

Stem Cell Science: Current Ethical and Policy Issues

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There is increasing support for embryonic stem (ES) cell research on both sides of the Atlantic. In the United States, the outcome is more funding from non-federal sources, despite the current administration's opposing views. In Europe, a similar pragmatic turn is in the making, but the future is still uncertain. Acceptance of ES cells is mitigated by the uncritical belief that their use is ethically more suspect than is the case for adult cells.

THE VARIEGATED SCENE OF STEM CELL POLITICS

For nearly a decade, stem cell research has been at the center of public attention, both as a fascinating area of biomedical research and as a permanent focus for ethical and legal controversy.¹ More than any other health-related technology, future treatments derived from stem cell science seem to hold a promise of ground-breaking cures for many intractable diseases, and beyond that for a more or less radical extension of the human lifespan. It is indeed fascinating to see how the public reception of stem cell science typically links hopes for a “spare parts” approach to degenerative disease with the advent of a true regenerative medicine and with the promise of an increased longevity in good health (Figure 1), a perception also fueled by scientific discourse. On the other hand, few developed countries have failed to entertain fierce ethical debates about the morality of deriving stem cells from early human embryos, often driven by conservative opponents of abortion. The arguments exchanged in these debates are hardly new, since for the most part they revive traditional discussions about the moral standing of human prenatal life. Nevertheless, they often result in widely divergent national regulations, because these controversies have interacted with specific national issues as well as national styles of political solution finding (Figure 2). As a result, no global regulatory framework for stem cell science is emerging at this time.

In Europe, a great diversity of legal situations prevails. Some countries completely prohibit human embryo research, a position often connected with a restrictive stance on abortion. A few nations—most prominently the United

Kingdom—have a liberal position allowing most types of human embryo research, including somatic nuclear transfer and, most recently, the production of hybrid and chimerical embryos.² Many European countries adopt a middle-of-the-road position, which allows the derivation of ES cells from spare embryos from *in vitro* fertilization (IVF) treatments, while prohibiting most other human embryo research. Furthermore, national attitudes are not fixed once and for all. For instance, France's status changed from “restrictive” to “middle-of-the-road” upon adoption of a new “Bioethics Law” in 2005.³ Germany has had since 1990 a very restrictive “Embryo Protection Law” that in effect prohibits the derivation of human ES cell lines, whereas the “Stem Cell Act” of 2002 allowed research to proceed on imported cell lines that were derived earlier than 1 January 2002.^{4,5} This situation is increasingly criticized and the German scientific community persistently calls for a more liberal law.⁶

The European debates on human ES cells revolve around national policies allowing or prohibiting human ES cell research. The United States presents a different case. The current administration is sternly opposed to any research entailing the destruction of human embryos. This is due to the strong influence of the Christian right, which is usually associated with Protestant fundamentalism, reinforced in this case by the Catholic Church. Nevertheless, a nationwide prohibition of such research was never really on the agenda. Instead, the Bush administration's policy is to exclude federal funding for this research unless it uses previously established cell lines. Academic laboratories set up independently of federal funding, as well as private sector research, were never prevented from doing human ES cell work. In addition, much of the political debate moved on to the state level, with individual states taking a proactive stance to favor this research by specific funding initiatives.

The Swiss debate holds special interest, because the Swiss citizenry has been called repeatedly to express its opinion on various biomedical issues over the last two decades, and one of these votes was directly relevant to stem cell research. On

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the basis of a nationwide vote held in 2004, the Swiss adopted a law authorizing the derivation of stem cell lines from spare embryos remaining after IVF treatment (Table 1). Although IVF for specifically producing research embryos is still

forbidden, as is the case in most European countries, the Swiss vote was a major turning point away from a rather restrictive position on reproductive technologies and human embryo experimentation that had prevailed during the 1990s. Interestingly, this vote of public confidence in stem cell science was held in the same month as Californian citizens adopted Proposition 71, which earmarked about \$3 billion for stem cell research through the California Institute of Regenerative Medicine. After winning several lawsuits brought by opponents of ES cell research, the California Institute of Regenerative Medicine has become the largest funding organization for stem cell science worldwide.⁷ Missouri is another state where the citizenry expressed support for ES cell research in a public vote (Table 1). Here, the issue was to secure the legal basis for this research. The lesson from these events may well be that if asked directly as citizens, people will in fact support ES cell research, and that even countries with a conservative attitude regarding the human embryo may change their minds if the therapeutic promise of this research appears sufficiently strong.



Figure 1 Poster for the 11th Wright Colloquium for Science (made by Etienne & Etienne), a high-quality science popularization event held every other year in Geneva, Switzerland. The text “Stem Cells and Regenerative Medicine. Would you like a supplement of life?” over a picture of a microinjected oocyte reflects the common perception that research on ES cells holds a promise of increased longevity.

