UNIVERSAL CHROMATIN REGULATORS AS TRANSCRIPTIONAL MODIFIERS ACROSS BIOLOGICAL KINGDOMS

Tech ID: 34221 / UC Case 2026-011-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

In eukaryotic cells, DNA is packaged into chromatin, a dynamic structure that can shift between more open (euchromatin) and condensed (heterochromatin) states to regulate processes like gene expression, DNA repair, and genome organization. This regulation is controlled by chromatin regulators, i.e. proteins that add, remove, or interpret epigenetic modifications, as well as remodel chromatin structure, working alongside transcription factors. These mechanisms are highly conserved across diverse eukaryotic species, underscoring their fundamental biological importance. However, experimentally testing the full function of these proteins remains challenging. Current high-throughput approaches often rely on protein fragments rather than full-length chromatin regulators, which can miss key functional domains and enzymatic activities. Additionally, most chromatin engineering has been developed in a few model systems, creating a need for more versatile tools that can function across a broader range of organisms, including plants and other less-studied eukaryotes.

This invention comprises a chromatin regulator protein fused to a DNA-binding protein that in turn modifies gene transcription. The inventors used a multi-kingdom, full length chromatin regulator (CR) library to uncover several potent chromatin regulator proteins. These proteins include the human proteins SAP25, MBD3, RCOR1, MTA2, WDR82, DPY30, the plant proteins CMT3, SWC2, or the yeast proteins CHZ1, IES5, and TTI1 respectively. These proteins are then fused to DNA binding proteins with the product of that fusion being referred to as CR fusion proteins. These CR fusion proteins are then able to proteins to increase or decrease transcription of specific genes in eukaryotic cells when introduced to cells with specific nucleic acids.

SUGGESTED USES

- Specific modification of transcription of specific proteins in eukaryotic cells

ADVANTAGES

- Can be used in a broad range of eukaryotic cell types across biological kingdoms
- Utilizes full length chromatin regulators rather than fragments

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**

» Genomics

RELATED CASES

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RELATED MATERIALS

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