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Low-temperature plasma needle effects on cultured metastatic breast cancer cells SEAN KNECHT, SVEN BILEN, MICHAEL MICCI, TIMOTHY BRUBAKER, MICHAEL WILSON, IAN COOK, NICHOLAS CZESAK, GARRET HIPKINS, Pennsylvania State University — The Penn State Low-Temperature Plasma group is presently investigating the applications of low-temperature plasma for biomedical applications, including the effects on MDA-MB-231 metastatic breast cancer cells. A plasma needle system has been designed and constructed that consists of a 22-gauge stainless steel syringe needle, which acts as the high-voltage electrode, covered with PEEK tubing as the dielectric with a ring ground electrode on the outside. The system is driven by a low-frequency AC voltage amplifier, with typical operating conditions of 2–5 kV peak voltage at 5 kHz. Helium is used as the working fluid and produces a plasma jet with $\sim$ cm's visible extent. Cultured breast cancer cells were provided by our collaborator and exposed to the plasma needle for varying doses and detachment of cells was observed. The effects are attributed to reactive oxygen and nitrogen species generation and transport through the cell culture medium. Plasma needle characterization and the results of the breast cancer experiments will be presented.

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