

MINISTRY OF PUBLIC HEALTH OF UKRAINE
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"Approved"
by Methodical Council
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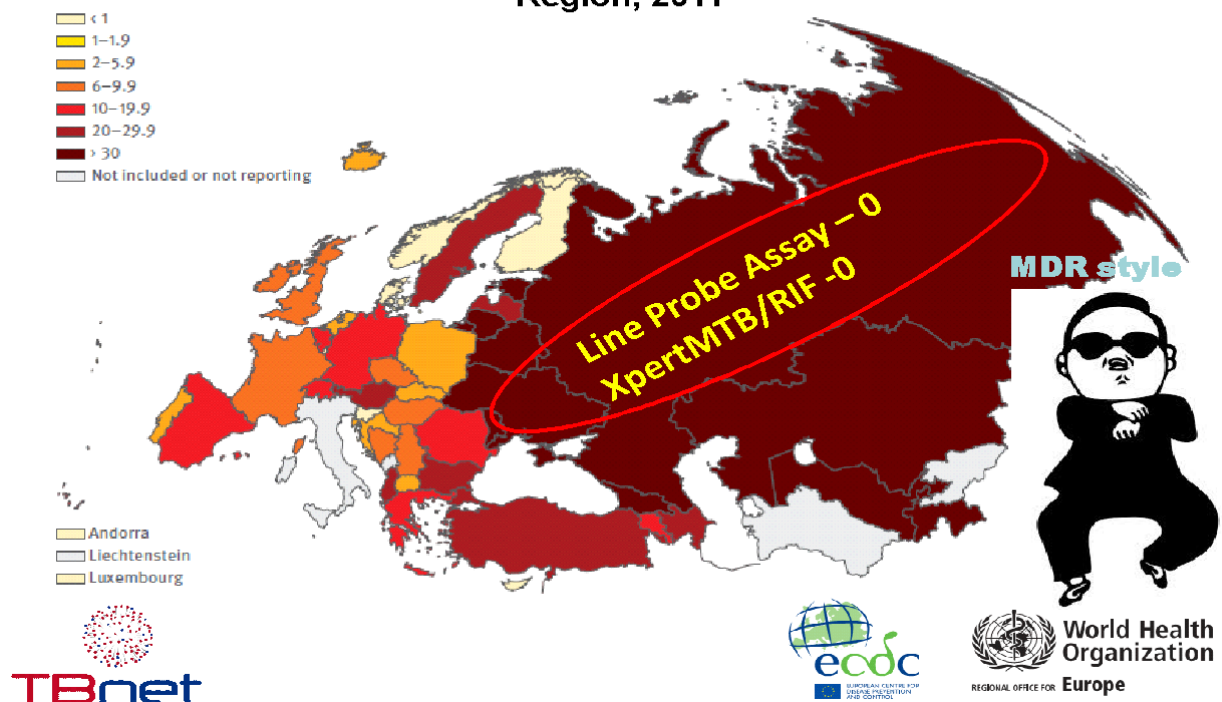
Self-Study Modules on Tuberculosis
for preparing students to practical classes
(in English)

<i>Subject</i>	Phthisiology (Tuberculosis)
<i>Module №1</i>	Curation of patients with respiratory diseases.
<i>Topic of practical class №5</i>	Diagnosis of tuberculosis in children and adults. Modern treatment of tuberculosis. TB control. Tuberculosis and concomitant diseases (alcoholism, drug addiction, COPD, pneumoconiosis, HIV). TB prevention.
<i>Course</i>	6th
<i>Faculty</i>	General medicine

1. Background

Tuberculosis (TB) remains one of the infectious diseases with the highest mortality globally. In 2011, it was estimated that there were 8.7 million new cases of TB worldwide. The World Health Organization estimates that around one third of the world's population has latent tuberculous infection (LTBI). Only a minority of immunocompetent persons infected with *Mycobacterium tuberculosis* will develop active disease. However, there is an increased risk for individuals with reduced immunity, particularly among those infected with the human immunodeficiency virus (HIV).

Map 1. Percentage of notified TB cases with multidrug resistance among previously treated laboratory-confirmed pulmonary TB cases, European Region, 2011



Why DOTS Is the Most Efficient and Cost-Effective Approach to TB Control

The World Health Organization (WHO) declared tuberculosis a global health emergency in 1993. Although this disease causes more morbidity and mortality than any other bacterial infectious agent, it can be effectively cured when medicines are provided under the DOTS (directly observed therapy, short-course) strategy. However, despite the existence of this effective treatment, most countries have not been able to achieve the WHO global targets of detecting 70 percent of cases and curing 85 percent of those detected. In addition, an alarming situation is occurring in countries where HIV is endemic: TB rates have risen dramatically, and TB is one of the most important causes of death in persons infected with HIV.

WHO reports that more than 90 percent of global TB cases and deaths occur in the developing world, where 75 percent of cases occur in the most economically productive age group (15–54 years) of the population. On average, an adult with TB loses three to four months of work time, which can have a detrimental effect on the family or household, resulting in the loss of approximately 20 to 30 percent of annual household income and, if the patient dies of TB, an average of 15 years of lost income. In addition to the devastating economic costs, TB imposes

indirect negative consequences—children leave school because of their parents' tuberculosis, and women are abandoned by their families as a result of their disease.

