Research & Reviews: Reports in Cancer and Treatment

Mechanism and Classification of Cancer Vaccines

Camillo Neri*

Department of Medical and Surgical Sciences for Children and Adults, University-Hospital of Modena, Italy

Commentary

Received: 07-Nov-2022, Manuscript No. RCT-22-82650; **Editor assigned:** 09-Nov-2022, Pre QC No. RCT-22-82650 (PQ); **Reviewed:** 23-Nov-2022, QC No. RCT-22-82650; **Revised:** 30-Nov-2022, Manuscript No. RCT-22-82650 (R); **Published:** 09-Dec-2022, DOI: 10.4172/Rep cancer Treat.6.6.003.

***For Correspondence:**
Camillo Neri, Department of Medical and Surgical Sciences for Children and Adults, University-Hospital of Modena, Italy

Email: camillo.neri@unime.it

DESCRIPTION

A cancer vaccine is one that either treats or prevents the development of cancer. Therapeutic cancer vaccines or tumour antigen vaccines are vaccines that treat existing cancer. Some vaccines are "autologous," meaning they are made from samples taken from the patient and are unique to that patient. Conventional vaccines enhance your body's natural defences against foreign invaders such as bacteria and viruses. Cancer vaccines that are therapeutic train the body to protect itself against its own damaged or abnormal cells, including cancer cells. These vaccines expose the immune system to cancer-related molecules, allowing the immune system to recognise and destroy cancer cells.

Sipuleucel-T (Provenge®), an FDA-approved cancer vaccine, is used to treat metastatic prostate cancer (spread). In men with prostate cancer, Provenge mobilises the immune system's disease-fighting forces. Provenge is made by removing immune cells, exposing them to a molecule from prostate cancer cells, and then reinfusing them into the body. In men with metastatic prostate cancer, Provenge has been shown to improve survival. T-VEC is a second FDA-approved therapeutic cancer vaccine that is used to treat advanced melanoma that cannot be removed completely with surgery.

Mechanism of cancer vaccines

Tumor antigen vaccines function similarly to viral vaccines. Cancer treatment vaccines are a sort of immunotherapy that treats cancer by boosting the body's natural anti-cancer defences. Cancer treatment vaccines, as opposed to cancer prevention vaccines, are intended for use in people who already have cancer; they work against cancer cells rather than anything that causes cancer. The premise behind therapeutic vaccines is that cancer cells have chemicals known as tumor-associated antigens that are not found in normal cells or are present at low quantities. Treatment vaccines can enable the immune system to recognise and respond to these antigens, allowing cancer cells to be destroyed.

Dendritic cells, for example, are Antigen-Presenting Cells (APCs) that take up antigens from vaccines, process them into epitopes, and then present the epitopes to T-cells through Major Histocompatibility Complex (MHC) proteins. If T-cells recognize the epitope as foreign, the adaptive immune system is activated, and cells expressing the antigens are targeted.

Types of cancer vaccines

Cancer vaccines can be Cell-based, Protein-based, and Gene-based.

Cell-based vaccines: Cell-based vaccines are tumor cells or tumor cell lysates. Canvaxin, a combination of three melanoma cell lines, failed phase III clinical trials. Another cell-based vaccine strategy involves the addition of tumor antigens to autologous dendritic cells (dendritic cells derived from the patient). Instead of relying on antigen processing by native APCs after the vaccine is delivered, antigen-presenting dendritic cells directly stimulate T-cells in this strategy. Sipuleucel-T (Provenge), the most well-known dendritic cell vaccine, only increased survival by four months. The ability of dendritic cell vaccines to migrate to lymph nodes and interact with T cells may limit their efficacy.

Peptide-based vaccines: Peptide-based vaccines are typically composed of cancer-specific epitopes and frequently require an adjuvant (such as GM-CSF) to stimulate the immune system and improve antigenicity. Her2 peptides such as GP2 and NeuVax are examples of these epitopes. However, due to MHC restriction, this approach necessitates MHC profiling of the patient. The use of longer peptides or purified protein, which is then processed into epitopes by APCs, can eliminate the need for MHC profile selection.

Gene-based vaccines: Gene-based vaccines are made up of the nucleic acid that encodes the gene. The gene is then expressed in APCs, and the resulting protein is processed to form epitopes. The delivery of the gene is especially difficult for this type of vaccine.