Tuberculosis

Infectious Agent
*Mycobacterium tuberculosis* is a rod-shaped, nonmotile, acid-fast bacterium.

Mode of Transmission
Tuberculosis (TB) transmission occurs when a contagious patient coughs, spreading the bacilli through the airborne route to a person sharing the same air space. Bovine TB (caused by the closely related *Mycobacterium bovis*) can be transmitted by ingestion of contaminated, unpasteurized dairy products from infected cattle.

Occurrence
Globally there are nearly 9 million new TB cases and nearly 2 million TB-related deaths each year. TB occurs throughout the world, but the incidence varies greatly (see Map 5-8). In some countries in sub-Saharan Africa and Asia the annual incidence is several hundred per 100,000. Drug-resistant TB is of increasing concern. Multidrug-resistant or MDR TB is TB resistant to at least two of the most effective drugs, isoniazid and rifampin (also called first-line drugs). Extensively resistant or XDR TB is resistant to at least these two drugs and any fluoroquinolone and at least one of three injectable drugs (i.e., amikacin, kanamycin, or capreomycin). Although MDR TB occurs globally, it is less common than drug-susceptible TB. There are nearly 500,000 new cases of MDR TB each year, with some countries having proportions of MDR TB as high as 20% (see Map 5-9). MDR and XDR TB are of particular concern among HIV-infected or other immunocompromised persons.

Risk for Travelers
To become infected, a person usually has to spend a relatively long time in a closed environment where the air was contaminated by a person with untreated TB who was coughing and who had numerous *M. tuberculosis* organisms (or tubercle bacilli) in secretions from the lungs. Documented sites of MDR and XDR TB include crowded hospitals, prisons, homeless shelters, and other settings where susceptible persons come in contact with infected persons with TB disease. Travelers who anticipate possible prolonged exposure to TB (e.g., those who could be expected to come in contact routinely with hospital, prison, or homeless shelter populations) or those who may have an extended stay over a period of years in an endemic country should be advised to have a two-step tuberculin skin test (TST) or an interferon-gamma release assay (IGRA), such as the QuantiFERON TB test (Gold or Gold In-Tube versions), before leaving their home country.

Because persons with HIV infection or other immunocompromising conditions are more likely to have an impaired response to the test, travelers should be advised to inform their physicians about such conditions.

Except for travelers with impaired immunity, travelers who have already been infected are unlikely to be reinfected.

The risk of TB transmission on an airplane does not appear to be greater than in any other enclosed space. To prevent the possibility of exposure to TB on airplanes, CDC and WHO recommend that persons known to have infectious TB not travel by commercial airplanes or other commercial conveyances. WHO has issued guidelines for notifying passengers who might have been exposed to TB aboard airplanes. Passengers concerned about possible exposure to TB should be advised to see their primary health-care provider for evaluation.

Risk for bovine TB (*M. bovis*) in travelers exists for those who consume unpasteurized dairy products in countries where *M. bovis* in cattle is common (Mexico is one of the more common places of infection for U.S. travelers).

Clinical Presentation
Infection is manifested by development of a positive TST or IGRA, which usually occurs 8–10 weeks after exposure. Overall, only 5%–10% persons progress from infection to disease during their lifetime. In the remainder, the infection remains in a latent state (latent tuberculosis infection or LTBI). The risk of progression is much greater in immunosuppressed persons (e.g., 8%–10% per year in HIV-infected persons). LTBI is an asymptomatic condition, and persons with LTBI do not transmit TB. Progression to disease can occur weeks to decades after initial infection. TB disease can affect any organ, but most commonly occurs in the lungs, known as pulmonary TB.
The most common types of extrapulmonary disease include lymphadenitis, pleuritis, bone and joint disease, meningitis, and genitourinary disease. Common TB symptoms include prolonged cough, fever, anorexia, weight loss, night sweats, and hemoptysis.

Map 5-8. Tuberculosis incidence rate, 2006


Map 5-9. Multidrug-resistance among reported tuberculosis cases, 2006

**Diagnosis**

Diagnosis of TB disease is confirmed by culturing *M. tuberculosis* from sputum or other respiratory specimens for pulmonary TB and from other affected body tissues or fluids for extrapulmonary TB. On average, it takes about 2 weeks to culture and identify *M. tuberculosis*, even with rapid culture techniques. A preliminary diagnosis of TB can be made when acid-fast bacilli (AFB) are seen on sputum smear or in other body tissues or fluids. However, microscopy cannot distinguish between *M. tuberculosis* and nontuberculous mycobacteria. This is particularly problematic in low TB incidence countries. Nucleic acid amplification tests are more rapid than culture and very specific for *M. tuberculosis*. They are also more sensitive than the AFB smear, but less sensitive than culture. A diagnosis of TB disease can be made by using clinical criteria in the absence of microbiologic confirmation. LTBI is diagnosed by a positive TST or IGRA.

**Treatment**

Persons with LTBI can be treated to prevent progression to TB disease. American Thoracic Society (ATS)/CDC guidelines for treatment of LTBI recommend 9 months of isoniazid as the preferred treatment and suggest that 4 months of rifampin is a reasonable alternative. Travelers who suspect that they have been exposed to TB should be advised to inform their physicians of the possible exposure and receive medical evaluation. CDC and ATS have published guidelines for targeted testing and treatment of LTBI. Recent data from the WHO suggest that drug resistance is relatively common in some parts of the world. Travelers who have TST or IGRA conversion associated with international travel should consult experts in infectious diseases or pulmonary medicine. TB disease is treated with a multiple drug regimen for 6–9 months (usually isoniazid, rifampin, ethambutol and pyrazinamide for 2 months, followed by isoniazid and rifampin for 4 months) if the TB is not MDR TB. MDR TB treatment is more difficult, requiring 4–6 drugs for 18–24 months; it should be managed by an expert in MDR TB. ATS/CDC/Infectious Diseases Society of America have published guidelines on TB treatment.

**Preventive Measures for Travelers**

Travelers should be advised to avoid exposure to known TB patients in crowded environments (e.g., hospitals, prisons, or homeless shelters). Travelers who will be working in hospitals or health-care settings where TB patients are likely to be encountered should be advised to consult infection control or occupational health experts about procedures for obtaining personal respiratory protective devices (e.g., N-95 respirators), along with respirator selection and training.

Based on WHO recommendations, the Bacille Calmette–Guérin (BCG) vaccine is used once at birth in most developing countries to reduce the severe consequences of TB in infants and children. However, BCG vaccine has variable efficacy in preventing the adult forms of TB and interferes with testing for LTBI with the TST. Therefore, BCG is not routinely recommended for use in the United States. Travelers should avoid eating or drinking any unpasteurized dairy products.

*Source: Centers for Disease Control (CDC), Atlanta, Georgia, U.S.A. World Trade Press is not in the health care business and accepts no liability for statements on this page.*