Coinfection with HIV significantly increases the risk of developing TB.

The WHO framework for control of TB, the DOTS strategy, has been adopted by ministries of health in developing countries as the most efficient and cost-effective approach to the prevention and control of TB. The success of the DOTS strategy depends on the adequate implementation of five key components—

- *Sustained political commitment* to increase human and financial resources dedicated to TB control and to make TB control a nationwide activity integral to the national health system
- *Access to quality-assured TB sputum microscopy* for case detection among persons presenting with, or found through screening to have, symptoms of TB (most important, productive cough for two or more weeks)
- *Standardized short-course chemotherapy available for all TB cases, under proper case management conditions including direct observation of treatment*—proper case management conditions imply technically sound and socially supportive treatment services
- *Uninterrupted supply of quality-assured medicines* with reliable pharmaceutical programming, procurement, and distribution systems.

- *Recording and reporting system enabling outcome.*

Responsibility for Successful Treatment

The overall goals for treatment of tuberculosis are 1) to cure the individual patient, and 2) to minimize the transmission of *Mycobacterium tuberculosis* to other persons. Thus, successful treatment of tuberculosis has benefits both for the individual patient and the community in which the patient resides. For this reason the prescribing physician, be he/she in the public or private sector, is carrying out a public health function with responsibility not only for prescribing an appropriate regimen but also for successful completion of therapy. Prescribing physician responsibility for treatment completion is a fundamental principle in tuberculosis control. However, given a clear understanding of roles and responsibilities, oversight of treatment may be shared between a public health program and a private physician.

Organization and Supervision of Treatment

Treatment of patients with tuberculosis is most successful within a comprehensive framework that addresses both clinical and social issues of relevance to the patient. It is essential that treatment be tailored and supervision be based on each patient's clinical and social circumstances (patient-centered care). Patients may be managed in the private sector, by public health departments, or jointly, but in all cases the health department is ultimately responsible for ensuring that adequate, appropriate diagnostic and treatment services are available, and for monitoring the results of therapy.

Status of the current *M. bovis* BCG TB vaccine

The BCG vaccine is one of the most widely administered vaccines today, and has been given over 4 billion times. Since the 1970s, it has been part of the Expanded Program on Immunization (EPI). Although BCG is a live vaccine, it is very safe with only very few adverse events reported. However, despite its impressive safety record, recent data indicate that BCG can cause disseminating BCGosis in immunocompromised individuals, due to genetic defects in host defence or due to HIV infection, particularly in infants (as previously discussed). BCG can, therefore, pose a risk to infants in HIVburdened areas. The WHO Global Advisory Committee on Vaccine Safety has, therefore, decided to advise against using BCG in HIV-positive children. Another concern regarding BCG is its limited efficacy against TB. New TB vaccines are needed

to either boost BCG to achieve improved infection control or, alternatively, replace BCG as more effective priming vaccines with improved safety profiles. These two strategies can be combined in combinatorial regimens. After a short introduction into the immunology of TB, these new types of TB vaccines will be discussed.

European Union Standards for Tuberculosis Care

STANDARDS FOR TB DIAGNOSIS

Standard 1

All persons presenting with signs, symptoms, history or risk factors compatible with TB should be evaluated for pulmonary and/or extrapulmonary TB.

Standard 2

All patients (adults, adolescents and children who are capable of producing sputum) suspected of having pulmonary TB should have at least two sputum specimens submitted for microscopic examination, culture and drug susceptibility testing (DST) in a quality-assured laboratory. When possible, at least one early morning specimen should be obtained. In countries, settings or populations in which MDR-TB is suspected in a patient, rapid testing for the identification of rifampicin- and isoniazid-resistance, using validated tools in a quality-assured laboratory, should be performed.

Standard 3

For all patients (adults, adolescents and children) suspected of having extrapulmonary TB, appropriate specimens from the suspected sites of involvement should be obtained for microscopy, culture, DST and histopathological examination in a quality-assured laboratory. In countries, settings or populations in which MDR-TB is suspected in a patient, rapid testing for the identification of rifampicin and isoniazid resistance in a quality-assured laboratory could be performed.



Standard 4

All persons with chest radiographic findings suggestive of pulmonary TB should have sputum specimens submitted for microscopic examination, culture and DST in a quality-assured laboratory. In countries, settings or populations in which MDR-TB is suspected in a patient, rapid testing for the identification of rifampicin resistance and when possible isoniazid resistance in a quality-assured laboratory should be performed.

Standard 5

The diagnosis of culture-negative pulmonary TB should be based on the following criteria: all bacteriological tests are negative (including direct sputum smear examinations, cultures and

rapid molecular testing); chest radiographic findings based on the following criteria: all bacteriological tests are negative (including direct sputum smear examinations, cultures and rapid molecular testing); chest radiographic findings are compatible with TB; and there is a lack of response to a trial of broad spectrum antimicrobial agents (because the fluoroquinolones are active against *M. tuberculosis* complex and, thus, may cause transient improvement in persons with TB, they should be avoided). In persons who are seriously ill or have known or suspected HIV infection or have any immunecompromising conditions, the diagnostic evaluation should be expedited and, if clinical evidence strongly suggests TB, a course of anti-TB treatment should be initiated suggests TB, a course of anti-TB treatment should be initiated.

