

Crossing a Bright Red Line: Human Embryo Editing

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D. Joy Riley, MD, MA
Executive Director
The Tennessee Center for Bioethics & Culture
<http://tennesseecbc.org/>

On Monday of this week, He Jiankui of Southern University of Science and Technology in Shenzhen, China, shocked the scientific world prior to the beginning of a conference on gene editing. Dr. He announced a first: that he had edited the genes of embryos for seven couples undergoing fertility treatments, and that one pregnancy has resulted to date. It should be noted that there is no corroboration of this claim currently: it is an announcement; no scientific paper has been published about it.

Some of the specific claims, published in [The Guardian](#), are as follows:

1. All of the men in the group have HIV, and the women do not.
2. The aim was to disable CCR5, a gene which allows HIV to enter a cell.
3. Out of 22 embryos, 16 were edited.
4. Six attempts of transfer, using 11 embryos, were done.
5. A twin pregnancy was achieved, with one twin having both copies of CCR5 disabled; the other twin, one normal copy of the gene, and one copy disabled.
6. The [twins \(girls\)](#) were reportedly born a few weeks ago.

Multiple ethical questions arise here. Does anyone have the right to edit an embryo's genes? If so, who, and for what reason(s)? Katie Hasson and Marcy Darnovsky wrote in *The Guardian*, "Achieving meaningful public empowerment, a clear-eyed look at social consequences, and an acceptable level of honesty in the debate about human germline modification will not be easy, quick, or cheap. In the meantime, no individual or organisation—no scientist or fertility doctor, no biotech company or fertility clinic, no advisory committee or bioethics council or scientist-dominated summit—has the moral warrant to skip over these minimum criteria and try to hurry things along." Even Oxford's usually permissive Uehiro Professor of Practical Ethics, Julian Savulescu, found fault with the announced experiment, calling it "monstrous." Savulescu is quoted by *The Guardian* as saying, "This experiment exposes healthy normal children to risks of gene editing for no real necessary benefit. In many other places in the world, this would be illegal punishable by imprisonment."

In this case, the embryos' genes were edited to ostensibly save them from the fate of their fathers. University of Pennsylvania's Dr Kiran Musunuru, MD, PhD, MPH, has expertise in gene editing. *The Guardian* reports, "Musunuru said that even if editing worked perfectly, people without normal CCR5 genes faced higher risks of contracting certain other viruses, such as West Nile, and of dying from flu."

So what was the point of this experiment? Dr. He stated he wanted to make "an example" and "a first." He has previously worked with mice, monkey, and human embryos, and has applied for methods patents. *The Guardian* also reports that He "has two genetics companies." According to the *MIT Technology Review*, He has great aspirations. Antonio Regalado reported a previous statement by Dr. He: "'In this ever more competitive global pursuit of applications for gene editing, we hope to be a stand-out,' He and his team wrote in an ethics statement they submitted last year. They predicted their innovation 'will surpass' the invention of in vitro fertilization, whose developer was awarded a Nobel Prize in 2010."

He is reportedly on leave without pay, according to the *Chronicle of Higher Education*. Also, Rice University will investigate their own professor of physics and bioengineering, Michael W. Deem. Deem had previously advised He when the latter was at Rice, and the two collaborated on the experiment in China He announced on Monday.

Where is there any agreement about germline engineering?

Of note, The Council of Europe's Treaty No. 164 states, "The treaty allows genetic engineering only for preventive, diagnostic or therapeutic reasons and only where it does not aim to change the genetic make-up of a person's descendants." (Oviedo Convention: protecting human rights in the biomedical field). China, of course, is not a signatory to this treaty.