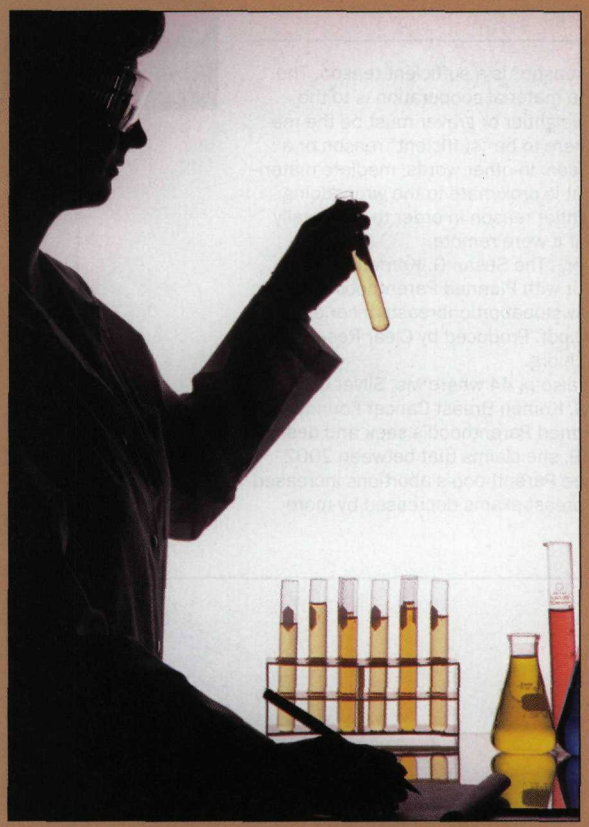
# NO NEED FOR EMBRYOS?



## Recent Discoveries Dramatically Alter the Stem-Cell Debate

**BY CHARLIE CAMOSY**

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Virtually no one, of course, is against stem-cell research. Every few months it seems a new technique for procuring stem cells without embryos makes headlines – trumpeted as good news by both sides of the debate.

But one might legitimately wonder what all this fuss is about. Americans and Europeans, in general, seem to overwhelmingly support embryonic stem-cell research (ESCR). And, after all, it does seem to take a fairly "thick" theological principle (defined as doctrine specific) – questionable underpinning for public policy – to worry about research which destroys undifferentiated balls of cells slated to be destroyed anyway. Indeed, religious figures and groups are leading the fight against ESCR by often using theological rhetoric to support their positions. President George W. Bush has used a rare veto to stop the federal government from funding new ESCR and has threatened to do so again. And the claim that a cluster of more than 200 cells is morally equivalent to, say, Michael J. Fox, is so implausible that it just *seems* that it must be based on strange religious dogma.

However, good reasons exist to be cautious about this position. The first is a lesson from history: explicitly religious groups and persons led the early fight to abolish slavery, and for civil rights, in the United States. History teaches us that while a position might first have a "thick" theological principle as its basis, the position can often become convincing to the public if argued persuasively. Second, objections to ESCR come from more than religious bodies. Indeed, whatever we might say about the role of religion in the United States, it is important to note that several other developed states have laws regarding ESCR which are *more* restrictive: Germany, Italy, Norway (though this policy may be in flux), Poland, Austria and Ireland. In fact, Germany and Italy have not only banned procurement of human embryonic stem (hES) cells from embryos, but they also avoid having "extra" embryos in frozen storage by requiring that all created embryos be implanted in the uterus after *in vitro* fertilization.[1] The fact that secular, developed states have such regulation should not be surprising because they have ethical and, as we will see, biological reasons to worry about ESCR that do not involve appeals to "thick" theological principles.

### The Moral Status of the Human Embryo

The technical arguments which surround this issue are too complex to be dealt with in sufficient detail here, but they must be highlighted for context.

Three general positions exist:

1. The embryo is simply human tissue and warrants the same kind of moral respect as any other similar kind of human tissue – that is, very little.

2. The embryo is a human organism, worthy of moderate moral respect, but not of the same as a rational, relational or self-aware human organism.

3. The embryo is a human organism, worthy of the same moral respect of a mature human organism – that is, she should be treated as a person.

