Abstract Submitted
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**Measurements of the constituent contributions to the physical properties of fibroblast populated collagen microtissues with magnetic micro-tissue stretchers**[1] RUOGANG ZHAO, ALAN LIU, Johns Hopkins University, THOMAS BOUDOU, CHRISTOPHER CHEN, University of Pennsylvania, DANIEL REICH, Johns Hopkins University — The mechanical properties of fibroblast populated collagen matrix (FPCM) provide important physical cues to regulate physiological and pathological processes of encapsulated cells. The mechanical strength of FPCM is arises from both of its constituents: the collagen matrix and the fibroblasts. Existing methods to separate the contribution of individual constituents by treating cm-scale tissue samples with decellularization drugs for prolonged periods have been shown to adversely affect the properties of the collagen matrix. To minimize such matrix damage, we have developed a magnetic microtissue stretching system that allows us to grow arrays of sub-mm scale microtissues that can be rapidly decellularized. This consists of arrays of paired micro-cantilevers that support the 3D FPCM and can be driven by incorporated magnetic material via externally applied magnetic fields. By measuring the tensile force applied to the FPCM and the tissue strain, we found the stiffness of the matured FPCM is 28.1 +- 1.8 kPa and that of the decellularized collagen matrix is 23.1 +- 3.1 kPa. These measurements of the stiffness of the intact collagen matrix in a remodeled FPCM can provide important clues on the mechanical environment that regulates the biological function of encapsulated cells.

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