



Category: Molecular Genetics

# Applications of Recombinant DNA Technology in treating ADA deficiency

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## Abstract

### What Is Recombinant DNA Technology

RDT or Generic Engineering is a process of manipulation of genes to produce an altered organism. The generic material of one organism is introduced into the genome of another organism. Mistake in the sequencing of genes can produce generic defects, it also arises due to errors in DNA replication often leading to genetic drift.

### ADA deficiency

It is a kind of genetic disorder which is caused by the mutation in Adenosine Deaminase enzyme. It causes accumulation of metabolic substances thus affecting the immune system causing Severe Combined Deficiency (SCID). SCID arises from a variety of molecular defects including defects in Y chain, various signaling molecules like JAK-3 and IL-7 receptor. Absence of ADA results in accumulation of deoxyadenosine in the intracellular compartments.

### Gene Therapy

This technique involved introduction of altered drugs to treat an infection. The DNA is administered and it reaches the damaged cell and disrupts the protein. The mutated gene that causes the disease is replaced with a healthy gene. It is said to be one of the promising techniques to treat infections.

### Gene Therapy approach to treat ADA

1. Use of Retroviral Vectors- Such vectors were made from a retrovirus and were created by replacing harmful retroviral genes with normal ADA genes. These vectors were mixed with T cells which were extracted from a person's blood and grown in culture dishes. Then the retroviral vectors entered the T cells and implanted the normal ADA gene into T cell chromosome.
2. Q PCR determination of vector copy number-Q PCR was performed with primers and probe to amplify MND-ADA vector. The TAMRA probe was used to detect MND-ADA and GCsapM-ADA vector. All reactions were performed on 7900 sequence detector system.

A lot of research work is going to develop permanent cure for ADA deficiency. Early diagnosis and treatment of active infection to treat SCID is essential. Unlike T cells which live for a few months, stem cells live throughout the patient hence they need lifetime supply of ADA.

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