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A Physically Triggered Cell Death via Transbarrier Cold Atmospheric Plasma Cancer Treatment

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Cold atmospheric plasma (CAP), an ionized gas, composed of complex multi chemical and physical factors, has shown promising application in medicine particularly in cancer treatment. Over the past decade, significant progress has been made in this direction. Both chemical and physical factors in CAP have been demonstrated to have unique biological impacts on cancer cells. From a chemically based vision, the anti-cancer efficacy will be completely determined by the cellular sensitivity to chemical factors in CAP, particularly reactive species. However, such a nature just sets a limitation for the efficacy of CAP because some cancer cells are resistant to reactive species particularly H₂O₂. In contrast, physical factors in CAP may be mainly electromagnetic effect, can also impact cancer cells under specific experimental conditions, which not only causes a strong killing effect on some reactive species-resistant cell lines but also provide non-invasive potential to use CAP in clinic application. Here, we will focus on two physical effects: direct killing by physically based strategy and sensitization of cancer cells to drugs used in chemotherapy. We hope these discussions could inspire peers in terms of new directions in plasma medicine.



Short Bio

Dr. Dayun Yan is currently a postdoctoral scientist at the Department of Mechanical and Aerospace Engineering at George Washington University. He obtained Ph.D. degree (Mechanical Engineering) at George Washington University under the supervision of Dr. Michael Keidar. Dr. Yan has nearly eight years' experience in cold atmospheric plasma-related research. He interests in the topics in plasma medicine, plasma sources, plasma physics, and biophysics. Currently, he focuses on the physical effect of cold plasma on cells and tissues, which may provide a new vision to understand the interaction between cold plasma and the biological system. He served as the discussion leader or session chair at plasma-related conferences (Gordon Research Seminar, ICOPS, and PPPS). He presented several invited talks at key conferences (GRS, GRC, ICOPS, IWPCT, PPPS, ICPM, and ISPC). Dr. Yan has published a book (Cold Plasma Cancer Therapy) and more than 40 papers in peer-reviewed journals.

