

Position Statement on Stem Cells

*The world will never starve
for want of wonders, but
only for want of wonder.*
--G. K. Chesterton

"We are the first generation to contemplate killing our very young children and grandchildren to use their body parts for our benefit."

As the frontiers of medical research advance over time, the Church in each age is called to accurately evaluate the moral questions of its era and to live faithfully in the midst of new discoveries and possibilities.

The whole counsel of God, concerning all things necessary for his own glory, man's salvation, faith, and life, is either expressly set down in Scripture, or by good and necessary consequence may be deduced from Scripture¹

With those words, the Westminster Confession affirms the confidence of the Church that in every aspect of life, Christians can receive sufficient direction from Scripture to discern God's will and to respond obediently to all moral challenges, including those which have not been faced by previous generations. We believe that our limited and fallen understanding and reasoning must always be subject to the authority of Scripture.

Scripture commands us to love our neighbors and to demonstrate compassion for all who suffer. The Bible also teaches that we are forbidden to take innocent human lives and that there is a continuity between life before and after birth. Those key biblical principles provide the guidance we need to live faithfully when confronting new challenges and opportunities in the areas of life, death and biotechnology.

"Stem cell research" is a prominent contemporary topic. The popular understanding (though false) is that although "embryonic stem cells" could provide

cures for those now suffering from Alzheimer's disease, Parkinson's disease, multiple sclerosis, diabetes and numerous other devastating illnesses, such research is being unreasonably opposed by uncaring people, who are unmoved by the suffering of others. It is a controversy in which emotions sometimes run high, but the scientific and moral dimensions of the discussion are seldom well elucidated.

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What are stem cells?

Human “stem cells” are cells present throughout the biological stages of human life, from human embryo, to fetus, to baby, to child, to adult. Stem cells have the amazing potential to make identical copies of themselves and to “differentiate” into the more than 200 types of cells with specialized functions that are needed to support a human life -- from a neuron in the brain, to a muscle cell of the heart, to a lymphocyte circulating in the bloodstream, producing antibodies to fight infection.

The process that leads a fertilized egg, over time, to produce all the cells, organs, and complex structure that characterize an adult human being is an incredible one, which science has barely begun to understand. The beginnings of that process provide the background and terminology used in discussions of stem cells. At the time of fertilization—the union of a sperm and an egg—a new, genetically unique individual is formed. In the earliest stages of development, the fertilized egg (“zygote”) divides and forms a ball of cells. That ball of cells develops a cavity (blastocyst stage) and comes to consist of two portions, the “trophoblast” (which will develop into the placenta and umbilical cord) and the “inner cell mass” (which will become the fetus). The “inner cell mass” will produce the three primary “germ layers” of cells that will later give rise to all the cell types of the body.² The “ectoderm” (external layer) is the source of cells which include skin cells and neurons of the brain. The “mesoderm” (middle layer) produces cells including muscle cells and blood cells. The “endoderm” (internal layer) yields cells such as pancreatic cells and alveolar cells of the lung.³

Scientists use the term “totipotent” to describe a cell having the potential to generate all the cells that make up the embryo plus its supporting structures

(placenta and umbilical cord). The term “pluripotent” is used to describe stem cells which can give rise to all the cells of the human body (cells from all three germ layers). The term “unipotent” describes more limited stem cells which can produce cells of only one of the three lines.³ The zygote is described as totipotent. Scientists have found embryonic stem cells to be pluripotent. It was initially believed that adult stem cells were unipotent.

However, “studies have shown that blood stem cells (derived from mesoderm) may be able to generate both skeletal muscle (also derived from mesoderm) and neurons (derived from ectoderm). That realization has been triggered by a flurry of papers reporting that stem cells derived from one adult tissue can change their appearance and assume characteristics that resemble those of differentiated cells from other tissues. The term plasticity . . . means that a stem cell from one adult tissue can generate the differentiated cell types of another tissue.”⁴ Adult stem cells are present in relatively low numbers and are mixed with differentiated cells in the tissues, therefore it is more time-consuming to isolate them, but adult stem cells have been isolated which developed from all three germ layers and adult stem cells have demonstrated the capability to differentiate into tissues other than the ones from which they originated.

