



4-1-2008

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Zundel, Collin D. (2008) "Embryonic Stem Cell Research: When Should It Be Allowed?," *Brigham Young University Prelaw Review*: Vol. 22 , Article 14.

Available at: <https://scholarsarchive.byu.edu/byuplr/vol22/iss1/14>

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EMBRYONIC STEM CELL RESEARCH: WHEN SHOULD IT BE ALLOWED?

by Collin D. Zundel¹

Embryonic stem cell research is a greatly debated subject. Proponents see it as an opportunity to help those with serious diseases, while opponents believe the research process destroys precious life. The purpose of this paper is to create a rule outlining in which cases embryonic stem cell research should be permitted. Opposing sides can come to a compromise when the research is permitted under certain criteria. Embryonic stem cell research should only be allowed when humans are not killed or severely harmed, when intended to cure serious illness or injury, when there is consent from the donor, and when accredited scientific researchers conduct it. This essay will first discuss the background of embryonic stem cell research, including the controversy and government involvement. Next, it will breakdown and discuss the elements of the rule, discussing and applying when stem cell research should be permitted. Finally, the paper will discuss an alternative form of research which does not use embryonic stem cells, but instead obtains stem cells from adults.

I. THE BACKGROUND

At the end of 1998, it was announced that James A. Thompson and his colleagues from the University of Wisconsin were able to

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successfully isolate embryonic stem cells.² This breakthrough discovery marked the beginning of the stem cell controversy, a controversy that has been a hotly debated topic for many years. While stem cells have been a highly discussed subject, the issue is perhaps deeper and more complicated than a surface discussion may conclude. One fact about stem cells is that they are pluripotent, which means they are capable of turning into any cell type.³ They are also infinite, meaning they can divide an infinite number of times, whereas other cells divide only a finite number of times.⁴ A cell, such as a stem cell, which is both pluripotent and infinite, has the potential to turn into any type of cell or organ. This means a stem cell holds the ability to become a heart cell, lung cell, red blood cell, or any other type of cell for the body. Scientists see enormous possibilities in a cell with these two special characteristics. They believe that embryonic stem cell research will bring about therapies that will possibly treat and cure stroke, diabetes, Alzheimer's disease, Parkinson's disease, and many other currently incurable diseases.⁵

A stem cell has the unique capacity to renew itself indefinitely and turn into specialized cell types.⁶ To obtain this special form of cell, stem cells are taken from the blastocyst in embryos and fetal tissue. A blastocyst is a group of cells called the inner cell mass, which is a part of the early embryo. The blastocyst contains about two hundred to two hundred and fifty cells. Obtaining embryonic stem cells from a blastocyst results in the destruction of the embryo. Stem cell research that results in the destruction of human embryos is what brings up many ethical concerns.⁷

2 Nancy E. Snow, *STEM CELL RESEARCH: NEW FRONTIERS IN SCIENCE AND ETHICS 2* (University of Notre Dame Press, 2003).

3 *Id.* at 3.

4 *Id.*

5 *Id.*

6 A. Thomson et al., *Embryonic Stem Cell Lines Derived from Human Blastocysts*, 282 *SCI.*, 1146 (1998), <http://www.sciencemag.org/cgi/reprint/282/5391/1145.pdf>.

7 *Id.*

As a result of the embryonic stem cell debate, President Bill Clinton asked the National Bioethics Advisory Commission (NBAC) to conduct research on the issue. The NBAC published its report in 1999 and 2000.⁸ They covered scientific, legal, ethical, religious, and public policy perspectives as well as policy recommendations for stem cell research. After the publication of the report, the Clinton administration permitted federal funding for stem cell research using aborted fetal tissue, placentas, umbilical cord blood, and adult stem cells. The Clinton administration also provided funding for research of stem cells obtained from frozen embryos, also known as in vitro embryos. These in vitro embryos were created for the purpose of fertility treatments and were in excess of clinical need. This new policy did not stop the debates because many were unhappy with the Clinton administration's decision regarding embryonic stem cell research. They disagreed with the distinction made between destroying embryos for research purposes and using previously derived embryonic stem cells for research.⁹

President George W. Bush announced a conservative change on August 9, 2001.¹⁰ The change provided that federal funds would be given if three criteria were met.¹¹ First, that the derivation process, which begins with the destruction of the embryo, must have been initiated prior to nine o'clock P.M. EDT on August 9, 2001. Second, the stem cells must have been derived from an embryo that was created for reproductive purposes and was no longer needed. Third, informed consent must be obtained for the donation of the embryo from the person who possessed the embryo, and that donation must not have involved financial inducements.¹² Federal funds were allocated to adult stem cell research and research using stem cells taken

8 Snow, *supra* note 2, at 2.

9 *Id.*

10 George W. Bush, Pres. of the U. S., President Discusses Stem Cell Research, The Bush Ranch (Aug. 9 2001), <http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html>.

