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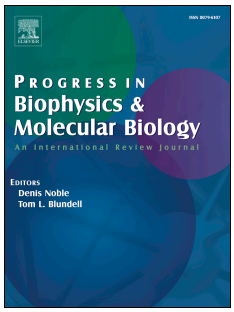

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Effects of simulated ischemia on the transmural differences in the Frank–Starling relationship in isolated mouse ventricular cardiomyocytes

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Abstract

The electrical and mechanical functions of cardiomyocytes differ in relation to the spatial locations of cells in the ventricular wall. This physiological heterogeneity may change under pathophysiological conditions, providing substrates for arrhythmia and contractile dysfunctions. Previous studies have reported distinctions in the electrophysiological and mechanical responses to ischemia of unloaded subendocardial (ENDO) and subepicardial (EPI) single cardiomyocytes. In this paper, we briefly recapitulated the available experimental data on the ischemia effects on the transmural cellular gradient in the heart ventricles and for the first time evaluated the preload-dependent changes in passive and active forces in ENDO and EPI cardiomyocytes isolated from mouse hearts subjected to simulated ischemia. Combining the results obtained in mechanically loaded contracting cardiomyocytes with data from previous studies, we showed that left ventricular ENDO and EPI cardiomyocytes are different in their mechanical responses to