Biomarkers Journal
ISSN: 2472-1646

Open access Commentary

Usage of Biomarkers to Produce Recombinant DNA

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DESCRIPTION

Recombinant DNA (rDNA) molecules are DNA molecules created through laboratory genetic recombination methods (such as molecular cloning) that combine genetic material from multiple sources, resulting in sequences that would not otherwise be found in the genome. A piece of DNA that has been created by combining at least two fragments from two different sources is referred to as recombinant DNA. Because DNA molecules from all organisms share the same chemical structure and differ only in nucleotide sequence within that identical overall structure, recombinant DNA is possible. Recombinant DNA molecules are sometimes referred to as chimeric DNA because they can be composed of DNA from two different species, similar to the mythical chimaera. R-DNA technology employs palindromic sequences, resulting in sticky and blunt ends. The DNA sequences used to build recombinant DNA molecules can come from any species. Plant DNA, for example, can be linked to bacterial DNA, and human DNA can be linked to fungal DNA. Furthermore, DNA sequences that do not exist in nature can be created and incorporated into recombinant molecules through chemical synthesis of DNA. Using recombinant DNA technology and synthetic DNA, any DNA sequence can be created and introduced into a wide variety of living organisms. Recombinant proteins are proteins that can be produced by the expression of recombinant DNA within living cells. The recombinant protein is not always produced when recombinant DNA encoding a protein is introduced into a host organism. Foreign protein expression necessitates the use of specialised expression vectors and, in many cases, significant restructuring by foreign coding sequences. Recombinant DNA differs from genetic recombination in that the former is produced artificially in a test tube, whereas the latter is a natural biological process that results in the remixing of existing DNA sequences in virtually all organisms. The laboratory process of creating recombinant DNA is known as molecular cloning. It is one of the two most widely used methods for directing the replication of any specific DNA sequence chosen by the experimenter, along with Polymerase Chain Reaction (PCR). There are two major distinctions between the methods. One difference is that molecular cloning involves DNA replication within a living cell, whereas PCR replicates DNA in a test tube free of living cells. Another distinction is that cloning entails cutting and pasting DNA sequences, whereas PCR amplifies by replicating an existing sequence. A cloning vector, a DNA molecule that replicates within a living cell, is required for the creation of recombinant DNA. Vectors are generally derived from plasmids or viruses, and they represent relatively small segments of DNA that contain the necessary genetic signals for replication, as well as additional elements for ease of inserting foreign DNA, identifying cells that contain recombinant DNA, and, where appropriate, expressing the foreign DNA. The vector used for molecular cloning is determined by the host organism, the size of the DNA to be cloned, and whether or not the foreign DNA is to be expressed. A variety of methods, such as restriction enzyme/ligase cloning or Gibson assembly, can be used to join the DNA segments. Cloning of any DNA fragment involves seven steps in standard cloning protocols: Choosing a host organism and a cloning vector, preparing the vector DNA, preparing the DNA to be cloned, creating recombinant DNA, inserting recombinant DNA into the host organism, selecting organisms containing recombinant DNA, and screening for clones with desired DNA inserts and biological properties. A related article goes into greater detail about these steps (molecular cloning). The foreign DNA contained within the recombinant DNA construct may or may not be expressed after transplantation into the host organism. That is, the DNA can be replicated without being expressed, or it can be transcribed and translated, resulting in the production of a recombinant protein.

CONCLUSION

In general, foreign gene expression necessitates the restructuring of the gene to include sequences required for the pro-

Received:	01-June-2022	**Manuscript No:**	IPBM-22-14453
Editor assigned:	03-June-2022	**PreQC No:**	IPBM-22-14453 (PQ)
Reviewed:	17-June-2022	**QC No:**	IPBM-22-14453
Revised:	22-June-2022	**Manuscript No:**	IPBM-22-14453 (R)
Published:	29-June-2022	**DOI:**	10.35841/2472-1646.22.8.137

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Citation Kamali H (2022) Usage of Biomarkers to Produce Recombinant DNA. Biomark J. 8:137.

duction of an mRNA molecule that can be used by the host's translational apparatus (e.g. promoter, translational initiation signal, and transcriptional terminator). Specific changes to the host organism may be made to improve ectopic gene expression. Changes to the coding sequences may also be required to optimise translation, make the protein soluble, and direct the recombinant protein to the correct site.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.