

This 10-second video will help you know how to edit the gene

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Previously, scientists only knew how CRISPR worked, but never witnessed it until now. This is the first time they have seen the Cas9 protein process cut a piece of DNA with a CRISPR mechanism, one of the most miraculous things of 21st century science, turned back into a real-time video.

1. Successful genetic modification helps people not to be afraid of disease

Let's watch the video to know how to edit the gene.

The yellow stuff like cotton balls is the Cas9 protein itself. Brown yarn is DNA. The Cas9 protein has cut the DNA in half for a few seconds.

This video was screened by structural biologist Osamu Nureki at the University of Tokyo at the CRISPR 2017 conference in Montana, USA.

CRISPR gene modification technology uses a gene editing tool called CRISPR, taken from bacterial proteins that allows scientists to cut and paste specific DNA sections. Experts believe that CRISPR genetic modification technology could create revolution in medicine, basic science and agriculture.

CRISPR-Cas9 is a cheap but effective gene editing tool, for extremely high accuracy. It exploits part of the bacterial immune system, which contains CRISPR self-repeating sequences in the genome.

When bacteria are infected with foreign DNA, CRISPR-Cas9 will insert this foreign DNA fragment into the CRISPR region in its genome. The bacterium then transcribes them into a number of 'pointers' RNAs for Cas proteins that are known to be invading foreign DNA. After finding them, Cas is like an automatic scissors that will dissolve foreign DNA to protect the safety of bacteria.

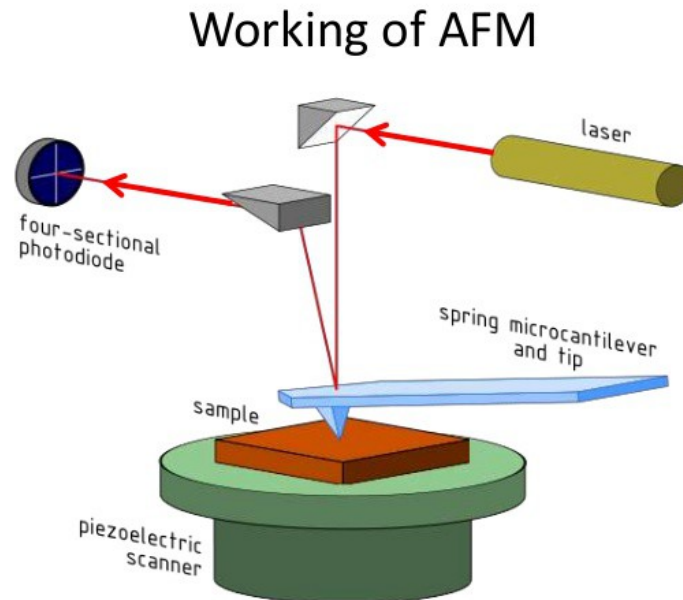
In 2012, scientists proved the potential of this system. They intentionally encode CRISPR with a specific DNA, then the system can cut the genes in the right segment of the target DNA, opening up the opportunity for extremely precise genetic editing.

Scientists have used CRISPR / Cas9 technique in many different species from changing the color of flowers, treating genetic diseases in mice, slowing cancer cells, removing HIV virus in living animal cells. and even editing human embryonic genes to eliminate disease-causing genes.

In the past, scientists only knew that they worked and the results after they were completed but had never been observed how the CRISPR process actually took place. Because the gene cutting process is too small to be seen and returned.

It was not until Nureki and his team used a high-speed atomic force microscope that recorded this process, that we had the opportunity to see firsthand how the magic took place inside the genes. edit.

The high-speed atomic force microscope consists of a probe with an extremely small nose, only as small as an atom. The probe is scanned over the surface of the specimen and when it approaches, it interacts with other atoms with Van der Waals forces.



Operation mechanism of atomic force microscope.

Van der Waals is a molecular force created by electron polarization, which causes the probe to vibrate. A laser will record this signal and recreate the image on the scan surface.

Although it only lasted for 10 seconds but these are the first scientific images, and the best in CRISPR gene editing techniques, scientists have witnessed in the 21st century.

The research was published in Nature Communications.

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