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Recombinant DNA Technology and Its Use in Medicine

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Introduction

A DNA molecule carrier that allows recombinant DNA fragments to replicate in host species. A prokaryotic or eukaryotic specimen may be used to extract the DNA fragment, which may be a gene. Both the vector and the insert must be cut with restriction enzymes and purified after separation of the fragment of interest, or insert. A procedure known as ligation is used to join the purified bits together. Ligase is the enzyme that catalyses the ligation reaction [1].

The process of isolating and expanding a single fragment of DNA into a host organism in order to produce a large number of identical copies is known as molecular cloning. Molecular cloning is a powerful technique that allows the generation of complex combinations of DNA fragments for the most disparate dosing conditions. As a result, most modern biomedical basic research studies and translational applications depend on this method [2]. This chapter will include an overview of current molecular cloning procedures and their possible applications, as well as the fundamental principles and protocols needed to conduct a conventional cloning experiment using restriction enzyme digestion and ligation of two DNA fragments.

Use of RDT in Medicine

RDT has made it possible to cure a variety of diseases by replacing defective or diseased genes in the human body with new genes. It has brought many groundbreaking improvements to the field of medicine, introducing previously unimaginable ways of treating diseases and distributing drugs.

Insulin: Through using bacteria as a host cell, scientists were able to produce human insulin, which is now available on the market.

Vaccines: Both DNA and proteins are used to make recombinant vaccines. The DNA version is less expensive to produce and is thermostable, so it does not require the use of a "cold chain" for transportation and storage. The production of DNA vaccines has been the subject of numerous studies. However, a few DNA vaccines have been effective in becoming human DNA vaccines.

Human Growth Hormones: Recombinant DNA technology has recently been used to produce growth hormones.

Monoclonal Antibodies: Monoclonal antibodies were made possible thanks to hybridoma technology.

Interferon: RDT uses E. coli to make this glycoprotein, which is used to treat lymphoma and myelogenous leukaemia.

Antibiotics: In 1928, Alexander Fleming used RDT to discover penicillin for the first time [3].

Infectious diseases: RDT has allowed the development of many diagnostic tests for tuberculosis, cancer, measles, smallpox, hepatitis, and other viral infections such as covid-19.

Conclusion

DNA cloning in microbial plasmids is a simple and flexible way to amplify DNA. For many microorganisms, suitable plasmid vectors and efficient transformation systems are now available, allowing the introduction and establishment of recombinant plasmids produced by enzymatic reactions in vitro. The genetic plasticity of E. coli makes it a common cloning host organism. There are, however, a variety of plasmid cloning systems that use alternate microbial hosts. The construction of new recombinant plasmids is frequently a multi-step method that necessitates a cloning scheme that is transparent, simple, and forward-looking. The possible cloning pitfalls are often manifested as structural and maintenance plasmid instability, which involves a variety of strategic contrivances to avoid. The length of plasmid DNA is measured in micrometres and the width of double-stranded DNA is 2 nm. As a consequence, DNA manipulation using plasmid vectors is a well-developed branch of emerging nano- and microtechnolgy.

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