CHARACTERIZATION AND APPLICATION OF MICROWAVE PLASMA FOR WOUND HEALING

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Non-thermal plasma has a lot of ways for using in nowadays medicine. It presents many useful actions like charged particles, UV light, electric field, radicals, excited atoms, and molecules. That complicated chemistry directs to uncountable synergistic interaction between cold plasma and biological systems, involve cells and tissues.

The aim of this work is the investigation of the microwave discharge influence for skin wound healing. The potential of using plasma to wound healing firstly comes from the ability of plasma to penetrate by non-homogenous and cracked surfaces as better than liquid medical forms, but there are many more pros of plasma therapy [1].

Active particles generated by plasma, such as hydroxyl radicals, nitric oxide radicals, excited nitrogen molecules, atomic nitrogen, argon and oxygen, are probably responsible for a lot of effects of plasma therapy.

Diagnostics of plasma jet by optical emission spectroscopy has shown the presence of various active particles. Concentrations of active particles generated by plasma are dependent on conditions of plasma generation like applied power and gas flow. These effects were visually recorded using high speed camera.

Two different microwave plasma systems were used for the presented study. The first one was argon microwave plasma torch generated by surface wave using the quartz capillary, the second one was plasma torch with reverse and direct vortex argon flow [2 – 4].

For visual evidence of effects on skin caused by active particles was created simulation of skin tissue, with similar electrical properties as human skin [5]. Interaction between plasma jet and artificial skin tissue shown that UV light and temperature are not responsible for all observed effects which are noticed after plasma treatment [2 – 4].

Some part of experiments was realized in collaboration with Medical University of Sofia in Bulgaria. The theory of positive effect to wound healing was supported by experiments based on treating artificially created wounds on laboratory mice by cold plasma.

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