

# NEWS IN FOCUS



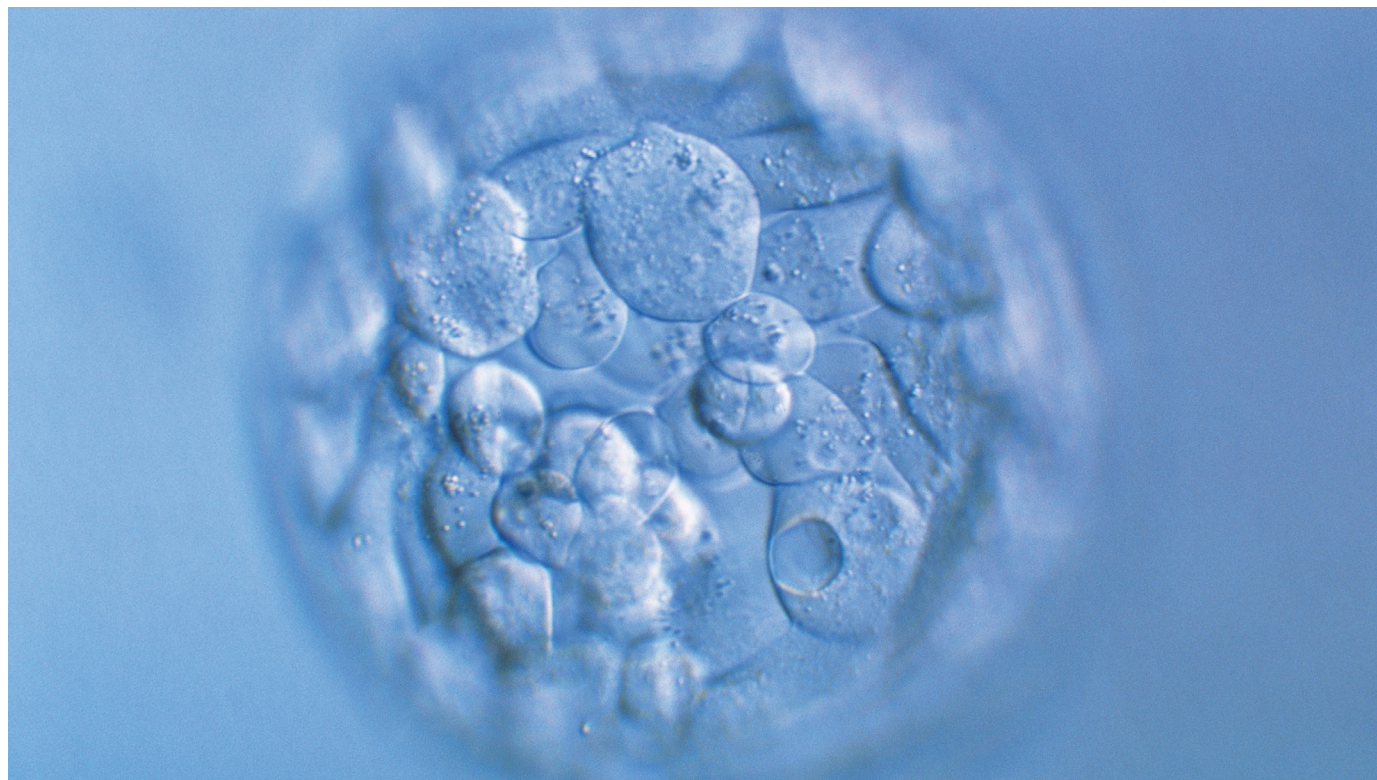
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PASCAL GOETHEL/SHUTTERSTOCK



A Chinese scientist claims that twin girls have been born whose genomes were edited at the embryo stage.

## GENOMICS

# International outcry over genome-edited baby claim

*The revelation from a Chinese scientist represents a controversial leap in genome editing.*

BY DAVID CYRANOSKI & HEIDI LEDFORD

Scientists are shocked and outraged by reports that a Chinese scientist claims to have helped make the world's first genome-edited babies — twin girls, who were born this month.

He Jiankui, a genome-editing researcher at the Southern University of Science and Technology of China in Shenzhen, says that he impregnated a woman with embryos that had been edited to disable the genetic pathway HIV uses to infect cells.

In a video posted to YouTube on 26 November, He says the girls are healthy and now at home with their parents. Sequencing of the babies' DNA has shown that the editing worked, and altered only the target gene, he says. The scientist's claims have not been verified through independent genome testing, nor published in a peer-reviewed journal. Later that day, the Chinese government announced an investigation into the claims.

If the report is true, the twins' birth would represent a significant — and controversial — leap in the use of genome editing. Until now,

the use of these tools in embryos has been limited to research, often to investigate the benefit of using the technology to eliminate disease-causing mutations from the human germ line. But some studies have reported off-target effects, raising significant safety concerns.

Documents posted on China's clinical registry show that He used the popular CRISPR-Cas9 genome-editing tool to disable a gene called *CCR5*, which encodes a protein that allows HIV to enter a cell. Genome-editing scientist Fyodor Urnov was asked to review documents that described the ▶

► claimed experiments for an article in *MIT Technology Review*. “The data I reviewed are consistent with the fact that the editing has, in fact, taken place,” says Urnov, who is based at the Altius Institute for Biomedical Sciences in Seattle, Washington. But he adds that the only way to tell whether the children’s genomes have been edited is to independently test their DNA.

