Effect of autologous mesenchymal stem cell (MSCs) injection on healing of cartilage defects: Results of preclinical and clinical studies

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Chondrogenesis is a well-orchestrated process derived by chondroprogenitors that undergo to condensation, proliferation and chondrocyte differentiation. Because cartilage lacks blood supply, it lacks regenerative power and subsequent wound healing. Cartilage degeneration caused by congenital anomalies, disease or trauma is of great clinical consequence as it leads to incomplete attempts of repair by local chondrocytes. The end stage of cartilage damage frequently leads to O A resulting in a significant decrease in the quality of life of millions of people. Treatment methodologies varied from pharmaceutical, nutraceutical, gene therapy, molecular engineering; in addition to tissue engineering (TE) also known as “cell therapy”. In vitro, MSCs showed the potential to differentiate and can be multiplied without losing their multilineage capacity of differentiation. This made the MSCs the cell of choice in tissue engineering. MSCs are multiline age progenitor cells and responsible for the turnover and repair of mesenchymal tissues, such as bone, cartilage, ligament, muscle, and fat. Although no clear definitive phenotype of MSCs has been described, through the use of the proper culture conditions, expanded MSCs can be stimulated to differentiate along specific pathways, such as chondrogenesis, adipogenesis, and osteogenesis. The objective of this work was to confirm the fitness of the dog as a good model of OA; effect of cell therapy in cases of acute and chronic, compared to control group surgically induced partial thickness chondral defects through the injection of autologus bone marrow derived MSCs in dogs. This work was done on 24 knees of male domestic mongrel dogs by doing surgical chondral defects then injected intra-articular with MSCs according to classified groups: acute (injected after 1 day),chronic (after 1 month) and control group not injected. The dogs sacrificed after 1,2,6,8 weeks of injection. Assessment by histological scoring of cartilage repair (OsScore) for blind randomized samples and by clinical examination for lameness degree score. Our results showed that dogs possess characteristics that are not found in traditional rodent models and confirmed the efficacy of direct intraarticular injection of MSCs to home and function in cartilage defects both in acute and chronic lesions. The local delivery of MSC is a good therapeutic option for O A.

Biography

Hala Gabr is a renowned Researcher in Stem Cell Biology and Therapy in Cairo University, Egypt. She is the Director of the Pediatric Bone Marrow Transplantation and Cellular Therapy Lab in Cairo University. She is the Co-Founder of the Egyptian Society for Progenitor Stem Cell Research, the leading stem cell research body in Egypt. She has published more than 30 papers in reputed journals and is an Editorial Board Member of a number of reputed journals. She has supervised nearly a hundred PhD and master thesis in stem cell research.

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