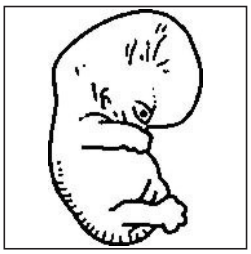


Embryonic Stem Cells and a Reformed Christian World View: A Response to Robert Boomsma

Adrian Teo and Donald Calbreath

Adrian Teo

The use of embryonic stem cells for medical research raises difficult ethical questions for many Christians. Robert Boomsma's article in the March 2004 issue of PSCF *presents one popular perspective for justifying its use. This paper is a critical response to that view and attempts to show that there are sound reasons for opposition to embryonic stem cell research. The arguments presented are shown to be consistent with the Reformed Christian world view which recognizes the significant worth of the human being because of God's will. Human beings are to be respected and protected in their life and dignity at all stages in their development from conception to natural death for the reason that we are predestined by God for his purposes and also are created in his image. To allow such research that requires the destruction of human embryos, however noble the purpose may be, is to treat the human person as merely a means to serve ends unrelated to the well-being of the embryos in question. We argue that such actions would be disrespectful, which in essence, constitute a direct attack on human worth and dignity and therefore, on God's image and will.*

The controversy over the appropriate and moral use of human embryonic stem cells (hES) is of particular concern among Christians, primarily because Christians remain divided on the question of the beginning of human life and its corresponding worth. Robert Boomsma's article in the March 2004 issue of *PSCF*[1] makes the claim that, from a Reformed Christian perspective, the issue is one of "alleviating disease" in order to assist in the redemption of the "brokenness of creation."[2] The proper application of hES technology is, according to Boomsma, a way of fulfilling the "stewardship responsibilities of developing, caring for, and helping redeem the creation."[3]

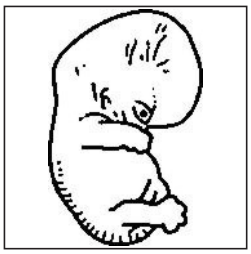
In this paper, we will show that there is an alternative and opposing perspective that places the moral status of the embryo as the prime issue and the value of human life in God's plan as foundational. Furthermore, it is a perspective that is just as firmly rooted in the Reformed tradition which insists upon the lordship of God before all other considerations, including our call to be stewards of creation and transformers of culture.

The Purpose of Human Life

The idea that all human life is valuable is rooted in what has been described by the late renowned theologian John Leith as "a special mark of Reformed theology"—predestination.[4] The doctrine of predestination, among other things, proclaims that human life, and therefore human personhood, is rooted "in the will and intention of God."[5] While it is beyond the scope of this paper to engage in an in-depth examination of this

[We offer] a perspective that is … rooted in the Reformed tradition which insists upon the lordship of God before all other considerations …

Adrian Teo *is associate professor of psychology at Whitworth College. He earned a joint doctorate in child psychology and school psychology at the Institute of Child Development, University of Minnesota, where he also served as a graduate assistant in the 28-year Minnesota longitudinal study of parents and children. He is a past winner of the Templeton Science and Religion Course competition, based on a course on the integration of Psychology and Christianity that he regularly teaches. His interests include academic achievement and antisocial behaviors in children, evolutionary psychology, theological anthropology, moral theology, and the interaction between science/psychology and Christianity. His homeland is Singapore in Southeast Asia. He can be contacted by email: ateo@whitworth.edu.*



Article

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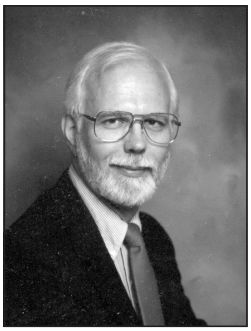
While few Christians would argue against the great value of human life in God's eyes, many, however, are uncertain about whether valuable human life extends into the womb.



Donald Calbreath

complex doctrine, it is worth noting that a belief in predestination implies an acceptance of the truth that our origin and destiny is from God, and therefore, from God we derive our purposes and absolute value. The value of every human being, then, is there only because God sees every human being as valuable and designed for his purposes.

Human value is further affirmed by the revelation that we are created in the image and likeness of God.[6] This means that human life is set apart from the rest of creation[7] by God for his purposes and *not* ours. The image of God also endows a certain value on the creature that prohibits the deliberate and unjust destruction of its life, as affirmed in the commandment against murder.[8] To directly will and act in violence toward human life constitutes, in essence, an attack on the image of God, and on his purpose and will.

The Beginning of Human Life

While few Christians would argue against the great value of human life in God's eyes, many, however, are uncertain about whether valuable human life extends into the womb. Historically, there is evidence that Christians since the late first or early second centuries already recognized the significant worth of the unborn, as can be found in early documents such as the Epistle of Barnabas[9] and the *Didache*, a first-century manuscript that conveys the teaching of the early Church: "Thou shalt not slay the child by procuring abortion, nor, again, shalt thou destroy it after it is born."[10] By the seventh century, this recognition of the unborn as a human person was of such significance that the killing of the unborn was condemned by the Quinisext Council at Constantinople.[11]

At the time of the Reformation, this view of the unborn was again affirmed by John Calvin, who, in keeping with the deep-rooted biblical belief in sanctity of human life, commented:

> … the unborn, though enclosed in the womb of his mother, is already a human being, and it is an almost monstrous crime to rob it of life which it has not yet begun to enjoy. If it seems more horrible to kill a man in his own house than in a field, because a man's house is his most secure place of refuge, it ought surely to be deemed more atrocious to destroy the unborn in the womb before it has come to light.[12]

In our modern era, the great twentieth century theologian, Karl Barth, went on record to declare that:

> The unborn child is from the very first a child … it is a man and not a thing, not a mere part of the mother's body … Those who live by mercy will always be disposed to practice mercy, especially to a human being which is so dependent on the mercy of others as the unborn child.[13]

Given that the identification of the unborn with the human being appears to be a common understanding among Christians historically, is there also reason to believe that all unborn, at any stage in prenatal development, should be accorded the same respect as human persons who have been born?

