Journal of Genetics and Gene Therapy

Opinion Article A SCITECHNOL JOURNAL

Vector's Potential in Gene Therapy by using Viruses for Genetic Medicine

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Received date: 11 March, 2023, Manuscript No. JGGT-23-95831;

Editor assigned date: 13 March, 2023, PreQC No. JGGT-23-95831 (PQ);

Reviewed date: 27 March, 2023, QC No. JGGT-23-95831;

Revised date: 03 April, 2023, Manuscript No. JGGT-23-95831 (R);

Published date: 13 April, 2023, DOI: 10.4172/Jggt.1000142.

Description

Gene therapy is a promising field of medicine that holds the potential to cure genetic diseases by altering the genetic material of patients. One of the major challenges in gene therapy is to deliver the therapeutic gene into the target cells efficiently and safely. Vectors are useful in this case. Vectors are vehicles that are used to carry therapeutic genes into the cells. Among various types of vectors, viruses have emerged as one of the most effective and popular gene methods of delivery.

Vectors in gene therapy

Vectors are DNA molecules that are used to transfer foreign genes into the target cells. These DNA molecules are designed to contain the development's therapeutic gene along with other components that enable them to enter the target cells, express the gene, and integrate it into the host genome. The effectiveness of gene therapy heavily depends on the efficiency and safety of these vectors.

Viruses are popular vectors in gene therapy

Viruses have evolved over millions of years to efficiently infect the host cells and transfer their genetic material. As a result, they are ideal vectors for delivering therapeutic genes into the target cells. Viruses can be created to carry therapeutic genes without causing harm to the host cells. They also have the ability to integrate the therapeutic genes into the host genome, causing the treatment enduring. There are several types of viruses that have been used as vectors in gene therapy, including retroviruses, adenoviruses, adeno-associated viruses, lentiviruses, and herpes simplex viruses. Each virus has its unique advantages and disadvantages, and the selected of virus depends on the type of disease and the target cells.

Retroviruses as vectors in gene therapy

The retroviruses are RNA viruses that are capable of integrating their genetic material into the host genome. As a result, they are ideal vectors for gene therapy, especially for disease treatment caused by mutations in the genes that are expressed in the dividing cells, such as blood cells and immune cells. Retroviral vectors have been used successfully in treating several genetic diseases, including Severe Combined Immunodeficiency (SCID), Adenosine Deaminase (ADA) deficiency, and X-linked Severe Combined Immunodeficiency (X-SCID). In these diseases, the patient's immune system is destroyed due to mutations in the genes that encode for immune cells. By using retroviral vectors to deliver the accurate reproductions of these genes into the patient's cells, the immune system can be restored.

Adenoviruses as vectors in gene therapy

Adenoviruses are DNA viruses that can cause respiratory, gastrointestinal, and eye infections in humans. They have been extensively studied as vectors for gene therapy due to their ability to infect a wide range of cells and express high levels of the therapeutic genes. Adenoviral vectors have been used in clinical trials for treating various diseases, including cystic fibrosis, cancer, and cardiovascular diseases. One of the major disadvantages of adenoviral vectors is their immunogenicity. The host immune system recognizes the adenovirus as foreign, producing an immune response, which can reduce the effectiveness of the treatment. However, several techniques have been developed to overcome this problem, including the use of modified adenoviral vectors that are less immunogenic.

Adeno-associated viruses as vectors in gene therapy

Adeno-Associated Viruses (AAVs) are small DNA viruses that do not cause any established human disease. They are attractive vectors for gene therapy because they can infect both dividing and non-dividing cells, and they have a low immunogenicity.

Citation: *Shin M (2023) Vector's Potential in Gene Therapy by using Viruses for Genetic Medicine. J Genetic Gene Ther 7:1.*

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