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Perspective

The Development of Mesenchymal Stem Cells from Adipose and Amnion Tissue in Reproductive Biotechnology

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DESCRIPTION

Due to their tremendous therapeutic potential, stem cell therapies are receiving more and more attention globally. Stem cells are now crucial tools in the creation of fresh, cutting-edge research areas and an effective choice for the treatment of chronic diseases as a result of technical advancements. However, there are many disagreements and conflicts around this kind of study, partly because of how stem cells are collected and categorised. Even while embryonic stem cells have an essentially limitless capacity for tissue differentiation and a tremendous capacity for tissue regeneration, their acquisition frequently necessitates the manipulation and killing of the embryo, which causes great anguish and ethical issues in human medicine. Contrarily, in veterinary medicine, where commercial medicines are already widely utilised, there are no clear guidelines for research and no strong standards for the evaluation of the findings. This situation emphasises the significance of fresh, in-depth study on the topic and stem cell lineages.

Over the past ten years, research on foetal membrane development in canine models and in-depth characterization of the tissue have demonstrated the tissue's potential to produce new stem cell lineages and biotechnology innovation in preclinical trials or alternative medicines. Due to their great capacity for differentiation, minimal tumorigenicity, and immunomediating properties, Mesenchymal Stem Cells (MSCs) generated from foetal membranes and adipose tissue from dogs have been the subject of studies that have gained attention in light of this situation. Extracellular vesicles, particularly exosomes, are thought to play a significant role in the transmission and exchange of genetic material between cells during the development of these cells. Classified by size, these vesicles transport proteins, lipids, DNA and mRNA, and are therefore fundamental for the processes of cell multiplication, development and differentiation. Like their parental cells, exosomes derived from stem cells possess characteristics that help stimulate angiogenesis and cell regeneration, suppress apoptosis pathways, and modulate the immune response in chronic tissue damage, both in vitro and in vivo. However, unlike stem cells, exosomes do not possess immunoreactive properties, are able to cross biological barriers and have no risk of unwanted differentiation, and are therefore considered potential alternatives for the use of stem cells in regenerative medicine. Within this context, exosomes derived from MSCs have already been used in regenerative medicine therapies of several human diseases such as lung diseases, liver fibrosis, osteoarthritis, spinal cord injury, and myocarditis because of their low tumorigenicity, immune response and cytotoxic effect when compared to other cell therapy methods.

To completely comprehend the cell differentiation process, it is crucial to analyse these vesicles' mechanisms of action and how they affect the environment around them. This analysis is also a crucial first step in the development of this novel area of study. Therefore, in order to increase cell survival in naturally poor passages, we sought to assess and contrast several passages of MSC cultures obtained from canine amniotic tissue supplemented with exosomes from MSCs. Research on cell therapy will advance as a result of the findings, which will help identify fresh and creative sources of stem cells. Research on stem cells for reproductive biotechnology has received a lot of attention and holds promise for treating a variety of ailments by mending damaged tissue or aged cells. Adipose tissue and the amniotic membrane are emerging as promising sources of mesenchymal stem cells, sparking a significant deal of interest in regenerative medicine. Adipocyte-derived Mesenchymal Stem Cells (AMSCs) and Amniotic-derived Mesenchymal Stem Cells (AMSCs) are both multipotent cells with improved capacity to develop into several lineages. We sought to assess the impact of basal exosome supplementation in cell cultures including canine amniotic Mesenchymal Stem Cells (MSCs). Mesenchymal stem cells were identified and cultivated using cell passages until 80–90% confluence was obtained using canine amniotic and adipose tissue as the source material.

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