Treatment of chronic venous leg ulcers with a hand-held DBD plasma generator

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In cold plasma medicine, a new field, antiinflammatory, antiitch, antimicrobic, UV, and other therapeutic modalities are combined within one treatment. Generally, two types of cold plasma can be discerned: Direct plasma (dielectric barrier discharge – DBD, corona discharge) and indirect plasma (plasma torch, plasma jet). DBD generates a low temperature plasma under atmospheric pressure and, thus, is a suitable instrument for a non-destructive treatment of biological material. The PlasmaDerm® VU-2010 device is a non-invasive active medical intervention which does not reach direct skin contact. For our medical application, a non-equilibrium, weakly ionized physical DBD plasma is generated by the application of high voltages across small gaps, whereas the electrode is covered by a dielectric. This nonconducting layer avoids the transition of the gas discharge into a hot arc by limiting the current. The biological tissue itself (skin) acts as the second electrode.

Chronic leg ulcers are a major problem in the eldery. The prevalence corresponds to 2-4 % in the population. 80% of chronic leg ulcers are caused by varicosis. Generally, three phases of wound healing (cleaning of the wound ground, granulation, and epithelialisation) can be discerned that are disturbed in chronic venous leg ulcers. Wound debridement, modern wound dressings and compression hosiery comprise methods of standard care. Despite these measures leg ulcers often persist. Additional plasma treatment may have the potential to facilitate wound healing by disinfection, stimulation of tissue regeneration and microcirculation as well as acidification of the wound environment. We are currently conducting a clinical trial with the PlasmaDerm® VU-2010 device to assess safety, applicability, and efficacy of chronic venous leg ulcer plasma treatment. The trial is still ongoing. So far, no profound adverse events of plasma treatment were reported pointing towards a positive outcome of our study.