Modified CRISPR controls expression of stem cell DNA

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Combining the two most powerful biological tools of the 21st century, scientists at the Gladstone Institutes have modified how the genome of induced pluripotent stem cells (iPSCs) is read for the first time using a variation of the CRISPR-Cas9 system. The development offers a major technological advance in creating cell models of genetic diseases.

In a study published in *Cell Stem Cell*, the researchers used a modified version of CRISPR called CRISPR interference (CRISPRi) to inactivate genes in iPSCs and heart cells created from iPSCs. The method, first reported in 2013 by Stanley Qi, PhD, a co-author on the current paper, significantly improves the original CRISPR-Cas9 system by allowing genes to be silenced—or turned off—more precisely and efficiently. CRISPRi also offers the flexibility of reversing and carefully controlling the amount of gene suppression.

The standard CRISPR system uses the protein Cas9 to delete a precise part of the genome by making small cuts in a cell's DNA. CRISPRi builds on this technology by using a special deactivated version of the Cas9 protein and an additional inhibitor protein, KRAB. Together, these proteins sit at the target spot on the genome and suppress gene expression without cutting the DNA. To the scientists' surprise, temporarily silencing gene expression in this way was much more consistent than permanently cleaving the genome.

Read full, original post: Modified form of CRISPR acts as a toggle switch to control gene expression in stem cells