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Genetic engineering

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Genetic engineering is a process that alters the genetic structure of an organism by either removing or introduction of DNA. Unlike traditionally animal and plant breeding, which involves doing multiple crosses and then selecting from the organism with the desire phenotype, genetic engineering takes the gene directly from one organism inserts it in the other. Molecular cloning is a set of experimental methods in molecular biology that are used to assemble recombinant DNA molecules and to direct their replication within host organisms. There are different ways by which foreign DNA can be inserted into cells. Cells have membranes that prevent DNA from simply diffusing in or out. This is the initial barrier that scientists must overcome in order to insert foreign DNA into a cell. The three ways of accomplishing this goal are transformation, transfection and transduction. Transformation is a way that bacterial cell pick up pieces of DNA from their environments. Transfection is the process of deliberately introducing naked or purified nucleic acid into eukaryotic cells. The word transfection is a portmanteau of trans-and-infection. Genetic material (such as supercoiled plasmid DNA or siRNA constructs) or even proteins such as antibodies may be transfected. Transduction is the process by which foreign DNA is introduced into a cell by a virus or a viral vector. In the medical field gene therapy, also called human gene transfer is the therapeutic delivery of nucleus acid into a patients' cell as a drug to treat disease. Not all medical procedures that introduce alterations to a patients' genetic makeup can be considered as gene therapy. Bone marrow transplantation and organ transplants in general have been found to introduce foreign DNA into patients. Gene therapy is defined by the precision of the procedures and the interaction of direct therapeutic effects.

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