

# IMPROVEMENTS TO CAS<sub>9</sub>-MEDIATED MUTATION

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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

## PATENT STATUS

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

## BRIEF DESCRIPTION

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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

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

## ADVANTAGES

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

## PUBLICATION

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[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](#)
- ▶ [HDR Reporter Cell Line](#)



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