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PlasTHER
THERAPEUTICAL APPLICATIONS OF COLD PLASMAS

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Front Matter

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The effect of UVC radiation on plasma activated water on killing Gram-negative bacteria

Ramin Mehrabifard [a], *Bernard Gitura Kimani* [a], *Zdenko Machala* [a]

[a] Division of Environmental Physics, Faculty of Mathematics, Physics and Informatics, Comenius University, Mlynská dolina, 842 48 Bratislava, Slovakia

Cold plasma has gained significant attention as a novel tool in biomedical and environmental applications due to its ability to generate a variety of reactive oxygen and nitrogen species (RONS). One of the most promising applications of plasma technology is the production of plasma-activated water (PAW), which exhibits strong antimicrobial properties and has been explored for disinfection, food safety, and medical treatments [1],[2]. PAW is produced by exposing water to cold plasma, leading to the generation of reactive species such as hydrogen peroxide, nitrites, nitrates, and peroxynitrites [3]. These species play a crucial role in bacterial inactivation; however, their instability over time poses a challenge for the long-term use of PAW in practical applications.

In this study, we investigate the potential of UVC radiation to reactivate PAW by regenerating its reactive species, thereby extending its antibacterial efficacy. UVC radiation is known for its ability to induce photochemical reactions in aqueous solutions, leading to the production of additional reactive species [4]. By exposing aged PAW to UVC light, we aim to restore its oxidative potential and enhance its effectiveness against bacterial pathogens. A combination of physicochemical analysis, including pH, oxidation-reduction potential (ORP), and reactive species quantification, along with bacterial inactivation assays, is used to assess the impact of UVC exposure.

The results of this study provide valuable insights into an improved technique for maintaining and even enhancing the antimicrobial potential of PAW. This approach could offer a practical and scalable solution for applications where prolonged storage and transport of PAW are required. By integrating UVC treatment, the stability and effectiveness of PAW can be significantly improved, making it a more reliable alternative for water disinfection, food preservation, and clinical sterilization.

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