Position 1 is simply biologically mistaken. An embryo is in a different biological category than mere "tissue." It is not a gamete or somatic cell that belongs to, or is part of, another organism. Rather, she is already an organism in her own right. That she is very small, that her cells are not (very) differentiated from each other, and that she may reproduce asexually (that is, "twin") do not change this fact.

Position 2 is tenable. It acknowledges the correct scientific status of the embryo, but makes a moral distinction between human organisms that have the mere potential for distinctively personal traits (relationality, rationality, self-awareness, etc.) and those that have them in an actualized form. The former are worthy of a certain level of moral respect, but not the full moral status granted to human persons.

Position 3 claims that because there are no members of *homo sapiens* that are not also persons in the moral sense, human embryonic organisms count as persons in the moral sense. It is especially skeptical when vulnerable and/or physically different members of our species are singled out as worthy of some moral respect, but not as full persons.

It is worth noting here that some attempt to bypass the moral status question altogether by noting that embryos in frozen storage are "going to die anyway" and some good should come of this tragic situation. But, of course, it is simply not the case that all stored embryos are going to die anyway. The United States is just beginning to have systems in place to allow for these embryos to be adopted – and many such "snowflake" babies have already been brought to term by loving adoptive parents. Also, setting the moral precedent that we may do such life-ending research on human organisms who are going to die anyway so that some good may come of it for other human organisms may have logical consequences which make us uncomfortable. Death row inmates "are going to die anyway" as well – should we be permitted to do non-consensual research on them which ends their lives? How about newborn babies that are born with a terminal illness? They "are going to die anyway" as well. Perhaps one would object here that it is unfair to compare a death row inmate or disabled infant to a human embryo – but then we are back to the original moral status question. It is not something that can be easily bypassed in this debate.

## Adult Stem Cells

Those who hold to position 3, and some who hold to position 2, generally find it morally problematic to destroy a human embryo in an attempt to find cures for other members of the human community. Also, some scientists who hold position 1 have acknowledged the need for alternatives to ESCR – especially given the fact that hES cells tend to produce tumors in non-human animal studies, have problems with patients' immune systems rejecting and attacking them, and have not provided a single viable cure for a human disease.

This has not been the case with other kinds of

### Recommended Books on Stem Cell Debate


Bonnicksen, Andrea L. *Crafting a Cloning Policy: From Dolly to Stem Cells*. Washington, D.C.: Georgetown University Press, 2002.

Holland, Suzanne, Karen Lebacqz, and Laurie Zoloth, eds. *The Human Embryonic Stem Cell Debate: Science, Ethics, and Public Policy*. Cambridge, Mass.: The MIT Press, 2001.

Lauritzen, Paul ed., *Cloning and the Future of Human Embryo Research*. New York: Oxford University Press, 2001.

National Bioethics Advisory Commission. *Ethical Issues in Human Stem Cell Research*. Honolulu, Hawaii: University Press of the Pacific, 2004.

Pontifical Academy for Life, *Declaration on the Production and the Scientific and Therapeutic Use of Human Embryonic Stem Cells*, Aug. 25, 2000.

Ruse, Michael, ed. *The Stem Cell Controversy: Debating the Issues*. Amherst, N.Y.: Prometheus Books, 2006.

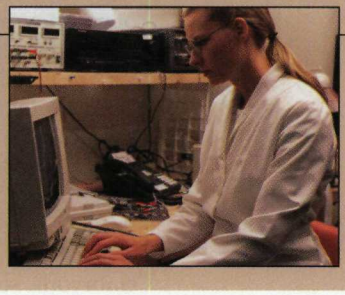
Snow, Nancy ed. *Stem Cell Research: New Frontiers in Science and Ethics*. Notre Dame, Ind.: University of Notre Dame Press, 2003.


