CHALCONES AND A DEGRADABLE POLYMER USED FOR THE DEVELOPMENT OF FLUORESCENT SYNTHETIC MATRICES FOR CELL CULTURES

Rezende, R.A.(1); Sabino, M.A.(2); Dernowsek, J.A.(1); Silva, J.V.L.(1); Urdaneta, N.(2); Campos, J.(2);
(1) CTI Renato Archer; (2) USB;

Electrospinning provides a simple and versatile method for generating ultrathin fibers from a rich variety of materials that include polymers, biopolymers and composites, which can simulate or biomimetize an extracellular matrix for cellular culture. Other interesting technique used for biomedical applications is the Photodynamic Therapy (PDT). Vascular-Disrupting Agents (VDA) are also used for this kind of applications. Each one (PDT or VDA) has its advantages in the treatment of tissue regeneration, solid tumors, etc., but also present drawbacks. For example, in PDT, hypoxia at the center of the tumor limits conversion of molecular oxygen into singlet oxygen, while VDAs are deficient at affecting the rim of tumor. An organic compound as chalcone could combine VDA with PDT properties and their deficiencies can be addressed. Then, combining the luminescent and conjugate organic compounds with the advantages of the electrospinning technique, interesting membranes can be constructed to serve in in vitro and in vivo cell cultures. The chalcones and derivatives can generate singlet oxygen in situ and to present anticancer and antimalarial activities, among others, which has been already reported. The objective of this research work is the synthesis, characterization and incorporation of a fluorescent chalcone derivative into poly(lactic acid) PLA membranes using the electrospinning technique. The results demonstrated that it was possible to synthesize the fluorescent chalcone, and it was possible to incorporate into the PLA fibers. Membranes were also fluorescent and with fibers in micro/nano scale. The chalcone derivative was encapsulated within fibers forming a 3D structure in the form of PLA meshes, using the electrospinning process (final conditions of 15 KV, 12.5% w/v, 13 cm). SEM showed that the obtained fibers were in the order of the micro-nanometric scale with porous e interconnected structure. The meshes had an appreciable surface roughness that can biomimetize an extracellular matrix. The in vitro biocompatibility study performed in an agar/blood medium at 37°C showed that the charged fibers were biocompatible and fluorescent and there was no evidence of cytotoxicity under the study conditions. Our special thanks to CNPq (CTI Renato Archer PCI-BEV Program) and FAPESP.