

presumption can in our view be overridden by other considerations like serious harm to the developing individual or others and the needs of preclinical research.

6. *Concentration of power.* We acknowledge that those who are able to use germ-line intervention will have unprecedented ability to introduce precise changes into the germ lines of particular individuals and families. However, in our view, it is better for human beings to possess this ability and to use it for constructive purposes like preventing disease in families than not to possess the ability. The central ethical question is public accountability by the scientists, health providers, and companies that will be involved with germ-line intervention. Such accountability presupposes transparency about the use of the technology and an ongoing monitoring process aimed at preventing its misuse.
7. *Misuse by dictators.* This objection focuses too much attention on technology and too little on politics. There is no doubt that bona fide tyrants have existed in the 20th century and that they have made use of all manner of technologies—whether the low-tech methods of surgical sterilization or the annihilation of concentration camp inmates with poison gas or high-tech weapons like nuclear warheads and long-range missiles—to terrify and to dominate. However, the best approach to preventing the misuse of genetic technologies may not be to discourage the development of the technologies but rather to preserve and encourage democratic institutions that can serve as an antidote to tyranny. A second possible reply to the tyrannical misuse objection is that germ-line intervention requires a long lead time, in order to allow the offspring produced to grow to adulthood. Tyrants are often impatient people and are likely to prefer the more instantaneous methods of propaganda, intimidation, and annihilation of enemies to the relatively slow pace of germ-line modification.
8. *Human rights and tampering.* It is a daunting task to imagine what the unborn and as-yet-unconceived generations of people coming

after us will want.¹² Even more difficult is the effort to ascribe rights to [future] human beings. Insofar as we can anticipate the needs and wants of future generations, we think that any reasonable future person would prefer health to serious disease and would therefore welcome a germ-line intervention in his or her family line that effectively prevented cystic fibrosis from being transmitted to him or her. In our view, such a person would not regard this intervention as tampering and would regard as odd the claim that his or her genetic patrimony has been artificially tampered with. Cystic fibrosis was not a part of his or her family's heritage that the future person was eager to receive or to claim. . . .

NOTES

1. It is perhaps worth noting that researchers performing somatic-cell gene therapy have carefully avoided diseases and subtypes of diseases that affect mental functioning. One thinks, for example, of Lesch-Nyhan syndrome, of certain subtypes of Gaucher disease and Hunter syndrome, of Tay-Sachs disease, and of metachromatic leukodystrophy.
2. We owe the suggestion of retinoblastoma as a candidate disorder to Kevin FitzGerald, S. J. We are also indebted to Nelson A. Wivel for information on the genetics of retinoblastoma. See Nelson A. Wivel and LeRoy Walters, "Germ-Line Gene Modification and Disease Prevention: Some Medical and Ethical Perspectives," *Science* 262(5133): 533-538; 22 October 1993. See also Stephen H. Friend et al., "A Human DNA Segment with Properties of the Gene That Predisposes to Retinoblastoma and Osteosarcoma," *Nature* 323(6089): 643-646; 16 October 1986; and Ei Matsunaga, "Hereditary Retinoblastoma: Host Resistance and Second Primary Tumors," *Journal of the National Cancer Institute* 65(1): 47-51; July 1980.
3. Although the genetics of the germ-line p53 gene mutation are more complex than the genetics of the germ-line mutation that causes retinoblastoma, p53 may turn out to be another important tumor suppressor gene to which the same comments apply. On the germ-line p53 mutation, see Frederick P. Li et al., "Recommendations on Predictive Testing for Germ Line p53 Mutations Among Cancer-Prone Individuals," *Journal of the National Cancer Institute* 84(15): 1156-1160; 5 August 1992; and Curtis C. Harris and Monica Hollstein, "Clinical Implications of the p53 Tumor-Suppressor Gene," *New England Journal of Medicine* 329(18): 1318-1327; 28 October 1993.
4. Eric T. Juengst, "Germ-Line Gene Therapy: Back to Basics," *Journal of Medicine and Philosophy* 16(6): 589-590; December 1991.

5. Burke K. Zimmerman, "Human Germ-Line Therapy: The Case for Its Development and Use," *Journal of Medicine and Philosophy* 16(6): 596-598; December 1991.
6. For a detailed discussion of and justification for germ-line intervention in this setting, see Marc Lappé, "Ethical Issues in Manipulating the Human Germ Line," *Journal of Medicine and Philosophy* 16(6): 621-639; December 1991.
7. As noted above, already in 1962 Joshua Lederberg was arguing against H. J. Muller's proposals for improving the human gene pool through programs of "voluntary germinal choice" by appealing to the prospect of rapid, global genetic intervention by means of germ-line gene therapy. See Joshua Lederberg, "Biological Future of Man," in Gordon Wolstenholme, ed., *Man and His Future* (London: J. & A. Churchill, 1963), pp. 265 and 269.
8. On the general issue of the freedom of scientific inquiry, see Loren R. Graham, "Concerns About Science and Attempts to Regulate Inquiry," *Daedalus* 107(2): 1-21; Spring 1978.
9. National Institutes of Health, Human Embryo Research Panel, *Report* (Bethesda, MD: NIH, 27 September 1994).

