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CRISPR CASY COMPOSITIONS AND METHODS OF USE

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OTHER INFORMATION

KEYWORDS

CRISPR, gene editing, genome, gene therapy, cell biology, CasY

CATEGORIZED AS

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2018-044-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,227,753	02/18/2025	2018-044

BRIEF DESCRIPTION

The CRISPR-Cas system is now understood to confer bacteria and archaea with acquired immunity against phage and viruses. CRISPR-Cas systems consist of Cas proteins, which are involved in acquisition, targeting and cleavage of foreign DNA or RNA, and a CRISPR array, which includes direct repeats flanking short spacer sequences that guide Cas proteins to their targets. Class 2 CRISPR-Cas systems are streamlined versions in which a single Cas protein bound to RNA is responsible for binding to and cleavage of a targeted sequence. The programmable nature of these minimal systems has facilitated their use as a versatile technology that is revolutionizing the field of genome manipulation, so there is a need in the art for additional Class 2 CRISPR/Cas systems (e.g., Cas protein plus guide RNA combinations).

Previously UC Berkeley researchers discovered a new type of Cas protein, CasY (also referred to as Cas 12d protein). CasY is short compared to previously identified CRISPR-Cas endonucleases, and thus use of this protein as an alternative provides the advantage that the nucleotide sequence encoding the protein is relatively short. CasY utilizes a guide RNA to perform double stranded cleavage of DNA. The researchers introduced CRISPR-CasY into *E. coli*, finding that they could block genetic material introduced into the cell. Further research results indicated that CRISPR-CasY operates in a manner analogous to CRISPR-Cas9, but utilizing an entirely distinct protein architecture containing different catalytic domains. CasY is also expected to function under different conditions (e.g., temperature) given the environment of the organisms that CasY was expressed in. Similar to CRISPR Cas9, CasY enzymes are expected to have a wide variety of applications in genome editing and nucleic acid manipulation. Recent studies have shown that the CasY complex utilizes a novel RNA, in addition to the guide RNA, to perform double stranded cleavage of DNA. Similar to CRISPR Cas9, CasY enzymes are expected to have a wide variety of applications in genome editing and nucleic acid manipulation.

SUGGESTED USES

- » Genome editing
- » Genetic engineering
- » Gene therapy
- » Research tools (e.g., high-throughput screening of gene functions in cell lines and *in vivo*)
- » Creation of transgenic animal models
- » Genomic imaging

ADVANTAGES

- » Functions under different conditions than current CRISPR-Cas proteins (e.g., lower temperatures)
- » Nucleotide sequence encoding the CasY protein is short, therefore it's especially useful in situations that employ a viral vector (e.g., an AAV vector), for delivery to a cell such as a eukaryotic cell

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
- 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
- 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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