In his article, Boomsma raised the question of whether embryos, because they are early entities in prenatal development, are in fact human persons and hence should be respected as such, or are they different from "fully developed humans."[14] The answer to this question, according to Boomsma, depends upon knowing the precise point of the beginning of human life. Boomsma then proceeded to argue that fertilization is itself a process, thereby implying that there is no precise point at which one can determine the moment at which life begins. This argument essentially builds upon that of Ronald Green, Chair of the Religion Department and Director of the Ethics Institute at Dartmouth College, who had served as a member of the National Institutes of Health's Human Embryo Research Panel in 1994. In his book, *The Human Embryo*

Donald F. Calbreath *is currently an associate professor of chemistry at Whitworth College (Spokane, WA) where he has taught for twenty-two years. Prior to that time, he directed a clinical chemistry laboratory for Durham County General Hospital in Durham, NC, and taught laboratory medicine as an adjunct faculty member in the Duke University Medical School program for physicians assistants. He has had a long-standing interest in biochemical aspects of mental illness and the relationship between biochemistry and behavior. Other recent work includes a collaborative project on autism with a faculty member from the School of Education, a presentation on neuroscience and the law at a national ASA meeting and a developing project in medical ethics from an evangelical perspective. In his spare time, Calbreath is a devotee of traditional Southern music and (along with his wife Sandy) enjoys spoiling his four grandchildren. He can be contacted by email at dcalbreath@whitworth.edu.*

Research Debates: Bioethics in the Vortex of Controversy, Green persuasively argued that biological events, including conception, are better described as continuous processes rather than point-in-time occurrences.[15]

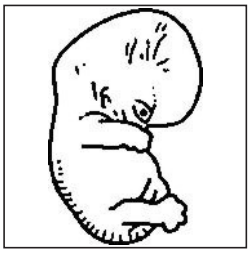
The argument about fertilization as a process, however, does not in any way prove that the embryo that comes into being at the *completion* of fertilization[16] is not a human life because the precise moment during the process of fertilization which marks the beginning of life is *irrelevant* to the central question of the moral status of human embryos used in research. It is also important to note that hES cells are harvested well after the process of fertilization is complete. Citing Josefson, Boomsma wrote: "Embryonic stem (ES) cells typically originate from blastocyst stage embryos that are formed approximately six days after fertilization in the human."[17] Thus, regardless of the observation that fertilization is a process and regardless of one's reasoned conclusion about the precise point in fertilization at which human life begins, the blastocyst embryo is not in the process of fertilization, but is rather in the subsequent process of cell division. Therefore, the fertilization-as-process argument fails to resolve the issue of the moral status of the embryo.

Every living human embryo is a full member of the species Homo sapiens *by virtue of its heritage and genetic constitution.... a "zygote" possesses a genome that on the one hand distinguishes it from the parents, but on the other hand identifies it as a member of the same species as the parents.*

If the precondition for human personhood is human life, then the initial question has to do with whether the embryo is a human life or not. The way to resolve this question is to first recognize that every living human embryo is a full member of the species *Homo sapiens* by virtue of its heritage and genetic constitution. Upon the completion of the process of fertilization,[18] what is now referred to as a "zygote" possesses a genome that on the one hand distinguishes it from the parents, but on the other hand identifies it as a member of the same species as the parents. Therefore, a living human embryo is a human life. It is a genetically-distinct organism, separate but dependent upon the mother, and fully capable of internally-directed growth and active self-integration. The point of the embryo being capable of internally-directed growth and active self-integration is necessary to distinguish it from other organized groups and types of human cells that may also share the same heritage and genetic constitution, but are not distinct organisms in their own rights.

Boomsma, however, argued that genetic composition alone cannot define personhood, citing as support the phenomenon of twinning that can occur up to fourteen days after fertilization.[19] While it is true that genetic makeup cannot fully describe what a person is, however, given that it sufficiently indicates the presence of a human life, we argue that therefore it also sufficiently reveals the presence of at least one human person. Does the phenomenon of early twinning "clearly argue against the genetic view"[20] as Boomsma claims? No, it does not. Just because cells can be detached from an embryo to become a monozygotic twin may or may not mean that there was more than one individual to begin with. There is no way of knowing for sure but there is in fact no need to resolve this question because the relevant issue is not about the genetic uniqueness of individuals, but rather the heritage and genetic commonality across all human individuals (i.e., *all* humans share the heritage and genetic code that sufficiently identifies them as members of the human species). We agree that genetic uniqueness alone cannot *fully* define the person, but the genetic constitution of the organism is a sufficient indicator of the status of the individual in question. In other words, it is not necessary to know whether an individual in question has a unique genetic constitution in order to decide if he or she is a human being, because all that is required is to know whether the individual[21] has the genome of *Homo sapiens*, regardless of the fact that he or she may share the same genetic makeup with a twin.

