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Transplantation of human adipose-derived mesenchymal stem cell with PCL skin scaffold to burn wound in nonimmunocompromised Guinea pigs

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Patients with massive burns have morbidity and mortality closely related to the limited availability of donor sites. Autografting has been considered as a gold standard treatment for excised burn wounds. However, in patients with extensive burns , limited availablity of donor sites for harvesting skin graft may significantly affect its utilization.

Skin tissue engineering by providing a reliable skin substitute, can be considered as an optimal alternative of human skin grafts for coverage of massive burns. This area of expertise has been developed to repair and regenerate damaged organs using a combination of cells, biomaterials and growth factors.

Nanofibers are submicron fibrils that mimic the extracellular matrix, promoting cellular adhesion, proliferation, and migration. Polycaprolactone (PCL) nanofibers were electrospun using standard techniques could be use as skin scaffold.

Human adipose-derived mesenchymal stem cells (HAMSCs) are well-established as having the capacity to differentiate into cells with mesodermal, ectodermal, and endodermal characteristics; as well as a higher proliferative, adipogenic and endothelial differentiation potential than bone marrow mesenchymal stem cells (BMMSCs). The ability to modulate immune responses, on the other hand, makes HAMSCs an important compatible stem cell source for transplantation therapy in allogeneic settings without immunorejection.

Here we propose a hypothesis that HAMSCs locally delivered via PCL nanothecnologic scaffold to skin burn wound could enhance wound healing through both differentiation into epithelial and endothelial cells and neoangiogenesis. In order to maximize the immunological incompatibility, HAMSCs would be injected to immunocompetent Guinea pigs. This could represent a novel therapeutic approach and enhance burn wound 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 is the member of endocrinology and metabolism research center from Aug. 2011. He has published 3 papers.

Kamran As'adi has completed degree of General Practitioner at 25 years of age at Shiras University of Medical sciences, Then straightly started specialty in General Surgery Residency in the same university for 4 years period. He got the Degree of National Board of General Surgery at 1994. Since that time he has been elected as Academic member of medical universities. From 1997 he started subspecialty in Plastic and Reconstructive Surgery in Tehran University of Medical Sciences, and got the degree of Board in Plastic and Reconstructive Surgery at 2000. He spent a complementary fellowship in craniofacial and breast reconstruction period in Henry Mondor Hospital in Paris School of Medicine. He visited plenty of Great experts in Plastic Surgery in reputable academic centers for training Plastic surgery around the United States. Since 2004 he has been Assistant Professor of Department of Plastic and Reconstructive Surgery at Tehran University of Medical Sciences. He has been elected as Member of American Society of Plastic Surgeons since 2005 and as an active member of International society of Aesthetic Plastic Surgery since 2008.