11 Stem Cell Information, <http://stemcells.nih.gov/policy> (last visited Jan. 29, 2008).

12 *Id.*

from umbilical cord blood and placentas. Federal funding would not go to research involving the creation or destruction of human embryos. President Bush's decision did not touch the issue of using aborted fetal tissue for stem cell research. Research using aborted fetal tissue continued to be eligible for federal funding.¹³

There are various debates between the ethical and scientific sides of embryonic stem cell research. Since embryos are potential humans, an important question is whether using stem cells derived from embryos should be considered murder. Arguing that embryonic research is murder, Senator Sam Brownback addressed Congress on June 29, 2006.¹⁴ He says that in our legal system embryonic stem cells are either a person or a piece of property. The law does not observe a transition from property to personhood because there is no dividing line. If you start out as a human being, then you will end up as a human being. If something has the potential to be human life, then it can never be property. He believes that once the process of life begins, it is human life from then on. Therefore, once it has been started, it is murder to stop the process of an embryo becoming a human.¹⁵

Giving a very different view, Senator Byron Dorgan addressed Congress on July 10, 2006.¹⁶ He said research that can find cures to diseases such as Alzheimer's, Parkinson's, heart disease, and diabetes must be a priority. More than one million people have been born through in vitro fertilization. However, fertility clinics fertilize many more eggs than are actually implanted in a woman's uterus. These clinics across the nation contain approximately four hundred thousand cryogenically frozen embryos. Eight thousand to ten thousand of these frozen embryos are simply discarded every year. This does not amount to murder any more than embryonic stem cell research. Those embryos will never become human beings because

13 Snow, *supra* note 2, at 2.

14 Marcia Clemmitt, *STEM CELL RESEARCH: IS PRESIDENT BUSH BLOCKING IMPORTANT MEDICAL RESEARCH?*, 16 CQ RES. 699, 713 (2006), <http://library.cqpress.com/cqresearcher/cqresrre2006090100>.

15 *Id.*

16 *Id.*

they are not implanted in a woman's uterus. Senator Dorgan believes this issue is about giving new life and opportunities to those who are suffering from disease.¹⁷ These two opinions are good examples of the opposing views between ethics and science. Both sides make important points that are necessary in the formulation of the rule.

II. THE BREAKDOWN AND DISCUSSION OF THE CRITERIA

In what cases should embryonic stem cell research be permitted? The rule stated earlier says that embryonic stem cell research should only be permitted when it does not kill or severely harm humans, when it is intended to cure disease or injury, when there is consent from the donor, and when it is conducted by accredited scientific researchers. This is still somewhat ambiguous and will need to be broken down to give the rule more clarity. For this purpose, it is necessary to define several key elements of the rule.

The first part of the rule says that stem cell research should not kill or severely harm humans. To "kill" would mean anything that ends human life.¹⁸ "Severe harm" means any measure that may have severe negative side effects, cause serious injury, or exploit humans.¹⁹ The third important part of this element is the definition of human life. This would mean a human at any stage of life, including a viable embryo. A viable embryo is one that is implanted in a woman's uterus.²⁰

The next criterion says the research must be intended to cure serious disease or injury. This means that the intention of embryonic stem cell research does not include reproductive cloning or therapeu-

17 *Id.*

18 http://dictionary.oed.com/cgi/entry/50126602?query_type=word&queryword=kill&first=1&max_to_show=10&sort_type=alpha&result_place=5&search_id=rjmj-hlRy1o-13529&hilite=50126602 (last visited Feb. 2, 2008).

19 Interview with Robert White, Philosophy Department, Brigham Young University, in Provo, Utah (Mar. 12, 2007).

20 *Id.*

tic cloning. This condition narrows the instances when this research should be permitted.

The rule also says that research should only be allowed when there is consent from the donor. This would mean that consent must be obtained from those who are giving the stem cells. In the case of embryonic stem cells, it would include the donors of the egg and sperm.

The last criterion is that accredited scientific researchers must conduct the research. Only certain people can do research with stem cells. A scientist must be accredited through schooling and experience to be allowed to conduct the research. They must be trained scientists and doctors who have gone through the proper steps of schooling.

Proponents strongly in favor of embryonic stem cell research would argue that nothing is killed. They do not believe that a five-to seven-day-old embryo is a human life. This brings up the question of when life actually begins during human development. Many people believe that an embryo is not a human life until birth, others believe that life begins at conception, and others believe life begins somewhere between conception and birth. These questions are not answerable by objective evidence. The argument should turn more to the potential of an embryo. When an embryo is implanted in the uterus, it has the potential to grow to be a full human being. When an embryo is on its way to this goal, it should not be interrupted. To not interrupt this process, the rule states that stem cell research must not result in the destruction of the embryo.

