## Contention 2: Gene editing is too risky

In 2015, researchers in China edited genes in a nonviable human embryo to try to treat an inherited blood disease, and [ended up with a lot of unintended and potentially dangerous changes](http://link.springer.com/article/10.1007%2Fs13238-015-0153-5).

The organizing committee ended the discussion by issuing a statement saying that “[it would be irresponsible to proceed with any clinical use of germline editing](http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12032015a)” until more safety and effectiveness research can be done, risks and benefits weighed, and a social consensus reached.

### Sub point A: a small mistake in gene editing can be fatal

Playing with the DNA of an organism, especially when it’s to be inherited to the next generation, is equivalent to creating an entirely new organism which is different from all other individuals. Even a small mistake, that shows up only once will be copied to a sufficiently large number of individuals, could end an entire species or destroy an ecosystem.

As [Alessandra Potenza](https://www.theverge.com/authors/alessandra-potenza) said in 2017, “Gene editing can sometimes lead to editing errors; other times, the desired DNA changes are picked up only by some cells, not all. When genetic changes can be passed down from generation to generation, even a small mistake could change the human gene pool forever — and we don’t really know what the consequences might be.”

### Sub point B: Gene editing may correct one fault but several others can be created

Undergoing a somatic gene therapy may mean that one fault is corrected and several others are created. This is because the genetic code is very specific in nature and a single misplaced atom can have widespread effects. This is what happens naturally in diseases like ‘sickle cell anemia’.

[Rudolf Jaenisch](http://wi.mit.edu/people/faculty/jaenisch), a stem cell biologist at MIT and the Whitehead Institute, said that in his research on mouse embryos, he’s found that he can’t edit the genes of diseased mice without also affecting the genes of mice that would otherwise be healthy.

And Keren Weintraub furthered that in trying to prevent a genetic mutation in sick children, doctors would have to introduce a gene mutation into healthy ones. Such a mutation would carry forward into the human population, and no one knows whether it would have an unintended effect.

“You don’t know what else you’re going to get,” [Sheldon Krimsy](http://www.tufts.edu/~skrimsky/) of Tufts University, who writes about science and ethics, said in an interview. “The genome is an ecosystem. Everything is in some kind of balance. You try to maximize one quality and you may affect another one.”

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#### Editing human embryos is okay — but don't turn them into people yet, geneticists say

By [Alessandra Potenza](https://www.theverge.com/authors/alessandra-potenza) Aug 3, 2017, 12:00pm EDT

But there are many concerns around genetically engineering humans. CRISPR is a very precise cut-and-paste tool, but it’s not perfect: sometimes, [it can lead to editing errors](https://www.theverge.com/2017/7/12/15955742/anti-crispr-cas9-protein-acriia4-genome-editing-jennifer-doudna); other times, the desired DNA changes are picked up only by some cells, not all. When genetic changes can be passed down from generation to generation, even a small mistake could change the human gene pool forever — and we don’t really know what the consequences might be.

#### The wrong gene could be accidentally cut

Associated Press, December 1, 2015, <http://www.foxnews.com/health/2015/12/01/potential-benefits-and-ethical-implications-gene-editing.html> The potential benefits and ethical implications of gene editing

Safety is a key question because gene editing isn't always precise enough; there's the possibility of accidentally cutting DNA that's similar to the real target.

#### Future generations can’t consent to gene editing, negative side effects could manifest in future generations

Associated Press, December 1, 2015, <http://www.foxnews.com/health/2015/12/01/potential-benefits-and-ethical-implications-gene-editing.html> The potential benefits and ethical implications of gene editing

Germline engineering "has been viewed almost universally as a line that should not be crossed," National Institutes of Health Director Francis Collins said at the time. After all, future generations couldn't consent, and any long-term negative effects might not become apparent for years. There's also concern about babies designed for better intellect, athleticism or appearance rather than to prevent disease.

