

The selective anti-cancer mechanism of cold plasma

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Abstract

Introduction: Nowadays cancer is considered the second mortality reason worldwide. Surgery, chemotherapy, and radiotherapy are expensive common therapies that have many side effects. Therefore it's so important to present new, efficient therapies. During recent decades, many studies have shown the effective potential of cold plasma in selective destruction of cancer cells. In physics plasma is a neutral ionized gas composed of electrons, ions, radicals, electromagnetic fields and so on. Plasmas are generally divided into thermal or non-thermal and can be generated by different methods.

Methods: Optical emission spectroscopy is one of the most common methods to determine reactive species produced in the plasma as well as the temperature. Cold plasma irradiation to cultured cells or tissues can be done in a direct or indirect manner. The flow cytometry assay, is used to determine cell death. Complementary to experiments, simulations, help us to understand the anti-cancer mechanism of cold plasma.

Results and discussion: The interaction of reactive oxygen and nitrogen species produced in plasma, with cell membrane lead to lipid oxidation and increase of cell membrane permeability. Subsequently, an increase in oxidative stress induces DNA damage and cell apoptosis. Furthermore, plasma induces an increase of intracellular calcium that can be considered as an anti-cancer mechanism of plasma. Tissue oxygenation is another result of plasma that open new opportunities for treatments in combination with radiotherapy.

Conclusion: According to the positive results, it appears that cold plasma can be considered as a promising treatment option in cancer therapy.

Keywords: cold plasma, cancer, reactive species, calcium

Reference

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