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Plasmas have been used for many years for different applications. Atmospheric pressure plasmas deliver electrons, ions, UV radiation and an electric field, which together are effective in killing bacteria. Cold atmospheric pressure plasmas might provide additional means to reduce the bacterial load in a burn wound. It is however important to keep a balance between inactivating the bacteria and maintaining the wound healing potential. [1,2]

We studied the effects of cold argon plasma treatment on in vitro inactivation of *Pseudomonas aeruginosa*. For the treatment, a pulsed cold atmospheric plasma jet (13.56 MHz micro-jet) was used. Bacteria were diluted in culture broth (LB), phosphate buffered saline (PBS) or physiological salt (PS) and were treated with plasma for different times in microtiter plates. Growth or the absence thereof was recorded after overnight incubation. Alternatively, surviving bacteria were counted by plating dilutions.

The use of microtiter plates was a convenient way to test many different aspects in plasma treatment. However, it proved not to be useful when LB or PBS were used. Growth was absent after treatment but this appeared in part to be due to inhibition of growth rather than bacterial killing. In contrast, bacterial inactivation upon plasma treatment in PS was immediate and reached a log 6 reduction after 1 min. Our results indicated that a low pH during plasma treatment is critical. In addition, distance, duty cycle, plasma dissipated power and treatment time are important.

Because reactive radicals in cold plasma can interfere with the healing process, cell cultures of keratinocytes in PS were also treated with cold plasma. Two hours after treatment, the release of lactate dehydrogenase was determined as a measure of membrane leakage due to the treatment. In addition, activity of the cells was quantified with a tetrazolium based assay after 24 hours. Short treatments (10-60s) with argon did not result in extensive membrane damage or loss of activity when immediately after treatment culture medium was added.
In conclusion, non-thermal argon plasma can be used to kill bacteria and yet preserve the viability of epidermal cells.

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References

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