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The real face of cloning
What will the world look like if renegade scientists persist in their experiments to clone a human? Experts say it won't be pretty - and that the era of human cloning might not last long.

By Tim Friend

The Raelians, a religious group that believes space aliens created life on Earth, grabbed headlines with their day-after-Christmas claim that they had helped bring the first human clone into the world. That claim remains unproven, and most experts consider it a hoax.

But as the dust settles from the carnival atmosphere of the past few weeks, other claims that clones are coming remain. The day of the clone may still be at hand.

"It is absolutely inevitable that groups are going to try to clone a human being. But they are going to create a lot of dead and dying babies along the way," says bioethicist Thomas Murray, president of the Hastings Center, a bioethics think tank in Garrison, N.Y.

Lost in the hype surrounding claims of human cloning are hard scientific facts that show cloning animals is fraught with perils both before and after birth. Scientists are able to clone sheep, cattle, pigs, goats and mice, but not without significant errors that commonly result in oversized fetuses, placental defects, lung, kidney and cardiovascular problems, brain abnormalities, immune dysfunction and severe postnatal weight gain.

Efforts to clone primates have proven even more difficult and might be impossible with current methods, scientists say. Of particular concern are embryos that appear normal and healthy but at the genetic level are a "gallery of horrors," says Tanja Dominko, who conducted primate cloning research at the Oregon Regional Primate Research Center in Beaverton.

Advanced Cell Technology of Worcester, Mass., is the only scientific group that has acknowledged making cloned human embryos for research purposes.

Discussion Questions

1. Discuss the financial ramifications of human cloning. Be sure to factor in the cost to care for children with deformities, cloning's effect on insurers and medical institutions, and the likelihood of litigious action against researchers and medical professionals. In the end, will the issue of human cloning be decided by financial rather than moral considerations? Why or why not?

2. Should the creation of pre-embryos and their use in medical research fall under the same legal and ethical guidelines as abortion? Explain.

3. Thomas Murray argues that most couples seeking to clone a baby reflect "despair, grief and narcissism run wild." Do you agree? Are there any legitimate reasons to clone a
making cloned human embryos for research purposes.

ACT medical director Robert Lanza says he hopes one day to create cures for diseases such as Alzheimer's based on cells harvested from cloned embryos. But his team has found that cloning human embryos is no simple task. Only one has reached the six-cell stage, and it had significant genetic abnormalities.

Lanza says techniques are improving for purposes of medical research but not enough for reliably creating healthy babies.

'Devastating birth defects'

If cloned babies start showing up in hospital nurseries, scientists predict that they will be hooked up to respirators because their hearts and lungs will have been deformed. Feeding tubes also might be necessary for infants who have brain damage and cannot suckle. Others might have extensive physical abnormalities. Even those born with a normal appearance probably would experience epilepsy, autism or behavioral abnormalities.

"All of the data on animal cloning demonstrates exceptionally high rates of fetal loss, abortion (and) neonatal deaths, and many cloned animals have devastating birth defects," says Gerald Schatten, vice chairman of obstetrics, gynecology and reproductive science at the University of Pittsburgh School of Medicine.

"When people are working with farm animals or laboratory mice and there is a newborn that is suffering, veterinarians can euthanize the animal. Are people who are attempting to clone humans going to euthanize suffering children?"

Two fertility specialists, Severino Antinori of Rome and Panos Zavos of Lexington, Ky., have announced independent efforts to clone humans. Antinori announced in March that a clone would be born around January. Zavos was to have begun his cloning efforts last fall. Antinori, Zavos and Brigitte Boisselier of Clonaid, the Raelian company that claims to have brought two cloned babies into the world, have made dozens of television appearances, and to the chagrin of some critics, have acquired an air of legitimacy by being invited to testify before Congress and the National Academy of Sciences.

Yet none of these people has provided evidence of the ability to actually clone a human safely, Murray says. When asked how they plan to avoid the types of deformities found in cloned animals, all three repeatedly have stated that the scientists who clone animals don't know what they are doing.

