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EFFECT OF THE ASSOCIATION OF ALGINATE WITH BIOCERAMIC ON STEM CELL VIABILITY

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The alginate and bioactive ceramics are biocompatible materials widely used in tissue engineering. The purpose of this research has been to investigate the influence of these biomaterials in the viability of stem cells. Hence, two different experiments were conducted. In the first, alginic acid sodium salt (alginate from Sigma-Aldrich) and a bioceramic (BC) of the $\text{SiO}_2\text{?CaO?Na}_2\text{O?P}_2\text{O}_5$ system were used. Alginate at 5% was solubilized in a buffer composed of NaCl and HEPES. Stem cells from three different primary cultures were isolated from young human teeth (SC1, SC2 and SC3), and cultivated in 50 μL of alginate in a cell density of 375,000 cells/well in tissue culture plate of 48 wells with Dulbecco's Modified Eagle's Medium (DMEM) — low glucose supplemented with 10% fetal bovine serum. The alginate hydrogels were crosslinked with CaCl_2 for 30 minutes. In the other experiment, the 67,500 cells SC1 were mixed in 50 μL of alginate containing 0, 1, 5 and 10% (w/v) of the bioceramic and cultivated in DMEM. Cell viability was assessed by 3-(4,5-dimethylthiazol-2-yl)- 2,5-diphenyltetrazolium bromide test (MTT). The results of comparison with three cell culture, after one and five days were, respectively, 0.640 ± 0.060 and 0.236 ± 0.040 ($p = 0.0001$) using SC1, 0.581 ± 0.107 and 0.177 ± 0.042 ($p = 0.0001$) using SC2, and 0.478 ± 0.023 and 0.248 ± 0.006 ($p = 0.0001$) using SC3. These results demonstrate that cell viability in alginate decreased regardless of the primary culture used. The mean of absorbance and SD of SC1 cultivated in alginate with bioceramic, after one and five days, respectively, were 0.158 ± 0.025 and 0.144 ± 0.019 ($p = 0.2268$) without BC, 0.151 ± 0.017 and 0.169 ± 0.031 (0.2194) using 1%, 0.113 ± 0.014 and 0.144 ± 0.020 ($p = 0.0083$) using 5%, and 0.083 ± 0.008 and 0.117 ± 0.006 ($p = 0.001$) using 10% of BC. These results indicate that the presence of bioceramic did not reduce the cell viability of SC1 at 5 days in alginate when 1 and 5% were used. Thus, although alginate has decreased stem cell viability over time, we demonstrated that this phenomenon can be reversed by its association with a BC. This result could be further investigated using in vivo tests aiming the development of devices for bone regeneration.