

Sample Abstract – *Engineering, Physics, & Mathematics*

Abstract Title: A Tissue-Engineered Scale Model of the Heart Ventricle

Laboratory studies of the heart use cell and tissue cultures to dissect heart function yet rely on animal models to measure pressure and volume dynamics. Here, we report tissue-engineered scale models of the human left ventricle, made of nanofibrous scaffolds that promote native-like anisotropic myocardial tissue genesis and chamber-level contractile function. Incorporating neonatal rat ventricular myocytes or cardiomyocytes derived from human induced pluripotent stem cells, the tissue-engineered ventricles have a diastolic chamber volume of ~500 μl (comparable to that of the native rat ventricle and approximately 1/250 the size of the human ventricle), and ejection fractions and contractile work 50–250 times smaller and 104–108 times smaller than the corresponding values for rodent and human ventricles, respectively. We also measured tissue coverage and alignment, calcium-transient propagation and pressure–volume loops in the presence or absence of test compounds. Moreover, we describe an instrumented bioreactor with ventricular-assist capabilities, and provide a proof-of-concept disease model of structural arrhythmia. The model ventricles can be evaluated with the same assays used in animal models and in clinical settings.

KEY

Abstract contains sufficient background to understand the problem under investigation

Abstract must contain a hypothesis, objective or statement about the problem under investigation

Abstract must contain a brief statement of the experimental methods/methodology used

Essential results must be present in summary form (even if preliminary)

Abstract must contain a conclusion that explains how the work contributes to the hypothesis, objective or statement of problem

Abstract Source: MacQueen L. A. et. al. (2018). *Nat. Biomed. Eng.* DOI: <https://doi.org/10.1038/s41551-018-0271-5>.

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