Okpongete Ezra

17/MHS06/055

BCH204 assignment

1. Steps of DNA replication

There are three main steps to DNA replication: initiation, elongation, and termination.

In order to fit within a cell's nucleus, DNA is packed into tightly coiled structures called chromatin, which loosens prior to replication, allowing the cell replication machinery to access the DNA strands.

Before DNA replication can begin, the double helix structure of the DNA molecules has to be 'unzipped.' Helicase, an enzyme, is integral to this process, breaking the hydrogen bonds that hold the complementary bases of DNA together (A with T and C with G). The separation creates a 'Y' shape called a replication fork and the two single strands of DNA now act as templates for making new strands of DNA.

Next, the Single-Stranded DNA Binding Protein (SSB Protein) binds to the now single-stranded DNA, preventing the separating strands from joining again.

The two strands of the double-helix DNA are joined together by cross-bars, twisted around. For this to work, each DNA strand runs in opposite direction.

One of the strands is oriented in the 3' to 5' direction (towards the replication fork), this is the leading strand. The other strand is oriented in the 5' to 3' direction (away from the replication fork), this is the lagging strand.

2. OUTLINE THE FUNCTIONS OF DNA REPLICATION ENZYMES

Enzyme -	-	Function
Topoisomerase	-	Relaxes the super-coiled DNA
DNA helicase.	-	Unwinds the double helix at the replication fork
Primase	-	Provides the starting point for DNA polymerase to begin synthesis of the new strand
DNA polymerase	-	Synthesizes the new DNA strand; also proofreads and corrects some errors

DNA ligase. - Re-joins the two DNA strands into a double helix and joins Okazaki fragments of the lagging strand