Single Amino Acid Polymorphism at Position 1709 Alters Integrin Beta 4 Function in BT-549 Breast Cancer Cell Growth

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Breast cancer is a leading cause of cancer death around the world; However, Black women are disproportionately affected as they are more likely to develop triple negative breast cancer and have higher mortality rates overall. A single amino acid polymorphism (SNP) was found at the 1709 amino acid position of Integrin Beta 4 (ITGB4), a protein that enhances cancer cell proliferation. At 1709, African populations often have proline, while Europeans have leucine. This study aims to determine whether this SNP affects breast cancer cell growth and ITGB4 function. It was hypothesized that proline cells would have higher growth and ITGB4 expression. MTT assay, TIRF Microscopy, and Phylogeny were conducted to examine the significance of this SNP. First, cells of 1709 proline (1709P), 1709 leucine (1709L), and an Empty Vector were cultured. Cell proliferation rates were measured through an MTT assay for cell counts. TIRF microscopy was also conducted to visualize ITGB4 expression on the cell surface. Finally, phylogeny of ITGB4 was studied to determine if the 1709 amino acid was evolutionarily conserved. Results showed a significant difference between proline and leucine cell variants. 1709 P displayed higher cell proliferation rates through MTT assay and stronger ß4 expression through TIRF microscopy. The 1709L was evolutionarily conserved, signifying that it is important to Integrin Beta 4 protein function. These results suggest that proline at 1709 enhances cell proliferation speed and increases ITGB4 expression in breast cancer cells, which could help explain the mechanisms causing mortality rates differences between racial populations.

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