

Advanced Application of Non-thermal Atmospheric Plasma in Medicine and Agriculture †

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Abstract: Classical cancer treatments, such as chemotherapy, radiotherapy, and surgery, show various side effects, sometimes with low treatment efficiency. In recent years, non-thermal atmospheric plasma (NTAP) has shown promising anticancer activity against more than 20 cancer types during in vitro studies. NTAP interacts with the oxygen, nitrogen, water, etc. in air, to produce various radical and non-radical species, for example, superoxide ($O_2^{\bullet-}$), hydroxyl radicals ($\bullet OH$), singlet oxygen (1O_2), nitrogen dioxide (NO_2), atomic oxygen (O), and nitric oxide (NO), etc. During the plasma–liquid interactions, some relatively long lifetime reactive species are generated in liquid, such as hydrogen peroxide (H_2O_2), nitrites (NO_2^-), and nitrates (NO_3^-). Understanding the NTAP mechanism on the complex bio-organism is crucial, so it is important to check the effect of NTAP on the proteins. The impact of NTAP on the different proteins such as hemoglobin, myoglobin, MTH1880, NOXA-SH3 domain, catalase, etc., to understand the action protein folding mechanism. Our experimental studies reveal that the oxidation of amino acids in proteins increases as the plasma treatment time increases. Additionally, NTAP shows its influence in agriculture. NTAP promises efficient green technologies to enhance productivity while maintaining good food quality and safety in the many steps of the food cycle. As a result, applications of CAP in agriculture have led to the creation of a rapidly developing field called “plasma agriculture.” Plasma Agriculture potentially offers increased production with less impact on the ecosystem, by suppressing plant diseases and enhancing crop yields. Our recent study observed that CAP treatment on seeds could influence seed germination and plant growth, although plasma treatment efficiency varies with seed types and harvest year. Our results concluded that the concentration of germination index and morphology of plants depends upon NTAP treatment.

Keywords: Plasma; anticancer; germination index (List three to ten pertinent keywords specific to the article; yet reasonably common within the subject discipline.)

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Conflicts of Interest

The authors declare no conflict of interest.