IMPROVEMENTS TO CAS9-MEDIATED MUTATION

Tech ID: 25181 / UC Case 2016-001-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,085,057	08/10/2021	2016-001
United States Of America	Published Application	20220042047	02/10/2022	2016-001
European Patent Office	Published Application	3383409	10/10/2018	2016-001

BRIEF DESCRIPTION

Cas9 is an RNA-guided DNA endonuclease used to perform targeted genomic manipulations, which can include the error-prone knockout of sequences via non-homologous end joining (NHEJ) and the introduction of precise edits via homology directed repair (HDR). HDR editing shows great promise for a variety of uses, such as generating new cellular immunotherapies, curing genetic disease, and introducing traits into agricultural crops. Yet the efficiency of HDR has lagged behind that of NHEJ, complicating these exciting applications. Additionally, worries have arisen about unintended knockout from off-target NHEJ.

UC Berkeley researchers have found that Cas9 operates by a surprising mechanism, which suggested ways to improve HDR. Taking advantage of this mechanism, researchers found simple methods to dramatically increase the efficiency of HDR, introducing targeted mutations in human cells with frequencies around 60%. Additionally, catalytically inactive Cas9 can be used to make mutations via HDR without attendant error-prone NHEJ. This latter activity allows the precise introduction of mutations with no danger of undesired knockout at off-target sequences.

SUGGESTED USES

- Precision gene editing in therapeutic contexts
- Introduction of desired traits in crops
- Generation of genetically modified organisms
- Isogenic cell line generation

ADVANTAGES

- High efficiency
- Targeted mutagenesis
- No off-targets with dCas9 editing

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Cas9, targeted mutagenesis, gene editing, therapeutics, homology directed repair, CRISPR

CATEGORIZED AS

- **Medical**
  - Gene Therapy
  - Research Tools
  - Therapeutics

RELATED CASES

2016-001-0

PUBLICATION

Enhancing homology-directed genome editing by catalytically active and inactive CRISPR-Cas9 using asymmetric donor DNA

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods And Reagents To Use Cas9 Rnp For Correcting The Hemoglobin Sickle Cell Mutation
- A Method To Cure Sickle Cell Disease
- COMPOSITIONS AND METHODS FOR ENHANCED GENOME EDITING
- HDR Reporter Cell Line

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