

# Embryo as epiphenomenon: some cultural, social and economic forces driving the stem cell debate

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## ABSTRACT

Our human embryonic stem cell debates are not simply about good or bad ethical arguments. The fetus and the embryo have instead become symbols for a larger set of value conflicts occasioned by social and cultural changes. Beneath our stem cell debates lie conflicts between those who would privilege scientific progress and individual choice and others who favour the sanctity of family life and traditional family roles. Also at work, on both the national and international levels, is the use of the embryo by newly emergent social groups to express resentment against cultural elites. The organisational needs of religious groups have also played a role, with the issue of protection of the embryo and fetus serving as a useful means of rallying organisational allegiance in the Roman Catholic and evangelical communities. Because the epiphenomenal moral positions on the status and use of the embryo are driven by the powerful social, cultural or economic forces beneath them, they will most likely change only with shifts in the underlying forces that sustain them.

On 19 July 2006, US President George W Bush vetoed a bill that would have greatly expanded federal funding for human embryonic stem (hES) cell research and permitted the derivation of new hES cell lines from frozen embryos remaining from in vitro fertilisation (IVF). Bush announced his veto surrounded by 18 families who had “adopted” “snowflake babies”, frozen IVF embryos not used by other couples to have children.

This event, rich in symbolism, illustrates how politicised the debates about hES cell research have become. It hints at some of the more fundamental cultural, social and economic forces driving the controversy, both in the USA and in Europe and elsewhere. It also tells us something about the limits of philosophical argumentation as a way of understanding and resolving the intense debates occasioned by hES cell research.

That our hES cell debates are not simply about good or bad ethical arguments becomes clearer when we see that President Bush’s veto evidences a deep contradiction. On the one hand, the President was prepared to marshal the full power of his presidency, exercising his first veto in 6 years in office, in order to protect frozen human embryos from being destroyed to make new hES cell lines. In the President’s words, he opposed the legislation because it “would support the taking of innocent human life in the hope of finding medical benefits for others”.<sup>1</sup>

On the other hand, the President said—and did—nothing about the medical procedure, IVF, that made the snowflake babies available in the

first place. Although he was prepared to slow progress on a biotechnology that could save the lives of children and adults, he was completely silent about the massive use of IVF, involving the routine creation and destruction of supernumerary embryos, by people for the purpose of having children of their own. No legislation has ever emerged from the Bush White House (or any preceding “right-to-life” administration) proposing to limit access to IVF or restrain IVF practitioners in any way. (In March 2004, the President’s Council on Bioethics, a Bush-appointed advisory body led at that time by the bioethicist Leon Kass, who had a long record of opposition to assisted reproductive technologies, issued its report *Reproduction and responsibility: the regulation of new biotechnologies*. This report promised, in its earliest drafts, to recommend new legal restraints on the practice of IVF. However, partly in response to heated criticism from IVF practitioners and patient groups, the final report offered little more than recommendations for the enhanced monitoring of the outcomes of IVF clinical practice.<sup>2</sup>) Like almost all but a small handful of opponents of hES cell research, Bush was intensely solicitous of the welfare of the spare IVF embryos that could be used for stem cell derivation but nearly heedless of the hundreds of thousands of embryos that have been created and left behind in assisted-reproduction technologies.

This neglect of embryos is not confined to IVF. It also manifests itself in connection with natural reproduction.<sup>3</sup> For example, it has long been known that there is an extremely high rate of embryo loss associated with conception and pregnancy. Estimates vary, but it is almost certain that *at least* half of all fertilised human ova arrest somewhere in early development, never going on to a completed pregnancy. If human embryos are the moral equivalent of children and adults, as many opponents of hES cell research insist, then on the basis of current estimates of world population growth,<sup>4,5</sup> this amounts to the catastrophic loss of perhaps a hundred million “human” lives worldwide each year. Yet no one in the global health establishment or a US administration has ever proposed devoting significant research funding to address this problem. Budget requests for the National Institutes of Health’s National Institute for Child Health and Human Development, the US agency closest to this issue, do not even identify early pregnancy loss or early miscarriage as a research priority.<sup>6</sup> It does not explain this moral indifference to say that many of these deaths are the result of “natural” processes such as chromosomal aneuploidies. Disease conditions such as

