38

NEW TOOLS IN WOUND THERAPIES: ATMOSPHERIC PRESSURE COLD PLASMA JET (APPJ) KILLS PATHOGENIC BACTERIA IN VITRO AND IN VIVO

Georg Daeschlein[1], Katrin Darm[1], Thomas von Woedtke[2], Michael Jünger[1]

[1]*University of Greifswald, Department of Dermatology, Greifswald, Mecklenburg-Vorpommern, Germany,* [2]*Leibniz Institute for Plasma Science and Technology e.V. (INP), Greifswald, Mecklenburg-Vorpommern, Germany*

Aim: Bacterial contamination and invasion is crucial for wound healing, therefore we tested the activity of cold plasma treatment against common wound pathogens *Staphylococcus aureus* (SA), *Pseudomonas* aeruginosa (PA) and ß-hemolysing A-streptococci (HAS) on agar and against SA contamination of normal human skin.

Methods: We used an atmosperic pressure plasma jet (APPJ) with quartz capillary. In the centre of the capillary a pin-type electrode (1 mm diameter) is mounted. Argon served as feed gas with flow rate of about 8 l/min. A radio frequency voltage (1-5 kV, 1.5 MHz) is coupled to the center electrode. The plasma is generated from the top of the center electrode and expands to the surrounding air outside the nozzle.

Dilutions of fresh overnight grown colonies of the pathogens were plated onto Columbia blood agar plates. Plasma treatment was performed by passing the plasma jet for 8 min over the agar plate. 110 clinical strains (isolated from chronic wounds) were tested and mean reduction factors ($RF=\log_{cfu}$ before – $\log_{cfu}$ after treatment) calculated. In a second experiment we treated resident and transient bacterial bioburden including SA on human skin by plasma (1min irradiation).

Results: Plasma treatment of pathogens on agar resulted in high logstep reductions against all tested 3 pathogens with RF ≥4.0. Treating skin colonization we were able to eliminate SA without significant changes of the resident flora.

Conclusions: The antiseptic like reduction power of the plasma could substantially sustain wound healing by reducing disturbing contamination as well as invading pathogens in case of infection.