

Development of Quercetin-loaded Polymeric Nanoparticles for Targeted Delivery to Colon Cancer

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Abstract

Quercetin (QCT) is a plant-derived compound with demonstrated potency in several diseases including colon cancer. The purpose of this study was to develop a novel nanoparticle (NP) platform for QCT that is targeted to the colon *via* the oral route using the pH-sensitive polymer Eudragit[®] S100. NPs were prepared by the nanoprecipitation method and characterized by different techniques. An optimized QCT-loaded Eudragit[®] S100 NP formulation was successfully prepared and showed a mean diameter of 66.8 nm and a partially negative surface charge of -5.2 mV, attributed to the ionization of methacrylate moieties in the polymer. The NPs contained on average 22.0 µg QCT/mg polymer at an encapsulation efficiency of 41.8%. Infrared spectroscopy and differential scanning calorimetry (DSC) both revealed the presence of intermolecular interactions, most likely H-bonding, between QCT and Eudragit[®] S100, which contributed to drug loading. DSC also indicated that the drug was present in the NPs in an amorphous state. *In vitro* release was conducted in media with different pH. Results showed no drug was released in media with acidic pH, but 91.8% release was achieved within 24 h upon incubation in media with pH 7.2. Our findings present a promising NP formulation for colon-targeted delivery of QCT in diseases such as colon cancer.