Stem Cell Ethics: A Theological Brief

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Should our society support medical scientists engaged in research on human embryonic stem cells? Some say "yes." Others say, "no." Why?

In the theological brief that follows, we will first offer a concise reminder of the significance of stem cells and the science of their derivation. We will then turn to the ethical controversy. We propose that this controversy is dominated by three competing moral frameworks. (1) The *embryo protection* framework directs our attention toward the derivation of stem cells. (2) The *nature protection* framework directs our attention toward perceived threats to our humanity in the face of advancing biotechnology, so it seeks to protect human nature from scientists *playing God* and our society from slipping toward *Brave New World*. (3) The *medical benefits* framework focuses on the improvement of human health and well being that the science of regenerative medicine promises. Finally, we will suggest three foundational rules for guiding Christian thinking about the ethics of stem cell research, rules that can be shared across moral frameworks.

Moral frameworks are conceptual devices used to sort through and order the various ethical questions raised by stem cell research. Questions asked within one framework may not be answered, or even addressed, within another framework. Indeed, some questions may be specifically excluded. Like the public generally, Christians along with Jews and Muslims often operate within these moral frameworks without understanding fully their implications. The rhetoric flying back and forth in the public debate is often colorful, acrimonious, and mean spirited. Frequently it obfuscates, making it difficult to discern just what the central issues might be and what is really at stake. By understanding all three frameworks and their implications for ethics, thoughtful Christians along with Jewish and Muslim colleagues can sort through the politicized rhetoric and make clearer moral decisions.

The Promise and Science of Stem Cells

The human body is made up of millions of cells. The better part of these cells can be described as "highly differentiated." That is, they have different, highly specialized, functions. Neural cells, heart cells, and liver cells are examples of highly differentiated

cells. Each of these differentiated cells has a limited life span. During that span it is capable of dividing a certain number of times before it dies, that is, before it undergoes senescence. With each division, each differentiated cell produce two cells identical to it, two cells with the same specialized function.

Stem cells are unlike highly differentiated cells in three important respects. First, stem cells are less differentiated than other cells; their function is less highly specialized. Second, stem cells do not have such limited life spans; these cells are capable of prolonged self-renewal. Third, when stem cells divide, they not only reproduce themselves, but they produce "daughter cells" that are more highly specialized than they are. Stem cells are vital to the human body. These cells regenerate certain organ systems of the human body through the generation of new cells within those organ systems. For example, hematopoietic (i.e. blood) stem cells replenish our blood supply. When we donate blood, hematopoietic stem cells respond by accelerating the production of replacement blood cells. These are the cells from which others stem, so to speak. Healing and growth depend on these stem cells. All people have stem cells in their bodies which are native to specific organ systems. For quite some time scientists have investigated the role these stem cells play in regenerating the tissues of those systems. In the last decade, however, something new has happened. Scientists have been able to derive stem cells in the laboratory that are not specific to particular organ systems. These stem cells offer the promise of regenerating any tissue in the body.

In August of 1998, for the first time, scientists derived stem cells from a human zygote (a fertilized egg). Working *in vitro* ("in glass"), the scientists allowed the zygote to develop to the blastocyst stage—about five days. At this stage the zygote becomes a sphere of cells consisting of an outer layer of cells (the trophectoderm), hollow fluid filled cavity (the blastocoel) and a cluster of cells inside this cavity (the inner cell mass). Breaking open the trophectoderm, scientists were able to isolate the inner cell mass, and, placing those cells into a culture medium, cause them to proliferate. Scientists named these isolated cells human embryonic stem cells (or hES cells).

