Temporary Inhibition of "Polo Like Kinase-1" Using the siRNA Technique in Triple-Negative Breast Cancer Cells To Reduce the Expression of Mesenchymal Markers

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In 2022, 2.3 million cases of breast cancer were diagnosed worldwide, with approximately 17% classified as triple-negative breast cancer (TNBC). TNBC is challenging to treat due to the absence of estrogen, progesterone, and HER2 receptors. Studies reveal ethnic disparities between non-Hispanic white (NHW) and Black women (NHB) using the MDA-MB-231 and MDA-MB-157 cell lines. Overexpression of Polo-Like Kinase-1 (PLK-1), a mitotic kinase in the G2 and M phases, promotes uncontrolled proliferation and treatment resistance. This study hypothesizes that inhibiting PLK-1 using the siRNA technique in TNBC will reduce the expression of epithelial-mesenchymal transition (EMT) markers: Vimentin, N-cadherin, ß-catenin, and E-cadherin. After 48 hours of siRNA transfection, RNA was converted into complementary DNA for RT-PCR analysis, and proteins were used for Western blotting. T-test results from RT-PCR showed a significant reduction in PLK-1 expression in both cell lines, with p-values of 0.009 in NHW-derived cells and 0.0152 in NHB-derived cells. Additionally, NHW-derived cells exhibited a decreasing trend in Vimentin, while NHB-derived cells showed an increasing trend in E-cadherin. Western blot results confirmed PLK-1 inhibition, with p-values of 0.0035 in MDA-MB-231 and 0.0009 in MDA-MB-157 cell lines. This resulted in an increasing trend of ß-catenin in MDA-MB-231, while in MDA-MB-157, there was a statistically significant reduction in N-cadherin (p-value of 0.0032) and a decreasing trend of Vimentin. These findings support siPLK-1 as a promising strategy for transitioning TNBC cells into a benign state, particularly in NHB women, who face the third-worst survival prognosis worldwide and showed the best response to this strategy.

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