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CHARACTERISATION OF HIGHLY ALIGNED ELECTROSPUN POLYCAPROLACTONE/GELATIN NANOFIBERS WITH HUMAN AMNIOTIC MEMBRANE SUPPORT FOR TENDON TISSUE ENGINEERING

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SUMMARY

Introduction: Recent development in tissue engineering for tendon tissue substitute has been promising to be as a suitable replacement in tendon repair instead of conventional autograft, allograft or xenograft. Tissue-engineered substitute could overcome the limitations imposed by current tissue grafts such as donor site morbidity, immunoreactivity, and pathogen transmission. However, finding the best combination of biomaterials in tendon tissue engineering is crucial in order to generate a scaffold that is biomimetic to native tissue. Combination of polycaprolactone (PCL), gelatin (GT), and decellularised human amniotic membrane (DHAM) would complement each other in order to fabricate a scaffold that poses the best properties for tendon tissue substitute. PCL is known for its easy processability and mechanical strength, while GT is hydrolysed collagen that attracts cellular attachment and growth. DHAM that has native extracellular matrix components provides extra mechanical strength and also growth factors to the scaffold. **Materials and methods:** Mixture of PCL and GT were electrospun on top of DHAM at optimized applied voltage, feeding rate and collecting distance that generated highly-aligned nanofibers (NF-DHAM). Fiber morphology and alignment were evaluated via microscopy. Physicochemical properties of NF-DHAM were evaluated in term of its wettability and mechanical properties. **Results:** Electrospinning of PCL/GT on the DHAM generated highly-aligned nanofibers with suitable alignment. The wettability test shows good hydrophilicity of the scaffold. The mechanical strength of NF-DHAM shows the suitability of the NF-DHAM to be used in tendon tissue engineering. Discussion: The fabricated NF-DHAM generated favourable highly-aligned nanofibers that have the suitable physicochemical properties for the purpose of tendon tissue engineering. Conclusion: The fabricated NF-DHAM is suitable for tendon tissue engineering application.

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