**Introduction**

Infection is a main cause of delayed healing and formation of chronic wounds. Therefore, wound dressings with antimicrobial agents are increasingly utilized in the treatment of critical-colonized or infected wounds. Polihexanide (PHMB) is regarded first choice because of its good skin tolerance beside its antimicrobial effects. Furthermore, a positive influence of polihexanide on wound closure was observed in individual clinical cases and in animal models [Kramer et al. 2004]. Hence, we have evaluated the effect of PHMB on wound healing using different in-vitro-test-systems.

**Methods**

Human keratinocytes were used for biocompatibility studies. Cell viability and proliferation was investigated by means of a luminometric ATP assay (ATPLite™, Perkin Elmer). The antimicrobial effect of PHMB was determined by microplate laser nephelometry (NepheloSTAR, BMG Labtech), suspension test (JIS L1902:2002) and a co-culture system with HaCaT keratinocytes and *Staphylococcus aureus*. For the co-culture keratinocytes were infected with increasing concentrations of *S. aureus* and cultured with or without the addition of PHMB. Additionally, antioxidant potential was measured using chemiluminescent determination of superoxide and peroxynitrite radical formation (ABEL® Antioxidant Test Kits with Pholasin® specific for superoxide and peroxynitrite, Knight Scientific Limited).

**Results**

PHMB has a proliferative effect on keratinocytes in low concentrations (0.2 – 2 µg/ml), up to 20% more living cells were found compared to the control, while higher concentrations displayed a negative effect on cell viability and proliferation (Fig. 1). In these concentrations a significant capacity to inhibit the proliferation of *S. aureus* could be observed (Fig. 2). In accordance, a biocellulose wound dressing containing PHMB (Suprasorb®X + PHMB, Lohmann & Rauscher GmbH & Co.KG) achieves a strong antibacterial effect (Fig. 3). Hence, this wound dressing was able to protect human cells in the co-culture system from bacterial damage and restore normal cell proliferation (Fig. 4). In addition, PHMB exhibited a significant concentration dependent antioxidant potential (Fig. 5).

**Conclusions**

Polihexanide seems to be an ideal antimicrobial substance in wound dressings for treating chronic wounds because of its low cytotoxicity, good skin tolerance and positive influence on proliferation.