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 TP53, which is altered in ~50% of all cancer cases across various types. In certain cancers such as ovarian, non-small cell lung (NSCLC), and pancreatic cancers, up to 70–90% of cases are found to have TP53 mutations. TP53 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. Such methods generally include contacting a target RNA inside of a eukaryotic cell with a CRISPR complex that includes a Cas12a2 protein and a guide RNA. The Cas12a2 is programmed to selectively kill cancer cells by targeting cancer-specific transcripts. This approach eliminates cancer cells by inducing trans chromatin cleavage, triggering DNA damage and cell death. Unlike existing methods, RNA-guided Cas12a2 senses cellular RNA signatures to shred chromatin, enabling precise targeting of undruggable mutations.

SUGGESTED USES

- » kill cancer cells by targeting cancer-specific transcripts
- » kill latent HIV-infected T cells by targeting HIV transcripts
- » kill HBV-infected cells by targeting HBV transcripts
- » kill other virus-infected cells by targeting viral transcripts
- » kill autoimmune T cells or other unwanted T cells by targeting transcripts of specific T cell receptors

ADVANTAGES

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

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS

CONTACT

Terri Sale
terri.sale@berkeley.edu
tel: 510-643-4219.

INVENTORS

» Doudna, Jennifer A.

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

- 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
- 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
- Methods and Compositions for Controlling Gene Expression by RNA Processing

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University of California, Berkeley Office of Technology Licensing
2150 Shattuck Avenue, Suite 510, Berkeley,CA 94704
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