#### [it would be irresponsible to proceed with any clinical use of germline editing](http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12032015a)

Keren Weintraub, National Georgraphic, December, 2015, https://news.nationalgeographic.com/2015/12/151203-gene-editing-terrific-terrifying-science/ 5 Reasons Gene Editing Is Both Terrific and Terrifying

Earlier this year, researchers in China edited genes in a nonviable human embryo to try to treat an inherited blood disease, and [ended up with a lot of unintended—and potentially dangerous—changes](http://link.springer.com/article/10.1007%2Fs13238-015-0153-5).

The organizing committee ended the discussion by issuing a statement saying that “[it would be irresponsible to proceed with any clinical use of germline editing](http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12032015a)” until more safety and effectiveness research can be done, risks and benefits weighed, and a social consensus reached. The group called for regulatory oversight of use in people, and concluded that “as scientific knowledge advances and societal views evolve, the clinical use of germline editing should be revisited on a regular basis.”

#### You can’t edit a gene without affecting others

Keren Weintraub, National Georgraphic, December, 2015, https://news.nationalgeographic.com/2015/12/151203-gene-editing-terrific-terrifying-science/ 5 Reasons Gene Editing Is Both Terrific and Terrifying

[Rudolf Jaenisch](http://wi.mit.edu/people/faculty/jaenisch), a stem cell biologist at MIT and the Whitehead Institute, raised another ethical concern: Is it morally acceptable to edit the genes of healthy children in the hopes of preventing unhealthy ones? In his research on mouse embryos, he’s found that he can’t edit the genes of diseased mice without also affecting the genes of mice that would otherwise be healthy.

In trying to prevent a genetic mutation in sick children, doctors would have to introduce a gene mutation into healthy ones. Such a mutation would carry forward into the human population, and no one knows whether it would have an unintended effect.

“You don’t know what else you’re going to get,” [Sheldon Krimsy](http://www.tufts.edu/~skrimsky/) of Tufts University, who writes about science and ethics, said in an interview. “The genome is an ecosystem. Everything is in some kind of balance. You try to maximize one quality and you may affect another one.”

#### Researchers still have a long way to go before using CRISPR to repair genes in patients.

The gene editor CRISPR won’t fully fix sick people anytime soon. Here’s why

By [Jocelyn Kaiser](http://www.sciencemag.org/author/jocelyn-kaiser)May. 3, 2016 , 3:15 PM

CRISPR still has a long way to go before it can be used safely and effectively to repair—not just disrupt—genes in people. That is particularly true for most diseases, such as muscular dystrophy and cystic fibrosis, which require correcting genes in a living person because if the cells were first removed and repaired then put back, too few would survive. And the need to treat cells inside the body means gene editing faces many of the same delivery challenges as gene transfer—researchers must devise efficient ways to get a working CRISPR into specific tissues in a person, for example.

CRISPR also poses its own safety risks. Most often mentioned is that the Cas9 enzyme that CRISPR uses to cleave DNA at a specific location could also make cuts where it’s not intended to, potentially causing cancer.

#### gene-editing are much less efficient than gene addition

The gene editor CRISPR won’t fully fix sick people anytime soon. Here’s why

By [Jocelyn Kaiser](http://www.sciencemag.org/author/jocelyn-kaiser)May. 3, 2016 , 3:15 PM

Because gene-editing methods such as CRISPR are so much less efficient than gene addition, for several diseases, “I don’t think there will be a strong rationale for switching to editing,” says Luigi Naldini of the San Raffaele Telethon Institute for Gene Therapy in Milan, Italy.

But when CRISPR is used to correct a gene using a strand of DNA that scientists supply to cells, not just to snip out some DNA, it doesn’t work very well. That’s because the cells must edit the DNA using a process called homology-directed repair, or HDR, that is only active in dividing cells. And unfortunately, most cells in the body—liver, neuron, muscle, eye, blood stem cells—are not normally dividing. For this reason, “knocking out a gene is a lot simpler than knocking in a gene and correcting a mutation,” says Cynthia Dunbar, president-elect of ASGCT and a gene therapy researcher at the National Heart, Lung, and Blood Institute in Bethesda, Maryland.

