiatry in various forms of tuberculosis in combination with dust diseases and HIV/AIDS.

#### **4. Basic knowledge and skills are necessary for topic studying**

For achievement of specific goals of a topic the student should own the following knowledge and skills:

1. To be able to examine patients affected with pulmonary tuberculosis and dust diseases.
2. To be able to lead medical examination of the patient, including chest examination: to define the form, to reveal deformations, respiration act lagging of this or that half of the thorax in combined pathology patients.
3. To be able to provide palpation, percussion, and auscultation of the thorax cage.
4. To state clinical estimation to the finding in combined pathology, to define pathogenesis of revealed symptoms.
5. To be able to sum up the finding.
6. To know the genesis of combined course of studied pathological changes.
7. To be able to define concrete syndrome of defeat in tuberculosis and its combination with dust diseases and HIV/AIDS infection.
8. To describe pathomorphological changes in the body in pulmonary tuberculosis in combination with dust diseases, HIV/AIDS.
9. To classify antitubercular preparations, to apply optimum performance of chemotherapy in specified combined pathology.

#### **5. Tasks for independent work during preparation for class**

**5.1.** The list of main terms, parameters, characteristics which the student should acquire while preparing to the class.

1. Pneumoconiosis	(from Latin. <i>pneumonum</i> - lung, <i>konies</i> -dust) - Group of chronic diseases of lungs caused by durable inhalation of industrial dust.
2. Silicosis	The causes of development – inhalation of dust, containing free silicon dioxide SiO <sub>2</sub>
3. Silicatosis	The cause of development – inhalation of silicate dust containing

	dioxide of silicon in bound state – asbestosis, talcosis, coalinosis, cementosis, glass fiber coniosis.
4. Metalconiosis	aluminosis, beriliosis, siderosis, staniosis.
5. Carboconiosis	The cause - (inhalation of carbonaceous dust) anthracosis, graphitosis
6. Pneumoconiosis	The cause – inhalation of toxicoallergenic dust – byssiniosis, amidosis.
7. HIV	Human immunodeficiency virus
8. AIDS	Acquired Immune Deficiency Syndrom

## 5.2. Theoretical questions for the class:

1. Definition of tuberculosis and pulmonary dust diseases (coniotuberculosis).	Phthisiology. Manual/Pyatnochka I.T., Ternopol, 2002 p.179-195	Phthisiology. A textbook/Petrenko V.I., p.157
2. Classification of pneumoconiosis subject to the structure of dust	p.123-127	p.158
3. Developmental stages of pneumoconiosis 1, 2, 3, their characteristic	p.123-127	p.158
4. Clinical course of tuberculosis in combination with silicosis. Differential diagnostics. Treatment of combined processes. Examination of the patients.	p.179-195	p.158-159
HIV-infection, the characteristic. Clinical picture. Treatment.	p.186-189	Phthisiology. A textbook/Petrenko V.I., p.182.
5. AIDS – final stage of clinical course of HIV-infection. Distinctions in display of tuberculosis in early and late stages. HIV - infestation. Clinical course of combination of tuberculosis and AIDS. Treatment. Examination of the patients.	p.186-189	p. 183.

### **5.3. Practical tasks which are doing during the class**

**Task №1.** To schedule conversation with a tubercular patient affected with pulmonary dust diseases, HIV-infection or AIDS, in which to reflect the cause of disease, feature of clinical course, necessity of treatment.

**Task №2.** To put questions, which are supposed to be discussed at examination of patients: to lead the analysis of complaints of main and concomitant diseases in the concrete patient.

**Task №3.** To lead objective pulmonary patient examination affected with dust diseases, HIV -infection and AIDS, and to schedule the survey design.

**Task №4.** According to objective examination, tool methods of testing, to diagnose, having specified type of tubercular process, localization, the clinical form, presence of destruction, bacterioexcretion, medicinal sensitivity MBT, results of histologic confirmation of the diagnosis, category, cohort, complications. To specify the diagnosis of dust disease, HIV-infection and AIDS in the formulation.

