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Dendritic cells as relevant tools to predict the outcome of tissue engineering constructs

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Objectives: Within TE constructs, cells represent adjuvants to the host immune system, acting through the maturation of dendritic cells (DCs), leading to increased co-stimulatory and MHC molecules expression, cytokine secretion and allo-stimulatory capacity. Starch and poly-caprolactone (SPCL) scaffolds have shown to support human adipose-derived mesenchymal stem cells (hASCs) growth and differentiation. The aim of this work was to evaluate the interaction of hASCs within SPCL scaffolds with DCs, gathering further knowledge on the immunomodulatory potential of these constructs. **Methods:** SPCL scaffolds, obtained by wet spinning methodology (SPCL-WS), seeded with hASCs were cultured in standard cell culture conditions for 48h prior to contact directly with DCs for further 24h, 48h and 72h. DCs were differentiated from the mononuclear fraction of human peripheral blood cultured with IL-4 and GM-CSF for 48h. The maturate and activated phenotype of DCs was evaluated by flow cytometry and RT-PCR before and after culture with the TE constructs, and compared with mature DCs, expressing CD80, CD83, CD86 and MHC class-II and lacking CD14 after incubation with LPS.

Results and Discussion: The findings showed that DCs maintain their immature status at days 3 and 7 days after replating, demonstrating low expression of CD80 and CD83. As replating procedures were shown to be a critical step in the routine evaluation of TE constructs this is a critical issue to address. Although DCs do not express the maturation markers, their genetic profile showed the presence of CD80, CD83, CD86 and CD1a, indicating that cells are capable of expressing those markers after adequate stimuli.

Conclusions: These TE constructs (SPCL-WS scaffolds and hASCs) showed the inability to induce allogenic DCs activation after direct contact culture. This supports the conclusion that the assembled TE constructs will be well tolerated by the host in an allogenic approach and might further indicate their immunomodulatory potential.

Key words: "dendritic cells" "allogenic" "immunomodulation"