PEGylated Herbal -loaded Nanoparticles for Cancer Therapy: Synthesis, Characterization, and Functionality

Abstract：

In this study, the chitosan nanoparticles (CS NPs) as drug carriers are prepared by cross-linking reaction of cationic CS and anionic tripolyphosphate (TPP) to encapsulate three herbal drugs, aloe-emodin (AE), berberine (BB) and curcumin (CC), respectively. Here, we focused on effects of the ratio of chitosan (CS) and tripolyphosphate (TPP), the type of drug and the concentration of drug loading on drug encapsulation efficiency, in vitro cellular uptake and viability. The CS NPs also grafted with different concentration or molecular weight of polyethylene glycol (PEG) to synthesize polyethylene glycol chitosan nanoparticles (PEG/CS NPs). The herbal-loaded NPs and PEG/CS NPs were determined by ultra violet–visible-near infrared spectrophotometer (UV-VIS-NIR spectrophotometer), Fourier transform infrared (FTIR) spectroscopy, dynamic light scattering (DLS), and scanning electron microscopy (SEM). Moreover, we studied human colon cancer cells (colo 205) which were treated with herbal-loaded NPs and demonstrated its molecular mechanisms in apoptosis. Compared with single drug, herbal-loaded NPs induced five times on growth inhibition, G2/M phase arrest and apoptosis in colo 205 cells.