

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 plasmid⁸. Sequence analysis of CasX revealed 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

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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
- ▶ 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)
- ▶ 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
- ▶ CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF (“Cas-VariPhi”)
- ▶ 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
- ▶ Methods to Interfere with Prokaryotic and Phage Translation and Noncoding RNA
- ▶ 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
- ▶ Engineered/Variant Hyperactive CRISPR CasPhi Enzymes 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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