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The mode of plasma jet delivery of reactive species in biological tissues

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In this work, we have investigated the plasma jet delivery of reactive oxygen and nitrogen species (RONS) in tissues mainly through plasma initiated UV photolysis and transport. The mode of UV photolysis has been studied by using a quartz plate barrier while the transport mechanism has been studied by using an agarose tissue model. The effects observed in two modes have been compared with the direct plasma effect. The quantification of reactive oxygen and nitrogen species inside deionized (DI) water has been done using UV-vis absorption spectroscopy. Additionally, we have used potassium iodide-starch complex to observe the color changes in all three modes. RONS, mostly hydroxyl radicals (OH) are instantaneously produced inside the liquid by plasma initiated ultra-violets. The longer lived RONS penetrate slowly inside the liquid through agarose tissue after switching off the plasma which cause gradual absorbance/color change within the solution. The effect of direct plasma treatment is much higher as compared to the other two modes. Since, the delivery mechanism of RONS inside is the same when plasma jet is used for the treatment of tissues or liquid solution, our study should provide a new insight in understanding the plasma jet delivery mode of RONS inside tissues when it is applied for biomedical application.

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