



## The Trouble With Tuberculosis

Check out the TB photo on our cover!

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Tuberculosis (TB) is common in developing countries, as well as in certain populations in developed regions. December's **Bug of the Month** explores current concepts in TB.

Tuberculosis (TB) is caused by organisms of the *Mycobacterium tuberculosis* complex, of which *M. tuberculosis* is the most common. TB is common not only in developing countries, but also in demographically and geographically defined groups in developed nations.

The tubercle bacilli retain dye when treated with mineral acid or an acid-alcohol solution and, hence, are referred to as being "acid-fast" on stain. Acid-fast, *M. tuberculosis* complex organisms must be differentiated from non-*M. tuberculosis* complex organisms.

TB primarily affects the lungs, but can cause disease in virtually any other organ.

Most people who become infected do not develop disease and they are referred to as having latent TB infection (LTBI). Populations most likely to have LTBI include:

- foreign-born persons from TB-endemic countries,
- aboriginals,
- inner city poor and homeless,
- the elderly,
- contacts of an infectious case of TB and
- those with chest radiographic evidence of old, healed TB.

### How does TB spread?

TB is spread by the airborne route in the form of infectious droplet nuclei. Aerosols of droplet nuclei containing *M. tuberculosis* are formed

when persons with respiratory TB cough, laugh, sing or talk. Droplet nuclei are lightweight, remain suspended in the air for long periods of time and can be carried long distances.

In 90% of cases, the primary infection is contained by the immune system and disease does not develop. In 5% of cases, the primary infection results in disease over the ensuing one to two years (primary disease). In another 5%, primary infection results in disease later in life (post-primary or reactivation disease).

The only way to know whether infection has occurred is by a positive tuberculin skin test (TST) (Table 1) used to diagnose LTBI, not TB disease; however, it can sometimes aid in diagnosis of active TB. A negative TST may call for a repeat test in seven to 21 days. This is a two-step test.

### When to suspect?

TB should be suspected in symptomatic individuals at high risk of being infected, especially if they have a condition, such as HIV/AIDS, diabetes or renal failure, that increases the risk of progression from infection to disease, particularly if there are chest radiographic abnormalities consistent with TB.

Common symptoms (if lasting more than two weeks) include:

- cough (with or without sputum),
- hemoptysis,
- fever,

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- weight loss and
- night sweats.

### How contagious is TB?

Only 30% to 50% of people who have close contacts with infectious TB develop positive skin tests. When infectious TB is suspected, patients should be isolated immediately until TB is ruled out.

If one is uncertain how to proceed or if an acid-fast bacillus (AFB) smear-positive specimen is reported, then the local TB control program, a respirologist or an infectious disease specialist should be consulted.

### How many sputum specimens?

For establishing the diagnosis, three consecutive sputum specimens collected on three separate days increases the chance of recovering *M. tuberculosis*. Recovery of the organism is the definitive diagnostic test and allows for drug susceptibility testing and more specific treatment. Saliva is not a good specimen. A deep cough sputum specimen is ideal.

### How is TB infection managed?

For those exposed to TB, having a new positive TST, without symptoms or chest radiographic changes, and in whom any specimens collected are negative for AFB on stain or culture, therapy is aimed at preventing progression to disease. Isoniazid (INH) is the standard drug used for prevention and is taken orally for six to 12 months. Other regimens may also be considered. Preventive therapy destroys the infecting organism and prevents active TB.

### What about full-blown TB?

TB is treated by taking a combination of anti-TB medications for at least six months, because the disease-causing organisms grow very slowly and

Table 1

### Interpretation of tuberculin skin test

| Tuberculin reaction size, mm induration | Setting in which significant (TB infection probable)  |
|---|---|
| 0 mm to 4 mm                            | HIV and high risk TB infection<br>Not normally significant but may be important in the presence of immune suppression |
| 5 mm to 9 mm                            | HIV infection<br>Close contact active, infectious case<br>Abnormal chest X-ray with fibronodular disease              |
| ≥ 10 mm                                 | All other cases   |

are very slow to be killed by the medications. INH, rifampin, pyrazinamide, ethambutol and streptomycin are the most frequently used for treating TB disease.

It is very important to take all medication as prescribed. If doses are missed, *M. tuberculosis* may become resistant to the medication and may start growing again. Numerous TB treatment regimens are available and should be initiated in conjunction with expert consultation.

References  
 1. Health Canada & Canadian Lung Association. Canadian Tuberculosis Standards, 5th Edition. Ottawa, Ontario, 2000.

### What is BCG?

Bacille Calmette-Guérin (BCG) is a live, attenuated vaccine derived from *Mycobacterium bovis*. Administration to newborns is aimed at reducing the incidence and severity of TB among those born into communities where TB is endemic and diagnosis of TB may be delayed.



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