### Online Resources

*Boston Globe*:
www.boston.com/news/science/stemcell

CHA ethics resources:
www.chausa.org

National Institute of Health:
http://stemcells.nih.gov



stem cell research. Research on stem cells found in adult tissues (hence the name[2]) like bone marrow and brain and nasal tissue have cured a host of diseases including leukemia, lymphoma and blindness. Success with diabetes, paralysis, and heart disease has been documented in human clinical trials.[3] Despite these important successes, some scientists worry that adult stem cells have a firm ceiling when it comes to new cures for disease. While they can be coaxed to become a large range of human tissue, unlike embryonic stem cells they appear to be unable to become each of the 220 cell types in the body. In addition, they are sometimes difficult and expensive to find – and they do not multiply as quickly as hES cells. This is why many of those who hold to position 1 and some who hold to position 2 continue to push for ESCR despite the promise of adult stem cells.

### Multipotent Stem Cells

Stem cells found in umbilical cord blood, the placenta, and amniotic fluid have had similar success to adult stem cells when it comes to treating disease – but offer more hope than adult stem cells because of their multipotency in becoming a wider range of cell types. Not only does this mean that a wider range of diseases may possibly be treated (Parkinson's and Alzheimer's are two of many examples), but these may be also used to help grow new organs and tissues for transplant. We are already able to grow livers, tracheas, and heart valves from multipotent stem cells, and the pancreas and nerve tissues are not far behind. These cells also multiply quickly, avoid immune rejection, and are easily procured. However, though some scientists believe that multipotent stem cells have all the therapeutic potential of embryonic stem cells, a majority believe that the only pluripotent stem cells can become all 220 cell types – an important feature if we are to maximize the cures to disease that we get from stem cells. This is yet another reason to hold out for research on pluripotent embryonic stem cells.

***That new pluripotent cells could be procured without killing human organisms was huge news. Amniotic fluid is discarded by the millions of gallons ever day. The possibility of a huge bank of pluripotent stem cells that could be genetically matched to patients would be simply invaluable to the future of medicine.***

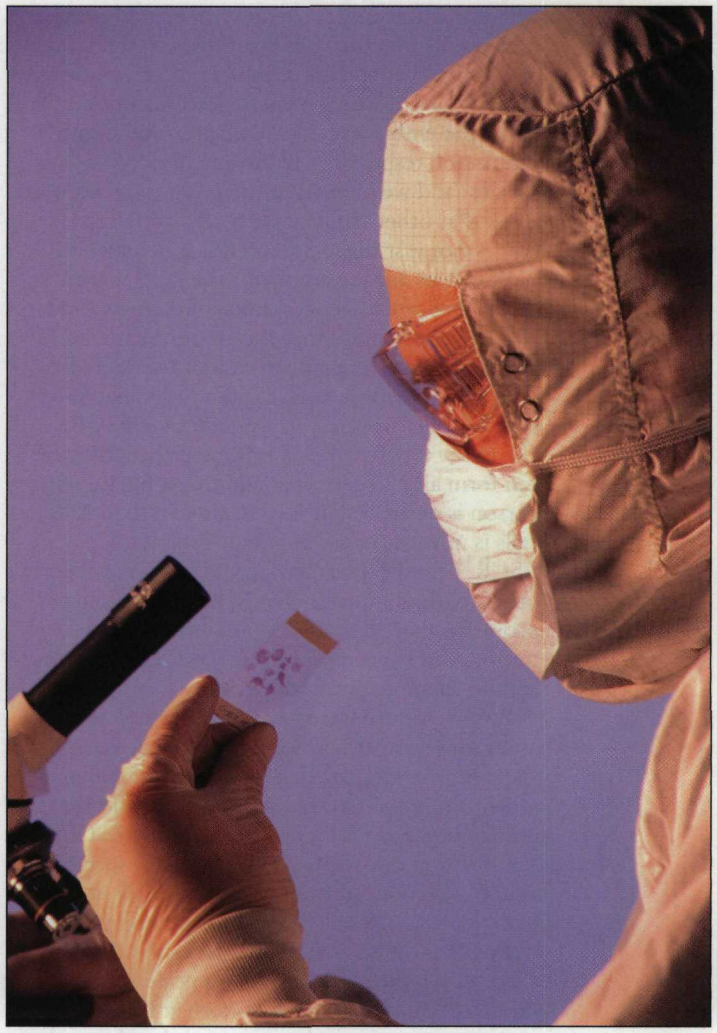
### Amniotic Fluid Stem Cells: Pluripotent after All?

