Cancer Targeting and Drug Delivery by Chimeric Proteins

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Every year, one in eight women will be diagnosed with breast cancer. A subtype of breast cancer is triple negative breast cancer, a disease in which tumors lack expression of estrogen receptors, progesterone receptors, and the human epidermal growth factor receptor 2. Because it lacks HER2 receptors and its growth is not supported by the hormones estrogen and progesterone, triple-negative breast cancer does not respond to hormonal therapies and HER2-targeted therapies. The aim of this project is to find a potential treatment that specifically targets and kills triple negative breast cancer cells without damaging healthy human cells. One of the options is to treat breast cancer patients using recombinant anthrax toxin. In this study, triple-negative breast cancer cells were treated with different combinations and concentrations of anthrax toxin for different amounts of time. Little is known about the mechanism of how anthrax toxin targets different proteins (enzymes) in the different pathways within the cancer cell. This mechanism was examined on the transcriptional and translational levels using qRT-PCR and Western Blot. The results indicate that recombinant anthrax toxin can kill triple-negative breast cancer cells and that treating triple-negative breast cancer cells with 300 ng/mL of Edema Toxin for 72 hours had the most powerful killing capacity. Treating the cancer cells with anthrax toxin also resulted in the upregulation of several genes and proteins from different pathways. In conclusion, anthrax toxin is a potential treatment for patients with triple-negative breast cancer.