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Commentary

Genetic Mapping usage in Better Diagnosis of Diseases

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DESCRIPTION

Gene mapping refers to the process of locating genes within the genome. Regions of the genome that directly code for proteins, or genes that code for proteins, are usually of great interest to scientists. Therefore, it is often a priority to locate each gene within the genome. Today, mapping procedures typically involve genome sequencing and analysis of the resulting sequences using digital techniques that allow the identification of genes of interest. Therefore, most genetic mapping projects start with genome sequencing. Gene mapping refers to the techniques used to identify the location of genes and the distances between them. The distance between different positions within a gene can also be represented by genetic mapping. Placing multiple molecular markers at specific locations in the genome is a fundamental component of genome mapping. There are many different types of molecular markers. When creating genome maps, genes can be thought of as a specific class of genetic markers that map in a manner similar to other markers. Genetic linkage maps and physical maps are two main categories of 'maps' used in genetic mapping. Both maps consist of genetic markers and loci. Physical maps contain actual physical distances, often measured in base pairs, whereas genetic map distances are based on genetic linkage information. A genetic linkage map shows the location of each gene on the chromosome and the relative distances between those genes. Initially, these maps were created by tracking the inheritance of several traits, such as eye color and hair color. Genetic maps are created using blood, saliva, or tissue samples from affected and unaffected family members. Saliva is the most commonly used sample for genetic mapping, especially in individual genetic research. Gene mapping is made possible by crossover, a normal biological event during meiosis (the cell division that produces sperm and oocytes). Chromosomes line up in pairs in the center of the cell at the first stage of meiosis. At this stage, chromosomes often "stick" to each other, exchanging similar pieces. This is also called crossing. Gene mapping allows us to identify which genes are present on each chromosome and where they are located within a particular chromosome. Based on the distance between two genes, mapping can also determine which genes are more likely to undergo recombination. There are many genetic mapping methods, including comparative, physical and genetic linkage mapping. However, mapping by physical and genetic linkage is more common. The essence of genome mapping is to map a collection of molecular markers to their respective locations in the genome. In some research areas, genetic mapping helps create new recombinants within an organism. Researchers begin by collecting blood, saliva, or tissue samples from family members with and without significant disease or features. The most common sample used for genetic mapping, especially face-to-face genomic testing, is saliva. The scientist then isolates DNA from the sample and probes it, looking for unique patterns in the DNA of the family member who has the disease and DNA of the person who does not have the disease. These unique molecular patterns in DNA are called polymorphisms or markers. In genetic mapping, sequence features that can be reliably distinguished from two parents can be used as genetic markers. Genes in this regard are represented by "traits" that are reliably distinguishable between the two parents. Linkages to other genetic markers are calculated as for shared markers, and the actual locus is bracketed in the region between the two nearest neighbors. The first step in genetic map creation is the development of genetic markers and mapping populations. The closer the two markers are on the chromosome, the more likely they are to be passed together to the next generation. Therefore, we can reconstruct their order using the "co-segregation" pattern of all markers. With this in mind, genotypes for each genetic marker are recorded for both parents and for each individual in subsequent generations. The quality of genetic maps is highly dependent on the following factors: the number of genetic markers on the map and the size of the map population. The two factors are related because a larger mapping population gives a higher "resolution" to the map, which helps prevent the map from becoming "saturated". Genetic mapping provides a powerful approach to identify the genes and biological processes that underlie any genetically influenced trait, including human disease. Genetic mapping (also called linkage mapping) can provide definitive evidence that a disease transmitted from parent to child is associated with one or more genes. This mapping also provides clues as to which chromosome contains the gene and where exactly that gene is located on that chromosome. Benefits in this area include betterdisease diagnosis, early detection of certain diseases, gene therapy, and drug management systems.

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