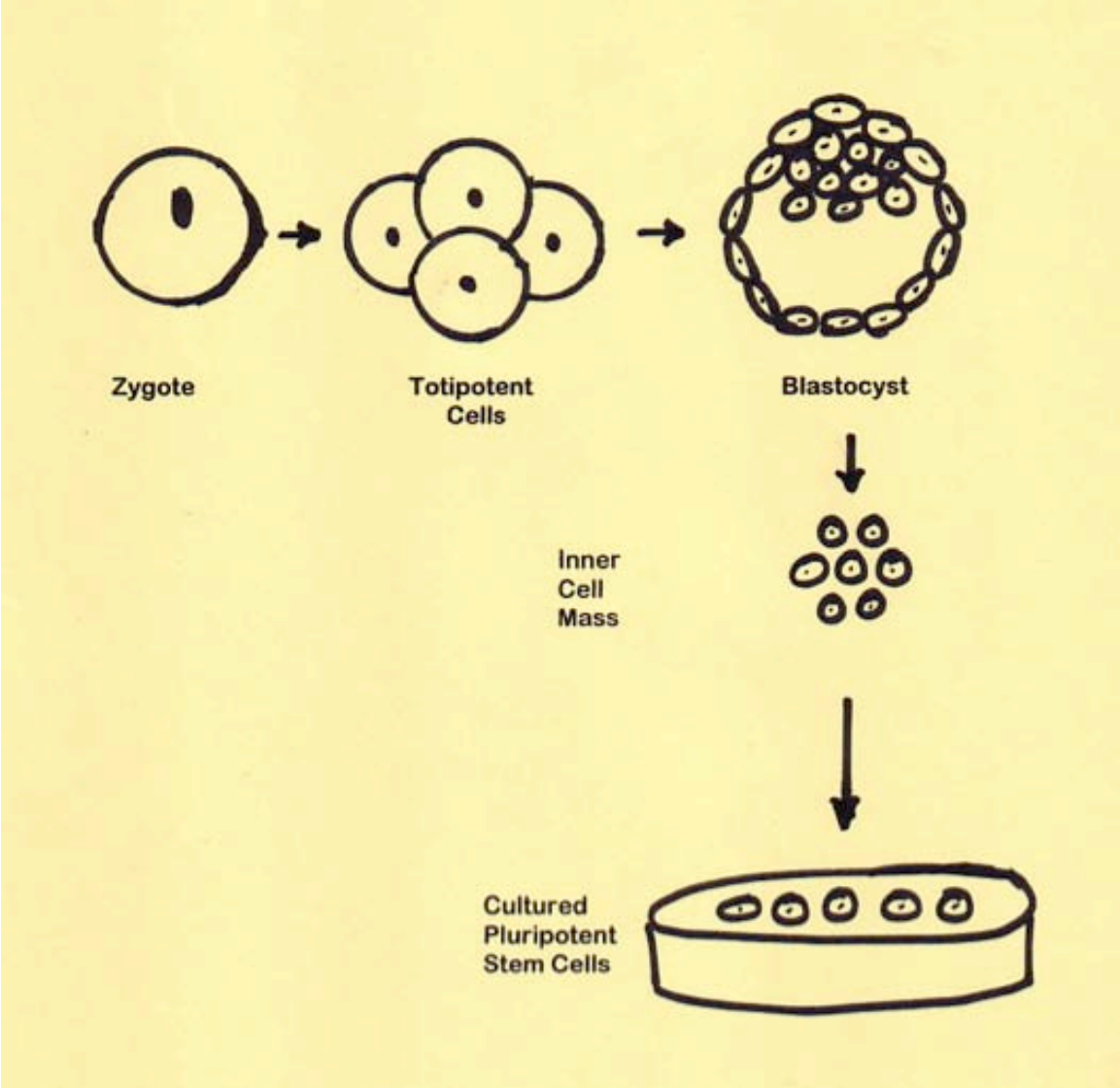
This naming has had some unfortunately consequences. The term "embryonic stem cells" can be misleading in at least two ways. First, by reifying the term embryo, it implies that there is such as thing as "an embryo." However, as a recent publication of the President's Council on Bioethics has pointed out, in a strictly technical sense, "there is no such *thing* as '*the* embryo,' if by this is meant a distinctive being (or *kind* of being) that deserves a common, reified name—like 'dog' or 'elephant.'"[1] From the Greek meaning "to grow," the term "embryo," used precisely, describes a stage of development—from fertilization until approximately the eighth week of gestation. Hence, properly speaking, in 1998 scientists derived stem cells from the zygote or the blastocyst, not the embryo. They might more properly have been called human blastocyst stem cells.

The term "embryonic stem cells" can be misleading for a second reason. The term "embryo" often evokes an image of an infant-formed creature in miniature, a creature

[1] The President's Council on Bioethics, *Monitoring Stem Cell Research: A Report of the President's Council on Bioethics* (Washington, D.C.: Government Printing Office, 2004), 12.

with a head, arms, legs, etc. In fact, at the blastocyst stage the cells of the zygote are virtually undifferentiated, consisting only two types of cells, the cells of the trophectoderm and the inner cell mass. That the blastocyst stage zygote does not yet "look like" a more developed human individual does not, in itself, constitute an salient ethical fact. An organism's form does not determine its moral status. However, precise concepts are vital to sound and fair ethical reasoning. When forming our ethical arguments we should strive to work with precise language, even though the phrase "human embryonic stem cells" is frequently unavoidable.

Having noted these difficulties with the term "embryo" and with it "embryonic stem cells" how should we proceed? These terms have become ubiquitous in the current discussion, as such, it is virtually impossible to avoid using them. However, when we do use them, we should be aware of their imprecision, remaining attentive to the value of using alternative terms.



Now, let us return to our discussion of the promise and science of human embryonic stem cells. Recall that stem cells found in the body are native to specific organ systems. They have the potential to regenerate the tissues of that organ system; they have the potential to generate multiple different daughter cells. Because of this characteristic, these cells are described as "multipotent." Recall also, that the stem cells found in the body can renew themselves for a prolonged period. It is thought that *in vivo*, or "in the body," these cells can renew themselves and produce daughter cells throughout the life of the organism.

