

Topic 31. Enzymes and molecular mechanisms of DNA replication.

Theoretical questions:

1. DNA replication. Components of the replicative complex and their biological role.
2. Stages of replication: initiation, elongation, termination. Substrates, energy supply of the process. The role of primers in the formation of Okazaki fragments.
3. Reparative DNA synthesis: types of DNA damage, ways to eliminate them. Process scheme, enzymes of dark repair of DNA damaged by the formation of thymine dimers. Xeroderma pigmentosum.

Study Questions and Tasks

1. DNA Replication. Components (enzymes and proteins) of the replication complex and their biological role.

N п\п	Components	Biological role
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

2. Stages of replication. Substrates, energy supply of the process. The role of primers in the formation of Okazaki fragments.

3. DNA repair synthesis: types of DNA damage, ways to eliminate them. Enzymes of dark repair of DNA damaged by the formation of thymine dimers. Pigmentary Xeroderma pigmentosum.

Case tasks

1. In patients with xeroderma pigmentosum, the skin is extremely sensitive to sunlight and skin cancer may develop. The cause is a hereditary deficiency of the enzyme UV endonuclease. What process is disrupted in this disease? Show this schematically.

2. A 58-year-old man underwent surgery for prostate cancer. After 3 months, he underwent a course of radiation and chemotherapy. The complex of drugs included 5-fluorodeoxyuridine, an inhibitor of thymidylate synthase. The synthesis of which nucleic acid does it inhibit? Write the reaction that is inhibited.

Textbooks:

1. Biochemistry 5th Edition Ch.22, pp. 292-301.
2. Prasad textbook of biochemistry OCR. Topic 19, pp.405-415.