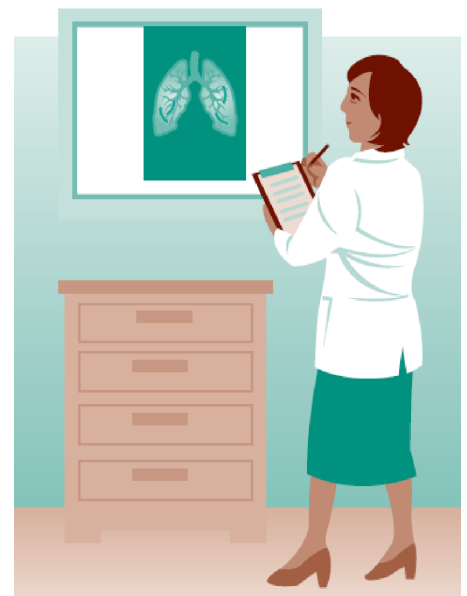
Standard 6

In all children suspected of having intrathoracic (i.e. pulmonary, pleural, and mediastinal or hilar lymph node) TB, bacteriological confirmation should be sought through examination of appropriate biological samples (by expectoration or induced sputum, bronchial secretions, pleural fluid or gastric washings) for smear microscopy, culture and DST in a quality assured laboratory. In the event of negative bacteriological results, a diagnosis of TB should be based on the presence of abnormalities consistent with TB on chest radiography or other imaging, a history of exposure to an infectious case, evidence of TB infection (positive tuberculin skin test (TST) and/or interferon- γ release assay (IGRA)) and clinical findings suggestive of TB. For children suspected of having extra-pulmonary TB, appropriate specimens from the suspected sites of involvement should be obtained for microscopy and for culture and histopathological examination microscopy and for culture and histopathological examination.

STANDARDS FOR TB TREATMENT

Standard 7

Any practitioner treating a patient for TB is assuming an important public health responsibility to prevent ongoing transmission of the infection and the development of drug resistance. To fulfil this responsibility the practitioner must not only prescribe an appropriate regimen, but also utilise local public and/or community health services, agencies and resources when necessary, to perform contact investigation, to assess the adherence of the patient and to address poor adherence when it occurs.



Standard 8

All patients (including those with HIV-infection) who have not been previously treated and without any risk factors for drug resistance should receive an internationally accepted first-line treatment regimen using drugs of known bioavailability. The initial phase should consist of two months of isoniazid, rifampicin, pyrazinamide and ethambutol. The continuation phase should consist of isoniazid and rifampicin given for four months (2HRZE/4HR). The doses of anti-TB drugs used should conform to international recommendations. Fixed dose combinations of two

(isoniazid and rifampicin), three (isoniazid, rifampicin and pyrazinamide) and four (isoniazid, rifampicin, pyrazinamide and ethambutol) drugs are highly recommended).

Standard 9

To assess and foster adherence, a patient-centred approach to administration of drug treatment, based on the patient's needs and mutual respect between the patient and the provider, should be developed for all patients. Supervision and support should be individualised and should draw on the full range of recommended interventions and available support services, including patient counselling and education. A central element of the patient-centred strategy is the use of measures to assess and promote adherence to the treatment regimen and to address poor adherence when it occurs. These measures should be tailored to the individual patient's circumstances, based on a detailed anamnesis of the patient's clinical and social history, and be mutually acceptable to the patient and the provider. Such measures may include direct observation of medication ingestion (directly observed treatment) and identification and training of a treatment supporter (for TB and, if appropriate, for HIV-infection) who is acceptable and accountable to the patient and to the health system. Appropriate incentives and enablers, including financial, social and psychosocial supports, may also serve to enhance treatment adherence.

Standard 10

Response to therapy in patients with pulmonary TB should be monitored by follow-up smear microscopy and culture at the time of completion of the initial phase of treatment (two months for drug-susceptible TB). If the sputum smear and culture are positive at completion of the initial phase, sputum smears should be examined again at three months and, if positive, drug susceptibility testing should be performed. In patients with extrapulmonary TB and in children unable to produce sputum, the response to treatment is assessed clinically.

Standard 11

An assessment of the likelihood of drug resistance, based on history of prior treatment, exposure to a possible source case having drug-resistant organisms and the community prevalence of drug resistance, should be obtained for all patients. Rapid testing, including rapid rifampicin and isoniazid resistance testing should be performed for all patients suspected of resistance as defined in standards 2 and 8. Furthermore, patient counselling and education should begin immediately for all TB patients, in order to minimise the potential for transmission.

