

How is tuberculosis in the U.S. evolving?

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Dr. MeissnerA 17-year-old male who moved from Nairobi to the U.S. nine years ago presents with a two-week history of fever and shaking chills, new onset cough, abdominal pain and nausea. A chest radiograph is shown below. Examination of the sputum reveals acid-fast bacilli. A nucleic acid amplification assay is positive for *Mycobacterium tuberculosis*, and this result is confirmed by culture. His HIV status is negative.

Which of the following statements regarding tuberculosis (TB) are true?

- Over the past two decades, the number of cases of TB reported each year in the U.S. declined until 2013-'15 when rates stabilized at about three cases per 100,000.
- In recent years, about 65% of all TB cases have occurred in people born outside the U.S.
- For latent tuberculosis, weekly rifapentine plus isoniazid for three months (total 12 doses) administered under direct observation is as effective as nine months of isoniazid (standard regimen) for children 12 years or older who are HIV-uninfected.
- Multidrug-resistant (MDR) TB is an infection or disease caused by a strain resistant to isoniazid and rifampin. Extensively resistant strains of TB are a subset of MDR TB that also are resistant to a fluoroquinolone and at least one of the following drugs: amikacin, kanamycin or capreomycin.
- A person with latent TB will have a negative sputum test, and the chest radiograph may be normal or may show evidence of a healed infection.

Answer: All are correct

The World Health Organization estimates that more than one-third of the world's population (nearly 2 billion people) are latently infected with *M. tuberculosis* and are at risk of developing disease. Almost 30,000 people die each week because of TB. Worldwide, nearly 1 million children become infected with *M. tuberculosis* each year. Because of international travel, population migration and population resettlement, disease occurs in all countries, but the greatest number of cases occur in areas of poverty and social disruption.

Approximately 9,500 cases of TB were reported in the U.S. in 2015. The case rate among foreign-born people was about 13 times higher than the rate among U.S.-born people (15.1 cases per 100,000 vs. 1.2 cases per 100,000). Four states — California, Florida, Texas and New York — account for about half of all reported cases. Two-thirds of reported cases occur among foreign-born persons, often years after arrival (as with the patient presented here) (*MMWR*. 2016;65(11):273).

People at greatest risk of infection with *M. tuberculosis* include close contacts of a person with active TB, those who emigrate from areas with high rates of TB, and residents and employees of certain settings such as correctional facilities, homeless shelters or health care facilities.

Differential diagnosis for this radiograph includes tuberculosis, metastatic thyroid carcinoma, vasculitis, sarcoid and histiocytosis.
Courtesy of H. Cody Meissner, M.D., FAAP



People with latent TB do not have symptoms and are not infectious to others. In the absence of treatment, about 5% to 10% of people with a latent infection (positive purified protein derivative [PPD] skin test or positive interferon gamma release assay) will develop disease at some point in their life.

The benefits from treatment of latent TB are greater for children than for adults for several reasons. First, among children younger than 5 years of age, a latent infection has been acquired recently, and the risk of development of active disease is greatest soon after the initial infection. Second, children have an increased risk of developing TB meningitis and disseminated disease relative to adults. Third, a child has more years when risk of conversion to active disease is possible. Fourth, children tolerate anti-tuberculous therapy with fewer side effects than adults.

Latent TB is more likely to progress to disease during the first two years after PPD skin conversion, among immunocompromised persons and among recipients of tumor necrosis factor antagonists for treatment of rheumatologic or inflammatory bowel disease. Other conditions that increase the risk of progression to active TB include body weight more than 10% below ideal, silicosis, diabetes mellitus, chronic renal failure, gastrectomy, jejunioileal bypass and solid organ transplantation.

Multidrug-resistant isolates are defined as resistant to rifampin and isoniazid, two of the four first-line drugs for treatment of TB. Ethambutol and pyrazinamide are the other two first-line drugs. MDR TB is difficult to cure and requires 18 to 24 months of multidrug therapy after sputum culture conversion to negativity. Five or six drugs are used to treat MDR TB, and these second-line drugs are less effective, more toxic and costlier than standard first-line drugs.

Mortality rates for patients treated for MDR TB exceed 10%. MDR TB develops when a patient with TB caused by a strain susceptible to first-line drugs is not treated adequately. This may occur because of incorrect drug selection, non-adherence, malabsorption, malnutrition or drug-drug interactions.

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Resource

- [Additional information regarding the diagnosis and treatment of tuberculosis in children can be found in 2015 AAP Red Book.](#)