University of Utah
UNDERGRADUATE RESEARCH JOURNAL

Compiling Cell Viability Data for Vitro Studies: Improving the Efficacy of Treatment for Meningioma Tumors

Azeem Mohammed, Dr. Randy L. Jensen MD, PhD , Dr. David L. Gillespie PhD, Majid Khan BS

Department of Neurosurgery

Meningiomas are non-malignant brain tumors that cause difficulty in concentration, memory loss, personality changes, and many other life altering complications, depending on the part of the brain which is affected. They are also the most common of all benign brain tumors, accounting for 36.4% of primary central nervous system tumors (1). Radiation therapy can be effective to treat meningiomas but there are side effects from this treatment. It is essential to reduce radiation toxicity as much as possible in treatment of meningioma patients. This project seeks to evaluate the innovative combinations of pharmacologic drugs, chemotherapeutic agents, and complete CRISPR knockout of the HIF-1a that plays a role in tumorigenesis. This all functions to increase anti-tumor efficacy while decreasing the toxicity of radiation therapy. A better understanding of the use of these methods in meningiomas will lead to better treatment options for these cancer patients. This research project is dependent upon maintaining a consistent culture of GAR WT and GAR 7-11-2 meningioma cell lines. The treatments via PARP inhibitor, radiation therapy, and exposure to hypoxia were done while the cells were in the 6 well plates. The cells were transferred to a 96 well plate so the Guava machine can analyze the viability of the cells post radiation/PARP inhibitor treatment. The data was collected in increments of 48, 72, and 96 hours to maximize the consistency and accuracy of the data. This data revealed that these

meningioma cell lines have a potential resistance to radiation therapy. This was validated with a LD-50 trial of 20 gray dose of radiation used for treating this cell line. The cell viability after this treatment was approximately 20 percent which is enough for the cells to make a recovery. A typical dose of radiation given to patients is approximately 10 gray, so these results point to the fact that these cell lines are potentially resistant. Another finding is that a PARP inhibitor treatment can help lower cell viability if treated in combination with radiation therapy. This combination is exemplified as the lowest viability so far in treating this cancer. Further research and experimental testing need to be done in order to confirm these findings.