Investigating a Novel Treatment for Breast Cancer Brain Metastasis: The Alpha-v Integrin Inhibitor Cilengitide Potentiates Cisplatin Chemotherapy

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Breast cancer is the most common cancer in women worldwide with almost 1.7 million new cases every year. A deadly form of breast cancer, called breast cancer brain metastasis, results in a median survival of only four months. This study aims to improve a commonly used chemotherapy treatment by combining it with a drug that can inhibit metastasis, thereby increasing the life expectancy. The extracellular matrix (ECM) and transmembrane proteins, such as alpha-v integrin, are vital to the process of metastasis as they help propel the cancer to other tissues. Cilengitide, a cyclic RGD pentapeptide, is an alpha-v integrin inhibitor that plays a role in detaching tumor cells from the ECM and can affect angiogenesis, cell viability, and cell motility. In a 2009 study, a combination of cilengitide and temozolomide, a brain cancer chemotherapy, drastically increased glioblastoma tumor cell death. For this project, a similar approach was studied for breast cancer brain metastases (BCBM) by combining the drug cilengitide and cisplatin chemotherapy. The efficacy of using both drugs together was analyzed in two different breast cancer cell lines. After treatment, cell viability was measured using a colorimetric assay and the data was quantified with a spectrophotometer. The data suggests that a combination of cilengitide and cisplatin chemotherapy was not effective for one cell line, but significantly effective for the other cell line. The successful cell line was derived from a metastasis of breast adenocarcinoma and was modified to express more alpha-v integrin. Since BCBM also accumulates alpha-v integrin during metastasis, my results hold exciting potential for BCBM treatment. For future research, I will be looking at how the drugs affect breast cancer cell motility.