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Animal-Human Hybrids Spark Controversy

Maryann Mott
[National Geographic News](#)
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Scientists have begun blurring the line between human and animal by producing chimeras—a hybrid creature that's part human, part animal.

Chinese scientists at the Shanghai Second Medical University in 2003 successfully fused human cells with rabbit eggs. The embryos were reportedly the first human-animal chimeras successfully created. They were allowed to develop for several days in a laboratory dish before the scientists destroyed the embryos to harvest their stem cells.

In Minnesota last year researchers at the Mayo Clinic created pigs with human blood flowing through their bodies.

And at Stanford University in California an experiment might be done later this year to create mice with human brains.

Scientists feel that, the more humanlike the animal, the better research model it makes for testing drugs or possibly growing "spare parts," such as livers, to transplant into humans.

Watching how human cells mature and interact in a living creature may also lead to the discoveries of new medical treatments.

But creating human-animal chimeras—named after a monster in Greek mythology that had a lion's head, goat's body, and serpent's tail—has raised troubling questions: What new subhuman combination should be produced and for what purpose? At what point would it be considered human? And what rights, if any, should it have?

There are currently no U.S. federal laws that address these issues.

Ethical Guidelines

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An ancient Etruscan statue of a chimera found in north-central Italy. The mythic beast had a lion's body, serpent's tail, and goat's head.

Photograph by James P. Blair, copyright National Geographic Society

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The National Academy of Sciences, which advises the U.S. government, has been studying the issue. In March it plans to present voluntary ethical guidelines for researchers.

A chimera is a mixture of two or more species in one body. Not all are considered troubling, though.

For example, faulty human heart valves are routinely replaced with ones taken from cows and pigs. The surgery—which makes the recipient a human-animal chimera—is widely accepted. And for years scientists have added human genes to bacteria and farm animals.

What's caused the uproar is the mixing of human stem cells with embryonic animals to create new species.

Biotechnology activist Jeremy Rifkin is opposed to crossing species boundaries, because he believes animals have the right to exist without being tampered with or crossed with another species.

He concedes that these studies would lead to some medical breakthroughs. Still, they should not be done.

"There are other ways to advance medicine and human health besides going out into the strange, brave new world of chimeric animals," Rifkin said, adding that sophisticated computer models can substitute for experimentation on live animals.

"One doesn't have to be religious or into animal rights to think this doesn't make sense," he continued. "It's the scientists who want to do this. They've now gone over the edge into the pathological domain."

David Magnus, director of the Stanford Center for Biomedical Ethics at Stanford University, believes the real worry is whether or not chimeras will be put to uses that are problematic, risky, or dangerous.

Human Born to Mice Parents?

For example, an experiment that would raise concerns, he said, is genetically engineering mice to produce human sperm and eggs, then doing in vitro fertilization to produce a child whose parents are a pair of mice.

"Most people would find that problematic," Magnus said, "but those uses are bizarre and not, to the best of my knowledge, anything that anybody is remotely contemplating. Most uses of chimeras are actually much more relevant to practical concerns."

Last year Canada passed the Assisted Human Reproduction Act, which bans chimeras. Specifically, it prohibits transferring a nonhuman cell into a human embryo and putting human cells into a nonhuman embryo.

Cynthia Cohen is a member of Canada's Stem Cell Oversight Committee, which oversees research protocols to ensure they are in accordance with the new guidelines.

She believes a ban should also be put into place in the U.S.




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Creating chimeras, she said, by mixing human and animal gametes (sperms and eggs) or transferring reproductive cells, diminishes human dignity.

"It would deny that there is something distinctive and valuable about human beings that ought to be honored and protected," said Cohen, who is also the senior research fellow at Georgetown University's Kennedy Institute of Ethics in Washington, D.C.

But, she noted, the wording on such a ban needs to be developed carefully. It shouldn't outlaw ethical and legitimate experiments—such as transferring a limited number of adult human stem cells into animal embryos in order to learn how they proliferate and grow during the prenatal period.

Irv Weissman, director of Stanford University's Institute of Cancer/Stem Cell Biology and Medicine in California, is against a ban in the United States.

"Anybody who puts their own moral guidance in the way of this biomedical science, where they want to impose their will—not just be part of an argument—if that leads to a ban or moratorium. . . . they are stopping research that would save human lives," he said.

Mice With Human Brains

Weissman has already created mice with brains that are about one percent human.

Later this year he may conduct another experiment where the mice have 100 percent human brains. This would be done, he said, by injecting human neurons into the brains of embryonic mice.

Before being born, the mice would be killed and dissected to see if the architecture of a human brain had formed. If it did, he'd look for traces of human cognitive behavior.

Weissman said he's not a mad scientist trying to create a human in an animal body. He hopes the experiment leads to a better understanding of how the brain works, which would be useful in treating diseases like Alzheimer's or Parkinson's disease.

The test has not yet begun. Weissman is waiting to read the National Academy's report, due out in March.

William Cheshire, associate professor of neurology at the Mayo Clinic's Jacksonville, Florida, branch, feels that combining human and animal neurons is problematic.

"This is unexplored biologic territory," he said.

"Whatever moral threshold of human neural development we might choose to set as the limit for such an experiment, there would be a considerable risk of exceeding that limit before it could be recognized."

Cheshire supports research that combines human and animal cells to study cellular function. As an undergraduate he participated in research that fused human and mouse cells.

But where he draws the ethical line is on research that

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would destroy a human embryo to obtain cells, or research that would create an organism that is partly human and partly animal.

"We must be cautious not to violate the integrity of humanity or of animal life over which we have a stewardship responsibility," said Cheshire, a member of Christian Medical and Dental Associations.

"Research projects that create human-animal chimeras risk disturbing fragile ecosystems, endanger health, and affront species integrity."

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