

Mechanism of Action and Side Effects of Anti-Mycobacterial Therapy

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DESCRIPTION

Anti-mycobacterial therapy refers to the treatment of infections caused by bacteria of the genus *Mycobacterium*. *Mycobacterium tuberculosis*, the causative agent of Tuberculosis (TB), is the most well-known member of this group. While TB is the most common infection caused by mycobacteria, there are other species that can also cause disease in humans, such as *Mycobacterium leprae* (the causative agent of leprosy) and *Mycobacterium avium* Complex (MAC), which is a group of bacteria that can cause infections in people with weakened immune systems. Anti-mycobacterial therapy is an essential component of the management of mycobacterial infections, especially TB, which is a major global health problem. According to the World Health Organization (WHO), there were an estimated 10 million cases of TB globally in 2019, with 1.4 million deaths attributed to the disease. The various anti-mycobacterial agents used to treat mycobacterial infections, their mechanisms of action, and their side effects.

The first-line agents used for the treatment of TB include isoniazid, rifampin, pyrazinamide, and ethambutol. These drugs are usually used in combination, and the combination used is determined by the susceptibility of the bacteria to the drugs. Isoniazid and rifampin are the most important drugs in the treatment of TB, and they are often used in combination with pyrazinamide and ethambutol. Isoniazid is a bactericidal drug that works by inhibiting the synthesis of mycolic acids, which are essential components of the mycobacterial cell wall. Isoniazid is one of the most effective drugs for the treatment of TB, and it is

usually given daily for 6-9 months. However, isoniazid can cause liver toxicity, and patients on this drug need to be monitored for signs of liver damage. Rifampin is another essential drug in the treatment of TB. It is a bactericidal drug that works by inhibiting the bacterial RNA polymerase, which is essential for the synthesis of bacterial RNA. Rifampin is highly effective in killing TB bacteria, and it is usually given daily for 6-9 months. However, rifampin can cause liver toxicity and can also interact with other medications, including anticoagulants and antiretroviral drugs. Pyrazinamide is a bactericidal drug that works by disrupting the energy metabolism of the bacteria.

It is usually given daily for the first 2 months of treatment and is then stopped. Pyrazinamide can cause liver toxicity and joint pain, and patients on this drug need to be monitored closely for side effects. Ethambutol is a bacteriostatic drug that works by inhibiting the synthesis of mycobacterial cell wall components. It is usually given daily for 6-9 months and is often used in combination with isoniazid, rifampin, and pyrazinamide. Ethambutol can cause vision problems, and patients on this drug need to have regular eye exams to monitor for any changes in their vision. In addition to the first-line agents, there are also second-line agents that can be used to treat TB. These drugs are usually reserved for cases of drug-resistant TB, which is a major concern in many parts of the world. The second-line agents include drugs such as kanamycin, capreomycin, and levofloxacin. These drugs have different mechanisms of action from the first-line agents and are often used in combination to treat drug-resistant TB.

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