In order not to destroy viable embryos, researchers turn to excess in vitro fertilization for embryonic stem cell research. There are clinics all across the country that have excess in vitro embryos, which comes from couples who have donated eggs and sperm for the purpose of their own familial development.²¹ There are many in vitro embryos left behind that couples will no longer need. Therefore, the question is raised of what to do with unused in vitro embryos. Many feel that excess in vitro embryos should be donated to other couples who may not have the capability of providing eggs and

21 Clemmitt, *supra* note 14, at 710–711.

sperm.²² Although this is the preferable solution, the supply is more in excess than can be used by couples in need.²³ Also, couples may not be comfortable with someone else using their embryo to have a baby. An alternative solution to supplying couples in need or simply discarding the embryos would be to donate the embryos to science for the use of embryonic stem cell research.²⁴ If the embryos are used for research instead, they could be used to potentially cure serious disease or injury.

Stem cell research should be limited to the condition of curing serious disease or injury. Stem cells have the potential to treat spinal cord injuries and diseases such as leukemia and diabetes among others.²⁵ Embryonic stem cells have the possibility to cure injuries and diseases for which there was previously no treatment. The sensitivity of embryonic stem cells coupled with its major possibilities makes it reasonable for its allowance with limitations. Through limitations and regulations, the nature of life will be protected, and researchers will be prevented from pursuing their own selfish interests.

The consent from the donor is essential because it prohibits manipulating people in order to conduct research without their permission. People should have a say when their property is used for research. This ensures that those who are against embryonic stem cell research will have no part in it. It is also important that only accredited scientific researchers and doctors conduct the research. Only those who are specially trained should be allowed to conduct the research. This bans people from trying to conduct the research without the necessary qualifications. Regulating the researchers will preserve the precious stem cells that are available and will help to ensure that they are taken seriously and not wasted. The last two parts of the rule make it complete and allow for the progress of research and the preservation of human life.

22 *Id.*

23 *Id.*

24 *Id.*

25 Joseph Panno, *STEM CELL RESEARCH: MEDICAL APPLICATIONS AND ETHICAL CONTROVERSY* 36 (Facts on File, 2005).

III. APPLICATION OF THE FOUR CRITERIA

The rule can now be further illustrated through test cases as it has been properly defined. The first example is with two doctors who have been researching at a reputable medical school for a number of years. They were among the first to take the lead in stem cell research and have given a number of lectures promising its results. They have put their reputations at risk saying that new cures will be coming for problems like Parkinson's disease and severe spinal cord injuries. They have asked several pregnant women who do not want to continue in their pregnancy to come in. Their research has proved promising, but they have not yet come up with a way for doing the research without destroying the fetus in the woman's uterus. Both doctors feel that the benefit of the stem cell research will far outweigh the cost of destroying the embryos.

This case could be somewhat controversial because the doctors have had some promising results. There is evidence the research is being conducted by accredited scientific researchers as it is performed at a medical institution. Also, the researchers are performing research for the right purpose of curing disease and serious injury. However, the research is being performed at the cost of human life. They are destroying viable human embryos. Although the doctors are justifying their research, it still falls short of the rule created earlier. The fact that it falls short for just one part of the rule makes the research in this case unacceptable.

The next case is of a pregnant twenty-four year old. She has just found out she is pregnant and has decided not to keep the baby. She has met with her doctor, and together they decided to abort the fetus. The doctor suggests that the fetus be used for stem cell research. He explains to her that the stem cells will be studied and used to help people who have disease or are seriously injured. The embryo will be destroyed, but the stem cells will be used for research purposes. She agrees to participate in the research and allows them to take the embryonic stem cells.

This case is more controversial because it brings up the question of what to do with embryos that will be destroyed no matter what. This case satisfies all the criteria of the rules except for the killing

of a viable embryo. The fact that she is aborting the fetus is already controversial because human life is destroyed. The destruction of life is not for the purpose of embryonic stem cell research. The embryo should be used for stem cell research because it will be destroyed no matter what. Another example of this would be of a murdered person donating organs. The donated organs do not sanction the murder just as taking stem cells does not sanction the abortion. Though life is being lost, the bodily organs can provide help to those in need. This example therefore satisfies all the criteria of the rule.

The third example is of a young married couple. They have wanted to become pregnant for a long time but have been unable. They decided to use the process of in vitro fertilization to become pregnant. The process was a success and the wife is now pregnant. The excess in vitro embryos will be discarded because they can no longer be used to help anyone become pregnant. The doctor tells the couple that the excess in vitro embryos can be used for stem cell research to help those with disease and serious injury. They decide to donate their excess in vitro embryos to a reputable medical research program.