Human embryonic stem cells differ from stem cells found in the body in two important ways.[2] First, whereas stem cells found in the body can self-renew throughout the life of the organism *in vivo* (the life-span of these cells is considerably shorter *in vitro*), hES cells appear to be capable of unlimited self-renewal in their pre-differentiated state without genetic deterioration. This characteristic is referred to in scientific literature as "immortality." Second, whereas stem cells found in the body are multipotent, hES cells are "pluripotent." They have the potential to produce all cell and tissue types in the human body. [3] Hence, unlike stem cells found in the body, which regenerate the tissues of specific organ systems, hES cells hold out the promise of being able to rejuvenate any and all tissues.[4]

If a scientist could guide stem cells to become specific tissues and develop means of transplanting these cells into the body, stem cell therapy would not merely stop deterioration of a part of our body due to disease or injury; it would regenerate tissue to levels of health and strength that represent our 'normal' expectations. Medical researchers hope to discover regenerative therapies for heart disease, liver disease, diabetes, spinal cord injury and paralysis, Parkinsons, Alzheimers; and in related research, nearly every type of cancer. The potential global impact of regenerative medicine is staggering.

Stem Cells and Cloning

The controversy over stem cells has been complicated by its entanglement with the controversy over cloning. This confusion engendered by this entanglement calls for clarification. The two controversies come together on the issue of immune rejection. If we were to coax hES cells to become differentiated neural cells, and if we were to implant those cells into a patient, that patient's immune system would likely put up a blockade and fight off an invasion of what, genetically speaking, are foreign cells. This

[2] The relative differences between hES cells and so-called "adult" stem cells will be discussed in detail below.

[3] There is some debate as to whether stem cells are not just 'pluripotent,' but 'totipotent,' that is, able to create an entire embryo.

[4] In September 1998 scientists at Johns Hopkins University made a second discovery. They isolated human primordial germ cells (hEG) from aborted fetuses at five to eight weeks. These cells are also pluripotent, though it appears that they may not be immortal. To date they hEG cells have not shown quite the promise of the hES cells; but further research is being pursued. Our ethical analysis in this article will not take up issues related to human embryonic germ cells.

problem of immune rejection, or 'histocompatibility,' represents a significant technical hurdle that scientists will need to clear if the promise of hES cell transplantation is to be realized. (Our experience with organ transplants demonstrates how serious a problem histocompatibility can be.) If, however, the stem cells could be made with the exact genetic code of the recipient, then the transplant-recipient's body would welcome the new cells as its own. The technology of cloning appears to offer the possibility to achieve just such a genetic match.

The process looks like this. The laboratory researcher would begin with a woman's egg, an oocyte, and remove the DNA nucleus. Then using the technique of somatic cell nuclear transfer (SCNT) developed in the Dolly experiments, a DNA nucleus taken from a skin cell or some other somatic cell in the future recipient's body would be rendered quiescent and then transferred to this enucleated oocyte. The egg would then possess a full complement of DNA, the very DNA of the future recipient. The egg would be activated, and at five days or so the stem cells would be harvested. They would be teased into becoming heart tissue or liver tissue or whatever is needed. They would be placed into the patient's body. The stem cells would then regenerate whatever organ welcomes them home. This technique is called "therapeutic cloning" and promises perhaps the best way to overcome the problem of immune rejection. It is generally distinguished from "reproductive" cloning, which would be the use of somatic cell nuclear transfer to generate a child.

The addition of therapeutic cloning to stem cell research, however, advances another set of ethical issues. Not only must the ethics of stem cells deal with the problem of *destruction* of a blastocyst, but it must also deal with the *deliberate creation* in the laboratory of a new "embryo" that is slated for destruction. Some people believe that the deliberate creation of an embryo with intent to destroy it is an even more serious ethical issue than the destruction of embryos that were already "slated for death" because they would not be implanted during the IVF process.

We turn now to the three moral frameworks that have structured—and, in our view limited—the public debate over stem cells.

Framework #1: Protecting the Early Embryo

The first moral framework we call the *embryo protection* framework. The most prominent issue in the public debate about stem cell research is the moral status of the embryo. People have asked: should an embryo be granted the same moral status as a human person? The embryo protection framework takes this as the principle moral concern; this concern functions as a moral frame for understanding and interpreting all of the stem cell debate.

This framing of the ethical question begins with the origin of stem cells. The destruction of the blastocyst takes center stage. Many who operate within this framework take the zygote as having a moral status equal to that of any other person. They argue that the destruction of the blastocyst is tantamount to taking a human life. Insofar as human embryonic stem cell research requires the destruction of a blastocyst, it is held to be morally illicit, regardless of the potential good it might offer.

On what grounds might we think the early embryo possesses a dignity that forbids scientists from harming it? The most sophisticated account is provided by Vatican Catholics. It ties together ensoulment, dignity, moral protection, and genetic novelty. This position, articulated already in the 1987 encyclical *Donum Vitae* provides the foundational moral logic for what would later become the official Roman Catholic position on the stem cell debate.[5] *Donum Vitae* argues that three elements are crucial to the creation of a morally defensible human individual: the father's sperm, the mother's egg, and a divinely implanted soul. *Donum Vitae* notes that at fertilization a novel genetic code—neither that of the mother nor that of the father—is created. *Donum Vitae* takes this genomic novelty to be evidence of the presence of a unique individual, and thus reasonably the moment of ensoulment. Ensoulment is the event which establishes a divine moral claim, so that the destruction of the blastocyst constitutes not only murder but an offense against God's creation. Alleged empirical evidence that the early embryo has this divinely ascribed status is the uniqueness of the person-to-be's unique genetic code. Once a unique genome has been established, then it is morally incumbent on us to protect it from harm.

