

Formulation and in Vitro Evaluation of Cubosomes Containing CeO₂ Nanoparticles Loaded with Glatiramer Acetate Drug

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Abstract : Cerium oxide nanoparticles (nano-series) are used as catalysts in industrial applications due to their free radical scavenging properties. Given that free radicals play an essential role in the pathology of many neurological diseases, we investigated the use of nanocrystals as a potential therapeutic agent for oxidative damage. This project synthesized nano-series from an environmentally friendly bio-pathway. Investigation of cerium nitrate in culture medium containing inoculated *Lactobacillus acidophilus* strain before incubation produces nano-series. Loaded with glatiramer acetate (GA) was formed by coating carboxymethylcellulose (CMC) and CeO₂. FE-SEM analysis showed nano-series in the 9-11 nm range, spherical shape, and uniform particle size distribution. Cubic nanoparticles containing anti-multiple sclerosis (anti-Ms) treatment called GA were used. Glycerol monostearate (GMS) was used as a fat base, and evening primrose extract was used as an anti-inflammatory in cubosomes. Design-Expert® software was used to study the effects of different formulation factors on the properties of GA-loaded cubic dispersions. Thirty GA-labeled cubic dispersions were prepared with GA-labeled carboxymethylcellulose and evaluated in vitro. The results showed an average nano-series size of 89.02 and a zeta potential of -49.9. Cubosomes containing GA-CMC/CeO₂ showed a stable release profile for 180 min. The results showed that cubosomes containing GA-CMC/CeO₂ could be a promising drug carrier with normal release behavior.

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