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Design and Optimization of Flutamide-Loaded Polymeric Nanocarriers for Enhanced Prostate Cancer Therapy

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Abstract

This research focuses on the design and optimization of polymeric nanocarriers for delivering flutamide, a nonsteroidal antiandrogen drug, to prostate cancer cells. Prostate cancer is a leading cause of cancer-related morbidity and mortality among men. While flutamide has shown promise in prostate cancer treatment, its limited bioavailability and potential side effects necessitate a targeted drug delivery system. The study aims to engineer and characterize polymeric nanocarriers to enhance the solubility, stability, and controlled release of flutamide, ultimately improving its therapeutic efficacy. The research employs a systematic approach involving the selection of biocompatible and biodegradable polymers for nanocarrier fabrication. Various formulation parameters, including polymer composition, drug loading, and particle size, will be optimized to achieve maximum drug encapsulation efficiency and sustained release kinetics. The physicochemical properties of the nanocarriers, such as morphology, size distribution, and drug release profile, will be thoroughly characterized using advanced analytical techniques. The outcomes of this research will contribute to the development of an efficient and targeted drug delivery system for prostate cancer therapy. The optimized flutamide-loaded polymeric nanocarriers have the potential to enhance drug bioavailability, reduce side effects, and improve patient compliance, thus advancing the field of nanomedicine in cancer treatment.