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Commentary

A Note on the Recombinant DNA Technology

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DESCRIPTION

Recombinant DNA technology has contributed to medical treatment through two methods: production of important pharmaceutical proteins (biopharmaceuticals) and gene therapy to replace defective genes. Genetic engineering or recombinant DNA technology, introduces foreign genes into microorganisms, plants and animals to express new traits. This technology has been used in the breeding of crops and livestock to increase the yield of food production and to produce pharmaceuticals and industrial chemicals. Pharmaceutical proteins produced by Genetically Modified Organisms (GMOs) are generally accepted but foods made from GMOs have not yet received mainstream acceptance. Although GM foods have been cultivated in different parts of the world, the European Union and some countries for over 20 years, it is important that the general public is not yet convinced of the safety of GM foods.

Biopharmaceuticals

Recombinant DNA technology has been successfully used to produce a variety of human proteins in microorganisms used to treat diseases, such as insulin and growth hormone. Recombinant DNA Technology and Genetically Modified Organisms. Unlike chemically synthesized medicines, these are biopolymers (mainly endogenous proteins) that pose a variety of special considerations and concerns.

• Whether the molecule produced by rDNA technology is biologically equivalent to a naturally occurring molecule.

• Because they are primarily proteins, they provoke immunogenic reactions that limit their usefulness. Testing these connections causes unique problems. For example, their pharmacokinetics and metabolism are difficult to assess because they are produced endogenously. Since they are only available in small doses, traditional test protocols involving gradually increasing doses until side effects occur may not be possible. Traditional drug safety assessments require the compounds to be tested separately in at least two mammalian species, one of which does not have to be a rodent. For substances with specific activity in humans, evaluation in rodents and other model species may not be appropriate. Differences in immunological susceptibility in the animal and human systems can have disastrous consequences, as demonstrated by the TeGenero study testing antibody TGN1412 for the treatment of rheumatoid arthritis and chronic B-cell lymphocytic leukemia.

Gene therapy

Gene therapy aims to treat/cure/prevent a disease by replacing defective genes with normal genes using recombinant DNA technology. Most human clinical trials of gene therapy are still in the research stage, with more than 400 trials involving approximately 3000 patients to treat monogenic disorders, cancers and AIDS (Acquired immunodeficiency syndrome). Scientists agree that this is the most powerful application of rDNA technology, but it is risky and should be used with caution.

Recombinant DNA Technology and Genetically Modified Organisms ensuring patient safety in clinical trials has led to the development of better risk assessments in clinical trials

Applications

- Recombinant DNA is widely used in biotechnology, medicine and research. The most common use of recombinant DNA is in basic research, and this technology is important for the latest research in bioscience and biomedicine.
- Recombinant DNA is used for gene identification, mapping, sequencing, and determination of their function.
- Recombinant proteins are widely used as reagents for laboratory experiments and for producing antibody probes for studying protein synthesis in cells and organisms.
- Many other practical applications of recombinant DNA can be found in industry, food production, human medicine and veterinary medicine, agriculture and biotechnology. DNA technology is also used to detect the presence of HIV in humans.
- Application of recombinant DNA technology in agriculture-For example the production of Bt Cotton to protect plants from roundworms.
- Drug applications-Insulin production with recombinant DNA technology is a classic example.

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- Gene therapy-An attempt to correct a genetic defect that leads to a hereditary disease.
- Clinical diagnosis-ELISA is an example where recombinant DNA can be applied.

Limitations

- Destruction of native species in an environment where genetically modified species have been introduced.
- Elastic plants can lead to elastic weeds that are theoretically difficult to control.
- Mutual contamination and transfer of unique DNA between organisms. Recombinant organisms that pollute the natural environment.
- Recombinants are a population of clones that are just as susceptible.
- A single disease or pest can quickly wipe out the entire population.
- The appearance of super bugs is expected.
- It is exaggerated by fear of the unknown about what technology makes and how it affects civilization. Such systems can result in people having their genetic information stolen and used without permission.
- Many people are concerned about the safety of modifying foods and medicines with recombinant DNA technology.