

VIABILITY OF STEM CELLS CULTIVATED WITH BIOACTIVE F18 GLASS

Thallyson Medeiros¹
Natasha Maurmann²
Marina Trevelin Souza³
Patricia Pranke⁴

SUMMARY

Bioactive glasses are synthetic materials applied in the regeneration of hard and soft tissue. Regarding bone tissue engineering, bioglasses act in the formation, precipitation and deposition of calcium phosphates enhancing osseointegration and osteoinduction. In this study, a new bioactive glass of the system $\text{SiO}_2\text{-Na}_2\text{O-K}_2\text{O-CaO-MgO-P}_2\text{O}_5$, called F18, was tested regarding its influence on stem cell viability, and comparing it with the tissue culture plate (TCP) and hydroxyapatite [$\text{Ca}_5(\text{PO}_4)_3(\text{OH})$], one of the main constituents of tooth enamel and bone tissue. The literature has shown that F18 could be successfully used as a coating on metallic implants and has accelerated tissue repair for bone and skin wounds. To carry out the experiments, mesenchymal stem cells from the pulp of exfoliated human deciduous teeth were used. The stem cells (10.000 per well) were seeded in a 96-well TCP. After 1 day, the culture medium was removed and the cells were exposed to the tested materials at concentrations of 0.25, 0.5, 1.0, and 2.0 mg/mL. Cell viability was evaluated by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) after two days of incubation. The mean and standard deviation values of absorbance obtained for the TCP were 0.26 ± 0.03 and for the hydroxyapatite they were 0.22 ± 0.05 for 0.25 mg/mL; 0.23 ± 0.05 for 0.5 mg/mL; 0.21 ± 0.04 for 1.0 mg/mL and 0.27 ± 0.03 for 2.0 mg/mL. For the F18, these values were 0.25

¹ Mestrando pelo Programa de Pós-Graduação em Ciências Biológicas: Fisiologia da Universidade Federal do Rio Grande do Sul - UFRGS, thallysonpedro@icloud.com;

² Pós-doutoranda pela Faculdade de Farmácia da Universidade Federal do Rio Grande do Sul - UFRGS, natasha.maurmann@ufrgs.br;

³ Doutora pelo Curso de Engenharia de Materiais da Universidade Federal de São Carlos-UFSCar, marina.trevelin@gmail.com;

⁴ Professor orientador: doutor, Faculdade de Farmácia da Universidade Federal do Rio Grande do Sul - UFRGS, patriciapranke@ufrgs.br.



11^o COLAFOB

11^o Latin American Congress of
Artificial Organs and Biomaterials
17th Congress of Latin American Society of Artificial Organs,
Biomaterials, and Tissue Engineering

± 0.03 for 0.25 mg/mL; 0.25 ± 0.01 for 0.5 mg/mL; 0.25 ± 0.02 for 1.0 mg/mL and 0.21 ± 0.04 for 2.0 mg/mL. These results indicated that the F18 bioactive glass and hydroxyapatite did not affect the stem cell viabilities ($p = 0.0878$), regardless of the studied concentration. Although bioglasses are known to release ions into the cell culture medium, in this work this phenomenon did not influence the cell viability. According to ISO 10993-5, a material is cytotoxic when it decreases cell viability by 30%. Thus, F18 bioglass can be considered not cytotoxic at 0.25, 0.5, 1.0, and 2.0 mg/ml, being thereby, very promising for medicinal application that requires bioactivity and/or biocompatibility for bone regeneration.

Acknowledgments: MCTIC, FINEP, CNPq, CAPES, FAPERGS, VETRA, and Stem Cell Research Institute (IPCT).