cancer, malaria and AIDS, which we regard as major global health problems, also are the result of natural processes. Nor does it help to say that these disease-related deaths are not intentionally caused, and therefore morally different from the deliberate destruction of embryos for hES cell research. That the infection of children by malaria or HIV/AIDS is not deliberate does not reduce our moral commitment to fighting the spread of these diseases. While appeal to an omission/commission distinction may slightly mitigate blame for this massive loss of embryonic life, it cannot justify the total neglect of it.

### POOR PHILOSOPHISING

How, then, can we explain this deep inconsistency in attitudes towards the embryo on the part of opponents of hES cell research? Philosophers and bioethicists who have addressed this question appear to believe that the core problem here is simply a matter of sloppy thinking. Identifying and removing these inconsistencies, the work of moral philosophy and bioethics, thus becomes a way of resolving our stem cell debates. Because moral positions must be internally coherent, those who champion the sanctity of the early embryo are presented with a choice: either justify your selective commitment to embryos, or bring your views on stem cell research into conformity with your actual attitudes about and treatment of them. Since few opponents of hES cell research are likely to commit to massive programmes of embryo rescue or alter reproductive practices that occasion embryo death, it follows that they must rethink their opposition to hES cell research.<sup>7</sup>

Unfortunately, philosophical arguments of this sort have had little impact. Opponents of hES cell research continue their resistance to embryo destruction in the face of repeated demonstrations of the apparent contradictions in their position. This has led some students of the stem cell debates to seek a deeper understanding of the factors at work behind and beneath some of these surface arguments. Recently, some scholars of the US abortion debates have drawn attention to the ways in which the fetus and the embryo have both become symbols for a larger set of value conflicts occasioned by social and cultural changes.

### DEEPER VALUE CONFLICTS

One of these scholars, Janet Dolgin, sees these debates as pitting against each other two visions of the place of the individual in society. "One vision," she says, is "linked with religious orthodoxy and served by tradition. It values fixed roles, social hierarchy, and social loyalty within communal, and especially familial, settings."<sup>8</sup> The competing vision is linked with secularism and modernity. It values autonomous individuality and choice. During the late 20th century, the divide between these two visions was widened by the feminist movement, which championed women's autonomy and saw access to reproductive health services and abortion as essential to it. In the USA, the Supreme Court decision *Roe v Wade* sharpened the conflict by in effect (if not intentionally) siding with the feminist position against traditionalist opposition to abortion. From 1973 onward, the debates about the moral status of the fetus thus became surrogates for much deeper social and cultural changes that were working their way through US society and also in Europe and other regions where modernisation was creating tensions between competing visions of gender, sexuality, family and social roles.

When viewed in this context, some of the apparent inconsistencies in the pro-fetus, pro-embryo position begin to make better sense. The bioethicist Dena S Davis notes the

tolerance of IVF by many hES cell opponents even as they vehemently resist life-saving hES cell research. She calls this "the puzzle of IVF" and tries to explain it in terms of the deeper value conflicts I have mentioned. Abortion and our treatment of the human embryo stir such intense controversy because they expose our sharp disagreements over the role of women, the meaning of human sexuality and the importance of the traditional family. But IVF connects with a very different, even opposing, value constellation. In Professor Davis's words, "While the embryo in the abortion context is ... a stand-in or replacement for concerns about family life and structure, the embryo in the context of IVF exists primarily to allow married, heterosexual, economically stable couples to "complete" their families by having children."<sup>9</sup> Once we see this, the symbolism and underlying coherence of President Bush's veto event becomes more evident. On this occasion, the embryo, now symbolised by each of the snowflake babies in its parent's arms, is an epiphenomenon. The deeper message the President is sending to his religiously traditionalist voter base by means of an embryo-protecting veto is that he joins them in opposing those who would privilege scientific progress and individual choice over the sanctity of family life and traditional family roles.<sup>10</sup>

