DNA DAMAGE IN MAMMALIAN CELLS BY NON-THERMAL ATMOSPHERIC PRESSURE MICROSECOND PULSED DIELECTRIC BARRIER DISCHARGE PLASMA IS NOT MEDIATED BY OZONE

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Non-thermal dielectric barrier discharge (DBD) plasma is now being widely developed for various medical applications ranging from wound healing to cancer therapy but the physical and biological mechanisms of interaction of such plasmas with mammalian cells are still not well understood. Non-thermal DBD plasma is known to generate significant amounts of ozone [1] and it is possible that ozone may have a major role to play in mediating the interactions of non-thermal plasma with mammalian cells. Although typically requiring much higher treatment time than the typical times reported here, ozonation is, in fact, widely employed to kill micro-organisms in water [2]. Ozone therapy is also being studied and developed for wound healing, healing of diabetic ulcers and is known to have various medical and physiological effects in mammalian tissue [3, 4]

We have shown earlier that plasma treatment of mammalian cells submerged in a shallow layer of culture medium can result in dose dependent DNA damage. We specifically examined the induction of DNA damage by DBD plasma and showed that DNA damage is induced primarily by neutral active species [5]. We wanted to understand the role of ozone in mediating the interaction of non-thermal plasma dielectric barrier discharge plasma with mammalian cells. The goal of this paper was to test the hypothesis that ozone mediates the interaction of non-thermal atmospheric pressure dielectric barrier discharge plasma with mammalian cells. We show that ozone treatment is qualitatively different from non-thermal atmospheric pressure DBD plasma treatment and does not play a major role in mediating the interaction of non-thermal DBD plasma with mammalian cells.

References:

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