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**The Influence of Different Formulations of Silversulphadiazine Cream
on Burn Wound Healing and Glycerin Gel Sheet as Alternative
to Reduce Scar Tissue Formation.**

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The development of silversulphadiazine as an anti-microbial agent in a cream base for topical burn wound treatment has significantly changed the mortality rate of the burn trauma. However, SSD therapy didn't change the morbidity of the burn trauma at all. The final outcome in terms of quality of the scar tissue formation is even worse, when compared to wounds that are allowed to heal spontaneously. The influence of the existing SSD formulations on the quality of wound healing is greatly neglected. The effect of topical agents can be evaluated in a mirror image burn wound model in domestic pigs. The conventional SSD formulation serves as a standard. Biopsies for pathological evaluation are taken at regular time points during a six to twelve week observation period. On suspicion of the negative influence of paraffine in the commercial formulation, reformulation with cetomacrogol (CetomSSD) was performed by the pharmacy of the Red Cross Hospital Burn Centre.

Description of the healing pattern of SSD cream (Flammazine®):

Retardation of wound healing, retardation of the inflammatory response, retardation of degradation of non-viable collagen with calcification as a consequence, hair follicle death leading to ongoing chronic inflammatory activity, strong irritation of the outgrowing epithelium, extensive fibrosis.

The healing pattern of CeSSD cream (Flammacarium®):

More pronounced retardation of all wound healing parameters, pronounced calcification of non-viable tissue and granulation tissue, comparable hair follicle death leading to ongoing chronic inflammation after full re-epithelialization, inflammation with macrophages and giant cells surrounding particles related to CeSSD treatment, chronic inflammation around deep vascular structures, comparable fibrotic wound bed.

The healing pattern of SSD in cetomacrogol cream (CetomSSD):

No retardation of wound healing, no retardation of the inflammatory response, no calcifications, no hair follicle death leading to ongoing chronic inflammation, only slight irritation of the outgrowing epithelium.

Glycerin and wound healing:

Based on the technology of the preservation method of the Euro Skin Bank, glycerin has been recognized to have distinct anti-microbial properties dependent on its concentration. In wound healing, glycerin is attractive to use if the concentration achieved at the wound surface is high enough to be bacteriostatic, but without unacceptable slowing-down of epithelial outgrowth. The mode of action of glycerin in a gel sheet was studied in an experimental burn wound model in comparison with a standard hydrogel.

The healing pattern of a glycerin gel sheet dressing material (Elasto-gel®):

At the glycerin treated side, no wound infection can be observed in contrast to the contralateral hydrogel treated side, which became heavily infected. Also a diminished inflammation reaction is seen. Macrophages store lipids as a result of phagocytosis of glycerin. Although there is a slow release of glycerin incorporated in the gel, the daily amount applied to the wound can interfere with the rate of epithelialization. Daily application of a glycerin gel sheet can impair wound healing fully. However, if the glycerin gel sheet is applied once a week, the epithelialization rate will be mainly unchanged.

Conclusions:

Silversulphadiazine cream has no inflammation modulatory properties. Above all induction of chronic inflammation around dead hair follicle remnants by silversulphadiazine cream, even after full epithelialization of the burn wound, will lead to an undesirable increase of fibrosis and wound contraction. Modulation of inflammation and inhibition of bacterial growth are attractive properties of the glycerin gel sheet dressing. Glycerin gel sheets can reduce scar tissue formation if healing of the burn wound is prolonged. Glycerin gel sheets also can be used as an alternative to silicon sheet materials used for scar treatment, especially if skin defects still remain. Based on the relation between contamination of the wound with *Staphylococcus Aureus* and hypertrophic scar formation (personal communication Dr. Beerthuis, Burn Centre, Gronigen) the bacteriostatic properties of glycerin gel sheets are even more attractive.