"If you are doing it the way of the animal cloners, yes, there is a risk," Zavos told USA TODAY in August when he introduced an anonymous couple who said they plan to have a cloned baby. "We have the science of maternal fetal medicine, and we will be monitoring the pregnancies very carefully."

Many of the birth defects observed in cloned animals are similar to the gross physical
deformities and mental retardation found in rare genetic disorders caused by a phenomenon known as genetic imprinting, says Arthur Beaudet, professor of genetics at Baylor College of Medicine in Houston.

These disorders arise when the genes of the mother and father do not align for embryonic development as nature intended.

Here's how imprinting occurs: At the moment of natural conception, the 30,000 genes in the DNA of the father must combine in the fertilized egg with the 30,000 genes of the mother. Then there are two copies of every gene, and together they form a master program to build an embryo cell by cell, sometimes with genes from the father turned off to let the mother's genes do the work, and other times the mother's genes stay silent to let the father's do their part.

Imprinting disorders arise when either the mother's or father's genes imprint themselves on the program in places where they should have been minding their own business -- like mom and dad talking at the same time rather than taking turns. In other words, both copies of a gene are turned on when one of them should be silent, and the result is a genetic error that might cause a developmental disorder.

Perils of reprogramming

In cloning, a scientist plucks the DNA containing the copies of all of the mother and father's genes from a fully formed adult cell and inserts it into an egg that has been stripped of its own nucleus of genes. Because there is no conception to spark the creation of an embryo, scientists must somehow reprogram that adult DNA back to the brink of embryonic development as though fertilization had just occurred.

Reprogramming is perhaps the most active area of cloning research, but scientists do not know how to do it. So they must insert the DNA from adult cells into dozens or even hundreds of eggs, give a little jolt of electricity to stimulate the cell to divide and keep their fingers crossed. Most scientists agree that only about 1% to 2% of these attempts in animals lead to a live birth. Of live births, only about 20% appear to be normal.

The prevalence of genetic disorders in cloned animals and the lack of knowledge about reprogramming are the primary reasons the scientists who work on cloning and issues of reprogramming say they are skeptical that anyone can clone a human without genetic errors, Beaudet and others say.

"Just from the scientific safety considerations alone, this is completely appalling," says Schatten, who is leading efforts to clone rhesus monkeys. These efforts have been unsuccessful. "Those of us actively engaged in research cloning have invested years and years of dedicated efforts and have encountered enormous difficulties in generating a single" cloned embryo.

Congress introduced another bill Jan. 8 to make human cloning in the USA illegal. But it has been unable to pass a number of anti-cloning bills because the legislation has included a ban on research using cloning techniques to create stem cells.

Researchers want to create "mini-embryos" -- a ball of cells that has not yet taken

http://usatoday30.usatoday.com/educate/college/healthscience/articles/20030126.htm
The real face of cloning: What will the world look like if renegade scientists persist in their pursuit of any form -- as sources of stem cells; this type of research is called therapeutic cloning. Supporters believe these primordial stem cells hold promise for treating a wide range of disorders including Alzheimer's, cancer and diabetes. They say they fear that the bath water will be thrown out with the baby and that Congress will ban embryonic stem cell research.

Opponents say it is immoral to use human embryos for research. Obtaining stem cells means destroying the embryo, which many people consider the same as abortion.

But some experts believe the real stake in the heart of human cloning will come the first time angry parents sue a laboratory or a doctor over a genetically damaged cloned child. A strong case for malpractice could be made. And the same arguments that scientists are making today against human cloning will become fodder for expert witnesses.

"People will forgive a health care provider for making a mistake as long as enough basic information was provided in advance, and the alternative to a treatment was death or a miserable life," says Scott McMillen of McMillen, Reinhart and Voght, malpractice attorneys in Orlando. "But in cloning we're not trying to save a life. We're trying to create a life from scratch, and to do that with negligence would be actionable. And ultimately it is a jury that will decide whether there was negligence."

