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**Steps of DNA replication**

* Intiation
* Enlongation
* termination

**DNA replication proteins**

At the replication fork, many replication enzymes assemble on the DNA into a complex molecular machine called the replisome. The following is a list of major DNA replication enzymes that participate in the replisome:

|  |  |
| --- | --- |
| **Enzyme** | **Function in DNA replication** |
| DNA helicase | Also known as helix destabilizing enzyme. Helicase separates the two strands of DNA at the Replication Fork behind the topoisomerase. |
| DNA polymerase | The enzyme responsible for catalyzing the addition of nucleotide substrates to DNA in the 5′ to 3′ direction during DNA replication. Also performs proof-reading and error correction. There exist many different types of DNA Polymerase, each of which perform different functions in different types of cells. |
| DNA clamp | A protein which prevents elongating DNA polymerases from dissociating from the DNA parent strand. |
| Single-strand DNA-binding protein | Bind to ssDNA and prevent the DNA double helix from re-annealing after DNA helicase unwinds it, thus maintaining the strand separation, and facilitating the synthesis of the nascent strand. |
| Topoisomerase | Relaxes the DNA from its super-coiled nature. |
| DNA gyrase | Relieves strain of unwinding by DNA helicase; this is a specific type of topoisomerase |
| DNA ligase | Re-anneals the semi-conservative strands and joins Okazaki Fragments of the lagging strand. |
| Primase | Provides a starting point of RNA (or DNA) for DNA polymerase to begin synthesis of the new DNA strand. |
| Telomerase | Lengthens telomeric DNA by adding repetitive nucleotide sequences to the ends of **eukaryotic chromosomes**. This allows germ cells and stem cells to avoid the Hayflick limit on cell division |