Endnotes

1. Westminster Confession, *Book of Confessions*, 6.006.
2. *Stem Cells: Scientific Progress and Future Research Directions*. Appendix A: Early Development. Department of Health and Human Services. June 2001. <http://stemcells.nih.gov/info/scireport>
3. *Ibid.*, Chapter 1: The Stem Cell.
4. *Ibid.*, Chapter 4: The Adult Stem Cell.
5. During the process of development in the womb, the placenta and umbilical cord are tissues produced by the baby to support its growth. The blood that circulates from the baby, through the umbilical cord, to the placenta, and back to the baby is the baby's blood, produced by the developing child, and is different from the mother's blood. Because the umbilical cord is discarded at birth, stem cells can be obtained from the blood remaining in the umbilical cord after birth without harming the baby.
6. Position Statement on Abortion, Presbyterians Pro-Life Research, Education and Care, Inc., Allison Park, PA, adopted June 1988, rev 9/93.
7. Fowler, Paul B., *Abortion: Toward an Evangelical Consensus*, 1987, Multnomah Press, Portland, Oregon, pp 144, 145.
8. Dowd, Bryan and Chris Macosko, “Key question for research on human embryos is whether it is moral,” *Commentary*, Minneapolis *Star Tribune*, March 12, 2004.
9. Cameron, Nigel, “The stem cell debate gets hotter,” *Biotech Commentary*, Council for Biotechnology Policy, July 19, 2004. http://www.pfm.org/BiotechTemplate.cfm?Section=Biotech_Home&Template=/ContentManagement/ContentDisplay.cfm&ContentID=13134
10. Testimony of Nigel Cameron, Ph.D., given August 1, 2001 before the United States Senate Committee on Appropriations, Subcommittee on Labor, Health and Human Services, Education, and Related Agencies Hearing on Embryonic Stem Cell Research http://www.thecbc.org/redesigned/research_display.php?id=61

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Embryonic vs. adult stem

Although all stem cells are believed to have wide potential, early research indicates that embryonic stem cells behave differently than stem cells from other sources. At this time, in fact, embryonic stem cells have not been shown to be helpful in alleviating any medical problems whereas work with adult stem cells, which poses no moral problem, has resulted in a number of successes. Doctor Nigel M. de S. Cameron, Ph.D., chair of the Advisory Board for The Center for Bioethics and Human Dignity and founding editor of the international journal *Ethics & Medicine*, summarized the status of stem cell research this way in July 2004:

Even the more honest advocates of embryo stem cell research have admitted that cures are a long, long way off. This is patently clear to those who have followed the animal experiments, which have so far yielded very little evidence of cures and many problems . . .

I gave a presentation at the Experimental Biology conference in Washington, D.C. a few weeks ago, where I was surveying the ethical pros and cons of stem cell research. Alongside me were other speakers who are experts in embryo and stem cell research. The embryo research expert talked about basic research. The adult stem cell expert, on the other hand, talked about patients with what had been thought to be incurable diseases going home from the hospital cured. (If you want to read some of the latest research go to www.stemcellresearch.org . . .)⁹

Even if human embryonic stem cells were to be effective and even if they were the only means of obtaining effective treatments, the principle that it is wrong to take an innocent human life still applies. Doctor Cameron articulately summarized the moral challenge:

For the question we face is distinctly ethical in character. At the heart of our conception of civilization lies the principle of restraint: that there are things we shall not do, shall never do, even though they may bring us benefit; some things we shall never do, though the heavens fall.

