

Tuberculosis: Review Questions

George J. Alangaden, MD

QUESTIONS

Choose the single best answer for each question

- Between 1992 and 1998, the number of cases of tuberculosis (TB) in the United States declined among each of the following groups EXCEPT:**
 - Adults between 25 and 44 years of age
 - Children younger than 15 years
 - Persons born in foreign countries
 - Persons born in the United States
- A 54-year-old woman with diabetes mellitus who recently started working as a hospital volunteer has a tuberculin skin test (TST) as part of an annual TB testing and prevention program. She had not received the BCG vaccine, nor had she been tested before. The TST reveals 5 mm of induration at 48 hours. Which of the following is the most appropriate next step in this patient's treatment?**
 - Classify the test as positive and start therapy for latent TB infection
 - Obtain a chest radiograph to rule out active TB
 - Repeat the test after 2 weeks to check for a booster reaction
 - Report the test as negative and repeat after 1 year
- A 36-year-old man who is a recent immigrant from a TB-prevalent country has a positive result on a TST that was performed during the course of a routine medical evaluation. He has no symptoms of TB. His chest radiograph shows no abnormalities; he is HIV-seronegative. He drinks alcohol but reports no intravenous drug use. Each of the following treatment regimens for latent TB infection in this patient is appropriate EXCEPT:**
 - Isoniazid 300 mg daily for 6 months
 - Isoniazid 300 mg daily for 9 months
 - Rifampin (10 mg/kg body weight) daily for 4 months
 - Rifampin (10 mg/kg) and pyrazinamide (15–20 mg/kg) daily for 2 months
- A 26-year-old nursing aide in the second month of her pregnancy is evaluated for a 4-week history of fever, night sweats, and cough. A chest radiograph shows infiltrates in the apex of her right lung. A sputum examination reveals a few acid-fast bacilli. Which of the following is the most appropriate treatment?**
 - Administer isoniazid, rifampin, and ethambutol for 9 months
 - Administer isoniazid, rifampin, pyrazinamide, and ethambutol for 6 months
 - Administer isoniazid, rifampin, pyrazinamide, and streptomycin for 6 months
 - Wait until the second trimester before starting anti-TB therapy
- A 35-year-old man admitted to the hospital because of a chronic cough and low-grade fever receives a diagnosis of pulmonary TB. Laboratory tests at the time of admission showed seropositivity for HIV. He begins therapy with isoniazid, rifampin, pyrazinamide, and ethambutol with prompt clinical response. When he is evaluated in the clinic 2 weeks after his discharge from the hospital, he has a CD4+ cell count of 52/mm³ and a plasma HIV RNA level of 500,000 copies/mL. Antiretroviral therapy with zidovudine, lamivudine, and indinavir is initiated, and his rifampin is changed to rifabutin. He is readmitted to the hospital 3 weeks later with high fevers. His chest radiograph now reveals intrathoracic lymphadenopathy and worsening lung infiltrates. His sputum Gram stains, acid-fast bacillus stains, and sputum and**

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Dr. Alangaden is an Associate Professor of Internal Medicine, Division of Infectious Diseases, Wayne State University School of Medicine, Detroit, MI.

blood cultures are negative for any organisms. Which of the following is the most likely diagnosis?

- A) Drug-resistant tuberculosis
- B) Immune reconstitution
- C) Non-Hodgkin's lymphoma
- D) Rifabutin hypersensitivity

