Histology & Cell Biology

Effect of adipose-derived stem cells on induced photoaging in the skin of adult Guinea pig. Histological and immunohistochemical study

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Introduction: Skin aging is a complex biological process. Photoaging describes the sun damaging effects on skin mainly due to chronic ultraviolet (UV) light exposure. To date, currently available anti-aging strategies have unsatisfactory results for the patients which generate the urge for new treatments. As adipose-derived stem cells (ASCs) are available in abundant quantities, harvested by a minimally invasive procedure, could be safely transplanted and differentiated along multiple cell lineages, their use in treatment of many diseases has extensively been investigated.

Aim of the Work: To assess the potential ability of ASCs to ameliorate skin changes in adult female guinea pigs induced by chronic exposure to artificial light source similar to the sun rays in its UVA and UVB spectrum.

Materials and Methods: Adipose-derived stem cells were isolated from subcutaneous white adipose tissue of five adult human donors undergoing elective liposuction surgery. Twenty adult female guinea pigs were used and were randomly divided into two groups, each was subdivided into two subgroups five animals each. Subgroup IA served as control. Subgroup IB was intradermally injected with saline solution. Subgroup IIA served as the photoaging model. Subgroup IIB served as the photoaging model intradermally injected with ASCs. Isolated stem cells were cultured, characterized and differentiated into osteogenic lineage. Skin specimens were prepared and examined using different histological and immunohistochemical techniques. Morphometric and statistical studies were also performed.

Results: Subgroup IIA showed various UV damaging effects in the skin epidermis and dermis, while ASCs injection in subgroup IIB resulted in partial restoration of the skin structure.

Conclusion and Recommendation: Intradermal injection of ASCs partially improved the photodamaging effects. Thus, further studies are needed before ASCs injections could be clinically used to treat photoaging.

Recent breakthrough in the treatment of schistosomiasis complications

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Background: Hepatosplenomegaly is a characteristic feature of Schistosoma infestation. However, splenic injury had received little scientific researches than the well-known liver injury. Moreover, the role of bone marrow derived mesenchymal stem cells (BM-MSCs) in treatment of splenic injury due to schistosomiasis has not yet been investigated.

Aim of the work: to explore the structural changes which might occur to spleen during chronic infestation with schistosomiasis and the possible therapeutic role of (BMMSCs) in ameliorating these changes.

Materials and methods: Fifty female Swiss Albino mice, weighing about 25 gm were classified into group A (control group) and group B (experimental group). Animals in group A were equally subdivided into subgroup A1 which served as donors for stem cells obtained from their bone marrow, and subgroup AII which were injected with phosphate buffer saline (PBS) and used to collect control spleen samples. Whereas, animals in group B, were all infected with S. mansoni cercariae (60/ mouse) by subcutaneous injection, then subdivided into three subgroups; subgroup B1 sacrificed after eight weeks, subgroup BII treated intraperitoneally with 2x106 MSCs suspended in PBS per mouse at eighth week after infestation hen scarified four weeks later, and subgroup BIII allowed to survive for twelve weeks without treatment then sacrificed.

Results: Histological examination of spleen sections of subgroup B1 showed structural changes including deposition of eggs which were surrounded by inflammatory cells and collagen fibers. Subgroup BII showed more extensive structural changes. This was associated with significant increase in collagen fibers and TNF-α immunological reaction compared to control. However, (BM-MSCs) treated subgroup BII illustrated improvement of splenic structure.

Conclusion: Chronic Schistosoma mansoni infestation has a deleterious effect on the structure of the spleen. Bone marrow derived mesenchymal stem cells have a relevant therapeutic potential on the spleen of an animal model of Schistosoma mansoni.

The therapeutic role of acellular dermal matrix seeded with mesenchymal stem cells versus autologous skin graft in healing of skin defect

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Background & objectives: One of the major challenges facing the surgeons is replacing a full-thickness skin loss successfully. This study aimed at seeding of bone marrow-mesenchymal stem cells (BM-MSCs) on the decellularized matrix to test the efficacy of these scaffolds for the repair of skin defects in rats as well as to compare the microstructure of the skin after using autologous skin graft.

Methods: A 2 × 2 cm2 size full thickness skin defect was created on the dorsum of twenty male Wister rats (200- 250g) under xylazine (5 mg/kg) and ketamine (50 mg/kg) anesthesia. The animals were then randomly divided into four equal groups: group I, the defect was left for spontaneous recovery, group II, the defect was repaired with acellular dermal matrix (ADM) alone, group III, it was repaired with ADM seeded with BM-MSCs and group IV, the defect was repaired with autologous skin graft.