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The Effects of Atmospheric Plasma and Oleocanthal on Cancer Cell Migration

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Cold atmospheric plasma cells, which have a wide use area, affects the processes of proliferation, migration and differentiation, but mechanisms of treatment are not fully known. Oleocanthal has anti-cancer, anti-inflammatory and anti-oxidative effects in vivo and in vitro conditions. In our study, we used MCF-7, MDA-MB-231 and NB2a cell lines and also adipose derived mesenchymal stem cells. The cells were exposed to different dilutions of oleocanthal and cold atmospheric plasma. After treatments MTT assay was applied to investigate cell proliferation rate and toxic effects of oleocanthal and cold atmospheric plasma. For cell migration test, cells were performed (+) plus shape using pipette tips. Cell proliferation and migration were evaluated in a semi-quantitative scoring system. Apoptosis and oxidative stress were assessed by TUNEL and NOS immunohistochemistry and immunoreactivities were analyzed using H-score method. According to MTT results, application of cold atmospheric plasma with oleocanthal significantly inhibited cancer cell proliferation migration whereas these parameters were increased in mesenchymal stem cells. However, immunoreactivities of NOS markers and TUNEL positivity were increased in cancer cells whereas the opposite effect was observed in mesenchymal stem cells.

As a result of treatments, it was determined that cold plasma added to oleocanthal enhanced proliferation and migration in normal cells, which decreased proliferation and migration of cancer cells. It was thought that complementary treatment with a lesser side effect could provide a better quality of treatment using these agents.

Keywords: Cancer Cells, Mesenchymal Stem Cell, Oleocanthal, Cold Atmospheric Plasma, Oxidative Stress, Apoptosis.