CRISPRoff: Gene editing epigenetic method allows researchers to turn most genes in the human genome on and off without altering DNA sequences

Over the past decade, the CRISPR-Cas9 gene editing system has revolutionized genetic engineering, allowing scientists to make targeted changes to organisms' DNA. While the system could potentially be useful in treating a variety of diseases, CRISPR-Cas9 editing involves cutting DNA strands, leading to permanent changes to the cell's genetic material.

Now, in a paper published online in Cell on April 9, researchers describe a new gene editing technology called CRISPRoff that allows researchers to control gene expression with high specificity while leaving the sequence of the DNA unchanged.

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"The big story here is we now have a simple tool that can silence the vast majority of genes," says [researcher Jonathan] Weissman, who is also a professor of biology at MIT and an investigator with the Howard Hughes Medical Institute. "We can do this for multiple genes at the same time without any DNA damage, with great deal of homogeneity, and in a way that can be reversed."

They also selected one gene to use as an example of how CRISPRoff might be applied to therapeutics: the gene that codes for Tau protein, which is implicated in Alzheimer's disease…

"What we showed is that this is a viable strategy for silencing Tau and preventing that protein from being expressed," Weissman says.

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