

ANTITUBERCULOUS DRUGS

Tuberculosis is an infectious bacterial disease acquired, often in childhood, by inhaling the tuberculosis bacilli present in the spray caused by a sneeze or cough from someone who is actively infected. It may also, rarely, be acquired from infected unpasteurized cow's milk. The disease usually starts in a lung and takes one of two forms: either primary infection or reactivated infection.

In 90 to 95 per cent of those with a primary infection, the body's immune system suppresses the infection but does not kill the bacilli. They remain alive but dormant and may cause the reactivated form of the disease. After they are reactivated, the tuberculosis bacilli may spread via the lymphatic system and bloodstream throughout the body (see Sites of infection, below).

The first symptoms of the primary infection may include a cough, fever, tiredness, night sweats, and weight loss. Tuberculosis is confirmed through clinical investigations, which may include a chest X-ray, isolation of the bacilli from the person's sputum, and a positive reaction – localized inflammation – to a skin test (in which tuberculin – a protein extracted from tuberculosis bacilli – is injected into the skin).

The gradual emergence in adults of the destructive and progressive form of tuberculosis is caused by the reactivated infection. It occurs in 5 to 10 per cent of those who have had a previous primary infection. Another form, reinfection

tuberculosis, occurs when someone with the dormant, primary form is reinfected. This type of tuberculosis is clinically identical to the reactivated form. Reactivation is more likely in people whose immune system is suppressed, such as the elderly, those on corticosteroids or other immunosuppressant drugs, and those with AIDS. Reactivation tuberculosis may be difficult to identify because the symptoms may start in any part of the body seeded with the bacilli. It is most often first seen in the upper lobes of the lung, and is frequently diagnosed after a chest X-ray. The early symptoms may be identical to those of primary infection: a cough, tiredness, night sweats, fever, and weight loss.

If left untreated, tuberculosis continues to destroy tissue, spreading throughout the body and eventually causing death. It was one of the most common causes of death in the United Kingdom until the 1940s but the disease is now on the increase again worldwide. Vulnerable groups are people with suppressed immune systems and the homeless.

Why they are used

A person who has been diagnosed as having tuberculosis is likely to be treated with three or four antituberculous drugs. This helps to overcome the risk of drug-resistant strains of the bacilli emerging (see Antibiotic resistance, p.86).

The standard drug combination for the treatment of tuberculosis consists of rifampicin, isoniazid, and pyrazinamide. In areas where there is high prevalence of drug-resistant tuberculosis, or a large number of organisms is present, ethambutol may be added. However, other drugs may be substituted if the initial treatment fails or drug sensitivity tests indicate that the bacilli are resistant to these drugs.

The standard duration of treatment for a newly diagnosed tuberculosis infection is a six-month regimen as follows: isoniazid, rifampicin, and pyrazinamide (perhaps with ethambutol) daily for two months, followed by isoniazid and rifampicin for four months. The duration of treatment can be extended from nine months to up to two years in people at particular risk, such as those with a suppressed immune system or those in whom tuberculosis has infected the central nervous system.

Corticosteroids may be added to the treatment, if the patient does not have a suppressed immune system, to reduce the amount of tissue damage.

Both the number of drugs required and the long duration of treatment may make treatment difficult, particularly for those who are homeless. To help with this problem, supervised administration of treatment is available when required, both in the community and in hospital.

Tuberculosis in patients with HIV infection or AIDS is treated with the standard antituberculous drug regimen;

TUBERCULOSIS PREVENTION

A vaccine prepared from an artificially weakened strain of cattle tuberculosis bacteria can provide immunity from tuberculosis by provoking the development of natural resistance to the disease (see Vaccines and immunization, p.92). The BCG (Bacille Calmette-Guérin) vaccine is a form of tuberculosis bacillus that provokes the body's immune response but does not cause the illness because it is not infectious. The vaccine is no longer given as part of the routine immunization schedule but is offered to certain high-risk groups, for example newborn babies in areas where there is a high rate of tuberculosis.

How it is done

The vaccine is usually injected into the upper arm. A small pustule usually appears 6–12 weeks later, by which time the person can be considered immune.

but lifelong preventative treatment with isoniazid may be necessary.

How they work

Antituberculous drugs act in the same way as antibiotics, either by killing bacilli or preventing them from multiplying (see Action of antibiotics, p.86).

How they affect you

Although the drugs start to combat the disease within days, benefits of drug treatment are not usually noticeable for a few weeks. As the infection is eradicated, the body repairs the damage caused by the disease. Symptoms such as fever and coughing gradually subside, and appetite and general health improve.

Risks and special precautions

Antituberculous drugs may cause adverse effects (nausea, vomiting, and abdominal pain), and they occasionally lead to serious allergic reactions. When this happens, another drug is substituted.

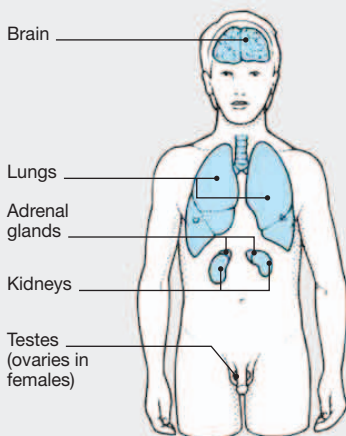
Rifampicin and isoniazid may affect liver function; isoniazid may adversely affect the nerves as well. Ethambutol can cause changes in colour vision. Dosage is carefully monitored, especially in children, the elderly, and those with reduced kidney function.

COMMON DRUGS

Amikacin	Cycloserine
Capreomycin	Ethambutol *
Ciprofloxacin *	Isoniazid *
Clarithromycin *	Pyrazinamide
	Rifabutin
	Rifampicin *
	Streptomycin

* See Part 3

SITES OF INFECTION



Tuberculosis usually affects only part of one lung at first. However, later outbreaks usually spread to both lungs and may also affect the kidneys, leading to pyelonephritis; the adrenal glands, causing Addison's disease; and the membranes surrounding the brain, which may lead to meningitis. The testes (in men) and the ovaries (in women) may also be affected.