عنوان مقاله:

A Mimicry of the Tumor Microenvironment's Impact on SLC۴A۷ (NBCn۱) and Caspase-۳ Gene Expression in Breast Cancer, along with in Silico Traits of NBCn۱

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خلاصه مقاله:

Background: This study investigates the relative expression of the Na+, HCO۳- cotransport gene NBCn۱, and caspase-۳ within the tumor microenvironment of human breast cancer, considering the in vivo microenvironment. Method: In this experimental study, breast cancer MDA-MB-۲۳۱ cells were cultured under normoxia/hypoxia conditions for ۲۴, ۴۸, and ۷۲ hours with varying glucose concentrations (۵.۵, ۱۱, and ۲۵ mM). The mRNA expression of NBCn۱ and caspase-۳ was evaluated using real-time polymerase chain reaction. The stability and binding pocket of NBCn۱ were assessed using DispHred and the Computed Atlas of Surface Topography of proteins (CASTp) servers, respectively. The location prediction of the protein was determined using the Transmembrane Helices; Hidden Markov Model (TMHMM) server. Results: Normoxia led to an increase in NBCn۱ expression during all three time periods, displaying heterogeneity. The expression was particularly elevated at glucose concentrations of ۲۵ and ۵.۵ mM. In hypoxic conditions, gene expression was reduced; however, an increase in glucose concentration enhanced SLC۴A۷ expression. Specifically, a glucose concentration of ۲۵ mM led to decreased caspase-۳ expression under hypoxic conditions. In silico studies revealed that SLC۴A۷ becomes disordered when the pH falls below ۷, with most amino acids in the binding pocket being nonpolar. Conclusion: The heightened risk of breast cancer metastasis may be linked to the upregulation of SLC۴A۷ and downregulation of caspase-۳ expression, underscoring their fundamental roles in cancer treatment and prevention. SLC۴A۷ is a transmembrane protein, and its folding is pH-dependent.

کلمات کلیدی:

Tumor Microenvironment, SLC۴A۷, Caspase-۳, Breast neoplasms, In silico