

this issue only. And the pro-science, pro-patient community has not shown that to be true.”

One physician in Congress, Representative Joe Schwarz of Michigan, believes that his sup-



Congressman Joe Schwarz, M.D.

port of human embryonic stem-cell research played a role in his loss in an August primary. Schwarz, a moderate Republican from a very conservative district, had voted for the bill that was vetoed by the President, and he lost to a more conservative challenger. “That was one of the cards my opponent played,” he said, adding that he plans to resume practicing otolaryngology and to lend his support to a bipartisan Michigan initiative promoting stem-cell research.

The Bush administration’s policy prohibits federal funding for research using any human embryonic stem-cell lines except those established before August 9, 2001. Only about 21 qualifying cell lines are readily available, and since 2001, approximately \$90 million in federal grants has been provided for

Single-Cell Storm

Susan Okie, M.D.

Scientists at Advanced Cell Technology, a California company, reported in August that a single cell taken from an eight-cell human embryo can sometimes be coaxed to produce embryonic stem cells, suggesting that such “biopsies” might be a way to generate new stem-cell lines while preserving embryos.

The report, published online by the journal *Nature*,¹ stirred up considerable controversy, in part because both the journal’s initial press release and a podcast interview with senior author Robert Lanza gave the impression that two new lines had been created without destroying any embryos. “What we have done, for the first time, is to actually create human embryonic stem cells without destroying the embryo itself,” Lanza said in the podcast.² On the contrary, all 16 donated embryos used in the study were destroyed during the experiments, a fact that was stated, although not emphasized, in the article. A total of 91 cells (called blastomeres) were individually removed from the early-stage embryos and were cultured, in most cases in dishes with other blastomeres. Two of the blastomeres gave rise to embryonic stem-cell lines. The results — together with unpublished work by the authors — suggest, in principle, that single-cell biopsies (which are done on some embryos in IVF clinics for pre-

implantation genetic diagnosis) could be used to derive stem cells without destroying embryos.

Nature issued clarifications of its press release shortly after its online publication and again 2 days later, citing “internal communications problems.” Meanwhile, the findings were prominently reported in the national media as a possible solution to the Bush administration’s opposition to the use of federal funds for research on new stem-cell lines. A White House spokeswoman was quoted in news reports, however, as saying that the new technique would not resolve the President’s ethical concerns about the use of embryos in research. Later the same week, Richard Doerflinger of the U.S. Conference of Catholic Bishops, a prominent critic of such research, e-mailed reporters, charging that the study had been misrepresented. “This experiment left no embryos alive and solves no ethical problems,” Doerflinger wrote.

At a hearing of the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies in early September, Lanza received a tongue-lashing from Senator Arlen Specter (R-PA), a strong supporter of stem-cell research. “It’s a big black eye if scientists are making false and inaccurate representations,” Specter told Lanza.

Lanza maintained that he had been quoted out of context by interviewers and said he had been shocked by the critical response. "Our paper was 100% correct," he said. "It's very clear that there's a lot of politics going on here."

Advanced Cell Technology has had financial troubles, but its stock price experienced a bump after the *Nature* publication, and company officials are clearly hoping that cell lines made with the use of the technique will become eligible for federal research funding. However, James Battey, Jr., chairman of the NIH Stem Cell Task Force, said he doubted that the new method will silence the concerns of some critics. For example, he said it is not certain that removing a cell from an eight-cell embryo does no harm, even though hundreds of apparently healthy infants have been born from embryos that underwent the procedure for genetic testing. It is also unknown whether a single human blastomere can develop into an embryo, as is possible in animals. "My guess is, absent complete reassurance on these issues, there will be individuals who will find this protocol morally and ethically problematic," Battey predicted.

Dr. Okie is a contributing editor of the *Journal*.

1. Klimanskaya I, Chung Y, Becker S, Lu SJ, Lanza R. Human embryonic stem cell lines derived from single blastomeres. *Nature* (Web only). (Accessed September 28, 2006, at <http://www.nature.com/nature/journal/vaop/ncurrent/abs/nature05142.html>)
2. Abbott A. "Ethical" stem-cell paper under attack. *Nature* 2006;443:12.

such research. Experts say the limitations have hampered progress and have probably discouraged many researchers from entering the politically fraught field. A recent survey of the scientific literature on human embryonic stem-cell research showed that in 2004, articles by authors from other countries outnumbered those by authors from the United States.¹

The Castle-DeGette bill, passed by Congress last summer, would have allowed the National Institutes of Health (NIH) to fund research on additional stem-cell lines developed from excess embryos donated by couples who had undergone in vitro fertilization (IVF) procedures. Although the bill passed, there were insufficient votes to override the President's veto, which Bush announced at a press conference surrounded by children who had been "adopted" as embryos. "This bill would support the taking of innocent human life in the hope of finding medical benefits for others," Bush said. "It crosses a moral boundary that our decent society needs to respect."

Polls suggest that most Americans do not share that view. In a survey of a nationally representative sample of adults that was conducted in July by the Pew Research Center for the People and the Press, 56% of the respondents said it was more important to conduct stem-cell research that might lead to cures than to avoid destroying human embryos, and only 32% said that preserving the potential life of embryos should be the priority. Annual Pew polls show that public support for embryonic stem-cell research increased by 13 percentage points

between 2002 and 2004 and has since remained stable. Most people who oppose this research on religious grounds do so because they believe that an embryo is a person from the moment of fertilization.

Those who favor the use of excess IVF embryos for research point out that these embryos are routinely discarded. "To say that embryonic stem-cell research is the taking of innocent human lives without applying the same standard to IVF clinics — I just don't understand how one can make that line in the sand," said biochemist and Nobel laureate Thomas Cech, president of the Howard Hughes Medical Institute (HHMI). The board of HHMI decided about 5 years ago to begin funding such research after considering a request from Douglas Melton, an investigator from Harvard University who wanted to derive new stem-cell lines from human embryos. Of more than 300 scientists, including Melton, whose laboratories are supported by HHMI, 8 are currently studying human embryonic stem cells and 26 others have indicated that they plan to do so. Their small numbers probably reflect wariness about political controversy and uncertain funding, rather than doubts about the promise of the field, according to Cech. "It's considered to be an extremely risky career move to move into an area that could become criminalized," he said.

In fiscal year 2005, the NIH spent \$40 million on human embryonic stem-cell research and \$198 million for research on more differentiated types of human stem cells (sometimes called "adult" stem cells), chiefly hematopoietic