

## Uses of Genetic Engineering in Plants, Animals, Gene Therapy & More

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This is the second part of a fascinating guide to some of the basic terms used in genetic engineering.

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In genetic engineering, a gene of interest is first identified and isolated from the thousands of genes an organism may have. The isolated gene is then cut from its source DNA molecule with restriction enzymes and, using a vector virus or bacterium carrier, is transferred or blasted (with a gene gun) into a target DNA molecule.

Restriction enzymes, also called restriction endonucleases, are enzymes that cut DNA at a specific nucleotide sequence. Restriction enzymes are usually found in bacteria. They are extracted from them for use in genetic engineering.

Vectors are genetic sequences derived from viruses or bacteria. They are used to move genes into the target cell. A gene gun is a machine that offers one way of getting genetic material into cells.

So now the source gene is transferred. However, most organisms have defense mechanisms to prevent foreign genes from affecting them. They can stop a foreign gene by blocking its ability to express itself. This is known as gene silencing. To get around gene silencing, a promoter gene is added. It promotes the source gene in the target DNA and makes it more acceptable to the host cell.

With genetic engineering, transgenic gene transfer is possible. Transgenic means between different and unrelated species. For example, between a plant and an animal. This kind of genetic transfer across species borders does not occur in nature.

Genetically modified crops and foods are created using genetic engineering. The basic premise for using genetic engineering here is to 1) create plants in greater quantities 2) produce healthier plants and 3) yield plants that are more resistant to pest attacks and diseases. Genetically engineered foods may have more vitamins and health-giving properties than regular unmodified foods. Supporters of GM crops and food claim that larger, healthier yields would help resolve the issue of feeding growing populations around the world.

Animals can also be modified using genetic engineering. For example, cows that yield more milk or vitamin-enriched milk and pigs that have more fat content. However, traditional breeding methods have been found to be more cost-effective and convenient. Genetically engineered animals like rats or mice are used as lab animals for genetic and other research work.

Genetic engineering is also carried out for gene therapy purposes. Many diseases or disorders are caused by the absence or over-expression of genes. By replacing the defective genes with healthy genes, many health issues could be contained or cured. Gene therapy is still in the experimental stage.

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