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"In Vitro Comparison of Oral Squamous Cell Carcinoma HPV-positive and HPV-negative Invasiveness and Voltage-Gated Sodium Channel Isoforms Expression"

Voltage-gated sodium channels (VSGCs) are transmembrane proteins that allow for the flow of sodium ions across the cell membrane. Their function is well known to propagate action potentials along nerve and cardiomyocytes muscle cells. More recently, VGSCs are also recognized to be abnormally expressed in cancer cells. The increased expression of VGSCs is associated with increased cell migration and invasion in cancer metastasis in several types of cancer. While sodium channel isoforms can perform similar biological functions, they can also exhibit unique properties and roles within a cell. VGSCs have at least nine distinct sodium channel isoforms found in mammals: Nav1.1, Nav1.2, Nav1.3, Nav1.4, Nav1.5, Nav1.6, Nav1.7, Nav1.8, and Nav1.9. Each isoform affects different parts of the body. For example, Nav1.5 is primarily expressed in cardiac muscles.

It is essential to understand the underlying mechanism that drives cancer cell migrations in cancer metastasis. As cancer metastasizes, the prognosis becomes progressively worse. Therefore, identifying molecular pathways that regulate rapid cell motility will improve cancer treatments and outcomes. Our current experiments generated qualitative and quantitative data comparing two types of oral squamous cell carcinomas (OSCCs): human papillomavirus-positive (HPV-positive) and human papillomavirus-negative (HPV-negative). The late stages of OSCCs are characterized by metastasis, and recent studies have shown that despite HPV infection being a significant cause of increased incidences of cancer, HPV-positive OSCCs have demonstrated a 53% improved overall survival rate compared to HPV-negative OSCCs. An invasive assay was performed over a seven-day period from which the area of the cell migrations through a 1% agarose matrix was calculated. In addition, to further explore molecular pathways, an immunofluorescence assay was performed. Indirect staining was conducted to qualitatively visualize VGSCs expression patterns in OSCC.