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A need to revisit the therapeutics for tuberculosis

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Tuberculosis (TB) is a worldwide leading cause of morbidity and mortality, spread by Mycobacterium tuberculosis (Mtb) infection. The emergence of multidrug- and extensively drug-resistant strains to the available antibiotics has become a severe health threat and an immense burden on health care systems. The mycobacterial cell envelope is an intricate structure composed of mycolyl-arabinogalactan-peptidoglycan (mAGP) complex responsible for its viability, virulence, and persistence that can modulate the innate immune resistance to the antibiotics by enabling the survival of pathogen inside the host [1]. Multi-Drug Resistant (MDR) TB is resistant to isoniazid and rifampin (first-line drugs) whereas extensively drug-resistant (XDR) TB is resistant to first-line drugs, as well as second-line regimen and fluoroquinolone Mycobacteria have evolved different strategies such as strengthening mycobacterial cell wall, protecting bacteria from degradation via lysozyme, and immunogenicity of mycobacteria due to the presence of glycosylated form of the muramyl dipeptide to cache peptidoglycan (PG) and circumventing antibacterial activity [2]. Thus, new alternative therapeutics schemes become essential to combat the globally acquired resistance to the current tuberculosis treatment regimens. Revisiting TB therapeutics includes the potential use of β-lactams, synergistic combinations of cell wall targeting antibiotics, repurposing the antibiotics that are not commonly used in anti-TB therapy, and Host directed therapies could be used as an alternative therapeutic approach to tackle drug-resistant TB [3, 4]. The recent developments toward the potential application of mycobacteriophage-dedicated enzymes targeting the complex mycobacterial cell wall arrangement have also evolved in repurposing mycobacterial metabolism as an anti-TB therapy [5]. Host-directed therapy (HDT) is an emerging concept for the management of MDR- and XDR-TB, where HDT agents modulate host response with or without adjunct antibiotics that target autophagy, vitamin D pathway, and anti-inflammatory response for the treatment of TB and its comorbid conditions (HIV infection or diabetes) by modulating host cell functions [6, 7]. The global battle of TB combating requires additional support, research, and new partnerships among government, non-government and scientific organizations to revisit the existing therapies and repurpose the drugs.

Biography

Dr. Ruchi Chawla is a researcher in the field of Pharmaceutics, with expertise in evaluation and development of dosage forms. She has had the opportunity of working in industry and academics with experience in teaching, administration and research. Currently, she is serving as an Associate Professor in Indian Institute of Technology (Banaras Hindu University), Varanasi, India The research group of Dr. Chawla has been extensively involved in developing nanotechnological based dosage forms for treatment of various diseased conditions like tuberculosis, Alzheimer's disease, depression, lung disorders etc. Through her research she wants to develop targeted treatment modules so that issues of poor bioavailability, resistance and patient non-compliance can be addressed.

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