Stem Cells: Biopsy on Frozen Embryos

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To the Editor:

Kathy Hudson is correct to point out (Sept.-Oct. 2006)[1] that the technique for producing stem cells reported recently by scientists at Advanced Cell Technology (ACT) does not eliminate the ethical questions regarding embryonic stem cell research. But she also fails to acknowledge a way that this technique could be used to answer some important objections to this research, as well as some concerns that she raises.

The ACT paper reports the creation of stem cell lines from single cells ("blastomeres") obtained from eight-cell embryos (grown for two to three days after fertilization). We know that when a single blastomere is removed from an eight-cell embryo, the residual seven-cell embryo is viable, since such embryos are produced during Pre-implantation Genetic Diagnosis (PGD), after *in vitro* fertilization (IVF). These embryos regularly develop normally when implanted in the uterus.

Hudson points out, however, that removing a cell from the embryo carries significant risks, since this manipulation may disrupt developing intercellular networks, decrease the chance of implantation in the uterus, and even directly destroy the embryo. Because of these risks, she concludes that it would be "almost certainly a nonstarter to ask couples going through IVF to contribute a cell for stem cell research." Similar concerns about risks to the embryo or a resulting child from this technique have been voiced by Leon Kass, former chairman of President Bush's Council on Bioethics[2].

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[1] K.L. Hudson, "Embryo Biopsy for Stem Cells: Trading Old Problems for New Ones," *Hastings Center Report* 36, no. 5 (2006): 50-1.

[2] N. Wade, "New Stem Cell Method Avoids Destroying Embryos" *New York Times*, August 24, 2006, p. A1.

But these concerns about possible harms overlook a more attractive source of embryos and way of using them. First, the embryo should be obtained not from a couple undergoing IVF currently, but instead (with the appropriate informed consent) from the hundreds of thousands of embryos frozen after an IVF cycle and no longer desired for a future pregnancy. Second, after one of these embryos is defrosted, grown to the eight-cell stage, and a blastomere is removed, the embryo should be simply refrozen (at the blastocyst stage, approximately day five). If this were done successfully, the embryo could maintain its ability to develop, since published reports have shown that a refrozen blastocyst can produce a healthy pregnancy[3]. Admittedly, the thawing and re-freezing process could reduce the chance of successful implantation and development, but this hardly seems relevant when there is no future pregnancy planned. Any concerns for harms that could be suffered by a resulting child are also moot, since the embryo will never become a child.

Some will oppose the proposed process due to the danger to the embryo, or due to a general objection to manipulation of embryos. But these concerns are less pressing to many than those raised by the intentional destruction of embryos.

Some will oppose this process on the ground that the blastomere that is removed itself has the potential of developing into an embryo. But scientifically, it is not clear what to say about the potentiality of this cell, since there are no known cases where one has been grown into an independent pregnancy. In fact, if the technique that would be required to grow this cell into an embryo is itself unnatural, it is not clear what to make of this potentiality. For example, does the fact that cloning could some day create an entire human from the nucleus of one of my skin cells make the destruction of skin cells now morally problematic?

In short, I support embryonic stem cell research by current methods, and, along with a majority of Americans, I believe that the federal government should be funding this research. But I think we should also pursue approaches that could make stem cell

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[3] M. Farhat, B.-S. Zentner, F. Lossos, et al., "Successful Pregnancy Following Replacement of Embryos Previously Frozen at Blastocyst Stage," *Human Reproduction* 16, no. 2 (2001): 337-339.

research even more attractive to more Americans. Trading the old problems for some new ones may be a good deal.