

Cold plasma treatment to support healing of chronic wounds

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During the past decade the new interdisciplinary field of research plasma medicine has been established. Applying cold atmospheric pressure plasma may provide numerous future applications in medicine, ranging from wound care support, to blood coagulation, or medical device disinfection, and even cancer treatment. Cold plasma consists of partially ionized gas and contains several biological active components including reactive oxygen and nitrogen species (ROS and RNS), mild heat and UV-radiation. The challenge hereby is to proof that plasma treatment can have lethal effects on bacteria, whereas eukaryotic cells can be promoted to grow and proliferate under the same conditions. Our aim was to investigate the impact of cold plasma on the stimulation of mammalian cells with respect to chronic wound healing. Therefore, human cells from cell culture and from biopsies

were treated with the atmospheric pressure plasma jet kINPen MED and other plasma sources to compare their effects on treated cells. However, the underlying processes still need to be identified to modulate the plasmas for future applications – especially with respect to clinical application (including patient diversity) and comparison of different plasma sources. Our results indicate that for an optimal plasma treatment for each plasma source the control of ambient conditions, as well as a careful plasma treatment harmonized to the respective cell line, or respectively the patients is of tremendous importance for a successful approach of plasma therapy. Nevertheless, future plasma applications *in vivo* demand for thorough investigation on plasma-cell and plasma-liquid interactions ensuring safety and reliability of devices in advance of its clinical use. For future progression in the development of medical devices, the standardization of plasma generating processes as well as the biological tests is needed. This work will provide some aspects on how to compare different plasma treatment regimes, but also will give some hints what still need to be investigated regarding patient treatments.

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