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Rachel Smith

Bioethics Thesis

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Human Embryonic Stem Cell Ethics

Recent advances in human stem cell research have generated boundless enthusiasm on the part of researchers as well as igniting a debate over the morality of the research. The ethical discussion concerning stem cell research is rarely simple. Like most moral quandaries, it is fraught with many layers of complexity, encompassing divergent ethics, faiths, and cultural backgrounds. Dr. Chris MacDonald, of the Dalhousie Bioethics Department writes, “Ethics, as a discipline, is about careful consideration of issues that matter to human well-being and to human freedom. The debate over stem cell research sits squarely within this domain. In practical terms, ethics requires arriving at courses of action that seem reasonable – if not always ideal – to one’s neighbors” (1).

All agree that research on human stem cells has amazing potential. The moral conflict arises because in the creation of embryonic stem cell lines, or colonies, potentially viable embryos are destroyed. There are four sources of fetal stem cells, and all of them have complex ethical issues surrounding their use in research.

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In examining the controversy surrounding the practice of research on fetal stem cells, it is important to note that there are four very different ways of obtaining stem cells. The first method involves obtaining discarded embryos from fertility treatments at In Vitro Fertilization (IVF) Clinics; the second involves researchers combining donated eggs and sperm in the laboratory to create embryos on which to do research; the third are embryos created through SCNT, or somatic cell nuclear transfer, a device that allows fertilization of an egg without the use of sperm; and the fourth method entails deriving tissue for research from aborted fetuses to get embryonic germ cells. Each of these four methods is morally problematic in its own way.

(1) The moral argument regarding the use of embryonic stem cells obtained from surplus embryos created during fertilization therapy is possibly the most simplistic. Many who otherwise do not condone fetal stem cell research support the scientific use of discarded IVF embryos, believing that to use them in research respects the dignity of the embryo more than humanely disposing of it does. Even some of the sources that President Bush drew on to make an educated choice about the future for federal funding of human embryonic stem cell research support the work. The American Association for the Advancement of Science, whose paper “Stem Cell Research and Applications: Monitoring the Frontiers of Biomedical Research” was instrumental to President Bush’s decision, believes that fetal stem cell research on IVF embryos is appropriate. They write, “The most ethical source of human primordial stem cells is embryos produced for the process of in vitro fertilization whose progenitors have decided not to implant them” (8). Surplus embryos exist because multiple embryos are created through the process of aiding a woman or couple in conceiving a child. An ova donor can provide up to 30 eggs

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in a single cycle. While the procedure has been significantly refined in the thirty years since it was first successfully performed, completely successful fertilizations still rare enough statistically that all of the eggs that have matured are harvested. In a majority of the cases, up to 50% of the resulting embryos are not viable. It often takes several attempts at implantation before an embryo or embryos successfully embed in the endometrium, making it important to try to fertilize all of the ova (Schmidt). Robert Edwards, a scientist who was part of the first successful birth of an embryo implanted through IVF, writes that “it is also clear now that the chances of success, i.e. of establishing a clinical pregnancy, have not improved greatly . . . the chance of a single embryo implanting [today] is not much greater than 15%” (46). However, in most cases, between one and twenty viable embryos are not implanted. Recently, some have chosen to donate these embryos to science.

Louis Guenin, Professor of Ethics at Harvard Medical School believes that because discarded IVF embryos have no chance to be actualized, “it seems difficult to deny that relieving widespread suffering is morally better than destroying embryos at no gain” (27). Guenin makes a case for research on IVF embryos by arguing that doing research on them has the potential to help the human race, while euthanizing them helps nothing. Because he admits only two potential ends for the embryos, he is able to easily conclude that doing research on IVF embryos is the morally superior treatment. But this argument alone is not enough to determine the morality of research on IVF embryos.

First, if it is to be concluded that the embryos otherwise have an intrinsic right to develop into conscious and reasoning persons, consenting to the research would be, by definition, immoral. An immoral act resulting in a potential good cannot be considered moral

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(Knight). Second, the argument cannot be based on the idea that doing research on surplus embryos is a more dignified end because otherwise they would simply be euthanized. While the concept of sacrificing a minority to benefit the greater human race is widely utilized, it should be emphasized that all excess embryos are not destroyed. Women or couples undergoing fertility treatments may pay up to \$20,000 to a young woman who agrees to donate eggs in addition to the medical costs incurred for both the ova retrieval and the embryo implantation procedures. The prohibitive cost deters many from looking into IVF as a viable option, but another alternative exists. More and more people are choosing to adopt embryos. Thus, arguing that research on IVF embryos is moral because embryos have no other potential end is not an acceptable argument. Some disagree vehemently with the use of discarded IVF embryos as part of research. They argue that such embryos should be adopted just as orphaned or abandoned children are adopted. Subsequently, they regard the embryos as not only possessing all the genetic material that makes them human but also deserving all of the rights fundamental to human persons. Dr. Pellegrino avers, "I oppose any system of research that is based on destruction of living human embryos. They are members of the human species from conception and therefore have special moral status. To set a cutoff point of 14 days, prior to which an embryo may be used for research, is totally arbitrary" (1). Some argue that while they would not otherwise support human embryonic research, because extra IVF embryos generally end up being euthanized, research is a better end. Dr. Pellegrino disputes that argument, for "you can't do something that is intrinsically wrong even if good may come of it" (1). His argument is sound so long as one accepts the premise that utilizing human embryos for research is fundamentally wrong. Similarly, his assertion

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that the fourteen-day restriction on research on embryos is totally arbitrary is not totally accurate. The fourteen-day benchmark after which no research can be conducted on embryos refers to the differentiation occurring within the embryo. Fourteen days after fertilization, it is growing rapidly, and on day 16, appearance of the primitive streak signals the beginning of gastrulation. While the embryo changes and matures in very important ways during every day post-fertilization, the occurrence of the primitive streak is considered an important developmental event, and an appropriate time to halt embryonic research (Warnock Committee).

Yet some of those most vehemently against fetal stem cell research argue the use of embryos at any stage of development is tantamount to destroying a human life. The Center for Bioethics and Human Dignity, in their essay “On Human Embryos and Stem Cell Research: An Appeal for Legally and Ethically Responsible Science and Public Policy” write “Human embryos are not mere biological tissues or clusters of cells; they are the tiniest of human beings” (4) and they quote the 1995 Ramsey Colloquium statement on embryo research which reminds the reader that:

The [embryo] is human; it will not articulate itself into some other kind of animal. Any being that is human is a human being. If it is objected that, at five days or fifteen days, the embryo does not look like a human being, it must be pointed out that this is precisely what a human being looks like—and what each of us looked like—at five or fifteen days of development. (qtd. in Center for Bioethics and Human Dignity 2)

Both sides of the debate argue that without legislation regarding IVF embryo donation, unethical publicly owned companies would finance such experimentation. Dr. Edmund Pellegrino, Director of the Center for Clinical Bioethics and an opponent of human

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embryonic research, writes that so long as there are no federal sanctions on the research, “There is a coalition of scientists eager to do the research, and there are biotechnology companies eager to profit from it” (1). Dr. Myron Genel, Chairman of the AMA’s Council on Scientific Affairs, and an advocate of human embryonic research writes, “Pluripotent stem-cell research is so promising that it will inevitably take place in the private sector. Federal funding would ensure scientifically rigorous research. More important, federal oversight would provide assurances that the acquisition of discarded embryos takes place with respect and donor consent” (1).

