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Embryonic Stem Cell Research in the United States: Balancing Scientific Progress and Bioethics

Introduction

Stem cell research was and still is a hot debate topic. In this paper, we will discuss the controversy of this issue. We will begin by giving a brief background of stem cells and why they are important to human development. Next we will explain the potential applications of stem cell research. Next, we will look at the controversy involved in stem cell research, first from a theological point of view, and then the secular point of view. In the last section, we will explore the politics regarding stem cell research in the United States.

Background

What are stem cells? Stem cells are cells that have the ability to divide for indefinite periods in culture to specialized cells. Stem cells can be multipotent, pluripotent or totipotent. Multipotent stem cells are the most specialized stem cells; they give rise to one particular type of cell. Pluripotent stem cells are capable of forming into most tissues of an organism. Totipotent stem cells have unlimited capacity; being able to specialize as extraembryonic membranes and tissues, the embryo, and all postembryonic tissues and organs. A stem cell that is totipotent is said to have a *total* potential.[1]

These cells are a key factor in human development. When an egg is fertilized by a sperm it creates a single cell, the zygote, which is capable of developing into an entire human being. This resulting cell is a totipotent stem cell. After a few days, the zygote will form into a blastocyst. Inside the blastocyst is a group of cells called the *inner cell mass*. These cells are pluripotent, so they are able to develop into any type of cell in the human body. [2] However, it is important to note that they cannot form into an organism because "they are unable to give rise to the placenta and supporting tissues necessary for development in a human uterus." If one were to place a single inner cell mass into a woman's uterus, it would not develop into a fetus. [3] With that said, a pluripotent cell's potential is not total. Afterward, these pluripotent stem cells are further specialized into multipotent stem cells. The most well known multipotent stem cells are blood stem cells and skin stem cells.

Applications

Now that we know what stem cells are capable of, the next question is: What can we use them for? The most prominent application that can be realized from stem cell research are cell

[1] National Institutes of Health. "Stem Cells: A Primer." The Stem Cell Controversy. Ed. Michael Ruse and Christopher A. Pynes. Amhearst: Prometheus Books, 2006. 28.
[2] National Institutes of Health, 29.
[3] National Institutes of Health, 29.

therapies. Many of the diseases and disorders that afflict humans are a result of the "disruption of cellular function or destruction of tissue in the human body".[4] For example, Type I diabetes is caused from the disruption of insulin producing cells in the pancreas, called islet cells. The most common treatment for Type I diabetes is insulin injections. However, it has been found that "transplantation of an entire pancreas or islet cells can help mitigate the need for insulin injections".[5] With stem cells, we could create a stem cell line that will develop into islet cells. These cultured islet cells can then be transplanted to Type I diabetics, potentially curing them of the disease.

Furthermore, stem cells can be a solution to curing Alzheimer's disease or paralysis, a result from brain damage or spinal cord injury, respectively. Similarly, by using stem cells to culture certain brain cells or neural cells it is possible to be able to replace the damaged cells.
To summarize, stem cells can be used to "rejuvenate failing tissues: organs, nerves, spines, and brain tissue"[6]; thus we can help people overcome debilitating diseases such as Alzheimer's, Parkinson's, heart and liver failure, and cancer.

Do embryos have the same rights as people? -- Religious Issues

Most of the religious controversy is centered around the Catholic Church. Where the Catholic Church stands on the stem cell controversy is illustrated in the *Donum Vitae*, distributed by the Congregation for the Doctrine of the Faith on February 22, 1987. Many of their arguments against stem cell research is based on the moral opinion that one must "defend and promote life" as Pope John Paul II encourages.

The Pope refers to biblical passages to help answer the questions such as "When does life start?" and "When does one achieve moral status?" One such passage says, "Before I formed you in the womb I knew you, and before you were born I consecrated you." The Pope uses this as evidence that God intends life to begin from the very beginning of conception in a female's womb. So stem cell research, which effectively destroys the blastocyst cell when stem cells are harvested, is a "crime against their dignity as human beings who have a right to the same respect owed to a child once born, just as to every person."[7] Unsurprisingly, Catholic Church is opposed to stem cell research, and thus many of its followers are in the same position. But what about the fact that stem cell research promises cures or relief to those suffering from diseases and disorders? The Catholic Church has a dictum that says, "A good end cannot justify an evil means."[8] This means that the actions you do cannot be justified by the good that comes of it. To the Catholic Church, "the action of harming or destroying an embryo is inherently wrong and its wrongness cannot be lessened in any way by the potential therapeutic procedures that may result."[9]

Even though stem cell researchers have good intentions, the Catholic Church will not budge in its position against it.

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[4] National Institutes of Health, 31.
[5] National Institutes of Health, 32.
[6] Peters, Ted. "The Stem Cell Controversy." The Stem Cell Controversy. Ed. Michael Ruse and Christopher A. Pynes. Amherst: Prometheus Books, 2006. 223.
[7] qtd. Kalbian, Aline H. "Stem Cells and the Catholic Church." The Stem Cell Controversy. Ed. Michael Ruse and Christopher A. Pynes. Amhearst: Prometheus Books, 2006. 244.
[8] Kalbian, 244.
[9] Kalbian, 244.

