

## Immunotherapy as a Developing Cure for Lethal Brain Cancers

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### DESCRIPTION

Immunotherapy is class of treatments that take advantage of a person's own immune system to help kill cancer cells. Immunotherapy for cancer has made progress and is now becoming part of the treatment options that are more frequently discussed with oncology patients. This type of treatment was given to patients with progressive disease who had only a few months to live. The results were often disappointing. Immunotherapy was generally considered as safe option for the treatment. CAR-T-cell immunotherapy modifies a patient's own T cells so that they can more effectively identify the cancer cells that make up brain tumors. Immunotherapy drugs work better only for some cancers. It will show great results for some people but does not work for others. Results of immunotherapy also help to make the development of different approaches to understand cancer more. Using the right antibody or cell at the right time is the main step in this development process. Herceptin antibody targeting the her2/neu proto-oncogene has benefited women with breast and ovarian cancer. This discovery demonstrated targeting cell surface receptors that control important biological functions such as opposed to any available tumor surface antigens was the main path to generate useful clinical responses. Recently FDA approved PROVENGE marketed by Dendron Corp in the United States to treat refractory prostate cancer in men. This prostate tumor antigen (prostatic acid phosphatase)-Granulocyte-macrophage colony-stimulating factor fusion does protein stimulation on dendritic cells in vitro. Dendritic cells were activated ex-vivo and are reintroduced into the cell. Patient host anti-tumor T cells are re-stimulated which attacks the cancer back with all the force. This immune response adds another 4 months of life. Glioblastoma Multiforme (GBM), World Health organization Stage IV (WHO Stage IV) and anaplastic astrocytoma (WHO stage III) is considered as deadly cancer. These types of cancers are almost fatal and are highly invasive and can lead to death in few span of time. This contributes to their resistance to be cured by traditional surgical resection and directed radiation therapy. Therefore, there is a need to develop better treatments which will at least stop the spreading all over the body. Benefits of generating

an immune response is that immune effectors (cells or antibodies) can now detect and destroy tumor cells inaccessible areas where traditional surgery, radiation and chemotherapy drugs will not reach. Due to its relative isolation from the systemic circulation via the blood-brain barrier, the initiation of a productive immune response in the brain is more limited than other types of cancers. Local microglial cells can also T lymphocytes cells present in tumor-associated antigens. However, usually only a few T cells reach the brain. Normal brain cells also express Fas ligand and express TGF- $\beta$ , making it difficult to maintain an immune response. Therefore, lymphoid cells must be recruited from the periphery by different sites of cytokines and chemokine. Lymphocytes can infiltrate tumors and mediate anti-brain tumor immunity. Extraordinary discoveries are being made in neuro-onco-immunotherapies till now including therapies for other cancers as well. It should be combined with other modalities target for others aspects of cancer biology. Immune-based therapies have been used in several ways to treat brain cancer. These include non-specific methods using adjuvants, lymphokine-activated killer cells or genetically modified tumor cells; including specific immunotherapy, use of monoclonal antibodies, tumor-infiltrating lymphocytes, alloreactive T cells, chimeric antigen redirection either T cells, purified and cloned tumor antigens are also used alone or in combination with in vitro cultured Dendritic Cells (DCs). Advances in brain tumors with Immunotherapy are progressing developing at high rate making it as a most researched topic. Initial attempts used non-specific approaches such as adjuvants and His LAK cells. A non-specific cellular approach was effective in a minority of patients. The current general focus is on methods which targets on specific locations. Recent studies show progress of immunotherapy as a cure for cancer. It also helps in producing long-term tumor antigens survivor. Glioma cells seem to possess numerous tumor associated antigens. Identification of other strategies that can be combined with immunotherapy approaches will certainly improve success against these lethal brain cancers. About 15% -20% immunotherapy is not a proven as a cure for brain tumors, but there are clinical trials that can help researchers to get closer to cure of this spreading disease.

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