Genetic Imprinting

National Human Genome Research Institute (NHGRI)

Source

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In genomic imprinting the ability of a gene to be expressed depends upon the sex of the parent who passed on the gene. In some cases imprinted genes are expressed when the are inherited from the mother. in other cases they are expressed when inherited from the father. Unlike genomic mutations that can affect the ability of inherited genes to be expressed, genomic imprinting does not affect the DNA sequence itself. Genomic imprinting affects gene expression by chemically modifying DNA and/or altering the chromatin structure. Often, genomic imprinting results in a gene being expressed only in the chromosome inherited from one or the other parent. While this is a normal process, when combined with genomic mutations, disease can result. For example, Prader-Willi syndrome and Angelman syndrome are two distinct diseases caused by a deletion in the same part of chromosome 15. When this deletion occurs on the chromosome 15 that came from the father, the child will have Prader-Willi syndrome. However, when the deletion occurs on the chromosome 15 that came from the mother, the child will develop Angelman syndrome. This occurs because genes located in this region undergo genomic imprinting.