Commentary

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A Short Note on Mesenchymal Stem Cells Derived Extracellular Vesicles

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Description

Extracellular Vesicles are nanoscale particles with a lipid membrane that are trapped and released by most cell types and contain proteins, lipids, and genetic material. These secreted particles have the ability to transfer bioactive components between cells, activate signalling pathways, and facilitate intercellular communication.

The main types of VE include the following: exosomes (diameter range 30-150 nm), which are emitted by intracellular endosomes; Microvesicles (50-1000 nm diameter range) derived from protrusions of regions of the plasma membrane; and apoptotic bodies (diameter range 50-5,000 nm) that have arisen as cell fragments that are subject to programmed death. Both exosomes and microvesicles contain proteins derived from their stem cells, but they have different properties due to their different biogenesis mechanisms. Exosomes transport lipid molecules from both the Golgi apparatus and the plasma membrane, while microvesicles transport lipids only from the plasma membrane. In the field of electric vehicle research, the nomenclature is somewhat chaotic due to overlapping characterizations of different subtypes of exosomes and microvesicles, in part because the physical separation of electric vehicles by particle size and the distinction between markers of different biogenetic pathways does not it is practical. According to the guidelines of the Minimum Information for Extracellular Vesicle Studies (MISEV) 2018, it is advisable to use operational terms for electric vehicles with a description of the physical properties such as size, biochemical composition, to distinguish subsets of EVs, unless the authors can determine specific markers of subcellular origin.

Mesenchymal stem cells derived extracellular vesicles (MSC-EVs)

MSC-EVs share the biological properties of their parent cells and have been used successfully to treat various diseases. Compared to MSC therapy, MSC-EVs are easier to use because they are easier to handle and store. Several MSC-EVs developed expand the area of medical application through precise and targeted clinical therapy. Although they play a promising role in regenerative medicine, MSCEVs are heterogeneous, with a wide variety of compositions, and are influenced by various factors in their manufacture and use.

Application of mesenchymal stem cells derived extracellular vesicles

In preclinical studies in humans, EV-based therapies have been used to treat various organ diseases, but their efficacy has been controversial. On the other hand, many clinical studies have been conducted with genetically modified extracellular Vesicles that broaden the scope of biomedical applications and are a powerful tool for solving clinical problems.Application of MSC-EVs in drug delivery.

MSC-EVs are endogenous vectors, shuttling between cells with excellent biocompatibility.

Application of MSC-EVs in oncology

MSC-EVs have shown promise in treating tumors, but the results remain controversial. For example, secreted MSC-EVs like MSCs have an immunomodulatory capacity.

Application of MSC-EVs in hereditary disease

As a natural delivery tool, EVs could correct mutations related to inherited diseases by fusing with recipient cells and transferring biomaterials like RNA, miRNA, proteins and even DNA.

MSC-EVs modified by engineered biotechnology

For better therapeutic efficacy, a modification of the surface molecules of MSC-EVs has been developed to increase retention in the bloodstream. By changing characteristics such as particle size, surface receptors, or membrane charge distribution, MSC-EVs can prevent clearance by the liver, kidneys, and reticuloendothelial systems.