The most-discussed safety risk with CRISPR is that the Cas9 enzyme, which is supposed to slice a specific DNA sequence, will also make cuts in other parts of the genome that could result in mutations that raise cancer risk.

#### The weaponized vaccines

05.06.2015 Author: [Ulson Gunnar](https://journal-neo.org/author/ulson-gunnar/)

The Dangers of Human Gene Editing  
<https://journal-neo.org/2015/06/05/the-dangers-of-human-gene-editing/>

The first and foremost danger of human gene editing in particular is its use in weaponized vaccines. Such fears are founded upon what was revealed by the United Nations during the apartheid government in South Africa where a government program named “Project Coast” actually endeavored to produce vaccines that were race-specific in hopes of sterilizing or killing off its black population.

The United Nations in a report titled [Project Coast: Apartheid’s Chemical and Biological Warfare Programme](https://www.unidir.org/files/publications/pdfs/project-coast-apartheid-s-chemical-and-biological-warfare-programme-296.pdf) would admit:

*One example of this interaction involved anti-fertility work. According to documents from RRL [Roodeplaat Research Laboratories], the facility had a number of registered projects aimed at developing an anti-fertility vaccine. This was a personal project of the first managing director of RRL, Dr Daniel Goosen. Goosen, who had done research into embryo transplants, told the TRC that he and Basson had discussed the possibility of developing an anti-fertility vaccine which could be selectively administered—without the knowledge of the recipient. The intention, he said, was to administer it to black South African women without their knowledge.*

At the time, the technology to accomplish such a feat never materialized. Now it has.

#### Slow Kill

05.06.2015 Author: [Ulson Gunnar](https://journal-neo.org/author/ulson-gunnar/)

The Dangers of Human Gene Editing  
<https://journal-neo.org/2015/06/05/the-dangers-of-human-gene-editing/>

Another danger is “slow kill.” This would be the process of using gene editing to affect individuals directly or through a genetically modified food supply subtly, infecting or killing off targeted demographic groups over a longer period of time. The advantage of this method would be the ambiguity surrounding what was causing upticks in “cancer” and other maladies brought on by degraded immune systems and overall health.

And while some might be tempted to claim the dangers of this technology being used against populations remains solely in the realm of “Nazi eugenicists” and racist South African regimes, the truth of the matter is even Washington has penned policy papers advocating weapons deployed amid the “world of microbes.”

Mentioned in the US Neo-Conservative Project for a New American Century’s (PNAC) 2000 report titled [Rebuilding America’s Defenses](https://www.newamericancentury.org/RebuildingAmericasDefenses.pdf) it stated:

*The proliferation of ballistic and cruise missiles and long-range unmanned aerial vehicles (UAVs) will make it much easier to project military power around the globe. Munitions themselves will become increasingly accurate, while new methods of attack – electronic, “non-lethal,” biological – will be more widely available. (*[p.71 of .pdf](https://www.newamericancentury.org/RebuildingAmericasDefenses.pdf)*)*

*Although it may take several decade for the process of transformation to unfold, in time, the art of warfare on air, land, and sea will be vastly different than it is today, and “combat” likely will take place in new dimensions: in space, “cyber-space,” and perhaps the world of microbes. (*[p.72 of .pdf](https://www.newamericancentury.org/RebuildingAmericasDefenses.pdf)*)*

*And advanced forms of biological warfare that can “target” specific genotypes may transform biological warfare from the realm of terror to a politically useful tool. (*[p.72 of .pdf](https://www.newamericancentury.org/RebuildingAmericasDefenses.pdf)*)*

Biological warfare that can “target” specific genotypes is precisely what is now possible in the advent of improved gene editing. While many may suspect profit alone drives large pharmaceutical corporations to push vaccines on the global population, in reality, what it may also represent is an attempt by these very conspirators to create a well established globalized medium through which to administer their targeted bioweapons, yet another reason why the matter of human healthcare and biotechnology (and specifically vaccines) is a matter of not just business, [but of national security as well](https://journal-neo.org/2015/05/04/vaccines-and-national-security/).