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Lactic acid and carbonate based nanotherapies for treating prostate cancer

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Abstract

Current prostate cancer treatment remains ineffective primarily due to ineffectual therapeutic strategies and numerous tumor-associated physiological barriers which hinder efficacy of anticancer agents. Therefore, the focus of this study was to investigate a new combination therapy approach simultaneously targeting the androgen-androgen receptor (AR) and X-linked inhibitor of apoptosis protein (XIAP) signaling pathways for treating prostate cancer. The effect of bicalutamide (antiandrogen), embelin (XIAP inhibitor) and their derivatives on the growth of prostate cancer cells in vitro and in vivo was first examined. Using a combination of MTT assay and isobologram analyses, combination of bicalutamide, embelin and their derivatives were observed to synergistic in their ability to inhibit cell growth. This effect was found to be cell line and schedule dependent. Since bicalutamide and embelin are extremely hydrophobic, polymeric micelles were fabricated using lactic acid and carbonate based copolymers specifically designed to improve drug solubility. Polymeric micelle formulations were found to increase the aqueous solubility of bicalutamide and embelin several fold. Additionally, the potential benefit of antiandrogen and XIAP inhibitor combination was confirmed in animal studies. Tumor growth was effectively regressed upon simultaneous treatment with antiandrogen and XIAP inhibitor formulated in polymeric micelles.

Biography

Michael Danquah, M.S., Ph.D., is an Assistant Professor of Pharmaceutical Sciences at Chicago State University College of Pharmacy (CSU-COP). He obtained his Master's Degree in Chemical Engineering from the University of Kentucky, and a Ph.D. in Pharmaceutics and Drug Delivery from the University of Tennessee Health Science Center. Dr. Danquah's research interests include: (i) Design and synthesis of novel biodegradable polymers for drug and nucleic acid delivery and (ii) Application of stem cells and biomaterials for tissue regeneration and repair. He has several peer-reviewed journal articles and is the author of the book "Emerging Trends in Cell and Gene Therapy".