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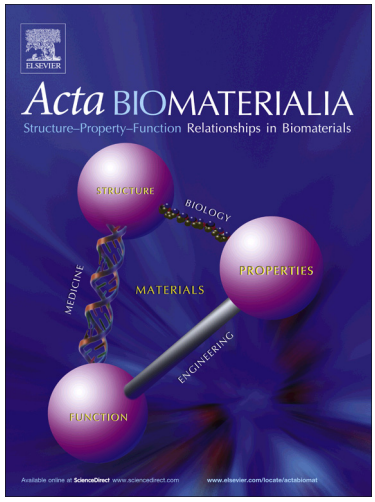


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# Macromolecular crowding for tailoring tissue-derived fibrillated matrices

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Tissue-derived fibrillated matrices can be instrumental for the *in vitro* reconstitution of multiphasic extracellular microenvironments. However, despite of several advantages, the obtained scaffolds so far offer a rather narrow range of materials characteristics only. In this work, we demonstrate how macromolecular crowding (MMC) - the supplementation of matrix reconstitution media with synthetic or natural macromolecules in ways to create excluded volume effects (EVE) - can be employed for tailoring important structural and biophysical characteristics of kidney-derived fibrillated matrices. Porcine kidneys were decellularized, ground and the obtained extracellular matrix (ECM) preparations were reconstituted under varied MMC conditions. We show that MMC strongly influences the fibrillogenesis kinetics and impacts the architecture and the elastic modulus of the reconstituted matrices, with diameters and relative alignment of fibrils increasing at elevated concentrations of the crowding agent Ficoll400, a nonionic synthetic polymer of sucrose. Furthermore, we demonstrate how MMC modulates the distribution of key ECM molecules within the reconstituted matrix scaffolds. As a proof of concept, we compared different variants of kidney-derived fibrillated matrices in cell culture experiments referring to specific requirements of kidney tissue engineering approaches. The results revealed that MMC-tailored matrices support the