Pro-angiogenic features of Wharton's Jelly-derived Mesenchymal stromal cells enhance vascular formation on novel Chitosan-*graft*-Poly (ε-Caprolactone) Copolymer

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INTRODUCTION

Enhanced vascularisation is critical to the treatment of ischemic tissues and the engineering of new tissues and organs [1]. Paracrine factors from Wharton's Jelly-derived Mesenchymal Stromal cells (WJ-MSCs) could act as a stimulant for vascular formation [2,3]. In this study, we report on the strong cell adhesion of Human Umbilical Vein Endothelial Cells (HUVECs) on a novel chitosan-*graft*-poly (ε-caprolactone) (Ch-*g*-PCL) copolymer [2] that can be used as a biodegradable matrix for the formation of angiogenic sprouting induced by WJ-MSCs Conditioned Media (CM) for potential blood vessel regeneration.

MATERIALS AND METHODS

We first synthesize the copolymer by grafting modified PCL-COOH onto a chitosan backbone as recently described [3]. We prepare spin-coated films from the copolymer on glass substrates. Following, we investigate the cellular adhesion of HUVECs by means of Scanning Electron Microscopy and their viability using the alamarBlue® assay. After incubation with CM, we observe the formation of "tip cells" that lead the angiogenic sprouting, by ELISA detection. Furthermore, we examine the gene expression involved in angiogenesis by means of qPCR.

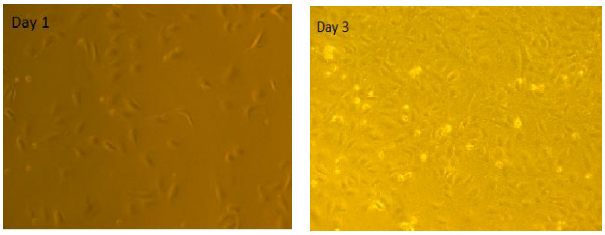

Figure 1: Adhesion and proliferation of HUVECs at passage 3 on Ch-*g*-PCL matrices supplemented with Endothelial Growth Medium+2% FBS on day 1 and day 3 after seeding.

RESULTS

Our preliminary results demonstrate a strong adhesion of HUVECs on the copolymeric material from the first day in culture, and a proliferation increase after 3 days. Successful seeding of HUVECs on Ch-*g*-PCL matrices and subsequent treatment with Conditioned Medium from WJ-MSCs led to angiogenic sprouting. This indicates the potential of this system to be used as inductive scaffold for blood vessel regeneration.

REFERENCES

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