CRISPR bombshell: Chinese researcher claims to have created gene-edited twins

**By**[**Dennis Normile**](https://www.sciencemag.org/author/dennis-normile)**Nov. 26, 2018 , 1:10 PM**

**HONG KONG, CHINA—**On the eve of an international summit here on genome editing, a Chinese researcher has shocked many by claiming to have altered the genomes of twin baby girls born this month in a way that will pass the modification on to future generations. The alteration is intended to make the children’s cells resistant to infection by HIV, says the scientist, He Jiankui of the Southern University of Science and Technology in Shenzhen, China.

The claim—yet to be reported in a scientific paper—initiated a firestorm of criticism today, with some scientists and bioethicists calling the work “premature,” “ethically problematic,” and even “monstrous.” The Chinese Society for Cell Biology issued a statement calling the research “a serious violation of the Chinese government’s laws and regulations and the consensus of the Chinese scientific community.” And He’s university [**issued a statement**](http://www.sustc.edu.cn/news_events_/5524) saying it has launched an investigation into the research, which it says may “seriously violate academic ethics and academic norms.”

Other scientists, meanwhile, asked to see details of the experiment and its justification before passing judgment.

Top of Form

Bottom of Form

He told [**The Associated Press**](https://www.washingtonpost.com/world/asia_pacific/ap-exclusive-first-gene-edited-babies-claimed-in-china/2018/11/25/bb9b74de-f124-11e8-99c2-cfca6fcf610c_story.html?utm_term=.535f85d245b8) (AP) that he altered embryos for seven couples during fertility treatments, with one pregnancy resulting thus far. In each case, the father was infected with HIV; the mothers were HIV-negative. He’s goal was to introduce a rare, natural genetic variation that makes it more difficult for HIV to infect its favorite target, white blood cells. Specifically, He deleted a region of a receptor on the surface of white blood cells known as CCR5 using the revolutionary genome-editing technique called CRISPR-Cas9.

According to the AP report, He was not trying to prevent transmission of HIV from the father’s sperm to the embryo, a highly unlikely event. The risk of transmission drops even lower when the sperm is washed before insemination through in vitro fertilization, as occurred here. Rather, He said he wanted to protect the babies from infection later in life.

The International Summit on Human Genome Editing begins here on Tuesday and many researchers, ethicists, and policymakers attending the meeting first learned of He’s claim through media reports. Organizers of the conference told reporters at a pre-event briefing they were awaiting further details.

Scientists are investigating the use of CRISPR-Cas9 as a treatment for many genetic diseases, such as muscular dystrophy and sickle cell anemia. One long-running study in HIV-infected adults has crippled CCR5 with another genome-editing technology, and a similar study is underway in China with CRISPR. But these cases involved gene editing of so-called somatic cells that are not passed on to the patient’s children. He reportedly went a step further, altering the genome in early stage embryos, which would affect sperm and eggs—the germline—and make the change heritable. Such work is effectively barred in the United States and many other countries. Whether it fits within China’s regulatory environment is not clear.

He is scheduled to speak at the summit on gene editing on Wednesday, but organizers were unsure whether he planned to discuss his experiment. He [**put a series of videos on YouTube**](https://www.youtube.com/channel/UCn_Elifynj3LrubPKHXecwQ) to justify the experiment and explain how it was done. He also invited viewers to send comments to his lab and to the two babies, named Lula and Nana.

Yet many scientists say the experiment was premature and the potential benefits not worth the risk. “The underlying purpose of doing the experiment was obviously to show that they could do gene editing on an embryo, but the purpose for the party involved does not make any sense,” says Anthony Fauci, an HIV/AIDS researcher who heads the U.S. National Institute of Allergy and Infectious Diseases in Bethesda, Maryland. “There are so many ways to adequately, efficiently, and definitively protect yourself against HIV that the thought of editing the genes of an embryo to get to an effect that you could easily do in so many other ways in my mind is unethical.”

Pablo Tebas, a clinical researcher at the University of Pennsylvania who led a small study that crippled CCR5 in HIV-infected adults using what’s known as zinc finger technology, similarly denounced the embryo alteration. “The experiment is not medically justified,” said Tebas, who noted that CCR5 mutants are not benign as people are more susceptible to serious consequences from West Nile infections. “Hopefully these kids will not have any health problems," he says.

“Gene editing itself is experimental and is still associated with off-target mutations, capable of causing genetic problems early and later in life, including the development of cancer,” Julian Savulescu, an ethicist at the University of Oxford in the United Kingdom, said in a statement released today by the U.K. Science Media Centre. “This experiment exposes healthy normal children to risks of gene editing for no real necessary benefit,” he says. Sarah Chan, a bioethicist at the University of Edinburgh, worries that the premature use of gene editing prior to consideration of social aspects of the work “threatens to jeopardize the relationship between science and society … and might potentially set the global development of valuable therapies back by years.”

CRISPR pioneer Jennifer Doudna of the University of California, Berkeley, notes that the work has not been published and urged caution in [**a statement released today**](https://news.berkeley.edu/2018/11/26/doudna-responds-to-claim-of-first-crispr-edited-babies/). However, "Assuming that independent analysis confirms today’s news, this work reinforces the urgent need to confine the use of gene editing in human embryos to settings where a clear unmet medical need exists, and where no other medical approach is a viable option, as recommended by the National Academy of Sciences,” Doudna wrote.

Apparently anticipating the criticism, He boldly proclaimed in one of this videos that his group has reflected deeply on how to help families facing risks of genetic diseases. “[**We believe ethics are on our side of history**](https://www.youtube.com/watch?v=Qv1svMfaTWU),” says He, who calls the term “designer babies” an epithet.

Richard Hynes, a cancer researcher at the Massachusetts Institute of Technology in Cambridge who co-chaired [**the National Academies of Sciences, Engineering, and Medicine report that Doudna referred to**](https://www.nap.edu/catalog/24623/human-genome-editing-science-ethics-and-governance), says it laid out “stringent conditions” that should be met before undertaking genome editing: There had to be a serious, unmet medical need; the effort should be well-monitored and with sufficient follow-up; and there had to be informed consent of the parents.

He adds that the United Kingdom’s [**Nuffield Council on Bioethics’s report on human genome editing**](http://nuffieldbioethics.org/project/genome-editing-human-reproduction), released in July, reached similar conclusions. “All these questions need to be looked into when we hear what he’s actually done,” Hynes says. Alta Charo, a bioethicist at the University of Wisconsin at Madison, notes that the National Academies report does mention CCR5 as a potential target of gene editing. Whether the current experiment is justified “comes down to a risk-benefit analysis,” she says.

*With reporting by Jon Cohen.*