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Abstract

Tridecaptins: An undershadowed class of antibiotics to combat colistin- and multidrug-resistant Enterobacteriaceae

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Abstract:

The emergence of extremely drug-resistant and pan drug-resistant strains of Enterobacteriaceae worldwide demands the immediate discovery and development of new antibiotics. The present study discusses the antimicrobial potential of tridecaptin M, a new member of this old family of antibiotics, isolated from a mud bacterium Paenibacillus sp. M-152. Tridecaptin M displayed strong antibacterial activity (MICs of 2 to 8 µg/ml) against clinical strains of Klebsiella pneumoniae (which were resistant to colistin, carbapenems, third- and fourth-generation cephalosporins, fluoroquinolones, fosfomycin, and other antibiotics) and mcr-1-positive Escherichia coli strains. The compound exhibited negligible acquired resistance, low in vitro cytotoxicity and hemolytic activity, and no significant acute toxicity in mice. It also showed promising efficacy in a thigh infection model of colistin-resistant K. pneumoniae. The in vitro kinetic studies revealed that tridecaptin M at a concentration of 16 µg/ml eradicated the bacteria completely in high cell-density culture. This class of antibiotics possesses a distinct mechanism of action than polymyxin or other antibiotics in the market; hence the chances of cross-resistance are negligible. Altogether, the study demonstrated that tridecaptins are an excellent drug candidate against drug-resistant bacteria. Further studies on safety assessment and PK/PD analysis are required. The study also explains how microbial metabolites could provide a solution to tackle the antibiotic-resistance in superbugs.

Biography:

Dr. Nandanwar has completed his PhD in 2008 from Panjab University, Chandigarh (India) and continued his research in antibiotic discovery from bio-diversity. He is

actively working on management of antibacterial resistance through alternative approach as well as discovering new antibiotics. He is the Senior Principal Scientist, at a premier Indian institute, CSIR-Institute of Microbial Technology, Chandigarh.. He has published more than 25 papers in reputed journals and also filed patent applications for translation of technology.

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