Long term cytotoxic effects of polystyrene-block-polyethylene oxide

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How cells interact with and respond to biomaterials is highly influenced by a number of cues presented at the material surface. A better understanding of how surface cues can regulate stem cells *in vitro* is vital to exploit the potential of stem cells in regenerative medicine applications. Block copolymer thin films are interesting due to their ability to self-assemble into ordered nanostructures (Figure 1(A)), showing great potential for space-controlled functionalization. Polystyrene-*block*-polyethylene oxide (PS-*b*-PEO) coated surfaces have been explored as cell culture substrates and protein adsorption and cell attachment has been studied (REF1-3). However, in order to use this material as a platform for stem cell differentiation, any long-term cytotoxic effects of this polymer must be established. The aim of this experimental investigation was to evaluate the *in vitro* biocompatibility of PS-*b*-PEO using murine chondrocytes. The study was undertaken with thin PS-*b*-PEO films with cylindrical hexagonal phase on silicon wafers. Cells were observed after 4 hours, 1 day, 3 days and 5 days after seeding to analyse cellular adhesion, growth, morphology, viability and metabolic activity. Preliminary results show viability of 99%, cell proliferation and strong adhesion as shown by the presence of prominent F-actin stress fibres in Figure 1 (B). Cells cultured over the polymer film presented an area almost 30% larger than those grown on glass coverslips, due most likely to difference of hydrophobicity. The findings suggest that PS-*b*-PEO is not cytotoxic and may be biocompatible for long term stem cell studies.

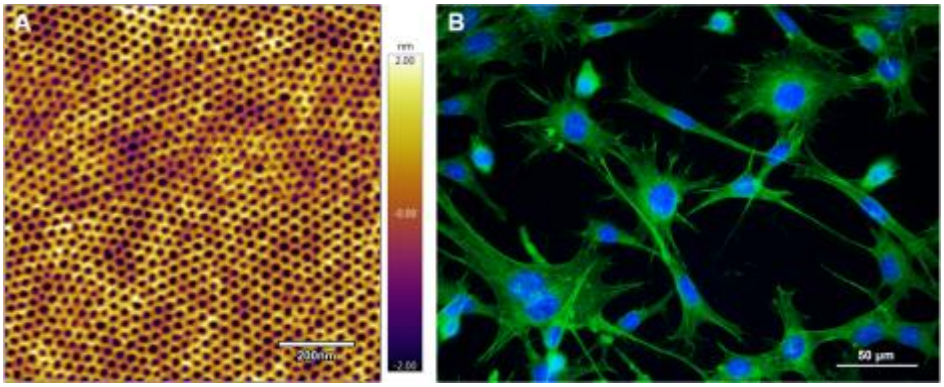

Figure 1: (A) AFM height image of PS-b-PEO thin film. (B) H5 murine chondrocytes stained for F-actin (green) and cell nucleus (blue) on PS-*b*-PEO surface after 3 days of cell culture.

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