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On the use of Plasma Activated Liquids for the treatment of cancer cells

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Abstract

Several studies focus on the treatment of liquids via cold atmospheric pressure plasma (CAP) to enable the production of plasma-activated liquids (PALs) containing reactive oxygen and nitrogen species (RONS) having selective anticancer activity [1,2]. In this work, a microsecond pulsed dielectric-barrier-discharge jet was used to produce PAL for the treatment of T-leukemia cells, spleen lymphoblast cell line and normal lymphocytes; while a multiwire plasma source was used for the production of PAL for the treatment of Epithelial Ovarian Cancer (EOC) and non-cancer epithelial cell lines of ovarian origin (HOSE).
On T-lymphoblastic cell line, PAL induced apoptosis through the activation of the intrinsic pathway and inhibited cell-cycle progression. The use of the scavengers NAC or O-phenantroline significantly decreased PAL pro-apoptotic activity. For the first time, results of PAL on leukemia cells cultivated in hypoxia, which plays a critical role in promoting chemoresistance, are presented [1,3].
The PAL treatment showed a selective cytotoxic effect on EOC with respect to HOSE. Moreover, further investigation showed the ability of non cancer cells to adapt to the oxidative burst, induced by PAL, by increasing antioxidant proteins (*i.e.* superoxide dismutase) levels [2].
Taken together, our results provide a deeper understanding on the cellular and molecular impact of PAL on cancers cells, highlighting its partial selectivity towards malignant cells and its cytotoxic activity in model of chemoresistance, such as cell cultured in hypoxia.

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