SELECTIVE CELL ELIMINATION USING RNA-GUIDED CHROMATIN SHREDDING

Tech ID: 34079 / UC Case 2025-154-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Cancer is driven by genetic mutations, notably in p53, which is altered in ~ nearly half of all cancers and up to 70–90% of cases of some of the most difficult-to-treat cancers, including ovarian, pancreatic, and non-small cell lung cancer. P53 mutations also tend to be clonal, arising early and persisting across tumor cells in a heterogenous population. Restoring p53 function for tumor regression has been considered the "holy grail" of cancer therapy. However, no approved therapies are available to target the p53 protein due to its lack of druggable pockets and the difficulty of re-activating defective transcription factors. Conventional treatments, like chemotherapy, induce systemic DNA damage, leading to widespread side effects. Therefore, there is a need for compositions and methods that address the above.

UC Berkeley researchers and collaborators at Utah State University and the University of Utah have developed methods and compositions for cleaving chromosomal DNA in a eukaryotic cell that address some of the problems with cancer therapies mentioned above. The newly engineered CRISPR-Cas12a2 system detects a cancer signature within a cell and the Cas12a2 enzyme activates and initiates “chromatin shredding,” slicing up all the genetic material inside that specific cell. This widespread genetic demolition triggers cell death, destroying mutated cells while leaving healthy cells completely untouched.

SUGGESTED USES

» Programmable treatment system can target difficult-to-treat and recurrent cancers, including primary glioblastoma (a lethal brain cancer), ovarian, pancreatic, and non-small cell lung cancers

» Treatment for “undruggable” mutations that lack traditional drug-binding targets

ADVANTAGES

» RNA-guided Cas12a2 senses cellular RNA signatures to shred chromatin, enabling precise targeting of undruggable mutations

» Does not need to bind to the protein; system destroys the cell based on its genetic signature

» Can kill highly mutated or treatment-resistant cancer cells that survive chemotherapy

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OTHER INFORMATION

KEYWORDS

CRISPR; Cas12a2; Viral Infection; Therapeutics; Immune cell diseases

CATEGORIZED AS

» **Biotechnology**
» Genomics
» **Medical**
» Disease: Cancer
» Disease: Infectious Diseases
» Gene Therapy
» Research Tools
» Therapeutics

RELATED CASES

2025-154-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Next-Generation Lipid Nanoparticles for Precision Nucleic Acid Delivery
- 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
- Targeted Nucleic Acid Editing via Cas9-Deaminase Fusion Proteins
- 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)
- Generation of Chimeric RNA with Type III CRISPR-Cas
- CasX Nickase Designs, Tans Cleavage Designs & Structure
- Methods and Compositions for Modifying a single stranded Target Nucleic Acid
- Genetically Encoded, Biologically Responsive, And Programmable Bispecific Aptames As Therapeutic Protein Degraders
- 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
- Compositions and Methods for VIPR-Based Nucleic Acid Targeting
- Precision-Engineered Cas12a: Eliminating Collateral DNA Cleavage for Next-Generation Genome Editing
- 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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