Development of a controlled-release anti-parkinsonian nanodelivery system using levodopa as the active agent.

ABSTRACT

A new layered organic-inorganic nanocomposite material with an anti-parkinsonian active compound, L-3-(3,4-dihydroxyphenyl) alanine (levodopa), intercalated into the inorganic interlayers of a Zn/Al-layered double hydroxide (LDH) was synthesized using a direct coprecipitation method. The resulting nanocomposite was composed of the organic moiety, levodopa, sandwiched between Zn/Al-LDH inorganic interlayers. The basal spacing of the resulting nano-composite was 10.9 Å. The estimated loading of levodopa in the nanocomposite was approximately 16% (w/w). A Fourier transform infrared study showed that the absorption bands of the nanocomposite were characteristic of both levodopa and Zn/Al-LDH, which further confirmed intercalation, and that the intercalated organic moiety in the nanocomposite was more thermally stable than free levodopa. The resulting nanocomposite showed sustained-release properties, so can be used in a controlled-release formulation. Cytotoxicity analysis using an MTT assay also showed increased cell viability of 3T3 cells exposed to the newly synthesized nanocomposite compared with those exposed to pure levodopa after 72 hours of exposure.

Keyword: Coprecipitation; Layered double hydroxide; Levodopa; Sustained release.