

# New procedure clones stem cells from adults

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Byline: Ariana Eunjung Cha

Scientists have grown stem cells from adults using cloning techniques for the first time - bringing them closer to developing patient-specific lines of cells that can be used to treat a whole host of ailments, from heart disease to blindness.

The research, described in Thursday's online edition of the journal *Cell Stem Cell*, is a controversial advance likely to reopen the debate over the ethics of human cloning.

The scientists' technique was similar to the one used in the first clone of a mammal, Dolly the sheep, which was created in 1996.

They "reprogrammed" an egg cell by removing its DNA and replaced it with that of an adult donor. Scientists then zapped the cell with electricity, which made it divide and multiply. The resulting cells were identical in DNA to the donor.

The first success in humans was reported last year by scientists at the Oregon Health & Science University and the Oregon National Primate Research Center. But they used donor cells from infants. In this study, the cells came from two men, a 35-year-old and a 75-year-old.

Paul Knoepfler, an associate professor at the University of California at Davis who studies stem cells, called the new research "exciting, important, and technically convincing."

"In theory you could use those stem cells to produce almost any kind of cell and give it back to a person as a therapy," he said.

In their paper, Young Gie Chung, from the Research Institute for Stem Cell Research for CHA Health Systems in Los Angeles; Robert Lanza, from Advanced Cell Technology in Marlborough, Mass.; and their co-authors emphasized the promise of the technology for new therapies. What they didn't mention - but was clear to those working with stem cells - was that their work was also an important discovery for human cloning.

While the research published Thursday involves cells that are technically early stage embryos, the intention is not to try to grow them into a fully formed human. However the techniques, in theory, could be a first step toward creating a baby with the same genetic makeup as a donor.

Bioethicists call this the "dual-use dilemma."

Marcy Darnovsky, executive director of the Berkeley, Calif.-based Center for Genetics and Society,

explained that many technologies developed for good can be used in ways that the inventor may not have intended and may not like.

"This and every technical advance in cloning human tissue raises the possibility that somebody will use it to clone a human being, and that is a prospect everyone is against," Darnovsky said.

The research was conducted in California by a large team that included representatives from both academia and industry and was funded by a private medical foundation and South Korea's Ministry of Science.

From a technical standpoint, the technique - called somatic-cell nuclear transfer - is far from perfect. Chung's team attempted the cloning 39 times and only two tries produced embryos. At first they couldn't get the cells to multiply. But it turned out that if the researchers waited two hours - instead of 30 minutes - before trying to coax the cells, it worked.

"We have reaffirmed that it is possible to generate patient-specific stem cells using [this] technology," Chung said.

Shoukhrat Mitalipov, director of the Center for Embryonic Cell and Gene Therapy at Oregon Health & Science University, developed the method that Chung's group built upon. He emphasized that the work involves eggs that have not been fertilized.

"There will always be opposition to embryonic research, but the potential benefits are huge," Mitalipov said.

Eighteen years ago, news about Dolly's birth led to impassioned calls for a ban on human cloning for the purpose of producing a baby who is a genetic copy of someone else. Several countries took measures to limit or outlaw such work. But in the United States, the issue became entangled in the politics of abortion, and Congress became deadlocked. Some lawmakers called for a ban on reproductive human cloning, but others refused to support such legislation unless it included a ban on human cloning whether it was for the purposes of reproduction or for the development of new therapies.

President George W. Bush brokered a compromise of sorts, restricting federal funding from stem cell research that results in harm to a human embryo.

At least 15 states have laws addressing human cloning. About half of them ban both reproductive and therapeutic cloning.

Since embryonic stem cell research began to take off 15 years ago, one of the main challenges scientists have faced is getting the material for their experiments. Many had been getting the cells from embryos left over from fertility treatments, but religious groups such as the U.S. Conference of Catholic Bishops vehemently objected to this, arguing that it involves killing a human being because the research involved fertilized eggs.

About seven years ago, scientists discovered they could use a different, molecular approach, called induced pluripotent stem cells, that could turn ordinary cells into stem cells without the need for an egg. While this technique did not present the same ethical issues, researchers soon found that some of the new cells had glitches, and there is still debate over how significant the flaws are. The research conducted by Mitalipov and Chung provides a second way of producing those cells through laboratory techniques.

By Ariana Eunjung Cha

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