

Crispr genetic editing with the help of cas9

Business



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One of our society's most curious qualities is our tendency to forget the fact that we all are animals.

We might have constructed the idea of civilization and tried to develop ourselves away from our natural instincts, but at our very core we are still victims of our biology, just like any chimpanzee or dog. We are controlled by base impulses and limited in our actions by our bodies, even if we can dream of bigger things. However, these governors, these limits, must be governed by something themselves, and we begin to wonder: is there a way for us to take this role for ourselves, to engineer ourselves just like we do our creations? The answer, in fact, is yes, as it comes in the form of genetic editing. Inside each and every single one of our cells is the biological code which dictates how our bodies, behaviors, and even minds develop, our DNA. But now, the curious and ambitious nature found in ours has led us to seek controlling it.

By editing our DNA, adding new fine-tuned genes and removing the faulty, harmful ones, we are fully in control of our limits. But while scientists have tried to come up with such capabilities for years (with some few, minor successes), we haven't had real success. Now, with the help of some simpler organisms, we have the means to do so in the form of a mechanism called CRISPR. This scientific development has become incredibly popular recently due to its discovered potential, and although it is actually quite simple, has been misrepresented and explained. So why don't we take a look at what it is, what it can do, and what we're doing with it? First of all, we have to clarify what CRISPR is. The acronym stands for " Clustered Regularly Interspaced

Short Palindromic Repeats” which is a phenomenon found in the DNA of almost half of all genome-sequenced prokaryotic bacteria.

These are repetitive sections of DNA surrounded by certain markers and spacers, all quite obviously foreign to the cell.[1][7] What scientists found in the last decade is the function that these clusters serve, which had previously proven enigmatic; they are caches of genetic information, taken from invading bacteriophage viruses to be injected into the cell’s own DNA for future reference in the case of a repeated attack. How does any of this relate to gene editing?[1] Well due to the protein used by the bacteria to modify its own DNA, called Cas9 and in fact, the actual part of the technology which does most of the heavy lifting. It is an incredibly powerful and efficient mechanism that outperforms any and every other system that humans have come up with in almost all metrics.[7] That is why this discovery is so monumental; after decades of trying to develop such an effective system, we find that nature has already engineered it almost perfectly.

Except that is not all. There is another reason for its huge and rapid prominence in science. Just like mentioned before, this mechanism is incredibly potent and is opening a lot of avenues for experimentation which were previously almost purely theoretical. Scientists have already started using this technology in a wide array of applications, investigating its uses in everything from playing around with bacteria genomes to make them light in the dark, fixing genetic diseases such as sickle-cell and beta-thalassemia, and even editing the physical traits of human embryos.[4][6] As you can see, the possibilities once it comes to genetic disease are almost endless; with <https://assignbuster.com/crispr-genetic-editing-with-the-help-of-cas9/>

almost-certain, eventual solutions for metabolic, autoimmune, and neurodegenerative diseases such as Alzheimer's, Duchenne's, diabetes, and many more, simply by changing the gene which causes them.

And yet there is even more potential when it comes to improvement of organisms for a certain purpose. Food crops are already engineered to augment certain beneficial properties, but through the use of CRISPR, their development could be quicker and more accurate at the same time.[2]

Animals and even humans themselves could be engineered as well, accelerating our evolution to keep up with our technological development, making ourselves faster, stronger, smarter and all-around better through careful and deliberate fine-tuning.[3] However, just like in any other related field, there are serious consequences which can arise from its irresponsible use, more so with CRISPR due to its potential. Just like it can fix cells, it can also break them.

For example, scientists have experimented with a deadlier version of the H5N1 bird flu virus, and a respiratory virus which can cause cancer in mice. [6] And due to the nature of the technology, these damaging effects can be devastatingly long-reaching. A lab with either one of those two - or another dangerous GMO (Genetically Modified Organism) - could experience a containment breach and accidentally expose the outside world to its contents, who would be able to reproduce and become an almost permanent part of our environment. These could then create immense devastation before a suitable response could be created, as they'd be too powerful for defenses not previously exposed to them. And, when it comes to human modifications, accidental effects on a human genome could bring disaster as <https://assignbuster.com/crispr-genetic-editing-with-the-help-of-cas9/>

they would most likely be inherited by its offspring.[5] There is also the frightening possibility of bioweapons engineered to affect future generations or groups, seeking members of a certain race, ethnicity, or possessing a specific trait.

In conclusion, CRISPR, and gene editing in general, is a technology with untold amounts of potential, and a magnitude of effects which has almost certainly never before been witnessed. Yet these include both positive and negative possibilities, which will require unprecedented amounts of responsibility, caution, and effort to stimulate and prevent, respectively. It will be a backbreaking undertaking, and I'm sure that no human today can truly comprehend what it will take for us to preserve ourselves and our environment in a relative safety once this technology is widespread. Yet it will require not just practical efforts, but also confronting deep, difficult questions, such as what makes us human, definitively to maintain a sense of identity. However, all of this is still in the future, and we must not let paranoid pessimism dampen our endeavors, as this progress is inevitable anyway, but it is also an opportunity. It is another frontier which much we valiantly face, and one which once we conquer it will only serve to propel our hopes further.

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