



Cold Plasma for accelerated healing of chronic wounds in diabetic patients

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Diabetic foot (DF) syndrome is a common complication of diabetes mellitus and requires specialized treatment. Type 2 diabetic patients are often compromised by wounds with persistent infection and chronic inflammatory processes accompanied by a delayed wound closure.

Cold atmospheric pressure plasma (CAP) is a promising tool for biomedical and clinical application. Applying energy to molecular or noble gases generates partially ionized gases that mediate biological response mediated by reactive oxygen and nitrogen species (ROS and RNS) in combination with electric fields and mild UV radiation.

The goal of this placebo-controlled patient-blinded study was to show that application of cold plasma in addition to standard care treatment compared to placebo could accelerate wound healing with a significant regression of wound size. Wound closure progression and microbiological analysis were monitored time dependently to prove the effects. It is known, that wound oxygenation is an important factor of wound healing and scavenging reactive species could impair wound healing. Therefore, some patients were monitored by hyperspectral imaging in order to investigate the underlying processes, such as tissue oxygenation and microcirculation.

Here we show results of the first randomized clinical trial with a clear focus on improvement of wound healing. Cold plasma treated wounds significantly earlier turned into healing process, irrespectively from bacterial load reduction and infection status. These results support the hypothesis that cold plasma efficacy do not primarily rely on antimicrobial effects, but directly turn chronic wounds into acute wounds, and therefore stimulate wound healing processes.