

Hippurate-Zinc layered Hydroxide Nanohybrid and its synergistic effect with Tamoxifen on the HepG2 cell lines.

ABSTRACT

A new simple preparation method for a hippurate intercalated zinc-layered hydroxide (ZLH) nanohybrid has been established, which does not need an anion-exchange procedure to intercalate the hippurate anion into ZLH interlayers. Methods: The hippuric acid nanohybrid (HAN) was prepared by direct reaction of an aqueous suspension of zinc oxide with a solution of hippuric acid via a one-step method. Results: The basal spacing of the nanohybrid was 21.3 Å, indicating that the hippurate anion was successfully intercalated into the interlayer space of ZLH, and arranged in a monolayer fashion with the carboxylate group pointing toward the ZLH inorganic interlayers. A Fourier transform infrared study confirmed the formation of the nanohybrid, while thermogravimetry and differential thermogravimetry analyses showed that the thermal stability of the nanohybrid was markedly enhanced. The loading of hippurate in the nanohybrid was estimated to be about 38.7% (w/w), and the release of hippurate from the nanohybrid was of a controlled manner, and therefore the resulting material was suitable for use as a controlled-release formulation. HAN has synergistic properties with tamoxifen toward a HepG2 cell line, with an IC₅₀ value of 0.35 compared with hippurate. In the antiproliferative assay, the ratio of viable cells account for cells treated by the combination tamoxifen with HAN to untreated cells was sharply reduced from 66% to 13% after 24 and 72 hours, respectively. The release of hippuric acid anions from HAN occurred in a controlled manner, and the resulting material is suitable for a controlled-release formulation.

Keyword: Hippurate; Zinc layered hydroxide; Nanohybrid; Synergistic effect; Tamoxifen; HepG2 cell lines.