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The impact of OH on DNA fragmentation and denaturing APOORVA KASHYAP, HAROLD MCQUAID , DAVIDE MARIOTTI, PAUL MAGUIRE, Ulster University — Plasma jets deliver large radical fluxes, including OH, and understanding radical interactions with biomolecules, in comparison with radiolysis studies, can help develop plasma medicine approaches. We used an environmentally isolated He-H2O RF plasma to supply fluxes dominated by H, OH and H2O2 to DNA in liquid. The plasma was situated remotely ($>$ 50 mm) and no charged species reach the liquid. Using this simplified plasma effluent chemistry, DNA fragmentation and denaturing was investigated using Gel Electrophoresis (GE). Significant double-stranded breaks occurred within 60 s and by 500 s, the average fragment size had decreased linearly from 50kbp to 5kbp, equivalent to an increase in number of fragments from 2000 to 15000. DNA exposure to H2O2 alone showed limited fragmentation. Simulation of species in liquid indicated a much shorter lifetime for H compared to OH, while H2O2 was long-lived. Thus, OH is most likely cause of rapid DNA fragmentation due to reaction with H atoms in the DNA sugar phosphate backbone. The measured OH flux into solution is 1x1014 OH s-1 therefore results in an estimated fragmentation rate, from GE, of 30 s-1, equivalent to $>$ 50 bonds broken s-1. This will be compared to rate coefficients from radiolysis.

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None

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