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# Temporal resolution of cell death signaling events induced by cold atmospheric plasma and electroporation in human cancer cells

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## ABSTRACT

Cancer treatment resistance and their invasive and expensive nature is propelling research towards developing alternate approaches to eradicate cancer in patients. Non-thermal, i.e., cold atmospheric plasma (CAP) and electroporation (EP) applied to the surface of cancerous tissue are new methods that are minimally invasive, safe, and selective. These approaches, both independently and synergistically, have been shown to deplete cancer cell populations, but the signaling mechanisms of death and their timelines of action are still widely unknown. To better understand the timeframe of signaling events occurring upon treatment, human cancer cell lines were treated with CAP, EP, and combined CAP with EP. The stages and incidence of apoptosis were tracked through time via flow cytometry while the activation/inactivation of the penultimate apoptotic signaling complex was examined through real-time fluorescent imaging. These treatments represent a promising new therapy in the global fight against cancer.

## KEYWORDS

Cold atmospheric plasma, CAP, electroporation, EP, cancer, oncology, apoptosis, flow cytometry, microscopy