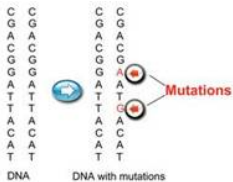


# Kinds of Gene Mutation

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## What kinds of gene mutations are possible?



### Mutation: Introduction:

The changes in a genomic sequence are called as Mutation.

DNA copy error, UV radiation, viruses, transposons and mutagenic chemicals are the inducing factors of mutation.

### Gene Mutation: Definition:

A gene mutation is a permanent change in the DNA sequence that makes up a gene. Mutations occur from a single DNA base to a large segment of a chromosome. Alteration of gene sequence also possible and it can be done by various ways. These mutations effects on health and alter the functions depending on the place where they occur.

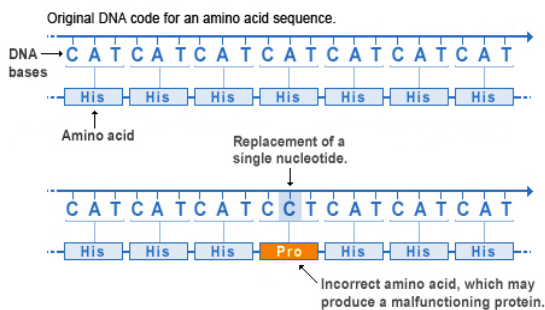
## The Types of Mutations

- Small scale mutation – Point mutations, Insertions, deletions
- Large scale mutation – Translocation, Inversion.

Point mutations occur within the protein coding region of a gene may be classified into three kinds.

1. Silent mutations: code for the same amino acid.
2. Missense mutations: code for a different amino acid.
3. Nonsense mutations: code for a stop and can truncate the protein.

### Missense mutation

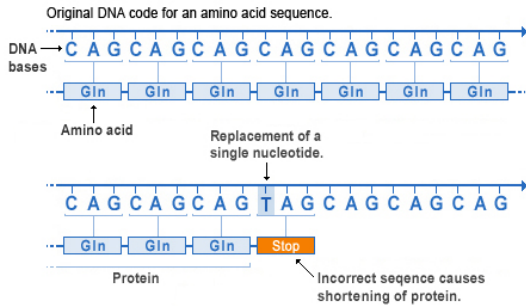


### Missense mutation:

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It is a change in one DNA base pair that results in the substitution of one amino acid for another in the protein made by a gene.

## Nonsense mutation



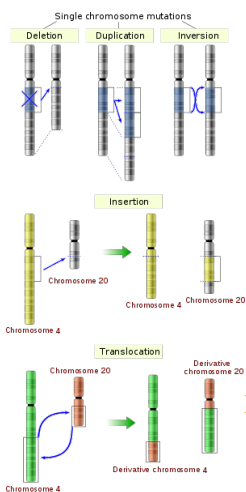
**Nonsense mutation:**

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A change in one DNA base pair results with nonsense mutation. DNA sequence signals the cell to stop building a protein and results with the shortened protein which alters the functions of gene.

## Insertion:

By adding a piece of DNA an insertion changes the number of DNA bases. So, the protein made by the gene may not function properly.



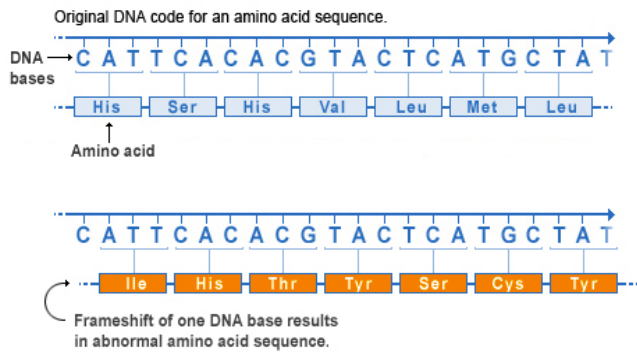
**Deletion:**

The number of DNA bases will be altered by the deletion of a DNA piece. Small deletions occur in one or a few base pairs and larger deletions remove many genes. The function of protein may be altered because of the deleted DNA.

**Duplication:**

A piece of DNA is abnormally copied one or more times. This mutation may alter the function of the resulting protein.

## Frameshift mutation



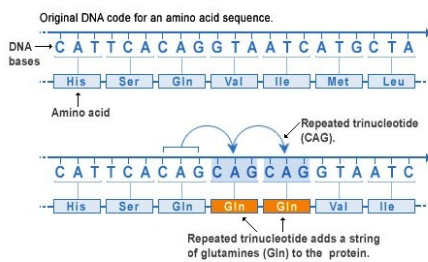
**Frameshift mutation:**

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The addition or loss of DNA bases changes a gene's reading frame results with the frame shift mutation. A frame shift mutation shifts the grouping of bases and changes the amino acid code results with the non functional protein.

## Repeat expansion:

Repeat expansion mutation



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Nucleotide repeats are short DNA sequences that are repeated a number of times in

a row. This type of mutation can cause the resulting with the improper functional protein.

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