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. Class 2 CRISPR-Cas are streamlined versions in which a single Cas protein bound to RNA is responsible for binding to and cleavage of a targeted sequence. The programmable nature of these minimal systems has facilitated their use as a versatile technology that is revolutionizing the field of genome manipulation. Current CRISPR Cas technologies are based on systems from cultured bacteria, leaving untapped the vast majority of organisms that have not been isolated. There is a need in the art for additional Class 2 CRISPR/Cas systems (e.g., Cas protein plus guide RNA combinations).

UC Berkeley researchers discovered a new type of Cas 14 protein. Site-specific binding and/or cleavage of a target nucleic acid (e.g., genomic DNA, ds DNA, RNA, etc.) can occur at locations (e.g., target sequence of a target locus) determined by base-pairing complementarity between the Cas14 guide RNA (the guide sequence of the Cas14 guide RNA) and the target nucleic acid. Similar to CRISPR Cas9, Cas14 enzymes are expected to have a wide variety of applications in genome editing and nucleic acid manipulation.

**SUGGESTED USES**
- Genome editing
- Gene therapy
- Research tools
- Diagnostics

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**CONTACT**

Terri Sale  
terri.sale@berkeley.edu  
tel: View Phone Number

**INVENTORS**

» Doudna, Jennifer A.

**OTHER INFORMATION**

**KEYWORDS**
CRISPR, Cas 14 Type

**CATEGORIZED AS**
- Agriculture & Animal Science
- Transgenics
- Medical
- Diagnostics
- Gene Therapy
- Research Tools
- Therapeutics
- Research Tools
- Nucleic Acids/DNA/RNA
- Veterinary
- Therapeutics

**RELATED CASES**
2019-104-0

**ADDITIONAL TECHNOLOGIES BY THESE INVENTORS**
- Compositions and Methods of Use for Variant Csy4 Endoribonucleases
- Methods and Compositions for Controlling Gene Expression by RNA Processing
- Structure-Guided Methods Of Cas9-Mediated Genome Engineering
- Methods and Compositions for Using Argonaute to Modify a Single-Stranded Target Nucleic Acid
- Efficient Site-Specific Integration Of New Genetic Information Into Human Cells
- Cas9 Variants With Altered DNA Cleaving Activity
- Split-Cas9 For Regulatable Genome Engineering
- Methods For High Signal-To-Noise Imaging Of Chromosomal Loci In Cells Using Fluorescent Cas9
- Identification Of Sites For Internal Insertions Into Cas9
- Cas13a/C2c2 - A Dual Function Programmable RNA Endoribonuclease
- RNA-directed Cleavage and Modification of DNA using CasX (CRISPR-CasX)
- RNA-directed Cleavage and Modification of DNA using CasY (CRISPR-CasY)