# CASX NICKASE DESIGNS, TANS CLEAVAGE DESIGNS & STRUCTURE

Tech ID: 29659 / UC Case 2019-011-0

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Issued Patent | 12,275,964 | 04/15/2025 | 2019-011 |
| European Patent Office | Published Application | 3841205 A0 | 06/30/2021 | 2019-011 |

## BRIEF DESCRIPTION

Metagenomic analysis of microbial DNA from groundwater samples revealed a new protein, CasX, that prevented bacterial transformation by plasmid DNA when expressed with cognate crRNAs targeting the plasmid[8]. Sequence analysis of CasXrevealed no similarity to other CRISPR-Cas enzymes, except for the presence of a RuvC nuclease domain similar to that found in both Cas9 and Cas12a enzyme families as well as transposases and recombinases. The evolutionary ambiguity of CasX hinted at a distinct structure and mechanism for DNA targeting, but without reconstitution of a functional CasX enzyme it was not possible to determine its
mechanism of plasmid interference.

UC Berkeley inventors found variant CasX polypeptides that induce programmable, site-specific genome repression in E. coli and genome editing in human cells, distinct from Cas9 and Cas12a, which establishes this enzyme family as a third CRISPR-Cas system for genetic manipulation.

## SUGGESTED USES

- Genome editing
- Gene therapy
- Research tools
- Genomic imaging

## ADVANTAGES

- Functions under different conditions than currently used CRISPR-Cas proteins
- Nucleotide sequence encoding the CasX is short, therefore especially useful when using a viral vector for deliver to cell

## CONTACT

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## INVENTORS

- Doudna, Jennifer A.

## OTHER INFORMATION

**KEYWORDS**

CRISPR, gene editing, genome, CasX, Cas12e

**CATEGORIZED AS**

- **Biotechnology**
  - Genomics
- **Imaging**
  - Medical
- **Medical**
  - Gene Therapy
  - Research Tools
  - Screening
  - Therapeutics
- **Research Tools**
  - Nucleic Acids/DNA/RNA
- **Veterinary**
  - Other
  - Therapeutics

**RELATED CASES**

2019-011-0

## 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)
- Generation of Chimeric RNA with Type III CRISPR-Cas
- 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
- 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

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