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

Tech ID: 28955 / UC Case 2018-057-0

PATENT STATUS

Country	Type	Number	Dated	Case
Rep Of Korea	Issued Patent	10-2863727	09/19/2025	2018-057
United States Of America	Issued Patent	12,319,963	06/03/2025	2018-057
Japan	Issued Patent	7316275	07/19/2023	2018-057
United States Of America	Issued Patent	11,447,824	09/20/2022	2018-057
United States Of America	Issued Patent	11,118,224	09/14/2021	2018-057
United States Of America	Issued Patent	10,253,365	04/09/2019	2018-057
United States Of America	Published Application	20250354212	11/20/2025	2018-057
European Patent Office	Published Application	3714050 A0	09/30/2020	2018-057

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

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INVENTORS

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OTHER INFORMATION

KEYWORDS

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

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS
- Genome Editing via LNP-Based Delivery of Efficient and Stable CRISPR-Cas Editors
- Tissue-Specific Genome Engineering Using CRISPR-Cas9
- Type III CRISPR-Cas System for Robust RNA Knockdown and Imaging in Eukaryotes
- Cas9 Variants With Altered DNA Cleaving Activity
- Cas12-mediated DNA Detection Reporter Molecules
- Improved guide RNA and Protein Design for CasX-based Gene Editing Platform
- Compositions and Methods for Delivering Molecular Cargo to Cells
- Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
- Miniature Type VI CRISPR-Cas Systems and Methods of Use
- RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)
- Generation of Chimeric RNA with Type III CRISPR-Cas
- CasX Nickase Designs, Tans Cleavage Designs & Structure
- In Vivo Gene Editing Of Tau Locus Via Liponanoparticle Delivery
- Methods and Compositions for Modifying a single stranded Target Nucleic Acid
- A Dual-RNA Guided CasZ Gene Editing Technology
- A Protein Inhibitor Of Cas9
- RNA-directed Cleavage and Modification of DNA using CasX (CRISPR-CasX)
- Compositions and Methods for Genome Editing
- IS110 and IS1111 Family RNA-Guided Transposons
- Variant Cas12a Protein Compositions and Methods of Use
- In Vitro and In Vivo Genome Editing by LNP Delivery of CRISPR Ribonucleoprotein
- CRISPR CASY COMPOSITIONS AND METHODS OF USE
- Single Conjugative Vector for Genome Editing by RNA-guided Transposition
- Improved Cas12a Proteins for Accurate and Efficient Genome Editing
- CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF
- Compositions and Methods for VIPR-Based Nucleic Acid Targeting
- Methods Of Use Of Cas12L/CasLambda In Plants
- THERMOSTABLE RNA-GUIDED ENDONUCLEASES AND METHODS OF USE THEREOF (GeoCas9)
- Variant TnpB and wRNA Proteins
- Efficient Site-Specific Integration Of New Genetic Information Into Human Cells
- Class 2 CRISPR/Cas COMPOSITIONS AND METHODS OF USE
- Compositions and Methods of Use for Variant Csy4 Endoribonucleases
- Immune Cell-Mediated Intercellular Delivery Of Biomolecules
- Methods and Compositions for Controlling Gene Expression by RNA Processing

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