10. See, for example, the following critiques of human embryo research: "The Inhuman Use of Human Beings," *First Things* 49: 17-21; January 1995; Dianne N. Irving, "Testimony Before the NIH Human Embryo Research Panel," *Linacre Quarterly* 61(4): 82-89; November 1994; and Kevin O'Rourke, "Embryo Research: Ethical Issues," *Health Care Ethics USA* 2(4): 2-3; Fall 1994.
11. Alex Mauron and Jean-Marie Thévoz, "Germ-Line Engineering: A Few European Voices," *Journal of Medicine and Philosophy* 16(6): 654-655; December 1991.
12. There is a rather substantial literature on this topic. See, for example, Ruth Faden, Gail Geller, and Madison Powers, eds., *AIDS, Women and the Next Generation* (New York: Oxford University Press, 1991); LeRoy Walters, "Ethical Issues in Maternal Serum Alpha-Fetoprotein Testing and Screening: A Reappraisal," in Mark I. Evans et al., eds., *Fetal Diagnosis and Therapy: Science, Ethics and the Law* (Philadelphia: J.B. Lippincott, 1989), pp. 54-60; and Lori B. Andrews et al., eds., *Assessing Genetic Risks: Implications for Health and Social Policy: Report* (Washington, DC: National Academy Press, 1994).

What Does "Respect for Embryos" Mean in the Context of Stem Cell Research?

BONNIE STEINBOCK

Steinbock examines the question of whether embryonic stem-cell research is consistent with proper respect for embryos. She argues that early embryos have less than full moral status—they are not due the same respect that we give persons—but they still have a "significance and moral value that other bodily tissues do not have." We must not use embryos in frivolous ways, she says, but "respect for embryos does not require refraining from research likely to have significant benefits, such as treating disease and prolonging life."

Like abortion, embryo research polarizes those who believe that embryos have as much of a right to life as any born human being, and those who maintain that embryos are not the kinds of entities that can have rights, because rights are restricted either to persons or to sentient beings.¹ However, those who deny that embryos can be possessors of rights need not strip them of moral significance altogether. There is a "third alternative," which is that although

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human embryos do not have full moral status, or human moral status, they are a form of human life and, as such, deserving of respect. This is the view that virtually every commission considering the issue has taken, including the Human Embryo Research Panel of the National Institutes of Health (NIH)² and the Warnock Committee³ in Great Britain. But what does "respect for embryos" mean? Is this simply an empty phrase, solemnly invoked by national commissions to soften or conceal the fact that they are endorsing killing embryos?

This was charged by Daniel Callahan,⁴ who took the NIH Human Embryo Research Panel to task

for failing to demonstrate (as opposed to merely asserting) that progress in scientific research depends on using human embryos. Callahan's point is not that respect for embryos entails that they never be destroyed or used in research. Rather, it is that the interests or goals to be accomplished by using human embryos in research must be shown to be compelling, and unreachable by other means. If less than compelling purposes can justify the destruction of embryos, or if compelling goals could be reached without destroying embryos, the idea that embryos are due profound respect rings hollow.

A similar view regarding embryonic stem (ES) cell research was expressed by Richard M. Doerflinger.⁵ He cited advances in isolating and culturing adult stem (AS) cells and suggested that AS cells might be more clinically useful than embryonic cells because treatments based on a patient's own cells would avoid problems of tissue rejection⁶:

No one can say with certainty at this time whether embryonic stem cells will have any clinical use that cannot equally well be addressed by other means. . . . At a minimum, an ethic that demands serious respect for human embryonic life will also demand that other, morally accepted alternatives be explored first. (p. 144)

The suggestion that other alternatives should be explored first makes sense only if there is some reason to believe that these alternatives are likely to yield comparable results. As a nonscientist, I cannot evaluate the research cited by Doerflinger. A recent article in *Science*⁶ says, "Scientists are now speeding ahead with work on adult stem cells, hoping to discover whether their promise will rival that of embryonic stem (ES) cells." If that is so, it is possible that it will not be necessary to use ES cells for therapeutic purposes. At the same time, no one can accuse the National Bioethics Advisory Commission of simply assuming that there will be scientific benefits from embryonic stem cell research, or ignoring the possibility that AS could be used instead of ES cells. Its report, *Ethical Issues in Human Stem Cell Research*,⁷ examines at great length the scientific evidence, and the possibility that AS cells can replace embryonic cells. It concludes that

this is unlikely because ES cells have a property that AS cells do not: the ability to differentiate into all cell types. The report states⁷:

