The Torch
Vol. 3 (6)

Immunotherapy for metastatic cancer treatment

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Cancer is the leading cause of death all across the world. The global cancer burden is expected to be 28.4 million cases in 2040. The notion of utilizing the immune system to fight cancer has been around for centuries. Over the years, it has been ameliorated to deal with such a multifaceted disease, and immune-based cancer therapies have been established as a first-line cancer treatment. Compared to other conventional methods, it has brought considerable improvement in the survival of patients. The immune system typically detects and destroys foreign and abnormal self-cells and can restrict cancer growth. Immune checkpoints highly regulate this process. However, cancer finds a way to evade destruction by the immune system, and immunotherapies have been developed to harness the immune system's strength to fight against cancer. When immunotherapy comes into play, it helps attack only the cancer cells without damaging self-cells. Immune checkpoint inhibitor therapy (ICI) employs drugs that block immune checkpoints and allow the immune system to respond more vigorously to cancer. For instance, CTLA4 checkpoint inhibition increase 10-year survival rates in melanoma patients. Checkpoint inhibition in combination with chemotherapy, radiotherapy and immunomodulatory drugs has been successful in clinical trials. T-cell transfer therapy is also an option in immunotherapy that boosts the ability of T cells to fight cancer. It is based on producing immune cells that can recognize and kill cancer. CAR T-cell therapy modifies T-cells using chimeric antigen receptors to fight cancer. These cells chase down and eliminate cancer cells and remain in the body as a defence even after cancer is gone. Numerous clinical trials are investigating CAR T cell therapies for various cancer types. Targeted molecular therapy involves using drugs to help distinguish between healthy cells and cancer cells while incapacitating cancer cells so that the immune system can target them efficiently. In addition, cancer vaccine-based treatment elicits an immune response against cancer. For instance, the human papillomavirus (HPV) vaccine protects against cervical, throat and anal cancer. Monoclonal antibody-based immunotherapies utilize antibodies that attach and inhibit proteins expressed by cancer cells. Either naked antibodies such as alemtuzumab and rituximab are used or conjugated antibodies such as doxorubicin which have immunotoxins attached. These are used in combination with cytokines such as IL-2 and GM-CSF to stimulate the immune system. Immunotherapy has been approved to treat various metastatic cancers such as melanoma, hepatocellular carcinoma and Hodgkin's lymphoma. It is delivered in different ways like intravenous, oral, topical and intravesical, and novel approaches are being developed rapidly. Therefore, immunotherapies have proven to be promising in the battle against cancer and are highly expected to arise as one of the most efficient treatment options.

Keywords: CAR, Human papillomavirus, melanoma, T cells, checkpoints, metastatic

Citation:
Himanshi Yadav. Immunotherapy for metastatic cancer treatment. The Torch. 2022. 3(6). Available from:
https://www.styvalley.com/pub/magazines/torch/read/immunotherapy-for-metastatic-cancer-treatment.