

Emerging Trends in Materials Science and Nanotechnology

April 26-27, 2018
Rome, Italy

Nano Res Appl, Volume:4
DOI: 10.21767/2471-9838-C1-009

CHITOSAN/GELLAN GUM/ β -CYCLODEXTRIN/CURCUMIN HYDROGEL AS A SUPPORT MATRIX FOR ENHANCING ADHESION AND PROLIFERATION OF HUMAN ADIPOSE-DERIVED STEM CELLS

Alessandro F Martins¹, Ariel C de Oliveira¹, Bruno H Vilsinski¹ and Matt J Kipper²

¹Federal University of Technology, Brazil

²Colorado State University, USA

Chitosan (CS) is recognized for its excellent performance to interact with polyanionic macromolecules (such as gellan gum, GG) to enable the production of physical hydrogels (polyelectrolyte complexes; PECs). CS was associated with GG, β -cyclodextrin (β -CD) and curcumin (CU) to create PECs for wound healing purpose. CS/GG/ β -CD/CU hydrogels containing large contents of pores were produced by the first time, controlling the pHs of the CS solutions and CS:GG/ β -CD/CU weight ratios. Stable PECs matrices were created using a suitable level of CU (23 mg) at GG/ β -CD solutions in a 2/1 rate at pH 6.0. The CU could organize the polymeric chains in the hydrogel networks, allowing the formation of materials with well-defined pore structures. After neutralization step, the hydrogels loaded with CU displayed self-assembling behaviors. SEM images of the CS/GG/ β -CD/CU hydrogels before and after neutralization (performed in ultrapure water) confirmed the reorganization of polymer chains. The self-

assembling capacity was also confirmed by thermal analysis. Throughout the neutralization step, the CU was not released from the PEC matrix. So, the β -CD/CU complex can stabilize the PECs arrangements, permitting the development of a stable support matrix (scaffold) to enhance the adhesion and proliferation of human adipose-derived stem cells (ADSC cells). Scaffolds used for wound healing and tissue engineering purposes should similarly promote cell adhesion and provide mechanical and chemical cues that can guide cell shape, cell migration, and other relevant cellular activities. In this facet, CS/GG/ β -CD/CU hydrogel significantly promotes ADSC attachment, adhesion, and proliferation. The number of adhered cells on the PEC surface significantly increased throughout seven days ($p < 0.05$). Fluorescence and SEM images confirmed these statements.

affmmartins@gmail.com