# The Preparation of Nanoparticles Based on Unsaturated Fatty Acid Impregnated Chitosan Membrane for Using in Cancer Related Infections

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The present study includes the design of a chitosan membrane decorated with unsaturated fatty acid based carrier system for cancer treatment and antibacterial application. For this purpose, a suitable drug with antitumoral and antimicrobial properties was loaded into nanoparticular formulation and the nanoparticle formulation was embedded into chitosan membrane in order to prevent tumor-associated infections that may occur due to the weakening of the immune system during the cancer treatment. In this study, poly styrene-graft-poly oleic acid-g-poly ethylene glycol graft copolymers (PS-g-Poleic-g-PEG) were prepared by free radical polymerization and the physicochemical characterization was carried out via Fourier-transform infrared spectroscopy (FTIR) and proton nuclear magnetic resonance (H-NMR). Pristine PS-Poleic-PEG nanoparticles and the different concentrations [2:1-1:1 polymer/drug (w/w)] of caffeic acid loaded PS-Poleic-PEG NPs were prepared by solvent evaporation technique.The size-size distribution of NPs was performed by changing the some parameters. The short term stability of NPs were investigated at 4 °C in storage conditions for 30 days. Drug encapsulation and loading efficiency of drug loaded NPs were also evaluated. The chitosan membrane and the chitosan membrane with Caff NPs were sucessfully fabricated. The chitosan-caff-NPs composite membrane showed controlled release during about 50 days. The mechanical properties of obtained chitosan membrane-drug loaded nanoparticles and chitosan membrane were observed higher than for chitosan membrane-naked nanoparticles. The Caffeic acid NPs-composite membranes indicated excellent antibacterial properties than the chitosan membrane against the Escherichia coli and Staphylococcus aureus. In vitro culture medium of SaOS-2 human osteosarcoma and MC3T3-E1 osteoblast cell lines, the anticancer activity of the all samples was evaluated by MTT assay and verified through the flow cytometry and double staining methods. As a results, the designed novel drug delivery platform showed great potential to cancer-associated infections treatment in bone cancer cases