It is important to note that others, such as Green, have argued that there is really no single criterion to determine the moral status of the embryo, and instead, we (as individuals and as a society) choose the point at which the embryo becomes worthy of moral respect through a process of weighing multiple considerations.[22] Among the considerations included in this deliberation process, there is little doubt that one of the highest priorities for many people would be the potential benefits of a successful hES research program. We are thus led down a path in which the likely destination is a capitulation to utilitarian reasoning where the ends of research outweigh the morally-questionable means of embryonic destruction. Such is this pragmatic approach that places much confidence in the reliability of fallen human judgment and perhaps, even more so, in the nobility and transparency of fallen human motivation.



There is precedence within the Reformed Christian tradition to assume that human life begins at conception [or to state it more precisely, human life begins immediately after the completion of the fertilization process] and therefore, the embryo is also to be regarded as a human life.

In describing the theology of the Reformed tradition, Leith wrote: "No human life is ever the simple result of the forces of biology or history. Every human has its first source in God's intention."[23] If, in fact, as we have argued, the embryo is a human life that began at the completion of the fertilization process, then we would recognize that every embryo is created by God for his own purposes.

Reformed Christians have traditionally embraced the assumption that human life, uniquely created for God's own purposes, is valuable and is to be protected from undue violence from the point of conception. This is evident in official statements adopted by a number of churches within the Reformed tradition. One example comes from the 1972 Synod of the Christian Reformed Church, which condemned "the wanton or arbitrary destruction of any human being at any stage of its development from the point of conception to the point of death."[24]

Another noteworthy example is found in the Constitution of the Reformed Presbyterian Church of North America which declares:

> Unborn children are living creatures in the image of God. From the moment of conception to birth, they are objects of God's providence as they are being prepared by Him for the responsibilities and privileges of postnatal life. Unborn children are to be treated as human persons in all decisions and actions involving them. Deliberately induced abortion, except possibly to save the mother's life, is murder.[25]

Similarly, the Associate Reformed Presbyterian Church published the following statement in 1981:

> We believe that the Scriptures clearly and plainly testifies to the infinite worth of human life by virtue of man having been created in the image and likeness of God, and that decisions about life and death are God's prerogatives and not man's, and that even in the case of rare exceptions such as judgments by medical personnel about highly technical medical problems, human judgement should always stand in submission to the divine judgement and wisdom of God.
>
> We also believe the Scriptures point up a unique relationship between God the Creator and the unborn child. And, therefore, regarding the divine mysteries of the conception and development of human life, we dare make no other inference than the conclusion that it is not for men basically to be the determiners of life and death, even for the unborn child. Therefore, in all instances, one should seek to preserve the life of the unborn child.[26]

The independent, nonprofit corporation Presbyterians Pro-Life, which consists of members and pastors of the Presbyterian Church (USA), has also called for "the protection of innocent human beings—all of them made in the image of God—from conception to natural death."[27] Furthermore, in their statement supporting President Bush's decision on restricting the federal funding of hES research, the group unambiguously declared: "Each one of us began our lives as a fertilized ovum."[28]

It seems that the common, but implicit basis for each of these *declarations* is that human life begins at the point of conception or, to state it more precisely, human life begins immediately after the completion of the fertilization process. These quotations serve to demonstrate that there is precedence within the Reformed Christian tradition to assume that human life begins at conception and therefore, the embryo is also to be regarded as a human life.

Human Life and Human Personhood

The next significant question to address is whether and when a human life is also a human person who is endowed with the full privileges and rights of personhood? For Boomsma, the "gradualist" approach is preferred. Human personhood does not emerge at any one point, but rather, develops over time, attaining greater and greater ability to fulfill the role of imaging God.[29] From this premise, it is reasoned that there is a meaningful distinction between those entities that are "potential persons" and those that are "persons with potential." Embryos, being unable to exercise the stewardship responsibilities requiring some level of "capacity, task, and relationship inherent in the image of God" are therefore not complete persons.

Before examining the major problems with this line of reasoning, it should be noted that this gradualist interpretation serves one primary purpose: to justify the destruction of embryos by somehow defining them as less-than-complete persons. It is reasoned that the end of medical research (and the potential benefits it brings) does in fact justify the means of defining embryos as entities different from the rest of us. What we have here is yet another attempt to create a separate class of human beings: the human sub-person or partial-person. This unfortunate entity is one who does not yet possess the full rights and privileges of full personhood and therefore whose life can be legitimately denied and deliberately destroyed to serve the interest of other complete persons. In fact, the very reason for the creation of such a class of human beings is to legitimize their destruction for use in research.