This case seems to satisfy all of the requirements to allow for stem cell research under the proper conditions. The research is not killing or harming viable human embryos. It is intended for the right purpose of helping those with disease and injury. It was given with the consent of the donor, and will be performed by accredited scientific researchers. This research should be allowed according to the criteria of the rule.

The rule for stem cell research applies to the different cases that have been presented. It is reasonable to assume that the rule will hold for even the most difficult cases. Embryonic stem cell research should only be performed when no one is killed or harmed, when accredited professionals conduct the research, when there is consent, and when it is for the right purpose. A strong base is formed when creating and applying the different elements of the rule. Stem cell research will most likely continue to be a highly debated subject. It is important to consider its possibilities coupled with the sensitivity of human life. The medium between limitations and its allowance will bring about much progress in the future.

IV. OTHER ALTERNATIVES

Many people argue that adult stem cell research is just as effective as embryonic research and does not raise the same ethical concerns that embryonic research raises. David A. Prentice, Professor of Life Sciences at Indiana State University, says that despite twenty years of experiments with mouse embryonic stem cells and the fervor that has arisen regarding human embryonic stem cells, their advantage over adult stem cells are unsubstantiated. He further points out that there is “no current clinical treatment using embryonic stem cells.”²⁶ There are few and modest advances with embryonic stem cells in animal models of disease, and there is difficulty obtaining pure cultures in the laboratory dishes. He says the stem cells themselves are even difficult to maintain in culture. Proponents of embryonic stem cell research admit that potential treatments run the risk of immune rejection by the patient and of tumor formation. He also points out that a report from 2001 states that “embryonic stem cells are genomically unstable, exhibiting variable gene expression even in the controlled conditions of the laboratory.”²⁷ If adult stem cell research can be proven to be more promising than embryonic stem cell research, then, in the future, we may have good reason to focus entirely on adult stem cells.

William B. Slayton, of the Department of Pediatrics, College of Medicine at the University of Florida, and Gerald J. Spangrude, of the Department of Oncological Sciences at the University of Utah, give an overview of adult stem cells in their essay called “Adult Stem Cell Plasticity.”²⁸ They say that adult stem cells may provide “solutions that avoid the legal and ethical problems of cloning and fetal stem cell approaches.”²⁹ Until recently, popular belief held that adult

26 David A. Prentice, THE PRESENT AND FUTURE OF STEM CELL RESEARCH: SCIENTIFIC, ETHICAL, AND PUBLIC POLICY PERSPECTIVES, IN STEM CELL RESEARCH: NEW FRONTIERS IN SCIENCE AND ETHICS 18 (Nancy E. Snow ed., 2003).

27 *Id.*

28 William B. Slayton & Gerald J. Spangrude, *ADULT STEM CELL PLASTICITY*, IN *ADULT STEM CELLS* 1 (Kursad Turksen ed., 2004).

29 *Id.*

stem cells were restricted in their ability to produce tissue different from their original source tissue. Studies have shown that adult stem cells are plastic, meaning they can differentiate into their own source tissue and also unrelated tissue. However, Slayton and Spangrude outline four current controversies involving adult stem cell plasticity.³⁰ The first is that plasticity has been inferred from an undefined mixture of cells. It is therefore unclear which cells give rise to the new types and whether separate cell lineages arise from the same cell. The second problem has to do with the culture period. They say it becomes unclear whether the stem cells, as originally isolated, had the ability to produce the results or whether modifications occurred because of the period. The third problem is that most studies have not shown the ability of transdifferentiating stem cells to self-renew. Finally, most studies have not shown the functionality of transdifferentiated stem cells. In summary, these problems demonstrate that science has not furnished sufficient evidence for adult stem cell plasticity.³¹ Much work is necessary to confirm that the cells exhibiting plasticity are the adult stem cells. They conclude that focusing only on adult stem cell research and ignoring the potential of embryonic stem cells may lead to missed opportunities. Each approach has the possibility of being advantageous in certain clinical situations.³² It is important to take this article into consideration because both aspects of stem cell research show potential and deserve attention.

V. CONCLUSION

This short paper has discussed the background of embryonic stem cell research and the reasons it has become a controversial subject in the United States. A rule was proposed that embryonic stem cell research should only be permitted when it does not kill or severely harm humans, when it is intended to cure serious disease, when there is consent, and when it is conducted by accredited scientific researchers. The rule was further explained and then outlined in a

30 *Id.* at 5.

31 *Id.*

32 *Id.* at 15.

number of test cases where it was found to apply. Finally, this review discussed other alternatives of stem cell research. Although these other methods have potential, many agree that researchers should still explore the potential of embryonic stem cells. This has been a controversial subject, but both sides of the debate have justification. Compromising on the subject may be the only way to preserve and enhance life in both cases.