

# IMPROVED CAS<sub>12A</sub> PROTEINS FOR ACCURATE AND EFFICIENT GENOME EDITING

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

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,454,685	10/28/2025	2019-162

## 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.

## CONTACT

Terri Sale  
terri.sale@berkeley.edu  
tel: 510-643-4219.



## INVENTORS

» Doudna, Jennifer A.

## OTHER INFORMATION

### KEYWORDS

genome editing, Cas12a

### CATEGORIZED AS

- » **Agriculture & Animal Science**
  - » Animal Science
  - » Plant Traits
  - » Plant Varieties
  - » Transgenics
- » **Biotechnology**
  - » Food
  - » Genomics
  - » Health
  - » Proteomics
- » **Environment**
  - » Other
- » **Medical**
  - » Gene Therapy
  - » Research Tools
  - » Screening
  - » Therapeutics
- » **Veterinary**

» Other

» Therapeutics

## 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
- ▶ 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
- ▶ 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)
- ▶ 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
- ▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF
- ▶ 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)
- ▶ 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



University of California, Berkeley Office of Technology Licensing

2150 Shattuck Avenue, Suite 510, Berkeley, CA 94704

Tel: 510.643.7201 | Fax: 510.642.4566

<https://ipira.berkeley.edu/> | [otl-feedback@lists.berkeley.edu](mailto:otl-feedback@lists.berkeley.edu)

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