International Research Journal of Pharmacy and Pharmacology
ISSN 2251-0176
2020
Vol.8 No.5

Repurposing common Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) could potentially reverse intrinsic antibiotic resistance in the TB-causing superbug

Sanjib Bhakta[1]

[1]The Institute of Structural and Molecular Biology, University of London and UCL, UK

Abstract

The rise of antimicrobial resistance is leading to ever-more untreatable illness. Intracellularly surviving bacterial pathogens have endogenous machinery to evade host defenses as well as antibiotic treatment. Drug efflux and formation of biofilms are the two key fundamental mechanisms of intrinsic resistance which render many antibiotics ineffective against them. *Mycobacterium tuberculosis* has unique multi-drug transporter protein complexes that allow the pathogen to take up nutrients for survival, while allowing it to extrude deleterious ones so as the signaling molecules for quorum-sensing leading to biofilm formation. Our work has shown that the non-steroidal anti-inflammatory drugs (nsaids) have anti-bacterial action against *Mycobacterium tuberculosis*. The most potent NSAID so far, at sub-inhibitory concentrations, inhibited whole-cell efflux pumps activity at par with/better than potent efflux pump inhibitors such as verapamil and chlorpromazine. In addition, the NSAID inhibited mycobacterial biofilm formation significantly. Analysis of the extracellular polymeric substances of treated biofilm showed macromolecular alterations compared to the untreated controls. Furthermore, transcriptomic analysis revealed modulation of key metabolic pathways in NSAID-treated *M. Tuberculosis* revealing novel endogenous targets of the drug. The over-the-counter immunomodulatory drug's new antibiotic action has paved an alternative route for tackling antimicrobial resistance in tuberculosis (TB).

Biography:

Sanjib Bhakta is a full Professor of Molecular Microbiology and Biochemistry, Strategic Dean (Internationalisation and Partnership) and Programme Director of MRes Global Infectious Diseases at the Institute of Structural and Molecular Biology, Birkbeck, University of London and UCL. His continued research interest in infectious bacterial diseases (funded by Wellcome Trust, Medical Research Council, UK and EU) is focused on developing novel therapeutics as well as repurposing existing drugs to tackle antibiotic resistance and persistence in tuberculosis (TB), a global health and economic emergency. To date, he has published more than 100 original research articles for a number of internationally acclaimed journals including J. Exp. Med., JBC, Tuberculosis, Biochem. J., JAC, FEBS J, Mol Micro, British Medical Journal, PLOS, J. Med Chem and Nat Sci Report.

Speaker Publications:

1. "Repurposing drugs for treatment of tuberculosis: a role for non-steroidal anti-inflammatory drugs"; Maitra A, Bates S, Shaik M, Evangelopoulos D, Abubakar I, McHugh TD, Lipman M, Bhakta S; Br Med Bul/(2016) 118(1):138-48. doi: 10.1093/bmb/ldw019.

2. "Repurposing-a ray of hope in tackling extensively drug resistance in tuberculosis"; Maitra A, Bates S, Kolvekar T, Devarajan PV, Guzman JD, Bhakta S; Int J Infect Dis./ (2015) 32:50-5. doi: 10.1016/j.ijid.2014.12.031.

3. "Antitubercular specific activity of ibuprofen and the other 2-arylpropanoic acids using the HT-SPOTi whole-cell phenotypic assay"; Guzman JD, Evangelopoulos D, Gupta A, Birchall K, Mwaigwisya S, Saxty B, McHugh TD, Gibbons S, Malkinson J, Bhakta S; BMJ Open/(2013) 20;3(6). pii: e002672. doi: 10.1136/bmjopen-2013-002672.

7th World Congress and Exhibition on Antibiotics and Antibiotic Resistance; London, UK- March 16-17, 2020.

Abstract Citation:

Sanjib Bhakta, Repurposing common Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) could potentially reverse intrinsic antibiotic resistance in the TB-causing superbug,

Antibiotics 2020, 7th World Congress and Exhibition on Antibiotics and Antibiotic Resistance; London, UK- March 16-17, 2020. (https://antibiotics.pharmaceuticalconferences.com/abstract/2020/repurposing-common-non-steroidal-anti-inflammatory-drugs-nsaids-could-potentially-reverse-intrinsic-antibiotic-resistance-in-the-tb-causing-superbug)