The orienting bioethical principle of the embryo protection framework is "nonmaleficence"—that is, "do no harm." To take a life (the life of the developing zygote in this case) violates the do no harm principle. According to many working within this framework, our first ethical responsibility is to forestall stem cell research. Those who support stem cell research are accused of disrespect for the value of human life. Foremost

[5] Congregation for the Doctrine of the Faith, *Instruction on Respect for Human Life in its Origins and on the Dignity of Procreation (Donum Vitae)* (22 February 1987), Acta Apsotolicae Sedis 1988,80,70-102. See also: John Paul II, *Evangelium Vitae* (25 March 1995), Acta Apostolicae Sedis 1995, 87, 401-522.

among those who frame the debate in this way are Roman Catholic spokespersons and some outspoken Protestant American evangelicals.

When the issue is framed this way, those who support stem cell research must argue that an early embryo or blastocyst is not a 'human person' and that destroying it is not equivalent to murder. These arguments can be difficult to make. If the blastocyst is not yet fully a human person and therefore protectable, when does a developing zygote become protectable? The public debate has largely raged over this question; the embryo protection framework has set the terms of the debate. Because so much public attention is given to this framing, we sometimes fail to notice that voices speaking out of two other frameworks are trying to be heard.

Framework #2: Protecting Human Nature from *Brave New World*

This brings us to the second moral framework on our list, the *nature protection* framework. This framework responds to a perceived. threat to human nature posed by stem cell research and especially cloning; it is the threat that ours scientists will *play God* with the human genome and lead our society toward *Brave New* World. Those who operate within this framework concentrate their ethical attention on potential unforeseen negative consequences of stem cell research, consequences triggered by human limitation and human pride. Despite the good intentions that inform scientific pursuit, those who employ this framework perceive threats to nature, even our human nature, in the face of advancing biotechnology.

Two arguments cluster in this framework. Both arguments begin by imagining future negative consequences of research and work back to our present situation to assess whether or not contemporary science is on a trajectory toward those futures. The first argument is consequentialist: The use of our technologies is walking us down the path toward a "Brave New World." Those who advance this argument fear that if we do not stop proliferating new technologies, we will drift toward the *Brave New World* that novelist Aldous Huxley warned us against in the 1930s. Whatever our good intentions might be today, lurking in the future is a world that we will not be able to control. Hence, we should not take the first steps.

This is a version of the "slippery slope" or "camel's nose under the tent" argument: once we take a first step, such as developing stem cells, we will not be able to draw a line and prevent further technologies, and eventually we will do something immoral and regret the consequences of our actions. Some argue, for example, that the destruction of the developing zygote will coarsen our collective conscience, desensitizing society to the value of human life. This desensitization, in turn, will signal a fundamental violation of our own humanity.

For some, however, the immoral step is not eventual, but immediate. Here we find the second argument in this framework. This argument suggests that the use of stem cell technologies violates something essential about human nature. This is not simply a

question of consequences, but of not violating important natural and human boundaries. Some will argue, for example, that the fertilization of an egg outside the human body is "unnatural" and therefore wrong. Such technologies (e.g. cloning) are said to elicit within us a deep sense of repugnance; our moral judgment should be guided by this intuitive sense of repugnance.[6]

Both of these arguments claim that any manipulation of human genes—even to support better human health—risks violating something sacred lying deep within our nature. As such, these manipulations reflect human pride or *hubris*. A central ethical agenda is to prohibit our scientists from "playing God"—that is, to prevent our society from thinking that we can improve ourselves by genetic technologies. Instead, we should appreciate what nature has bequeathed us, including our limitations and our imperfections. This concern is forcefully articulated by the current chair of the President's Council on Bioethics, Leon Kass.[7]

Framework #3: Medical Benefits

This brings us to the third framework: the *medical benefits* framework. Few people doubt that hES cell research offers tremendous promise for medical advance. For many, this promise serves as the framing consideration within which all other concerns related to stem cell research must be considered. In contrast to the other two, this framework begins by developing a positive vision for the future and then works back to the present situation asking: in what way can biomedical science help us actively bring about that future?

Here the orienting bioethical principle is "beneficence," or "doing good." This principle holds that we are morally obligated to pursue the good. Stem cell research appears to be a way of doing good; human embryonic stem cells have the potential for regenerating human organs and other tissue, if not immediately at least in the future. Moreover, the promise of regenerative medicine is currently based upon a theory with considerable experimental corroboration; the promise of stem cell medicine is realistic. Relief of human suffering, the lengthening of lives with improved health, and overall advances in human flourishing are taken as compelling by those who advocate from this framework. These considerations are used to frame all other concerns.

