

A Review on CRISPR-Cas9: A New Frontier in Gene Editing Technology

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Abstract: *Gene editing has evolved significantly over the past few decades, with CRISPR-Cas9 emerging as one of the most transformative techniques in modern molecular biology. Since its development, CRISPR-Cas9 has revolutionized genetic research by providing a precise, efficient, and versatile method for modifying genes. This review explores the principles of CRISPR-Cas9, its development, applications, advancements, and the ethical considerations surrounding its use. With the potential to cure genetic diseases, enhance agricultural traits, and advance scientific research, CRISPR-Cas9 continues to shape the future of biotechnology and medicine. CRISPR-Cas9, a groundbreaking tool in genetic engineering, has revolutionized the way scientists manipulate DNA. This technology, derived from a bacterial defense mechanism, allows for precise, targeted gene editing. It has wide-ranging applications in medicine, agriculture, and biotechnology, enabling advancements in gene therapy, crop improvement, and functional genomics. However, ethical concerns and off-target effects remain challenges. This review provides an overview of CRISPR-Cas9's history, methodology, modifications, and applications, while highlighting its potential and limitations*

Keywords: CRISPR-Cas9, Gene Editing, Genome Engineering, Gene Therapy, Agricultural Biotechnology, Precision Medicine, Genetic Diseases, Ethical Implications