EVALUATION IN VITRO CYTOTOXICITY OF DIFFERENT OXYGEN DOPING ON THE TI-20MO ALLOY

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1. Introduction

The ideal biomaterial should induce predicable, controlled, guided and rapid healing of host tissues. Titanium (Ti) is the consensual biomaterial employed in implants for allowing a well osseointegration [1]. Recently, promising alloys that added niobium (Nb), tantalum (Ta), zirconium (Zr) and molybdenum (Mo) to Ti are being investigated [2-3]. These alloys are a new class of Ti -based alloys, which avoid Al and V, while exhibiting low values of Young's modulus, quite attractive as a biomaterial [4].

2. Experimental

To investigate the biocompatibility as well as the differentiation of osteoblastic cells cultived on a Ti-20Mo alloy after annealing heat treatment comparing with Ti-20Mo alloy doped with different oxygen, *in vitro* cell viability, immunofluorescense and alkaline phosphatase were used. For this, MC3T3-E1 line cells were cultured on Ti-20Mo alloys with base medium [αMEM supplemented with 10% FBS and 1% gentamicina]. These cells were exposed on Ti-20Mo alloys for 48 hours to assay MTT and indirect immunofluorescence. The alkaline phosphatase assay was analyzed with 7 days.

3. Results and Discussions

The present results demonstrated that all studied alloys presented no cytotoxic effects on the osteogenic cells. In addition, a high activity of alkaline phosphatase was observed. All of them, independently from the treatment, showed a central and flattened cell body and numerous and long processes.

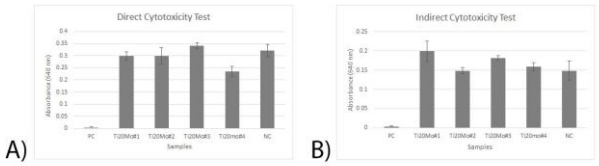

Fig. 1: *MTT in MC3T3-E1 cells cultured for 48 hours on Ti-20Mo alloy after different treatments. A) Direct cytotoxicity test B) Indirect cytotoxicity test. PC: Positive Contro – 1% phenol; #1: Annealing heat; #2: 1 x 10^{-2} Torr; #3: 1 x 10^{-1} Torr; #4: 1 x 10^{0} Torr; NC: Negative Control – polystyrene.*

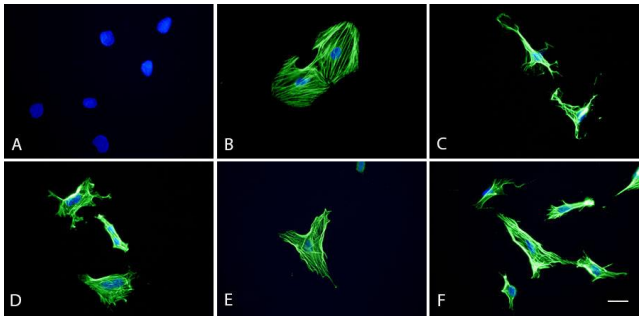

Fig. 2: *Immunostaining for actin (green) in MC3T3-E1 cells cultured for 48 hours on Ti-20Mo alloy after different treatments. A: Reaction Control; B: Control – Glass; C: Annealing heat; D: 1 x 10^{-2} Torr; E: 1 x 10^{-1} Torr; F:1 x 10^{0} Torr. Their nuclei were labeled with DAPI (blue). Bar = 20 µm*

4. References

[1]-E. Eisenbarth; D. Velten, M. Müller, R.Thull, J.Breme. Biomaterials., ***25,*** 5705 (2004).
[2]- P. A. Kuroda, et al. Materials Science and Engeneering C, **67**, 511 (2016).
[3]- D. R. Correa, et al. Materials Science and Engeneering C, **34**, 534 (2014)
[4]- M. Geetha, A. K. Singh, R. Asokamani, A. K. Gogia, Prog. Mater. Sci. **54**, 397 (2009).

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