Do embryos have the same rights as people? -- Secular Issues

Are human embryos human beings? If so, do we have the moral imperative to protect them as we do for all human beings? Embryonic stem cell researchers are often interrupted by concerned voices who passionately believe that human embryos are indeed important enough to be called "human". Many of these voices don't doubt the lifesaving potential of stem cell research to uncover new forms of regenerative medicine. However, opponents reject stem cell research because it necessarily involves the destruction of human embryos.[10] They argue that destroying human embryos is immoral because it destroys human life.[11]

Still, not all opponents agree on the exact moment when an embryo is actually entitled to ethical consideration. According to Dr. Cynthia Cohen, a bioethicist at the Kennedy Institute of Ethics at Georgetown University, there are four main views of when an early human embryo is deserving of such ethical consideration: (1) the time of fertilization view; (2) the fourteen-day or later view; (3) the potentiality view; and (4) the group of human cells view. These views "start from the assumption that individual human beings are owed great moral consideration and then attempt to fix the time at which these humans come into being".[12]

The *time in fertilization view* argues that all human life begins as a result from the joining of a sperm and an egg. Because "everybody" began this way, "all fertilized eggs must be individual human beings".[13] Robert George, a member of the President's Council on Bioethics, maintains:

> 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.[14]

Supporters of this view argue that because human embryos are humans, just as we do not kill one life to save another, we should not kill embryos in the process of conducting stem cell research, even if it could enable us to save many other lives. Supporters include President George W. Bush, as well as major embryology textbooks, such as one that states, "A zygote is the beginning of a new human being."[15] However, some opponents of this view contend that it does "not seem obvious" that all fertilized eggs must become individual human beings, since the development of an embryo depends "largely on its interactions with neighboring cells and other environmental cues, and that the genotype of the zygote does not determine the organization and development of the early embryo once and for all".[16] Moreover, due to many complications that can occur after fertilization, as many as 75 to 80 percent of all early embryos die early in pregnancies.[17]

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[10] Lako, M, AO Trounson and S Rainey Daher. "Law, Ethics, Religion, and Clinical Translation in the 21(st) Century." Stem Cells (2010), 2.

[11] Cohen, Cynthia B. Renewing the Stuff of Life: Stem Cells, Ethics, and Public Policy. New York: Oxford University Press, 2007, 59.

[12] Cohen, 61.

[13] Cohen, 61.

[14] George, Robert P. The Clash of Orthodoxies: Law, Religion, and Morality in Crisis. Wilmington, Del.: ISI Books, 2001, 320.

[15] Doerflinger, Richard M. "Old and new ethics in the stem cell debate." The Journal of Law, Medicine & Ethics 38.2 (n.d.): 212-9.

[16] Cohen, 64-65.

[17] Cohen, 65.

Supporters of the *fourteen-day or later view* argue that the development of an early human embryo depends on a sequence of events that "leads to the formation of a distinct individual with differentiated parts at about day fourteen". After the fourteenth day, the cells in the embryo develop enough such that "the brain, the nervous system, and the organs of the body" become distinguishable. They argue that embryonic stem cells harvested before this time is ethical because the embryo is not a human being.[18] Given this, do we owe an early human embryo any sort of moral consideration? According to the cloning report of the President's Council on Bioethics, the early human embryo "has a moral status somewhere between that of ordinary human cells and that of a full human person," declaring that:

> the embryo in its earliest stages (certainly in the first fourteen days) is not the moral equivalent of a human person but that it commands significantly more respect than other human cells. We also hold that the embryo can be used for life-saving or potentially life-saving research while still being accorded the "special respect" it deserves.[19]

Indeed, it can be observed that an embryo that dies naturally and prematurely does not evoke sadness of the same magnitude that a fetus would receive after a miscarriage, for instance.

The potentiality view argues that "even though the fertilized egg is not an individual human being, it is a *potential* human being and will, in the normal course of events, grow into an actual [human being]"[20] that can "think, feel, [and] anticipate the future".[21] Unlike the fourteen day view, the potentiality view opposes the destruction of not just an embryo, but also the fertilized egg created at conception. Some opponents argue that a fertilized egg is "not the same entity" as an embryo, but rather is the material from which an embryo develops.[22] A fertilized egg is not yet a human being, but rather only has the potential to become human, and is therefore not significant enough to have moral consideration.

The last of Cohen's four views of whether human embryos are individual human beings is the *group of human cells view*. Supporters of this view actually support embryonic stem cell research, arguing that an early human embryo "days after fertilization amounts to a group of cells clustered together that do not constitute specific differentiated cells or tissues", and are not entitled to any special moral consideration.[23] They reject the potentiality view, saying that the potential to become a human being is hardly the same as actually being a human being, "any more than a pile of building materials is the same as a house."[24] However, opponents claim that this view focuses only on the fertilized egg, so does not actually address whether it is morally acceptable to perform stem cell research on an *embryo*.

