

Cows Milk Benefits of Stem Cells

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Scientists have shown that stem cells can bring renewed youthful vigor to aged cows, and they hope the same will be true in humans.

Stem cells were injected into elderly cows -- animals whose age was equivalent to an 80-year-old human. Tests showed boosted immune systems and rejuvenated blood vessels more than a year after an injection of a tablespoonful of stem cells taken from cloned bovine fetuses.



[See photo](#)

The technique is not ready for use with humans, because the cells were taken from fetuses that developed for up to 120 days, which would clearly raise ethical questions if practiced in humans. But, the scientists who performed the study believe embryonic stem cells taken from days-old embryos in a petri dish, perhaps some leftover post-in-vitro fertilization, could impart the same benefits.

"The cells are so competitive and youthful that they just take over," said [Robert Lanza](#), vice president of medical and scientific development at [Advanced Cell Technology](#) in Worcester, Massachusetts. Researchers from the Memorial Sloan-Kettering Cancer Center in New York City, University of Pennsylvania and the Mayo Clinic also worked on the project.

Scientists already know that bone marrow transplants can cure diseases like leukemia. The paper, published in the June 2005 issue of *Cloning and Stem Cells*, shows that the fetal stem cells repopulated one cow's bloodstream without using the harsh immunosuppressive drugs or tissue-matching necessary for bone marrow transplants today. The method also eliminates the risk of graft-versus-host disease. To compare results, they administered the drugs to the other two cows at different doses.

"This is a brilliant paper that breaks new ground in developing a large-animal model to understand crucial aspects of therapeutic cloning," said [Gerald Schatten](#), professor of obstetrics, gynecology and reproductive sciences and cell biology and physiology at the University of Pittsburgh School of Medicine.

The technique seems to "reboot" the immune system, Lanza said, which could help patients with autoimmune diseases, including multiple sclerosis, rheumatoid

arthritis, juvenile diabetes, lupus and inflammatory bowel disease, among others.

"Cloned cells taken from the animals formed gigantic white-blood-cell colonies that are only seen with very, very young cells," he said.

The scientists created clones of three cows and implanted them inside other cows' uteruses. When the embryos had developed for up to 120 days, they removed the fetuses and isolated stem cells from clones' livers and injected them in to the older cows. (Cow fetuses don't produce the desired stem cells until they've developed for more than 100 days, Lanza said.)

The researchers attached a genetic marker to the stem cells so they could follow where the stem cells traveled in the adult cows' body. They found the markers in rejuvenated blood vessels as well as in new white blood cells circulating in the cows' bloodstreams.

"Implanting the embryo would obviously be unethical in humans," Lanza said. It's also unnecessary, he said, because the stem cells can be obtained from very early embryos in a petri dish without implantation.

Nigel Cameron, a senior fellow and international advisory board member of the [Center for Bioethics and Human Dignity](#), said it was "very disturbing" that the cells were taken from three-month old fetuses.

"Prima facie it looks very implausible that they could be moving from (cows to humans)," Cameron said. "And what is so interesting is that we have one state, New Jersey, in which the law has been designed specifically to protect this kind of ghoulish fetal harvesting." (The New Jersey [law](#) (.pdf) allows cloning for research but outlaws reproductive cloning.)

In any case, it's still not 100 percent clear that the technique will have the same results in humans, Schatten said.

"There's lots of good news in this paper, and it certainly brings us a step closer to clinical reality," he said. "But because of some technical problems in growing embryonic stem cells from cattle embryos, the full cycle of therapeutic cloning has not yet been totally tested."

Several countries, including Canada, Australia and Germany, and some [U.S. states](#), have outlawed human therapeutic cloning.

"This study underscores that laws against SCNT (somatic cell nuclear transfer, or therapeutic cloning) might very well destroy the best hope of millions of patients for cures," said Bernard Siegel, director of the [Genetics Policy Institute](#) in Wellington, Florida.



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