Synthesis and characterization of polylactic acid electrospun membranes for controlled drug release

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In the present work, Polylactic Acid (PLLA) electrospun membranes loaded with a drug have been developed and designed with the purpose of being used for the regeneration and healing of the skin. Tetracycline hydrochloride, a water-soluble antibiotic, was introduced into the membrane. Due to the hydrophobicity of PLLA, an emulsion was made between the polymer solution and an aqueous phase to introduce the drug into the membrane structure. Hyaluronic acid was also included in the aqueous phase to study the stability of the emulsion and its possible effects on fiber morphology. Studies were carried out to choose the operating conditions in the electrospinning process, to optimize the amount of hyaluronic acid in the aqueous phase and to observe the influence of the ratio of aqueous phase to total emulsion. The results gave the electrospinning optimum parameters of 7% of PLLA in the solution in chloroform/acetone mixtures, 14 cm traveling distance of the jet, feeding rate of 1 mL/h and an applied voltage of 18 kV. Electrospun fibrils are porous being the porosity dependent on the hyaluronic acid content of the aqueous phase. In addition, an increase of the pore area has been found by increasing the proportion of aqueous phase. Thereafter, a study of drug release by means of spectrophotometry showed low release yields (around 6%) up to five-day delivery. On the other hand, a characterization of the mechanical properties by tensile test gives the membrane with 0.2% of hyaluronic acid as an optimum.

Speaker Biography

Jose A Gomez-Tejedor (Researcher ID: H-4614-2012, Orcid ID: 0000-0001-6854-0829, Scopus ID: 55915419300) received his PhD in in theoretical physics in 1995 from the Technical University of Valencia, Spain. In 1996 he joined the Technical University of Valencia, where he is currently assistant professor of applied physics. His research has focused in the synthesis, design and characterization of biomaterials for Tissue Engineering. He has been working on the physical characterization of biomaterials using different experimental techniques: Differential Scanning Calorimetry (DSC), Thermomechanical Analysis (TMA), Dynamic Mechanical Analysis (DMA), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) AFM nano-indentation, etc. He has published more than 50 papers in scientific journals and books that have been cited more than 550 times (h-index = 12) and has made more than 50 contributions to international conferences.

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