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Diagnostics of Nonthermal Atmospheric Pressure Plasma for Plasma Biosciences and their Biological Cell Interactions throughout Ultraviolet Photolysis[1]

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Nonthermal biocompatible plasma (bioplasma) sources and their characteristics operating at atmospheric pressure have been introduced for biological cell interactions, especially used in Plasma Bioscience Research Center (PBRC), Korea. The electron temperatures and plasma densities are measured and analysed here for the nonthermal bioplasma sources in PBRC. Herein, we introduced plasma-initiated ultraviolet photolysis of water inside the biological solutions, to generate the reactive hydroxyl radical OH and hydrogen peroxide H_2O_2 species that may results in apoptotic cell death. These molecular changes in genomic DNA have been investigated by the confocal Raman and circular dichroism spectroscopy. We also found enhanced anticancer effect of monocytes and macrophages activated by nonthermal plasma which act as immune-modulator on these immune cells. Further, we investigated the action of the microsecond pulsed plasma activated media (MPP-AM) action on the lung cancer cells and its DNA oxidation pathway. Moreover, we also checked the action of heavy water and normal water activated water on the different cancer cell lines, to show the apoptotic cell death.

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