Though the argument for adoption of surplus embryos rather than research is very strong, it should also be noted that approximately 100,000 embryos currently exist frozen in nitrogen gas. As IVF has only recently become affordable for middle-class women and couples, it seems likely that in the next decades the number of embryos frozen in stasis will rise sharply. Even if all of the people interested in adopting embryos were able to adopt, it seems unlikely that all of the surplus embryos would be utilized. Thus if policy-makers choose to make embryonic research illegal, the majority of the surplus embryos will eventually be discarded due to the lack of enough adoptive families. While federal guidelines still allow privately funded IVF research, one state has chosen to take an unequivocal stand on this specific issue. Louisiana has prohibited any research on IVF embryos.

(2) The morality of embryos created purely for research by soliciting the donation of an ovum and a spermatozoon is questionable. Though some see little difference between embryos created during fertility treatments and embryos created for the express purpose of research, most ethicists disagree. Margaret Somerville, of the McGill University’s

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Center for Medicine, Ethics and Law, says “To transmit human life for no purpose other than its intentional destruction, we have to ask, Are we ethically justified in doing that?”

(7).

Many religions that support embryonic stem cell research do not advocate the creation of embryos purely for research. Though he admits it is a hotly debated question in the Islamic world, Abdulaziz Sachedina, Professor of Islamic studies in the religious studies department at the University of Virginia in Charlottesville says “The consensus among Muslims does not hold treat the embryo in first twelve days, that is before implantation, as a living being, although it does have a pulse . . . However, it is not permissible to fertilize an embryo simply in order to create a cell line for research purposes” (2).

Similarly, Courtney Campbell, Director of the Program for Ethics, Science, and the Environment at Oregon State University said Mormons believe that “human embryos are a developing form of human life and as such command special moral respect. Procuring embryos from infertility clinics is consistent with such respect. Creating embryos solely for research purposes reduces the human embryo merely to a resource and violates moral respect” (1). Further, many who disagree with the practice of creating embryos for research argue that there are sufficient IVF embryos currently in existence to fill the need for research. This makes the creation of more embryos an excessive act and inconsistent with respect for human embryos.

Some scientists argue that by creating embryos in the lab with the intension of using them for research, they have more control over the experiment. For example, while they might receive a surplus IVF embryo, they know little to nothing about the heredity of the embryo, and it is more difficult to do specialized tests on it. Most IVF embryos come

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from extremely healthy ova donors and generally healthy spermatozoa donors. With donated ova and spermatozoa, researchers can approach people with specific characteristics that they'd like to study. Sean Tipton, spokesman for the American Society of Reproductive Medicine says, "At one level, it's cleaner than using leftover embryos" (3). Further, the single embryo is often a limiting factor. One of the most important parts of scientific research is providing results that can be verified through repeating the research protocol. With individual embryos of unique unidentified genetic background, it might be impossible to reliably repeat some experiments.

The discussion about the creation of embryos for research purposes is not merely a theoretical debate. Over the years, several privately funded research studies have been conducted and publicized after soliciting the donation or sale of ova and spermatozoa from young people. The institutions that ran the studies included the Eastern Virginia Medical School and the Jones Institute for Reproductive Medicine, among others.

Conceivably, many more privately funded studies have occurred whose findings have not been brought to the attention of the media.

In the end, while it is true that allowing scientists to create embryos strictly for research purposes would allow them more latitude in scientific innovation, it is a weak argument for the unnecessary creation of embryos for experimentation. Were hundreds of thousands of surplus embryos not currently in existence in the United States and throughout the world as a result of the boom in IVF treatments, it would be a relevant argument. The Nuffield Council on Bioethics writes "As long as there are sufficient and appropriate donated embryos from IVF treatments for use in research, the Council takes the view that there are no compelling reasons to allow additional embryos to be created

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merely to increase the number of embryos available for ES cell research or therapy” (1).

In 1997, researchers at Eastern Virginia Medical School paid young women between \$1,125 and \$3,500 to donate ova for research. This also raises the question of exploitation of donors, since there is some medical risk associated with donating ova. Allowing researchers to be directly involved in soliciting donations of genetic material greatly increases the potential for influencing donors. Offering any sort of incentive, monetary or otherwise, to incite donation of ova for research has stopped for the time being in the wake of the very negative response of ethicists. With a lack of funding for such private research, few are undertaking stem cell research done on embryos created strictly for research and none are publicizing such endeavors.

(3) Embryos created through somatic cell nuclear transfer (SCNT) present a unique research opportunity and challenge. SCNT embryos are created through the combination of a donated ovum whose nucleus is removed with an adult cell’s gene-containing nucleus. The resultant cell can be caused to divide and to form an early embryo whose stem cells can be harvested. This procedure is the basis of cloning. The American Association of Medical Colleges says “Somatic Cell Nuclear Transfer (SCNT) or therapeutic cloning involves removing the nucleus of an unfertilized egg cell, replacing it with the material from the nucleus of a ‘somatic cell’ (a skin, heart, or nerve cell, for example), and stimulating this cell to begin dividing” (“Somatic Cell Nuclear Transfer (Therapeutic Cloning),” 1). Potentially, this therapy could mean stem cells that have complete immunological compatibility with the donor, because the ova are fertilized with the patient’s own genetic material.

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Cloning has been a hotly contested issue since English author Aldous Huxley published *Brave New World* in 1932. Research on embryos created through SCNT is approached warily because many consider cloning technology tantamount to cloning an actual human person itself. While the creation of an embryo through SCNT is considered biological cloning, all embryos created through SCNT for research are intended not to develop beyond 14 days, distinctly different than the purpose of reproductive cloning. The Nuffield Council on Bioethics, a traditionally liberal English institution, writes:

We consider that research into SCNT and other forms of reprogramming the nuclei of human somatic cells may potentially offer very significant medical benefits. Where such research falls within the remit of the HFE Act . . . [we would support] such research to be licensed. We understand that a possible objection to this is that it could prepare the ground for reproductive cloning. However, reproductive cloning (which has the intention of producing a new individual who is genetically identical to the nuclear donor) is not permissible under UK law; the purpose of this proposed use of SCNT, by contrast, is to allow research into means of producing stem cells for cell and tissue therapy. (“Stem Cells,” 2)

Though legislation has been passed completely banning all forms of cloning in the United States, California Senator Feinstein along with Orrin Hatch has already introduced a bill that would revise the legislation to only ban reproductive cloning, allowing research currently being done in her state to continue unchecked.

The first research institution to take advantage of a new California state policy allowing stem cell research has been Stanford University, in Palo Alto. After receiving a substantial anonymous grant, in December Dr. Irving Weissman, Director of the Institute

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for Cancer/Stem Cell Biology and Medicine announced that Stanford would be doing research using embryos created through SCNT. Stanford released a statement that read “Creating human stem cell lines is not equivalent to reproductive cloning . . . in creating a stem cell line, cells are removed from the developing cluster. These cells can go on to form many types of tissue, but cannot on their own develop into a human” (“Stem Cell Information and Resources,” 1).

Research on embryos created through SCNT has ethical problems similar to those posed by embryos created for research. By definition, research cannot be done on spare IVF embryos, and many proposed embryonic research protocols require the use of SCNT to obtain a stem cell line appropriate to the experiment. Thus the argument expressed by the Nuffield Council for Bioethics against the creation of more embryos for research is not applicable for embryos created through SCNT. Similarly, a large supply of ova must be available to be combined with the adult stem cells, creating supply problems if ova donations remain uncompensated and creating ethical problems if donors are compensated. While some, like most conservative Christians, unequivocally believe that creating SCNT embryos for research is wrong; other ethicists find the issue more ambiguous. As recently as December of 2000, the Vatican’s weekly newspaper *L’Osservatore Romano* editorialized SCNT, saying that it was an “extremely positive element” of modern science (“SCNT Editorials,” 1). Just a week later, a responding editorial from top Bishops concluded that it was too soon to tell whether SCNT was licit because they weren’t sure if the product of SCNT is human life (“SCNT Editorials,” 1). Another objection is that the use and refinement of SCNT may assist human reproductive cloning in the future.

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While California state law has allowed and even encouraged Stanford's new research program, research on embryos created through SCNT is illegal in Iowa, Michigan, and arguably Virginia. Four other states have enacted laws controlling the SCNT technology, but their legislation is aimed at prohibiting cloning aimed at beginning a pregnancy only. Despite vigorous protests, however, ultimately the research at Stanford is ongoing, leaving both secular and religious ethical questions regarding the authenticity of the research unanswered.

(4) The final means of deriving tissue for fetal stem cell research comes in the form of germ cells. Embryonic germ cells are tissue derived from the unformed reproductive organs of 5 to 10 week old fetuses. While they cannot differentiate into as many specialized cell types as embryonic stem cells, embryonic germ cells are still considered primordial cells whose potential to differentiate is far greater than other sources such as adult stem cells. Germ cells are obtained through elective abortions, raising unique ethical issues.

Groups on both sides of the abortion debate condemn the use of aborted fetuses in research. The United Methodist Church, a traditionally liberal institution that advocates a woman's right to choose abortion, condemns the use of aborted fetuses for research ("Church official lauds Bush's stem cell research decision," 1). President Bush, who in late 2002 supported a ban of certain types of abortions, took an early stand on the issue of research on aborted embryos on January 26, 2001, stating in a public speech, "I believe we can find stem cells from fetuses that died a natural death, but I do not support research from aborted fetuses." At first it might seem surprising that such divergent groups would both oppose the use of aborted fetal tissue in research. Yet many individuals and groups

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who advocate the opportunity to choose abortion do so because they support free choice, not because they believe that abortion is inherently right. Princeton President and Chair of the National Bioethics Advisory Commission Harold Shapiro writes, “by using aborted fetuses for important scientific and clinical research, [some groups believe that] you provide indirect support for the decision to abort by lending that act some moral worth” (1). In opposing germ cell research, groups that support an individual’s right to make an unbiased choice without indirectly lending moral credence to the act of abortion.

Ultimately, few openly support the use of germ stem cells in research.

In the end, some groups condemn all four means of obtaining embryonic or germ tissue for research. They propose that rather than using any sort of embryo in research, adult stem cells should be harvested for experimentation. They argue that adult stem cells have just as great a potential as embryonic stem cells. While embryonic stem cells are able to proliferate a year or more in a laboratory, most adult stem cells cannot proliferate for extended periods of time, making it difficult to obtain the infinite supply of cells needed for transplants. Discovered among differentiated stem cells in tissue or organs, adult stem cells can only differentiate to yield the major specialized cell types of the tissue or organ. Embryonic stem cells, on the other hand, have the potential to differentiate into virtually any specialized cell type. Groups opposing all human embryonic stem cell research believe that using adult stem cells would eliminate the moral problem inherent in the creation of fetal stem cell lines, because adult stem cells can be harvested without harming the cell source.

THE ETHICS

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The ethics of the embryonic stem cell research are at once complex and multi-faceted. In this presentation of the ethics underlying the research debate, I will discuss some of the major ethical positions both supporting and opposing human embryonic research. My paper will by no means comprise a complete survey of the ethical positions regarding embryonic research; that would be the work of hundreds of pages rather than an undergraduate thesis. Instead I will focus on more mainstream arguments.

At this time in history, like perhaps no other, our society faces immense ethical dilemmas compounded by the speed at which new technology is being invented and scientific breakthroughs are being achieved. These amazing new techniques promise to change science and medicine as we know them, both altering current procedures as well as the way we think about those procedures. In the last two decades, many have increasingly warned that we are getting ahead of ourselves, utilizing new discoveries in science and medicine before their ramifications are fully explored. Dr. Thomas Shannon, a Professor of Religion and Social Ethics at Worcester Polytechnic Institute, writes in *An Introduction to Bioethics* “the record of technology is certainly a mixed one. Clearly technology has brought benefits . . . other technologies have fairly negative consequences” (11).

One such technology, many argue, comes in the case of human pluripotent stem cells. Isolating and culturing human embryonic stem cells has only been possible since late 1998, but by 1999 scientists were already beginning research using embryonic stem cells. But is the use of human embryonic stem cells in research ethically acceptable? These issues bear very careful review and consideration. In studying embryonic stem cell

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research, this survey of ethical systems will concentrate on ethical positions that are frequently used in conjunction to this particular issue.

One of the fruits of the development of modern society is that we consider all human life precious, regardless of race, social standing, or intelligence. Human life is considered sacred either traditionally as a gift from God or because the person “is an inherent center of value [in and of themselves]” (Shannon 46). This paper will primarily address western religious conceptions of embryonic stem cell research. It is important to remember, however, that religions centered in countries that have no legislative or scientific response to the stem cell debate offer unique and important additions to the human embryonic research question. For example, Damien Keown, Editor of the online Journal of Buddhist Ethics writes, “Buddhism teaches that individual human life begins at conception. By virtue of its distinctive belief in rebirth, moreover, it regards the new conceptus as the bearer of the karmic identify of a recently deceased individual, and therefore as entitled to the same moral respect as an adult human being” (1). These views, however, do not represent a large number of people currently making decisions about embryonic research. Of the western religious traditions, Christianity, Islam, and Judaism are predominant, and deserve special consideration.

The Christian argument regarding human embryonic experimentation is complex and ongoing. The Christian denominations and groups that support the research are greatly outnumbered by those who oppose it. The argument against human embryonic research can be broken down into those denominations that oppose research because they believe in life as a basic good, those that believe research is wrong on the basis of their

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interpretation of the Christian narrative, and those that oppose research because God has instructed them through the Bible that embryos are human persons.

The Catholic Church was an early opponent of human embryonic research, and continues to act as a religious leader opposing any sort of embryonic stem cell research. Life, Catholicism holds, is an intrinsic good, something we have a moral responsibility to protect. The Vatican dealt with the question of personhood swiftly and absolutely in 1997 with *Evangelium Vitae*, later writing in the Declaration on the Production and Scientific and Therapeutic Use of Human Embryonic Stem Cells:

The living human embryo is - from the moment of the union of the gametes - a human subject with a well defined identity . . . [it] has the right to its own life; and therefore every intervention which is not in favor of the embryo is an act which violates that right . . . [creating a stem cell line is] a gravely immoral act and consequently is gravely illicit.

(6)

Indeed, Pope John Paul II spoke out against stem cell research during his 2001 World Day for Peace speech, saying “Human life cannot be seen as an object to do with as we please . . . There can be no peace when this most basic good is not protected.... To [the list of world injustices] we must add . . . use of human embryos for research” (7).

Catholic ethicists Ronald Lawler, Joseph M. Boyle, Jr., and William E. May define the human good as that which perfects and completes human nature in their book *Catholic Sexual Ethics: A Summary, Explanation, & Defense*. They refine this definition in their treatment of basic goods, things that are pursued by people of all cultures. One such basic good, they opine, is life. By making choices that are compatible with the love of God and people, Catholics affirm basic goods. Actions that faith absolutely forbids are always

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wrong “because acts such as these are incompatible with the goods of persons which God calls us to love and absolutely respect” (Lawler, Boyle, and May 90). While they do not directly address the question of human embryonic stem cell research, it is clear that their position follows that of the Church, absolutely opposing such an action, arguing that it is incompatible with the basic good of life. Through affirming the basic worth of human life, the Catholic Church is absolute in its rejection of embryonic research as a practice. The Protestant view of embryonic stem cell research is more complex. In addition to being fundamentally pluralistic in nature, there are many organizations that claim to speak the will of Protestant denominations, but none that actually appear to have the right to that authority. Protestants rely on the importance of individual reflection on matters of ethics, and many Protestant ethicists have responded to the problem of embryonic stem cell research with their own unique conclusions. Reverend Terry Hamilton, the Chaplain of Queens College in North Carolina declared in a sermon:

According to the Presbyterian Church's Book of Order, when a person is baptized, the congregation answers this question: 'Do you, the members of this congregation, in the name of the whole Church of Christ, undertake the responsibility for the continued Christian nurture of this person, promising to be an example of the new life in Christ and to pray for him or her in this new life?' . . . no child belongs to his or her parents, but that every person is a child of God . . . every young one is our child, the church's child to care for. This is not an option. It is a responsibility. (qtd. in Hauerwas 1)

This sense of personal responsibility is common to many Protestant theologians and congregations, such as Episcopal and United Church of Christ churches (Robinson 1). A leading Protestant theologian is Stanley Hauerwas. Hauerwas, a United Methodist

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Professor of Theological Ethics at Duke University and author of numerous titles on Christian Ethics, has also been named “America’s Best Theologian” by Time magazine. Hauerwas concurs with Reverend Hamilton that the Protestant Church as a body has a responsibility to every person, particularly children and the unborn. Hauerwas argues that it is precisely this responsibility, given by God, and reiterated in Protestant teaching, that should lead Protestants to oppose abortion and subsequently embryonic stem cell research. Hauerwas writes that rather than considering life sacred in and of itself, we should recognize the special nature of life as a gift. If we consider it sacred, we imply that we must preserve life at all costs, and “Christians believe there is much worth dying for” (2). Instead, Hauerwas writes, “As part of the giftedness of life, we believe that we ought to live in a profound awe of the other's existence, knowing in the other we find God” (3). Second, responding to the question of when life begins, Hauerwas reminds his readers that Christians shouldn’t spend time deciding when life begins, but rather hoping that it has. “Having children, [then,] is an extraordinary act of faith and hope. But as Christians we can have a hope in God that urges us to welcome children” (3). Protestants should oppose human embryonic research, then, because as Christians they feel drawn to live in hope that the new life will enrich the existing community of believers. Terminating the pregnancy runs counter to the message of hospitality for the unborn and awe in the rich way human life can express itself. Hauerwas concludes that Christians should be known as “those peculiar people who don’t kill their [unborn] babies or their old people [through euthanasia]” (Time).

Many Protestants do adopt this view, opposing stem cell research as well as abortion, yet there are still conspicuous differences between Protestant groups. At least one

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denomination, the United Church of Christ, has chosen to support limited human embryonic research, and Presbyterian Church USA has issued statements espousing the research, but Evangelical Christians have a strikingly different view.

Evangelical Christians believe that they should be directed by the commands of God as revealed through the Bible, utilizing a form of moral values known as divine command ethics. The Evangelical Church has come out in strict opposition of using human embryos for research, basing their argument on Biblical references, and arguing that life is sacred from the moment of conception. Divine command theory, or the belief that “religion tells us how to act” (Hinman) is a form of theism, that is, the belief in a personal God who is the creator and ruler of the world. Evangelical denominations utilize divine command ethics, embracing the Bible as divinely inspired and utterly without error, “the final authority for all Christian faith and life” (“Official Creed of the Evangelical Free Church of America,” 1). One way that Christian denominations fit divine command ethics into their daily lives comes in the form of deontological ethics. Knowing from scripture what God directs them to do; Christians are bound to obey what they know as their duty absolutely.

Deontological ethics, or duty-based ethics, directs people to be guided by their principles. Dr. Shannon writes that an example of deontological ethics is “the Ten Commandments of the Judeo-Christian tradition. The Ten Commandments are basically a set of moral duties that tell what to do or not to do” (6). Practicing deontology can be enticing, because it includes a simple way to discriminate between possible actions. It is logical, and tends to be possible to make a solid decision quickly. It also has its drawbacks. Because it is based on a solid set of principles, there is very little room in deontological

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reasoning for individual reflection on a particular issue. Similarly, it doesn't take into account the circumstances in which an individual might find oneself. Deontological ethics, Dr. Shannon opines, "typically neglects the outcome of an act and is inattentive to substantive differences in the outcome of our actions or the way an unnuanced act can affect individuals or society" (6). A Christian's divine command practitioner's deontological duty can be discovered through study of the Bible.