### **Contents of the topic**

Dust diseases arise owing to influence on organism of the person of harmful factors of the environment during industrial activity. The most spread and studied are the diseases connected with inhalation of various dust.

Pneumoconiosis – is a group of chronic diseases of the lungs caused by long inhalation of industrial dust. Pneumoconiosis is characterized by development of fibrosis, connective tissue nodules and their conglomerates (units) in lungs and lymph nodes.

Conglomerates may undergo necrosis, partial calcification or destruction, resulting in caverns. The patient affected with silicosis has enlarged, consolidated lungs. The parietal and mediastinal pleurae are thickened and inosculate, under the pleura may occur bullous emphysema.

In mucous membrane of bronchial tubes, tracheas, throat, nasal turbinates – atrophy and sclerotic changes, therefore pneumoconiosis may follow chronic bronchitis.

Owing to pathological changes in lungs in patients affected with pneumoconiosis, pulmonary ventilation, gas distribution and diffusion of oxygen in alveoli are disturbed, respiratory insufficiency develops, which becomes complicated by the development of uncompensated cor pulmonale. Most often pneumoconiosis becomes complicated by pulmonary tuberculosis. Pneumoconiosis subject to

development, are subdivided into silicosis, metalconiosis, carboconiosis, hypersensitive pneumonitis, or pneumoconiosis.

**Forms of pneumoconiosis:**

- interstitial,
- nodular,
- central.

**Subject to the course they can be:** rapidly progressive, with slow course, with stable, with regressing. Besides, pneumoconiosis has the following stages of development:

1 stage – is characterized by enrichment and deformation of lung pattern, presence of net pneumosclerosis and small nodules in middle departments of lungs.

2 stage – is characterized by deformation of roots of lungs, emphysema, a large quantity of small and middle nodules throughout the pulmonary parenchyma.

3 stage – is characterized by expressed pneumosclerosis, presence of greater units, conglomerates, cavities, bullous emphysema.

**Coniotuberculosis** - complication of silicosis with pulmonary tuberculosis. Most often the tuberculosis joins pulmonary silicosis. In stage 1 – in 10-20% cases; in stage 2 – in 20 -60%; in stage 3 - in 60 - 80%.

Tuberculosis in silicosis patients develops as a result of endogenous reactivation of residual changes in lungs, or intrathoracic lymph nodes, or as a result of exogenous superinfections. In the lungs, initially arise foci, then infiltrates and even cavities.

Clinically, the patients develop stable subfebril body temperature, weakness, rapid fatigability, hyperhidrosis, nodulars appear in the apexes of lungs, ESR being accelerated.

Silicotuberculosis and other forms of coniotuberculosis demand antitubercular treatment, and also, the preparations designed to liquidation or stabilization of nonspecific bronchitis. Treatment of chronic cor pulmonale is also carried out.

**HIV-infection** is the disease which develops as a result of long persistence of human immunodeficiency virus (HIV) in lymphocytes, macrophages and nervous system cells, and is characterized by progressing destruction of immune system.

**AIDS** – the final stage of HIV-infection, affected by immune and nervous systems defeat and displays the development of severe viral, bacterial, parasitic diseases and/or malignant neoplasms that may be fatal.

In the world, sexual way of transfer of HIV prevails. Transfer of HIV through blood occurs by transfusion of infected blood, through infected needles and syringes.

There are several stages of development HIV-infection: acute HIV-infection, asymptomatic carrying stage, persistence generalised lymphadenopathy stage, AIDS – the final stage of clinical course of HIV-infection.

About one third of all HIV-infected are infected MBT. In people infected by HIV, presence of any infection, including tuberculosis, provokes faster distribution HIV-infection.

The immune system will lose ability to warn growth and to localize the distribution of MBT. Therefore disseminated and extrapulmonary diseases are more common. But the pulmonary tuberculosis remains the most widespread form in HIV-infected people. Its manifestation depends on degree of immunosupresion. In 20 cases in HIV-infected in a year after the tuberculostatic therapies begins, there comes fatal outcome either from tuberculosis or from other HIV-dependent pathology (sepsis, diarrhea, pneumonia, Kaposhi's sarcoma, cryptococcal meningitis). Death rate of patients affected with HIV-infection and tuberculosis decreases if use standard modes of chemotherapy are used.