EMBRYONIC VS ADULT STEM CELLS, AND THE POLITICS OF HOPE

Because much of the controversy on stem cells has revolved around the status of the early human embryo, the notion that adult stem cells are the ethically preferable avenue for research has been very popular. For obvious reasons, it has been advanced most forcefully by opponents of human embryo research (e.g., see DoNoHarm, Coalition of Americans for Research Ethics⁸). But even scientists who may not necessarily have strong feelings about the matter have come to believe that “embryo equals ethical problems”, whereas adult stem cells are presumed to be ethically trouble-free. This opinion is problematic for three reasons. First, adult stem cells, especially the banking of cord-blood cells,

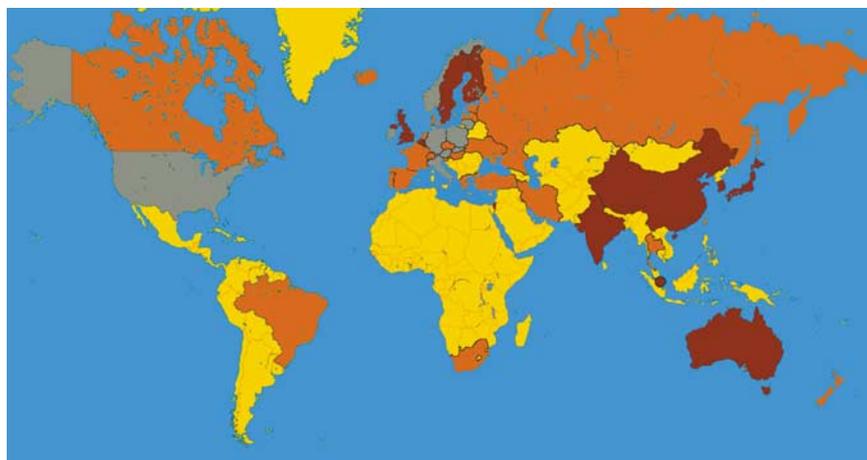


Figure 2 World stem cell policy map showing countries with permissive (dark brown), flexible (light brown), or restrictive or no policy on ES cell research. Permissive policy allows various laboratory techniques to create ES cell lines, including nuclear transfer/research cloning and the extraction of stem cells from embryos that remain unused after IVF treatments. Flexible policy allows the creation of stem cell lines from donated embryos unused after IVF treatments. Countries colored in brown represent about 3.5 billion people, more than half the world’s population. Reproduced from <http://www.mbbnet.umn.edu/scmap.html> (reprinted with permission of William Hoffman, MBBNet, University of Minnesota).

Table 1 Recent public votes on issues related to stem cell research

Country or state	Year	Issue being voted on	Outcome
Switzerland ^a	2002	Liberal abortion law	Adopted (72%)
California ^b	2004	Proposition 71: \$3 billion public money for stem cell research	Adopted (59%)
Switzerland ^a	2004	Law authorizing the derivation of human ES cell lines from spare embryos	Adopted (66%)
Italy ^c	2005	Referendum against a restrictive law on reproductive technologies that also limits ES cell research	88% of voters accepted the proposal, yet it was repealed because the necessary minimum voter turnout was not reached
South Dakota ^b	2006	Act banning virtually all abortions	Repealed (56%)
Missouri ^b	2006	Initiative to change constitution to protect human ES cell research from legal challenges	Adopted (51%)

The table shows the results of ballot measures or referenda held in the current decade on issues directly or indirectly related to human ES cell research. Except for the Italian referendum, which is difficult to interpret, all show support for ES cell research and/or a liberal stance on the status of the human embryo. ^aSwiss Federal Administration: results of popular votes (<http://www.admin.ch/ch/f/pore/va/index.html>). ^bNational Conference of State Legislatures (<http://www.ncsl.org/programs/legismgt/elect/dbintro.htm>). ^cDatabank on Direct Democracy (<http://www.sudd.ch/>).

have raised ethical issues of their own. Second, opponents of ES cells typically extol adult stem cells as the more promising alternative on scientific grounds, not only ethical ones. But this makes their position more fragile, because it depends on the promises of adult stem cells, which need to turn out as they wish them to be. Third, if we do not believe that a human early blastocyst has a standing comparable to that of a human person, for instance because we realize that this is impossible to prove on the basis of general secular arguments,⁹ then the ethical divide between embryonic and adult stem cells largely vanishes.

We will not discuss the third problem further here, but will turn to the first one. The ethical issue of cord-blood banking has emerged around two competing practices, namely public banks set up for allogeneic stem cell transplants vs private banks for autologous therapy. These embody two contrasting views, one of organized altruism in the service of the public interest, the other of a private business catering to a self-centered view of future health. Furthermore, the scientific rationale behind these two kinds of cell banks is quite different, as the private banks are in effect asking their customers to have faith in future therapeutic progress that *may* make their cellular “bank deposit” cashable in terms of treatment for a disease that they *may* happen to get, whereas the public banks rely on existing therapies to meet existing needs. This adds a dimension of scientific controversy to the debate. In 2004, the European Group on Ethics, a high-level ethics advisory commission of the European Union, published an opinion that is quite critical of private cord-blood banking.¹⁰ Short of banning private cord-blood banking altogether, the European Group on Ethics argues for regulation and strict controls over advertising. The controversy seemed to abate somewhat in recent times, with a conciliatory proposal by Richard Branson, founder of the Virgin group of companies, suggesting a mixed system whereby every cord-blood donation would be split into an autologous deposit and a

contribution to a public bank.¹¹ The point is not to analyze this controversy further, but to note that ES cells are not alone in raising ethical issues, and that it is simplistic to give adult stem cells an ethical blank check.