Urnov takes issue with the decision to edit an embryo’s genome to prevent HIV infection. He is also using genome-editing tools to target the *CCR5* gene, but his studies are in people with HIV, not embryos. He says that there are “safe and effective ways” to use genetics to protect people from HIV that do not involve editing an embryo’s genes.

Paula Cannon, who studies HIV at the University of Southern California in Los Angeles, also questions He’s decision to target that gene in embryos. She says that some strains of HIV don’t even use this protein to enter cells, they use another protein called CXCR4. Even people who are naturally *CCR5*-negative are not completely resistant to HIV, Cannon adds, because they could be infected by a CXCR4 strain.

She also says it makes no sense that He recruited families with an HIV-positive father, as was the case with the twins, because there is no real risk of transmission to the children.

“This experiment exposes healthy normal children to risks of gene editing for no real necessary benefit,” says Julian Savulescu, director of the Oxford Uehiro Centre for Practical Ethics at the University of Oxford, UK.

In an interview with the Associated Press, He said the goal of the work was not to prevent transmission from the parents, but to offer couples affected by HIV a chance to have a child that might be protected from a similar fate. But years of research is needed to show that meddling with the genome of an embryo is not going to cause harm, says Joyce Harper, who studies women’s and reproductive health at University College London. Legislation and public discussion should also occur before genome editing is used in embryos destined for implantation.

Southern University of Science and Technology said in a statement on 26 November that it was unaware of He’s experiments, that the work was not performed at the university and that He has been on leave since February. The university says its researchers must abide by national laws and regulations, and respect international academic ethics and academic standards. It will set up an independent committee to investigate the matter.

Making gene-edited babies goes against regulations released by China’s health and science ministries in 2003, but it is not clear whether there are penalties for those who break the rules.

More than 100 Chinese biomedical researchers posted a strongly worded statement

online condemning He’s claims. “Directly jumping into human experiments can only be described as crazy,” the statement reads. The scientists call on Chinese authorities to release the findings of any investigation to the public.

“This is a huge blow to the international reputation and the development of Chinese science, especially in the field of biomedical research,” the statement says. “It is extremely unfair to the large majority of diligent and conscientious scientists in China who are pursuing research and innovation while strictly adhering to ethical limits.”

*Nature* tried to contact He but did not receive a response before its deadline. In his video, He says he supports the use of genome editing in embryos only in cases that relate to disease. “I understand my work will be controversial, but I believe families need this technology and I am willing to take the criticism for them,” he says.

News of the experiment came a day before researchers in the field gathered in Hong Kong for a major international meeting on genome editing, running from 27 to 29 November. Even before the news of He’s work emerged, many in the field thought it was inevitable that someone would use genome-editing tools to make changes to human embryos for implantation into women, and had been pushing for an international consensus on how genome editing to modify eggs, sperm or embryos should proceed. ■

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## PLANETARY SCIENCE

# ‘Marsquake’ hunter begins to probe planet’s innards

*Joint US–French–German mission will monitor seismic activity on Mars.*

BY ALEXANDRA WITZE

Earthlings are about to hear Mars’s heartbeat.

On 26 November, NASA’s InSight mission touched down near the Martian equator and embarked on the first mission dedicated to listening for seismic energy rippling through the red planet.

Any ‘marsquakes’ InSight detects could yield clues about the planet’s mysterious interior, including how it is separated into a core, mantle and crust. Whatever scientists learn about Mars’s innards could help to illuminate how our own planet evolved billions of years ago.

InSight had been cruising through space since its launch in May, tracked by mission control at NASA’s Jet Propulsion Laboratory

(JPL) in Pasadena, California. On Monday, just before 11:53 a.m. local time, the spacecraft entered the Martian atmosphere at nearly 20,000 kilometres per hour.

As it neared Mars’s surface, the spacecraft demonstrated a new way to communicate with its controllers on Earth, 146 million kilometres away. Two ‘cubesats’, each the size of a briefcase, relayed information from InSight to Earth in close to real time. The experiment suggests that miniature satellites like these could allow faster communication with probes in deep space.

InSight landed at Elysium Planitia, a broad, flat region just north of the Martian equator. It is one of the most boring places on the planet, says Bruce Banerdt, a planetary scientist at JPL and the US\$994-million mission’s principal investigator. That’s an advantage for InSight,

which needs a safe, geologically stable place to do its work.

The first photo that InSight sent from the surface of Mars showed a flat, relatively rock-free landscape stretching to the horizon, with the foreground speckled with dust from the landing.

“It’s happy. The lander is not complaining,” said Rob Manning, chief engineer at JPL, shortly after InSight touched down.

## LISTENING IN

Mission scientists will use the lander’s camera to scout the ground for the smoothest and most level area to deploy its French-built seismometer (see ‘Ear to the ground’). InSight’s robotic arm will pluck the instrument off its back and place it on the ground, then put a