Gene Suppression Encyclopedia Article

Gene Suppression

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Gene Suppression

Genetic suppression is defined as the restoration of the wild-type phenotype in an organism that has a mutational alteration in a **gene**. Cells in which a suppressor **mutation** has acted to restore a previously mutated function are called revertants. Revertants are cells that are significantly better than the mutant but are not necessarily of a fully wild-type phenotype.

Without the influence of the suppressor, a genetic mutation will produce an altered phenotype from that of the wild-type. The suppressor can be another mutation on a different gene, or a suppressor mutation on the same gene but located some distance from the first mutation, or a suppressor in the cytoplasm that has generated due to a change in non-chromosomal **DNA** (such as a plasmid).

Several events can occur as suppressor mutations. An informational suppressor is one that does not change the sequence of the mutated gene, but rather affects the expression of the information encoded by the original, nonmutated gene. An example is an altered **transfer RNA** that misreads the mutant codon on the DNA. The misreading can cause the tRNA to recognize the mutated sequence as coding for an **amino acid**. In this way, the tRNA mutation can suppress the codon mutation. Another suppression mutation is the alteration in the originally mutated codon, which produces another codon different from both the wild-type and mutant **codons**. The new codon might act to restore the proper reading frame or reinitiate **transcription** or **translation**.

Suppression can be manifest in several ways. It may suppress a mutation that has resulted in the decreased activity of a protein. Suppression can also affect the production of an inhibitory agent. The inhibitory agent will no longer reach a level that causes a mutant phenotype. Another suppressor effect can be to boost the level of a substrate that a mutated enzyme needs for its activity. Thus, even though mutated, enzymatic activity can be restored because of the increased amount of the substrate. Yet another suppressor effect is the production of a new protein; the activation of another, normally silent, gene for the mutated protein. Finally, some suppressor mutations cause the accumulation of a product that is normally not accumulated. The accumulated product may be available to the damaged protein, restoring its function.