

Abstract Submitted  
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**Effects of Mechanical Coupling Between Cardiomyocytes and Cardiac Fibroblasts on Myocardium**<sup>1</sup> PINAR ZORLUTUNA, TRUNG DUNG NGUYEN, NEERAJHA NAGARAJAN, Univ of Notre Dame — Cardiomyocytes show excitatory responses to stimulation solely by mechanical forces through their stretch-activated ion channels, and can fire action potentials upon mechanical stimulation through a pathway known as mechano-electric feedback. Furthermore, cardiomyocyte (CM) – cardiac fibroblasts (CF) can couple mechanically through cell-cell junctions. Here we investigated the effects of CM and CF mechanical coupling on myocardial physiology and pathology using a bio-nanoindented coupled with fast calcium imaging and microelectrode arrays. In order to study mechanical signal transmission, we measured the contractile forces generated by CMs, as well as by CFs that were coupled to the CMs. We observed that CFs were beating with the same frequency but at smaller magnitude compared to CMs, and their contractility was dependent on the substrate stiffness. Our results showed that beating CMs actively stretched neighbouring CFs through the deformation of the substrate the cells were seeded on, which promoted the myocardial contractility through mechanical coupling. The results also revealed that CM contractility was propagated greater on soft substrates than stiff ones. Results of this study could help identify the role of the infarcted tissue stiffness and size on heart failure.

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Pinar Zorlutuna  
Univ of Notre Dame

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