IW-005

Action of atmospheric pressure non-thermal plasma on the biomolecules and bio-organism

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Plasma medicine is an upcoming research area that has attracted the scientists to explore more deeply the utility of plasma. So, apart from the treating biomaterials and tissues with plasma, we have studied the effect of plasma with different feeding gases on modification of biomolecules. Additionally, we have checked the action of nanosecond pulsed plasma on the biomolecules. We have checked the plasma action on proteins ((Hemoglobin (Hb) Myoglobin (Mb) and lysoenzyme), calf thymus DNA and amino acids. The structural changes or structural modification of proteins and DNA have been studied using circular dichroism (CD), dynamic light scattering (DLS), gel electrophoresis, protein oxidation test, UV-vis spectroscopy and 1D NMR, while Liquid Chromatograph /Capillary Electrophoresis- Mass Spectrometer(LC/CE-MS) based qualitative bio-analysis have been used to study the modification of amino acids. We have also shown the effect of NaCl and ionic liquid on the formation of OH radicals using electron spin resonance and fluorescence techinques.

Keywords: Non-thermal plasma, Biomolecules, Bio-organism, Plasma medicine

IW-006

Interactions of non-thermal bioplasma with cancer, and immune cells

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There is the urgent need of new human health care's technology against cancers or tumors based on plasma electronics, medicine and biology. Main target of our study is to enhance efficacy and selectivity of plasma on cancer cells with metabolic modifiers and by inducing immune-modulations. We have evaluated the combination effect of plasma with metabolic modifiers (2-DG) on various solid and liquid cancers. Our findings suggest that 2-DG enhances the efficacy and selectivity of plasma and induces apoptosis in blood cancer cells through glucose deprivation. Finally, we conclude that 2-DG with non-thermal plasma may be used as a combination treatment against cancer cells. Our work also comprises plasma induced activation of immune cells; which find applications for curing various kinds of resistant tumors and other dreadful diseases. Plasma significantly activates immune cells which increases cell death in solid tumors in co-culture conditions.

Keywords: THP-1, plasma electronics, 2-DG

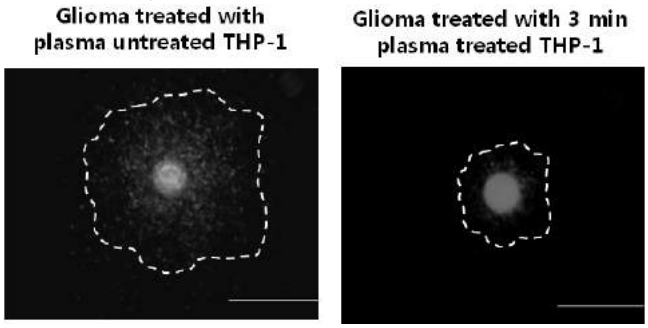

Figure 1. 3D spheroid culture to check invasion capabilities of gliomas treated with plasma activated immune cells