Preparation, modification and characterization of alginate hydrogel with nano/micro- fibers for tissue engineering.

B.P. Santana[2], G.F.R. Paganotto[1], E.N. Pollnow[1], C.C.G. Santos[2], R.V. Carvalho[2], E. Piva[2], F.F. Demarco[2], and N.J.V. Carrenõ[1].

[1] *Universidade Federal de Pelotas. Engenharia de Materiais, RS, Brazil*

[2] *Universidade Federal de Pelotas. Faculdade de Odontologia, RS, Brazil*

Tissue engineering is a recent approach where tissues and organs can be engineered using a combination of cells and polymer scaffolds that mimic many roles of extracellular matrices in the body [1, 2]. Alginate is a polymeric acid extracted from brown seaweeds and a potential candidate for this type of research, due to its numerous applications as an injectable cell delivery vehicle in tissue engineering application. There is an effort to improve the functionality of this material for future applications, and using nano-materials is known that they permit a greater similarity to natural extracellular matrix. Our hypothesis is that modification of alginate hydrogel with nano/micro-fibers of titanium dioxide and hydroxyapatite, increase the surface area of adhesion and interconnectivity between cells, providing structural stability and organization aiming to use the material tissue regeneration. To test this hypothesis, we first examined the cytotoxicity of nano/micro-fibers, before we characterized the structural composition by the FTIR spectroscopy, scanning electron microscopy and X-ray diffraction. The results for the test of cytotoxicity showed no cytotoxic effects at concentrations evaluated, demonstrating biocompatibility. The results of characterization by infra red shown that there was no change in the chemical structure of alginate with the nano/micro-fiber, in Scanning Electron Microscope we observe morphological changes, providing more links to the material, allowing the cells increased adhesion surface area and interconnectivity as well as providing structural and organizational stability and X-ray diffraction we observe the stock of the crystalline phase of titanium dioxide and hydroxyapatite in alginate. There is a great prospect of success in the new material as the results, because it maintained its bioactivity and biocompatibility, and new methodologies for evaluation of the same are being performed.

Keywords: polymer scaffolds, tissue engineering, nano/micro-fibres

Work supported by: CNPQ

bianca_palma@yahoo.com.br

[1] Tan R, Niu X, Gan S, Feng Q. Preparation and characterization of an injectable composite. Journal of materials science 2009 Jun;20(6):1245-53.

[2] Park H, Kang SW, Kim BS, Mooney DJ, Lee KY. Shear-reversibly Crosslinked Alginate Hydrogels for Tissue Engineering. Macromolecular bioscience 2009 May 6.