



Tuberculosis

Old disease causes ravages once again

BY DINA FISHER, MD

Approximately two billion people in the world are infected with *Mycobacterium tuberculosis*. This bacterium is transmitted between individuals via respiratory secretions. In nine out of 10 people infected with *Mycobacterium tuberculosis*, the immune system can contain the tubercle bacilli and disease will not occur. This is termed latent tuberculosis infection. One out of 10 infected individuals, however, will go on to develop tuberculosis disease (TB), either soon after exposure or after a latency period. TB most commonly occurs in the lungs, but can involve any organ system in the body, resulting in diseases such as tuberculous meningitis, genitourinary tuberculosis and tuberculous lymphadenitis. In 2002, there were an estimated 8.7 million new cases of disease and 1.8 million associated deaths worldwide. Currently, TB is the second-largest single pathogen infectious cause of death in the world.

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Symptoms

- respiratory disease: cough for > 3 weeks; fever; weight loss; hemoptysis
- non-respiratory illness: any organ system; in Canada, main TB sites — lymph node (usually cervical), genitourinary or bone

Incidence

Epidemiology

- Canada is a low-burden country
 - incidence — 5.2 cases per 100,000 individuals in 2002
 - 67% were born elsewhere
 - 15% were Canadian-born Aboriginals
- highest worldwide incidence — sub-Saharan Africa, with rates reaching 1,100 per 100,000
- HIV/AIDS is the major reason for the increase of TB in Africa

Risk factors

- birthplace outside North America and Western Europe
- Canadian Aboriginal
- immunocompromised status
 - HIV/AIDS
 - immunosuppressive medications, e.g. tumour necrosis factor inhibitors
 - diabetes
 - renal failure
 - silicosis
- recent contact with infectious TB case
- lung scar on chest x-ray consistent with post-primary pulmonary TB

Chest x-ray

- cavities and/or nodules in apical and posterior segments of upper lobes and superior segment of lower lobes
- evidence of lung volume loss
- pediatric and immunosuppressed patients — lymphadenopathy, pleural and/or pericardial effusions, airspace infiltration
- disseminated disease (military TB) — nodules \leq 3 mm throughout the lung, due to hematogenous spread of the bacilli

Diagnosis

Pulmonary TB

- sputum examination for acid-fast bacilli (AFB) and sputum culture for mycobacteria
- if sputum can't be expectorated, obtain sample by giving inhalation of 3% or 5% hypertonic saline via nebulizer
- nebulized sputum sample has a higher yield for the diagnosis of pulmonary tuberculosis than bronchoscopy — 90% vs 77%

Non-respiratory disease

- AFB smear and mycobacterial culture specimens from affected organ
 - lymph node — fine needle aspirate
 - genitourinary disease — first morning urine sample

Treatment

- usually four antibiotics — rifampin, isoniazid, pyrazinamide and ethambutol — for 8 weeks, followed by rifampin and isoniazid for 4 months
- choice of antibiotic should be guided by sensitivity testing of the organism
- Mycobacterium tuberculosis* easily becomes resistant, so treatment must include two antibiotics to which it's susceptible
- inappropriate treatment of TB has led to multi-drug resistant tuberculosis — bacteria resistant to both isoniazid and rifampin — that's very difficult to treat and requires a prolonged course of therapy
- given the small numbers of cases per year in Canada, refer or consult a TB specialist

Side effects

- isoniazid, rifampin and pyrazinamide all cause liver toxicity — monitor liver enzymes monthly
- rifampin induces cytochrome P450 — lowers levels of many medications, e.g. coumadin, prednisone, birth control pills, calcium channel blockers

Public health concerns

- individuals with pulmonary TB can transmit disease via respiratory secretions, especially if there's enough bacilli in the sputum to be seen under the microscope (sputum smear-positive disease)
- such patients should be under respiratory isolation, either at home or in hospital, for \geq 3 weeks of treatment

Latent infection

- preventative therapy is recommended for individuals with known tuberculosis infection who are at high risk of developing TB disease
- to determine if someone has been infected with *Mycobacterium tuberculosis*, perform a tuberculin skin test
- blood tests for detection of tuberculosis infection may be available in Canada in the near future — QuantiFERON TB Gold and T-SPOT-TB
- it's very important to ensure that an individual does not have TB disease before giving treatment for latent TB infection — this assessment includes chest x-ray, inquiry into symptoms, sputum smear and culture, if appropriate

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