Standard 12

Patients with, or highly likely to have, TB caused by drug-resistant (especially MDR/extensively drug-resistant (XDR)-TB) organisms should be treated with specialised regimens containing second-line anti-TB drugs. The regimen chosen may be standardised or based on suspected or confirmed drug susceptibility patterns. At least four drugs to which the organisms are known, or presumed, to be susceptible to, including an injectable agent and pyrazinamide, should be used. Treatment should be given for at least 20 months, the recommended intensive phase of treatment being 8 months (instead of 6 months as in previous recommendations; see below the EU adaptations for further detail).

Standard 13

A written record of all medications given, bacteriological response and adverse reactions should be maintained for all patients.

Asbestos-related lung diseases

The use of asbestos has been banned throughout the European Union since 2005. However the dangerous effects of asbestos on health were known decades ago. Despite the ban, the number of asbestos-related deaths continues to rise as it can take many years after the initial exposure for diseases to develop.

Since 1975, the health risks associated with asbestos exposure were widely recognised and its use throughout the world reduced from 5 million tonnes in 1975 to 3 million tonnes by 1998. Strict methods to protect workers were introduced until asbestos use was restricted and later banned. Industries were advised to replace asbestos with a less dangerous substance.



Asbestos is the name used for a group of natural minerals. It has been used in a large number of products because of its unique properties. It will not catch fire even at very high temperatures and it is extremely flexible and hardwearing. There are three main types:

Asbestos is made up of fibres, which can break down into smaller fibres that cannot be seen with the naked eye. Products that contain asbestos generate fibres when they are damaged. Fibres are released into the air and can be inhaled into the lungs to cause harm. The presence of fibres in the lungs causes scars to form that can stop the lungs from working properly and can cause cancer. All types of asbestos are potentially fatal if they are inhaled. Diseases can take 15–60 years to develop and they have no cure.

Crocidolite (blue) Needle-like fibres Strongest of all asbestos fibres Most lethal of all asbestos types High resistance to acids	Amosite (brown) Spiky fibres Resistant to heat	Chrysotile (white) Curly fibres Most flexible of all asbestos types Can withstand the highest heat 95% of all asbestos mined
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Asbestos is most usually found in buildings that were built or refurbished before 2000. It was commonly used in insulation, lagging on pipe work and water tanks and cement for walls, ceilings and floors.

Anyone who has to work with materials that contain asbestos has a risk of being exposed to asbestos fibres if materials are damaged. Examples of workers who may be at risk are: miners, builders, plumbers, electricians, joiners, plasterers, decorators, heating engineers, gas fitters and demolition contractors. The person or company who is responsible for maintenance and repair of a building is also responsible for managing the risk from asbestos; assessing whether it is present, its condition and whether it poses a risk for workers. Ask to see an asbestos survey if in doubt.

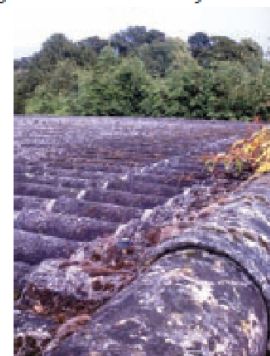
Images kindly supplied by www.kentsurveys.com



Old heating system containing brown, white and blue asbestos - some damage



Damaged asbestos pipe insulation



Asbestos cement garage roof and walls

2. Learning Objectives

With the participation of the teacher, students should be able:

1. To interview with patient (especially attracting attention in professional history) and to check clinical symptoms (percussion, auscultation, palpation) in TB patients.
2. To study the radiological implications of different forms of pulmonary tuberculosis.
3. To learn of BCG and BCG-M usage, conditions of storage, assessment of indications and contraindications for vaccination and revaccination.
4. Clinical management of LTBI and active TB.
5. Prevention of TB.
6. Treatment in Special Situations.
7. To recognize dispensary monitoring groups of tuberculosis patients.
8. To learn causes, extent of disability and disability groups in TB.
9. To learn the radiological implications of dust pulmonary diseases.
10. To evaluate spirometry and ECG abnormalities in TB patients.
11. To know social groups require screening for tuberculosis, basic rules of ethics and deontology in the diagnosis of HIV/AIDS.
12. To know basic principles of DOTS therapy.
13. Targeted testing and treatment for LTBI.
14. Preventive therapy in HIV-infected persons.
15. TB risk and tumour necrosis factor- α inhibitors.
16. Molecular epidemiological analyses.

Under the guidance of teacher students would be:

- * to read the method of collecting complaints and anamnesis in patients with infiltrates in the lungs.
- *to learn basic clinical symptoms during physical examination (inspection, palpation, percussion, auscultation) patients with respiratory diseases, accompanied by infiltrates.
- *to study the radiological features of infiltrative opacity during different respiratory diseases.
- *to teach students **what** should be done if you find in patients infiltrate by CXR.
- *to learn the basics of lung imaging.

*to recognize that TB tends to be associated with particular chest radiographic presentations that tend to correlate with patient age and immune status. Remember that TB has a diverse appearance on chest radiography and accurate diagnosis requires a high index of suspicion.