### REGIONAL TENSIONS

While scholars like Dolgin and Davis are right to signal the presence in these debates of competing visions of gender, family and society, there is also a set of regional, social and economic tensions at work feeding the debate. Opposition to cultural elites is another dimension of the conflict over embryos. In the USA, this takes the form of resentment on the part of populations in the South, Southwest and more agrarian parts of the Midwest to values and attitudes found in the bi-coastal, especially northern, regions of the country. To a large extent, the South was left behind by the first waves of modernisation. Bitter feelings dating from the Civil War era led there to a measure of cultural *ressentiment* against cultural elites. Among the foes were the northeastern educational and media establishments, and the federal government (not least the federal judiciary, which was viewed as responsible for forced integration during the civil rights struggles of the mid 20th century).<sup>11-13</sup>

As the South and its cultural sphere grew in economic and political importance from 1970s onward, these resentments crystallised around issues that symbolised the cultural and regional divide. Almost anything associated with race was implicated, from voter registration initiatives to school bussing. The gay liberation movement furnished a new opportunity for the expression of cultural antagonism, with gay marriage recently becoming the foremost symbol of the divide. And, of course, there was *Roe v Wade*, the icon for judicial activism and the imposition of federal government policy over state or regional autonomy. With the advent of stem cell research, the soil was thus well prepared to make the embryo a further vehicle for the expression of these deep regional conflicts. It is hardly surprising that when the South and its affiliated cultural regions finally attained control of the federal government, first in the Reagan administration and most decisively in the two Bush presidencies, this outcast, anti-government-values agenda paradoxically become federal policy. Now it was up to the states associated with the older ruling elites, notably California, Illinois and the states of the Northeast, to try to reassert their hegemony through programmes of ambitious support for stem

cell research.<sup>14-17</sup> In all of this, once again, the embryo is an epiphenomenon of much deeper societal divisions.

The regional social, cultural and economic forces driving the embryo debate are not confined to the USA. The emerging split among Anglicans over the roles of women and gay people in the church suggests that the divide between North and South, developed and less developed, modern and traditionalist, established and emergent societies is also playing a role in global religious-ethical debates. I believe, as well, that some of the divisions in Europe on the stem cell issue have to do with conflicts between nations at different stages of social and economic development, and between those at the periphery and those at the centre of the European community.<sup>18, 19</sup> This picture is somewhat clouded by social and historical particularities. For example, the recent emergence of Spain as a champion of stem cell research reflects the electoral success of a socialist government and a rejection of a long history of clerical intervention in society. In Germany, the political weight of the Catholic south has combined with a history of eugenic abuses to produce a very conservative national response to reproductive and genetic issues. Until recently, Norway, with its conservative Lutheran and evangelical churches, has been a peripheral and cultural outlier in the otherwise liberal Scandinavian north. Norway's relative lack of biotechnology sector, as compared with other Nordic nations, and its long tradition of resistance to cultural innovations among its Scandinavian neighbors, may also play a role.

### CATHOLIC INVOLVEMENT

There is also the special role played in these debates around the world by the Roman Catholic Church. Here, it seems, we have the clear primacy of an ethical-religious position: the absolute sanctity accorded to prenatal human life from conception on. Indeed, the Roman Catholic position is so absolute that it avoids many of the inconsistencies displayed by others on the pro-embryo side of the debate. With rigorous logic, Catholic teaching opposes both stem cell research and IVF, the latter because it is regarded as a deformation of human sexuality and parenting and because it involves the willingness to create and discard human embryos.<sup>20</sup> In 2004, under pressure from the Vatican, Italy passed one of the most restrictive laws governing assisted-reproduction technologies. Couples using IVF in Italy must limit themselves to the creation and transfer of no more than three embryos. Embryos cannot be frozen or discarded, and, regardless of the impact on the mother's health, all the embryos must be transferred to her womb.<sup>21, 22</sup>

The Catholic position is not entirely free of inconsistencies. Despite the Church's militant opposition to both abortion and embryo destruction, it has hardly ever spoken out to call for research to reduce the massive loss of early embryonic life in natural conception. This suggests that deeper sociological and cultural forces also shape the Church's strong stand against the deliberate destruction of prenatal life. In fact, while opposition to abortion has long been a part of official Catholic moral theology, the intensity of Catholic involvement with this issue is fairly recent. One reason for this is the relative absence of challenges to the historic Catholic position until the mid 20th century. Liberalised abortion laws in the USA and Europe then provoked Church leaders to action. But social factors also played a role.

