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Editorial Notes on Importance and Uses of Marker Genes

Marcella Faria*

Department of Molecular Biology, University of Cologne, Germany

Editorial

The marker gene is a DNA sequence that is found on chromosomes close to the detectable target. The selectable marker gene is used in plant genetic engineering and the development of genetically modified organisms. Antibiotic-resistant genes include the streptomycin-resistant gene, the hygromycin-resistant gene, the gentamicin-resistant gene, and the ampicillin-resistant gene. The function of the selectable marker is known to us, which means that the use of these types of markers is to achieve a secondary function in addition to the target gene. When experimenting on antibiotic resistance cells, when a marker gene for antibiotic resistance is inserted into the modified cell type, it can grow in antibiotic-rich media, whereas unaltered cells cannot. Screenable markers are gene sequences that are used to determine whether a cell population is altered or not. The presence of the screenable marker in the altered cells indicates that the target has been correctly inserted. For example, consider the green fluorescence protein-coding gene sequence [1-3].

A gene for a green fluorescence protein is isolated and inserted into the target cells along with the gene of interest. If the plasmid correctly incorporated the genes, the cells may glow green under a fluorescence microscope, indicating that they have been transformed. Among the screenable markers are blue-white screening, GUS assay, opine synthesis, and luciferase. The target gene, plasmid DNA, and technique used in the experiment are the three most important aspects of any genetic engineering experiment. The target gene is a gene whose function we want to investigate or change. This is usually a known gene. The plasmid is a bacterial extrachromosomal DNA that can transfer gene sequences that we want to study. It's a vehicle that transports genetic material. The antibiotic that inhibits the target cell's activity is chosen and used in the cell culture media. That is, when normal cell populations or normal target cells are cultured in antibiotic-rich media, they cannot grow.

When an antibiotic-resistant gene sequence is inserted alongside the gene of interest. Microsatellite markers are polymorphic DNA loci that contain repeated nucleotide sequences with 2 to 10 nucleotides per repeated unit. The majority of the repeats within an individual microsatellite locus have the same number of nucleotides in the repeated unit, but the number of repeats for a specific locus may differ, resulting in alleles of varying length, which can be analysed with fragment analysis by capillary electrophoresis. Because microsatellite markers are subject to Mendelian inheritance, length variation analysis is a widely used tool in applications such as Microsatellite Instability (MSI). Until the advent of molecular mapping, many plant species' linkage maps were limited in size. The inability to incorporate many markers into a single stock for genetic analysis was the primary challenge in developing linkage maps [4,5]. This inability resulted from the negative effects of expressing all mutant phenotypes in a single stock. Because molecular markers use normal DNA or protein molecules to score the genetic material, they are phenotypically neutral.

***Address for Correspondence:** Marcella Faria, Department of Molecular Biology, University of Cologne, Germany, E-mail: MarcellaFaria125@gmail.com.*

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When compared to traditional phenotypic markers, this is a significant advantage. Molecular markers are DNA fragments that are linked to a specific region of the genome. Marker molecules can be short DNA sequences, such as those surrounding a single nucleotide polymorphism with a single base-pair change. They can also take the form of longer DNA sequences, such as microsatellites, which can range in length from 10 to 60 base pairs. Restriction fragment length polymorphisms are marker molecules that track a specific DNA sequence as it moves between cells. It is a type of molecular marker that is based on the hybridization of cloned DNA to DNA fragments. They are only found in a single clone or restriction enzyme combination. Randomly amplified polymorphic DNA molecular markers are commonly used in plant breeding and are based on the cloning of random locations of a plant's genome using polymer chain reaction gene cloning. Proteins are marked with isozyme molecular markers.

They are intended to detect enzymes that have different amino acid sequences but catalyse the same amino acid reaction. MSI is a type of genomic instability caused by a dysfunctional mismatch repair (MMR) protein that results in the accumulation of insertions or deletions (indels) in microsatellites during replication. MMR proteins are in charge of correcting mistakes made by DNA polymerase during replication. They accomplish this by recognising a temporary insertion-deletion loop formed when DNA polymerase slips. Cells with a dysfunctional MMR protein accumulate errors that result in frameshift mutations (indels), resulting in the appearance of novel alleles at microsatellite loci that can be easily identified using fragment analysis.

Conflict of Interest

None.

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