The Bible describes in detail how precious the human creation is. Indeed their very image mirrors that of their Creator (King James Bible, Gen. 1:27-28). Yet when does this life begin? The embryo is endowed at the moment of its conception with its full complement of genetic material. This literally shapes what sort of person the fetus will become, so long as the pregnancy runs its term. At least five passages in the Bible explicitly refer to the unborn, including Job 31:15, Psa. 139:13-16, Isa. 49:1, Jer. 1:5, and Gal. 1:15. From a literalist reading of these passages, it would appear that embryos from the moment of conception are known, cared for, and protected by God. Further, God warns "Whoso sheddeth man's blood, by man shall his blood be shed: for in the image of God made he man" (King James Bible Gen. 9:6). Despite the differences in their creeds, all Christian denominations that oppose human embryonic research utilize Biblical arguments in their arguments. Dennis P. Hollinger writes for the Center for Bioethics and Human Dignity, an Evangelical association that deeply opposes human embryonic research. Hollinger equates doing research on human embryonic stem cells with the research done in Nazi Germany. "We must not sacrifice one class of human beings", he chides, "to benefit another. Scripture resoundingly rejects the temptation to do evil that good may result" (4). Thus, many Christians heatedly oppose fetal stem cell research, arguing that

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scientists should not commit evil even if a great good might come of it. Yet many other Christian denominations support embryonic stem cell research.

The Presbyterian Church USA, the Latter Day Saints Church and the General Synods of the United Church of Christ support limited embryonic research. While the United Church of Christ has not come out with an official statement unequivocally supporting embryonic research, they have produced a General Synod resolution supporting the idea that, given an appropriate public discussion of the issue, strictly regulated embryonic research of all types may be undertaken (Buford 2). Similarly, the Science and Religion Information Service (SRIS) informed the public through a press release in 2001 that the 213th General Assembly of the Presbyterian Church USA “affirms the use of fetal tissue and embryonic tissue for vital research” (1). Yet, they write that respect for the embryos must be shown, and the research must be carefully regulated. These Christian viewpoints apply a more liberal examination of the Bible to the problem of human embryonic stem cell research and discern their duty from critical reflection. While they do believe that large parts of the Bible reflect the will of an omniscient and benevolent God, they reject some parts of the Bible as being contradictory to the will of God. Because they do not rely on the Bible for exact moral directions, their stance is not overtly deontological. Rather, it is a combination of using deontological ethics to judge the authority of possible acts and consequentialist ethics to take into account the complex ethical and moral realities that are part of modern life” (Melton). Though they have not issued an official statement in favor of embryonic stem cell research, it is the Church of Jesus Christ of Latter-day Saints (LDS) that has had the most impact supporting human embryonic stem cell research.

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The LDS church has had a quiet, yet very important role in the U.S. struggle over legalizing embryonic stem cell research. In July 2001, the LDS church issued a cautious statement, allowing that embryonic research “merits cautious scrutiny” (“LDS Press Release” 1). Five members of the LDS serve in the Senate: Senators Orrin Hatch, Gordon Smith, Robert Bennett, Mike Crapo, and Harry Reid, all of whom have come out supporting governmental funding for the research. The Mormon position is based on their doctrinal stance that “each person lived as a spirit child of God prior to being born and receiving a physical body on Earth” (Clark 2). The spirit and flesh are joined when or after implantation in the uterus, making the usage of embryonic tissue in research far more acceptable. In an open letter to President Bush in 2001, Orrin Hatch wrote “To me a frozen embryo is more akin to a frozen unfertilized egg or frozen sperm than to a fetus naturally developing in the body of a mother.” While Mormons unequivocally oppose abortion, on the grounds that while it is not murder, it is nearly as bad as murder, they believe the unimplanted embryos are empty of the human spirit. In speaking to the Senate, Republican Senator Smith of Oregon said that stem cells were “the dust of the earth—they are essential to life, but standing alone, will never constitute life” (qtd. in Clark 3).

An important difference between the Judeo-Christian and the Islamic traditions is that while the Judeo-Christian exhorts its followers to follow the laws of their countries, Islamic law covers all forms of life. Lawrence M. Hinman, author of *Ethics: A Pluralistic Approach to Moral Theory* writes “Muslim religious law covers virtually all areas of human behavior . . . this movement establishes a religious state under which all citizens are subject to a religiously based civil law” (90). The widely divergent ideas held by

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Islamic ulama (clergy) about embryonic stem cell research are marked by differing interpretations of the Surahs.

While most mainstream Muslim ulama believe that embryonic stem cell research is appropriate, and supported by Qu'ranic law, other members of the clergy believe that the Qu'ran explicitly forbids embryonic research. Those who believe that the Qu'ran forbids experimentation on embryos cite passages in which the creation of the embryo is described in detail, such as 23:12-14, and include God's admonition that infants (a word that some Islamic scholars argue is meant to describe both babies and the unborn fetuses) should not be killed out of fear or poverty (Holy Qu'ran 81:7-10). Yet while some individuals espouse this view, no mainstream Islamic organizations are willing to support a ban on embryonic research.

Abdulaziz Sachedina, professor of religious studies at the University of Virginia, says the true debate instead exists between those who believe ensoulment, or the endowment of the fetus with a soul, occurs either at 40 or 120 days. Mainstream Islamic ethicists concur that stem cell research is both acceptable and desirable before the fetus is 40 days in development. Sachedina concluded that it is because of its therapeutic benefits that stem cell research is acceptable in Islamic law.

Most Orthodox and Reform Jewish groups support embryonic stem cell research, including the Union of Orthodox Jewish Congregations, the Orthodox Union, the Reform movement's Department of Family Concerns, the Rabbinical Council of America, the National Council of Jewish Women, Hadassah, and the Religious Action Center of Reform Judaism openly support fetal stem cell research, so long as the goals of the research are unattainable by any other means. Richard Address, director of family

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concerns for the Union of American Hebrew Congregations, says Jewish tradition holds that "a fetus less than 40 days old is not considered a human being" (2). God, Jews believe, has given humanity the ability to create such technologies in order that we might help to alleviate suffering. In an open July 26, 2001 letter to President Bush, Orthodox officials wrote: "Moreover, our rabbinic authorities inform us that an isolated fertilized egg does not enjoy the full status of person-hood and its attendant protections. Thus, if embryonic stem cell research can help us preserve and help humans with greater success, and does not require or encourage the destruction of life in the process, it ought to be pursued" (qtd. by Address 5).

The main difference between the conservative Christian and the predominant Jewish belief about the morality of using embryonic stem cells for research is certainly personhood. Unlike the Catholic Church, Jews believe that a fertilized embryo holds no special moral significance. Rabbi Elliot Dorff, bioethicist and philosophy Professor at the University of Judaism in Los Angeles writes "Genetic materials outside the uterus have no legal status in Jewish law, for they are not even a part of a human being until implanted in a woman's womb, and even then, during the first 40 days of gestation, their status is 'as if they were simply water'" (3). Before implantation, the embryos have no distinctive status, and their utility to potentially alleviate suffering of actualized human persons makes research appropriate.

The question that concerns secular ethicists is somewhat simpler than those facing religious ethicists. They seek to answer, who is a person? Daniel Callahan, author of *Abortion: Law, Choice and Morality*, and Robert N. Wennberg, author of *Life in the Balance; Exploring the Abortion Controversy*, argue that the unborn increases in value as

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it matures physically. Callahan describes three schools of thought regarding personhood: “the genetic school, the developmental school, and the school of social consequences” (378).

The genetic school believes that anyone who possesses human genetic code is a human person. Personhood is conferred at the moment of conception, because the unicellular zygote created from the union of ovum and spermatozoa contains all of its genetic code.

One potential problem with the genetic school of thought is that “it identifies the person with the genetic code and is open to the charge of genetic determinism” (Shannon 48).

Those who are part of the genetic school would not condone any sort of human embryonic research. Lord Kennet, an early opponent of stem cell research argues, “Licensing embryo research would be the beginning of a very slippery slope indeed. It is the threshold. After the first license to experiment on the undeniably human, the door is open” (“7 December 1989 House of Lords Transcript,” cols. 1027-1028). Some of the most aggressive opponents of the legalization of research on fetal stem cells are those who believe in the genetic school, arguing that at the moment of fertilization, the zygote accrues all the rights belonging to an independent human being. The slippery slope argument has found significant popularity with those who believe that any sort of moral or legal legitimization of the concept of doing research on embryos will ultimately “corrupt and degrade our basic beliefs about what it is to be human” (Mulkay 68).

The developmental school concurs that the fertilization of the egg marks a point in which the embryo has the potential to develop under the right conditions as ordained by its genetic code. Yet, they argue that some degree of development and interaction with the environment around them is necessary for personhood. Rational interaction is the way

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that the developmental school defines personhood. Semantics are very important in interacting with this debate. Robert N. Wennberg suggests that:

It is helpful to maintain a distinction between the terms person and human . . . A fetus growing in a woman's womb is human, which is to say it is not canine, feline, or anything other than human. And a dead corpse is still a human corpse even though it is no longer a person, its capacity for rationally activity having been irrevocably terminated.

(34-35)

Which, the authors ask, has a greater right to life: the human with potential personhood or the human with acknowledged personhood in the form of self-aware and rational activity? Ultimately, Wennberg concludes, "We rightly acknowledge a fetus to be a potential person" (35). Yet there are problems with this method of thought as well. While both Wennberg and Callahan try to explicitly define the non-biological dimension of personhood, it is not a dimension easily quantified. In fact, Wennberg discusses one of the developmental school's largest problems in being accepted by mainstream society, namely that by his more-than-biological logic, a newborn infant would still be considered a potential person.

The third philosophy is the school of social consequences. Rather than concentrating on either biological or developmental determinants for personhood, the school of social consequences focuses on the traits that society values in people. This effectually negates the value of the biological or developmental aspects of personhood, replacing them with those that a particular society deems relevant. As Dr. Shannon writes, "The desires of society, expressed in public policy, take precedence over the biological or developmental aspects" (48). In some societies, at certain stages of development, this might appear to be

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a very positive means of determining personhood. Yet, as Dr. Shannon points out, the potential negative consequences of this school are obvious: throughout history, societies have meted out very negative consequences for those who do not fit the criteria for social acceptability. This orientation closely resembles Jeremy Bentham's conception of utilitarianism, e.g. the idea that government is based on making the most people happy. Unlike Kantian ethics, which value the action rather than the result, this utilitarianism values the results rather than the actions. Thus, if treating a non-person poorly would result in having a society comprised only of human "people", the action would be counted as good because the end result was desirable. The drawbacks to this form of reasoning are obvious. Like consequentialism, in utilitarianism it is almost impossible to identify all of the possible effects a potential action could cause. Calculating the various results of a particular action would take so much time that by the time the utilitarian ethicist has made a decision, the situation will have likely shifted, prompting the process to begin anew. Similarly, a particular person or government is never entirely in control of a particular situation, the probability of a particular end either occurring or not occurring. Utilitarianism is an inefficient gauge by which to judge the morality of potential actions. John Stuart Mill assumed that the person would eventually seek the greatest pleasure, forgoing the pleasures of the flesh for an afternoon of scholarly investigation. Thus, in seeking the greater pleasure of the society, Mill assumed that the society would seek logical, academic, and moral pleasures rather than more hedonistic, excessive pleasures. The assumption that an entire society might be based on such a principle is faulty, and ultimately, inappropriate.

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The debate over the ethical treatment of embryos is complex and ongoing. Many groups that feel it appropriate to support one aspect of the research completely disagree with the methods behind another aspect of embryonic research. Ultimately, though, it seems that the issue comes down to what exactly the respect and dignity human persons deserve is, and further, what exactly is a human person? Clearly, if embryos have the status of a person, they cannot be treated as a means to even the most humanitarian end.

THE SCIENCE

While stem cell research itself is a relatively new concept dating back only three decades, humans have been curious about the source of fertility and pregnancy for thousands of years, and exploring the way embryos develop since Aristotle. To understand the significance of their discoveries, it is important to have a basic working knowledge of some scientific language.

The history of embryology is rich and interesting. For several hundred years, questions about embryos were theoretical in nature until roughly the seventeenth century, when scientists such as William Harvey and Regnier de Graaf dissected female animals, eventually discovering evidence that refuted Aristotle's theory that conception was the result of the mingling of menstrual blood and spermatozoa. Such animal experimentation persisted throughout the next hundred years, eventually leading to a more modern idea of how female reproductive organs work to produce ova and nourish embryos.

The morality of doing research on human embryos is currently a hotly debated issue, yet it is not an issue that has only recently become relevant. Edward Yoxen writes, "research procedures (involving thousands of human embryos and fetuses assembled into

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collections of specimens) have been followed for at least a hundred years, which raise serious moral questions” (27). In the nineteenth and early twentieth century, research on human embryos was limited to embryos aborted or surgically removed. It was difficult for scientists to, in effect, compare results, as their specimens were scattered throughout the world, and research progressed slowly.

It took scientists until November 1998 to successfully isolate and culture human embryonic stem cells, a feat that had eluded them for more than twenty years after embryonic mouse cells had been isolated and cultured. Embryos are a unique source of tissue for research because embryonic stem cells, considered precursor cells, are able to differentiate into literally hundreds of kinds of tissue in the human body. Adult stem cells, or even germ cells, derived from aborted fetuses have a more limited ability to differentiate.

A human embryo is defined by the American Heritage Dictionary of the English Language as the prefetal product of conception from implantation through the 8th week of development. For the purposes of considering developmental stages individually, we can describe an embryo as the multi-cellular product of the fertilization of an ovum by a spermatozoon. The fertilized ovum that has not undergone mitotic cell division, or cleavage, is described as a zygote. Embryonic research is generally limited to embryos less than two weeks in development. This benchmark is legal in nature only in the United Kingdom. Elsewhere in the world, it is a moral limit customarily adopted by most scientists such as those currently working at Stanford. This limit has physical as well as moral meaning, for on the fifteenth day, gastrulation, or the formation of gut begins.

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Gastrulation is literally the creation of a three-layer sac that will eventually become organs.

Before the gastrula appears in the third week, the embryo exists in the form of the blastula, or blastosphere, consisting of globular cell layer that encircles a fluid-filled cavity. After fertilization, the zygote begins to undergo mitotic division. By the second day post-fertilization, the embryo has divided once, becoming a two-cell stage embryo, and has reached the size of .15 mm, a size that it retains throughout early cleavage.

Division continues, causing the resultant cells, or blastomeres, to grow smaller and smaller for the embryo to remain only .15 mm in size. By the fifth day, the embryo resembles a closely packed ball of cells, and is described as the morula. The morula undergoes the first differentiation, in which the tightly packed cells are compacted, resulting in the inside and the outside cells. The embryo is now referred to as the blastula.

The inside cells will become the embryo itself, while the outside cells will become the placenta and membranes surrounding the embryo. Three structures make up the inside group of cells: the trophoblast, which is the layer of cells that surrounds the blastula, the blastocoel, which is the hollow cavity inside the blastula; and the inner cell mass, which is a group of approximately 30 cells at one end of the blastocoel.

As gastrulation continues, cells migrate towards the center of the cavity, forming a second spherical layer of cells. These are the mesoderm and the endoderm. The endoderm will eventually become the lungs and the gastrointestinal tract, while the mesoderm will eventually become connective tissue, muscle, bone, and the urogenital and circular systems. After the endoderm and the mesoderm appear, the ectoderm grows rapidly over the embryo. The ectoderm will eventually comprise the epidermis, all of the

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sense organs, and the nervous tissue. While the embryo changes and matures in very important ways during every day post-fertilization, the occurrence of the primitive streak is considered an important developmental event, and an appropriate time to halt embryonic research.

Ultimately it was research in human developmental biology that discovered, isolated, and cultured human embryonic stem cells. Human embryonic stem cells appear roughly five days into the development of the embryo, after the first differentiation occurs. It is from the inner cell mass that stem cells arise, the cells that, if the embryo continues development, would become all the tissues of the body.

Stem cells are isolated in the laboratory by moving the inner cell mass, which comprises approximately 30 cells from the embryo into a plastic Petri dish, which has been spread with a culture medium. The culture medium is a form of nutrient broth, and the transferred cells divide and extend across the dish, proliferating until they begin to crowd the culture dish. Typically, the inside of the Petri dish has been coated with a layer of mouse embryonic skin cells that are pre-treated to prevent them dividing. This cell layer provides a sticky surface for the inner cell mass to attach to, as well as a nutrient source for the dividing cells. When the crowding begins to occur, the cells are gently plated into several culture dishes, a process that is repeated many times over many months. Plating involves suspending cells in a medium, then distributing them evenly over a pre-coated Petri dish by gently shaking them from side to side. The process of replating the cells is called subculturing. The original 30 cells that the inner cell mass of the embryo may yield literally millions of embryonic stem cells. After a period of more than six months, embryonic stem cells that have proliferated without differentiating can be referred to as

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an embryonic stem cell line. To be described as an embryonic stem cell line, the stem cells must be pluripotent and appear genetically normal.

The potential for human embryonic stem cells are enormous. While there are many technical problems to overcome before embryonic stem cells can be a viable source of medical and scientific data, many steps have already been taken. Human embryonic stem cells have been successfully isolated and cultured, and stem cells have been caused to differentiate. Yet with a dearth of federal funding, little research is able to go on.

Stanford's eleven million dollar anonymous grant remains the exception, rather than the rule. In the future, researchers project that they may be able to learn how undifferentiated stem cells become differentiated ("Stem Cells: A Primer," 2). This understanding might mean that scientists would be able to understand how diseases arise, and formulate more effective ways to respond to them. New medications might be able to be tested on stem cell lines, rather than on human subjects. The most amazing potential technology comes in the form of the differentiated tissue. Research done on mouse stem cell colonies would suggest that it is possible to reliably proliferate and transplant differentiated stem cells, leading to high hopes for human embryonic research. Currently, donated organs and tissue replace damaged tissue in humans, but if researchers are able to cause stem cell lines to differentiate reproducibly, stem cell lines might become a renewable source of cells and tissue to treat such diseases as heart disease, Parkinson's disease, and diabetes. After obtaining embryonic stem cell lines, researchers can begin to prepare differentiated stem cell lines, that is, cells that exhibit the properties of different advanced tissues such as muscle, epithelial, germinal, and others. By differentiating the cells, scientists may be able to generate specialized cells needed for various therapies. For example, many

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theorize that in the future embryonic stem cells may be the basis for treating Parkinson's disease. Parkinson's is a very common neurodegenerative disease. More than 2% of people more than 60 years old have some form of Parkinson's. Parkinson's is likely to be an appropriate application of stem cell treatments because researchers already know so much about the disease. Specifically, scientists know that it is dopamine-producing (DA) neurons that are needed to treat Parkinson's, and have already proposed several protocols to create and culture DA neurons from embryonic stem cell lines in the laboratory. If researchers are able to generate a great quantity of DA neurons for transplantation into human subjects, the transplantation procedure should be able to become available to the general public suffering from Parkinson's.

POLICY

President Bush in his August 11, 2001 speech about stem cell research laid out a policy that was meant to keep from alienating any of the parties involved in the issue. Declaring that "We do not end some lives for the medical benefit of others" in the 8/11/2001 edition of the New York times, the President made it clear that he thought it was a moral issue that had already been decided. Since some 60 stem cell lines or "colonies" were already in existence, he allowed limited research to be conducted on them while halting federal funding for any further creation of new lines. This was a decision that satisfied no one. Groups opposed to human fetal stem cell research felt that it encouraged others in the further creation of new stem cell lines, and those in favor of the research said that allowing scientists access to a very limited amount of lines would hinder progress. Even

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then, questions existed as to the viability of some of the stem cell lines. Months later, scientists would confirm that as many as 80% of the colonies were unusable.