The HIV-infected with positive Mantoux test, contacts with open form of tuberculosis are prescribed preventive reception of isoniasid on 300mg per day during 12 months.

## **6. Materials for self-control**

1. To sketch the scheme of dust diseases pathological changes in the lungs.
2. What is the most frequent localization of tubercular changes in pulmonary dust diseases:
  - A. proximal
  - B. middle
  - C. distal

The standard of the answer: A.

### **A. Tasks for the control of the initial level of the knowledge.**

1. A miner, 43 years old, has been diagnosed pneumoconiosis in connection with changes in the lungs. **What factor of professional hazard played main role:**
  - A. action of vibration;
  - B. inhalation of chemical substances;
  - C. gas contamination;

- D. influence of ambient temperature difference;
- E. atmospheric pressure and humidity air change;
- F. inhalation of dust.

2. A woman, 35 years old, in the course of 4 years has been suffering from chronic bronchitis. Five months ago hemoptysis developed, the body temperature raised to 38C. The plan X-ray film of the thoracic cavity: against the background of the enrichment lung pattern in the apex portions of both lungs – focal shadows of small and middle intensity, under the clavicles – radiolucencies. Mantoux test with 2 TU PPD -L - infiltrate 10 mm route in the anamnesis is absent.

**What is diagnosis in the patient?**

Variants of answers:

- A. Carcinomatosis;
- B. Pneumoconiosis;
- C. Disseminated pulmonary tuberculosis;
- D. Bilateral focal pneumonia;
- E. Focal pulmonary tuberculosis.

**3. What are the most important diagnostic signs of connection of tuberculosis in pneumoconiosis patients?**

- A. Positive tuberculin sensitivity of Mantoux test with 2 TU PPD -L.
- B. Revealing MBT in sputum.
- C. Presents of symptoms of tubercular intoxication.
- D. Findings as to recent tuberculosis.
- E. Focal shadows on the roentgenogram.

**4. A patient, 25 year old, suffers from AIDS and micobacteriosis. What combination of antibacterial preparations is optimum for patients?**

- A. kanamicin+cikloserin+rifampicin;
- B. rifampicin+etambutol+PASK;
- C. isoniazid +streptomycin+capreomicin
- D. pyrasinamid+etambutol+ethionamid;

5. In an AIDS-patient in radiological examination, a massive focal-infiltrative shadow in the lower portion of both lungs is revealed.

Reaction to Mantoux test with 2 TU PPD -L negative. **Which is the most likely diagnosis in the patient ?**

- A. Bilateral lower portion pneumonia
- B. Disseminated tuberculosis.
- C. Carcinomatosis.
- D. Bronchiectatic disease.
- E. Mycobacteriosis.

## 7. The control of final level of the topic mastering

1. A patient, 46 years old, silicosis join tuberculosis. What is the most likely symptomatology?

- A. Absence of symptoms;
- B. Just dry cough;
- C. Pain in the thorax;
- D. Hemoptysis;

E. Weakness, rapid fatigability, hyperhidrosis, stable subfebril temperature, the focuses on apices.

2. A patient, 37 years old, fell sharply ill: temperature up to 40C, chills, hoarse cough, dyspnea, cluster headache. Ten years ago recovered from disseminated tuberculosis, without visible residual changes in the lungs at present. The disease developed after long-lasting hyperinsolation. At radiological research in both lungs to full extent are crowded, homotypic focuses, in smear MBT are not found. Tuberculin test negative. What diagnosis with greater probability can be put to the patient?

- A. Chronic dissemination pulmonary tuberculosis, phase infiltration, MBT (-);
- B. Carcinomatosis of lungs;
- C. Silicopulmonary tuberculosis;
- D. Millitary tuberculosis;
- E. Bilateral microfocal pneumonia.