Must human embryos only be used for procreation? What about embryos that are donated through in vitro fertilization? There are potentially many more views besides these and the ones we have discussed above. The arguments concerning stem cell research raise valid and fundamental questions about whether such research is ethical. Supporters of the views described above assume we society is obliged to give an embryo every chance of becoming born into the

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[18] Cohen, 67-68.
[19] Bioethics, President's Council on. Human Cloning and Human Dignity. New York: Public Affairs, 2002, 173-175.
[20] Cohen, 73-75.
[21] Doerflinger, Richard M. "Old and new ethics in the stem cell debate." The Journal of Law, Medicine & Ethics 38.2 (n.d.): 216.
[22] Cohen, 76-78.
[23] Cohen, 78-79.
[24] President's Council on Bioethics, 169.

world. Traditionally, reproduction was the only end for embryos. However, as what occurs in many other areas of science and research, scientists inevitably discover new applications for the same entity. Acknowledging this, an embryo could potentially serve multiple, life-affirming ends besides reproduction. Specifically, only recently have such embryos become able to be used to *preserve* or *regenerate* lives that would have otherwise ended. The important question to consider is this: At what point in development does an embryo become human? Debates regarding this divisive and potentially intractable issue continue today, spanning communities, nations, and ideologies.

Policy Regarding Embryonic Stem Cell Research in the United States

On August 9, 2001, President George W. Bush appeared on national television to announce that the federal government will be prohibited from funding research of embryonic stem cells created after that day.[25] Mr. Bush continued to allow funding for such research done on stem cells harvested prior to this date, reasoning that embryos that currently exist are already dead, and that it is the destruction of *new* embryos that is ethically objectionable.[26] If only research using stem cell lines that already existed could receive federal funding, then, Mr. Bush argues, there would be no incentive for any further destruction of embryos.[27] This decision was borne out of ethical concern, because some believe early human embryos have inherent moral values, and that the destruction of the embryos is tantamount to infanticide. Yet despite his concern, Mr. Bush only banned the funding using public funds, but did not officially oppose the continuation of embryonic stem cell research in the private sector.[28]

Eight years later, President Barack Obama lifted the ban on the federal funding of human embryonic stem cell research. In the executive order signed on March 9, 2009, Mr. Obama stated that:

> research involving human embryonic stem cells… has the potential to lead to better understanding and treatment of many disabling diseases and conditions…[and] should be supported by Federal funds… and in so doing to enhance the contribution of America's scientists to important new discoveries and new therapies for the benefit of humankind. [29]

Through this order, Obama reversed the ethical decisions made during Mr. Bush's presidency and, according to Richard M. Doerflinger, Deputy Director of the Secretariat for Pro-Life Activities (United States Conference of Catholic Bishops), introduced "a model of the new ethic," in which:

> Progress and "science" are the ultimate values; alleviation of human suffering will drive the enterprise; moral objections raised against the destruction of human life at an early stage of development are mere "ideology," "politics," or… "dogma."[30]

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[25] McLaren, Anne. "Ethical and social considerations of stem cell research." Nature (November 2001): 130.
[26] Sandel, 208.
[27] Brock, Dan W. "Creating Embryos for Use in Stem Cell Research." The Journal of Law, Medicine & Ethics 38.2 (2010): 229.
[28] Sandel, Michael and Phil D, 209.
[29] Administration of Barack H. Obama. "Executive Order 13505." 9 March 2009.
[30] Doerflinger, 216.

While these goals are admirable, Doerflinger reasons that the nation's values regarding stem cell research shouldn't be a "push-and-pull game" based on whoever party is in power to determine the personhood of an early human embryo. Instead, our collective reason to pursue embryonic stem cell research should be based on "something deeper and more fully committed to respect" for all members of the human race.[31]

Conclusion

Will embryonic stem cell research laws reverse course once again when the United States elects a new president? Should the decision to allow the harvesting of early human embryos potentially depend on the question of life and death? Perhaps the most powerful reason to support embryonic stem cell research is its incredible potential to save lives. If this were not the case, then the public opinion toward this research could be considerably different. As one stem cell expert in the United Kingdom has said:

> One of the problems is that in order to persuade the public that we must do this work; we often go rather too far in promising what we might achieve. This is a real issue for the scientists. I am not entirely convinced that embryonic stem cells will, in my lifetime, and possibly anybody's lifetime for that matter, be holding quite the promise that we desperately hope they will.[32]

Stem cell research holds many promises, but like a wish upon a star, such predictions are not guaranteed to come true. The contentious debate about the personhood of embryos provides valid points from both sides, although Obama's support will encourage even more controversy in the field. For the supporters who cheer and celebrate our scientific progress, stem cell research gives hope that they or their loved ones may benefit from lifesaving treatment one day. But for the many who oppose the destruction of embryos, their concerns regarding of the moral status of the embryo may go unheard, at least for the time being.

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[31] Doerflinger, 216.

[32] Prof. Lord Robert Winston. Gresham Special Lecture. 20 June 2005. 3 12 2010 <http://www.gresham.ac.uk/printtranscript.asp?EventId=347>.

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