Overcoming Docetaxel Resistance in Prostate Cancer

Yuan, Thomas (School: Paul Laurence Dunbar High School)

Acquired drug resistance is one of the biggest obstacles in cancer treatment, leading to increased chances of cancer relapses and progression. To combat drug resistances and to improve treatment outcomes, combination treatments, where multiple therapeutic agents are given simultaneously, are widely utilized in current cancer treatment protocols. In this study, the novel drug Obatoclax, a BCL-2 (B-Cell Lymphoma 2 Protein) inhibitor, was used in combination with 25 nM Docetaxel to evaluate their effects on prostate cancer apoptosis pathways. First, an Obatoclax treatment concentration of 4 nM was determined using Cell Viability Assays on PC3 Taxol-Resistant (TR) and DU145 TR prostate cancer cells. Then, Western Blots and Colony Formation Assays were performed with a combination of Obatoclax (4nM) and Docetaxel (25nM) to measure apoptosis and the molecular effects of the treatment. Results indicated that there was a very significant reduction of cancer cell colonies, a large reduction of PARP (Poly ADP-Ribose Polymerase) concentration, and a large increase of C-PARP (Cleaved - PARP) concentration. The results suggested that the treatment caused a strong apoptotic effect within TR prostate cancer cells, and may significantly improve chemotherapeutic efficiency and patient prognosis. Ongoing research includes using Western Blots to evaluate other indicators of apoptosis, such as BCL-2, BAX (BCL-2 Associated X), and BCL-2 XL (BCL-2 Extra Large) proteins.

Awards Won: