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Genomics
December 2002
Final Paper

Stem Cell Research: Issues and Ethics

Injured in an equestrian accident in May 1995 Christopher Reeve, the actor famed for his role as "Superman," is now a paraplegic. Since his accident, he has become a leading supporter of research to develop effective treatments for those affected by spinal chord injuries and other central nervous system disorders. Reeve testified in favor of federally funded stem cell research before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education and related agencies. His greatest hope for effective treatment and recovery lies in the promise and potential of stem cell research.

> I have personally seen rats who were made paraplegic in the laboratory fully recover after treatment with embryonic stem cells derived from their own species. There is no reason not to believe that the same can be done for people. [1]

Reeve's optimism about the possibilities of stem cell-related treatments, his powerful testimony, and his highly personal plea are persuasive arguments in favor of aggressive such research.

The potential medical applications of stem cell research may extend to many other conditions in addition to paralysis. Stem cells have a unique ability to both self-renew and give rise to other cell types and are responsible for replacing lost cells in most tissues. [2] Because of this attribute, stem cells may be able to benefit patients with diabetes because they could be induced to produce insulin. Similarly, if stem cells could grow cardiac cells, scientists might be able to replace damaged heart tissue in someone who has had a heart attack. By growing nerve cells scientists could potentially repair brain cells damaged by Alzheimer's or Parkinson's. Other conditions that could benefit from stem cell-derived treatments include MS, ALS, strokes and even burns.

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[1] "Stem Cell Research and Spinal Chord Injuries" An online discussion with Christopher Reeve. Thursday, July 12, 2001. Washington Post. http://discuss.washingtonpost.com/wpsrv/zforum/01/nation_reeve061201.html/

[2] Alan Colman and Justine Burley, "A Legal and Ethical Tightrope: Science, Ethics and Legislation of Stem Cell Research," EMBO Reports. European Molecular Biology Organization. p 2.

With all the promise associated with stem cell treatment, why are so many hesitant, or even adamantly opposed to continuing research? A large source of debate comes from the source of these stem cells. They can be found in adult human tissues including bone marrow and have long been used in treatments such as bone-marrow transplants. However, the medical potential of a stem cell is believed to be far greater if derived from an embryo. Embryonic stem cells, because they have not yet differentiated, are totipotent, capable of giving rise to practically any kind of human tissue. [3] These cells are harvested from the embryo approximately one week after fertilization, after the inner cell mass has formed. Removing the stem cells from at this 100-150 cell stage destroys the embryo.[4] The embryos used for this research are often the "left-overs" from in vitro fertilization (IVF), embryos that are discarded if not donated to another mother or to research. Even so, those who esteem the human embryo, even at this early stage, as equivalent to a human life feel it is morally wrong to destroy the embryo, no matter what the medical justification. In the eyes of such critics, stem cell research gets tied up in the debate over abortion. And though stem cells may be able to save lives of the living, these critics say it is at the expense of another "human life".

The third source of stem cells is from embryos created in the laboratory by implanting the patient's DNA into a denucleated egg cell. This technology has great appeal because it would prevent the otherwise probable rejection of the cultivated tissue by the patient's immune system. However, this method also presents an ethical dilemma because the same technology would be used for reproductive cloning. The procedure raises moral concerns regarding the creation of human embryos with the sole purpose of destroying them in order to obtain replacement cells for the patient who provided the nuclear DNA. [5]

These ethical issues behind stem cell research incite strong opinions from various religious groups. However, there has been no kind of theological consensus. On the contrary, many religious groups have taken polar opposite positions on the stem cell debate. Opinions often vary even within denominations.

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[3] Anne McLaren, "Ethical and Social Considerations in Stem Cell Research" Nature. Macmillan Magazines Ltd. 1 November 2001. p 129.
[4] Mclaren, p130.
[5] John A. Robertson, "Human Embryonic Stem Cell Research: Ethical and Legal Issues," Nature. Macmillan Magazines Inc. January 2001. p 76.

Reverand Archie LeMone, of the Shiloh Baptist Church in Northwest Washington, spoke for many in predominantly black Baptist denominations when he said, "We don't want stem cell research to go awry for profit." African Americans, he explained, whose ancestors came to this country as slaves, "the first form of human commodity," want to ensure that the buying and selling of humans will not be allowed again. [6] LeMone's concerns stem in part from the possibility that embryos and procedures might be patented.

Catholic officials have been some of the most strongly opposed to stem cell research. President Bush personally visited Pope John Paul II in July of 2001 and received an unexpected sermon on the evils of embryonic stem cell research. Like adamant anti-abortionists, the Catholic Church ardently opposes any research on human embryos because it regards the fertilized oocyte as warranting the same protections as adult human beings.[7] Catholics, like Southern Baptists, express "vigorous opposition to the destruction of innocent human life, including the destruction of human embryos," fearing that the use of embryos in research "would likely lead to an increase in the number of abortions and create a market for aborted embryos and other fetal tissues."[8]

The Jewish community, however, even in its most conservative divisions, takes a different stance. The Rabbinical Council of America, representing the country's largest organization of Orthodox Jews, supports funding stem cell research on embryos that otherwise would be discarded. "Our rabbinic authorities inform us that an isolated fertilized egg does not enjoy the full status of person-hood and its attendant protections," the council stated in a letter to President Bush. [9] Similarly, the United Synagogue of Conservative Judaism believes "it is not evil to do this research…[and that] an embryo outside the womb is not a human being."[10]

The Presbyterian Church also supports stem cell research. At its general assembly in Louisville in June, the church passed a resolution supporting "the use of fetal…and embryonic tissue for vital research" that could result in the healing of illness. Their position did not change

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[6] Bill Broadway, "Faith is a Force on Both Sides of the Stem Cell Debate: Religious commuities split sharply on permitting embryonic research," Washington Post. August 4, 2001. p B9. washingtonpost.com archives.
[7] EMBO, p 3.
[8] Broadway.
[9] Broadway.
[10] Broadway.

if the cells were taken from embryos discarded after IVF or from fetal tissue after abortions.[11] Muslims too sustain stem cell research, though limit their support to the use of "early embryo leftovers" in fertility clinics in research aimed at curbing and eliminating disease.[12]

One religious position surprising to many is that of the Church of Jesus Christ of Latter Day Saints. Mormons, known for their moral conservativism and political activism against abortion and government recognition of gay marriage, have been one of the strongest sources of religious support for stem cell research. Utah Senator Orrin Hatch and Oregon Senator Gordon Smith, both Mormon Republicans, were leaders of a movement within the Republican Party urging President Bush to fund embryonic stem cell research. All five Mormon senators, both Democrats and Republicans, spoke out for such funding despite their universal pro-life views. The Mormon stance is more flexible than the Catholic because of a vital difference in theology. Whereas Catholics believe life begins at conception, Mormons hold that each person lived as a spirit child of God prior to being born and received a physical body on Earth. From this point of view, life on earth begins not at conception but with the union of body and spirit when or after the embryo is implanted in the uterus.[13]

Many believe in an effort to appease both sides of the ethical and religious debate over stem cell research, in August of 2001, President George W. Bush announced his decision to approve limited Federal funding of stem cell research. Bush restricted finance to 60 existing stem cell lines, thus preventing any further destruction of human embryos.[14] The Bush decision did not limit stem cell research in the private sector. Initially six out of ten Americans approved of Bush's decision, and nearly 20% of those who disapproved said they did so because they felt his position was not strict enough.[15] However, today, "a year after President Bush's decision on stem cell research, scientists say they are being hindered by federal rules governing the use of embryonic stem cells because access to stem cell lines approved for research is limited."[16] The

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[11] Broadway.
[12] Broadway.
[13] Drew Clark, "The Mormon Stem Cell Choir," August 3, 2001. http://slate.msn.com/?id=112974
[14] George W. Bush. "Remarks by the President on Stem Cell Research" August 9, 2001. http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html
[15] Poll: Public responds to Bush stem cell decision. August 13, 2001. http://www.cnn.com/2001/ALLPOLITICS/08/13/stem.cell.poll/
[16] "The Stem Cell Debate" December 9, 2002. http://www.cnn.com/SPECIALS/2001/stemcell/

Bush decision has led to many problems including a lack of government restriction over potentially unethical practices in the private sector, growing concern over possible instable karyotypes of stem cells if greatly amplified in culture, continued destruction and/or inutility of unused IVF embryos, and an increasing number of American scientists leaving the United States to conduct their research in other countries where restrictions are less limiting.

Laws regarding stem cell derivation and research vary widely from one country to another. In Israel derivation of human embryonic stem cell lines from "spare" IVF embryos is permitted. Here in France the 1994 Bioethics Law prohibited human embryo research for a period of 5 years, but after careful deliberation, research on embryos has now been authorized to include the study of new therapies based on stem cells—and this from a country that is well over 50% Catholic! The Israeli model carefully qualifies the type of embryos to be used for research without greatly limiting scientists' access to them. The French model instead qualifies the application of stem cell research—to therapeutic treatments. In combination, these two models demonstrate how Federal law could avoid reproductive cloning, and prevent the destruction of any embryos that are not already destined for that fate. The UK and other European Union members offer effective models for just that. The Human Fertilisation Act of 1990 in the UK permits research that involves the creation and use of embryos for only five specified research purposes including infertility treatment. In August 2000 a report was submitted to the government advocating broadening the range of permissible research to understand better human disorders and diseases. As of last year the report was still awaiting Parliament approval. Similarly, one year ago, the European Group on Ethics in Science and Technology (EGE), an advisory board that reports to the president of the European Union, published a opinion on the "Ethical Aspects of Human Stem Cell Research and Use" recommending European funding for stem cell research and the use of "spare" embryos from IVF for deriving embryonic stem cells. [17] Compared to the UK and the rest of Europe, the United States has the most permissive policy regarding stem cell research.

Throughout the quarter we have discussed the potential genomics offers medicine. As with sequencing the human genome, stems cell research carries with it great promise for future health care. Many of the ethical concerns expressed by some religious groups and apprehensive conservatives are valid. However, rather than limiting the amount or speed of research, we

[17] EMBO, p 4.

should be directing our energies toward regulating the applications of this research. Just as with genome sequencing, it is necessary to establish laws that guarantee this technology may only be used for the good—both of the individual patient and of society. Just as Estonia provides a model for effective law-making regarding gene sequences, the United States can look to Europe for potential legislative models regarding stem cell research. A more lenient ruling regarding federal funding would most likely require a sway of public opinion. This change in public opinion would probably naturally result from a better public understanding of the technology, its applications, and potential, if combined with increased voter participation. This leads us back to a prominent theme of the course, that with increased knowledge comes increased responsibility—in this case the responsibility to help educate those around us and then express our views politically (by voting and writing letters to governing representatives).