



Team 435

PATHOLOGY

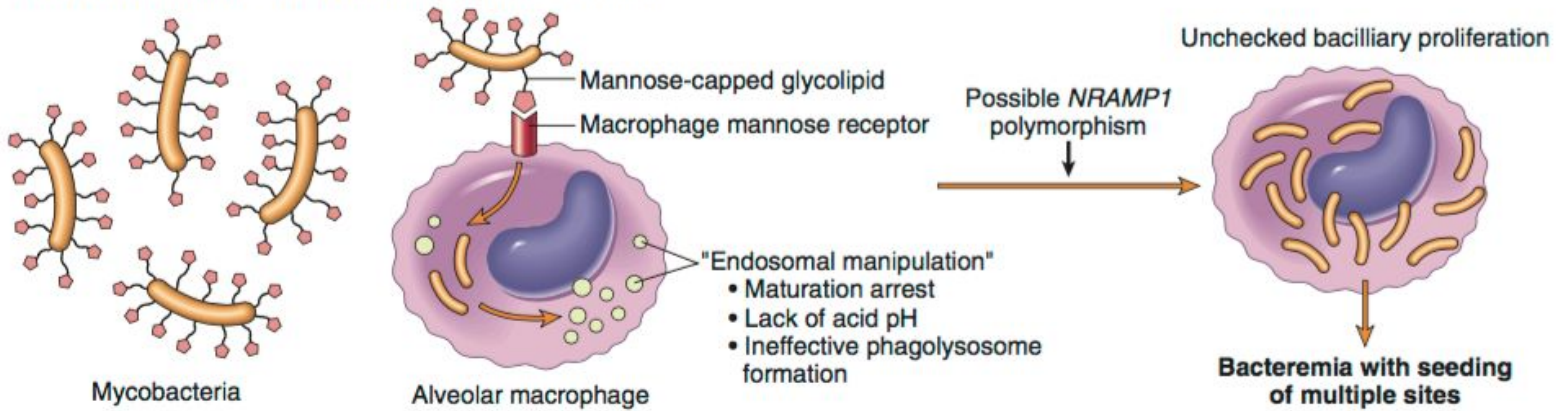
As a doctor you should know what can threaten your patient's life
should know what makes your patient suffers from pain

