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Poly (lactide)-based nanoparticles by free-radical dispersion polymerization: Fabrication, characterization and *in vitro* studies

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We have used the macromonomer method to prepare crosslinked, paclitaxel-loaded PLA-PEG (stealth) nanoparticles using free-radical dispersion polymerization. The nanoparticles were optimized using statistical D-optimal mixture design. Nanoparticle fabrication with poly(lactide) is mainly carried out by the dispersion of preformed polymers which makes it difficult to attach targeting moieties to the surface of the nanoparticle and to produce crosslinked networks. Confirmation of nanoparticle synthesis was by scanning electron microscopy. Particle size and size distribution and the zeta potential of the optimized formulation were determined using Zetasizer nano Zs. The release profile of paclitaxel-loaded nanoparticles was determined by high performance liquid chromatography and revealed that encapsulated drug is released over 7 days. *In vitro* cytotoxicity studies were carried out using the CellTiter®glo luminescent cell viability assay in MCF7, MDA-MB-231 (breast cancer) and SK-OV-3 (ovarian cancer) cell lines. The cytotoxicity assay shows that the blank nanoparticle is biocompatible with no toxicity for the duration of the assay compared to medium-only treated controls. Further, the paclitaxel-loaded nanoparticle formulation exhibits similar cytotoxicity compared to free drug in solution against the cancer cell lines tested. *In vitro* intracellular localization of nanoparticle by confocal microscopy also demonstrated that the nanoparticles are rapidly internalized by MCF-7 cancer cells within one hour probably by non-specific endocytosis. The stealth nanoparticles are suitable for the design of controlled delivery systems for bioactive agents.

Biography

Simeon K. Adesina completed his Ph.D. at the Howard University College of Pharmacy in December 2010 under the direction of Professor Akala. He has published four research articles in peer reviewed journals and also has a patent with Professor Akala. He joined Howard University as Assistant Professor in January 2012.

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