IN VITRO EVALUATION OF OSTEOBLAST RESPONSE TO BACTERIAL CELLULOSE MODIFIED WITH MWNTS

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The field of tissue engineering is a multidisciplinary field and draws on experts from clinical medicine, mechanical engineering, materials science, genetics, and interrelated disciplines from both engineering and the life sciences.

In recent years, natural polymers have gathered widespread interest for use in biomedical materials and devices for the various benefits each offers over its synthetic polymer cousins. Among these, bacterial cellulose (BC) has gained particular interest more recently. Cellulose’s virtual ubiquity in nature in organisms ranging from redwoods to plankton attests to its biological utility, and its usefulness in biomedical and tissue engineering applications is now becoming apparent as well.

The cell adhesion is mediated by specific cell surface receptor for molecules in the extracellular matrix, proteins and proteoglycans by the cell. Osteoblast cells may also require cell-cell adhesion for optimum survival and growth, and consequently, they tend to grow in patches.

Material and methods: Immunocytochemical assay were used to determine the expression of ?1 integrin and vinculin was evaluated in groups as follows: a) osteoblast treated with native BC, b) osteoblast treated with only MWNTs-COOH, c) osteoblast treated with BC with MWNTs-COOH in two concentrations and a control group. Finally, samples were observed under CLSM. Assessing adherence levels was done with fluorescence and SEM techniques. Osteoblast were seeded at a concentration of 50,000 cells per well, on which previously placed 3D-scaffold and was incubated. Then the cells were dehydrated by using an ethanol gradient. Finally, samples were sputter-coated with gold for SEM.

Results: The expression of both, ?1 integrin and vinculin, was similar in all groups tested, however, in according with viability and proliferation tests, MWNTs-COOH scaffolds was the sample with higher expression levels. Nevertheless, BC-MWNTs scaffolds showed good adhesion properties too. This demonstrated that the combination BC with MWNTs-COOH provides improved conditions for cell adhesion.

Keywords: MWTNs, Bacterial cellulose, Osteoblast cells

References:


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