GENOME EDITING VIA LNP-BASED DELIVERY OF EFFICIENT AND STABLE CRISPR-CAS EDITORS

Tech ID: 32925 / UC Case 2023-015-0

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO 2024/112479	05/30/2024	2023-015

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. The programmable nature of these systems has facilitated their use as a versatile technology that is revolutionizing the field of genome manipulation. There is a need in the art for additional CRISPR-Cas systems with improved cleavage and manipulation under a variety of conditions and ones that are particularly thermostable under those conditions.

UCB researchers created a set of efficient CRISPR-Cas9 proteins from a thermostable Cas9 from the thermophilic bacterium Geobacillus stearothermophilus (GeoCas9) through directed evolution. The gene editing activity of the evolved mutant proteins was improved by up to four orders of magnitude compared to the wild-type GeoCas9. The researchers showed that the gene editors based on the evolved GeoCas9 can be effectively assembled into lipid nanoparticles (LNP) for the rapid delivery to different cell lines in vitro as well as different organs or tissues in vivo. The LNP-based delivery strategy could also be extended to other gene editors.

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

ADVANTAGES

- Gene editing activity greatly improved over wild type GeoCas9
- Functions under different conditions than current CRISPR-Cas9 proteins (e.g, thermostable and enzymatically active in a wide temperature range)

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INVENTORS

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OTHER INFORMATION

KEYWORDS

CRISPR, gene edit, genome, gene therapy

CATEGORIZED AS

- **Biotechnology**
  - Genomics
- **Materials & Chemicals**
  - Biological
- **Medical**
  - Gene Therapy
  - Research Tools
  - Therapeutics
- **Research Tools**
  - Nucleic Acids/DNA/RNA
- **Veterinary**
  - Therapeutics

RELATED CASES

2023-015-0

» Has an extended lifetime in human plasma

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS
- Type III CRISPR-Cas System for Robust RNA Knockdown and Imaging in Eukaryotes
- Cas12-mediated DNA Detection Reporter Molecules
- Highly Multiplexed Tagging Methods for RNA Imaging and Other Applications
- 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
- Single-Stranded Nucleic Acid Detection And Imaging System Using Cas9
- 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
- Split-Cas9 For Regulatable Genome Engineering
- Methods to Interfere with Prokaryotic and Phage Translation and Noncoding RNA
- Minimal RNA Targeting CRISPR Cas Systems
- Variant Cas12a Protein Compositions and Methods of Use
- 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)
- Structure-Guided Methods Of Cas9-Mediated Genome Engineering
- Efficient Site-Specific Integration Of New Genetic Information Into Human Cells
- CRISPR-Cas Effector Polypeptides and Methods of Use Thereof
- Virus-encoded DNA-binding Proteins
- Class 2 CRISPR/Cas COMPOSITIONS AND METHODS OF USE
- Compositions and Methods of Use for Variant Csy4 Endoribonucleases
- Methods and Compositions for Controlling Gene Expression by RNA Processing

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