

POTENTIALITIES OF DBD AND PLASMA GUN NON THERMAL PLASMA SOURCES IN CANCEROLOGY

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Over the past few years, nonthermal atmospheric pressure plasma has emerged as a novel promising tool in medicine. In Orleans, an important project "Plasmed" dedicated to the study of therapeutic applications of plasmas in cancerology and dermato-cosmetology, gather together plasma researchers, biologists, medical doctors and partner companies.

In a first step, the antitumor effect of plasma treatment has been studied on U87 malignant glioma (brain tumor) cells *in vitro* and *in vivo* using a pulsed floating electrode DBD plasma reactor driven by an adjustable power supply. This allows plasma treatments over a wide range of parameters concerning applied voltage and discharge frequency up to one kHz. Bioluminescence (BLI), a gene expression imaging modality that is closely dependant upon metabolism and proliferation, was used to assess cell viability or tumor growth together with MTT assay for *in vitro* experiments. In that case, 24-well plates were seeded with U87 cells previously transfected by the luciferase gene (U87-Luc). *In vitro* plasma induced a decrease of BLI resulting from a massive cell death. Already, very interesting results have been obtained *in vivo*, showing plasma antitumor effect on human U87-Luc grafted on Swiss nude female mice. They indicate that a very substantial delay in tumor grow is initiated for plasma treated tumors compared to non-treated ones. Both *in vitro* and *in vivo* data highlight a major antitumor effect of plasma treatment, may be linked to an apoptosis induction.

Studies are ongoing to elucidate mechanism of action of plasma in apoptosis induction and to understand the implication of the different plasma components in the cytotoxic effect. In parallel, series of experiments are now performed involving a new type of plasma applicator¹ consisting in plasma gun that allows treatment at long distance from HV discharge. Fraction of millimeter size plasma probe was developed for mouse colon treatment. After a general presentation of the project, we will report on *in vitro* and *in vivo* FE DBD experiments concerning U87 before presenting first results on tolerance study and effect on *in vitro* cell lines using plasma gun.

1. FR. WO2009050240 (2009), Centre National de la Recherche Scientifique (FR) and Université d'Orléans (FR), J.M. Pouvesle, C. Cachoncinlle, R. Viladrosa, A. Khacef, E. Robert, S. Dozias.

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