The main problem with the gradualist approach is that it basically adopts a functionalist view of personhood. The individual is a person only to the extent that he or she is able to accomplish a list of functions …

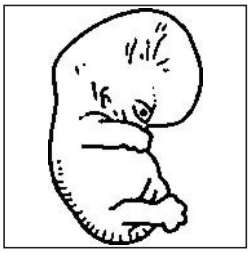
This line of reasoning, however, carries with it a very dangerous implication. If the basis for defining personhood status depends on the benefits attainable for the service of others (whether in medical research or to serve some other valuable ends) rather than on a totally independent criterion, then there is no longer any objective and absolute grounding for human rights and dignity. We can always redefine personhood and create new classes of beings to suit our purposes, as long as they are deemed to have some utility. Such a view is clearly utilitarian and inconsistent with the biblical truth about the nature of humans as made in the image and likeness of God, and whose identity rests absolutely upon God's will and design.

The main problem with the gradualist approach is that it basically adopts a functionalist view of personhood. The individual is a person only to the extent that he or she is able to accomplish a list of functions, which are gradually attained over the course of development. In this case, it is the ability to play the role of stewards of creation. The book of Genesis does describe this mandate given to humans,[30] but it is important to notice that the ability to fulfill a biblical mandate does not form the basis of human worth. Human worth (and dignity) is firmly rooted in the fact that God created humans for his own purposes[31] and in his image and likeness, as we have shown. There are, in fact, many people who are unable to exercise stewardship due to age, congenital defects, disease, and accidents. No reasonable person would argue that these are incomplete persons with limited rights to life that may be justifiably forfeited if their body parts could be used to serve the interests of others. The functionalist view of personhood effectively destroys the very foundation for the defense of basic human rights (i.e., the right to life) upon which all other rights are based. Furthermore, the functionalist perspective does not tell us at what stage a human life becomes fully persons. For example, how would one decide on what additional rights and privileges fetuses, or neonates, or toddlers are entitled to that embryos are not? At which point do they become possessors of the same privileges and rights that you and I enjoy?

It is also important to note that the biblical basis for a gradualist understanding of personhood is weak, especially when the relevant passages are read in context. Instead, there is perhaps a stronger suggestion in Scripture of an assumption of personal continuity linking the present individual to the time when he was in the womb. For example, in Jer. 1:5, God revealed that he knew Jeremiah even before he was formed in the womb and that he set the prophet aside for his purpose even before he was born.[32] Although it is true that the primary message in this verse is the certainty of the plan and wisdom of God,[33] nevertheless, what is stated is that the very person of Jeremiah himself was formed, known, and chosen by God prior to his birth, for the purpose of God.

In Boomsma's article, he recalled Ps. 139:13–16 to show that the Bible fails to confirm that personhood begins at fertilization. What he failed to notice is that, in these verses, David showed that he viewed himself to be the same person at the time of writing as when *he* was knitted together in his mother's womb.[34] Theologian James Peterson, whom Boomsma cited,[35] has argued that this verse primarily conveys the intimate involvement of God in the psalmist's life prior to birth and in no way does it indicate the point at which the thing in the womb becomes the psalmist.[36]

In contrast, the report of the committee to study the matter of abortion of the 38th General Assembly of the Orthodox Presbyterian Church specifically chose this verse to support the argument of personal continuity.[37] It is significant to note that Peterson's point was that the verse does not clearly indicate a precise point in time for the beginning of personhood, which we agree, but he did not consider that the underlying assumption of the biblical writer was his own personal continuity. In Ps. 51:5, we see once again that personal continuity is assumed as David



repented of his sinfulness: "Surely I was sinful at birth, sinful from the time my mother conceived me."[38] What came into existence at conception was the same sinful baby at birth and the same David who sinned in adulthood. There may not be any clear teaching in Scripture of the precise moment at which personhood begins, but neither is there any suggestion of a gradual development from potentiality to actuality of personhood in Scripture. Instead, what we see taken for granted in these Scripture passages is the continuity of the person from conception to life after birth.

So at what point does human personhood begin? To resolve this question we must first recognize that every living human embryo is a full member of the species *Homo sapiens* by virtue of its heritage and genetic constitution. There are no partial members in this discrete category. One either is or is not a member of the species *Homo sapiens*. In parallel, the metaphysical and moral status of the embryo is also discrete. It either is or is not a human person. The determination of its status is based on a historical and biblically-rooted view of human personhood as a substantial unity of body and soul[39] in contrast to the radical dualism of Gnosticism and Manichaeism that the early church fathers vehemently opposed.

Given the substantial unity of body and soul, it is therefore reasonable to conclude that where there is a living human body, there is a human person. Conversely, there is no such entity as a living human body that is not also a human person.

In this view of personhood, the body is not merely a vehicle with instrumental value, extrinsically related to the person residing inside, but rather is an intrinsic and irreducible part of the personal reality of the individual. In Scripture, the apostle Paul called the body a member of Christ[40] and the temple of the Holy Spirit,[41] thereby highlighting, not only its dignity and worth, but also its personal quality. Given the substantial unity of body and soul, it is therefore reasonable to conclude that where there is a living human body, there is a human person. Conversely, there is no such entity as a living human body that is not also a human person.

