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Drug resistance in Mycobacterium tuberculosis

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Tuberculosis (TB) has always been the most dangerous disease worldwide. It is caused by Mycobacterium tuberculosis. Rifampicin and isoniazid are the two most efficient first-line anti-TB drugs. During these years, tuberculosis has taken a new turn which is not very convincing to the public. It seems that certain strains of the bacteria have evolved resistance to the anti-TB drugs. The management of these drug-resistant strains becomes the most critical part in the treatment of the disease. Three types of TB drug resistance types have been evolved by different strains of Mycobacterium tuberculosis and they are multidrug-resistant (MDR) TB that show resistance to the most efficient first-line drugs namely rifampicin and isoniazid; extensively drug-resistant (XDR) TB that resists most of the second-line drugs namely fluoroquinolone and kanamycin; totally drug-resistant (TDR) TB that is completely resistant to all the antibiotics used in the treatment of TB. Owing to drug resistance, TB has now become a worldwide concern. One solution to tackle this circumstance is to understand the mode of action of each of the anti-TB drugs and acquire the knowledge of the development of drug resistance. The combined efforts of these can be utilised to eliminate this problem. New drug targets can be selected and researched to eradicate drug resistance. Computational techniques are advisable to detect new targets and sequences, and mutations in the bacterial genome leading to the resistance with which an effective solution could be achieved.

Keywords: Drug resistance, Molecular mechanisms, Mycobacterium tuberculosis, First-line anti-TB drugs, second-line anti-TB drugs, Tuberculosis

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