*to be able recognize groups with highly risk of catching tuberculosis

*diagnosis formulation of tuberculosis of respiratory organs according up dated classification

*to work out a plan of investigation of a patient suffering from tuberculosis

to demonstrate ability of filling medical forms for patient with active form of tuberculosis

*to work out a plan of chemotherapy an adequate to clinical category of tuberculosis case.

*to detect a category of focus of tuberculous infection.

*to make up the plan of antiepidemical management of every focus of tuberculous infection.

*to make up a plan of chemoprophylaxis what is an adequate to clinical category&focus of tuberculous infection.

*to detect types of chemoprophylaxis taking into consideration time of revealing, age, possible intercurrent diseases and other factors.

*to detect consecequences of chemotherapy patients suffering from tuberculosis

*to diagnosis urgent status due to tuberculosis complications and medical emergencies.

3. Interdisciplinary integration

Name of discipline	Necessary skills
Human Anatomy	Segments of the lungs. Features of the blood supply and aeration. Tuberculosis causes overwhelming impression I, II and IV segments of the lungs.
Pathological Physiology	Inflammation. Tuberculous inflammation. Exudative and productive inflammation processes.
Pathological Anatomy	Morphological manifestations of tuberculous inflammation in organs and tissues, residual tuberculous changes.
General and Clinical Pharmacology	TB chemotherapy, classification, dosage, methods of administration. Pharmacokinetics of antituberculosis drugs. Adverse reactions to antibacterial drugs, prevention and elimination.
Propedeutics of Internal Medicine	Methods of physical examination of patients. Diagnostic value of epidemiological history, physical methods of examination of patients, puncture of pleural cavity, microscopic examination of fluid for M. tuberculosis.
Department of Hygiene and Ecology	Domestic hygiene. Types of disinfection. The structure and organization of TB dispensary. Procedure for issuance of

	disability list for TB patients. Rising incidence of tuberculosis among health care workers. Fundamentals of nutrition, physical education and hardening in the prevention of tuberculosis.
Radiology	Methods of lung imaging. Interpretation of CT and CXR films.

4. Fill this table.

Question	Answer
1. Describe the laboratory methods for detection of Mycobacterium tuberculosis.	
2. What bacterioscopic detection methods MBT ?	
3. What do you know types of mycobacteria?	
4. What are the ways of human infection with TB?	
5. What are the most characteristic changes hemogram with active tuberculosis?	
6. What is tuberculin?	
7. What are the results of the Mantoux test you know?	
8. What methods of radiologic diagnosis you know?:	
9. What is DOTS strategy?	
10. What are the basic principles of the aims and objectives of DOTS?	
11. Which category of patients includes DOTS system for standard treatment?	
12. What schemes DOTS therapy exist for different categories of patients?	
13. What provides adapted to the conditions of Ukraine DOTS strategy for the diagnosis and treatment of TB?	
14. What is the role of general practitioners in the early detection of tuberculosis?	
15. What complaints includes intoxication syndrome?	
16. What complaints includes bronhopleuralpulmonary syndrome?	
17. What do you ways of spreading of HIV?	
18. What are the main clinical features of the course of tuberculosis in AIDS patients?	
19. What properties have enlarged peripheral lymph gland in tuberculosis patients with HIV / AIDS?	

20. What Happens When People Have Pneumoconiosis?	
21. What complaints from a patient coniotuberculosis?	
22. What features collection that the history of life in patients with coniotuberculosis?	
23. What are the major changes spirohrami in patients with coniotuberculosis	
24. What the methods of X-ray diagnosis coniotuberculosis you know?	

Study Questions 4.1-4.7

4.1 Why must TB disease be treated for at least 6 months?

4.2 Which four drugs are recommended for the initial treatment of TB disease?

4.3 Why should at least two drugs be used to treat TB disease?

4.4 Name two factors that can lead to drug resistance.

4.5 What treatment regimens should be used for HIV-infected TB patients? In what special situations should treatment for TB disease last longer than the usual course of treatment?

Case Study 4.6 An 18-month-old girl is admitted to the hospital because of meningitis. Doctors discover that her grandmother had pulmonary TB and was treated with a 6month regimen. The medical evaluation of the child confirms the diagnosis of TB meningitis. ■■ For how lonWhat should be included in each patient's treatment plan?

4.6 Name the drug or drugs that may cause each of the following symptoms or adverse reactions.

Nervous system damage:

Hepatitis:

Eye damage:

Orange discoloration of the urine:

4.7 How often should patients be monitored for adverse reactions to TB drugs?

CASE PRESENTATION

Case Study 1

Mr. Vigo was diagnosed with smear-positive pulmonary TB in January. He was treated with isoniazid, rifampin, and pyrazinamide by his private physician. He visited his physician again in March. His drug susceptibility test results were not available at the time of this appointment. Nevertheless, the physician discontinued his prescription of pyrazinamide and gave him refills of isoniazid and rifampin. Mr. Vigo visited his physician again in April. He had a persistent cough, and his sputum smear was found to be positive. . What should be done next?