Abortion rose to prominence in Catholic teaching during the period when the Church was facing a crisis of identity.<sup>23, 24</sup> In Europe, the postwar period saw a rise in secularism and consumerism that made inroads even among traditionally

Catholic constituencies. In the USA, the election of John F Kennedy as president in 1960 marked the end of nearly a century of immigrant Roman Catholicism (although the issue of Catholicism's relationship to immigrants has been revived recently with the influx of a new wave of predominantly Hispanic immigrants). During the long European immigrant period, Catholic identity sustained millions of working class Irish-, Italian-, German- and Polish-American immigrants in the face of discrimination and it also offered the Church an assured place among American Catholics. As Richard Alba observes, "[E]thnic communities and cultures serve vital human needs because they provide enduring personal identities amid the social flux of a rapidly changing society and also provide communities of solidarity that are larger than face-to-face groups and are smaller than the whole society."<sup>25</sup> As immigrant and ethnic identities waned, however, the Church was faced with the question of how it could continue to elicit the support of its members. What could it offer to its members that was both religiously distinctive and able to build organisational loyalty? These questions were sharpened by the reforms of the second Vatican Council, which, in the minds of many traditionalist Catholics, removed or weakened familiar features of Catholic life and identity. As Kerry N Jacoby observes, "The Church, as *Roe* came down, was in a crisis of authority, leadership, and respect. The youth were leaving, the clergy were in rebellion, and few things seemed secure in the Catholic World."<sup>26</sup> More recently, in Europe, ethnic immigration from largely non-Catholic (and Muslim) regions of Africa and Asia has further challenged the authority and hegemony of the Church in its traditional culture sphere. Coupled with a sense of demographic threat as Catholic populations fail to grow at the same rate as non-Catholic immigrant ones, this has occasioned Papal and other statements urging a return to traditional Christian values, including "family" values and opposition to abortion.<sup>27</sup>

During the 1970s and '80s, some Catholic leaders, both in the USA and abroad, saw a path that led through a programme of strong support for social justice, and advocacy for the poor, including new Hispanic immigrants and African-Americans. (In Latin America, this same impulse took the form of liberation theology and the "preferential option for the poor".) However, in the USA, this social justice strategy was limited by the economic ascent of many Catholics into the middle and upper classes<sup>28</sup> and there and elsewhere by the discomfort of the Catholic leadership with a radical and confrontational economic position. Under the guidance of a series of traditionalist popes, the Vatican appears to have instead chosen opposition to abortion as a hallmark of global Catholicism. The issue has since come to define conservative, devotional Catholicism. In the words of one commentator, "by the mid-1970s ... the pro-life movement had become the dominant focus of Catholic action and even identity in the culture war."<sup>29</sup> To those who ask, "Why should I be a Catholic?" the answer is, "because you are among those idealists that oppose the modern "culture of death", which includes such things as abortion and embryonic stem cell research". By rejecting values associated with ruling cultural elites, many American Catholics who long felt marginalised by liberal (and historically Protestant) American values have thus been able to maintain their stance of cultural opposition. The intense in-group reinforcement once provided by ethnic identity and the shared experience of cultural difference and discrimination are now partly sustained by a countercultural religious-ethical position. The stance has further served institutional needs by affording the Catholic



Church an active presence in national affairs. Since the mid 1970s, the US Conference of Catholic Bishops' Secretariat for Pro-Life Activities has been a major centre of opposition to embryo and hES cell research.<sup>30–32</sup> This same office has not chosen to risk the organisational capital it has accumulated in the abortion and stem cell debates by openly challenging American Catholics' widespread use of IVF. Thus, the Catholic position on these matters is driven at least as much by underlying organisational and social concerns as by moral commitments.

