Genetic Marker Encyclopedia Article

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Contents

Genetic Marker

A genetic marker is a particular **gene** or **DNA** base sequence associated with a identifiable **chromosome**. Increasingly, specific genetic markers are being associated with particular genes or traits. Genetic markers can be used to determine the risk of developing a disease attributed to a gene or genes associated with the marker.

A genetic marker can also be used as a probe to mark a **nucleus**, chromosome or locus.

Genetic markers are a basic and powerful tool of modern **genetics**. Because of speed and cost effectiveness, genetic markers continue to be used as an efficient method of screening organisms and producing initial maps of the genetic material of organisms, even when many more precise molecular tools are available.

Genetic markers have three essential properties. Genetic markers are easily identifiable (i.e., easily genotyped), associated with a specific locus, and polymorphic. The usefulness of a genetic marker is often related to its heterozygosity.

For example, genetic markers associated with patients who also have known **risk factors** for heart attacks have been identified. In 2000 scientists discovered effect of certain genes (IL-1 genes) in altering the risk of heart disease and asthma. IL-1 proteins are important in controlling the body's inflammatory response and inflammation is often associated with the disease pattern that leads to heart attacks. By identifying specific IL-1 genes the genetic risk of heart disease may be predicted for patients. This is especially important in patients who do not have other risk factors such as smoking, obesity, or elevated cholesterol levels.

Polymerase chain reaction (PCR) DNA typing tests can also be used to identify restriction fragment length polymorphisms (RFLPs) that can be used as genetic markers on both genetic linkage maps and physical linkage maps. In addition to establishing a correlation between certain genes and diseases, these markers have wide use in forensics, paternity and maternity cases, and in the development of agricultural products with desired characteristics.

Genetic markers can include the production of various easily screened chemicals, or more obvious observable effects such as colors or different structures. Genetic markers can also be used as an identifier for genetic engineering. After the marker is linked to a gene, its subsequent presence in cells indicates a successful genetic **transformation**. Markers of this nature can include antibiotic resistance, fluorescent genes, or other characteristics that the non-transformed organism is lacking.