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Spermatogenesis restoration in non-obstructive azoospermia by mesenchymal stromal/stem cells and their exosomes

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Abstract

Among different type of cell therapies, stem cell therapy, especially mesenchymal stromal/stem cell (MSC) therapy, is being progressively developed as a new promising treatment for degenerative disorders due to their high differentiation potential while maintaining the ability to self-replicate and retaining features of their source cells. In 10% of infertile men, non-obstructive azoospermia (NOA) is the cause of their infertility. Results of in vitro studies showed that various tissue sources derived MSCs could differentiate into male and female germ cells or gamete progenitor cells through simple systems. MSCs, on the other hand, have been examined for their therapeutic efficacy in treating NOA animal models induced by chemical or surgical agents. The findings of these trials showed the success of MSC allotransplantation or xenotransplantation in the seminiferous tubules. Furthermore, exosomes released by MSCs have been shown to stimulate spermatogenesis in the testes of infertile animal models. Despite major improvements in the treatment of reproductive illnesses in men and women using MSCs or their exosomes, no clinical study for the treatment of NOA has been completed. Furthermore, exosomes released by MSCs have been shown to induce spermatogenesis in the testes of infertile animal models. Despite major improvements in treating reproductive illnesses in males and females using MSCs or their exosomes, no completed clinical trial has been reported for treating NOA. The purpose of this systematic review is to study the potential of MSC therapy for NOA in males. This comprehensive study demonstrated the ability of MSCs in restoring fertility in men suffering from NOA. Mastering and effectively using this therapy in clinical practice can assist a large number of patients in reactivating spermatogenesis and enjoying fatherhood. According to existing information, it is not simple to answer "which MSCs source has a more potential for treating azoospermia?" Ranking the cell sources is problematic due to the lack of comparative research on the MSC sources for azoospermia therapy in the three types of in vitro, in vivo, and clinical trials. By the way, given the effectiveness of cell isolation and the challenges of obtaining a suitable cell source, such as better cell yield, fewer surgical procedures, and donor-recipient cell similarity, adipose tissue-derived MSCs can be recommended for the treatment of azoospermia. However, other sources of MSCs may potentially be effective for azoospermia cell therapy.

Biography

Dr. Amin Tamadon as a faculty member of The Persian Gulf Biomedical Sciences Research Institute has a DVM from Shiraz University, Iran and a PhD in Veterinary Obstetrics and Reproductive Diseases from Shiraz University, Iran. He has a Postdoc fellowship from Seoul National University, South Korea on cell therapy of infertility and a Postdoc fellowship from Fudan University, China on neuroscience and 3D imaging. Amin currently works as head of Department of Marine Stem Cell and Tissue Engineering at the Persian Gulf Biomedical Sciences Research Institute, Bushehr University of Medical Sciences, Iran.

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