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Evaluation of the effects of umbilical cord matrix mesenchymal stem cells in the healing of an experimental model of critical bone defect in Wistar rats

Seyed Jafar Hashemian Tehran University of Medical Sciences, Iran Delayed union or nonunion have been estimated 5-10% of the fractures annually. It will require further surgical procedures because of impaired healing. Causes of impaired healing include infection, high-energy injuries with significant bone loss, soft tissue and vascular structure compromise, osteoporosis causing a decrease in bone mineral density, diabetes and smoking causing disturbances to microcirculation, and specific fracture patterns. The management of choice is autologous cancellous bone grafting. However, this will be associated with various problems including donor site morbidity, loss of function, infection and a limited supply.

Human umbilical cord mesenchymal stem cells (HUCMSCs) have shown osteogenic, chondrogenic, and adipogenic differentiation potency as well as a higher proliferative, osteogenic and endothelial differentiation potential than bone marrow mesenchymal stem cells (BMMSCs). HUCMSCs also did not have BMMSCs disadvantage like frequency and differentiation capacity decline with age. The ability to modulate immune responses, on the other hand, makes HUCMSCs an important compatible stem cell source for transplantation therapy in allogeneic settings without immunorejection. Here we propose a hypothesis that HUCMSCs locally delivered via direct injection to bone defect hematoma could enhance bone healing through both differentiation into osteoblast and endothelial cells and neoangiogenesis. In order to maximize the immunological incompatibility, HUCMSCs would be injected to immunocompetent Wistar rats. This could represent a novel therapeutic approach and enhance bone defect healing more effectively.

Biography

Seyed Jafar Hashemian is a medical student in Tehran University of Medical Science. He is chief of student's stem cells research committee of cellular and molecular research center in Iran University of Medical Science from Aug. 2010. He has published 3 papers.