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Air DBD plasma effects on cell lines

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Cold plasmas at low/atmospheric pressure are widely utilized since almost 50 years to modify the surface of materials intended for biomedical applications, with the aim of driving the interactions of proteins, cells, and biological tissues with materials in lab wares, prostheses, biomedical devices and the like.

In the new field of Plasma Medicine [1, 2], direct exposure of living tissues to atmospheric pressure air plasmas have started to be utilized for therapeutic uses, e.g. for sterilization and decontamination of wounds, for wound healing and for other uses. In some of these applications, cell activation has been measured, a phenomenon that may be properly used in certain applications, at reduced "dose" of plasma exposure (i.e., of oxygen and of nitrogen reactive species such as ozone and NO_x gases, among others).

In this study we have tested cell adhesion and proliferation of an immortal, Saos 2, and a primary, NHDF, cell line exposed at different doses of air DBD plasma by means of a home-made plasma source.

Atmospheric plasma discharges applied on the two selected cell lines have shown an effect strongly dependent on cell type. We observed a stimulating plasma effect only for NHDF cells at low number of pulses which probably means that low doses of plasma generated species may induce positive effects in growth, proliferation and behaviour on this particular cell line.

Differently, we have seen an inhibition of cell adhesion and growth on the Saos 2 osteoblastoma cell line, directly dependent on the plasma doses. The obtained results may demonstrate that by properly tuning the dose of exposure of cells and biological tissues to air plasma it could be possible to stimulate positive or negative effects on cell growth, that would in turn be useful in several branches of Medicine like tumor suppression or tissue regeneration.

Keywords

DBD

cell line

plasma medicine