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CRISPR-Cas9 technology

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Several diseases have no cure for many years. Even a new drug takes around 20 years to get prescribed to the patients as the drug development involves various phases from concept to marketing. The employment of CRISPR-Cas 9 gene editing in research is proving to transform the drug discovery process besides its therapeutic importance. Years back, microbiologists found a peculiar pathway called CRISPR-Cas immunity in bacteria that uses the adaptive immune system as a defence mechanism against its foreign invaders. Later, molecular biologists found a way to mimic this mechanism to edit genes at particular sites in eukaryotic cells. CRISPR-Cas9 is one of the gene-editing tools that can modify mutated genes in different diseases. Parts of the genome can be removed (knock-out) or added (knock-in) to alter the DNA sequence sections. CRISPR in bacteria works by cutting parts of the viral DNA, then saving the bit to recognise and defend during the next viral attack. Similarly, CRISPR-Cas9 is designed with complementary single-guide RNA to target DNA sequence and an enzyme (Cas9) that creates double-strand breaks at specific sites in the genomic sequence. DNA repair mechanisms then repair these damages in the DNA, correcting the target genes. In this way, mutated genes in disease conditions are corrected. CRISPR-Cas9 technology is a unique way to cure a range of diseases that have a genetic component, such as cancer, hepatitis B or even cholesterol in the future.

Keywords: CRISPR-Cas9, Gene-editing, Drug discovery, Adaptive immune system, Genetic diseases, Bacteria

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