

Summary of the DVSc thesis No: 18078, Faculty of Veterinary Medicine, Urmia University.

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Title of thesis: Evaluation of the effect of local transplantation of cultured macrophage in combination with mesenchymal stem cell/ macrophage culture supernatants on incisional and excisional wound healing in rat

Summary:

Wound healing is an orderly sequence of events restoring the integrity of the damaged tissue. It consists of inflammatory, proliferation, and remodeling phases. The objective of the current study was to investigate the effect of local transplantation of cultured macrophage loaded with mesenchymal stem cell/macrophage culture supernatants on wound healing. Sixty-four healthy adult male Wistar rats were randomized into 4 groups of sixteen animals each: 1) SHAM group. 2) MAC-MSK/SN group: One-milliliter application of a mixture comprising mesenchymal stem cell and macrophage culture supernatants in a 1:1 ratio was administered locally to the wound bed. 3) MAC group: Local transplantation of macrophage cells cultured in the wound bed. 4) MAC + MAC-MSK/SN group: Local transplantation of cultured macrophage with mesenchymal stem cell/ macrophage culture supernatants in the wound bed. An incisional wound model was used for biomechanical studies, while an excisional wound model was used for biochemical, histopathological, and planimetric assessments. The wound area was significantly reduced in the MAC + MAC-MSK/SN group compared to other groups ($P < 0.05$). Biomechanical measurements from the MAC + MAC-MSK/SN group were significantly higher than other experimental groups ($P < 0.05$). Biochemical and quantitative histopathological analyses revealed a significant difference between MAC + MAC-MSK/SN and other groups ($P < 0.05$). MAC + MAC-MSK/SN showed the potential to improve wound healing significantly. This appears to work by angiogenesis stimulation, fibroblast proliferation, inflammation reduction, and granulation tissue formation during the initial stages of the healing process. This accelerated healing leads to earlier wound area reduction and enhanced tensile strength of the damaged area due to the reorganization of granulation tissue and collagen fibers.

Keywords:

Macrophage, Mesenchymal stem cell, Cell culture, Wound healing, Supernatant