

Abstract Submitted  
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**Insights into Mechanotransduction: Effects of Unequal Anisotropy Ratios in Cardiac Muscle** DILMINI WIJESINGHE, BRADLEY ROTH, Oakland University — The properties of cardiac muscle are anisotropic: they depend on direction along or across the myocardial fibers. Studying the effects of anisotropy is essential for understanding the behavior of cardiac muscle. The bidomain model represents the intracellular and extracellular spaces separately, so “unequal anisotropy ratios” means the degree of anisotropy is different in the two spaces. In previous studies, analyzing unequal anisotropy ratios of the conductivity using the electrical bidomain model revealed new and unexpected mechanisms of excitation of action potential wave fronts by a pacemaker. In this study, analyzing unequal anisotropy ratios of the mechanical moduli using the mechanical bidomain model explores how the tissue grows and changes in response to mechanical forces: mechanotransduction. A coupled set of partial differential equations representing the bidomain model was solved numerically. These simulations predict that the distribution of mechanotransduction is sensitive to the condition of unequal anisotropy ratios, particularly when the fiber direction varies throughout the tissue. These results have implications for the study of growth and remodeling of the heart during diseases such as cardiac hypertrophy.

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