The Evasion of Cell Death by Cancer Cells Detached From the Extracellular Matrix

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Metastasis occurs when cancer cells successfully evade a type of cell death known as anoikis, which allows them to travel freely throughout the body. Anoikis, when occurring naturally, is cell death due to detachment from the extracellular matrix (ECM). Metastasis is responsible for about 90% of all deaths due to cancer. This project's overarching goal was to make a step towards understanding how cancer cells evade anoikis, and how to induce any apoptotic process on these metastatic cells. Breast cancer (MDA-MB-231) and lung cancer (A549) were both tested with 4 different chemical agents and alamarBlue assays (tests of cellular viability) were conducted. The 4 chemical treatments include Buthionine sulfoximine (BSO), Ferric ammonium citrate (FAC), Erastin, and RAS-selective lethal 3 (RSL3). BSO is an anoikis inducer which works by preventing the synthesis of Glutathione. FAC, Erastin, and RSL3 are ferroptosis inducers. They each work through their own process, all of which are highlighted in my project. A combination of BSO and FAC proved the most effective in reducing viability in cells detached from the ECM, while RSL3 was most effective in reducing viability in cells still attached to the ECM. These results were supported by statistical analysis of the data. The results of my project indicate a difference in the induction of ferroptosis and anoikis, likely occurring due to modulated protein expression. I will continue my research this summer, analyzing the expression of the proteins Ferritin and GPX4 to understand their role in the cellular evasion of both anoikis and ferroptosis.