Case Study 2

Mr. Vigo was diagnosed with smear-positive pulmonary TB in January. He was treated with isoniazid, rifampin, and pyrazinamide by his private physician. He visited his physician again in March. His drug susceptibility test results were not available at the time of this appointment. Nevertheless, the physician discontinued his prescription of pyrazinamide and gave him refills of isoniazid and rifampin. Mr. Vigo visited his physician again in April. He had a persistent cough, and his sputum smear was found to be positive. . What should be done next?

Case 3. Suspicion of Lung Cancer with Nodal Metastases in an Immunocompromised Patient

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History

The patient is a 67-year-old man with a 30 pack-year smoking history and a recently identified lung nodule. Systemic lupus erythematosus had been diagnosed in 1972. One year ago he presented with proteinuria and was found to have membranous glomerulonephritis by renal biopsy. He was started on mycophenolate and prednisone, with subsequent improvement in his renal function. Three months into therapy he developed night sweats, low-grade fevers and malaise. He was admitted to an outside hospital, where a CT scan of the chest revealed a left upper lobe pulmonary nodule with solid and ground glass components and mediastinal lymphadenopathy highly suspicious for primary lung cancer. Flexible bronchoscopy was performed for bronchoalveolar lavage and brushings; cytology was negative for malignancy; and cultures were negative for bacterial, viral and fungal pathogens. He left against medical advice without a diagnosis. Mycophenolate and prednisone were continued. The patient presented to our institution 2 months later with continued complaints of malaise, unproductive cough, bilateral hand tremor and intermittent low-grade fevers. He also reported significant, progressive memory loss; a vocalist in an amateur singing group, he found he was no longer able to remember words to songs.

Physical Exam

On physical examination, the patient was afebrile at 36.9° C, with a normal heart rate and normal blood pressure. His respiratory rate was 14 breaths per minute and SaO₂ was 100% while breathing room air. His physical exam was normal except for mild wasting, dysdiadochokinesia of the left upper extremity, and difficulty with attention and short-term recall. He was unable to remember three objects after 1 minute.

Lab

A lumbar puncture showed a mild lymphocyte predominant leukocytosis with no red cells; gram stain and fungal stains were negative. A CT scan of the chest revealed a left upper lobe nodule (Figure 1). Left paratracheal and left hilar adenopathy was noted (Figure 2). A PET scan showed FDG avidity in the left paratracheal and left hilar nodes and fainter avidity in the left upper lobe lesion (Figure 3). Comparison films were not available. An MRI of the brain showed mild atrophy and compensatory ventricular enlargement and multiple small lacunar infarcts in the basal ganglia, thalamus and periventricular white matter; no evidence of lupus cerebritis was noted. The patient underwent a bronchoscopy with endobronchial ultrasound-guided transbronchial needle aspiration of the left paratracheal node. Results of Diff-Quik staining and mucicarmine staining of the specimen are shown in Figures 4 and 5.

Laboratory:

Leukocytes 3.0 x10³/mm³

Hemoglobin 9.7 g/dL

Platelets 251 x10³/mm³

Differential Neutrophils 58%, Lymphocytes 36%, Monocytes 5%, Basophils 1%

Sodium 135 mM/L

Potassium 4.5 mM/L

Chloride 105 mM/L

Bicarb 22 mM/L

BUN 20 mg/dL

Creatinine 1.3 mg/dL

Glucose 85 mg/dL

ESR 80 mm/hr

Lumbar Puncture: 56 White Cells (Neutrophils 23%, Lymphocytes 70%, Monocytes 6%, Basophils 1%); LDH 24 U/L, Protein 48 mg/dL, Glucose 35 mg/dL; Gram Stain: negative; KOH Stain: negative. Cryptococcal Antigen: negative; VDRL: nonreactive.

Chest CT: A nodule with mixed solid and ground glass elements was identified in the left upper lobe, measuring approximately 2.3 cm x 1.8 cm. Left lower paratracheal lymphadenopathy was noted measuring approximately 2.0 cm in the largest diameter. No other pulmonary nodules were identified. There was no pleural effusion, pneumothorax, or congestion (Figures 1 and 2).

PET Scan: Faintly FDG avid (SUV mean 0.9/ max 1.1) focus in the LUL; small FDG avid (SUV mean 3.1/max 4.3) focus in left hilar region and an FDG avid focus (SUV mean 4.4/max 5.5) in the left lower paratracheal region (Figure 3).

Figures

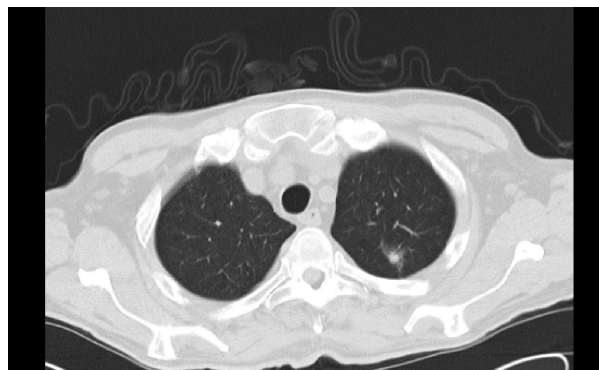


Figure 1. Axial view of CT scan of the chest (lung windows) showing a left upper lobe lesion with surrounding ground glass opacification.

