

# What Condition Could Stem Cells Help First?

**A- Loss of vision, B – Spinal-cord injuries, C – Limb Circulation**

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The answer almost doesn't matter, because stem-cell research has become the latest casualty of a plague sweeping biomedical science: advances in the lab aren't reaching patients. Only part of the blame for the logjam can be pinned on President George W. Bush's 2001 executive order that crippled human embryonic-stem-cell research, which means that the problem won't magically disappear when Bush leaves the White House next January.

To be sure, his order has acted like ankle manacles on a racehorse: not even a thoroughbred can advance when researchers are prohibited from using federal money for studies on any stem-cell lines except those that were in existence in 2001. There were 71 then; 65 have since proved useless. Researchers have turned to state and private money, and although that falls well short of what federal agencies could provide were it not for Bush's ban, there have been notable successes in using human embryonic stem cells (ESCs) to treat lab animals. A partial list: curing macular degeneration and other causes of blindness in mice, restoring blood flow to "ischemic" limbs (such as occurs in diabetes) in rats, repairing heart damage in mice, treating type 1 diabetes in mice, restoring a normal rhythm to damaged hearts in pigs and, last week, treating stroke in mice. The approach used in that study, led by Stuart Lipton of the Burnham Institute for Medical Research, is typical. Scientists start with human ESCs, induce them to turn on only those genes that make the cells morph into (in this case) adult nerve cells and transplant them into lab animals.

The real obstacle is that "no one is funding research to get these advances into the clinic," says Robert Lanza, chief scientific officer of Advanced Cell Technology. "Venture capitalists won't go near it because they got burned in the biotech bust, and pharmaceutical companies worry that it's too high-risk. People are going blind, and we have cells that could prevent that."

He means it. Four years ago Lanza and colleagues induced human ESCs to grow and differentiate into eye cells called retinal epithelial cells, which they have used to treat blind mice. In people, the cells show promise for treating macular degeneration, a leading cause of blindness. Equally encouraging, the retinal transplants did not produce tumors, a possibility that has long worried researchers. But scientists don't have the money to launch a clinical trial of the retinal cells. In the NEWSWEEK Poll, only 2 percent of those surveyed identified blindness as the area where stem cells "would be most useful."

Right about now, Geron Corp. expected to start implanting neural cells derived from human ESCs into patients with spinal-cord injuries. Although the Food and Drug Administration in May put the trial on hold pending more data showing the transplants would be safe, Geron's could nevertheless be the first clinical trial of human ESCs. Further away is using stem cells produced by a technique unveiled last November, when scientists reported turning back the clock on adult cells. Using a virus to slip four genes (including, problematically, one that can cause cancer) into adult skin cells, they "reprogrammed" them to cells indistinguishable from embryonic stem cells. Despite claims (though not by scientists who know what they're talking about) that reprogrammed cells would obviate the need for embryos as a source of stem cells, the promise remains to be seen. The new cells seem to produce tumors, and might not be able to turn into any of the 200 kinds of human cells, as ESCs can.

Bush's ban has deterred so many scientists from studying stem cells that "very few U.S. labs have the experience to build on the reprogrammed cells," says Asa Abeliovich of Columbia University, crippling "the exact types of research the administration wanted to encourage." If the next president lifts the ban, it would free up federal money to move the research out of the lab and into suffering patients.

**Answer: A- Loss of vision**

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