IMPROVED CAS12A PROTEINS FOR ACCURATE AND EFFICIENT GENOME EDITING

Tech ID: 30433 / UC Case 2019-162-0

PATENT STATUS

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<td>United States Of America</td>
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BRIEF DESCRIPTION

Mutated versions of Cas12a that remove its non-specific ssDNA cleavage activity without affecting site-specific double-stranded DNA cutting activity. These mutant proteins, in which a short amino acid sequence is deleted or changed, provide improved genome editing tools that will avoid potential off-target editing due to random ssDNA nicking.

SUGGESTED USES

Genome editing in animals, plants, and human cells.

ADVANTAGES

Accurate and efficient genome editing.

Background: Cas12a (formerly called Cpf1) is a type V CRISPR-Cas enzyme derived from bacteria that is used for RNA-guided genome editing in animal, plant and human cells. However, Cas12a possesses an additional enzymatic activity in which a DNA target-bound Cas12a can rapidly and non-specifically degrade any single-stranded DNA (ssDNA) substrate in a sequence-independent manner. This enzymatic activity is endonucleolytic, which means that the ssDNA substrate does not need a free 5' or 3' end to be cut. For this reason, natural Cas12a-type enzymes have the potential to induce off-target genome editing due to nicking of exposed ssDNA in cells.
RELATED CASES
2019-162-0

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
▶ Type III CRISPR-Cas System for Robust RNA Knockdown and Imaging in Eukaryotes
▶ Cas12-mediated DNA Detection Reporter Molecules
▶ Improved guide RNA and Protein Design for CasX-based Gene Editing Platform
▶ Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
▶ RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)
▶ CasX Nickase Designs, Tans Cleavage Designs & Structure
▶ In Vivo Gene Editing Of Tau Locus Via Liponanoparticle Delivery
▶ A Dual-RNA Guided CasZ Gene Editing Technology
▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF ("Cas-VariPhi")
▶ Modifications To Cas9 For Passive-Delivery Into Cells
▶ A Protein Inhibitor Of Cas9
▶ RNA-directed Cleavage and Modification of DNA using CasX (CRISPR-CasX)
▶ Compositions and Methods for Genome Editing
▶ Split-Cas9 For Regulatable Genome Engineering
▶ NANOPORE MEMBRANE DEVICE AND METHODS OF USE THEREOF
▶ Methods to Interfere with Prokaryotic and Phage Translation and Noncoding RNA
▶ CRISPR CASY COMPOSITIONS AND METHODS OF USE
▶ Single Conjugative Vector for Genome Editing by RNA-guided Transposition
▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF
▶ Engineered/Variant Hyperactive CRISPR CasPhi Enzymes And Methods Of Use Thereof
▶ Engineering Cas12a Genome Editors with Minimized Trans-Activity
▶ Methods Of Use Of Cas12L/CasLambda In Plants
▶ Type V CRISPR/CAS Effector Proteins for Cleaving ssDNA and Detecting Target DNA
▶ 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
▶ CRISPR-Cas Effector Polypeptides and Methods of Use Thereof
▶ Class 2 CRISPR/Cas COMPOSITIONS AND METHODS OF USE
▶ Compositions and Methods of Use for Variant Cas4 Endoribonucleases
▶ Identification Of Sites For Internal Insertions Into Cas9
▶ Methods and Compositions for Controlling Gene Expression by RNA Processing