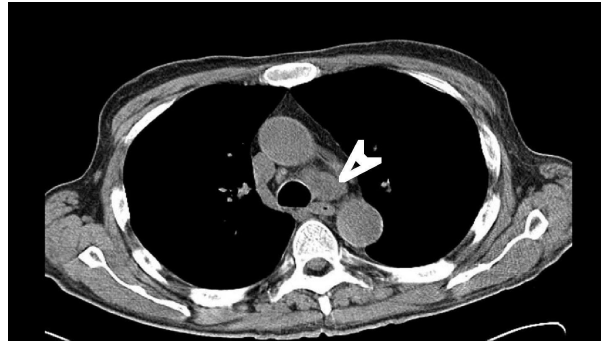


Figure 2. Axial view of CT scan of the chest (mediastinal windows) showing an enlarged left paratracheal lymph node in the aortopulmonary window (arrow).



Figure 3. Coronal section of PET scan showing FDG-avidity in the left paratracheal area (white arrow) and left hilum (black arrow). The left upper lobe lesion was weakly positive (not shown).

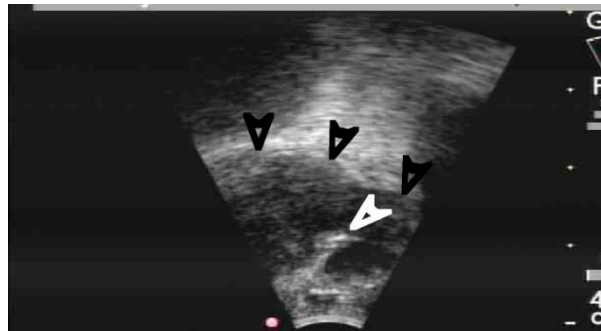


Figure 4. EBUS view of the left paratracheal lymph node (outlined by dark arrows) during needle aspiration (white arrow at needle tip). Centimeter markings are in white at right of frame.

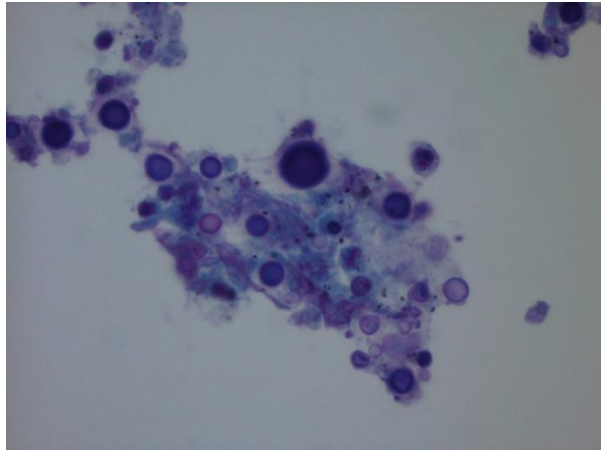


Figure 5. Diff-Quik stained EBUS-TBNA specimen.

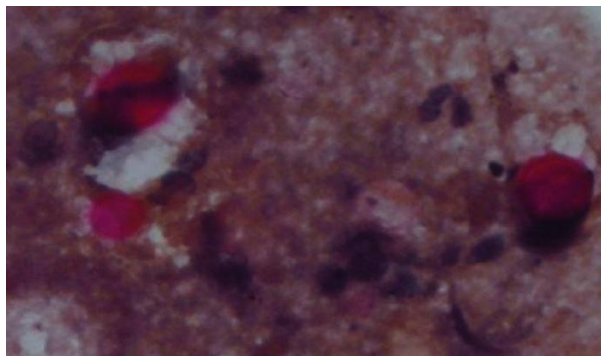


Figure 6. Mucicarmine stained EBUS-TBNA specimen.

Начало формы

Question 1

What is the diagnosis?

- ☐ A. Adenocarcinoma of the lung
- ☐ B. Small cell carcinoma
- ☐ C. Cryptococcosis
- ☐ D. Histoplasmosis
- ☐ E. Blastomycosis

Конец формы

Case 4. Bronchiectasis and recurrent pulmonary infections

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History

A 59-year-old female never-smoker presents with a history of recurrent lower respiratory tract infections and cough. She developed her first episode of pneumonia at age 33 and has experienced lower respiratory tract infections approximately one to three times per year since that time. Exacerbations typically consist of increased cough and sputum production, significant fatigue and mild-to-moderate shortness of breath on exertion. Her symptoms improve for a few months with a course of oral antibiotics (and/or prednisone). She reports occasional low-grade fevers but no chills, night sweats or weight loss. She has had no improvement with the use of inhaled steroid and long-acting bronchodilator therapy. Her only medications are venlafaxine and intermittent antihistamine use.

Her past medical history is significant for left breast cancer which was treated with mastectomy as well as adjunctive radiation and chemotherapy. During follow-up with her oncologist, a right lower-lobe pulmonary nodule was noted on chest radiograph and was subsequently shown to have increased uptake on PET scan. Computer tomography (CT) guided biopsy showed granulomatous inflammation and no evidence of malignancy. Chest CT at that time revealed bronchiectasis, most prominent in lower lobes.

