Journal of Genetics and Gene Therapy

Commentary

A SCITECHNOL JOURNAL

Genetic Therapy by Gene Transfer

Stecca Anna*

Introduction

Gene transfer is a genetic engineering technique which involves the transfer of genes from vector cell to another cell or organism. The process of gene transfer is frequently employed in both basic and applied biology. DNA transfer into animal cells is a basic and well-established method. It's become a must-have tool for gene cloning, gene function and regulation research, and the creation of small batches of recombinant proteins for testing and verification. The gene transfer experiment aids in the expression of the injected genetic construct (or transgenic) in recipient cells, as well as the disruption or inactivation of specific endogenous genes (leading in loss of function). Gene transfer has a wide range of uses, including large-scale commercial manufacturing of recombinant antibodies and vaccines, as well as gene medicine and gene therapy. They include everything from the utilization of mammalian and insect cell cultures to the transfer of DNA into human patients for disease correction and prevention. Every cell or a specific target population of cells in organisms or genetically modified complete animals formed by Gene transfer contains a specific modification. Animals like this are employed to research gene function and expression, model human diseases, manufacture recombinant proteins in their milk and other fluids, and increase the quality of livestock herds and other domestic species.

Gene therapy is the transfer of DNA intentionally for therapeutic purposes. Gene transfer being the essential factor in gene therapy is one of the main purposes of cloning. Gene transfer can be performed by targeting somatic cells or germ cells of the body. In somatic gene transfer, the changes are done in the recipient's genome and there is no passing of the changes done to the offspring. The purpose of germline gene therapy is passing on the changes to their offspring. It is attained by changes made in the parent's egg and sperm cells.

Techniques Involved In Gene Transfer

Transfection is divided into two types; temporary and steady. The transfected DNA is not incorporated into the host chromosome during temporary transfection. To obtain a transient yet high level of expression of the target gene, DNA is delivered into a recipient cell. Permanent transfection is another name for stable transfection. The transferred DNA is integrated (inserted) into chromosomal DNA through stable transfection, and the genetics of recipient cells is permanently altered. Gene transfer into animal cells, regardless of delivery mechanism, must achieve three separate aims. The external genetic material must first cross the cell membrane. Direct transfer is used in physical transfection methods to transport DNA and RNA across the membrane, when the membrane is ruptured during delivery and DNA and RNA can diffuse through. Other delivery methods require the nucleic acid to create a complex that attaches to the cell surface before it can be internalised. The genetic material must be liberated in the cell and delivered to its place of expression or activity once it has crossed the cell membrane. At this point, the nucleic acid is again inactive. Following escape from the endosomal vesicle, DNA or RNA complexes are deposited in the cytoplasm in most transfection procedures.

RNA may act directly in the cytoplasm, whereas DNA must be transferred to the nucleus. It is feasible to transfer DNA directly into the nucleus using technologies such as particle bombardment and microinjection, eliminating the need for intrinsic transport routes. As part of the infection cycle, many viruses transfer their nucleic acid cargo to the nucleus, usually after interacting with cell surface receptors and either internalisation within endosomes or direct fusion with the plasma membrane. There are a few outliers, such as poxviruses (such as the Vaccinia virus) and alphaviruses (such as the Sindbis virus) that replicate in the cytoplasm. The final stage of gene transfer involves the activation of exogenous genetic material.

Gene transfer can be attained naturally or artificially. Live cells, bacteria, other DNA molecules and viruses are the natural agents used in natural techniques to transmit genes. The techniques include Bacterial transformation, Conjugation, Phage transduction, Retro-viral transduction, Transposition, Agrobacterium tumefaciens mediated gene transfer. In Artificial technique, physical or chemical agents are used in transmitting an exogenous gene to another cell or organism. Lipofection, Calcium-phosphate mediated transfer and Transfer with DEAE-dextran are the chemical gene transfer techniques. Electroporation, Microinjection, Gene transfer using ultrasound and Micro-projectile transfer are physical techniques involved in gene transfer.

***Corresponding author:** Stecca Anna, Department of Genetics, The Ohio State University Wexner Medical Center, USA, E-mail: steccanna@euroimmun.it

Received date: August 03, 2021; **Accepted date:** August 17, 2021; **Published date:** August 24, 2021

Acknowledgments

The authors are grateful to the journal editor and the anonymous reviewers for their helpful comments and suggestions.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest for the research, authorship, and/or publication of this article.

Author Affiliations Top

Department of Genetics, The Ohio State University Wexner Medical Center, USA, E-mail: steccanna@euroimmun.it