It has already been shown earlier that the embryo is a human life (which, of course, entails a human body) by virtue of its heritage and genetic constitution. Hence, the reasonable conclusion is that the embryo is also a human person. The same is also true of the zygote and the fetus. While none of these entities in the prenatal stages of human development look or act like any adult human being, nevertheless, they look and act exactly the way they should at the particular stages of their development. We can also recognize that the embryo possesses both potentiality and actuality, but it is important to remember that potentiality is always in reference to that which is in a state of actuality, because potentiality cannot exist without actuality. The embryo's potential is not to develop into a human person but to mature and grow as the kind of being he or she already is (actuality)—a human person. In the simple, and yet profound words of Robert George, McCormick Professor of Jurisprudence at Princeton University:

> The being that is now you or I is the same being that was once an adolescent, and before that a toddler, and before that an infant, and before that a fetus, and before that an embryo. To have destroyed the being that is you or me at any of these stages would have been to destroy you or me.[42]

Respect for Human Embryos

As we have already noted, the functionalist approach to determining personhood is fundamentally flawed and dangerous. To Boomsma's credit, he proposed that the potential person, i.e., the embryo, should be treated with respect. He argues that to respect the embryos is to not treat them "cavalierly," but to speak of and handle them respectfully in the lab, and "minimizing harm wherever possible."[43] However, this requirement of respect is wholly inconsistent with the instrumental use of the embryos and the unavoidable destruction of their lives. In what way is the destruction of the embryos for the purpose of harvesting their stem cells a minimization of harm? This seems to us to be manifestly disrespectful according to the expectations set forth by Boomsma himself. A proper respect for a human being requires that we refrain from treating the individual as an instrument for some external purpose, regardless of the nobility of the purpose. We are reminded of the words of Boomsma, that humans must be treated as "ends in themselves and not as means to an end."[44]

Boomsma's main concern with protecting the ongoing research on hES cells is the tremendous promise it holds for healing a large

variety of diseases. Certainly this concern is a legitimate one, particularly for Christians in the medical professions who see their work as part of the healing ministry of Christ, who is the consummate healer. In this regard, Boomsma asked the question: "Are embryos human persons from the point of fertilization or is there some other way to look at embryos that would allow their being treated differently from fully developed humans?"[45] In other words, what is suggested is that if we can find an alternative to the conception-as-beginning idea, then it would remove the major moral concern and obstacle to the highly promising research on hES cells. On the contrary, the true moral status of embryos remains as it is, regardless of how any number of people may choose to see or define it otherwise.

Because he mistakenly regarded embryos as only potential *image bearers, Boomsma was led to the conclusion that in a fallen, imperfect world certain relatively minor wrongdoings may be acceptable in order to bring about a greater good.*

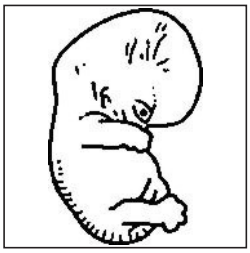
The proper question is not whether we can somehow, through the use of mental and linguistical gymnastics, define the embryo out of full human personhood, but whether the *true* moral status of the embryo is that of the human person. It is a question about absolute truth, not convenience and most certainly, not utility. In answer to Boomsma's question then, we respond, "Yes, there are other ways of looking at embryos that would allow them to be treated differently from fully developed humans, but our commitment to truth requires that we ask first the question of whether embryos are, in fact, humans or not." What makes an entity a person cannot be based on the potential benefit that this entity brings to others.

To many, the great potential for new cures for life-threatening diseases may appear to be a good reason to support hES cell research. Bringing healing to a damaged world is fully consistent with the Christian world view. As Boomsma has argued, Christians have a covenantal responsibility to share in the redemptive work of Christ through our lives and actions. As stewards of creation, we share in the responsibility of applying our gifts of intellect to develop technology that can bring about healing and social justice. It would seem, therefore, that any technology that could potentially bring about healing to millions of people should be pursued wholeheartedly. Such is the promise of research on hES cells.

At this point, Boomsma rightly raised the issue of justice for the embryos.[46] But because he mistakenly regarded embryos as only *potential* image bearers, Boomsma was led to the conclusion that in a fallen, imperfect world certain relatively minor wrongdoings may be acceptable in order to bring about a greater good. He further added that "hES cell use may be justified if the purpose is to promote redemption/stewardship responsibilities."[47] To Boomsma, it is promoting respect for embryos if they are used to serve a noble cause. In other words, the end *does* justify the means. However, given that Boomsma also claimed that humans must be treated as "ends in themselves and not as means to an end,"[48] we cannot help noticing a contradiction.

If embryos are humans as we have established, then to support hES research is to treat them as a means to serve an end. We can affirm that alleviating human suffering is part of what we are called to do as image bearers, as Boomsma has pointed out, but we must always do so within the boundaries of right and wrong that God has defined for us. To treat any human person as only a means[49] in service of ends chosen by others is to overstep that boundary. Even in a fallen world where sin and imperfections abound, the Psalmist confidently proclaimed: "The ordinances of the LORD are sure and altogether righteous."[50] Therefore, we are assured that God "will also provide a way out"[51] of the temptation to do wrong. To suggest that minor wrongdoings are acceptable and, perhaps, even called for by the Christian world view is to imply that God's law itself is contradictory, for it requires contradictory behaviors.

