Analysis of the Correlation Between Immunogenomic Phenotype and Patient Outcomes for Prostate Cancer

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Immunotherapy has revolutionized some cancer treatments. Yet, the same treatments showed disappointing outcomes for most prostate cancer patients, with five-year survival rates of 99% for early-stage and 31% for advanced-stage. Given the demonstrated immune tolerance of prostate cancer to otherwise successful treatment strategies, a deeper understanding of the mechanisms that support this tolerance may allow for new strategies to enhance immunotherapy. Immune infiltrations of prostate cancer patients were characterized and investigated to see if the tumor immune landscape is a good marker for patient prognosis and an indicator for the implementation of certain treatment strategies. Based on bulk mRNA sequencing data from The Cancer Genome Atlas, fractions of ten immune infiltrates were analyzed using Prism. Prostate cancer had one of the lowest percentages of total immune infiltration among all cancers; it had low expressions of CD8+ T cells and high expressions of M2 macrophages, indicating a potent immunosuppressive tumor microenvironment. Interestingly, despite the five-year survival rate difference of 68% between early and advanced stages, immune infiltration varied little. Furthermore, progression-free survival was not affected by any immune infiltrates; however, low M2 to M1 ratios and high expressions of ‘pro-inflammatory’ cells increased patients’ progression-free survival by 25%. The results demonstrated that immune infiltration could be a prognosis marker and aid the design of individualized treatment, but forewarn the ineffectiveness of current immunotherapy. As such, this research urges the acceleration of studies into new treatment strategies, such as the repolarization of macrophages, to effectively improve patient prognosis for prostate cancer.

Awards Won:

Fourth Award of $500