3. A patient, 38 years old, each spring against the background of paroxysmal dyspnea lung dissemination develops (midsized foci), intoxication is absent, route in anamnesis is absent. Which is the most likely disease in the patient ?

- A. Silicosis;
- B. Silicatosis;
- C. Metalconiosis;
- D. Carconiosis;
- E. Hypersensitive pneumonitis or pneumoconiosis (byssiniosis, amidosis).

4. A patients, 64 years old, having worked on mine during 20 years, is the invalid of the second group on pneumoconiosis, however in the last 3 years reduction of dyspnoea has been marked, palpitation, exercise performance restored. At X-ray examination: decrease of foci in lungs is marked. What is the kind of the pneumoconiosis course ?

- A. Quickly progressing;
- B. Slowly;
- C. Stable;

D. Regressing.

5. A patient, 47 years old, with route on the mine in the course of 15 years. In radiological research in lungs large round darkening of wrong form are defined. Define the form of pneumoconiosis:

A. Interstitial;

B. Focal;

C. Knotty;

**The patterns of answers: 6:** 1. F, 2. B, 3. B,4.C, 5.E.

**7:**1. E, 2. D, 3. E, 4. D, 5. C.

### **Recommended reference**

#### **Main literature:**

1. Petrenko V.I. Phthiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

2. Pyatnochka I.T. Phthiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.

#### **Additional literature:**

1. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.

2. Harryes A.TB. Clinical manual for South East Asia/ A.Harryes, D. Maner, M. Uplecar – Biella: WHO, 1997 – 145 p.

### **Topic# 11 : Tuberculosis of the peripheral lymph nodes. Clinical picture. Diagnostics. Treatment.**

#### **1. Currency of the topic**

Extrapulmonary tuberculosis accounts for 10% of total morbidity, but the percent tends to be larger among children and adolescents, and is up to 15%. The percentage of tuberculosis of the peripheral lymph nodes (TBPLN) in the structure of extrapulmonary tuberculosis accounts for 3,1% – 43,0%. In the last decade, frequency of occurrences of combined and generalized tuberculosis that affect TBPLN has increased from c 25,5% to 31,6%. The somatic condition of TBPLN-patients has been materially worse; among them concomitant non-tubercular diseases accounts for 57,1%. Problems of diagnostics and treatment provoke proliferation of complicated diseases (40% in the modern period).

This guidance aims to help students systematize learning and mastering of the theme at their hands-on practice and extra-class preparation.

**2. General goal:** to create the conditions for students ensuring the successful getting of the knowledge and skills allowing to diagnose clinical forms of secondary tuberculosis and analyze obtained results.

**3. The concrete aims:**

1. To explain the pathogenesis of TBPLN.
2. To define indications for laboratory and functional examination of TBPLN-patients.
3. To independently realize and estimate the findings of objective examination of TBPLN-patients.
4. To use the findings of laboratory examination (direct and fluorescent bacterioscopy, flotation, inoculation of medium, estimation of MBT drug resistance, histologic study of pathologic material for verification of clinical form of TBPLN).
5. To estimate the findings of histological screening of peripheral lymph nodes puncture for differential diagnostics of tuberculosis and other diseases.
6. To estimate the findings of hemogram, cytological screening of peripheral lymph nodes puncture for verification of abnormal changes in the body, severity of tubercular process and its distinction from other diseases.
7. To define the aim and indications for individual tactics of treatment.
8. To create of patient's clinical diagnose according to clinical classification.

**4. Basic knowledge and skills are necessary for topic studying**

<b>Previous subjects</b>	<b>Derived skills</b>
1. Department of topographic anatomy	To know the classification of the peripheral lymph nodes, their localization, structure.
2. Department of introduction into internal diseases	To know the approaches of laboratory examination and function study of the patient and determine their volume.
3. Department of normal and pathologic physiology and Department of introduction into internal diseases	To know the approaches of blood tests, the peripheral lymph nodes material, urine. To know the pathologic changes from normal state.
4. Department of histology	To know the approaches of histologic study and cytologic screening. To be

	capable to prepare a pathologic smear, fulfill its microscopy and differentiate cell structures in various diseases.
5. Department of microbiology	To know the detection tubercular mycobacteria approaches in pathologic material. To be capable to prepare a direct smear, to carry out Nielsen staining, and find tubercular mycobacteria in it. To realize a pathologic material inoculation of dense medium.
6. Department of pathologic anatomy	To implement histologic study of pathologic material taken during biopsy.

