

## NON-EQUILIBRIUM PLASMA STERILIZATION OF SUPERFICIAL TISSUE WOUNDS AND BURNS

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Bacterial infection of wounds and burns is a major management concern for healthcare professionals. Infections in wounds can complicate illness, increase healing time, increase discomfort, can cause anxiety, and can lead to complications and death. Non-equilibrium plasma was shown to be effective at sterilizing surfaces and Floating-Electrode Dielectric Barrier Discharge (FE-DBD) has been used on living tissues without causing any damage. Our experiments show that treatment of surface wounds with FE-DBD can reduce the concentration of pathogenic bacteria present in the wound.

Experimental equipments consisted of: an electrode constructed of copper core, with Ultem™ shell, and quartz dielectric, an alternating current power supply, custom built with frequency range 50 Hz to 3.5 KHz and pulse duration range of 1μs to 10μs. The electrode was encased in an acrylic shell. The electrode was offset from the edge of the shell by 1.5mm to allow consistent uniformity and allow working distance.

Artificial wounds were created in porcine skin and inoculated with high concentration of bacteria then permitted to incubate for 2 hrs. After incubation, the wounds were treated for 2 minutes at 2.5 KHz and 5 μs pulse duration. Sampling of the wounds after treatment yielded average of 3 log reductions in bacterial concentration without causing damage to the tissue.

Sterilization results on pig skin will be presented where a clear relationship between dose and dose rate is considered. We show that dose rate plays a crucial role in the amount of tissue damage while sterilization effect is cumulative.

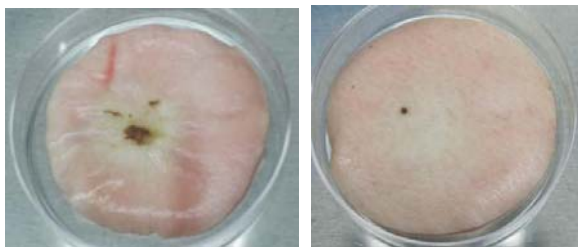


Fig. 1. Results of comparison of high dose rate to low dose rate for the same total dose: damaged tissue (left) and normal (right).