

Controlled release and angiotensin-converting enzyme inhibition properties of an antihypertensive drug based on a perindopril erbumine-layered double hydroxide nanocomposite.

ABSTRACT

The intercalation of perindopril erbumine into Zn/Al-NO₃-layered double hydroxide resulted in the formation of a host-guest type of material. By virtue of the ionexchange properties of layered double hydroxide, perindopril erbumine was released in a sustained manner. Therefore, this intercalated material can be used as a controlled-release formulation. Results: Perindopril was intercalated into the interlayers and formed a well ordered, layered organic-inorganic nanocomposite. The basal spacing of the products was expanded to 21.7 Å and 19.9 Å by the ion-exchange and coprecipitation methods, respectively, in a bilayer and a monolayer arrangement, respectively. The release of perindopril from the nanocomposite synthesized by the coprecipitation method was slower than that of its counterpart synthesized by the ion-exchange method. The rate of release was governed by pseudo-second order kinetics. An in vitro antihypertensive assay showed that the intercalation process results in effectiveness similar to that of the antihypertensive properties of perindopril. Conclusion: Intercalated perindopril showed better thermal stability than its free counterpart. The resulting material showed sustained-release properties and can therefore be used as a controlled-release formulation.

Keyword: Controlled release; Angiotensin-converting enzyme; Inhibition properties; Antihypertensive drug; Perindopril erbumine; Layered double hydroxide; Nanocomposite.