Another point raised by Boomsma was that the unwanted embryos from IVF procedures would eventually be discarded anyway and, therefore, to use them in such a way that could potentially save others from suffering is in fact showing respect.[52] On the contrary, this line of reasoning only makes sense if one accepts that the proper worth of the embryo rests on its capacity to serve the purposes and well being of other human beings,[53] because to respect an entity is to accord it the proper worth. If instead, the embryo is a human person of intrinsic worth based solely on Almighty God's absolute valuation of the being, then the intentional destruction of the embryo for the sake of potential benefits to others is fundamentally a violation of human dignity and, therefore, disrespectful. Such an argument can easily and dangerously be extended to the use of organs of prisoners on death row for medical research. The same can also be said of harvesting organs from people in the late stages of any terminal disease.



Adult stem cell treatment regimens are as effective, if not more so, than embryonic stem cell approaches. In addition, the use of adult stem cells is at least morally neutral (and very likely considered morally positive), without the controversies associated with how embryonic stem cells are obtained.

It is important to be reminded of the biblical principle that one may never do evil to bring about good.[54] Therefore, just as we should not harvest the healthy organs of death row prisoners or terminal patients, neither should we bring about the premature death of embryos even if they may be eventually destroyed anyway.

Adult Stem Cells as an Alternative

The controversy over the ethics of embryonic stem cell research has obscured news of the feasibility of using adult stem cells for treatment of the same disorders. Adult stem cells derive from a variety of sources including cord blood, autopsy tissue, bone marrow, and tissues of patients themselves. The increasingly very real possibility is that adult stem cell treatment regimens are as effective, if not more so, than embryonic stem cell approaches. In addition, the use of adult stem cells is at least morally neutral (and very likely considered morally positive), without the controversies associated with how embryonic stem cells are obtained.

Boomsma summarized the specific issues in stem cell technology in a succinct fashion. His read on the research data was that embryonic stem cells offer a greater ability to differentiate than do adult stem cells, with the result that embryonic stem cells can be used more successfully and in more situations than adult stem cells. While he did acknowledge some of the current research on adult stem cells, he did not fully explore some of the significant new findings in the field. In fact, there is a growing recognition of the versatility of adult stem cells. As one example, in a May 2001 interview, bone marrow stem cells researcher and associate professor of pathology at New York University School of Medicine Neil Theise stated:

> It had been thought that only embryonic stem cells had such wide-ranging potential. However, this study provides the strongest evidence yet that the adult body harbors stem cells that are as flexible as embryonic stem cells.[55]

In another example, a report by the *New Scientist* opened with these sentences:

> A stem cell has been found in adults that can turn into every single tissue in the body. It might turn out to be the most important cell ever discovered.[56]

In our opinion, the optimism expressed is justified, given that in the last several years there has been a flood of reports of applications of adult stem cells to disease states in humans, ranging from brain tumors to various forms of cancers, autoimmune diseases, stroke, anemias, blood and liver diseases, and heart diseases.[57]

A leading researcher in adult stem cell applications is Catherine Verfaillie, MD, on the faculty of the University of Minnesota Medical School and director of the Stem Cell Institute at the medical school. Verfaillie and her colleagues have been world leaders in the development of techniques for use of adult stem cells in medical treatment. One of their important papers includes some of the first findings of the utility of bone marrow cells that could be developed into osteoblasts, chondrocytes, adipocytes, stroma cells, and skeletal myoblasts.[58] Another often-cited study published by the Stem Cell Institute demonstrated the wide versatility of adult stem cells as "an ideal cell source for therapy of inherited or degenerative diseases."[59] These adult stem cells could also generate hepatocytes (liver cells), thus raising possibilities for therapies for liver disorders.[60] More recent publications from this research group include a review of the promising therapeutic benefits of adult stem cells[61] and further research on umbilical cord cells.[62]

Within the last several months, a number of papers on applications of adult stem cells have appeared and are briefly mentioned here primarily to illustrate the rapid advances made in this field. For example, a few recent studies have found that adult stem cells are capable of self-renewal and differentiating into other kinds of cells. In one report, Goldman and Sims at the University of Rochester Medical Center reviewed and discussed evidence of stem cell populations in the adult human brain that are capable of generating neurons and glia.[63] In another, researchers at the University of Pittsburgh found that adult muscle stem cells can multiply as successfully as embryonic ones.[64] Additionally, it has also been shown that a wide variety of human mesenchymal stem cells (hMSC) can be obtained from human veins and can differentiate into several different types of cells.[65]

Other studies have looked at the application of adult stem cells in the treatment of diseases. For example, one recently published study found that adult stem cells appear to be of significance for corneal development and wound healing.[66] Another found that human stem cells are effective in enhancing wound healing in a rat model.[67] Finally, perhaps one of the most exciting news in this area of research has been the finding that human cord blood cells appear to have the characteristics of pluripotency, including the ability to differentiate into hepatocytes, bone cells, and cardiomyocyte.[68] One of the significant findings was that there were no tumor formations detected in any of the animals studied. Needless to say, this short selection represents only a few of the many available research studies that show the usefulness and success of adult stem cell investigations.

