THERMOSTABLE RNA-GUIDED ENDONUCLEASES AND METHODS OF USE THEREOF (GEOCAS9)

Tech ID: 27624 / UC Case 2017-151-0

PATENT STATUS

Patent Pending

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.

UC researchers discovered a new type of RNA-guided endonuclease (GeoCas9) and variants of GeoCas9. GeoCas9 was found to be stable and enzymatically active in a temperature range of from 15°C to 75°C and has extended lifetime in human plasma. With evidence that GeoCas9 maintains cleavage activity at mesophilic temperatures, the ability of GeoCas9 to edit mammalian genomes was then assessed. The researchers found that when comparing the editing efficiency for both GeoCas9 and SpyCas9, similar editing efficiencies by both proteins were observed, demonstrating that GeoCas9 is an effective alternative to SpyCas9 for genome editing in mammalian cells. Similar to CRISPR-Cas9, GeoCas9 enzymes are expected to have a wide variety of applications in genome editing and nucleic acid manipulation.

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

Functions under different conditions than current CRISPR-Cas9 proteins (e.g. thermostable and enzymatically active in a wide temperature range)
Has an extended lifetime in human plasma
Shown to work in mammalian cells

PUBLICATION

A thermostable Cas9 with increased lifetime in human plasma
ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods and Compositions for Using Argonaute to Modify a Single-Stranded Target Nucleic Acid
- Cas9 Variants With Altered DNA Cleaving Activity
- Cas12-mediated DNA Detection Reporter Molecules
- Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
- 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
- Decorating Chromatin for Precise Genome Editing Using CRISPR
- 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
- 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 Cas4 Endoribonuclease
- Small Molecule Assisted Cell Penetrating Cas9 RNP Delivery
- Methods and Compositions for Controlling Gene Expression by RNA Processing