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Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

Abstract **#1317**

TAILORING THE PROPERTIES OF GELATIN METHACRYLATE (GELMA)/ALGINATE HYDROGEL BLENDS FOR BIOPRINTING OF SMOOTH MUSCLE CONSTRUCTS

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The aim of the study was to investigate GelMA/alginate hydrogels blends for bioprinting of smooth muscle cells (SMCs). Our long-term goal is to engineer a platform to study the mechanisms that control the maturation of SMCs in the muscular layer of the urethra. Four hydrogel blends were prepared by mixing different concentrations (in %w/v) of GelMA/alginate: G1(5/1.5), G2(5/3), G3(7.5/1.5), G4(7.5/3). GelMA (10%) was used as control. The mechanical properties of the hydrogels, before and after crosslinking, were measured by rheometry. Ring-shaped constructs containing human bladder smooth muscle cells were fabricated using an extrusion-based printer. Following bioprinting, live/dead and metabolic assays were used to evaluate cell viability and proliferation. Rheometry analysis revealed that, in contrast to pure GelMA, addition of alginate significantly stabilized the variation in mechanical properties against changes in the temperature. The groups containing highest GelMA concentrations (G3, G4) displayed the largest viscosity, which, after crosslinking, resulted in constructs showing higher stability and lower swelling over time. The viability of the SMCs remained above 80% and was not significantly affected by the blend type. In all groups, cells adopted a spindle-like morphology and displayed a similar growth rate over a 5-day period. Overall, groups G3 and G4 appeared to offer better printability without compromising cell viability and growth. Although the optimal mechanical properties of the blends in terms of supporting optimal SMCs maturation still needs to be determined, the results of this work suggest that GelMA/alginate hydrogels constitute versatile and tunable hydrogels for smooth muscle tissue engineering.

Keywords

urethral tissue engineering; smooth muscle; bioink