## 5. Tasks for independent student's work during the preparation for the class

5.1. The list of the main terms, parameters, characteristics which the student has to muster during the preparation for the class.

Generalized lymphadenitis	Simultaneous lesion of several groups of lymph nodes.
Necrotic caseation in tuberculosis	Morphological variant of TBPLN, describable by prevalence of alteration processes with the wide-spread areas of caseous necrosis, that at times completely supplant lymph nodes, and a low-grade perifocal specific infiltration.
Infiltrative lymphadenitis	Morphological variant of TBPLN, describable by prevalence of exudation process and specific inflammatory reaction of lymph nodes appearing as non-necrotic polymorphocellular granulomas or its small quantity
Indurative lymphadenitis	Morphological variant of TBPLN, describable by prevalence of proliferation processes with fibrotic-scar changes.
Primary lymphadenitis	Tubercular lesion of lymph nodes in children and adolescents, infection-related disease due to hematogenic carrying of infection in its early-spread period, inclined to caseous necrosis tissue reaction type in lymph nodes, their dissolution and formation of fistulas.
Secondary lymphadenitis	Tubercular lesion of lymph nodes in adults and adolescents, infection-related disease due

	to lymphohematogenous carrying of infection during progression of primary affect, inclined to infiltrative and fibrous changes in lymph nodes without formation of fistulas.
Primary focus	The area of specific lesion of pulmonary or extrapulmonary localization, which is the source of lymphohematogenous carrying of infection.

### 5.2. Theoretical questions for the class.

1. Which groups of peripheral lymph nodes are more particularly affected by tuberculosis?	PhthisiologyManual /Pyatnochka I.T.,Ternopol, p.165	Phthisiology. A textbook /Petrenko V.I., p.201
2.To interpret the pathogenesis of tubercular lymphadenitis.	165	201
3.With what diseases the differential diagnostics of tubercular lymphadenitis should be performed?	166	-
4.Which is tuberculin response to tuberculosis of peripheral lymph nodes?	166	202
5.Which morphologic variants of tubercular lymphadenitis are specified?	165	-
6.Which evidence of progress tuberculosis of lymph nodes is marked?	166	201-202
7.What is the feature of chemotherapy of tubercular lymphadenitis?	166-167	202
8.Specify the indications for surgical service of tubercular lymphadenitis.	167	202
9.What is operative intervention in tuberculosis of peripheral lymph nodes?	167	202

### **5.3. Practical tasks, which are doing withing the class.**

#### **Tasks for the control of initial level of knowledge**

**1. To which period of development of tubercular process does TBPLN most often belong?**

- A. Primary;
- B. Secondary;
- C. Combined;
- D. Any.

**2. Combined TBPLN most often develops as a result of..**

- A. Exogenous superinfection;
- B. Endogenous reactivation of any localization focus;
- C. Secondary lesion of lymph nodes by tubercular mycobacteria followed nonspecific lymphadenitis.
- D. Chronic latent spread of microbes.

**3. Which factors can provoke exacerbation of TBPLN?**

- A. Nervous breakdown;
- B. Supercooling;
- C. Intercurrent diseases;
- D. All above mentioned.

**4. Which groups of peripheral lymph nodes are most often affected by tuberculosis?**

- A. Inguinal;
- B. Axillary;
- C. Intrathoracic;
- D. Cervical.

**5. Which pathomorphologic variants of tubercular lymphadenitis are not specified?**

- A. Indurative;
- B. Caseous-necrotic;
- C. Infiltrative;
- D. Combined.

