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Virotherapy: Brief Overview

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Abstract

New cancer therapies with novel mechanisms and functions are needed. Virotherapy is an outstanding example of such treatment. The ability to induce tumour destruction through a variety of pathways, as well as the possible lack of cross resistance with conventional therapies, is the benefits of virotherapy. The oncolytic virus not only has special mechanisms of action that aren't present in any other virus.

Virotherapy

Virotherapy is a biotechnology-based procedure that turns viruses into therapeutic agents by reprogramming them to cure diseases. Anti-cancer oncolytic viruses, viral vectors for gene therapy, and viral immunotherapy are the three primary divisions of virotherapy. Gene overexpression, gene knockout, and suicide gene delivery are three distinct types of treatment approaches used by these branches.

Oncolytic Virotherapy

Oncolytic virotherapy explains the rejections of malignant cells by viral propagations inside the tumour. These results differences in diseases from virus to virus, most of the viruses have trophism for malignant cells which makes them accept for oncolysis. Oncolytic viruses are oncolytic vaccines viruses, oncolytic HSV, and oncolytic measlevirus.

Mechanisms of Oncolysis in Virotherapy

Oncolytic viruses must be capable of replicating and infecting tumor cells selectively. Oncolytic viruses kill cancer cells through a variety of mechanisms, either directly or through immune mechanisms that destroy infected tumors cells. After exhausting all cell resources, a virus can use cell-destructive mechanisms such as autophagy, apoptosis, or necrosis during oncolysis.

Viral Gene Therapy

Viral gene therapy transmits to deliver the therapeutic genes to cells with genetic malfunctions.

Mechanism

To transmit the genes it should be starts with the engineering of the viral vector, through this mechanisms the viral vector may differ from one another. In these diseases the genetic mutation may cause deficiency of genes due to over expression of genes, viral gene therapy is introduced to eliminate these genes. This therapy either carries on in vivo or ex vivo. This vector is transferred directly to the tissue or organ of the patient, first tissue is recovered and transferred back to patient. The delivery of genes creates long lasting cells that continuously produce gene products.

Clinical development

It has successful clinical trials of viral gene therapy specially with adeno associated virus vector and t-cell therapy.

Gene Therapy

The design of gene therapy is simple that delivers the genetic material to cells that may slow down the diseases or repaired the damaged tissues. These gene therapies introduce the genes into normal or malignant cells to get therapeutic benefits.

Viral Immune Therapy

Viral immune therapy is the use of virus to restore the body immune system. Comparison of vaccines in which killed bacteria or virus cause immune response. Viral immunotherapy uses engineered virus to present antigens to the immune system, these antigens may form virus, bacteria or other diseases like cancer antigens. Vaccines are also another method to develop immunity to body. The inactivated viruses kills the viruses in the form of antigens to the host, the host also develops the immunity to the virus.

Cancer treatment

In the case of cancer, viral immunotherapy activates the immune system to fight cancer cells more effectively. Rather than avoiding cancer's causes, as one would assume in the sense of vaccination, cancer vaccines are used to cure cancer. (#43) The process is determined by the virus as well as the treatment. As described in the previous section, oncolytic viruses are stimulated.

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