"Development of Drug Loaded Nanoparticles for Treatment of Mycobacterium avium Infection"

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ABSTRACT

Currently, about one third of the world’s population is latently infected with Mycobacterium tuberculosis and about 4 million people die from the disease annually worldwide. Although treatment with antimicrobials can be curative, many people fail to complete the prescribed therapeutic regimen which can increase the risk of disease re-emergence, spread of infection to others and development of drug resistance. An improved approach is urgently needed for patient compliance. Development of safe and effective colloidal drug delivery systems may reduce the amount and frequency of antimicrobial therapy needed. The major goal of this research effort is to explore the safety and efficacy of antimicrobial loaded nanoparticles against M. avium. Various in vitro efficacy studies were done with a) amikacin-loaded nanoparticles, b) clarithromycin-loaded nanoparticles, and c) with aerogel nanoparticles loaded with rifampicin, clarithromycin and ethambutol.

Clarithromycin (CLA) and amikacin (AMK) loaded nanoparticles showed a significant reduction in viable M. avium compared to free antibiotics and untreated controls. Cytotoxicity assays revealed that all types of drug-laden nanoparticles were non-toxic to J774A.1 mouse macrophage cells at therapeutic doses. In vivo efficacy studies showed that only amikacin-loaded polymeric nanoparticles improved clearance compared to free amikacin in M. avium infected BALB/c mice. In general, none of the nanoparticle