That's why you study pathology

Lecture 5

Extra explanation to help you with primary and secondary TB

A. PRIMARY PULMONARY TUBERCULOSIS (0–3 weeks)



B. PRIMARY PULMONARY TUBERCULOSIS (>3 weeks)

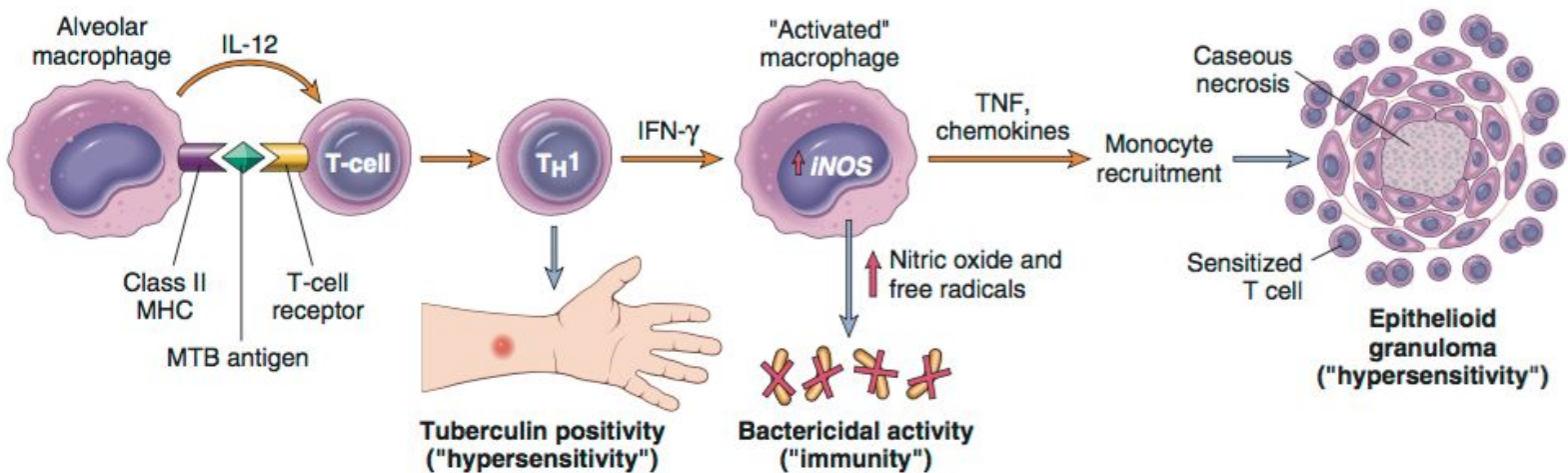
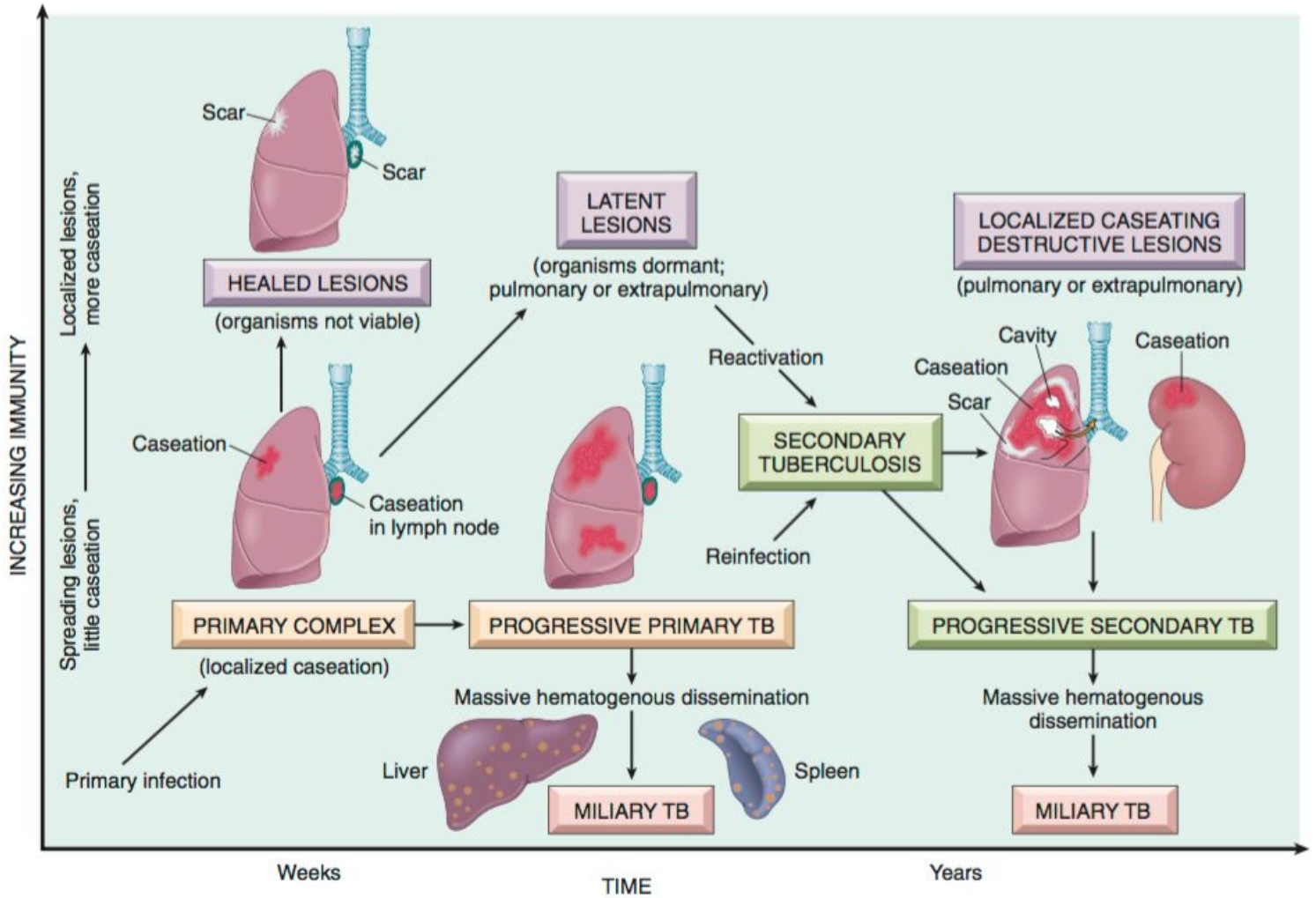