Defense attorneys may be hard-pressed to find a sympathetic jury. A USA TODAY/CNN/Gallup Poll Jan. 3-5 shows 86% of Americans say human cloning should be illegal.

Boisselier says the parents of the supposedly cloned children created by Clonaid all have "agreed to share the risk." But Murray says parents can change their minds and sue, and the people who are so eager to clone humans should recall the Jesse Gelsinger case.

**Headed to the witness stand**

Gelsinger died Sept. 17, 1999, at age 18, four days after entering a gene-therapy experiment at the University of Pennsylvania to treat his inherited liver disorder. At first, Gelsinger's parents were sympathetic to the scientists. But as information emerged about the risks and side effects that Gelsinger and his parents were never told about, they sued the hospital and everyone involved in the experiment.

Gelsinger's parents stated in the lawsuit that risks were downplayed and that the doctors were negligent in performing the experiment. The university settled the suit for an undisclosed amount.

McMillen says human cloning raises key questions of informed consent. Boisselier and Zavos have testified before Congress that human cloning in their hands is not as risky as animal cloning and that they are unlikely to create damaged babies. In a trial, those comments could come back to haunt them as they face cloning experts as expert witnesses for plaintiffs.

"I expect that the animal cloners who have said that it is too soon to clone humans

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would rally to the witness stand," McMullen says.

What is unknown is whether parents can recover anything from a group that has few assets, whether cloners that perform procedures outside the USA are liable or whether the cloners will have malpractice insurance.

What is certain is that parents of cloned children who have genetic defects will face high medical costs. Imprinting disorders that cause mental retardation and physical abnormalities carry medical costs of $1 million to $20 million over the lifetime of the child, says Beaudet, who treats children with imprinting disorders.

"There are many longer-term issues to be considered, such as: If we in fact develop this human cloning technology, who will have access to it, and who will pay for the procedures, and who will pay for the medical care if these children are born with medical defects?" asks Mark Rothstein, director of the Institute for Bioethics, Health Policy and Law at the University of Louisville.

Experts in the health insurance industry say the questions have not been addressed on whether infants born with genetic disorders caused by cloning would or should be covered. But legal experts say insurers might be justified in denying coverage if an infant is born as the result of a procedure that mainstream science says is likely to cause birth defects.

At the moment, however, insurers believe they might be obligated to pay for costs. "Obviously this is a new area," says Susan Pisano of the American Association of Health Plans, which represents the managed-care community. "Traditionally whether or not there has been some technology or procedure that has led to a pregnancy, the baby has been covered as a dependent. It is important to look at the safety aspects of this.

"But I also think discussions about these new developments need to be broad. This is an issue for all of society."

Several insurance companies declined to comment on the record. But all suggested that unless changes are made to specifically exclude cloned babies, the babies would be covered under group health plans. Individual plans could exclude a high-risk clone.

Murray says he is concerned for the people who would want to have themselves cloned. Boisselier, Zavos and Antinori have said the couples seeking their business are motivated by the desire to have a child who has their genes or to re-create a child who died.

'Narcissism run wild'

Murray, whose daughter was murdered in 2000, says it reflects "despair, grief and narcissism run wild. These aren't wicked motives, but trying to spare yourself the grief reflects a deep misunderstanding. Grief doesn't work that way, and cloning will not bring back a child."

These parents must realize that a clone has a good chance of being brain-damaged. A
narcissist might end up with a mentally retarded version of himself or herself.~

Just a few years ago, human cloning appeared to be something that would be left to science fiction while mainstream scientists pursued cloning techniques to create medical therapies. Scientists seem baffled that two fertility specialists and the Raelians have commandeered the debate with unsubstantiated claims.

Murray says it is tragic.

"People will keep claiming to have created cloned babies, and eventually someone will succeed, but at what cost? A lot of damaged children and disappointed parents."

"That is the very sad baggage that cloning will carry into the world."

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