. . . although much promising research currently is being conducted with stem cells obtained from adult organisms, studies in animals suggest that this approach will be scientifically and technically limited. . . . Moreover, because important biological differences exist between embryonic and adult stem cells, this source of stem cells should not be considered an alternative to ES and EG [embryonic germ] cell research. (p. ii)

This raises the intriguing question of how promising evidence for the utility of AS cells must be to pursue that line of research while delaying research using ES cells, out of respect for embryos. Certainly, if current research indicated that significant medical benefit was just as likely from research using AS, as opposed to ES, cells, respect for embryos would require us to use AS cells. However, no one is making this claim. Although no one can say for sure, the likelihood is that stopping research using ES cells and exploring instead the therapeutic possibilities of AS cells will result in the loss of significant medical benefits for people. A better alternative would be to conduct both kinds of research simultaneously. In any event, Doerflinger's reference to doing research with AS cells appears to be a red herring because it is clear from what he says in his Abstract that he rejects absolutely stem cell research that involves the destruction of human embryos. If such research is never morally acceptable, why go on about doing other research "first"? Doerflinger's views about embryo research derive from the right-to-life position on the moral status of the human embryo. They are unrelated to the "third alternative" which accords respect, but not full moral status, to the human embryo.

What, then, does respect for embryos require? It is important, first, to differentiate respect for embryos from respect for persons. Respect for persons means, as Kant instructs us, never treating persons as mere means to our ends, but always treating them as ends in themselves. This obscure phrase means that we must take seriously the ends—the projects, the goals—that other people have (at least if they are morally

permissible ends). We cannot do this with embryos as they do not have ends of their own. Lacking the kinds of ends that persons have, embryos cannot be given the respect that is due to persons. Nevertheless, they have a significance and moral value that other bodily tissues do not have because they are "potent symbols of human life."⁸ In this respect, embryos are like dead bodies, which also do not have interests.⁹ Unlike dead bodies, embryos are potential human beings in the sense that, under certain conditions, embryos can develop into human persons. This potential gives them a significance and importance that does not belong to other cells of the body, and imposes restrictions on what it is permissible to do to embryos. We show respect for human embryos by not using them in unimportant or frivolous ways, say, to teach high school biology or to make cosmetics or jewelry. However, respect for embryos does not require refraining from research likely to have significant benefits, such as treating disease and prolonging life.

Embryonic stem cells can be derived from embryos remaining after infertility treatment (sometimes called "spare" embryos), or they can be derived from embryos made solely for research purposes using in vitro fertilization (IVF). Both involve the destruction of embryos. However, the NBAC report distinguished morally between the two. It recommended that an exception should be made to the present ban on federal funding of embryo research to permit funding of research using spare embryos, but it recommended that federal agencies should not fund research involving the derivation of human ES cells from embryos made solely for research purposes⁷:

The primary objection to creating embryos specifically for research is that there is a morally relevant difference between generating an embryo for the sole purpose of creating a child and producing an embryo with no such goal. Those who object to creating embryos for research often appeal to arguments about respecting human dignity by avoiding instrumental use of human embryos (i.e., using embryos merely as a means to some other goal does not treat them with appropriate respect or concern as a form of human life). (p. v)

Certainly, if one takes the right-to-life view of human embryos, it is morally wrong to create embryos and then destroy them, regardless of

the purpose. However, according to the right-life view, it is also wrong to create more embryos than will be transferred for implantation; that is, it is wrong to create spare embryos and also wrong to use them in research. Because NBAC does not reject using spare embryos in research, but only creating embryos for the purpose of research, the question is, what justifies this distinction? Here NBAC's argument⁷:

Embryos that are discarded following the completion of IVF treatment were presumably created by individuals who had the primary intention of implanting them for reproductive purposes. . . . By contrast, research embryos are created for use in research and, in the case of stem cell research, their destruction in the process of research. Hence, one motivation that encourages serious consideration of the "discarded-created" distinction is a concern about instrumentalization—treating the embryo as a mere object—a practice that may increasingly lead us to think of embryos generally as means to our ends rather than as ends in themselves. (p. 56)

The first part of this paragraph simply reiterates the difference between spare and created embryos; it does not explain why there is a moral difference between the two. The last part attempts to provide a justification for a moral difference, but it relies on the view I have argued is conceptually confused: namely, that embryos should be treated as ends in themselves.