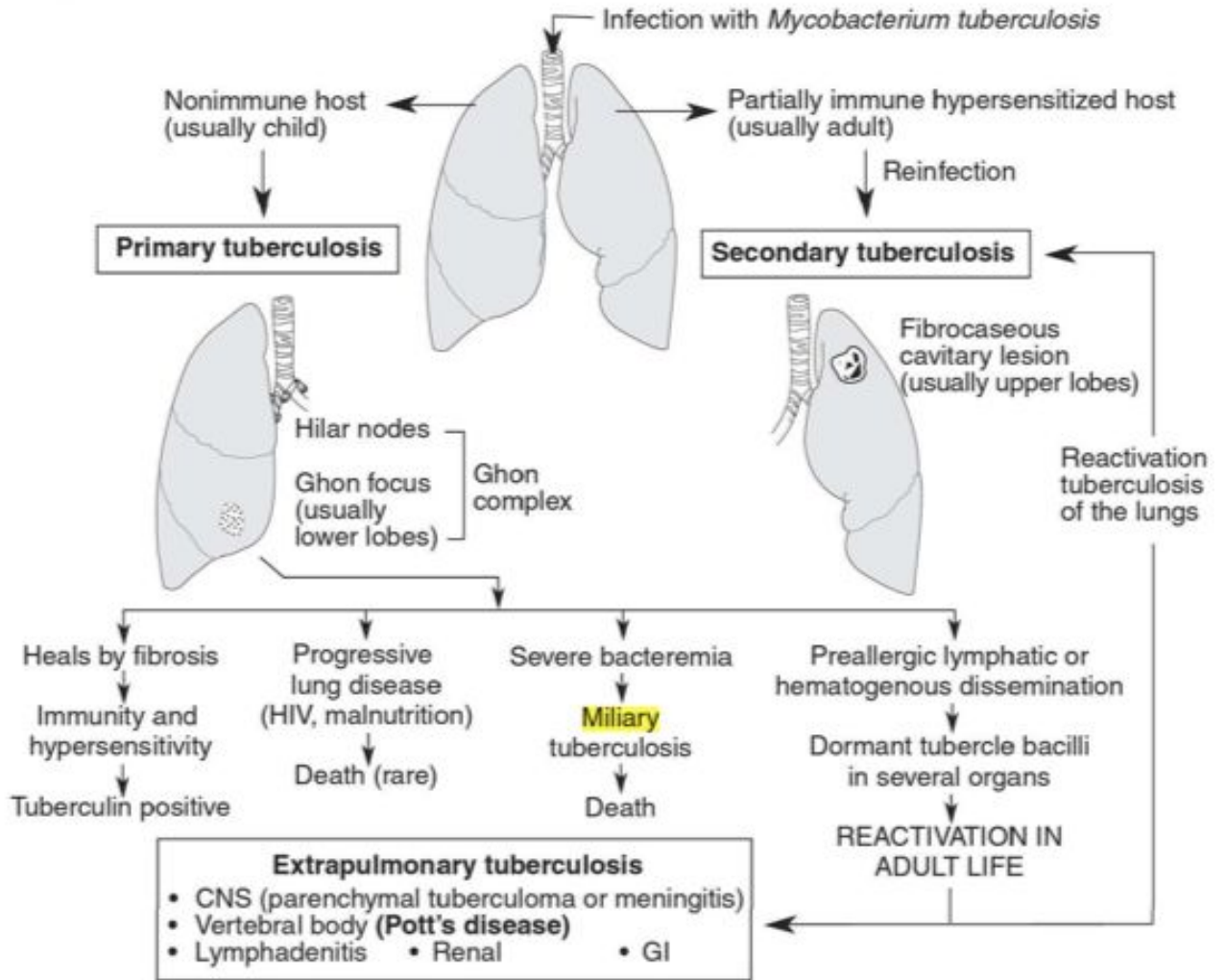
Figure 12–35 Sequence of events in the natural history of primary pulmonary tuberculosis. This sequence commences with inhalation of virulent strains of *Mycobacterium* and culminates in the development of immunity and delayed hypersensitivity to the organism. **A**, Events occurring in the first 3 weeks after exposure. **B**, Events thereafter. The development of resistance to the organism is accompanied by conversion to a positive result on tuberculin skin testing. Cells and bacteria are not drawn to scale. IFN-γ, interferon γ; iNOS, inducible nitric oxide synthase; MHC, major histocompatibility complex; MTB, *Mycobacterium tuberculosis*; NRAMP1, gene encoding natural resistance–associated macrophage protein 1; TNF, tumor necrosis factor.

