The Effect of Gefitinib on Cell Proliferation and Invasion in 2D and 3D Cultures of MDA-MB-231 Breast Cancer Cells

Choi, Henry (School: Saint Paul Academy and Summit School)

This experiment aimed to determine the viability of Gefitinib, an epidermal growth factor receptor inhibitor, as a treatment for triple-negative breast cancers (TNBC) and to illustrate the potential benefits of using 3D cultures as opposed to 2D cultures during in vitro studies. Previous research has shown Gefitinib to be successful in inhibiting lung cancers and that 3D cultures more effectively represent in vivo tumors as opposed to 2D cultures. The 2D trials were comprised of four groups with concentrations of Gefitinib at 0 uM, 5 uM, 10 uM, and 20 uM. Each group had two replicates, and wells were imaged after five days of incubation. Images were processed to determine the percentage of each well covered by cells. The 3D trials were comprised of five groups, each with three to four replicates. The groups had Gefitinib concentrations at 10 uM and 20 uM, both of which had a corresponding control group of Dimethyl Sulfoxide (DMSO) vehicle. A 0 uM control group was also used. The 2D trials showed that an increase of Gefitinib concentration decreased cell proliferation, with a p-value of 0.0261. The 3D trials showed that higher concentrations of Gefitinib increasingly slowed cell invasion, with p-values <0.0001. Both 2D and 3D cultures experienced slower cell proliferation with Gefitinib, and 3D cultures were less sensitive to treatment. The results suggest that Gefitinib may be a viable treatment for TNBC and that the adoption of spheroids as a tumor model may make the development of potential therapies more efficient.

Awards Won: