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

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

PATENT STATUS

<table>
<thead>
<tr>
<th>Country</th>
<th>Type</th>
<th>Number</th>
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<tr>
<td>United States Of America</td>
<td>Issued Patent</td>
<td>10,253,365</td>
<td>04/09/2019</td>
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<tr>
<td>United States Of America</td>
<td>Published Application</td>
<td>20190241954</td>
<td>08/08/2019</td>
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Additional Patents Pending

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

- Methods and Compositions for Using Argonaute to Modify a Single-Stranded Target Nucleic Acid
- COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS
- Cas9 Variants With Altered DNA Cleaving Activity
- Cas12-mediated DNA Detection Reporter Molecules
- Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
- RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)
- Methods For High Signal-To-Noise Imaging Of Chromosomal Loci In Cells Using Fluorescent Cas9
- A Dual-RNA Guided CasZ Gene Editing Technology
- A Protein Inhibitor Of Cas9
- Small Cas9 Protein Inhibitor
- Split-Cas9 For Regulatable Genome Engineering
- NANOPORE MEMBRANE DEVICE AND METHODS OF USE THEREOF
- Decorating Chromatin for Precise Genome Editing Using CRISPR
- 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

THERMOSTABLE RNA-GUIDED ENDONUCLEASES AND METHODS OF USE THEREOF (GeoCas9)

Structure-Guided Methods Of Cas9-Mediated Genome Engineering

Endoribonucleases For RNA Detection And Analysis

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 Cas4 Endoribonucleases

Small Molecule Assisted Cell Penetrating Cas9 RNP Delivery

Methods and Compositions for Controlling Gene Expression by RNA Processing