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LETTER

Extracellular Vesicles for Myocardial Ischemia-Reperfusion Injury: Still a Long Way [Letter]

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Dear editor

We read a research article "Intranasal Delivery of Endothelial Cell-Derived Extracellular Vesicles with Supramolecular Gel Attenuates Myocardial Ischemia-Reperfusion Injury" written by Wang et al with great interest.[1] The study conducted initially proved that the utilization of extracellular vesicles (EVs) combined with hydrogel significantly enhances the absorption efficacy in the nasal cavity. This remarkable discovery holds great potential in improving the treatment of myocardial ischemia-reperfusion injury by effectively inhibiting inflammatory responses and safeguarding the endothelial function. We would like to express our thoughts and insights regarding the knowledge and attitudes related to EVs.

In this research, a gel system was selected as the mode of transportation for EVs. The EVs were obtained from mouse aortic endothelial cells and subsequently administered intranasally multiple times in a mouse model that simulated ischemia-reperfusion injury to the heart. Actually, EVs are released by all the cell types present in the cardiovascular system.[2] These EVs can also be found in plasma, where their primary sources are erythrocytes, platelets, endothelial cells, and immune cells. The content of EVs in plasma is influenced by changes in the environment and has the ability to regulate pro-inflammatory and innate immune responses, coagulation pathways, as well as atherogenic interactions.[3]

This research findings highlighted that the utilization of hydrogel in conjunction with EVs yielded noteworthy benefits, including the reduction of pro-inflammatory Ly6C monocytes/macrophages and neutrophils levels. Additionally, it was observed that this combination resulted in a decrease in the development of microcirculation thrombi within the affected region, an improvement in endothelial barrier function, and an increase in microvascular density in the injured area.[4] However, in specific circumstances, EVs can play a role in the mechanism of cardiovascular diseases (CVDs).[5] Serum EVs, for instance, play a part in the progression of pulmonary arterial hypertension and vascular calcification. Additionally, EVs derived from adipocytes, along with their ceramide content, have a significant impact on the mortality rate related to heart conditions in advanced atherosclerosis. Thus, EVs are increasingly being recognized as key contributors in various stages of CVD development.

In recent years, researchers are currently making significant progress in gaining a deeper understanding of the role that naturally formed EVs play in cardiovascular pathophysiology. They are also identifying ways in which these EVs can be utilized as biomarkers for CVD, as well as exploring the potential therapeutic applications of externally administered EVs. Ongoing efforts are dedicated to developing and refining the procedures and principles used for purifying, characterizing, analyzing, and modifying these EVs. These advancements will undoubtedly support and facilitate future in-depth mechanistic investigations. It is important to note, however, that there are crucial considerations at each stage of this process. To ensure success in clinical translation and avoid significant setbacks, it is crucial to address and overcome these potential obstacles.

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In summary, we recognize the importance of the research carried out by Wang J, which explored the potential use of EVs in conjunction with hydrogel for nasal administration as a promising therapeutic method.

Disclosure

The authors report no conflicts of interest in this communication.

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