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Fabrication& characterization of 3D electrospun biodegradable nanofibers for wound dressing, drug delivery and other tissue engineering applications

Background: The use of electrospinning technology (ET) in fabrication of three-dimensional biodegradable electrospun nanofibers scaffolds (BENS)has recently gained considerable attention in tissue engineering. BENS are superior to other existing scaffolds in tissue regeneration as they provide high surface area-to-volume ratio, possess high porosity, and offer a biomimetic environment in a nanometer scale.

Objectives: To fabricate & characterizeBENS using polyethylene glycol 35000 (PEG35000) as a biodegradable polymer loaded with Amoxicillin Trihydrate (AT) for use as a wound dressing.

Method: Solutions of PEG35000in chloroform of varying concentrations were usedto fabricate BENS using ET. Blank &10% w/vAT loaded BENS were fabricated &further characterized. Morphology, size and diameter of BENSwere assessed using Scanning Electron Microscopy (SEM). Fourier Transform Infrared (FTIR) Spectroscopy was usedto identify the interaction between PEG35000 and AT. Differential Scanning Calorimetry(DSC) was usedto access the crystallinity and thermal behavior of the prepared BENS.

Results: Blank & AT loaded 35% w/v PEG3500 solutionsproduced the most homogenous and intact nanofibers. Major bandsof ATin FTIR were clearly observed in the spectrum of AT with PEG3500post electrospinning. Moreover, DSC thermogramsindicated thatAT existed in it amorphous dissolved statewithin PEGsupported by the disappearance of its melting peak at 133 C° and confirmed by absence of AT crystals under SEM.

Conclusion: BENSusing PEG35000 loaded with AT were successfully fabricated and characterized. Our findings show that thisdressing hasfeatures that make it a promising product for wound healing applications.

Biography

Husam Younes is a graduate of the Faculty of Pharmaceutical Sciences at the University of Alberta (UA) in Edmonton, Alberta, Canada. He received his BSc (Pharm) in 1992 followed by MSc (Pharmaceutical Technology) in 1995. He worked as a Technical Manager in the Pharmaceutical Industry in Palestine and Jordan then completed his PhD from UA in 2002. Between January 2003 and June 2007 he was appointed as an Assistant Professor at the School of Pharmacy, Memorial University of Newfoundland, St. John's, Canada. In August 2007, Dr. Younes moved to Qatar to start his new career as the Founding Chair of Pharmaceutical Sciences department in the new Pharmacy Program at Qatar University. He is currently an Associate Professor of Biopharmaceutics at the College of Pharmacy and the founder of the new Pharmaceutics and Polymeric Drug Delivery Research Laboratory. He previously worked in the pharmaceutical industry and as a senior consultant to Newfoundland Health Department in Canada. He also served on the Panel of Examiners of the Pharmacy Examining Board of Canada. His main research is in the areas of controlled drug release, biomaterials, tissue engineering and synthesis of novel biodegradable polymers designed for localized and targeted delivery of therapeutic proteins in cancer therapy. Research from his laboratory was supported by the National Sciences & Engineering Research Council (NSERC) in Canada and currently by Qatar National Research Foundation in Qatar and has been documented in numerous patents, peer-reviewed publications, books chapters, abstracts and conference proceedings. Dr. Younes supervised graduate students and postdoctoral fellows in his lab and acted as an editorial board member and a reviewer for many pharmaceutical and drug delivery journals.

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