

Definition:

Tuberculosis (“TB”) is a disease caused by bacteria spread through the air that commonly attacks the lungs of its victims.

How disease is contracted and developed over time:

The disease is spread person to person when someone with the untreated, active form of tuberculosis coughs, speaks, spits, laughs, or sings, propelling TB germs into the air. When these germs are inhaled, a person’s immune system may be able to kill or wall off the germs. Persons with a latent TB infection are not infectious and cannot spread the disease to others. Overall, without treatment, about 5 to 10% of infected persons will develop TB disease at some point in their lives. For persons whose immune systems are weak from other disease or infections such as HIV, the risk of developing active TB disease is considerably higher than for persons with normal immune systems.

Who is affected:

About a third of the world’s population has latent TB. People infected with TB bacteria have a lifetime risk of falling ill with TB of 10%. According to the World Health Organization, 8.7 million people worldwide fell ill with TB in 2011 and 1.4 million died from TB. Over 95% of cases and deaths are in developing countries. Sub-Saharan Africa carries the greatest proportion of new cases per population with over 260 cases per 100,000 persons in 2011. The largest number of new cases of TB occurs in Asia, which accounts for over 60% of new cases globally. TB mostly affects young adults although everyone is susceptible. At least a third of the 34 million people living with HIV worldwide have latent TB. This group is 21 to 34 times more likely to develop active TB than people without HIV.

Available treatment and prevention options

Both active and latent TB can be cured with the appropriate antibiotics. Treatment usually involves taking several types of antibiotics over at least six months. It is important for infected persons to complete the course of antibiotics and take it consistently. If they stop taking their antibiotics too soon or skip doses, TB bacteria that are still alive may become resistant to drugs. Treatment of drug resistant TB often requires the use of special TB drugs taken over the course of six to nine months. This long and complex regimen is burdensome for patients even when taken under direct observation of health care professionals, leading to the development of even more drug-resistant strains of TB.

Further, the current TB drug regimen is not compatible with certain common antiretroviral (ARV) therapies used to treat HIV/AIDS. To avoid drug-drug interactions in co-infected patients, the treatment regimen for one of the diseases must be sub optimally modified. This poses a massive challenge to controlling these twin epidemics, given that an estimated one-third of the 40 million people living with HIV/AIDS worldwide are co-infected with TB.

Differences in incidence and care

TB is prevalent in the developing world, especially in Sub-Saharan Africa and Asia. Despite the high incidence of TB particularly in the developing world, only one TB drug has been approved by US regulators over the past 50 years, limiting the flow of medical resources to TB sufferers in the developing world. Multidrug resistance has become an important factor. In some countries of the developing world where resources are limited, it is estimated that drug-resistant rates exceed 30 percent (13). In addition, the average cost of treating an antibiotic-susceptible case of TB in the US around US\$2,000, but for a multidrug-resistant case, the number soars to around US\$250,000, placing effective treatment well beyond the reach of impoverished nations and people.

Inputs needed to prevent, treat, or manage the disease

Costly antibiotics are needed to treat both latent and active TB. Patients diagnosed with active TB should undergo sputum analysis for TB bacteria weekly until sputum conversion is documented. Monitoring for toxicity includes baseline and periodic liver enzymes, complete blood cell (CBC) count, and serum creatinine. In countries where tuberculosis is more common, infants often are vaccinated with bacille Calmette-Guerin (BCG) vaccine because it can prevent severe tuberculosis in children. The BCG vaccine isn't recommended for general use in the U.S. because it isn't very effective in adults, and it causes a false-positive result on a TB skin test.

Conclusion:

TB is a global disease and affects a very large population, particularly in the developing world. Sufferers of HIV are particularly vulnerable to the disease because of compromised immunity. Treatment of TB requires a lengthy and costly course of antibiotics. Drug-resistant TB strains may result from inadequate treatment.

Sources:

<http://www.who.int/features/qa/08/en/>
<http://www.who.int/mediacentre/factsheets/fs104/en/>
<http://www.tbfacts.org/tb-statistics.html>
<http://www.tballiance.org/why/inadequate-treatment.php>

MIT OpenCourseWare
<http://ocw.mit.edu>

15.232 Business Model Innovation: Global Health in Frontier Markets
Fall 2013

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.