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A REVOLUTIONARY METHOD OF DNA MANIPULATION USING THE CRISPR MECHANISM

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CRISPR is a unique prokaryotic immune system whose structure was first described about 35 years ago, but whose function has long remained a mystery.

Molecular scissors were first discovered in 1987 in the genome of E. coli, an important model organism for microbiology and molecular biology. Japanese researchers studying E. coli have discovered an unusual repeating sequence in DNA. Subsequently, similar structures were found in many other prokaryotes. Similar structures have also been found in archaea and bacteria. However, nothing like this has been found in the genomes of eukaryotes and viruses [1].

The CRISPR system consists of a genomic cassette in which information about an invading virus or plasmid is recorded, and the Cas protein, which is responsible for the molecular mechanisms of immunity. When an infection invades, cells use CRISPR to cut out small fragments from the alien genome and insert them into a cassette.

The highly efficient DNA recognition underlying CRISPR is attractive for practical applications, and CRISPR systems are currently being developed for the precise manipulation of various genomes, including the human genome.

Cas9 is an RNA-regulated endonuclease that is associated with CRISPR-adaptive immune systems in many bacteria. For example, Streptococcus pyogenes uses Cas9 to store and subsequently inspect and remove foreign DNA, such as bacteriophage and plasmid DNA.

By unwrapping the foreign DNA and determining its complementarity with a 20-pair spacer of control RNA bases, Cas9 checks it; Cas9 will cut the foreign DNA strand only if the substrate is complementary to the control RNA [2].

The idea of genetic recombination is not new, and various methods of its application have been around for a long time. However, CRISPR surpasses all currently known technologies due to its accessibility and accuracy: its cost is only $ 75, and editing a single gene takes only a few hours. The technology has virtually unlimited applications. First, CRISPR allows scientists to investigate the functions of various genes - by simply cutting out the corresponding gene from DNA, they can see which body functions have been affected.

CRISPR is one of the most popular technologies used today. Many scientists and entrepreneurs dream of using CRISPR in scientific research. In order to prevent unwanted mutations and congenital anomalies and make CRISPR safe for everyone to use in the future, the technology needs to be improved.

References

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