DECORATING CHROMATIN FOR PRECISE GENOME EDITING USING CRISPR
Tech ID: 31814 / UC Case 2020-089-0

PATENT STATUS
Patent Pending

BRIEF DESCRIPTION
A novel fusion construct that fuses Cas9 to a truncated version of human PRDM9 with the purpose of improving precise genome editing via homologous directed repair (HDR). PRDM9 is a protein that deposits histone marks H3K4me3 and H3K36me3 simultaneously during meiosis to mark recombination hot spots where crossover occurs and is resolved by homologous recombination. H3K36me3 has also been demonstrated to be required upstream of homologous recombination repair after double stranded breaks (DSBs) and during V(D)J recombination for adaptive immunity. Recent evidence suggests PRDM9 acts as a pioneer factor opening closed chromatin. The newly engineered PRDM9C-Cas9 fusion construct shows increased HDR and decreased non-homologous end-joining mediated insertions and deletions (indels).

SUGGESTED USES
This newly engineered construct can be used to improve targeted insertions and substitutions mediated by CRISPR gene editing. Because of PRDM9's function as a pioneer factor we expect this tool to allow increased HDR:indel ratios across different cell types and regardless of preexisting chromatin architecture. This is relevant to editing in mammalian cells, plants, yeast and any other organisms that organize their DNA into chromatin. We also expect this tool to lead to more precise genome editing in primary cell lines which would be relevant for medical applications.

ADVANTAGES

RELATED MATERIALS

INVENTORS
> Doudna, Jennifer A.

OTHER INFORMATION
KEYWORDS
Cas9, PRDM9, CRISPR

CATEGORIZED AS
> Agriculture & Animal Science
> Biotechnology
> Genomics
> Environment
> Medical
> Gene Therapy
> Research Tools
> Veterinary
> Other

RELATED CASES
2020-089-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
> Methods and Compositions for Using Argonaute to Modify a Single-Stranded Target Nucleic Acid
> COMPOSITIONS AND METHODS FOR IDENTIFYING HOST CELL TARGET PROTEINS FOR TREATING RNA VIRUS INFECTIONS
> Cas9 Variants With Altered DNA Cleaving Activity
> Cas12-mediated DNA Detection Reporter Molecules
> Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
> Methods For High Signal-To-Noise Imaging Of Chromosomal Loci In Cells Using Fluorescent Cas9
> A Dual-RNA Guided CasZ Gene Editing Technology
> CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF ("Cas-VarPhi")
> A Protein Inhibitor Of Cas9
> Small Cas9 Protein Inhibitor
> Split-Cas9 For Regulatable Genome Engineering
> CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF ("Cas-Theta")
COMPOSITIONS AND METHODS FOR INCREASING HOMOLOGY-DIRECTED REPAIR
- 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 ("Cas-Omega")
- CRISPR-CAS EFFECTOR POLYPEPTIDES AND METHODS OF USE THEREOF
- Improved gRNA and Protein Design for CasX-based Gene Editing Platform
- Class 2 CRISPR/Cas COMPOSITIONS AND METHODS OF USE
- Compositions and Methods of Use for Variant Csy4 Endoribonucleases
- Identification Of Sites For Internal Insertions Into Cas9
- Chimeric Cas9 Variants With Novel Engineered Enzymatic Activities
- Small Molecule Assisted Cell Penetrating Cas9 RNP Delivery
- Methods and Compositions for Controlling Gene Expression by RNA Processing