### PROSPECTS FOR RESOLVING THE DEBATE

How does this understanding of the forces driving the hES cell debate help us understand the prospects of moving towards a resolution of our differences? First, and most obviously, it suggests that, despite the professional conceit of bioethicists like me, rigorous moral argumentation will not by itself end these debates. The resistance to hES cell research is too firmly allied with powerful social and cultural interests to melt away in the sunlight of philosophical illumination.

Second, this analysis tells us that because they are driven by powerful social, cultural or economic forces, these epiphenomenal positions will most likely change only with shifts in the underlying forces sustaining them. Many possible transformations might be imagined, but two in particular come to mind. The first are biomedical developments that move hES cell research towards clinical implementation. At present, opposition to hES cell research is a relatively cost-free stance that permits those adopting it to reap many symbolic and organisational rewards. This could change if hES cell research fulfils its therapeutic promise. For the past few years, I have been predicting that our stem cell debates will end abruptly the day after the first diabetic child walks out of a stem cell clinic cured of the disease. If families must choose between embryos and treatments for sick loved ones, the full gravity of these commitments will become clearer. Then, the family-values component of the anti-hES cell position will be internally challenged, as people will ask how they best can express their commitment to the welfare of families and children. Is it by opposing the destruction of human embryos, or by turning spare, and otherwise doomed, embryos to human benefit? If that happens, I believe, many of the opponents will look anew at their real valuation of the early embryo, and most will opt for cures.

To some extent, this argument works in the reverse direction. If adult stem cell research were to fulfil its promise, or if hES cell alternatives such as direct cellular reprogramming and the use of induced pluripotent stem (iPS) cell technology were to succeed in yielding effective therapies, then opponents of hES cell will be given an opportunity both to enjoy the medical benefits of stem cell technology and to reaffirm their oppositional stance to human embryo destruction. Indeed, the announcement of the work of Shinya Yamanaka and others in reprogramming first, mouse, and then human fibroblast cells through the use of retroviral gene transfer<sup>33–35</sup> was predictably met with enthusiasm by the White House and by many other hES cell opponents.<sup>36</sup>

In fact, the enthusiasm with which hES cell opponents greeted iPS cell technology is not yet entirely justifiable—either in scientific or ethical terms.<sup>37</sup> Current technologies for the creation of iPS cell lines require the use of retroviral gene therapy. This approach renders up to 20% of the cells carcinogenic. Until this problem is solved, it is not clear that

iPS cell lines can be used for patient-specific transplant therapies.

Nor is it clear that this technology really solves the ethical problem of embryo destruction that has generated the opposition to hES cell research. iPS cell technology brings an adult cell back to its pluripotent embryonic state. As the work of Nagy and others has shown, with appropriate technical manipulations and sufficient support, such a cell might have the potential to develop into a human being.<sup>38</sup> Since opponents of stem cell research and therapeutic cloning research usually base their arguments for the sanctity of fertilised or nuclear transfer embryos on precisely this kind of developmental capacity, it is not clear why they have not voiced similar concerns about iPS cell technology. It is true that it might be possible to advance arguments about why iPS cells are relevantly different from these other sources of stem cells. For example, one might stress the “naturalness” of fertilised ova, as opposed iPS cell cells. Such an argument, however, would raise many questions, and, in any case, it would not make sense of the opposition to the use of cloned “embryos” for stem cell production, since the creation of such embryos also is not natural.<sup>39</sup>

Nevertheless, these issues have not typically been raised by hES cell opponents. Instead, the mere announcement of the iPS cell technology has been taken by them as a victory for their cause. In this respect, the enthusiastic reaction to iPS cell technology further suggests that the moral issues here are epiphenomenal. The opponents of hES cell research—now enthusiasts for iPS cell research—appear less concerned about the lives of the entities that could become people than with declaring victory in a cultural war. Science and ethics have been subordinated to a larger cultural and now political agenda.

