HIGH VOLTAGE PULSED COLD ATMOSPHERIC PLASMA JETS, USED FOR FOOD TREATMENT AND BIOMEDICAL APPLICATIONS*

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We are producing cold atmospheric plasma jets by using coaxial structures and high voltage pulses: 20 – 30 kV amplitude, hundreds of nanoseconds width, and 100 – 200 pulses per second repetition frequency. High electric fields generate electric discharges at atmospheric pressure in helium or argon flow (flow rates are up to 5 l/min). The inert gas flow pushes the discharge plasma outside the discharge area, forming a plasma jet. For chemical activation, up to 5 % oxygen is added in the main gas. The average temperatures of the plasma jets are around 32^0 C. This low temperature gave us the possibility to treat heat-sensitive foods or to action on tumoral or normal cells.

The objective for heat-sensitive foods treatment is to inactivate and/or eliminate the pathogenic microorganisms from the food surface. We studied the influence of the plasma jets on microorganisms such as *Escherichia Coli, Staphylococcus Aurous, Sacharomyces Cerevisiae*. The efficiency of microorganism inactivation for each set of experimental parameters will be presented.

For tumoral cells, our aim was to maximize the controlled cell death (apoptosis). Helium-oxygen treatment induces apoptosis in B16-F10 tumoral cells, leading to an apoptosis rate greater than 70 %. The morphological modifications will be presented: loss of membrane asymmetry, chromatin condensation, apoptotic bodies and chromosomal DNA fragmentation. These aspects have been also identified on Giemsa stain slides. Concerning the effect of cold plasma jet on COLO320DM tumoral cells, we can notice that the apoptosis percent was major (greater than 55 %) in the case of cells treated with plasma jets in combination with Verapamil (an inhibitor of drug resistance of cells). In the same experimental conditions, the atmospheric plasma jets did not determine the onset of apoptosis in the normal cells we used (RAW 264.7 murine macrophages).

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