The patient works as a high school chemistry teacher. She has dogs and cats at home but no other exposures. She reports her tuberculin skin test to be positive for several years although she has no known tuberculosis exposure. Her family history is significant for her mother who had recurrent respiratory infections as a young adult and died at the age of 35 from respiratory failure. Review of systems was positive for intermittent heartburn symptoms and postnasal drip but no sinus congestion.

Physical Exam

The patient was in no distress and she was afebrile with an oxygen saturation of 95% on room air. There was no cervical or axillary lymphadenopathy. Respiratory exam revealed good breath sounds bilaterally with no crackles or wheeze. Cardiac exam was unremarkable. Her abdomen was nontender with no hepatosplenomegaly.

Lab

Normal complete blood count, electrolytes, creatinine, calcium

Normal liver transaminases and total bilirubin

Normal C-reactive protein

Normal immunoglobulin levels (IgG, IgM, IgA, IgE)

Skin testing for *Aspergillus sp.* - negative

Negative ANA, rheumatoid factor, anti-SSA & SSB

Cystic fibrosis testing for 97 mutations was negative

Alpha-1 antitrypsin level – 21 mg/dL (normal 72-192 mg/dL)

Esophagram – mild reflux to distal esophagus

Tailored barium swallow – mild hypopharyngeal dysmotility

PFTs -FEV1 2.16L (83% predicted)

FVC 2.86L (85% predicted)

FEV1/FVC 76%

No bronchodilator response

TLC 107%

RV 176%

DLCO 66%

Chest CT – moderately severe varicoid and cystic bronchiectasis involving multiple lobes with lower lobe predominance. Scattered centrilobular nodularity and linear opacities present. No evidence of emphysema. Patchy airtrapping is present on expiratory views. (Figure 1)

Microbiology

Bronchoalveolar lavage– *Mycobacterium abscessus*

Sputum– *Mycobacterium abscessus*, rare *Staphylococcus aureus*, rare yeast.

Figures

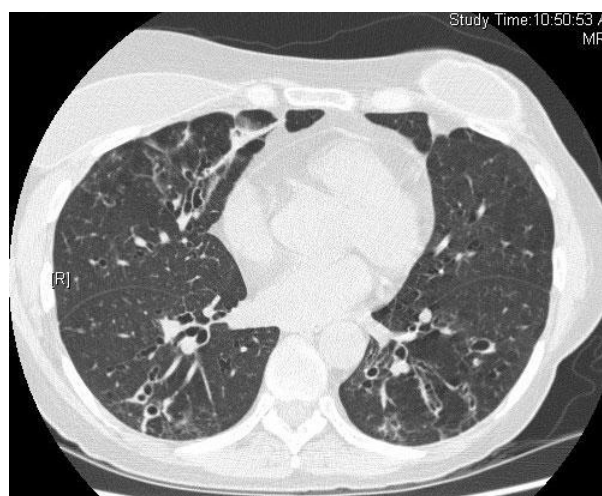


Figure 1. High-resolution chest CT

Question 1

Which of the following is the most likely condition to be associated with bronchiectasis in this patient?

- ☐ A Rheumatoid arthritis
- ☐ E Alpha-1 antitrypsin deficiency
- ☐ C Inflammatory bowel disease
- ☐ I Allergic bronchopulmonary aspergillosis (ABPA)
- ☐ E Common variable immunodeficiency

Конец формы

5. Practical skills

- Interview (collection) complaints, all histories (present, past), inspection and physical examination of the patient (revealing of abnormalities in organs and systems).
- To analyze and interpret results of the patient examination, data of chest X-ray, laboratory & instrument investigation.
- Defense of clinical point of view on diagnosis, prescribe adequate chemotherapy, detection of life prognosis and recovery.
- List the groups of people who should receive high priority for LTBI treatment.
- Describe treatment regimens for LTBI.
- Describe treatment regimens for TB disease.
- Describe the principles of preventing drug resistance.
- Describe patient monitoring during LTBI and TB disease treatment.
- Describe TB treatment adherence strategies.
- List the common adverse reactions to the drugs used to treat LTBI and TB disease.

References

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3. Guidelines for treatment of drug susceptible tuberculosis and patient care: 2017 update. Geneva: World Health Organization; 2017 (WHO/HTM/TB/2017.05).
4. Chest radiography in tuberculosis detection. Summary of current WHO recommendations and guidance on programmatic approaches. Geneva: World Health Organization, 2016 (WHO/HTM/TB/2016.20)
5. Standards. 7th ed. Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada, 2014
www.respiratoryguidelines.ca/sites/all/files/Canadian_TB_Standards_7th_Edition_ENG.pdf.
6. Nahid et al. Official American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America Clinical Practice Guidelines: Treatment of Drug-Susceptible Tuberculosis. 2016
7. National Institute for Health and Care Excellence. Tuberculosis: prevention, diagnosis, management and service organization (NICE guideline 33), 2016.
8. Your national protocols on clinical TB management are also acceptable.

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