The ancient Greek, Hypocrites, said, "benefit and do not harm." This is the first formulation of both beneficence and nonmaleficence. Those who advocate the medical benefits framework embrace both. However, they understand these two principles as standing in a particular relationship to one another. Beneficence takes precedence. Beneficence provides an orienting vision that calls us to actively engage in pursuit of human betterment. Of course this vision cannot be pursued by any means. Indeed, some means may come into conflict with the vision itself. Here the principle of nonmaleficence

[6] Leon R. Kass, "The Wisdom of Repugnance," in *Ethical Issues in Human Cloning*, ed. Michael C. Brannigan (NY: Seven Bridges Press, 2001) (first published in *New Republic*, June 1997)
[7] Leon R. Kass, *Life, Liberty and the Defense of Dignity* (San Francisco: Encounter Books, 2002)

can make such conflicts visible. In doing so it serves to focus attention back onto the positive ethical vision.

The Good Samaritan" by Vincent Van Gogh

This ordering of beneficence and nonmaleficence is exemplified by Jesus' parable of the Good Samaritan (Luke 10:29-37). The actions of the priest and Levite in Jesus' story were oriented by the principle of nonmaleficence: they did not do any additional harm to the already beaten and suffering man on the side of the road. They simply passed by on the other side. The actions of the Samaritan, by contrast, were oriented by beneficence: he pursued an opportunity to be of help. The Samaritan went out of his way to provide medical services and nurse the suffering man back to health. This tells us why so many Christian hospitals are named "Good Samaritan Hospital."

Christians who vigorously support stem cell research out of a medical benefits framework are sharply critical of those who would shut it down. The number of persons now living and yet to be born whose lives could be saved or improved by regenerative medicine number in the millions, perhaps hundreds of millions. Any delays in the progress of this research could be measured in the numbers of persons who will not benefit from stem cell research. As those who operate in the embryo protection framework call supporters of stem cell research to account for the moral status of the embryo, in a similar way those who operate within the medical benefits framework call

those oppose stem cell research to account for lives lost by not pursuing this research. For those who hold the medical benefits framework, to retard or prevent stem cell research from going forward, even on the basis of the ethical principle of nonmaleficence, risks "passing by on the other side." It risks failure to love one's neighbors.

Jewish and Muslim Frameworks

When Jewish ethicists approach issues arising from genetic research, they most frequently find themselves working from within the medical benefits framework. The Jewish commitment to *Tikkun Olam*—the responsibility to join God in repairing and transforming a broken world—provides theological support for scientific research in general, and medical research in particular. The Jewish interpretation of the Bible includes God's mandate to the human race to engage in healing, in making this world a better place. Jewish theology presumes that God's creation is not done yet. It's still on the way. We look to the future rather than the past to discern God's will. And God's will includes creative and redemptive activity yet to come. In short, healing and transforming are godly. The potential for medical benefits will play the decisive role in Jewish ethical thinking.

Jewish ethicist Eliot Dorf writes: "The potential of stem cell research for creating organs for transplantation and cures for diseases is, at least in theory, both awesome and hopeful. Indeed, in light of our divine mandate to seek to maintain life and health, one might even contend that from a Jewish perspective we have a *duty* to proceed with that research."[8]

If we ask questions from within the embryo protection framework, we note that the Jewish tradition does not date morally protectable personhood with conception, as does the Vatican. Rather, the question of personhood and ensoulment does not arise until quickening, thought to be at forty days. Because of this, Jewish ethicists seldom make claims from within the embryo protection framework.

When we turn to Islam, we find that in America Muslims fully support human embryonic stem cell research. They oppose human reproductive cloning. Still, the majority support stem cell research when discarded embryos are used; and nearly half support the creation of embryos for research purposes. We find in Islamic capitals around the world such as Cairo and Tehran scientific institutes springing up to pursue stem cell research.

Muslim ethicists are not likely to raise issues from within the embryo protection framework nor try to block deriving stem cells. Their situation is similar to that of the Jews. In some sections of the Qur'an we find quickening dated at 40 days after conception, elsewhere ensoulment at 120 days. In neither case would this produce an equivalent to the Roman Catholic commitment to ensoulment accompanied by dignity already at conception. The blastocyst is not considered a person; and the use of it for stem cell research does not violate Islamic law. The Islamic Institute in Washington strongly

[8] Elliott N. Dorff, "Stem Cell Research—A Jewish Perspective," *The Human Embryonic Stem Cell Debate*, edited by Suzanne Holland, Karen Lebacqz, and Laurie Zoloth (Cambridge: MIT Press, 2001) 92.

supports transferring excess embryos from freezers into laboratories. "It is a societal obligation to perform research on these extra embryos instead of discarding them."[9]

Now, we turn to a most interesting aspect of Islamic thinking. An additional argument is being raised within Islamic circles to support donation of extra fertilized ova in IVF clinics to stem cell research. Here is why. Inheritance is extremely important in cultures influenced by Islamic tradition. Inheritance is dependent upon blood lines; so genetics is an area of science put to use in determining just who is eligible to inherit family property. Clarity in this regard is paramount.

