A REVIEW: ROLE OF R-DNA TECHNOLOGY IN MEDICINAL INDUSTRY

Abstract

The purpose of this review is to provide R-DNA technology and their various different types of industrial applications. R-DNA technology is commonly used in virtually every aspect of biological sciences. These short reviews consider the vectors are becoming standard tools in potential therapeutic agents for human disease. Different types of viral vectors used for R-DNA technology, mostly E.coli uses for synthetic human insulin production. Different applications of r-DNA technology in Agriculture sector, Food industry, Medicinal industry (Disease diagnosis, Insulin Production, Vaccine Production etc.) Biotechnology, Protein Manufacturing.

Keywords: Plasmid Bacteriophage, Reverse transcriptase, RNA polymerase, Cloning, Restriction endonuclease, PCR (Polymerase chain reaction) Insulin.

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I. INTRODUCTION

R-DNA technology it includes some kind of procedures for analyzing DNA fragments from one to several organisms including introduce r DNA molecule into cell for replication into genome of the target cell. The R DNA technology was discovered in 1960s by Werner, Arber and Hamilton Smith.

II. PRINCIPLE OF R-DNA TECHNOLOGY

R-DNA technology has different principles these are as 1) Gene cloning, 2) Development of R-DNA; 3) Transfer of vector into the host; 4) Selection of transformed cells and 5) Transcription as well as translation of inserted gene. The meaning or definition of R-DNA technology is to identify, to isolate, to manipulate and to re-express genes from a given host [1-9]. The utilization of AAV mediated gene delivery and RNA mediated gene silencing is to transforming the potential therapeutic options for patients suffering from inherited metabolic liver diseases.

III. APPLICATIONS OF RECOMBINANT DNA TECHNOLOGY

1. **Insulin Production:** Synthetic human insulin prepares using R-DNA technology. Synthetic/recombinant DNA insulin is produced by introducing the human insulin gene into a yeast/bacterial host cell, results in the production of insulin that is the same as that made by human pancreas in its natural state.

   Insulin was previously extracted from pancreases of slaughtered animals particularly pigs and cows, before the invention of RDT. Unfortunately, this method had several disadvantages, including possibility of allergic reactions to animal proteins and the danger of spreading diseases from animals to people. [10] Insulin produced by r DNA technology, it is the first commercial health care product derived from R-DNA technology. Amongst 1982 protocol received all acceptance from national drug regulatory authorities, notably this US Snack or Drug Administration, hence enabling and economically survive mass manufacturing of human insulin, a hormone that regulates blood sugar levels and shall made naturally by beta cells in the pancreas. This facilitated that widespread commercial availability of insulin at a price affordable to patients with the functional muddles types 1 or type 2 diabetes sweetness, who either fail to hervorrufenoder till metabolize sufficient insulin[11].

2. **To Improve Life:** Possible to treat with intrinsic angle of life for example, to improve health, enhancing food resources and opposition to varying adverse environmental consequences. Especially in farming, the genetically modified plants have augmented resistance to damaging agents, increased product yield, and shown increased adaptability for finer existence.

3. **Disease Diagnosis:** R-DNA has revolutionized medicine and research in many ways. For instance, it has enabled genetic engineering of various organisms for research purposes. Furthermore, r DNA technology made it feasible to sequence and analyze human genome, leading to the discovery of new genes and the identification of genetic mutations that cause disease. This has greatly advanced our understanding of genetics and provided

new targets for drug development. One large field of application for recombinant DNA, related to medicine and research, is biotechnology – as shall be illustrated in the following chapter. Clinical experience with systemic administration of Retroviruses, Lentiviruses for liver diseases is scarce. [12] Many scientists studied on recombinant adeno-associated virus vector tropism in ocular tissue, recombinant adeno-associated virus vector host cell infection, and potential recombinant adeno-associated virus vector-treatable inherited retinal diseases [13–17]. Create a viral vector for gene therapy, the viral gene is required for replication and that cause pathogenicity are normally decreases from viral genome and supplant by genetic sequence to be delivered. Maintaining the replicative capability of the virus is beneficial for some applications, such as for oncolytic or tumorur cell killing viruses. Viral vectors used for liver targeted gene therapy mainly incorporate vectors based on AAVS, Lentiviruses, Retroviruses and Adenoviruses as different vectors served for different applications. [18,19,20,].

