Biocompatibility evaluation of hydrogels of polyacrylamide/chitosan, Ag or hydroxyapatite composites using osteroprogenitor cells

Contreras L[2], Pirela M[1], Briceño A[1], Noris-Suarez K[2], Gonzalez G[1].

[2]*Laboratorio de Ingeniería de tejidos-USB, Depto de Biologia Celular, Universidad Simon Bolivar, Varacas, Venezuela*
[1]*Centro de Ing. Materiales y Nanotecnología, Instituto Venezolano de Investigaciones Científicas, Caracas Venezuela, gemagonz@ivic.gob.ve*

Abstract

Hydrogels have been recognized as porous matrices interesting in medical applications. The characteristic features in the microstructure and their hydrophilic or hydrophobic properties allow them to be biocompatible [1]. The combination of hydrogels of PAAm with other compounds, extend their applications to combine their properties in a synergistic combination [2]. One area of interest for tissue engineering is the development of materials that contribute to bone regeneration processes, which has led to a continuous search for biomaterials, with sufficient biocompatibility and safety, capable of functioning as bone implants. Therefore, the objective of the present work is to evaluate the biocompatibility of PAAm hydrogels with different combinations with hydroxyapatite (HAP), chitosan (Cs), and combinations of these with silver nanoparticles (nAG) using as a model osteoprogenitor cells derived from neonatal rats (*Sprague Dawley*).PAAM hydrogels were synthesized by solution polymerization via free radical. Also, hydrogels of PAAm (100% m / m) with hydroxyapatite (2% m / m) and / or chitosan (3-5% m / m) and / or silver nanoparticles were synthesized. The syntheses were performed in a thermostated bath, using a magnetic stirrer, heated to a temperature of 30 ± 1 ° C and under continuous stirring of 800 rpm, until the formation of the hydrogels. PAAm hydrogels were evaluated using an electron microscope (SEM) model field emission Inspect FEI- F50.The conditioned medium discs were placed in DMEM medium supplemented with 10% FBS at 37 ° C for 48h. The hydrogel materials evaluated were: (PAAm, PAAm + 0.95% nAG, PAAm + 20% HAP, PAAm + 2% HAP + 2% nAG, PAAm + 5% Chitosan (Cs) and PAAm + 2% nAG + 2% HAP + 3% Cs). These samples were seeded at a density of 9300 cel/cm^2, and cells were cultured with conditioned medium (3 replicas for each condition). Fig 1a and b show the citotoxicity and cell adhesion results for the different materials after 48 h of cell culture, suggesting that the PAAm composites hydrogels showed an acceptable biocompatibility. Only the materials with nAg showed citotoxity.

Fig. 1 a. Citotoxicity test

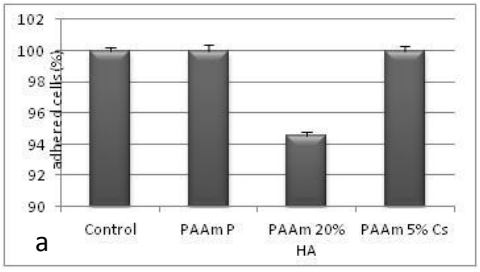
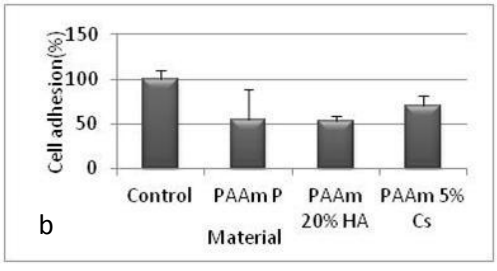


Fig. 1b. Cell adhesion



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