Extra explanation to help you with primary and secondary TB



Extra explanation to help you with primary and secondary TB

1° and 2° tuberculosis



(Adapted, with permission, from Chandrasoma P, Taylor CR. *Concise Pathology*, 3rd ed. Stamford, CT: Appleton & Lange, 1998: 523.)

PPD+ if current infection, past exposure, or BCG vaccinated.

PPD- if no infection or anergic (steroids, malnutrition, immunocompromise, sarcoidosis).

Summary & notes:

- **Mycobacterium tuberculosis** is the causative organism of tuberculosis (TB) in the lungs and elsewhere.
- Initial exposure to TB results in **development of an immune response** that has some resistance but also leads to **hypersensitivity** (as determined by a positive result on the tuberculin skin test)
- Mycobacterium tuberculosis gains access to the lungs by **inhalation** and causes pulmonary TB.
- Mycobacterium tuberculosis infection by ingestion is now rare, but not completely eradicated.
- **CD4+ T cells of the T_H1 subset** have a crucial role in cell-mediated immunity against mycobacteria; mediators of inflammation and bacterial containment include IFN- γ , TNF, and nitric oxide.
- The histopathologic hallmark of host reaction to tuberculosis in immunocompetent persons is the presence of **granulomas with central caseating necrosis**.
- **HIV-seropositive status** is a well-known risk factor for the development or recrudescence of active TB.
- A granuloma in TB, termed a '**tubercle**' is composed of activated macrophages, Langhans giant cells with surrounding lymphoid cells and fibroblasts with central caseating necrosis.
- Primary tuberculosis is the form of disease that develops in the previously unexposed and therefore unsensitized person.
- Secondary (reactivation) tuberculosis arises in the **previously exposed individuals** when host immune defenses are compromised and usually manifests as cavitary lesions in the lung apices.
- Both progressive primary tuberculosis and secondary tuberculosis can result in systemic spread, causing life-threatening forms such as **miliary tuberculosis** and tuberculosis meningitis.
- The outcome of tuberculosis depends on the adequacy of the host immune response.

1. This type of TB is usually correlated with unpasteurized milk:
 - A. Mycobacterium avium complex
 - B. Mycobacterium bovis
 - C. Mycobacterium hominis

2. Proliferation of bacteria within blood causing an infection is called:
 - A. Bacteremia
 - B. Septicemia

3. Immunocompetent patients affected with primary TB are usually symptomatic:
 - A. True
 - B. False

4. Which type of immunity does the body achieve after the first exposure to TB?
 - A. Type 1
 - B. Type 2
 - C. Type 3
 - D. Type 4

5. Which one of the following IL help in activating CD4 cells into TH₁ cells?
 - A. IL3
 - B. IL4
 - C. IL5
 - D. IL12

6. How can a patient get secondary TB?
 - A. You can not get secondary TB; if you get it the first time you'll become immune to getting it the second time.
 - B. Reactivation of dormant bacteria
 - C. Reinfection
 - D. Both B & C

1. B

2. B

3. B

4. D

5. D

6. D

7. In primary TB, the lesion likes to deposit:

- A. Sub-pleurally
- B. Peripherally
- C. Both A & B
- D. None of the above

8. Mycobacterium TB is:

- A. Aerobic with a high content of glycolipids
- B. Anaerobic with a high content of glycolipids
- C. Aerobic with a low content of glycolipids
- D. Anaerobic with a low content of glycolipids

8. A positive mantoux test will leave the injected area:

- A. With a bubble
- B. Flat

9. An AIDs patient comes to the hospital showing positive signs for TB, he takes a mantoux test, his test result will most likely be:

- A. Positive
- B. Negative
- C. The information given is not enough to know the result of the test.

