

Antimycobacterial, antimicrobial, and biocompatibility properties of para-aminosalicylic acid with zinc layered hydroxide and Zn/Al layered double hydroxide nanocomposites

Abstract

The treatment of tuberculosis by chemotherapy is complicated due to multiple drug prescriptions, long treatment duration, and adverse side effects. We report here for the first time an in vitro therapeutic effect of nanocomposites based on para-aminosalicylic acid with zinc layered hydroxide (PAS-ZLH) and zinc-aluminum layered double hydroxides (PAS-Zn/Al LDH), against mycobacteria, Gram-positive bacteria, and Gram-negative bacteria. The nanocomposites demonstrated good antimycobacterial activity and were found to be effective in killing Gram-positive and Gram-negative bacteria. A biocompatibility study revealed good biocompatibility of the PAS-ZLH nanocomposites against normal human MRC-5 lung cells. The para-aminosalicylic acid loading was quantified with high-performance liquid chromatography analysis. In summary, the present preliminary in vitro studies are highly encouraging for further in vivo studies of PAS-ZLH and PAS-Zn/Al LDH nanocomposites to treat tuberculosis.

Keyword: Zn/Al-layered double hydroxides; Zinc layered hydroxides; Tuberculosis; Para-aminosalicylic acid (PAS); Antimicrobial agents