Muslims who take advantage of reproductive technologies such as IVF worry about the excess fertilized ova in frozen storage. Might a mistake occur? Might one or more of these frozen zygotes accidentally get planted in another woman? Might there be a possibility—even if remote—that one family's genes might appear in the genome of a stranger? Could that person eventually make a claim on inheritance?

Now, such a worry can be eliminated if all frozen embryos are eliminated. Muslim families frequently offer their excess embryos for laboratory use, because this guarantees that genes with potential inheritance claims will not get out. The result is that laboratories will find a source for research materials among Muslims.

More Ethical Questions

We have identified three moral frameworks within which the public policy positions are argued: embryo protection, unforeseen consequences, and medical benefits. In principle, one could argue for or against stem cell research from within any of these frameworks. For instance, although those who stress benefits will tend to support stem cell research, some have cautioned that the benefits are still theoretical and therefore should not count as strongly as others count them. Most who stress embryo protection will oppose stem cell research, but some have argued that even within a framework that finds the embryo 'fully human' from the very beginning, it is possible to argue for stem cell research.[10]

Those whose primary ethical concern is the violation of something 'essential' to human nature can also disagree about what that 'essential' quality is: is it preserving the link between biology and reproduction, or preserving the sense of service to others or of the common good? Christians who differ on these issues can take different stances on stem cells even within the same framework. However, it is true that in general in the current debate the strongest opposition comes from those operating out of the first two frameworks, and the strongest support from the third. It is important to note, however, that Christian voices can be heard in all three. Embryo protection is not the only "Christian" way of framing the issues at hand.

While they have not been given the same public attention, a number of additional ethical questions have arisen within the stem cell debate. First, there are justice questions.

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[9] http://www.islamicinstitute.org/i3-stemcell.pdf#search='Muslim%20Stem%20Cell'.

[10] This is position taken by Karen Lebacqz, one of the authors of this paper. See her essay listed in the sources below.

Because genetic research is very expensive and today's investors expect to reap tomorrow's profits, how will costs and expectations affect distribution of benefits? Will people living in the poorer nations of our world benefit? Or will only citizens of the wealthier nations gain in health and longevity? What might be done to make expensive genetic therapies universally available?

These justice questions lead to a second concern. What might be the impact of stem cell research on women? All stem cell and cloning research requires human eggs. Women have to supply them. Will the hyper ovulation necessary to obtain eggs in sufficient quantities threaten the health of the younger women who provide them? Should researchers pay women for eggs? Will such payment provide opportunities for poorer women to increase their income? Will we end up with a form of economic exploitation within the research industry? No accusations are being made here. Rather, ethicists need to pursue such justice questions.

Third, the public discussion to date seems to presume that the source of embryonic stem cells is spare or unused zygotes previously produced by *in vitro* fertilization in clinics. It has tended to ignore the creation of new embryos either through *ex vivo* fertilization or nuclear transfer (SCNT). Of the four original stem cell lines of 1998, three used spare IVF embryos; but one was freshly derived. What this means is that the ethical discussion must confront directly the question not only of destruction of "embryos" but also of their deliberate creation for research purposes.

What about Other Sources of Stem Cells?

Because of the prominence of the embryo protection voices, some have thought that all ethical issues would disappear if only we could avoid destroying the blastocyst. Some argue that "adult" stem cells, if fully researched, are likely to hold the same benefit as embryonic stem cells. "Adult stem cells" refer to multipotent stem cells such as those found in the blood stream. They can be derived from living persons or umbilical cords and would not involve destruction of an early embryo. Here again, we note that the term "adult" may be misleading, for the just-born infant is considered an "adult" for purposes of adult stem cell research.

Others argue that adult stem cells will not solve the ethical issues. Adult stem cells are already partially differentiated, already designated for a limited range of tissue types. They are not pluripotent. To date, no credible experiments on adult stem cells have demonstrated that their value to regenerative medicine is equal to that of embryonic stem cells. Some studies have suggested that adult stem cells from one tissue type can migrate to and integrate into other tissues. However, it has not been demonstrated that these stem cells actually become the new tissue type; that is, it has not been demonstrated that they function as a stem cell of this new tissue type—they do not produce daughter cells of that tissue type nor do they appear to regenerate that tissue. In order for transplanted stem cells to be valuable for regenerative medicine they need to be capable of three things: 1) they must lodge in the host tissue, 2) they must become that tissue type, and 3) they must

regenerate that tissue. As of this writing, only embryonic stem cells have demonstrated all three capabilities. Most scientists recommend that adult stem cell research continue, to be sure; but they recommend that embryonic stem cell research also be continued.