10. Which of the following tests for TB has the highest sensitivity?

- A. Mantoux test
- B. PCR test
- C. Lowenstein-Jensen medium test
- D. Heaf test

11. Which of the following is a mediator of inflammation?

- A. TNF
- B. IFN- γ
- C. Nitric oxide
- D. All of the above

7. C

8. A

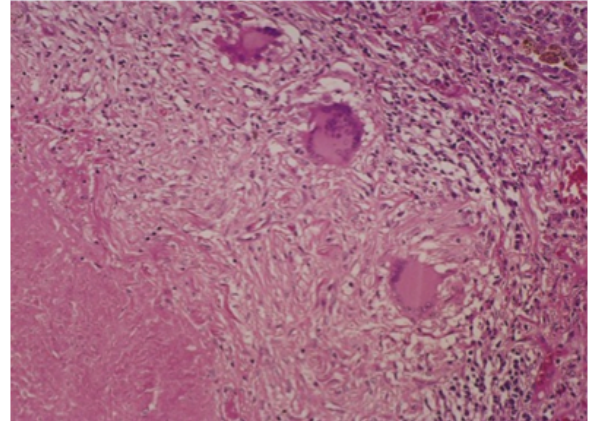
9. B

10. B

11. D

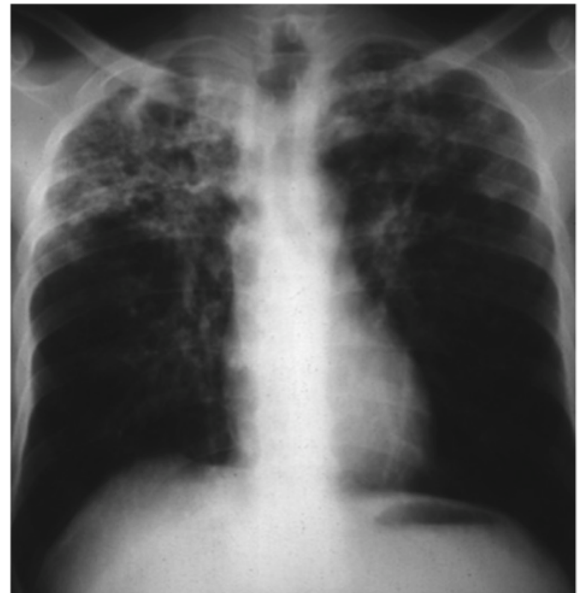
12. A 46-year-old woman has a routine health maintenance examination. On physical examination, there are no remarkable findings. Her body mass index is 22. She does not smoke. A tuberculin skin test is positive. A chest radiograph shows a solitary, 3-cm left upper lobe mass without calcifications. The mass is removed at thoracotomy by wedge resection. The microscopic appearance of this lesion is shown in the figure. Which of the following is most likely diagnosis?

- A. Mycobacterium tuberculosis infection
- B. Necrotizing granulomatous vasculitis
- C. Poorly differentiated adenocarcinoma
- D. Staphylococcus aureus abscess
- E. Thromboembolism with infarction



13. A 56-year-old man has had fever, night sweats and a 3kg weight loss over the past 4 months. In the past month, he has had episodes of hemoptysis. On physical examination, there are upper lobe rales. He has hypoxemia. The appearance of his chest radiograph is shown in the figure. He is most likely to have an infection with which of the following organisms?

- A. Candida albicans
- B. Influenza A
- C. Legionella pneumophila
- D. Mycobacterium tuberculosis
- E. Mycoplasma pneumoniae
- F. Nocardia asteroides



Answers:

12. (A). The figure shows pink, amorphous tissue at the lower left, representing caseous necrosis. The rim of the granuloma has epithelioid cells and Langhans giant cells. Caseating granulomatous inflammation is most typical of *Mycobacterium tuberculosis* infection. Calcifications would have helped to identify this mass as an old granuloma, not likely to be a neoplasm. Necrotizing vasculitis is unlikely to produce a single nodule, and there can be hemoptysis. A carcinoma may have central necrosis, not caseation, and there would be atypical, pleomorphic cells forming the mass. A pulmonary infarct should have extensive hemorrhage. A lung abscess would have an area of liquefactive necrosis filled with tissue debris and neutrophils.

13. (D). The radiograph in the figure shows prominent upper lobe cavitation, typical of reactivation-reinfection tuberculosis in adults. *Candida* is a rare cause of lung infection. Influenza viral infections have mainly interstitial mononuclear inflammation. Bacterial organisms such as *Legionella* are more likely to produce a widespread bronchopneumonia with alveolar neutrophilic exudates. *Mycoplasma* infection produces mainly interstitial mononuclear inflammation. Nocardiosis of the lung appears mainly as chronic abscessing inflammation.

Team members

Special thanks to team 434

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قال صلى الله عليه وسلم: من سلك طريقاً يلتمس به علماً سهل الله له به طريقاً إلى الجنة.
دعواتنا لكم بالتوفيق.