Enhancing the physico-chemical and biological performances of synthetic polymers via blending with natural polymers

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A promising strategy for the fabrication of bone tissue engineering (TE) scaffolds is the use of polymer blends, which combine good mechanical properties and biodegradability e.g. of synthetic polyester on the one hand with advantageous surface properties afforded by natural biopolymers on the other hand. Amongst naturally-derived polymers, polysaccharides are interesting materials since their carbohydrate moieties interact with or are integral components of many cell adhesion molecules and matrix glycoproteins.

In this presentation, the fabrication of bone TE scaffolds consisting of blends of polysaccharides κ-carrageenan (κ–CG), fucoidan (FUC) or Aloe vera (AV) with synthetic polymer polydioxanone (PDX) as well as an in-depth evaluation of their cellular responses will be discussed. The detailed analysis of the blend nanofiber properties revealed a different degree of miscibility of the synthetic polymers and the polysaccharides leading to a different enrichment at the surface of the blend nanofibers, which in turn improved NIH3T3 fibroblast cell viability, NIH3T3 proliferation, *in vitro* biomineralization potential, human osteosarcoma (SaOS-2) cell differentiation ability. In addition, all scaffolds did not cause significant RAW264.7 macrophage inflammatory responses as evidenced by the round cell morphology (Figure 1) [1-3].

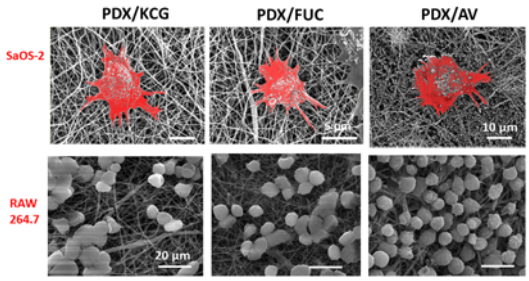

Figure 1. SEM images showing SaOS-2 and RAW 264.7 macrophage cell morphologies on PDX/KCG, PDX/FUC and PDX/AV scaffolds

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