The second problem is, as we mentioned earlier, the bet made by opponents on the success of future adult stem cell therapies and on the failure or irrelevance of ES cell research. But this leads to a more basic question: why did opponents of ES cells paint themselves into a corner where their ethical position seems open to refutation by empirical results, namely if it turns out that ES cell research is more successful? Why not opt for a “heroic” moral stance, whereby future therapies arising from “immoral” embryo-destroying research are forsworn in advance? It seems that renouncing successful treatment for severe diseases because they originate from morally repulsive research is no longer an option that moral conservatives can comfortably choose. This is reflected in the increasing number of right-wing public figures who have changed sides and now support ES cell research. An early example is Nancy Reagan’s opposition to the Bush administration on this issue.¹² Another is Governor Schwarzenegger’s support for Proposition 71 in California. Clearly, the therapeutic imperative is increasingly seen as the clinching argument in stem cell debates, and this has important political consequences.

Before we turn to these, it is essential to analyse why the therapeutic promise of stem cells, embryonic and adult alike, is so convincing to the public. The issue is not so much the objective, scientific assessment of these promises, but why they make such a huge impression on public opinion. A possible explanation is the simplicity and clarity of the “spare parts” model of therapy. The vision of a new regenerative medicine, based on the replacement of damaged cells with new ones, is a very powerful one. Through this easily understood model, the metaphor of “spare parts” has been boosted, and this vision can be seen at work in two current social representations. The first is the hope for a more or less

radical life extension in good health. We mentioned earlier that this is a recurrent theme in scientific as well as popular presentations about stem cells. It also converges with the notion of life extension as an increasingly legitimate objective for medical research, with or without stem cells. This objective used to be seen as the dream of prophets on the fringes of academic respectability (see, e.g., ref. 13), but is now becoming part of mainstream thinking in ageing research.¹⁴ The second powerful image is used extensively by private stem cell banks: your deposit is “warranty extension” on your bodily functions. Again, this conjures up a vision of indefinite repair of one’s body through the replacement of worn tissues and cells, this time specifically thanks to adult stem cells.

We can conclude that embryonic and adult stem cells raise similar high hopes in the minds of the public and that popular support for both ultimately depends on whether these hopes are fulfilled within a reasonable time frame. The politics of hope is a risky game: the promise of therapeutic breakthroughs is what makes people approve this research, even to the point that public persons turn against a central aspect of their ideological commitments. To increase the chances for these hopes to materialize, it is essential to really provide this research with the means it needs to succeed.

WHY EUROPE NEEDS A PROACTIVE STEM CELL POLICY

We have reviewed the ethical and political debates on stem cell science on both sides of the Atlantic and noted that these discussions evolve. Attitudes that seem firmly entrenched can change. We also criticized the common belief that using adult stem cells is necessarily ethically superior to ES cells. We will now combine these two aspects and discuss their policy implications.

As the Californian situation shows, pragmatism can win over dogmatic adherence to conservative moral beliefs, and this can result in massive financial support for stem cell research from public sources. The same pragmatic turn occurs in some European countries, but unfortunately it does not have the same financial consequences. Also, if we consider research funding by the EU (European Union), the situation is not rosy. Attempts by countries opposing ES cell research to stop EU funding even in countries where this is legal failed.¹⁵ However, this may be a Pyrrhic victory, as EU funds for stem cell research pale in comparison with the money earmarked for this research in the United States. There is a common view that, because of the Bush administration’s ideological commitments, the United States may lag behind Europe and that one may even see a reverse brain drain of stem cell specialists to the Old World.¹⁶ Except as regards the United Kingdom,¹⁷ this is probably exaggerated and may in fact express a dangerous complacency on the part of Europeans. More permissive laws on ES cell research will not energize this field if appropriate funding is not forthcoming and if the mistaken belief that ES cells are ethically suspect in comparison with adult cells leads to restrictive regulation and red tape. The Swiss example is enlightening in this respect. As mentioned earlier, public opinion did change toward a more liberal stance, and a law enabling ES cell work

was indeed passed with massive support. Yet, as of today, very few Swiss scientists work on ES cells, because the law places great bureaucratic hurdles on the collection of spare embryos and because there is little specific funding for this line of research. Cynics may even see a change for the worse in the current situation: the people may feel good believing that they opted for a more enlightened law that reflects their expectations for medical progress, but opponents may feel good too, because they anticipate that little will change in practice.

We believe that the Swiss situation also applies in many countries of continental Europe. To change, it needs a renewed effort on the part of the European scientific community. Scientists working on ES cells should be less shy about the ethics of their work, knowing that it is ethically legitimate and enjoys public support. They should also be more vocal in defending the hopes placed on stem cell science by the public and in requesting the means to realize their promises. It would indeed be tragic if these hopes should be dashed by timidity and lack of vision.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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