EXPLANATION OF ANSWERS

1. **(C) Persons born in foreign countries.** In 1998, a total of 18,361 cases of tuberculosis (TB) were reported in the United States, indicating a decrease of 31% from 1992.¹ The decrease occurred in both sexes and all age groups. The number of cases of TB in persons born in the United States decreased by 44% between 1992 and 1998, and the number of cases in persons born in foreign countries increased by 4%.
2. **(C) Repeat the test after 2 weeks to check for a booster reaction.** The delayed hypersensitivity response to *Mycobacterium tuberculosis* in infected persons may decline over time. Therefore, in previously infected individuals, an initial tuberculin skin test (TST) may show negative results but may “boost” the response to a second TST. This boosted positive reaction may be misinterpreted as a conversion reaction, implying recent infection. Two-step testing is therefore recommended for the initial tuberculin skin testing of adults such as health care workers who will be tested periodically. If the initial TST is negative, a repeat TST should be performed 1 to 3 weeks later. If the result is positive, the person should be considered infected and treated accordingly; if the result is negative, the person is not infected.¹
3. **(D) Rifampin (10 mg/kg) and pyrazinamide (15–20 mg/kg) daily for 2 months.** The preferred treatment of latent TB infection (LTBI) in persons not infected with HIV is a 9-month regimen of isoniazid. Administration of rifampin for 4 months or administration of isoniazid for 6 months is also acceptable. The combination of rifampin plus pyrazinamide administered for 2 months was effective and well tolerated in HIV-infected persons treated for LTBI and was recommended as an alternative regimen in the American Thoracic Society and Centers for Disease Control and Prevention Guidelines of 2000.² However, between February and August of 2001, a total of 21 cases of liver injury, including 5 deaths, have been reported among persons treated with this combination. The guidelines recently have been revised, and the combination of rifampin and pyrazinamide should be used with caution, especially in patients with alcoholism and those taking potentially hepatotoxic medications.

The combination regimen is contraindicated in patients with liver disease.³

4. **(A) Administer isoniazid, rifampin, and ethambutol for 9 months.** Pregnant women who are suspected of having TB must be treated without delay, irrespective of the stage of the pregnancy. The preferred treatment regimen is isoniazid, rifampin, and ethambutol administered for 9 months. If the likelihood of isoniazid resistance is low (less than 4% in the community), then ethambutol may be excluded. Streptomycin can cause ototoxicity and therefore should be avoided. The teratogenic potential of pyrazinamide is unknown; therefore, it is not recommended for use during pregnancy.¹
5. **(B) Immune reconstitution.** All patients with TB disease should be evaluated for HIV infection. Potential drug interactions between rifampin and protease inhibitors must be considered when initiating therapy for TB in HIV-infected patients taking antiretroviral drugs.⁴ Rifabutin appears to have little interaction with the protease inhibitor indinavir and is one of the recommended treatment options. Paradoxically, some HIV-infected patients with TB have an initial clinical deterioration manifested by fever, lymphadenopathy, and worsening of pulmonary infiltrates when started on potent antiretroviral therapy. This immune reconstitution syndrome is presumably caused by the development of active cell-mediated immunity brought about by antiretroviral therapy.⁵

REFERENCES

1. Core curriculum on tuberculosis. 4th ed. Centers for Disease Control and Prevention, Division of Tuberculosis Elimination; 2000. Available at <http://www.cdc.gov.nchstp/tb/pubs/corecurr/default.htm>.
2. American Thoracic Society, Centers for Disease Control and Prevention. Targeted tuberculin testing and treatment of latent tuberculosis infection. *Am J Respir Crit Care Med* 2000;161 (4 Pt 2):S221–47.
3. Update: fatal and severe liver injuries associated with rifampin and pyrazinamide for latent tuberculosis infection, and revisions in American Thoracic Society/CDC recommendations – United States, 2001. *MMWR Morb Mortal Wkly Rep* 2001;50:733–5.
4. Notice to readers: updated guidelines for the use of rifabutin or rifampin for the treatment and prevention of tuberculosis among HIV-infected patients taking protease inhibitors or nonnucleoside reverse transcriptase inhibitors. *MMWR Morb Mortal Wkly Rep* 2000;49:185–9.
5. Narita M, Ashkin D, Hollender ES, Pitchenik AE. Paradoxical worsening of tuberculosis following antiretroviral therapy in patients with AIDS. *Am J Respir Crit Care Med* 1998;158:157–61.