## **6. Tasks for self-control of the final level of student's knowledge**

6. Olga R. is 12. Mantoux reaction with 2 TU - infiltrate 13 mm in diameter. She was vaccinated by BCG in maternity house, revaccinated at 7 years old. Half a year ago she was in contact with patient suffering from open form of TB. She has no complaints, skin pale and clean, temperature is normal. There is local hyperemia placed in the right axillary. There are painless lymph nodes sized 0.4-0.7 mm, palpated as soft and elastic. Haemogram: hemoglobin-135 g/l, leukocytes-  $12 \cdot 10^9$  /l, rode/n-8%, ESR-19 mm/h. There are no changes in lung and heart received under physical investigation. Roentgenogram of lungs shows no pathology.

### **Diagnose according to clinical classification?**

7. Maxim D is 25. According to anamnesis he was treated 4 years ago due to primary revealed pulmonary TB. No complaints. Objectively: there is lymph nodes, 4 mm in diameter, of dense consistency and painless in the right supraclavicular area. Haemogram: hemoglobin -120g/l, leukocytes-  $9.3 \cdot 10^9$  /l, rode/n-7 %, ESR-12 mm/h. There are no MBT revealed by bacterioscopy.

### **Diagnose according to clinical classification?**

8. Patient A. is 20-years-old. Mantoux reaction with 2 TU- infiltrate 18 mm in diameter. Half a year ago he was contacted with patient suffering from open form of TB. There are complaints of general weakness, enhanced fatigue, decreased appetite. Objectively: there is bit morbid increased lymph nodes, placed on the neck side surface, 0.8 cm in diameter. There is a soft field in its center with a fistula-like path. Hemogram: hemoglobin -115g/l, leukocytes-  $10 \cdot 10^9$  /l, rode/n-9 %, ESR-16 mm/h. Microscopy of the fistula excretions reveals MBT.

### **Diagnose according to clinical classification?**

#### **The patterns of answers:**

1.B 2.B 3.D 4.B 5.D

6. NTB(date of revealing) right axillary region( peripheral l/n, phase of infiltration) Destr- MBT 0 M0 C0 Resist0 Hist0 Car 3 Koh (year)
7. NTB (date of revealing) right side under clavicle region (peripheral l/n , fase of calcinations and petrification) Destr- MBT 0 M0 C0 Resist0 Hist0 Cat 5.1 Koh (year).
8. NTB (date of revealing) cervical right region (peripheral l/n ) Destr +,MBT+,M+,C0,Resist0 Hist0, Car 1, Koh (year).

## Recommended reference

### Main literature:

1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.

### Additional literature:

1. Zaytceva S.I.Extrapulmonary TB. Manual/ S.I. Zaytceva, S.L. Matveeva, Kharkiv, KDMU, 2004. – 8 p.

2. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.

## Topic# 12 : Tuberculosis of the bones and joints. Clinical picture. Diagnostics. Treatment.

### 1. Currency of the topic

Tuberculosis of the bones and joints (TBB&J) accounts for 20 % of extrapulmonary tuberculosis. The younger a child is, the greater risk of his/her being affected by TBB&J. For the last 15 years, the average dally census of TBJ in common sickness rate of tuberculosis has remained stable (5-7 %). If TBB&J in children left early untreated, they undoubtedly become invalid, and with age without any chance to recovery, but under anatomical and functional features their state of health deteriorates.

The initial stage of extrapulmonary tuberculosis is difficult to diagnose, which refers to ambiguity of initial signs of the disease; this will lead to late diagnostics of advanced cases and invalidism.

**2. General goal:** to diagnose and scheme TBB&J treatment regimen.

### 3. The concrete aims:

1. To generalize results of the interrogatory of a patient, data of physical examination and investigations with concrete clinical form of secondary tuberculosis.

2. To identify the main syndromes of different clinical forms of TBB&J.

3. To establish the diagnosis of TBB&J forms of tuberculosis on the ground of obtained results of the examination.

4. To formulate clinical diagnosis of TBB&J forms of tuberculosis according to classification.

5. To prescribe complex treatment in different clinical forms of TBB&J.
6. To diagnose the complications of TBB&J and to perform a first aid in urgent states of a patient.

