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Nature-inspired novel drug design paradigm using nanosilver: efficacy on multi-drug-resistant clinical isolates of tuberculosis.

Seth D, Choudhury SR, Pradhan S, Gupta S, Palit D, Das S, Debnath N, Goswami A.

Biological Sciences Division, Indian Statistical Institute, 203 B. T. Road, Calcutta, 700108, West Bengal, India. dipankarvet@yahoo.co.in

Abstract

Despite discovery of the pathogen more than 100 years ago, tuberculosis (TB) continues to be a major killer disease worldwide. Currently a third of world population is infected and multiple-drug-resistant (mdr) TB registers maximum mortality by a single pathogen. Nanomedicine provides enormous opportunity for developing novel drugs. We have recently demonstrated surface-modified-lipophilic-nanosilica as drug to combat malaria and 100% lethal virus, BmNPV. Nanosilver possesses inherent antibacterial properties, but toxicity is a major concern. We hypothesized that capping with nature-inspired biomolecules, bovine serum albumin (BSA) and Poly-n-vinyl-pyrrolidone (PVP) used as blood volume extender, might insure biosafety. BSA-nano-Ag was found to be more stable than PVP-nano-Ag at physiological pH. In this first ever study on clinical isolates collected from TB endemic areas, we report, BSA-nano-Ag act as potent anti-TB drug. Further study with (human serum albumin)-nano-Ag and core-shell-nano-Ag could increase the biocompatibility of oral TB drug formulations without compromising on the efficacy of the drug.

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