Sulforaphane and Panobinostat: A Novel Therapy for Glioblastoma Multiforme

Koduru, Harika (School: Bergen County Academies)

Glioblastoma Multiforme (GBM) is not only a ruthless cancer but also the most common form of cancer diagnosed in adults. Despite currently available treatment strategies and emerging therapies, the prognosis for patients remains poor. This study aimed to investigate the potential efficacy and mechanism of action (MOA) of the histone deacetylase (HDAC) inhibitor, Panobinostat, in combination with the naturally occurring phytochemical, Sulforaphane. HDAC inhibition is an emerging therapy that affects histone-regulated gene expression and has been shown to induce cell cycle arrest and apoptosis in cancer models However, Panobinostat causes adverse effects such as heart attacks and liver disease therefore the purpose of my study was to establish a lower dosage of Panobinostat by combining it with a naturally occurring chemical such as Sulforaphane with the same efficacy. Initially employing in silico techniques on GEO datasets GSE108958 and GSE14364. It was found that the key genes with the highest connectivity from both sets treated by Panobinostat or Sulforaphane were downregulated and enriched in the TGF-β signaling pathway, suggesting a similar MOA. This suggests potential efficacy, as TGF-β functions as a late-stage tumor promoter. Subsequently, an in vitro study was conducted using the human GBM cell line, T98G, which was exposed to either Panobinostat, Sulforaphane, or both in combination, after which cell proliferation and TGF- β expression was measured. Data suggested that Panobinostat and Sulforaphane in combination synergistically (King's Synergy) inhibited cell proliferation and decreased TGF- β protein expression in GBM cells, suggesting a potential treatment regimen for investigation in the affected patients.

Awards Won:
Fourth Award of $500