#### 4. Basic knowledge and skills are necessary for topic studying

Previous subjects	Derived skills
1. Department of topographic anatomy	To know the classification, localization, structure of osteoarticular apparatus.
2. Department of faculty therapy	To implement objective study of osteoarticular apparatus.
3. Department of histology	To know the structure of bone tissue, cartilaginous tissue. To implement histologic study of the material.
4. Department of microbiology	To implement microscopic investigation of pathologic material (MBT test).
5. Department of pathologic anatomy	To implement histologic study of pathologic material taken during biopsy.
6. Department of microbiology.	To know detection tubercular mycobacteria approaches in pathologic material. To be capable to prepare direct smear, to carry out Ziehl-Neelsen staining and find tubercular mycobacteria in it. To realize a pathologic material inoculation of dense medium.
7. Department of roentgenology	To estimate the roentgenogram of skeletal system in various projections. To know the bone structure and its projection of the anatomic subunits at anterioposterior [AP] radiograph and lateral X-ray film. To know the basic radiological signs of skeletal system pathology. To define, draw out and describe the pathologic changes at the roentgenogram of the bone structures, draw the radiological consultation report.

## 5. Tasks for independent student's work during the preparation for the class

5.1. Theoretical questions for classes to be studied at extracurricular activities.

1. Which forms of TB bones and joints are most frequently diagnosed?	Phthisiology. A teaching manual in Ukrainian and English/ Pyatnochka I.T., p.170	Phthisiology. A textbook/Petrenko V.I., p.-
2. Which are basic pathogenetic factors of TBB&J?	170-171	-
3. Where are located pathologic focus in TBB&J?	170-171	-
4. Which TBB&J course phases are specified?	171	-
5. Which features of clinical picture of pre-arthritis stage are common?	171	-
6. What is arthritic stage?	171	-
7. Why inflammation in surrounding soft tissues in TBB&J is called 'scrofulous abscess' or 'cold abscess'?	171	-
8. What is postarthritic stage?	171	-

9. Which complications of TBB&J are possible?	171	-
10. Which TBB&J treatment regimen in arthritic stage is applied?	172	-

## 5.2. Practical tasks, which are doing withing the class.

1. To explain the pathogenesis of TB bones and joints.
2. To independently realize and estimate the findings of objective examination of TBB&J -patients.
3. To use the findings of laboratory examination (direct and fluorescent bacterioscopy, flotation, inoculation of medium, estimation of MBT drug resistance, histological study of pathologic material for verification of clinical forms of TBB&J)
4. To define the aim and indications for individual tactics of treatment.

### Contents of the topic

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 a result the influx (cold) abscesses may form, which rather often accompany spine tuberculosis.

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

1. 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.
2. 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.
3. phase-postarthritic, which is characterized by the process stabilization with the formation of stable skeletal deformations.
4. In arthritic phase of bone-joint tuberculosis complications may appear:
  - destructive processes in bones and joints,

-cold (influx) abscesses,  
-fistulae and as the result-amyloidosis disease of internal organs.

In addition to these complications, at tuberculous spondylitis, pareses and paralyzes may arise as a result of spinal cord squeeze. For diagnostics of bone-joint tuberculosis roentgenographic and tomographic examination are used. The diagnosis is verified by means of histological, cytological and microbiological examination of the content of the abscess, bone cavities, material taken by puncture and biopsy from affected joint and bone tissue.

### **Recommended reference**

#### **Main literature:**

1. Pyatnochka I.T. Phthisiology. A teaching manual in Ukrainian and English / I.T. Pyatnochka – Ternopol.: Ukrmedknyha, 2002. – 257 p.
2. Petrenko V.I. Phthisiology. A textbook for students / V. I. Petrenko – Kyiv.: Medicine, 2008. – 287 p.

#### **Additional literature:**

1. Zaytceva S.I.Extrapulmonary TB. Manual/ S.I.Zaytceva, S.L.Matveeva, Kharkiv, KDMU, 2004. – 8 p.
2. Crofton J. Clinical Tuberculosis / J.Crofton, N. Horne, F. Miller – London.: Macmillan press LTD, 1995. - 210 p.