Conclusion

For those still unconvinced by the arguments we have presented thus far, we offer one other consideration. Philosopher Peter Kreeft of Boston College has presented a compelling argument against the destruction of human life in the womb.[69] Using the analogy of a hunter who has to decide whether to shoot a target that has been spotted, there are four possible outcomes. First, if the hunter does not know whether the target is a person or not and it actually is, then shooting the target amounts to manslaughter. Second, if the hunter does not know whether the target is a person or not and it is not a person, then nevertheless, shooting the target amounts to criminal negligence. The hunter, as is the researcher, is legally required and morally expected to first determine beyond any reasonable doubt that the target or subject is in fact *not* a person before proceeding. Alternatively, if the hunter knows that the target is a person and it in fact is, then shooting amounts to murder. Finally, if the hunter knows that the target is not a person, and the hunter is correct, then no wrongdoing is committed. Therefore, the only legitimate possibility for proceeding with hES research is when one is certain beyond reasonable doubt that embryos are not human beings. We hope that the counter-arguments that we have presented will offer sufficient reasonable doubt to encourage supporters of hES research to reconsider their position.

It is our position that the human embryo is human life and therefore carries with it the full worth and privileges of a complete human person, made in the image of God and for his purposes. The partial or potential person simply does not exist. As we have shown, this position is consistent with the Reformed Christian world view and arguably, with most of Christendom at least until the early twentieth century. At the same time, we recognize that there is no infallible scriptural proof for either of the two opposing positions (the unborn is or is not a person from conception). However, because the perspective we presented is more ancient and more consistent with the biblical teachings that have been passed down through the ages,[70] therefore the burden of proof (as shown in the analogy of the hunter) lies squarely on the shoulders of those who argue with Boomsma on the legitimacy of destroying human embryos for the purpose of extracting stem cells. Thus, we concur with the opinion of the Orthodox Presbyterian Church, which recommended that "the Christian is under Scriptural obligation to act on the assumption that the unborn child is a person from conception."[71] To which we add, "unless proven otherwise."

Notes

[1]Robert Boomsma, "Embryonic Stem Cells and a Reformed Christian World View," *Perspective on Science and Christian Faith* 56, no. 1 (2004): 38–48.
[2]Ibid., 41.
[3]Ibid.
[4]John H. Leith, *Introduction to the Reformed Tradition* (Atlanta, GA: John Knox Press, 1981), 103.
[5]See Leith, *Introduction to the Reformed Tradition*, 74, 104. In writing about Calvin's theology, Leith explained that the foundation of personhood is in the will and intention of God, who conceived of every person even before the person's existence and gave each his or her own identity and destiny.
[6]"Then God said, 'Let us make man in our image, in our likeness, and let them rule over the fish of the sea and the birds of the air, over the livestock, over all the earth, and over all the creatures that move along the ground'" Gen. 1:26 (New International Version).
[7]Humans were not created after our own kind. In Gen. 1:11–25, all living things were created "according to their kinds" and the only exception was the creation of human beings.
[8] "Whoever sheds the blood of man, by man shall his blood be shed; for in the image of God has God made man" Gen. 9:6 (New International Version).
[9]*Epistle of Barnabas* 19:5, trans. J. B. Lightfoot, www.earlychristianwritings.com/text/barnabas-lightfoot.html.
[10]*Didache* 2:2, trans. J. B. Lightfoot, www.earlychristianwritings.com/text/didache-lightfoot.html.
[11]*Quinisext Council*, Canon 91, www.intratext.com/IXT/ENG0835/_P4J.htm. This council was convened by Byzantine Emperor Justinian II to address disciplinary issues related to the fifth and sixth ecumenical councils, which gave rise to its name *Quinisext*. It is also referred to as the Council in Trullo.
[12]John Calvin, *Commentary on the Four Last Books of Moses Arranged in the Form of a Harmony* (Grand Rapids, MI: Eerdmans, 1950).
[13]Karl Barth, *Church Dogmatics* 3, ed. Geoffrey Bromiley (Edinburgh: T & T Clark, 1961), 415.
[14]Boomsma, "Embryonic Stem Cells," 41.
[15]R. M. Green, *The Human Embryo Research Debates: Bioethics in the Vortex of Controversy* (New York: Oxford University Press, 2001). See Chapter 2 in particular.
[16]The technical term for this early embryo is "zygote."
[17]Boomsma, "Embryonic Stem Cells," 39.
[18]This complex process involves several stages as follows: sperm capacitation, acrosome reaction with penetration of ovum, attachment of sperm head to the secondary oocyte, and fusion of male and female pronuclei.
[19]Boomsma, "Embryonic Stem Cells," 42.
[20]Ibid.
[21]Note that this argument on genetic constitution applies to complete organisms, not parts of organisms.
[22]Green, *The Human Embryo Research Debates.* Also see R. M. Green "Determining Moral Status," *American Journal of Bioethics* 2, no. 1 (2002): 20–30.