Because of this, several other proposals have been made. One suggests that stem cells might be derived from "organismically dead" embryos – those that were frozen following IVF and upon being thawed fail to divide. If they are declared organismically dead, then using them does not involve killing. Others have suggested that it may be possible to remove one or two cells from the inner cell mass in order to culture stem cells. Just as one or two cells are often removed from an IVF embryo in order to check for genetic disease, this process would not destroy the blastocyst. Still others have proposed that we might use science to create an organism that is genetically engineered so that it could not develop into a full-fledged human embryo or fetus. Or it might be possible to stimulate an egg into dividing without having fertilized it or used SCNT; thus, there is no "embryo" but only a dividing egg.[11]

Two things should be noted about these proposals. First, it should be noted that their development attests to the significance of the embryo protection framework. Each represents a way of trying to avoid the problem of killing the early blastocyst. Second it should be noted that each of these proposals raises new and difficult ethical issues. For instance, removal of one or two cells from the inner cell mass might put that blastocyst at risk for anomalies if brought to birth. For this reason, the President's Council rejects this option even though it avoids the ethical issue of killing an embryo.

Souls, Humans, and God

While we would urge strongly that concerns of justice and beneficence should be weighed as vigorously as concerns about protection of the blastocyst, we recognize that for many people of faith, the status of the developing embryo is a stumbling block. Many Christians would gladly support stem cell work if only they did not associate it with killing. Indeed, the effort to find ways "around" the destruction of the blastocyst suggests that this issue lurks in the minds of scientists, whether Christian or not. Many people, especially people of faith, believe that the zygote possesses a soul. As such they hold that at every stage it must be treated with dignity, as an end in itself, and not sacrificed for some further end, even the end of improved human health.

Official Roman Catholic moral theology exemplifies this belief.[12] This official theology holds that a human being must be respected as a person from "the first moment of conception." In 1974, Roman Catholic officials stated, "From the time that the ovum is fertilized, a new life is begun which is neither that of the father nor of the mother; it is rather the life of a new human being with his own growth."[13] These officials identify three factors that contribute to the constitution of each human being: the egg from the

[11] These proposals are discussed in a "white paper" of the President's Council on Bioethics published in May 2005 and entitled "Alternative Sources of Human Pluripotent Stem Cells."
[12] See, for instance, Vatican documents such as *Donum Vitae* (1987) and *Evangelium Vitae* (1995).
[13] From "Declaration on Procured Abortion," quoted in *Donum Vitae*, 5.I.1.

mother, the sperm from the father, and a newly created soul infused by God. The human person here is envisioned as a "unified totality," both corporeal and spiritual. Roman Catholic officials have noted that from fertilization it is clear that we have the first two factors—the sperm and the egg—but it is not clear whether or not we have the third factor, the God-given soul. To be sure, the presence of the soul is something that human investigation can ever detect. Hence, from the advent of in vitro fertilization, the official Roman Catholic position has relied on a better-safe-then-sorry argument. If we cannot know with certainty when it is that God imparts a soul to the developing zygote, and if we want to avoid all chance of destroying an ensouled human being, then from the "moment of conception" the developing zygote must be treated *as if* it were a full human person deserving of protection and respect.

In 1987 Roman Catholic officials added to this better-safe-than-sorry argument. Modern genetic science, these officials argued, appears to confirm the belief that the zygote ought to be treated as a human person from fertilization. At fertilization the mother's DNA combines with the father's DNA to establish a new genetic code, a code shared with no other human being. From the genetic point of view the zygote is taken to be unique, and thus individual. The officials ask: how can a human individual not be a human person? The zygote is taken to be a "personal presence"; a person with a right to life, a right that cannot be morally denied in medical research. For those who take such a position, it is understandable why the destruction of the blastocyst would be problematic, and why they would be opposed to stem cell research that uses current methods.

However, this argument has problems both scientifically and theologically. Theologically, we should point out that a position that specifically links the possession of a soul to the time of conception has not historically been the stance of the Roman Catholic church. St. Thomas Aquinas, for instance, argued that male embryos were 'ensouled' at about 40 days, while female embryos were not ensouled until about 80 days in the womb. If Thomas' views were accepted in the Church today, there would be no problem with use of the 4-day old blastocyst for scientific research! However, an even more important theological problem, in our view, is that this position, in both its historic form and its current form, sees 'ensoulment' as something that God instills into a person at a specific time of development. The soul is seen as a "substance" or "essence" that is infused by God. Our "soul," then, is something that inheres in us. Whether it is given at conception, or whether it is given or gained at some later time in development, the crucial idea is that it is something that we "have." Once we have it, we are fully human and should be protected and respected.