As we stand on the threshold of the biotech century, we could hardly confront a decision that is more onerous, since the promised benefits from this technology may be great . . . If there are things that we should not do, it is easy for us to refuse to do them when they offer no benefit. When the benefit they offer is modest, the choice is still not hard. The challenge to morals and to public policy lies precisely here, where the benefits seem great. Yet it is here also that our intuitive respect for the early embryo requires us to pay a price.¹⁰

We are hopeful that adult stem cells will one day provide new avenues for treatment of diseases which are currently untreatable and will alleviate the suffering of many. Research done thus far suggests that work with adult stem cells has great potential and promise. But even if it were true that adult stem cells do not accomplish the cures that embryonic stem cells might achieve, we must limit our work to that which can be done in a way that is morally right and does not kill one human life in the hopes of helping another, even if the human who must be killed is small -- even a very tiny human embryo, which each of us once was.

What is the moral issue?

When stem cells for use in research or for treatment of disease are obtained in a manner that does not harm the donor, there is no ethical dilemma. The situation is analogous to a healthy person donating a unit of blood to benefit others, or to a person with two healthy kidneys donating one to help another. No one is harmed and there is great potential to save or significantly improve the life of someone else. "Adult stem cells" pose no moral problems because they can be obtained without harm to the donor. The list of adult tissues reported to contain stem cells is growing and includes bone marrow, peripheral blood, brain, spinal cord, dental pulp, blood vessels, skeletal muscle, epithelium of the skin and digestive system, cornea, retina, liver, and pancreas.⁴ Bone marrow transplants, in which stem cells capable of producing all the types of blood cells are transfused into a person who needs them, have been performed successfully for a number of years. Umbilical cord blood from newborn babies⁵ is a readily-available source of stem cells. Recovering stem cells from cord blood poses no moral problems and may have some advantages since the cells are younger and have not undergone the deleterious effects that aging may have on stem cells recovered from adults.

The only types of human stem cells which raise moral concern are human "embryonic stem cells" or fetal stem cells which require the killing of the donor to obtain the stem cells. The "embryonic stem cells" causing current controversy are obtained by allowing an embryo to develop in the laboratory to the "blastocyst" stage (a stage that occurs just before the embryo would implant in the uterine wall in a normal pregnancy) and then, in a process that ends the development of that individual, the embryo is destroyed and cells from the "inner cell mass" (which would have developed into the fetus) are separated from the others. Those cells are then propagated in the laboratory as embryonic stem cell lines for various uses, but they will not develop into a baby because the baby's life was ended when its stem cells were removed.

The embryo is very small and is only about a week old when it is destroyed to obtain embryonic stem cells. In most discussions of abortion, the prenatal life being ended is one to which we can easily relate. Even

very early in a pregnancy, say from eight to twelve weeks, the fetus already has easily-recognized features and a beating heart which can be seen on ultrasound. In the destruction of human embryos to create embryonic stem cell lines, the life that is being destroyed may appear, to our examination, to be just a collection of cells. But it is no ordinary group of cells. At the time of fertilization, when the 23 chromosomes of the sperm merge with the 23 chromosomes of the egg, a new human life comes into existence as a single, 46-chromosome cell called a "zygote." The zygote is just one cell, but already the genetic characteristics of that future human adult -- gender, blood type, hair and eye color, and all other genetic characteristics -- have been determined.

Even more remarkable, contained in that zygote are all of the instructions for how and when that cell will divide, which genes will be turned on and off at what times, and what types of specialized cells will be created in what locations in order to produce the more than 200 types of cells that are needed. The cells are not randomly produced and distributed, but rather are organized into the appropriate organs. For example, astrocytes, oligodendrocytes, and neurons are located in the brain while the insulin-producing cells reside in the pancreas. The various organs and tissues assemble into a complex structure, the human body, with head and trunk, arms and legs, right and left, front and back all in proper position. The cells in the brain capable of sight extend forward in the face forming eyes, a beating four-chambered heart connects to a network of blood vessels, propelling blood, delivering nutrients and oxygen to every cell of the body and removing toxic cellular waste products. The nervous system, digestive system, reproductive system are all intricately formed to provide for life. As in post-natal life, programmed cell death is part of the process of life. In utero, this means that instead of webbed fingers and toes, certain cells destroy themselves so that fingers and toes develop as separate structures.²

The zygote and early embryo may not be impressive to the human eye, but given the opportunity to implant in the uterine wall, in nine months that group of cells -- that embryo -- will be a baby, capable of independent life.

