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Gene modulation by ozone: Aurora kinases A and B in the context of breast carcinoma

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Introduction: The Aurora kinases A (AURKA) and B (AURKB) are crucial regulatory enzymes of the cell cycle and mitosis, frequently overexpressed in various types of cancer, including breast cancer. **Objective:** Given the growing investigation into the therapeutic potential of medical ozone in oncological settings, this study aimed to evaluate the effects of different ozone concentrations on the expression of AURKA and AURKB genes in breast cancer cell lines. **Methods:** MDA-MB-134 (luminal B) and HTB-123 (triple-negative) cells were cultured under controlled conditions (37°C, 5% CO_2) and treated with ozone doses (10, 15, 20, 30, and 40 µg/mL) via gas exposure in culture medium for 45 minutes. After established time points (48 hours and 72 hours), total ribonucleic acid (RNA) was extracted and complementary deoxyribonucleic acid (cDNA) was synthesized. Gene expression quantification was performed by reverse transcription-quantitative polymerase chain reaction (RT-qPCR), normalized using validated reference genes. Statistical evaluation was conducted using analysis of variance (ANOVA) followed by Tukey's post hoc test, with significance set at $p<0.05$. **Results:** A significant reduction in AURKA expression was observed in both cell lines starting at 30.0 µg/mL, with HTB-123 showing greater sensitivity to the 40µg/mL dose after 72 hours ($p<0.01$). For AURKB, a more pronounced dose-dependent response was observed in MDA-MB-134, with a statistically significant decrease from 15 µg/mL, especially after 72 hours ($p<0.05$). **Conclusion:** Treatment with increasing doses of ozone negatively modulates AURKA and AURKB expression, demonstrating a potential antitumor effect associated with cell cycle regulation. These findings contribute to the understanding of ozone's role as an adjuvant agent in breast cancer therapy, with differential impact on distinct molecular subtypes.

Keywords: breast neoplasms; ozone; genomic instability; AURKA.