Amniotic Fluid Stem (AFS) cells are listed above as multipotent – and, until recently, this is what most thought they were: able to become several different cell types but not pluripotent. This conventional wisdom was rocked in the January 2007 issue of *Nature Biotechnology*.[4] Here a Harvard/Wake Forest team claimed that it isolated AFS cells which "can give rise to adipogenic, osteogenic, myogenic, endothelial, neurogenic and hepatic lineages, inclusive of all embryonic germ layers." This, it claims, "meets a commonly accepted criterion" for pluripotent stem cells. Indeed, it concludes, "that AFS cells are *pluripotent* [emphasis added] stem cells capable of giving rise to multiple lineages including representatives from all three embryonic germ layers."

That new pluripotent cells could be procured without killing human organisms was huge news. Amniotic fluid is discarded by the millions of gallons ever day. The possibility of a huge bank of pluripotent stem cells that could be genetically matched to patients would be simply invaluable to the future of medicine. Importantly, however, the media coverage of this dramatic study quoted some scientists who were skeptical. Some questioned whether these cells were actually pluripotent and want to wait for further demonstration. Some acknowledged that AFS cells are pluripotent, while also claiming that hES cells are *more* pluripotent – apparently suggesting that pluripotency may admit of degrees. The key question here seems to be what "pluripotency" actually means. If we use the "commonly accepted" definition of the Harvard/Wake-Forest study – which is simply that a cell which can give rise to representatives of all three embryonic germ layers – this definition does not admit of degrees; a cell either does, or does not, do this. And both AFS and hES cells have been shown to do so. Another definition might be that that a cell is pluripotent only if it can generate all 220 cell types. This is a harder threshold to meet – as not even human *embryonic* cells have been shown to do this (though there is good reason to think that they could). AFS cells, having newly received this kind of attention, have not been shown to form all 220 types either, but there is also good reason to think that they will. They have already been

shown to generate the three basic kinds of cells – from all three embryonic germ layers. If a stem cell can generate one representative from a germ layer it is a good bet that it can generate all cells of that type (bone, muscle, neural, etc.). Second, though we are not sure yet where exactly AFS cells come from, it is reasonable to think they might come from the embryo herself – in which case whatever we could say about hES cells we could also likely say about AFS cells.

But another, very different, set of claims seem to be exemplified by Robert Daley, a Harvard cellular biologist who is doing ESCR. He argues that even if AFS cells are as good therapeutically as hES cells, this is not a reason to stop ESCR. He claims that AFS cells "are not a substitute for human embryonic stem cells, which allow scientists to address a host of other interesting questions in early human development." He also says that he has, "always emphasized that embryonic stem cells have value beyond therapy. They are important tools for research. You will not learn about the earliest days of human development by studying amniotic cells."[5] True enough, but if Daley is correct then the debate over ESCR has dramatically shifted – the argument for destroying embryos and spending hundreds of billions of tax dollars is no longer about dramatic therapies for serious disease. The fact that it may help to address "interesting questions" in embryonic development[6] will not have the political weight needed to maintain public support for ESCR funding. If this is merely about adding pages to embryology textbooks, then we could do this by studying primate embryos without destroying human organisms.



## Other Pluripotent Alternatives?

There have been other techniques touted as moral and scientific alternatives to ESCR. Though again it goes beyond the scope of this article to go into the detail necessary to make a convincing argument, it appears that each of these techniques have biological and ethical worries that AFS cells do not. For instance, much has been made in recent weeks in the popular press about pluripotent stem cells being derived from somatic cells.[7] Aside from the success of this technique not being new (the President's Council on Bioethics covered the technique, along with several others, in some detail three years ago[8]), the press also largely missed the downside of this technique in its coverage. For instance, the President's Council worried that this procedure "might proceed too far" thus "resulting in the functional equivalent of a zygote" and return us to the ethical problem it was trying to avoid in the first place: creating a fellow member of our species slated for destruction. Another problem is that these pluripotent cells seem to show some capacity to cause tumors that hES cells have.

