The Effect of Inhibiting DNA-Protein Kinase and ADP-Ribose Polymerase on Head and Neck Squamous Cell Carcinoma Survivability

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Head and neck squamous cell carcinomas (HNSCC) are aggressive tumors with high recurrence rates and poor patient survival. Although HNSCCs only account for 3% of cancers in the United States, there has been an increase in diagnoses over the past 20 years due to the rising prevalence of human papillomavirus (HPV)-associated tumors (Chaturvedi et al.). Drugs such as Cetuximab, an epidermal growth factor receptor (EGFR) inhibitor, are clinically used for patients diagnosed with HNSCC. However, many patients have intrinsic or have acquired resistances to the Cetuximab with radiotherapy requiring new forms of therapy to combat HNSCC tumors. Drugs such as DNA-Protein Kinase inhibitor (DNA-PKi) NU7441 and Poly ADP Ribose Polymerase inhibitor (PARPi) Olaparib are two drugs that are currently being tested to be potential treatments to HNSCC. The question posed is whether inhibition of DNA-PK and PARP significantly decrease the survival of Head and Neck Cancer cells, and if so, are there any synergistic or additive effects when the drugs are combined with each other and radiotherapy? The experiment was conducted with SCC-1, SCC-2, SCC-6, and SCC-90 HNSCC cell lines with the concentration of the drugs ranging from 0.5 uM to 1.0 uM of each drug. The results show that the use of DNA-PKi NU7441 and PARPi Olaparib decreased the survival of each cell line tested and proved to have a synergistic effect when paired with radiotherapy. Additionally, the use of DNA-PKi NU7441 displayed a slightly cytotoxic effect on the HNSCC cell lines without radiotherapy suggesting that with higher concentrations, the use of DNA-PKi as a target therapy could potentially work.

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