

CAS1, A NON-SEQUENCE SPECIFIC DNASE

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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,087,431	10/02/2018	2009-065

FULL DESCRIPTION

Like eukaryotic cells, prokaryotes must defend against parasitic infection. Well-characterized mechanisms of innate immunity in bacteria include mechanisms that block phage adsorption or DNA injection, abortive infection (Abi) and restriction/modification systems (RMS). More recent evidence suggests that prokaryotes have evolved an adaptive immune system that might be functionally analogous to RNA interference in eukaryotes. Initial evidence for this immune system emerged from in silico analysis of a distinctive repetitive DNA feature that is common in prokaryotic genomes. These repetitive elements, called CRISPRs (Clustered Regularly Inter spaced Short Palindromic Repeats), consist of a short repeat (24-48nt) sequence followed by a 'unique' spacer sequence of approximately the same length.

CRISPRs are transcribed and processed into small CRISPR-derived RNAs (crRNA) that are proposed to serve as sequence-specific guides for the targeted interference of viral and plasmid replication. A variable cassette of up to 45 protein families representing at least seven distinct immune system subtypes mediates this nucleic acid-based immune system. CRISPR-associated gene 1 (cas1) encodes the only universally conserved protein component of CRISPR immune systems, yet its function is unknown.

UC Berkeley researchers discovered the structural basis for the endonuclease activity of Cas1 protein. The crystal structure of the Cas1 protein reveals a novel fold organized into an N-terminal p-strand domain and a C-terminal α helical domain. The structure and DNA specific nuclease activity of Cas1 provides a foundation for understanding the potential role for this protein in the recognition, cleavage and/or integration of foreign nucleic acids into CRISPRs.

SUGGESTED USES

- » Facilitate cleaving DNA into short segments independent of sequence.
- » Biochemical and genetic characterization of Cas 1.

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CATEGORIZED AS

- » **Medical**
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- » Nucleic Acids/DNA/RNA

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