Scientists genetically modify human embryos for first time, reports say

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A team of researchers has created the first genetically modified human embryos, the MIT Technology Review reported this week.

If the achievement is true - the scientists in question have neither confirmed nor disputed the account - it could mark a milestone in preventing transmission of genetic diseases instead of just treating them.

It would also rev up debate about the safety and ethics of genetically changing human beings, including what laws exist to safeguard patients and what constitutes a medically legitimate genetic modification.

The technology could be used to alter people for nonmedical purposes such as making them taller, giving them a specific eye shape or switching out their black hair for a shade of blonde - decisions that could be seen as fundamentally upending the definition of human nature.

The Technology Review story said the scientists harnessed the gene-editing method called CRISPR, a milestone in its own right, to modify one-celled embryos and allow them to develop for a few days. Other news organizations have published their own articles about this purported accomplishment, including the well-respected biomedical website Stat.

Prominent biologist Shoukhrat Mitalipov of Oregon Health & Science University was the lead researcher on the study, according to the Technology Review and Stat stories. Both reports said he declined to comment.

"Results of the peer-reviewed study are expected to be published soon in a scientific journal," Oregon Health & Science spokesman Erik Robinson said Thursday. He declined to specify what the study discovered.

The Technology Review story also said Jun Wu of the Salk Institute for Biological Studies in La Jolla, Calif., took part in the research. On Thursday, the institute declined to discuss the study.

Mitalipov gained fame in 2013 for spearheading development of the first human embryonic stem cells genetically matched to specific living individuals. The method he and some colleagues employed, called somatic cell nuclear transfer, was originally used two decades ago to create Dolly the cloned sheep.

Those researchers had taken a nucleus from a donor cell in a sheep and transferred it into a sheep egg cell that had had its own nucleus removed. The combination cell acted like a normal fertilized egg, producing Dolly. That sheep had the DNA of the donor cell, so it was a nearly exact clone of the sheep where the donor cell was taken from.

Growing a creature in this way is called reproductive cloning, and the U.S. government bans such procedures on people. Mitalipov and colleagues performed what is called therapeutic cloning: They used the process to cultivate human embryonic stem cells, which are likewise genetically matched to the donor nucleus.

In theory, these stem cells could be grown into replacement tissues to repair disease or injury in the person with the matching DNA. Genetically matching the stem cells to a particular patient lowers the risk that tissue transplants would be rejected by the person's immune system.

Wu and other Salk researchers in the lab of Juan Carlos Izpisua Belmonte have collaborated with Mitalipov to explore somatic cell nuclear transfer as a therapy for mitochondrial diseases. Mitochondria are organelles that make most of the energy cells use and perform other vital functions. They carry their own DNA.

The scientists generated human stem cells in the lab, repaired mitochondrial defects and found that they were able to restore certain desired functions in cells.

They took human skin cells and inserted their nuclei into human egg cells with healthy mitochondria that had their own nuclei removed. Those manipulated egg cells were then grown until they produced embryonic stem cells, free of the defective mitochondria.

The United Kingdom has approved a method that resembles reproductive cloning to prevent inheritance of mitochondrial diseases. This process involves replacing the nucleus of an egg cell from a donor with healthy mitochondria with that from the egg cell of the mother-to-be with diseased mitochondria.

Whether the reports this week about genetically modified human embryos are true, the capability of genetically engineering human embryos is fast approaching, said a bioethicist and a stem cell researcher who have examined the issue.

But having the capability doesn't mean it should be done, said Michael Kalichman, co-founding director of the the Center for Ethics in Science and Technology at the University of California, San Diego.

Kalichman said society isn't ready for genetically modifying humans, and that it's time for the public to start paying attention to what has been considered a futuristic scientific issue.

The strongest argument for genetic modification is to stop diseases, he said. The strongest argument against the technology is that it might cause unanticipated problems.

Paul Knoepfler, a stem cell researcher at UC Davis, said no matter how much effort is spent to ensure patient safety, there are no guarantees.

"The bottom line is that we'll never really know until someone tries it," Knoepfler said. Potential harm might not emerge until adulthood or even until the genetically altered people have their own children, he added.

"The other big thing is, I am not really convinced we can draw a clear line between doing this for only medical purposes versus (cosmetic) traits," he said.

Finally, it's not clear why genetically editing human embryos would even be needed to prevent transmission of a genetic disease, Knoepfler said.

"We already have an existing technology which is basically embryo screening," he said. Multiple embryos can be generated through in vitro fertilization to find one that doesn't have the disease.

"That would be much safer than actually doing an edit," he said.