What is the Central Dogma of Protein Synthesis?

Worksheet

The central dogma states that genetic information flows in one main direction: DNA RNA (transcription) Protein (translation), turning stored genetic code into functional proteins.

Questions

1. What is the correct order of the central dogma?

A) Protein RNA DNA
B) DNA Protein RNA
C) DNA RNA Protein
D) RNA DNA Protein

2. What enzyme carries out transcription?

A) DNA polymerase
B) RNA polymerase
C) Ribosome
D) Ligase

3. Where does translation occur?

A) Nucleus
B) Mitochondria
C) Ribosome
D) Golgi apparatus

4. How many nucleotides make up one codon?

A) 1
B) 2
C) 3
D) 4

5. An mRNA coding region has 300 nucleotides. How many amino acids does the protein contain?

6. A DNA template strand reads ATG-CGA-TTT. What protein-coding mRNA is produced, and what does it start with?

7. If a mutation changes one DNA base, how might it affect the final protein?

8. Define: What is the central dogma?

9. Define: What is transcription?

10. Define: What is translation?

Answer Key

1. C) DNA RNA Protein - Genetic information flows DNA RNA (transcription) Protein (translation).

2. B) RNA polymerase - RNA polymerase synthesizes mRNA from a DNA template.

3. C) Ribosome - Ribosomes read mRNA and assemble proteins during translation.

4. C) 3 - A codon is a triplet of three nucleotides coding for one amino acid.

5. Each amino acid is coded by a triplet codon (3 nucleotides) Amino acids = 300 / 3 = 100 One codon is usually a stop codon, so the protein has about 99 amino acids

6. Transcription pairs A-U, T-A, C-G, G-C ATGUAC, CGAGCU, TTTAAA mRNA = UAC-GCU-AAA (this example does not start with AUG, so recheck orientation: using the correct template convention, mRNA mirrors the coding strand with TU) Using the coding (sense) strand ATG-CGA-TTT directly as mRNA sense gives AUG-CGA-UUU, starting with the start codon AUG (methionine)

7. A point mutation changes one mRNA codon That codon may code for a different amino acid (missense) or a stop signal (nonsense) The protein's shape and function can change, sometimes causing disease

8. The principle that genetic information flows from DNA to RNA to protein.

9. Copying a DNA gene sequence into a complementary mRNA strand.

10. Reading mRNA codons at the ribosome to assemble a chain of amino acids into a protein.