

There are three main types of mutations: **point missense mutations, point nonsense mutations, and frameshift mutations.** In each of the following DNA sequences, you will use the mRNA and amino acid sequences to identify the mutation that occurred and the effects of each, if any. Look and analyze carefully!

Types of Gene Mutations

Gene mutations may change the particular amino acid the triplet represents and thereby changing the overall shape and function of a protein. i.e. sickle-cell anemia

Point Mutations: May involve the substitution of one nucleotide for another, or the insertion or deletion of one or more nucleotides. There are two types of point mutations:

Substitution: A mutation in which one base replaces another in the DNA chain.

The old dog ran and the fox did too

The old hog ran and the fox did too

Silent: has no effect on the cell's metabolism

Mis-sense: creates a slightly altered but functional protein: may be harmful or beneficial

Nonsense: the gene is unable to code for any functional protein: severe consequences

Frame-shift mutation: A mutation in which a base deletion or base insertion causes the gene's message to be translated incorrectly.

Base Insertion: A mutation in which an extra nucleotide base is added to the DNA sequence. The entire message may be translated incorrectly.

The old dog ran and the fox did too

The old dog ran tan dth efo xdi dto o

Base Deletion: A mutation in which a nucleotide base is lost from the DNA sequence. Again the entire message may be translated incorrectly.

The old dog ran and the fox did too

The old dog rna ndt hef oxd idt oo

Original DNA Sequence: T A C A C C T T G G C G A C G A C T

mRNA Sequence:

Amino Acid Sequence:

Mutated DNA Sequence #1: T A C A T C T T G G C G A C G A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects?

What kind of mutation is this?

Mutated DNA Sequence #2: T A C G A C C T T G G C G A C G A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects?

What kind of mutation is this?

Mutated DNA Sequence #3: T A C A C C T T A G C G A C G A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects?

What kind of mutation is this?

Mutated DNA Sequence #4: T A C A C C T T G G C G A C T A C T

What's the mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects?

What kind of mutation is this?

Mutated DNA Sequence #5: T A C A C C T T G G G A C G A C T

What will be the corresponding mRNA sequence?

What will be the amino acid sequence?

Will there likely be effects?

What kind of mutation is this?

Which type of mutation is responsible for new variations of a trait but does not change it? _____

Which type of mutation results in abnormal amino acid sequence that codes for a new protein? _____

Which type of mutation stops the translation of the mRNA? _____