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HEALING EFFECTS OF OXYTOCIN ON CARDIOMYOCYTES

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Oxytocin, a hypothalamic neuropeptide, widely known to stimulate uterine contractions during childbirth, lactation after delivery and its recognition as a bonding hormone. It has emerged as a versatile hormone with cardiovascular protective and regenerative properties. The therapeutic potential of oxytocin over the broad scale of cardiovascular disorders like ischemic injuries, metabolic diseases and tissue regeneration is analyzed in this research.

An experiment conducted to simulate heart disease in rat models by blockage of coronary artery supply, and the administration of oxytocin has shown a remarkable result on the functioning; reduced size of infarction, decreased arrhythmias and cardiac edema (Xiong et al., 2020). Oxytocin acts as a cardiac anti-inflammatory factor by preventing mast cells from releasing tryptase and lowering key inflammatory signals like High-Mobility Group Box 1 (HMGB1), Nuclear Factor kappa-light-chain-enhancer of activated B cells p65 subunit (NF- κ B p65) (Xiong et al., 2020). The anti-inflammatory mechanisms of oxytocin are mediated by adenosine monophosphate (AMP)-activated Protein Kinase signaling pathway causing inhibition of the Nucleotide-binding domain, Leucine-rich-containing family, Pyrin domain-containing-3 (NLRP3) inflammasome, and pyroptosis cell death (Yao et al., 2022). This pathway remains effective during hyperglycemia, overcoming the limitations of standard cardioprotection under hyperglycemic conditions.

In addition to its rapid cardiovascular protective effect, oxytocin helps the heart repair itself by activating epicardial progenitor cells. Stem cells derived from heart cells in humans, oxytocin stimulate these cells to multiply, change shape, helping it to return to a more flexible and functional state. Research on Zebrafish, which share this mechanism with humans, shows that oxytocin released after heart injury is essential for activating repair cells, boosting heart muscle cell growth, and rebuilding blood vessels (Wasserman et al., 2022). Oxytocin also guides various stem cells to become heart, muscle, and bone cells while blocking fat cell formation, highlighting its potential for regenerative medicine.

As a whole, oxytocin as a therapeutic factor has two vital roles: the first being the cardioprotective function and secondly the regenerative capability. As oxytocin protects and repairs the heart in many animal species, it is proven to be a safe hormone to use. This makes it a strong case to be tested further as a treatment for cardiac diseases of patients with diabetes and other metabolic disorders.