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

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OTHER INFORMATION

KEYWORDS

Cas9, PRDM9, CRISPR

CATEGORIZED AS

Agriculture & Animal Science

Biotechnology

Genomics

Environment

Medical

Gene Therapy

Research Tools

Veterinary

RELATED CASES

2020-089-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods and Compositions for Using Argonaute to Modify a Single-Stranded Target Nucleic Acid
- Cas9 Varyants With Altered DNA Cleaving Activity
- Cas12-mediated DNA Detection Reporter Molecules
- Cas13a/C2c2 - A Dual Function Programmable RNA Endonuclease
- RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)
- Methods For High Signal-To-Noise Imaging Of Chromosomal Loci In Cells Using Fluorescent Cas9
- A Dual-RNA Guided CasZ Gene Editing Technology
- RNA-directed Cleavage and Modification of DNA using CasX (CRISPR-CasX)
- Small Cas9 Protein Inhibitor
- Split-Cas9 For Regulatable Genome Engineering
- NANOPORE MEMBRANE DEVICE AND METHODS OF USE THEREOF
- CRISPR CASY COMPOSITIONS AND METHODS OF USE
- Improved Cas12a Proteins for Accurate and Efficient Genome Editing
- 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
- Endoribonucleases For RNA Detection And Analysis
- 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
- Small Molecule Assisted Cell Penetrating Cas9 RNP Delivery
- Methods and Compositions for Controlling Gene Expression by RNA Processing