TYPE V CRISPR/CAS EFFECUTOR PROTEINS FOR CLEAVING SSDNA AND DETECTING TARGET DNA

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OTHER INFORMATION
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Cas12, Cpf1, CRISPR, genome editing

CATEGORIZED AS
» Biotechnology
» Genomics
» Materials & Chemicals
» Biological
» Medical
» Diagnostics
» Gene Therapy
» Research Tools
» Therapeutics
» Research Tools
» Nucleic Acids/DNA/RNA

RELATED CASES
2018-057-0
BRIEF DESCRIPTION

Class 2 CRISPR–Cas systems (e.g., type V CRISPR/Cas systems such as Cas12 family systems) are characterized by effector modules that include a single effector protein. For example, in a type V CRISPR/Cas system, the effector protein - a CRISPR/Cas endonuclease (e.g., a Cas12a protein) - interacts with (binds to) a corresponding guide RNA (e.g., a Cas12a guide RNA) to form a ribonucleoprotein (RNP) complex that is targeted to a particular site in a target nucleic acid via base pairing between the guide RNA and a target sequence within the target nucleic acid molecule. Thus, like CRISPR-Cas9, Cas12 has been harnessed for genome editing based on its ability to generate targeted, double-stranded DNA (dsDNA) breaks.

UC Berkeley researchers have discovered that RNA-guided DNA binding unleashes indiscriminate single-stranded DNA (ssDNA) cleavage activity by Cas12a that completely degrades ssDNA molecules. The researchers found that target-activated, non-specific ssDNase cleavage is also a property of other type V CRISPR-Cas12 enzymes. By combining Cas12a ssDNase activation with isothermal amplification, the researchers were able to achieve attomolar sensitivity for DNA detection. For example, rapid and specific detection of human papillomavirus in patient samples was achieved using these methods and compositions.

SUGGESTED USES

Platform for molecular diagnostics for detecting target DNAs (double or single stranded)

ADVANTAGES

» Highly specific method of detection

» Attomolar sensitivity for DNA detection

» Target DNAs can be detecting using any convenient detection method (e.g., using labeled single stranded detector DNA)

RELATED MATERIALS

» CRISPR-Cas12a target binding unleashes indiscriminate single-stranded DNase activity

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS

▶ Lentivirus-like Particle Delivery of CRISPR-Cas9 & Guide RNA for Gene Editing

▶ Genome Editing via LNP-Based Delivery of Efficient and Stable CRISPR-Cas Editors

▶ Type III CRISPR-Cas System for Robust RNA Knockdown and Imaging in Eukaryotes