### CONCLUSION

An epiphenomenon is a secondary phenomenon that occurs alongside a primary phenomenon that causes it. I have argued that the commitment to the welfare of the human embryo that animates much of the current ethical objection to hES cell research is epiphenomenal in this sense. It springs from the soil of deeper social, economic, cultural and ecclesiastical realities, and deeper value disagreements. Bioethicists can contribute by pointing to problems in surface arguments. But they must never lose sight of the social realities at work. Unless these realities are addressed, it will be hard to achieve forward movement in our stem cell and related reproductive medicine debates.

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### REFERENCES

1. **Babington C.** Stem cell bill gets Bush's first veto. *Washington Post* 20 July 2006:A04. <http://www.washingtonpost.com/wp-dyn/content/article/2006/07/19/AR2006071900524.html> (accessed 6 October 2008).
2. **President's Council on Bioethics.** *Reproduction and responsibility: the regulation of new technologies*. Washington, DC: The Council, 2004. <http://www.bioethics.gov/reports/reproductionandresponsibility/index.html> (accessed 6 October 2008).
3. **Devolder K, Harris J.** The ambiguity of the embryo: ethical inconsistency in the human embryonic stem cell debate. *Metaphilosophy* 2007;**38**:153–69.
4. **Haub C.** Global and U.S. national population trends. *Consequences* 1995;**1**. <http://www.gcric.org/CONSEQUENCES/summer95/table2.html> (accessed 6 October 2008).
5. **World Bank.** World population growth. [http://www.worldbank.org/depweb/english/beyond/beyondco/beg\\_03.pdf](http://www.worldbank.org/depweb/english/beyond/beyondco/beg_03.pdf) (accessed 6 October 2008).
6. **National Institute of Child Health and Human Development.** [Congressional budget justification] FY 2007. <http://www.nichd.nih.gov/about/overview/approp/CJ/upload/FY2007.pdf> (accessed 6 October 2008).
7. **Harris J.** *Enhancing evolution: the ethical case for making better people*. Princeton: Princeton University Press, 2007:ch 10.
8. **Dolgin JL.** New terms for an old debate: embryos, dying, and the “culture wars”. *Houston J Health Law Policy* 2006;**6**:249–73.
9. **Davis DS.** The puzzle of IVF. *Houston J Health Law Policy*. 2006;**6**:275–96.

