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Measurement of plasma-generated RONS in the cancer cells exposed by atmospheric pressure helium plasma jet HEA MIN JOH, EUN JEONG BAEK, SUN JA KIM, TAE HUN CHUNG, Dong-A University — The plasma-induced reactive oxygen and nitrogen species (RONS) could result in cellular responses including DNA damages and apoptotic cell death. These chemical species, O, O_2^-, OH, NO, and NO_2^-, exhibit strong oxidative stress and/or trigger signaling pathways in biological cells. Each plasma-generated chemical species having biological implication should be identified and quantitatively measured. For quantitative measurement of RONS, this study is divided into three stages; plasma diagnostics, plasma-liquid interactions, plasma-liquid-cell interactions. First, the optical characteristics of the discharges were obtained by optical emission spectroscopy to identify various excited plasma species. And the characteristics of voltage-current waveforms, gas temperature, and plume length with varying control parameters were measured. Next, atmospheric pressure plasma jet was applied on the liquid. The estimated OH radical densities were obtained by ultraviolet absorption spectroscopy at the liquid surface. And NO_2^- is detected by Griess test and compared between the pure liquid and the cell-containing liquid. Finally, bio-assays were performed on plasma treated human lung cancer cells (A549). Intracellular ROS production was measured using DCF-DA. Among these RONS, productions of NO and OH within cells were measured by DAF-2DA and APF, respectively. The data are very suggestive that there is a strong correlation among the production of RONS in the plasmas, liquids, and cells.

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