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Commentary

Production of Recombinant Proteins by R-DNA Technology

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DESCRIPTION

Proteins are the workers of biological systems, facilitating most biological processes within cells, including gene expression, cell growth, proliferation, nutrition, cell-to-cell communication, and apoptosis. The main key factor for protein synthesis is stored in DNA and serves as a template for highly regulated transcriptional processes that generate messenger RNA (mRNA). The message encoded by the mRNA is then translated into the defined amino acid sequences that make up the protein. Proteins are synthesized in all organisms in a similar two-step process. That is, first the DNA is transcribed into RNA, and then the RNA is translated into protein. A recombinant protein is a protein encoded by recombinant DNA cloned into an expression vector that supports gene expression and translation of messenger RNA. Modification of genes by recombinant DNA techniques can result in the expression of mutant proteins. Recombinant proteins are engineered forms of natural proteins that are produced in a variety of ways to increase protein production, alter genetic sequences, and produce useful commodities.

Recombinant protein production begins at the genetic level where the coding sequence for the protein of interest is first isolated and cloned into an expression plasmid vector. Most therapeutic recombinant proteins are of human origin, but are expressed in microorganisms such as bacteria, yeast, or animal cells in culture. Human genes are very complex and often contain non-coding DNA sequences known as introns. Therefore, a gene with less intron is often produced by converting mRNA to cDNA (complementary DNA). Expression vectors provide promoter, ribosome binding site, and terminator sequences, as cDNA lacks regulatory regions. The production of recombinant proteins for research purposes is primarily driven by the cost-effectiveness, simplicity and speed of the process and reasonable product yields. Proteins co-expressed in bacteria do not undergo post-translational modifications. Phosphorylation or glycosylation; this requires eukaryotic expression systems

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Recombinant proteins are important tools for studying biological processes. The production of recombinant proteins requires the use of expression systems. Selection of an appropriate expression system depends on the properties and intended use of the recombinant protein and is essential for producing sufficient amounts of protein. Over the last 30 years, recombinant protein expression technology has advanced significantly. The *E. coli* system is a rapid way to express proteins, but it lacks many of the post-translational modifications found in eukaryotes. The capacity of *E. coli* for protein folding and disulfide bond formation is insufficient for many recombinant proteins, but many tools have been developed to overcome these limitations. In contrast to *E. coli*, insect cells, and mammalian systems also promote good protein folding and many post-translational modifications.

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