Regeneron WESEF 2023 Finalist

Maxwell Ma

Medicine & Health

Investigating The Theranostic Potential of Antibody X Against Small Cell Lung Cancer

Small cell lung cancer (SCLC) is an extremely aggressive form of lung cancer, and patients who are diagnosed with it have a very poor prognosis, as the 5-year survival rate is just 7%. This is partially due to a lack of therapies that produce permanent responses from patients, so new and effective therapies need to be developed to treat SCLC. Targeted treatments are effective and safe at destroying tumors, and the target for this study is delta-like ligand 3 (DLL3). This protein is specifically expressed on the cell membrane of SCLC cells but not healthy cells. By targeting DLL3 with an antibody that is conjugated to a radioisotope, the tumor is able to be imaged or destroyed. Typically, most treatment options image and treat cancer using unrelated drugs, but there is a developing field of radiation therapy that uses the same clone of antibody to both image and treat cancer, which is called theranostics. This is a promising new field of radioimmunotherapy because it allows doctors to dynamically view drug uptake in the tumor to provide a more informed, accurate, and safe treatment option. To create possible novel for SCLC, we developed a novel radioimmunoconjugate, which has the anti-DLL3 antibody, Antibody X. In order to achieve this goal, Antibody X was radiolabeled with Lutetium-177 with high purity to produce the radioimmunoconjugate [177Lu]Lu-DTPA-Antibody X. It was tested in vitro with a cell binding assay against the NCI-H82 cell line, which has a high expression of DLL3. From the data retrieved, it was concluded that there was high and specific percent cell binding of the [177Lu]Lu-DTPA-Antibody X to the NCI-H82 cells in the in vitro cell binding assay. The efficacy of Antibody X as a therapeutic agent in vitro means that it would likely also function well in vivo, where the toxicity, tumor regression, and overall survival of mice could be assessed. Ultimately, the goal of this research would be to translate Antibody X into the clinic in order to provide a specific, effective, and informed treatment option to patients who are diagnosed with small cell lung cancer.