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CRISPR: Race to the Cure

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CRISPR: Race to the Cure

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Abstract

On November 15th, the scientific world was taken by storm when Chinese researchers announced that the gene editing technique, CRISPR, was being used for the first time in a clinical trial.ⁱ CRISPR, which stands for clustered regularly interspaced short palindromic repeats, allows scientists to target specific genes for knockout, or even for replacement by other genes. The technique has showed promising results in both in vitro and animal models, and researchers foresee myriad medical uses for it. The aforementioned Chinese study involves genetically engineering T-cells to make them better able to fight cancer. Another CRISPR study involving reprogramming T-cells was approved by US ethics panels on June 21.ⁱⁱ In what is clearly shaping up to be a biomedical “race to the cure”, scientists are eager to determine whether CRISPR is a safe, effective means of treating cancer. If this proves to be the case, CRISPR could soon be used to wage war on genetic disorders such as cystic fibrosis, or perhaps even autoimmune diseases such as Type I diabetes or multiple sclerosis.

Keywords

CRISPR, genetic engineering, ethics

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*From the Managing Editor***CRISPR: Race to the Cure**

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On November 15th, the scientific world was taken by storm when Chinese researchers announced that the gene editing technique, CRISPR, was being used for the first time in a clinical trial.ⁱ CRISPR, which stands for clustered regularly interspaced short palindromic repeats, allows scientists to target specific genes for knockout, or even for replacement by other genes. The technique has showed promising results in both *in vitro* and animal models, and researchers foresee myriad medical uses for it. The aforementioned Chinese study involves genetically engineering T-cells to make them better able to fight cancer. Another CRISPR study involving reprogramming T-cells was approved by US ethics panels on June 21.ⁱⁱ In what is clearly shaping up to be a biomedical “race to the cure”, scientists are eager to determine whether CRISPR is a safe, effective means of treating cancer. If this proves to be the case, CRISPR could soon be used to wage war on genetic disorders such as cystic fibrosis, or perhaps even autoimmune diseases such as Type I diabetes or multiple sclerosis.

While genetic engineering techniques such as TALEN have been around for some time, and have been safely used in human patientsⁱⁱⁱ, CRISPR has been heralded as a much less expensive technique, making its use in medicine more cost effective. In fact, CRISPR kits are now available for use at the undergraduate classroom level, proving that the technology is readily available.

The excitement surrounding CRISPR is widespread throughout the scientific community. Like any technology, CRISPR itself is amoral. If it proves to be safe, it holds tremendous potential to alleviate or possibly even eliminate many genetic disorders. In the future, it may even be possible to CRISPR edit human embryos at a very early developmental stage, so that the resulting child will be born free of genetic defects and the resulting developmental deformities that may have ensued.

With so much at stake, however, the ethical implications of CRISPR cannot be overlooked. While current studies focus on treating disease, CRISPR could certainly be used to edit any gene. Genetic enhancements would certainly be possible. Treatment of early-stage human embryos with CRISPR raises the possibility of germline editing, which means that any errors made in the process of CRISPR therapy could be passed to subsequent generations. While germline editing is still banned in the US,^{iv} many other countries, including the UK, have already reversed or are in the process of reversing their bans on such editing.

Human persons are created in the image of God, and therefore worthy of protection and respect. Genetic engineering technology should cause us to question what it means to be human. Is it possible, using genetic means, to change human nature itself? What risks, inherent in any new procedure, are considered

“too high”? Should germ line therapies ever be permitted, or are the risks to subsequent generations simply too great?

Once again, technology is moving faster than the ethical discussions surrounding its proper and wise stewardship. We dare not wait too long to make our voices heard.

ⁱ Cyranoski, David. “CRISPR Gene Editing Tested in a Person for the First Time.” *Nature News*, November 15, 2016. Accessed December 14, 2016.

ⁱⁱ Reardon, Sarah. “First CRISPR Clinical Trial Gets Green Light from US Panel.” *Nature News*, June 22, 2016. Accessed December 14, 2016.

ⁱⁱⁱ Reardon, Sarah. “Leukaemia success heralds wave of gene-editing therapies.” *Nature News*, November 5, 2015. Accessed December 14, 2016.

^{iv} Pearlman, Alex. Scientists Argue the US Ban on Human Gene Editing Will Leave It Behind. *Motherboard*, August 4, 2016. Accessed December 14, 2016.

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