



25-27 November 2019

International Meeting on Plasma Cosmetic Science



LOCATION

Hôtel Dupanloup
1 rue Dupanloup
45000 Orléans - FR

CONVENORS

Dr Eric Robert
& **Dr Jean-Michel Pouvesle**

Research Group in the Energetics of Ionized
Media (GREMI) / CNRS, University of
Orléans - FR

Dr Catherine Grillon

Molecular Biophysics Centre (CBM) /
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PROGRAM - REGISTRATION

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Co-authors: Maria Suchonova², Barbora Konecna², Barbora Tarabova¹, Slavomir Pasztor¹, Lubomira Tothova²**Biography**

Zdenko Machala's research focus are biomedical, agriculture and environmental applications of cold atmospheric plasmas and electrical discharges in air, including studies of the mechanisms of plasma-liquid interactions and effects of plasma activated water. Some examples include disinfection and sterilization, wound healing, root canal treatments, selective induction of apoptosis for cancer treatment, and plant growth promotion. He served as the president of the International Society for Plasma Medicine (2017-18), chaired the International Conference on Plasma Medicine (2016) and is a member of various international scientific boards. He was a finalist of the prestigious ESET science award (2019), won the Stefanik award for the best Franco-Slovak bilateral cooperation (2013), Slovak vice-prime minister award Personality of science and technology under 35 (2009), and other awards.

Cold air plasma of streamer discharge or plasma activated water for antibacterial effects and wound healing

Antibacterial effects of cold atmospheric plasmas or plasma activated water (PAW) are generally accepted as demonstrated by many researchers. We present antibacterial effects of cold plasma generated by streamer discharge in ambient air using a portable plasma pen *in vitro* on agar plates with *E. coli* and bacteria from human hand skin using scratches mimicking cutting wounds. Longer plasma treatment results in wider decontaminated scratch areas but the age of pre-cultivated bacteria is an important parameter: the antibacterial effect is weakened when bacteria are pre-grown on agar for more than 6 h. This plasma discharge was also preliminarily tested in a case study of large surface wound (~20 cm²) on volunteer's hand. The plasma treatment repeated once a day for 7 days and combined only with rinsing by tap water resulted in very little infection spread, very limited inflammation and a fast recovery of the skin tissue within 15 days.

PAW produced by transient spark air discharge with water electro-spray also demonstrated significant antibacterial effects if applied within a few minutes post activation. For longer conservation, such PAW can be quickly frozen post plasma activation, stored at -20 C and defrost just before application. The PAW inhibitory effect of bacterial growth is dependent on the bacteria concentration: especially efficient for the range of 10³-10⁷ CFU/ml.

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