10. **Luo M.** Evangelicals see dilemmas in G.O.P. field. *New York Times* 8 July 2007.
11. **Phillips K.** American theocracy: the peril and politics of radical religion, oil, and borrowed money in the 21st century. New York: Viking, 2006:ch 5.
12. **Feldman G.** The status quo society, the rope of religion, and the new racism. In: Feldman G, ed. *Politics and religion in the white South*. Lexington, Kentucky: University Press of Kentucky, 2005:287–352.
13. **Feldman G.** Epilogue: ugly roots: race, emotion, and the rise of the modern Republican party in Alabama and the South. In: Feldman G, ed. *Before Brown: civil rights and white backlash in the modern South*. Tuscaloosa, Alabama: University of Alabama Press, 2004:268–309.
14. **Rudoren J.** Stem cell work gets states' aid after Bush veto. *New York Times* 25 July 2006.
15. **Wade N.** California maps strategy for its \$3 billion stem cell project. *New York Times* 11 October 2005.
16. **Holden C.** Massachusetts proposes \$1 billion plan. *Science* 2007;**316**:966.
17. **Associated Press.** Maryland: stem cell grants. *New York Times* 19 May 2007.
18. **Walters L.** Human embryonic stem cell research: an intercultural perspective. *Kennedy Inst Ethics J* 2004;**14**:3–38.
19. **Fox C.** Cloning laws, policies, and attitudes worldwide: where does your country currently stand on therapeutic cloning? *IEEE Eng Med Biol Mag* March/April 2004:55–61.
20. **Congregation for the doctrine of the faith.** Donum vitae: instruction on respect for human life in its origin and on the dignity of procreation; replies to certain questions of the day, 1987. [http://www.vatican.va/roman\\_curia/congregations/cfaith/documents/rc\\_con\\_cfaith\\_doc\\_19870222\\_respect-for-human-life\\_en.html](http://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_19870222_respect-for-human-life_en.html) (accessed 6 October 2008).
21. **Fineschi V,** Neri M, Turillazzi E. The new Italian law on assisted reproduction. *J Med Ethics* 2005;**31**:536–9.
22. **Arie S.** Woman forced to have three embryos implanted is allowed fetal reduction to save her life. *BMJ* 2004;**329**:71.
23. **Carey PW.** *American Catholics: a history*. Westport, Connecticut: Praeger, 2004:133.
24. **Feuerherd J.** Politics and the pro-life movement. *National Catholic Reporter* 17 January 2003. [http://ncronline.org/NCR\\_Online/archives/011703/011703a.htm](http://ncronline.org/NCR_Online/archives/011703/011703a.htm) (accessed 6 October 2008).
25. **Alba RD.** The twilight of ethnicity among American Catholics of European ancestry. *Ann Am Acad Pol Soc Sci* 1981;**454**:86–97.
26. **Jacoby KN.** *Souls, bodies, spirits: the drive to abolish abortion since 1973*. Westport, Connecticut: Praeger Books, 1998:36.
27. **Pope Benedict XVI.** Abortion, euthanasia, a childless and "spiritually old" Europe. *AsiaNews* 8 September 2007. <http://www.asianews.it/index.php?!=en&art=10245&geo=1&theme=8&size=A> (accessed 6 October 2008).
28. **Keister L.** Upward wealth mobility: exploring the Roman Catholic advantage. *Soc Forces* 2007;**85**:1–31. <http://www.soc.duke.edu/~keister/upwardmobility.pdf> (accessed 6 October 2008).
29. **Merkowitz DJ.** In essentials, unity; in non-essentials, liberty; in all things, charity. *The Catholic Telegraph* 2006. <http://www.catholiccincinnati.org/tct/CT%20Anniversary/week7.html> (accessed 6 October 2008).
30. **Green R.** *The human embryo research debates: bioethics in the vortex of controversy*. New York: Oxford University Press, 2001:ch 1.
31. **Jaffe FS,** Lindheim BL, Lee PR. *Abortion politics: private morality and public policy*. New York: McGraw-Hill, 1981:ch 6.
32. **National Conference of Catholic Bishops.** *Pastoral plan for pro-life activities*. Washington, DC: United States Conference of Catholic Bishops, 20 November 1975. <http://www.ncbuscc.org/prolife/issues/abortion/roevwade/1975PastoralPlan.pdf> (accessed 6 October 2008).
33. **President's Council on Bioethics.** *Alternative sources of pluripotent stem cells* [white paper]. Washington, DC: The Council, 2005. [http://www.bioethics.gov/reports/white\\_paper/text.html](http://www.bioethics.gov/reports/white_paper/text.html).
34. **Takahashi K,** Tanabe K, Ohnuki M, *et al.* Induction of pluripotent stem cells from adult human fibroblasts by defined factors. *Cell* 2007;**131**:861–72.
35. **Yu J,** Vodyanik MA, Smuga-Otto K, *et al.* Induced pluripotent stem cell lines derived from human somatic cells. *Science* 2007;**318**:1917–20.
36. **Krauthammer C.** Stem cell vindication. *Washington Post* 30 November 2007:A23.
37. **Hyun I,** Hochedlinger K, Jaenisch R, *et al.* New advances in iPS cell research do not obviate the need for human embryonic stem cells. *Cell Stem Cell* 2007;**1**:367–8.
38. **Nagy A,** Gócsa E, Diaz EM, *et al.* Embryonic stem cells alone are able to support fetal development in the mouse. *Development* 1990;**110**:815–21.
39. **Magill G,** Neaves WB. Ontological and ethical implications of direct nuclear reprogramming. *Kennedy Inst Ethics J*. In press.