

# Genome Editing with CRISPR-Cas9

## Multiple Choice Questions

In the DNA double helix, which base pairs with Cytosine (C)?

- A) Adenine (A)
- B) Thymine (T)
- C) Guanine (G)
- D) Uracil (U)

What is the biological origin of the CRISPR system?

- A) It was synthetically created by human researchers.
- B) It is a natural defense mechanism used by bacteria to fight viruses.
- C) It was originally discovered in human stem cells.
- D) It is a protein found in all animal genomes.

What is the primary function of the Cas9 protein?

- A) It synthesizes new DNA strands.
- B) It acts as a guide to locate specific genes.
- C) It is a nuclease enzyme that cuts DNA.
- D) It protects the cell from radiation.

How do researchers engineer the CRISPR system to target a specific DNA sequence?

- A) By modifying the Cas9 protein structure.
- B) By changing the guide RNA to match the target sequence.
- C) By adding extra enzymes to the nucleus.
- D) By freezing the cells during the experiment.

What role does the PAM sequence play in the CRISPR process?

- A) It helps the Cas9 complex lock onto the DNA.
- B) It prevents the Cas9 from cutting the DNA.
- C) It acts as the "molecular scissors" to cut the strands.
- D) It accelerates the repair process of the cell.

Why do random mutations often occur after the CRISPR system makes a cut?

- A) Because the Cas9 protein is naturally unstable.
- B) Because the cell's natural DNA repair process is error-prone.
- C) Because the guide RNA deliberately introduces errors.
- D) Because the environment of the nucleus destroys the DNA.

How can scientists perform precise gene editing to replace a mutant gene with a healthy version?

- A) By using a different enzyme that does not cut the DNA.
- B) By adding a DNA template that carries the desired healthy sequence.
- C) By waiting for the cell to repair the gene naturally.
- D) By using heat to fuse the DNA strands.

What is a major advantage of CRISPR compared to previous gene-editing methods for studying human disease?

- A) It is the only method that does not use DNA.
- B) It is much slower than previous methods.
- C) It can target many genes at once.
- D) It only works on bacterial cells.

In which of the following can the CRISPR system be applied to edit DNA?

- A) Only in cultured cells.
- B) Only in fertilized eggs.
- C) In both cultured cells and fertilized eggs.
- D) Only in mature human patients.

Which of the following is NOT explicitly mentioned in the text as a future application of CRISPR?

- A) Drug development
- B) Agriculture
- C) Space exploration
- D) Treating genetic diseases in patients