

Write each codon per line and circle the mutated DNA base where the mutation took place.

Original DNA TAC GGA CGA TCT CAG GAG CCT ATA ATC

Deletion DNA _____

Mutated mRNA _____

Mutated Amino Acids _____

Original Amino Acid Met Pro Ala Arg Val Leu Gly Tyr STOP

Usually a frame shift mutation results in the synthesis of a nonfunctional protein.
Why do you think your mutated proteins might not be functional?

BASE SUBSTITUTION MUTATIONS

For simplicity, change only one base for all the following base substitution mutations.

A different type of gene mutation is called base substitution. It is the simplest type of mutation where a nucleotide pair is replaced with a different nucleotide pair.

Base Substitution GAC → GGC

One type of base substitution is called *transversion mutation*. Transversion mutation happens when one purine (A, G) is swapped with a pyrimidine (C, T).

Purine → Pyrimidine GAC → TAC
Pyrimidine → Purine GAC → GAG

Use the DNA code below to demonstrate a purine → pyrimidine transversion mutation. All you have to do is change one DNA base.

Write each codon per line and circle the mutated amino acid.

Original DNA TAC CAT GCA GAT CTG GCC CAG TTC ATC

Transversion DNA _____

Mutated mRNA _____

Mutated Amino Acid _____

Original Amino Acid Met Val Arg Leu Asp Arg Val Lys STOP

The opposite of transversion mutations is *transition mutations*. A transition mutation happens when one purine is swapped with the other purine or pyrimidine with pyrimidine.

| | |
|-------------------------|-----------|
| Purine → Purine | GAC → AAC |
| Pyrimidine → Pyrimidine | GAC → GAT |

Use the DNA code below to demonstrate a purine → purine transition mutation. All you have to do is change one DNA base.

Write each codon per line and circle the mutated amino acid.

Original DNA TAC GTC GCT CAA CGG GAC CTG ACC ACT

Transition DNA _____

Mutated mRNA _____

Mutated Amino Acid _____

Original Amino Acid Met Gln Arg Val Ala Leu Asp Trp STOP

A third type of base substitution is called *silent mutation*. Silent mutation happens when one base in a codon is changed but both code for the same amino acid.

| | |
|------------|-----------|
| DNA | CTT → CTG |
| Amino Acid | Leu → Leu |

Use the DNA code below to demonstrate a silent mutation. All you have to do is change one DNA base but the amino acid stays the same.

Write each codon per line and circle the mutated DNA base.

Original DNA TAC CAT TCT CGG TGT AAA AGG GCG ATT

Silent DNA _____

Mutated mRNA _____

Mutated Amino Acid _____

Original Amino Acid Met Val Arg Ala Thr Phe Ser Arg STOP