How should we treat an early human embryo?

Does the early embryo qualify as a human life which we are required to protect rather than to destroy? Scripture clearly teaches that God

places a higher value on humans than on the rest of creation, that the meaning and purpose of God for each human life begins before birth, that God forbids us to kill innocent human life, and that we are to protect and care for innocent life.⁶ The biblical theme of continuity of life before and after birth is particularly relevant.

The biblical writers did not use different words to label prenatal and postnatal life. The same Hebrew and Greek terms are often used to refer both to the born and the unborn. For example, Geber is a Hebrew noun usually translated man, male, or husband. In Job 3:3, Job curses the night in which it was said, "a man-child [geber] is conceived." Yeled is a term in Hebrew commonly translated child or boy. Yet Genesis 25:22 refers to yeladim (children) struggling inside the womb of Rebekah. Moses recites a law in which a Yeled (child, boy) comes forth from a woman (born prematurely).

In Greek, brephos is often used of infants and the newly born (Luke 18:15; 1 Peter 2:2; Acts 7:19). But in Luke 1:41 and 44, brephos is used of John the Baptist leaping in the womb of Elizabeth. Huios in the Greek means son and is used in Luke 1:36 of John being conceived by Elizabeth: "And behold, even your relative Elizabeth has also conceived a son in her old age; and she who was called barren is now in her sixth month."⁷

Although it might seem convenient if the facts were otherwise, neither Scripture nor biology gives us a basis to treat the zygote and embryo as anything other than the unique human lives that they are. By using the same words to describe prenatal and postnatal life, Scripture shows continuity between life before and after birth. The biological process of human development from zygote, to embryo, to fetus, to baby, to child, to mature adult is a continuous biological process. The only beginning point is fertilization, when a new individual is created. There is no basis for drawing any other conclusion.

If embryos are going to be destroyed anyway, isn't it better to use them to obtain stem cells?

Some have suggested that it is morally acceptable for "leftover" human embryos from *in vitro* fertilization clinics to be donated by their parents to be used as a source of stem cells since these frozen embryos will never be implanted and therefore will never develop into children. Two professors at the University of Minnesota effectively addressed the assertion that since no relative harm is done, such a practice would be moral:

The argument that research is justified as long as no relative harm is done to the subject and there is potential gain for others appears powerful at first inspection, and indeed it has proven powerful in the past. Gilbert Meilaender -- the Richard and Phyllis Duesenberg professor of Christian Ethics at Valparaiso University and a member of the President's Council on Bioethics -- cited two previous applications of the argument in a lecture at the University of Minnesota this past November.

The Tuskegee syphilis trials allowed black men with syphilis to go untreated to determine the effects of the disease. Access to "comfort" care for those men actually was improved by their participation in the trial, since their usual access to care was so poor. The fate of these men had been determined (by others) prior to the study. If no relative harm was done to them by participating in the study, and there was the promise of some gain for others, why not proceed?

Meilaender's second example was Nazi medical experimentation on prisoners at Auschwitz. Upon arrival at Auschwitz, prisoners were graded according to their "life prospects," and some were condemned to death (by others). If no relative harm was done to these prisoners -- already condemned to death -- and there was the promise of some gain for others, why not proceed?⁸

Such illustrations sharpen the focus on the moral issue involved in using "unwanted" embryos to obtain stem cells: What is wrong is wrong, regardless of the potential good that might result for others. "Shall we do evil that good may come of it?" (Romans 3:8)

We are the first generation to contemplate killing our very young children and grandchildren to use their body parts for our benefit.