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You, again: Are we getting closer to cloning humans?

- Story Highlights
- Cloning of monkey embryos and creation of stem cells hailed as breakthrough
- Ethical and technical challenges remain over human cloning
- Therapeutic cloning touted as part of a medical cure-all
- Maverick scientists have potential to attempt human cloning despite risks

By Dean Irvine

LONDON, England (CNN) -- Ever wanted to be a new you? Recent developments in cloning mean that day might be possible without therapy, a new diet or fitness regime.

Earlier this week a team in the U.S. led by Shoukhrat Mitalipov of the Oregon National Primate Research Center, announced they had created the first cloned monkey embryo and extracted stem cells from it.

While a scientific breakthrough in its own right, it also brings the possibility of curing genetic diseases, growing new organs and even making a carbon copy of human beings one step closer.

There is still a long way to go, with many technical and ethical dilemmas to overcome. The advancements in cloning have been slow and painstaking and prior claims to have developed cloned human cells found to be false; Dolly the sheep -- the first cloned animal -- was created over 10 years ago, and the only previous claim of human embryo cloning by South Korean scientist Woo Suk Hwang in 2004, was discredited.

Mitalipov's breakthrough was the result of merging skin cells of a 9-year-old rhesus macaque male with unfertilized monkey eggs that had the DNA removed.

It is a technique called nuclear transfer -- the same used to create Dolly the sheep -- and until Mitalipov's research there had been skepticism over whether a primate could be cloned in the same manner.

The next challenge is whether or not it can be done successfully with human cells.

"If cloning embryonic stem cells is successful, I would predict it would become a much larger component of stem cell technology because with it you can effectively study a patient in a whole range of different ways in the lab. It opens up all sorts of possibilities," Dr. Robin Lovell-Badge of the Royal Society told CNN.

While cloning is just one part of [stem cell research](#), it has been touted as having enormous potential as a cure for all manner of diseases. As the source of every cell, tissue and organ in the body, their medical application has the potential to repair damaged tissue, regrow internal organs and cure currently incurable diseases like Cystic Fibrosis, Alzheimer's and Parkinson's.

"Therapeutic cloning will hopefully be the solution for all the problems that have plagued transplant medicine for many years -- the shortage of tissue and rejection. Stem cells lines are basically immortal and with them we can turn them into any cell type," Robert Lanza, chief scientist for Advance Cell Technology, a U.S. company involved in regenerative medicine.

If the possibilities are enormous, so is the controversy surrounding the issue. Tampering with nature and being morally reprehensible -- these are common charges against stem cell research from religious and pro-life groups. As well as the ethical questions of cloning a human being there are still enormous technical obstacles to overcome.

"The monkey cloning research is an important step, and it does take cloning closer to being used in humans, but the potential to cure diseases is being oversold as there are many unanswered technical questions," Dr. Helen Wallace, from UK not-for-profit group, Genewatch told CNN.

Getting an acceptable and reliable success rate in cloning is one such challenge. The success rate of cloning different species varies -- cows have a 50 percent rate, while for mice it is only 1 to 3 percent. Mitalipov's team only generated two stem cell lines

from 304 monkey eggs.

"That might be encouraging in scientific terms but you'd have to argue very hard to use 300 human eggs with the chance of getting two cells line at the end of it, because human eggs are very valuable and most probably should go to fertility treatment," says Lovell-Badge.

Helen Wallace is more skeptical and wary about the demands on women from human cloning: "Claims that you could clone individual treatments of human beings to treat common diseases like diabetes, suggests you need a huge supply of human eggs. Where are they going to come from? Even if you don't have a religious view of the sanctity of life, you have to ask is there going to be a massive trade in human eggs from poor women to rich countries."

Currently egg donors for stem cell research have to go through a month of hormone therapy and undergo an operation to get the eggs -- it's not voluntary and compensation from private stem cell research companies can be up to \$35,000.

Looking beyond the [cloning](#) of human stem cells is the potential to grow new organs and even clone a human being. Mitalipov's team spent 10 unsuccessful years attempting reproductive cloning in monkeys and used 15,000 eggs in the process.

Potentially it would be genetically identical to the cell donor, but Lovell-Badge suggests that the "demands on reprogramming your adult cell back into the embryo are so much greater if you want that embryo to develop again into a full term child -- everything has to be reprogrammed perfectly."

"No reputable scientist wants to do reproductive cloning. I can't think of a good reason for doing it -- its ego, that's the only thing. So many cloned animals have developed abnormalities that the risks are just too great for humans," says Lovell-Badge.

A report this month from the U.N. University's Institute of Advanced Studies, however, warns that it is only a matter of time before a human being is cloned, claiming that while 50 countries have legislation that outlaws human reproductive cloning, another 140 members of the U.N. have no such laws, providing loopholes for unscrupulous scientists.

There have been unsuccessful attempts to create a worldwide ban on reproductive cloning through the U.N. hampered by some countries, including the U.S., wanting to include a ban on therapeutic cloning.

Until a ban it seems some will continue to try and create cloned human beings.

Reproductive scientist Panos Zavos is one such maverick, shunned by the greater scientific community, and one of the only people who have claimed to have attempted human reproductive cloning. A paper he published in 2004 claimed he cloned a human embryo from the skin cells of an infertile man and transferred it to the uterus of the man's wife although she did not become pregnant.

For Lanza, reproductive cloning is "like sending up a rocket knowing it's got a 25 percent chance it's going to blow up -- it's just not ethical."

More feasible it seems is cloning assisting tissue engineering. While many things can be dealt with by grafting cells, the use of stem cells from cloned embryos offers the possibility to make more complete things like, kidneys or livers.

"You can make every cell type you want from embryonic stem cells, and organs are made of many different cell types. A lab in the U.S. has been working on making miniature kidneys and are on the verge of seeing if they can be transplanted into a patient," says Lovell-Badge.

Cloning animals however might be more acceptable to the scientific community to look at questions of nature versus nurture. Said Lovell-Badge: "You could clone a bunch of genetically identical monkeys and study them, but you'd still have to really justify, in the UK at least, why you would want to do this."

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