Cardiotoxic Effects of Vasopressors on In Vitro Myocardial Tissue

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Pharmacological research of cardiac tissue has not covered certain aspects of biochemical interaction for many years. Current research focuses on myocardial stem cells which lack many characteristics of natively grow tissues. The absence of these characteristics may result in inaccurate interpretations of drug effects on cardiac tissues in other studies. The following paper will investigate the viability of thin-slice cardiac tissue collected from Wistar rats. The cardiac tissue culture model apparatus developed by J. Miller et al. serves as a basis for studying natively grown tissue drug interactions. The apparatus is capable of mechanical stimulation via electrodes and proper tissue perfusion via submerging samples in oxygenated Tyrode's solution which has been recorded to maintain cardiac tissue viability for up to 12 days. Following the proposal by J. Miller et al., the Wistar rat samples will be properly prepared and loaded into a similar apparatus and introduced to the vasopressor medications epinephrine, norepinephrine, and dopamine over a 12 day trial period. These vasopressors are commonly used in critical care settings, however, epinephrine, norepinephrine, and dopamine pose certain individualized risks to cardiac tissue. The following research may reveal key points of data such as what dosage generates equivalent cardiac energy output between the medications and the levels of cellular damage induced by the medications. Investigating equivalent energy output and damage to cardiac tissue will inform physician opinion as to the best indicated medication given a patient's presentation. By analyzing the effect of classical vasopressor medication on viable cardiac tissue, this research will also determine which vasopressor offers the greatest cardioprotective effects, as well as equivalent energy output.