

Terms & Guide Questions for Topic: DNA Replication

Terms

DNA polymerase	Sliding-clamp proteins
Gene family & protein family	Clamp-loading proteins
Replication fork	Topoisomerase
Leading & lagging strands	Origin of replication (Ori)
Okazaki fragments	Initiator protein
Primase	Origin of replication complex (ORC)
Nuclease, endonuclease, exonuclease	Telomere
DNA ligase	Simple-sequence repeat
Helicase	Telomerase
Single-stranded DNA-binding proteins (SSBs)	Reverse transcriptase

Guide Questions

1. During DNA replication, polymerization of nucleotides is catalyzed by _____ in the _____ direction.

Questions 2-4 refers to the Egr gene/protein family, which consists of four members: Egr1, Egr2, Egr3, and Egr4.

2. If you examined the nucleotide sequences for Egr1-4, how would you expect they would compare?
3. If you examined the amino acid sequences for Egr1-4, how would you expect they would compare?
4. If you examined the functions of Egr1-4 proteins, how would you expect they would compare?
5. Eukaryotes have approximately 15 DNA polymerase family members. What key properties do they all have in common?
6. What does the term “replication fork” refer to?
7. Which of the following distinguish the leading strand and the lagging strand during DNA replication?
8. What role does the enzyme Primase play during DNA replication?
9. If you treated cells with a compound that inhibits Primase activity while they are in the middle of DNA replication, which of the following effects would it have?

10. What is an endonuclease?
11. What is a 3' to 5' exonuclease?
12. How are RNA primers removed from Okazaki fragments?
13. What role does DNA ligase play during DNA replication?
14. How is double-stranded DNA separated during DNA replication?
15. Why are single-stranded DNA binding proteins (SSBs) critical to DNA replication?
16. Why are protein-protein interactions between sliding-clamp proteins and DNA polymerase critical to DNA replication?
17. How does topoisomerase contribute to the process of DNA replication?
18. What role do origins of replication (*ori*'s) play in DNA replication?
19. How do origins of replication in *E. coli* versus *S. cerevisiae* compare? What do they have in common? How do they differ?
20. Where are telomeres located within genomic DNA?
21. Simple-sequence repeats compose a significant percentage of the human genome beyond telomere (approximately 10%; i.e., 300 million base pairs). Which of following sequences would you define as a simple-sequence repeat?
22. What class of enzymatic activity does telomerase exhibit?
23. How does telomerase contribute to completion of DNA replication?