Burn Injuries

Modulation of Burn Scars through Laser Assisted Delivery of Stem Cells

Researchers at the University of Miami School of Medicine (Miami, Florida) and military research partners from the U.S. Army Institute of Surgical Research have advanced and investigated the use of laser therapy alone and as an adjunctive therapy to co-deliver stem cells to mitigate hypertrophic scars that are formed in a Duroc pig model of third degree thermal burns (that are formed using a branding iron). After burn scars were allowed to develop for 70 days on the backs of the animals, each scar received either carbon dioxide (CO^2) or erbium-doped yttrium aluminium garnet (Erbium:YAG) ablative fractional lasers with and without the co-delivery of stem cells (allogeneic or autologous adipose stem cells or bone marrow derived mesenchymal stem cells). Biopsy samples were taken from burns scars at various days post treatment for histologic evaluation, protein expression and cell culture analysis. Both lasers alone appeared to modulate hypertrophic burn scars with Erbium:YAG laser having an overall better clinical appearance. Interestingly, the deeper channels created by lasers in particular by CO^2 at higher settings appeared to limit the ability to deliver cells, which was hypothesized to be caused by thermal induced coagulation observed in the deeper channels. It is also likely that the high levels of ablative fractional laser energy produce a debridement effect on scars. Although observations also found that autologous stem cells in combination with Eribium:YAG laser also treat hypertrophic burn scars well. The data also indicates that repeat administration could further improve the scar modulation. In addition, the group also investigated the use of Polyethylene glycol-ylated gels to prolong the effect of allogeneic stem cells on treated scars and found it to exert an extended paracrine response.

> Laser assisted co-delivery of stem cells can potentially reduce the morbidity of post-burn scar contracture for injured Service members.

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