

Non-thermal atmospheric argon plasma treatment as a novel approach to improving wound healing: Results of a first randomized placebo-controlled clinical trial on skin graft donor sites

Julia Heinlin¹, Julia L. Zimmermann², Florian Zeman³, Wolfram Bunk², Georg Isbary⁴, Michael Landthaler¹, Tim Maisch¹, Roberto Monetti², Gregor E. Morfill², Tetsuji Shimizu², Julia M. Steinbauer¹, Wilhelm Stolz⁴, and Sigrid Karrer¹

¹ *Department of Dermatology, University Hospital Regensburg, ,93053, Germany*

² *Max-Planck Institute for Extraterrestrial Physics, Garching, 85748, Germany*

³ *Center for Clinical Studies, University Hospital Regensburg, 93053, Germany*

⁴ *Department of Dermatology, Hospital Schwabing, Munich, 80804, Germany*

E-mail: julia.heinlin@klinik.uni-regensburg.de

Background

Cold atmospheric plasma has already been shown to decrease the bacterial load on chronic wounds. However, until now it is not yet known if plasma treatment may also improve wound healing.

Objectives

To assess the impact of cold atmospheric argon plasma on the process of wound healing.

Methods

40 patients with skin graft donor sites on the upper leg were enrolled into our study. The wound sites were divided into two equally sized areas and randomly assigned to receive plasma treatment or argon gas only as a placebo mode for 2 min. Wound healing was evaluated independently by two blinded dermatologists, who compared the wound areas with regard to re-epithelialization, the amount of blood crusts, fibrin layers, and wound surroundings.

Results

From the 2nd treatment day onwards, wound areas treated with plasma (n=34) showed significantly more often improved wound healing than placebo-treated areas (day 1: p=0.25, day 2: p=0.011, day 3: p<0.001, day 4: p<0.001, day 5: p=0.004, day 6: p=0.008, day 7: p=0.031). Positive effects were observed in terms of improved epithelialization and fewer fibrin layers and blood crusts, whereas wound surroundings were always bland, independent of the type of treatment. Wound infection did not occur in any of the patients, and no relevant side effects were observed. Both types of treatment were well-tolerated.

Conclusions

Cold plasma treatment has shown to have positive effects on wound healing, but the mechanisms contributing to these clinically observed effects have to be further investigated.

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