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# Safety implications of cold atmospheric pressure plasma in biomedical applications

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Despite growing interest in the application of cold atmospheric plasma (CAP) jet treatments as medical treatment strategies, there has been comparatively little research on the safety and the potential genotoxic and cytotoxic effects of CAP jet treatment. Recent interest in the safety implications of CAP jet treatment in biomedical applications has led to research interest where DNA damage is studied using synthetic models as well as *in vitro* cell culture assays. The synthetic models involve the use of a double-stranded DNA oligomer, where the respective strand ends are tagged with fluorophore and quencher molecules. The *in vitro* assays involve cell culture where DNA strand breaks are detected using the γ-H2AX assay as well as the cytokinesis block micronucleus cytome (CBMNCyt) assay where chromosomal damage (micronuclei MN, nucleoplasmic bridge NPBs and nuclear bus, Nbuds) is detected. DNA and chromosomal damage are spotted using all assays studied. These results provide first insight into how we might measure the genotoxic and cytotoxic effect of CAP jet treatments in human cells. As well as aid the development of CAP jet-based applications where DNA damage is necessary, such as in cancer treatment, and where DNA damage should be avoided, such as in dermatological applications and exposed-wound treatments.

[1] Hong, Sung-Ha, et al. "Genotoxicity and cytotoxicity of the plasma jet-treated medium on lymphoblastoid WIL2-NS cell line using the cytokinesis block micronucleus cytome assay." *Scientific Reports* 7.1 (2017): 1-9.

[2] Szili, Endre J., et al. "The assessment of cold atmospheric plasma treatment of DNA in synthetic models of tissue fluid, tissue and cells." *Journal of Physics D: Applied Physics* 50.27 (2017): 274001.

[3] Gaur, Nishtha, et al. "On cold atmospheric-pressure plasma jet induced DNA damage in cells." *Journal of Physics D: Applied Physics* 54.3 (2020): 035203.