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Evaluation of the role of adipose-derived stem cells in the healing of indomethacin induced gastric ulceration in rats

Sahar Mansour Hassan Greish, Sally M Abdelmonem, Maha Atwa and **Mohamed Fathelbab**
Suez Canal University, Egypt

Introduction: Gastric ulcer is one of the most serious diseases. Untreated gastric ulcer is capable of inducing severe complications. Although there are many drugs used for the treatment of gastric ulcer, most of these produce several adverse reactions.

Aim: This study aims at providing new effective and non-chemical treatment for gastric ulcer through evaluating the role of the human adipose derived stem cells in the healing of indomethacin induced gastric ulcer.

Materials & Methods: Seventy two adult albino rats divided into 3 equal groups were included; Group N (Negative control: Untreated group), Group D (Positive control: Indomethacin induced gastric ulcer group) which included 24 rats subjected to Indomethacin induced gastric ulcer and phosphate buffer saline and Group T (ADSCs treated group), which included 24 rats subjected to Indomethacin induced gastric ulcer followed by intravenous injection of (3×10^6) adipose derived stem cells (ADSCs)/rat via tail vein. The source of stem cells was about 900 ml of human lipoaspirate. Six animals of each group were sacrificed 1 day, 3 days, 4 days and 5 days after ulcer induction with an ether overdose. Each stomach was examined for macroscopical mucosal lesions (Ulcer index) then each stomach was divided into two halves. One half was used for histopathological assessment and PCR for human Alu sequences to confirm the presence of transplanted human adipose derived stem cells in recipient rat stomach. The other half was frozen in liquid nitrogen, freeze dried (on -70° C) for ELISA assessment of VEGF and PGE2 in gastric tissue homogenate.

Results: ADSCs transplantation improved the histopathology of the gastric tissue in the stem cell treated group. Also the results of ulcer index was significantly decreased in the stem cell treated group at day 3, 4 and 5 of the study compared to the indomethacin challenged group. Regarding ELISA results, Indomethacin significantly decreased gastric levels of both VEGF and PGE2 in the non-stem cell treated group. However, ADSCs restored the levels of PGE2 to the normal levels and increased the VEGF levels significantly to above normal levels. PCR results revealed that stem cells successfully engulfed into the gastric wall by the third day and continued to persist until the 5th day.

Conclusion: This study revealed that human adipose derived stem cell implantation significantly accelerated gastric healing in indomethacin induced gastric ulcer in rats. The most probable underlying mechanisms are the migration of stem cells into the injured gastric tissue and the release of growth factors that induce angiogenesis like VEGF and PGE2. PGE2 is a very important protective factor of the gastric mucosa against ulceration and induces ulcer healing through improving the blood supply and stimulating the release of VEGF.

Biography

Sahar Mansour Hassan Greish is an Assistant Professor in Physiology, Faculty of Medicine, Suez Canal University, Ismailia, Egypt. Her work focuses on stem cell separation and its effect in regenerative medicine. She has also published few papers in the field of stem cell research.

saharmg@yahoo.com

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