

Difference Between Original and Mutated Sequences

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Key Difference - Original vs Mutated Sequences

In a DNA sequence, there are four naturally occurring [nucleotides](#). Each DNA sequence has a unique order of nucleotides. In a gene region, a precise nucleotide sequence is extremely important due to the genetic information it possesses to synthesize a specific protein. A single nucleotide difference can lead to a harmful result such as a wrong protein or a deadly disease. Hence, correct nucleotide order of a DNA sequence should persist for normal growth and functioning. Changes occur in DNA sequences due to various factors such as deletions, insertions, duplications, and translocations. Original nucleotide sequence deviates due to above factors into mutated sequences. There are several repair mechanisms that naturally occur to correct changes in an organism's [genome](#). However, original and mutated sequences exist in organisms genomes. The key difference between original and mutated sequences is that **original sequences do not contain damages or mutations** whereas **mutated sequences contain damages or the permanent alterations of the DNA sequences**.

What are Original Sequences?

The entire genetic information which is essential for each and every action of the organism is mainly stored in the genome of that organism in the form of DNA. DNA molecules comprise of four nucleotides attached sequentially by phosphodiester bonds. [Deoxyribonucleotide](#) is the building block which makes long DNA strands. According to the genetic code, four nucleotides are arranged in the DNA sequence. Hence, it has a correct order which is known as a genetic code to produce the correct [mRNA](#) sequence and [codons](#) to synthesize the correct amino acid sequence of the protein. When the whole sequence of the gene has the correct nucleotide order, we can refer to it as the original sequence of the gene because it converts into mRNA sequence and finally to correct protein during [transcription and translation](#). Original sequences are free from nucleotide differences, damages or mutations.

