Effect of a non-thermal atmospheric pressure plasma effluent on both growth media and PC-3 prostate cancer cells

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As an emerging field in medicine, plasma treatment offers many opportunities and challenges. Critical to any future implementation of plasma devices in medical therapy are in-depth studies of the end effects that such plasma sources induce in a liquid environment. Of particular interest is how the changes in the liquid affect biological matter contained within it [1]. Thus studies on plasma induced liquid chemistry combined with cellular response assays such as those for cell viability and death pathway analysis are required.

In this study the influence of the effluent of an rf driven microscale atmospheric pressure plasma jet [2] operated in gas mixtures of helium and oxygen, on PC-3 prostate cancer cells and their growth media are investigated. Absolute densities of relevant reactive oxygen species - atomic oxygen, ozone and metastable singlet delta oxygen have been measured and simulated in the plasma jet [3, 4]. Analysis of growth media exposed to the plasma effluent via a two step nitric oxide quantitation assay [5] showed high concentrations of nitrite produced in the media. This suggests large amounts of nitric oxide - a molecule of critical importance in both cell death and proliferation [6] - is being delivered from the plasma source. Additionally clonogenic assays were carried out and showed a decrease in the surviving fraction of PC-3 cells that is correlated with increasing exposure time to the plasma effluent. Furthermore studies of cellular proteins via western blotting, after exposure to the plasma effluent, showed evidence of cleavage of key caspase proteins, suggesting that cell death induced by the plasma effluent exposure occurs via apoptosis, and is likely caused by nitrosative or oxidative stress.

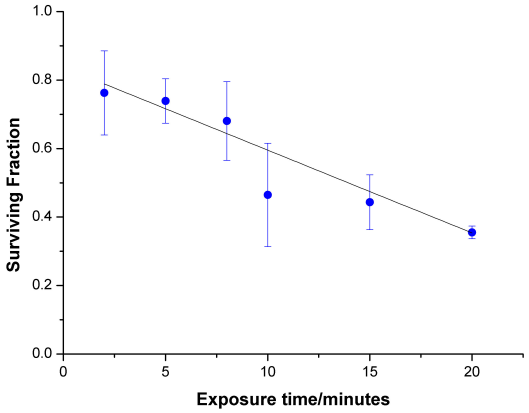

Figure 1: *Plot showing result of clonogenic assays*

References

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