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The in vitro cytocompatibility of chitosan-alginate-Bioglass® composite scaffolds

Laurence Ohia[1], Andrew P. Hurt[1], Darren S. Pink[1] and Nichola J. Coleman[1]

- [1] University of Greenwich, Faculty of Engineering and Science, United Kingdom

Introduction: Bioactive glasses are widely applied in the field of bone tissue regeneration[1]. Chitosan and alginate are cytocompatible polymers which upon blending interact to form a polyelectrolyte complex[2],[3]. The present study investigates the *in vitro* cytocompatibility of freeze-dried chitosan-alginate-Bioglass® composite scaffolds.

Materials and Methods: 100, 50 and 0% (w/w) chitosan-alginate blends (C100, C50 and C0, respectively) were prepared as 1% (w/v) solutions in 1% (v/v) aqueous acetic acid to which 10% Bioglass® by total weight of polymer were added. 5 cm^3 aliquots of the solution were frozen at -18 ˚C for 24 h then lyophilized for a further 24 h to produce the scaffolds. Optical microscopy was performed on the samples.

1 x 1 x 4 mm sections of scaffold were placed in contact with human MG63 osteosarcoma cells at a concentration of 10^6 cells/cm^3 for 24 and 72 h. The control consisted of cells only. Cell viability was measured by MTT assay[2].

Results and Discussion: Optical micrographs indicated that all blends formed macroporous scaffolds (Fig. 1). Scaffolds with increased proportions of chitosan displayed a higher porosity and a decreased matrix density.

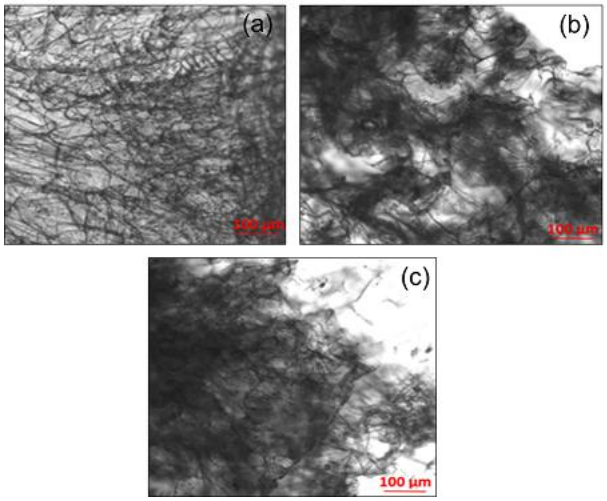

Figure 1: Optical micrographs of (a) C100, (b) C50 and (c) C0

Cell viability data demonstrated that all scaffolds supported the growth of MG63 cells (Fig. 2), and that biocompatibility increased as a function of chitosan-content.

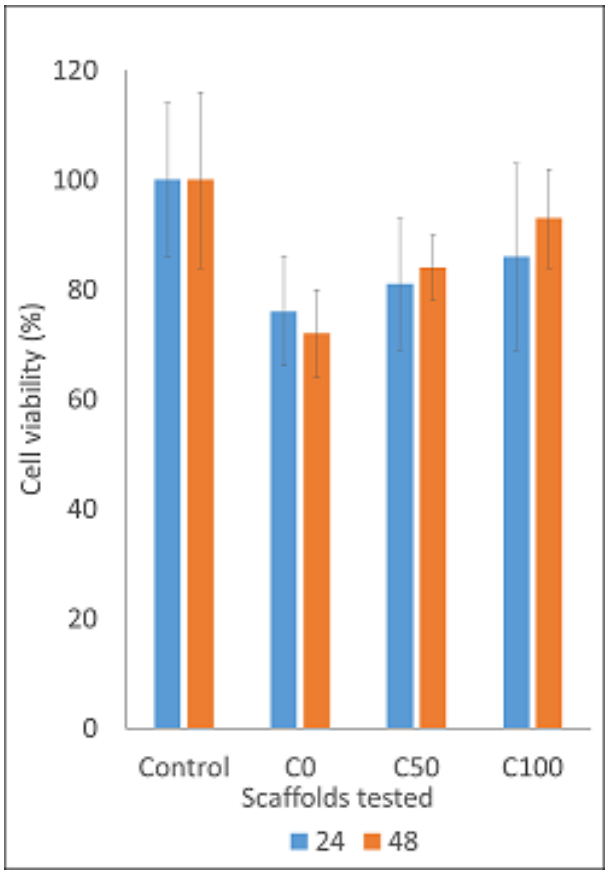

Figure 2: Cell viability after contact with scaffolds for 24 and 72 h

Conclusions: Porous scaffolds can be prepared from chitosan-alginate-Bioglass® blends. Increasing the chitosan content improved in vitro biocompatibility with respect to human MG63 osteosarcoma cells.

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