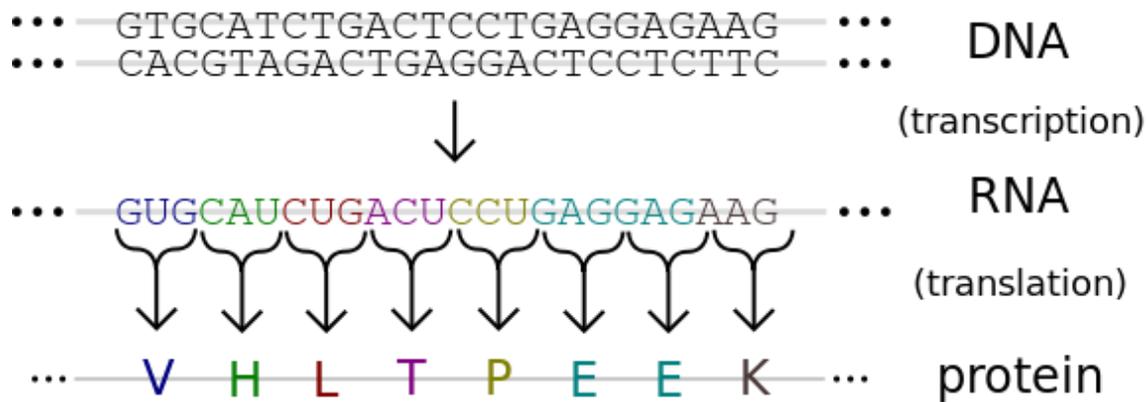


Figure 01: Original Sequence

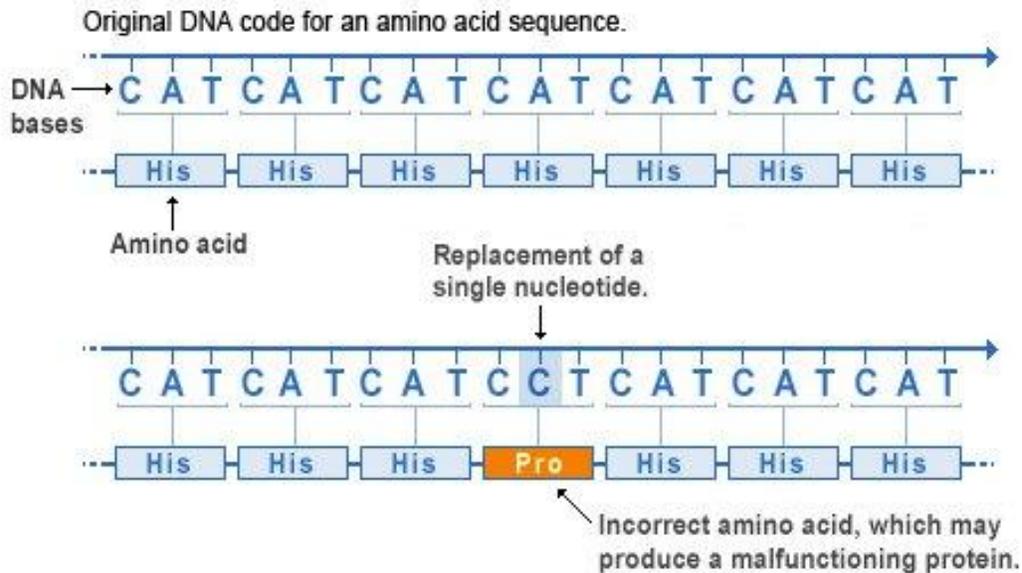
What are Mutated Sequences?

When the original nucleotide sequence of DNA is changed due to damage or any other reason, we refer to it as an alteration introduced to a normal sequence. Some of these alterations are repaired by cellular repair mechanisms. However, some alterations cannot be reversed. They lead to permanent alterations which are known as [mutations](#). Therefore, a mutation can be defined as a permanent alteration in the DNA sequence, which is sometimes inherited by offspring. The sequence which is subjected to permanent nucleotide alteration is known as a mutated sequence.

DNA sequence can alter due to different reasons, and these alterations affect the organisms' health and development. Single base pair changes are caused by substitutions. A piece of DNA can be inserted or deleted from the original sequence by causing a mutated sequence. Some DNA sequences can be abnormally copied one or more time. Frameshift mutations can also alter original sequences. If the resulting sequence is altered by any means, that particular sequence is known as a mutated sequence or gene.

Mutated sequences can be categorized into two major types based on where they are found. When mutated sequences are found in [somatic cells](#) (non-reproductive cells), they are known as **somatic mutations**. Most somatic mutations do not cause negative effects on the organism. However, if the mutation affects [cell division](#), it can be the basis for the development of cancer. Some mutations occur in [gametes](#) (reproductive cells). They are referred as **germ-line mutations**; these mutations are passed into offspring.

Missense mutation



U.S. National Library of Medicine

Figure 02: Mutated Sequence

What is the difference between Original and Mutated Sequences?

| Original vs Mutated Sequences | |
|---|---|
| Original Sequences are the DNA sequences which are not subjected to damages or mutations. | Mutated Sequences are the sequences which are subjected to permanent alterations of the nucleotide sequence or damages. |
| Nucleotide Order | |
| Original sequences have the correct nucleotide order. | Mutated sequences do not have the correct order. |
| Resultant Protein | |
| Original sequences of a gene results in a correct protein | Mutated gene sequence may or may not result in a correct protein. |

Summary - Original vs Mutated Sequences

DNA sequences are composed of nucleotide chains. The order of nucleotide arrangement is of utmost important since it is stored with genetic information. In original sequences, a correct nucleotide sequence can be identified. In mutated sequences, the original order of the nucleotides has been changed due to various factors. This is the main difference between original and mutated sequences.

Reference:

1. "DNA Is Constantly Changing through the Process of Mutation." Nature News. Nature Publishing Group, n.d. Web. [Available here](#). 05 June 2017.
2. Berg, Jeremy M. "Mutations Involve Changes in the Base Sequence of DNA." Biochemistry. 5th edition. U.S. National Library of Medicine, 01 Jan. 1970. Web. [Available here](#). 05 June 2017

Image Courtesy:

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APA: Difference Between Original and Mutated Sequences. (2017, June 10). Retrieved (date), from <http://www.differencebetween.com/difference-between-original-and-vs-mutated-sequences>

MLA: " Difference Between Original and Mutated Sequences." Difference Between.Com. 10 June 2017. Web.

Chicago: " Difference Between Original and Mutated Sequences." Difference Between.Com. <http://www.differencebetween.com/difference-between-original-and-vs-mutated-sequences/> (accessed [date]).



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