4. **Biotechnology:** R-DNA is a key tool in biotechnology, which involves use of living organisms or their components to develop useful processes and products. The main application of r DNA in biotechnology is the production of recombinant proteins, including recombinant antibodies. Recombinant antibodies production includes the use of recombinant DNA technology. These antibodies can be engineered to recognize specific targets, such as cancer cells, and can be produced in large quantities using recombinant DNA technology. This is why rAbs have opened several doors in the research and treatment of numerous medical conditions.

5. **Agriculture Sector:** R-DNA is useful in agriculture because it allows scientists to modify genetic makeup of crops to improve their quality, yield, resistance to pests and various diseases. Crops have been developed to tolerate environmental stresses, such as drought or high salinity, which can reduce crop yields. They can also require fewer pesticide applications, which can reduce environmental damage and lower production costs. Overall, recombinant DNA technology has contributed to increased food production, Improve crop yield, Pest resistance, Herbicide tolerance and improved agricultural sustainability.

6. **Food Industry:** R-DNA is an important tool used in the food industry to improve the nutritional value of food quality, and safety. It plays a crucial role in the production of genetically modified (GM) food, as r-DNA technology allows scientists to insert, delete and modify specific genes in an organism’s DNA in a precise and controlled manner. R-DNA technology also used to produce food additives and enzymes for production of various food products. E.g. Golden Rice, Flavr Savr tomato, Arctic apples.[21]

7. **Manufacture of Medicinal Proteins:** Therapeutic proteins like insulin, growth hormone, and clotting factors, which are used to treat a variety of disorders, can be produced by genetic engineering.

8. **Vaccine Preparation:** By introducing genes that code for particular antigens into a virus or bacteria, genetic engineering can be used to create novel vaccinations. This method has been used to create vaccinations against illnesses like the human papilloma virus and hepatitis B. (HPV).

9. **Pharmacogenomics:** Genetic engineering can be used to investigate how a person's genes influence how they react to medications. With this data, personalized medicine can be created, and patients who are more likely to have negative drug reactions can be identified.

10. **Genome Editing:** With genetic engineering, disease-causing genetic mutations can be fixed in an individual's genome. CRISPR/Cas9 genome editing technologies have shown promise the treatment of illnesses as sickle cell anemia and Huntington's disease.[22,23] Use of r DNA technology to produce intrinsically engineered organisms started inches who early 1970s with the pioneering inscertion of genes into bacteria just E. coli species.[24] Successful pilot experiments, in 1978 Caen and colleagues progressed to transfer an insulin synthesis genes into ampere plasmid of E. coli, manufacturing first-time genetically modified entity.[25]

11. **Gene Therapy:** Gene therapy uses genetic engineering to introduce or replace dysfunctional genes into the body to cure hereditary illnesses. A new gene is inserted into a patient's cells during gene therapy to replace a damaged one. Cancer and conditions like cystic fibrosis have both been treated using this method.[26]

IV. DISCUSSION AND CONCLUSION

R-DNA technology is a significant advancement in science greatly facilitated human life. It has developed ways in recent years for medicinal applications such as the treatment on, diabetes, hereditary illnesses, cancer and numerous plant ailments, particularly fungus and viral resistance. R-DNA technology has transformed several disciplines of research, including Health, Agriculture, and Biotechnology. Scientists can edit and modify DNA to generate new species with desired properties or to produce useful items on a massive scale via genetic engineering.

V. FUTURE OUTLOOK OF R-DNA TECHNOLOGY

Researchers conclude that the advances in R-DNA technology, in the genetic makeup of disease agents and in knowledge of the host immune response will lead to new vaccines against diseases for which no control measures currently exist. R-DNA technology playing a vital role in improving health conditions by developing new vaccines. Treatment strategies also improved by developing diagnostic kits, new therapeutic approaches and monitoring devices. It means to help monitoring, detect and cure diseases in less time and in fewer amounts; time consuming as well as money. Different vectors are used in producing vaccines to cure diseases.

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