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Abstract

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PLATELET LYSATE CELL-LADEN HYDROGEL-COATED SUTURE THREADS FOR TENDON REPAIR

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Tendon injuries constitute a major healthcare burden owing to the limited healing ability of these tissues and the poor clinical outcomes of surgical repair treatments. Recent advances in tendon tissue engineering (TTE) strategies, particularly through the use of biotextile technologies, hold great promise toward the generation of artificial living tendon constructs. We have previously developed a braided construct based on suture threads coated with gelMA:alginate hydrogel encapsulating human tendon cells. These cell-laden composite fibers enabled the replication of cell and tissue-level properties simultaneously. Based on this concept, in this study we explored the use of platelet lysate (PL), a pool of supra-physiological concentrations of growth factors (GFs), to generate a hydrogel layer, which is envisioned to act as a depot of therapeutic factors to induce tenogenic differentiation of encapsulated human adipose stem cells (hASCs). For this purpose, commercially available suture threads were first embedded in a thrombin solution and then incubated in PL containing hASCs. Herein, thrombin induces the gelation of PL and consequent hydrogel formation. After coating suture threads with the mixture of PL-ASCs, cells were found to be viable and homogeneously distributed along the fibers. Strikingly, hASCs encapsulated within the PL hydrogel layer around the suture thread were able to sense chemotactic factors present in PL and to establish connections between adjacent independent fibers, suggesting a tremendous potential of PL cell-laden hydrogel fibers as building blocks in the development of living constructs aimed at tendon repair applications.

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