Treating prostate cancer with immunotherapy

Cancer immunotherapy induces the immune system to recognize and destroy cancer cells. These therapies can work through a number of ways but two of the most researched methods are therapeutic cancer vaccines and immune checkpoint inhibitors. Therapeutic cancer vaccines exploit the fact that cancer cells often over express molecules known as antigens. Vaccines attempt to help the immune system recognize these antigens and thereby attack the cancer cells. Immune checkpoint inhibitors, on the other hand, attempt to block signals between immune cells which suppress the immune system or the signals cancer cells use to protect themselves from immune attack. Over the past few years, immunotherapies have been found to increase the survival of patients in a number of cancer types including melanoma, lung, kidney and prostate cancer. In 2010, the FDA approved the first therapeutic cancer vaccine, Sipuleucel-T, for the treatment of advanced prostate cancer. Since then a number of other vaccines have also shown a potential survival benefit in prostate cancer including three vaccines, Prostvac, ProstAtak and DCVAC. These therapies are being evaluated in large randomized clinical trials. In addition, ipilimumab, an immune checkpoint inhibitor, has been studied in two phase III trials in prostate cancer.

Interestingly enough, multiple studies have shown that immunotherapies have the potential to prolong survival even when tumors do not shrink and little or no response to treatment is seen early on. This may be because these agents work predominantly by slowing the growth of cancers rather than by shrinking them. In fact, multiple studies have shown that these agents don't generally cause PSA declines, but instead have the potential to slow future PSA rises. Additionally, studies suggest that immunotherapy treatment may be more effective when given earlier on in the disease course when the amount of tumor is less. Based on this data, trials have begun to evaluate immunotherapies in earlier and earlier stages of prostate cancer.

In addition, data from multiple studies have shown that at least two of these vaccines, sipuleucel-T and prostvac, are effective at enhancing immune system responses to cancer cells. These same studies have suggested that better immune responses are associated with improved survival. There is also growing evidence that the immune system has the capability to recognize additional antigens once it has been stimulated with a single tumor antigen via vaccine treatment. This concept is known as antigen spreading and may describe the mechanism by which the immune system can match the intrinsic biodiversity found among cancer cells. Studies have found that patients who develop immune responses to additional tumor antigens after treatment usually live longer than their counterparts.

Finally evidence exists that combining vaccines with traditional prostate cancer treatments including radiation, hormonal and chemotherapies further enhances immune responses. In addition there is evidence based on early studies that the combination of immunotherapies, specifically prostvac and ipilimumab in patients with advanced prostate cancer, may be even more effective at prolonging survival than the use of either therapy alone. In light of all this data, immunotherapies

look to have a promising role in the future treatment of prostate cancer.

Publication

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