Investigating Amalgamations of NURF Knockdown and Chemotherapies through Metabolic Deviations in Tumor Cells

Vaidyanathan, Ashish (School: Science, Math, and Technology Center at Mills E. Godwin High School)

Experimentation was conducted to determine the presence of metabolic deviations as a result of nucleosome-remodeling factor (NURF) knockdown in combination with chemotherapies. Due to large levels of tumor relapse, a more thorough and permanent therapy was sought to improve prognoses of those afflicted with triple negative breast cancer. Genetic knockdown of NURF was induced through shRNAs and was used concurrently with doxorubicin, etoposide, and paclitaxel. It was hypothesized that the amalgamation of NURF knockdown and doxorubicin would result in the largest metabolic deviations as it has been known to cause the most sensitization in cell-autonomous assays. An amalgamation of no chemotherapy with a no knockdown cell line was used as the control. Results indicate that NURF knockdown does cause statistically significant differences in baseline OCR levels when used with the two topoisomerase II poisons, doxorubicin and etoposide. However, results regarding deviations in baseline ECAR levels remain inconclusive as a result of statistical insignificance. It is believed that NURF is recruited along with metabolic intermediaries and products to promote abnormal gene expression. Once NURF is inhibited and DNA damage is enhanced with the topoisomerase II poisons, the cells rely on other forms of epigenetic modification to sustain the abnormalities; consequently, there exists an increase in metabolic activity to produce intermediaries and products which are noted to be involved as epigenetic modifiers. Future research can be conducted in order to target metabolism in conjunction with NURF KD and chemotherapies in order to prevent any means of tumor relapse.