IV. Mutagenesis

Mutations cause a change in the sequence of DNA base pairs, this occurs either by the **substitution** of one base for another (these are known as **point** mutations) or by the **insertion** or **deletion** of a base of sequence of bases (these are known unsurprisingly as, **insertion** or **deletion** mutations)

Mutations arise as a result of environmental factors or errors that occur during synthesis: replication errors, insertions/deletions, UV induced base pair alterations, strand breaks and covalent crosslinking.

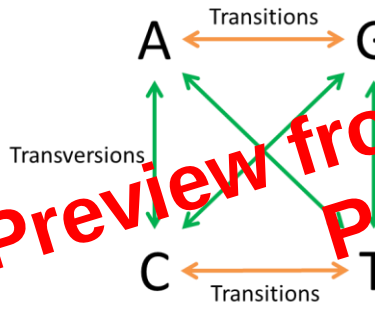
As the integrity of DNA is vital to the survival of the cell and reproduction there needs to be high fidelity replication (a good process) and repair mechanisms in place to correct any DNA damage that may occur.

A. **Point Mutations**

There are two main types of point mutations

Transitions: where a purine replaces another purine (A to G mutation) or a pyrimidine replaces another pyrimidine (C to T mutation)

Transversions: where a purine replaces a pyrimidine (C to G mutation) or a pyrimidine replaces a purine (A to C mutation)



1. **Spontaneous** DNA damage
    a. **Deamination**
        i. Of **cytosine** to form **uracil** which base pairs with **adenine**
        ii. Of **adenine** to form **hypoxyanthine** which will base pair with **cytosine**
        iii. Of **guanine** to form **xanthine** which will base pair with **thymine**
    b. **Depurination**

    This is the **loss** of **purine** bases which results from the **cleavage** of the bond between the purine base and deoxyribose. This leaves a **apurinic** (AP) site in the DNA

2. Base **mispairing**

    An **amino** group ($-NH_2$) which is a hydrogen bond donor is able to tautomerise to an **imino** group (=NH) becoming a hydrogen bond acceptor