If we reject the view that embryos are ends in themselves, what follows? In my view, it makes no moral difference whether one creates an embryo for reproductive purposes but ends up using it in research, or whether one creates an embryo for the explicit purpose of research. Respect for embryos is demonstrated by restricting their use to important ends. Research that promises to cure disease and save lives clearly qualifies.

The acceptability of this view depends, of course, on one's view of the moral status of the embryo. If embryos are people, there is a moral difference between creating embryos for reproductive purposes and creating them for research purposes. Creating embryos for birth benefits the embryo, whereas creating them for research purposes harms (kills) the

embryos to benefit others. But if you reject the idea that preimplantation embryos are the kinds of beings who can be benefited or harmed,¹ creating embryos for research purposes is just as acceptable as creating them for reproductive purposes. Both are valid; neither is frivolous. Therefore, neither contravenes the principle of respect for embryos as a form of human life.

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Declaration on the Production and the Scientific and Therapeutic Use of Human Embryonic Stem Cells

PONTIFICAL ACADEMY FOR LIFE

In this official position statement on embryonic stem cells, the Roman Catholic Church declares that it is morally impermissible to produce or use living human embryos to obtain embryonic stem (ES) cells, to produce and then destroy cloned human embryos to acquire ES cells, or to use ES cells that others have already derived.

Ethical Problems

... Given the nature of this article, the key ethical problems implied by these new technologies are presented briefly, with an indication of the responses which emerge from a careful consideration of the human subject from the moment of conception. It is this consideration which underlies the position affirmed and put forth by the Magisterium of the Church.

The *first ethical problem*, which is fundamental, can be formulated thus: *Is it morally licit to produce and/or use living human embryos for the preparation of ES cells?*

The answer is negative, for the following reasons:

1. On the basis of a complete biological analysis, the living human embryo is—from the moment of the union of the gametes—a *human*

subject with a well defined identity, which from that point begins its own *coordinated, continuous and gradual development*, such that at no later stage can it be considered as a simple mass of cells.

2. From this it follows that as a "*human individual*" it has the *right* to its own life; and therefore every intervention which is not in favour of the embryo is an act which violates that right. Moral theology has always taught that in the case of "*jus certum tertii*" the system of probabilism does not apply.
3. Therefore, the ablation of the inner cell mass (ICM) of the blastocyst, which critically and irremediably damages the human embryo, curtailing its development, is a *gravely immoral act* and consequently is *gravely illicit*.
4. *No end believed to be good*, such as the use of stem cells for the preparation of other differentiated cells to be used in what look to be

From Pontifical Academy for Life, Vatican City, August 25, 2000.

promising therapeutic procedures, *can justify an intervention of this kind*. A good end does not make right an action which in itself is wrong.

5. For Catholics, this position is explicitly confirmed by the Magisterium of the Church which, in the Encyclical *Evangelium Vitae*, with reference to the Instruction *Donum Vitae* of the Congregation for the Doctrine of the Faith, affirms: "The Church has always taught and continues to teach that the result of human procreation, from the first moment of its existence, must be guaranteed that unconditional respect which is morally due to the human being in his or her totality and unity in body and spirit: The human being is to be respected and treated as a person from the moment of conception; and therefore from that same moment his right as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life."

The *second ethical problem* can be formulated thus: *Is it morally licit to engage in so-called "therapeutic cloning" by producing cloned human embryos and then destroying them in order to produce ES cells?*

The answer is negative, for the following reason: Every type of therapeutic cloning, which implies producing human embryos and then destroying

them in order to obtain stem cells, is illicit; for there is present the ethical problem examined above, which can only be answered in the negative.

The *third ethical problem* can be formulated thus: *Is it morally licit to use ES cells, and the differentiated cells obtained from them, which are supplied by other researchers or are commercially obtainable?*

The answer is negative, since: prescinding from the participation—formal or otherwise—in the morally illicit intention of the principal agent, the case in question entails a proximate material cooperation in the production and manipulation of human embryos on the part of those producing or supplying them.

In conclusion, it is not hard to see the seriousness and gravity of the ethical problem posed by the desire to extend to the field of human research the production and/or use of human embryos, even from an humanitarian perspective.

The possibility, now confirmed, of using *adult stem cells* to attain the same goals as would be sought with embryonic stem cells—even if many further steps in both areas are necessary before clear and conclusive results are obtained—indicates that adult stem cells represent a more reasonable and human method for making correct and sound progress in this new field of research and in the therapeutic applications which it promises. These applications are undoubtedly a source of great hope for a significant number of suffering people.