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Mechanisms of selective antitumor action of cold atmospheric plasma DAVID GRAVES, University of California at Berkeley, GEORG BAUER, University Medical Center Freiburg, Germany — Transformed (precancerous) cells are known to be subject to elimination through intercellular RONS-dependent apoptosis-inducing signaling. It is a remarkable fact that the chemical species utilized by apoptosis induction in transformed cells are essentially identical to chemical species created by cold atmospheric plasma (CAP) in aqueous solutions. The association between CAP-induced biochemistry and natural cell anti-tumor mechanisms offers the opportunity to establish a rationale for the observed successes of CAP in selectively eliminating tumor cells in vitro and in vivo. In particular, 1O2 appears to act to selectively induce apoptosis in tumor cells, and can also result in self-perpetuating, cell-to-cell apoptotic signaling. Various CAP-generated liquid phase species can react to form 1O2, thus providing a hypothetical mechanism to explain how CAP can trigger therapeutic apoptosis in tumors. The analysis of model experiments performed with defined RONS in vitro implies that CAP-derived 1O2 induces the mechanism through which CAP acts selectively against cancer cells in vitro and tumors in vivo. This hypothesis needs to be tested experimentally in order to establish its validity.

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