Other techniques like "Altered Nuclear Transfer" and "Blastomere Extraction" have had their day in the spotlight as well and subsequently have had their biological and ethical downside discussed – by the President's Council and academic journals – at some length. Again, though the scientific and ethical issues are complex and warrant further study, the bottom line is that AFS cells produce none of the moral and biological questions and problems of the other techniques used to procure pluripotent stem cells.

## Conclusion

If one thought that the embryo was mere tissue, unworthy of moral respect, and also thought that

ESCR was the only procedure that could get the best results for curing difficult disease, then it is easy to see why the procedure would have strong support. But if we take science seriously, we know the embryo is at least worth some significant moral respect as a fellow member of our species, and we know that there is good reason to think that other kinds of stem cells are pluripotent – not just those procured from embryos.

But let us admit, simply for the sake of argument, that pluripotency admits of degrees and let us also keep in mind that the amount of moral respect given to the embryo admits of degrees. What if we were to resolve these two variables with hostility toward the argument for ESCR? Let us say for the sake of argument that AFS cells can form all 220 cell types and that a full human person is destroyed in ESCR. Research on AFS cells is now the overwhelmingly easy choice. ESCR, in addition to having the ethical problem of destroying human persons, has biological problems that AFS cells do not (they form tumors and have immune rejection problems) and no therapeutic advantage at all.

But what if we were to resolve the two variables with sympathy toward ESCR? Let us say for the sake of argument that AFS cells can generate most, but not all, of the 220 cell types and that a human organism is indeed destroyed in ESCR – but one that only demands moderate respect. While it is not as obvious as in the hostile comparison, I would still claim the argument in favor of ESCR is on weak ground. Why should hundreds of billions of dollars be spent destroying human organisms (who are worth at least a moderate amount of moral respect) on the *chance* that AFS cells may not produce some therapies – all the while hoping that the ESCR-specific problems of immune rejection and tumor formation will be overcome? No, even if we resolve the two variables as favorably as possible to arguments in support of ESCR, such arguments are still not convincing.

The current debate over stem cell research lacks subtlety, not only because many are unaware of the facts, but also because those leading and informing the public debate, on both sides, are not really interested in learning how best to help people who suffer from disease. Rather, it seems they are pandering to pro-life and pro-abortion-rights political ideology – each side being more invested scoring political points than whether or not we find a cure for Parkinson's disease. If one can see through the smoke from this unfortunate and unhelpful political battle, however, it appears that destroying embryos in order to treat serious disease is unnecessary and, indeed, biologically unsound. Happily, nurturing human embryos to birth, and producing umbilical cord blood, placental and pluripotent amniotic fluid stem cells in the process, is where our best hope lies for future therapies. ■

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## NOTES

1. European Consortium for Stem Cell Research, "Regulations in EU Member States Regarding hES Research," (February 2007): www.eurostemcell.org/Documents/Outreach/stemcell_hesc_regulations_2007FEB.pdf.
2. Even stem cell researchers themselves cannot agree on what kinds of names to give certain kinds of stem cells – or even on the precise definition of a certain names. For purposes of this paper, "adult" stem cells refer to those found in adult tissues, "multipotent" stem cells refer to those found in other kinds of tissue (umbilical cord blood, for example) but limited (though powerful) versatility in becoming other tissues. "Pluripotent" stem cells are also not found in adult tissue, but have the most versatility of any stem cell. Much more on this to come.
3. For a fairly substantial list of peer-reviewed studies on the therapies generated by adult stem cells download: www.stemcellresearch.org/facts/asc-refs.pdf (February 17, 2007).
4. Paolo, et al., "Isolation of Amniotic Stem Cell Lines with Potential for Therapy," *Nature Biotechnology* (January 25, 2007).
5. Personal correspondence, Jan. 31, 2007
6. One might also wonder what could be learned from studying and discarding a human embryo than could not also be learned from studying and discarding primate embryos.
7. Junying, et al., "Induced Pluripotent Stem Cell Lines. Derived from Human Somatic Cells," *Science* (November 20, 2007).
8. President's Council on Bioethics, "White Paper: Alternative Sources of Pluripotent Stem Cells," (May 2005).