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BIOMECHANICAL CHARACTERIZATION OF THE ACTIVE RESPONSE OF THE GUINEA PIG CAROTID ARTERY

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Abstract. The present work seeks to achieve the characterization, computational implementation and experimental validation of an activation model capable of predicting the active mechanical response of the guinea pig carotid artery. Firstly, a bio-chemo-mechanical activation model, that relates the active stress with the miosin and actin filament slide, is used and validated with experimental information of isometric contraction tests of pig carotid arteries found in the literature. Then, a fitting procedure using this model is proposed in this work. To this end, the active response of a guinea pig carotid artery ring mounted in a wire myograph is considered. In this test, a prestretch in the artery, which is submerged in a bath of physiological saline solution (PBS) with 2.5 nM CaCl 2, is applied and, later, the tissue is activated by adding 125 nM KCl in the bath. The parameter adjustment of the implemented model is made via a simplified analytical-numerical approach. Finally, a finite element simulation of the wire myograph test is carried out in order to refine the previously obtained parameters to more adequately represent the experimental response registered in the activation of the artery ring for different prestretch values.

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