There is another theological possibility, however. Our "soul" may not be a statement about something that we possess or that inheres in us. It can be instead a statement about our relationship with God. Many passages in Scripture dramatically demonstrate the care and attention that God has for each one of us, calling us from nonbeing into being and finally into fellowship within the divine life. "The Lord called me before I was born," says Isaiah; "while I was in my mother's womb he named me" (Isaiah 49:1). Psalm 139:16 is a powerful statement of God's knowledge and love for us when we are not yet formed: "Thy eyes beheld my unformed substance; in thy book were

written, every one of them, the days that were formed for me, when as yet there were none of them." What gives the prophet, the psalmist, and the rest of us dignity is God's call, God's knowing us and naming us as God's own. Soul is not a matter of a private, spiritual substance that we possess or that inheres in us or that is added by God to a unique genome. What is decisive is our relationship to God, an eternal relationship God established even before we are formed by calling us toward the divine. However it is imagined, "soul" describes the way in which our life overlaps with God's life and that we enjoy a spiritual and eternal relationship with God. In this understanding, we might be 'called' by God in many ways and for many purposes. Birth need not be the only purpose of our being 'formed.'

Scientifically, there are also problems with the view that a zygote is a person and therefore should be protected from the moment of conception. First, there is no "moment of conception." Conception is a process, not an instant. When, exactly, in that process should protectable status be declared? Further, the development of a zygote into an infant goes through many stages. If we respect and protect people differently at different stages of life (for instance, we do not require that children give informed consent for medical treatment, though we do require this for adults), then what kinds of respect and protection are appropriate at these many stages of development in the womb or *in vitro?*

It is true that conception creates a new entity with a new genome. But it does not create either an individual person or genetic uniqueness. What happens *in vivo*, naturally within the mother's body, is this: The zygote can divide into two, four, eight, or more individuals, all with the same genetic code. Identical twins or triplets are one possible result of such a division. Two or three children result who have the same genome. In addition, two eggs can be fertilized after one event of sexual intercourse; and these two zygotes can combine to form a baby with two genetic codes (technically known as a *chimera*). In fact, some scientists believe that chimerism is very common.

In short, within the first dozen to fourteen days after conception, the early embryo can divide and recombine in various ways. There is no established individual human being until approximately the fourteenth day after conception when the embryo becomes implanted in the uterine wall, a primitive streak appears, and we can identify a single individual who will become a baby if all goes well. If having a 'soul' or being a unique human being is a criterion for protection, then that protection would not come into play until about 14 days after conception. The crucial structures that develop at around 14 days help to explain why an informal but widely accepted practice has been adopted by scientists: called the "14 day rule," it specifies that no embryos are kept developing *in vitro* beyond 14 days. Ironically, although St. Thomas probably had his science quite wrong when he assigned 40 and 80 days to the developing male and female embryos, he may have understood something important about the need for a delay before assigning 'ensoulment' to an embryo.

For both theological and scientific reasons, therefore, we find problematic the stance that assigns absolute value to the zygote and opposes the destruction of the blastocyst in stem cell research. However, we know that Christians of good will may

disagree with us. We therefore turn to suggesting some principles that we believe all Christians might affirm.

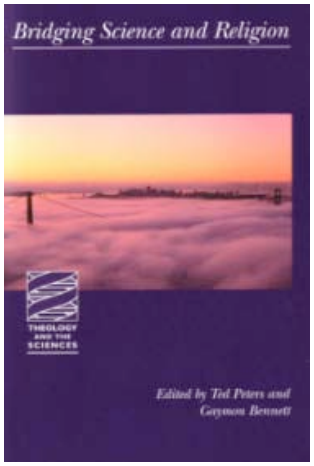
What Should We Do?

How should the worldwide Christian community think about the human embryonic stem cell controversy? We recommend thoughtful Christians abide by three rules. First, *trust the truth*. To acknowledge Jesus Christ as the "way, the truth, and the life" (John 14:6) is to acknowledge that our faith is rooted in truth, that no genuine truth can take us away from God. Theological truth should work in concert with scientific truth. As we understand the science of human development better, our theological views must encompass that truth.

Second, *steward our talents* (Matthew 25:14-30). In our own era, we count as talents the fact that our society is poised on the brink of breakthroughs in science and medicine that could dramatically enhance human health and wellbeing. Christian input to public policy is a matter of stewardship. It is important for all Christian voices to be heard, including and especially those from the "beneficence" perspective that have been overridden by the "embryo protection" voices.

Third, *strive for human betterment*. The biblical commandment to love God and neighbor (Matthew 23:36-40) applies to us both directly and indirectly. Indirectly, thoughtful Christians support thrusts in the wider society toward increased levels of justice, peace, caring, and human flourishing. Directly, we believe that Christians can, with good conscience, support scientists engaged in stem cell research.

This means we should pause, open our ears, and through the din of the shrill public debate listen carefully for coherent moral positions to be set forth. Thoughtful Christians should examine the three moral framework: the embryo protection framework, the naturalist or anti-playing God framework, and the medical benefits framework. Are they internally coherent? Are they supported by truth? By theology? Can common ground be found among them? We recommend weighing judiciously what is being said in every argument; then make a commitment, and then leap into the public fray. Such a commitment will be the result of careful judgment, not an unequivocally clear demand by God. The purpose of the field of ethics is to help people by providing a way through an otherwise messy situation. Thoughtful Christians have an opportunity and a responsibility to offer carefully considered judgments and suggested paths for the wider society to follow.



Further Reading

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