[23]Leith, *Introduction to the Reformed Tradition*, 104.
[24]Christian Reformed Church, *Acts of Synod* (1972), 64. See also the CRC website which affirms the same position: www.crcna.org/whoweare/beliefs/position_abortion.asp?WhoWeAreMenu.
[25]Reformed Presbyterian Church of North America, *The Constitution of the Reformed Presbyterian Church of North America* (Pittsburgh, PA: Crown and Covenant Publications, 2004). The section from which this quote came can be found at www.reformedpresbyterian.org/conv_constitution.html in the chapter *Of Marriage and Divorce*, 19.
[26]Associate Reformed Presbyterian Church, *Minutes of the General Synod, 1981,* 402–3. www.arpsynod.org/position.html
[27]Presbyterians Pro-Life, *A Voice for Renewal in the Presbyterian Church (USA).* www.ppl.org/voiceren.html.
[28]Presbyterians Pro-Life, *PPL responds to President Bush's Decision on Federal Funding for Stem Cell Research, 2001.* www.ppl.org/TS_StemCell_Response_Aug01.html.
[29]Boomsma, "Embryonic Stem Cells," 43
[30]Gen. 2:15 (New International Version). A good basic introduction to the concept of the cultural mandate in the Bible can be found in Chapter 2 of B. J. Walsh and J. R. Middleton, *The Transforming Vision: Shaping a Christian Worldview* (Downers Grove, IL: InterVarsity Press, 1984).
[31]Leith, in *Introduction to the Reformed Tradition*, wrote: "God thought of every person before he was and called him into being, giving him his name, his individuality, his identity as a child of God, and his dignity that no man should dare to abuse" (p. 104).
[32]Other examples include Gen. 25:24, Song of Sol. 8:5, Hos. 12:3, and Luke 1:41.
[33]See, for example, J. Peterson, "Is a Human Embryo a Human Being?" *God and the Embryo: Religious Voices on Stem Cells and Cloning* (Washington, DC: Georgetown University Press, 2003), 77–87.
[34]"For you created my inmost being; you knit me together in my mother's womb" Ps. 139:13 (New International Version).
[35]Boomsma, "Embryonic Stem Cells," 42.
[36]Peterson, "Is a Human Embryo a Human Being?"
[37]The 1971 report is available at www.opc.org/GA/abortion.html.
[38]New International Version.
[39]For example, see Thomas Aquinas' *Summa Theologica* first part, Q76 which is available at www.newadvent.org/summa/107600.htm. For those readers interested in a detailed analysis of the theology and philosophy of body and soul, we recommend: J. P. Moreland, and S. B. Rae, *Body and Soul: Human Nature and the Crisis in Ethics* (Downers Grove, IL: InterVarsity Press, 2000).
[40]1 Cor. 6:15 (New International Version).
[41]1 Cor. 6:19 (New International Version).
[42]R. P. George, *The Clash of Orthodoxies: Law, Religion, and Morality in Crisis* (Wilmington, DE: ISI Books, 2001), 320.
[43]Boomsma, "Embryonic Stem Cells," 44.
[44]Ibid., 41.
[45]Ibid.
[46]Ibid., 44.
[47]Ibid.
[48]Ibid., 41.
[49]Without their informed consent.
[50]Ps. 19:9 (New International Version).
[51]1 Cor. 10:13 (New International Version).
[52]Boomsma, "Embryonic Stem Cells," 44.
[53]Passages in the Bible such as Matt. 6:25–34 reveal that our personal well being is important in the eyes of God.
[54]Rom. 3:8 (New International Version).
[55]P. McDonnell, "Researchers Discover the Ultimate Adult Stem Cell" *New York University Medical Center Press Release*, May 3, 2001, www.newswise.com/articles/view/?id=STEMCEL3.nym. The focus of the interview was on a study published in the journal *Cell*. The full reference of the study is: D. S. Krause, N. D. Theise, M. I. Collector, O. Henegariu, S. Hwang, R. Gardner, S. Neutzel, and S. J. Sharkis, "Multi-Organ, Multi-Lineage Engraftment by a Single Bone Marrow-Derived Stem Cell," *Cell* 105 (2001): 369–77.
[56]S. P. Westphal, "Ultimate Stem Cell Discovered," *New Scientist* (January 23, 2002): www.newscientist.com/article.ns?id=dn1826.
[57]The number of publications in peer-reviewed scientific and medical journals is too many to list individually. A lengthy compilation of references and summaries can be found at www.stemcellresearch.org. Another useful extensive summary (from 1998–2003) was provided to the President's Council on Bioethics as background for a July 2003 Council meeting and was written by David Prentice, Ph.D, a professor in the Department of Life Sciences at Indiana State University. This report can be accessed at www.bioethics.gov/background/prentice_paper.html. Interested readers should also see D. A. Prentice, "Adult Stem Cells," *Issues in Law & Medicine* 19, no. 3 (2004): 265–94.
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[61]C. M. Verfaillie, R. Schwarz, M. Reyes, and Y. Jiang, "Unexpected Potential of Adult Stem Cells," *Annals of the New York Academy of Sciences* 996, (2003): 231–4.
[62]For example, see J. E. Wagner and C.M. Verfaillie, "Ex Vivo Expansion of Umbilical Cord Blood Hemopoietic Stem and Progenitor Cells," *Experimental Hematology* 32, no. 5 (2004): 412–3.
[63]S. A. Goldman, and F. Sim, "Neural Progenitor Cells of the Adult Brain," *Novartis Found Symposium* 265, (2005): 66–80.
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[69]P. Kreeft, *Making Choices: Practical Wisdom for Everyday Moral Decisions* (Ann Arbor, MI: Servant Books, 1990), 120.
[70]In 2 Thess. 2:15 (New International Version), we are called to "stand firm and hold to the teachings we passed on to you, whether by word of mouth or by letter."
[71]The report of the committee to study the matter of abortion to the 38th General Assembly of the Orthodox Presbyterian Church (1971) is available at www.opc.org/GA/abortion.html.