In the intervening seventeen months since Bush's decision on stem cell research, while it has disappeared from the President's agenda, other lawmakers are not ignoring the debate. Senator Sam Brownback, a Republican from Kansas has lobbied strongly for more stringent restrictions on the research. Last year, Brownback declared, "New advances in adult stem-cell research, being reported almost weekly, show more promise than destructive embryo research". As of March 2003, a bill is in progress in the House that would criminalize the use of fetal stem cells. State responses to the issue of human embryonic stem cell research range from California's endorsement of research to South Dakota's wholesale ban on any sort of embryonic research, regardless of the source. In all, 28 states have introduced legislation that in some way affects embryonic research. A California state law enacted in 2002 ignored the federal policy on stem cell research and welcomed fetal stem cell researchers. At least one institution has already taken advantage of the new policy. On 12/11/2002, as a result of an anonymous grant, Stanford began a stem cell research program.

Directed by Dr. Irving Weissman, a Stanford professor, the new research program will concentrate on nuclear transfer technology. Interestingly, Stanford will be creating embryos through SCNT, transferring the nucleus from diseased adult cells into donated ova. While California pioneered the idea, Oregon, New Mexico, and Texas are considered similar legislation, and New Jersey passed an identical bill in December of 2002.

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Of all of the countries involved in the fetal stem cell research debate, England established itself early as a leader in stem cell research. With the creation of the 1990 Human Fertilization and Embryology, which allowed for strictly regulated research involving embryos, the United Kingdom laid the groundwork for consenting to human fetal stem cell research in 1999. On December 20, 2000, a majority of 366 Parliament members voted to legalize the creation of human fetal stem cell lines (174 voted against the action). The UK, like other countries, requires full consent of potential donors. The regulatory agency in the UK is the Human Fertilization and Embryology Agency, and they are directed to be absolutely sure that no other option exists before approving individual research.

Meanwhile, 15 European countries, including Croatia, the Czech Republic, Denmark, Estonia, Georgia, Greece, Hungary, Lithuania, Moldova, Portugal, Romania, San Marino, Slovakia, Slovenia, and Spain signed and ratified the 1997 European Convention on Human Rights and Biomedicine, of which Article 18:2 states “The creation of human embryos for research purposes is prohibited” (“Convention for the Protection of Human Rights” 2). Additionally, 16 other European countries are signatories to the Convention, but did not ratify it.

Canadian scientists are renowned for their contributions to the science that made it possible to explore the potential of human fetal stem cells. As early as the 1960’s, J. Till, E.A. McCullouch, and C.P. Leblond discovered some of the main precepts that govern stem cell biology. Researchers are however currently prevented from doing research directly on human fetal stem cells because of a lack of clear guidelines or any sort of regulation governing the research in Canada. The Canadian Institute of Health Research

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admits that its guidelines are vague and do not clearly state if funding is provided for fetal stem cell research. The most informative statement available for researchers exists in the form of the 1998 Tri-Met Policy Statement, a document created by the three Canadian federal research funding bodies. Currently, this statement creates small groups of five individuals called Research Ethics Boards (REBs) that make final ethical decisions regarding federal funding for research, but it directs the REBs to consider the following:

No research may be done on any genetic material obtained from cadavers, obtained through any sort of transaction, or acquired through any sort of chicanery. Additionally, embryos may not be created specifically for the purpose of research, there can be no manipulation of the genetic material in the embryos, and all research must be completed by the 14th day after the creation of the gametes. While at first these guidelines may seem overly restrictive, it is instructive to note that each REB pod gets to make decisions independently and each REB is required to only have one member that is not a member of the research institution. Currently, Bill C-13 has been tabled twice by the Canadian House of Commons, mostly recently in October of 2002. C-13 roughly translates the Tri-Met's policy into law, creating the Assisted Human Reproduction Agency of Canada that would take over governance and regulation of all research from the individual REBs.

Canadian researchers are currently reporting the same problems that American researchers complain of; despite the apparent opportunity to work with fetal or embryonic stem cells, the large amount of their work is done with adult stem cells. If C-13 is passed, enacting even more stringent rules regarding the use of fetal stem cell lines, it seems likely that most future work will continue to be done on adult stem cells.

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In recent months, China has chosen to legislate the creation of a state-run embryonic stem cell bank in Tianjin, and several weeks ago, South Korea passed a law that would, if enacted, forbid cloning and certain types of human research. It is becoming increasingly apparent that countries, even or perhaps especially those less technologically advanced than European and North America powers, must pass legislation governing research, for allowing for a lack in legislation might allow less scrupulous scientists from other countries to travel to their country to do research.

Conclusions

Human embryonic research has not yet proven itself equal to its fantastic promise, but it is a technology that has been available just over five years, a period in which few human stem cell colonies have been created, and fewer researchers have been able to take part in the research. Groups and individuals opposed to human embryonic research have claimed that adult stem cells are a far more productive and humane means of research, citing the scientific advances researchers have already made using adult stem cells, derived without harming the donor, while research on embryos has discovered little. Scientists believe that adult stem cells may even be exploitable for cell therapies, and have succeeded in causing certain adult stem cells to differentiate into a limited number of specialized tissues. This progress is not reflected in human embryonic research. It is true: human embryonic research has yielded little. Yet while researchers on human stem cell colonies have encountered unexpected problems in the researchers, potential applications for the technology have expanded. With this research, scientists will be able to learn vital information about how stem cells begin to differentiate, and what makes these precursor

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cells different than specialized cell types. Specifically, they want to know why embryonic stem cells can proliferate in a laboratory for a year or more without differentiating, while adult stem cells cannot, and what are the factors within an individual organism that normally direct stem cell proliferation and renewal? With this information, and the ability to create an unlimited supply of specialized cells with which to treat patients with Parkinson's, diabetes, and other diseases. Further, scientists believe that with a greater understanding of human embryonic stem cells, they may be able to use the unique properties of the stem cell colonies to test new drugs without potentially harming subjects, and even learn more about birth defects. These medical treatments will not be possible if experimenting on human embryos is forbidden.

Clearly the viewpoints of religious groups are important to the ethical debate, whether one is religious or agnostic. Their opinions, reflected in the large groups of the faithful around the world, change public policy and affect the ongoing debate. But do they really reflect the numbers of people in each denomination? In polls, a majority of Catholics responded that they supported some form of limited stem cell research (Green), far outnumbering the smaller percentile that supported the Vatican's position. Similar trends seem to abound in the last two decades. It seems possible that while churchgoers listen and respect their church's input on lifestyle, government, and ethical decisions, ultimately they come to their own conclusion, not necessarily one that reflects their church's official stance. Thus, while this conclusion will take into account arguments made by religious groups, whether they reflect the feelings of the members of religious groups is questionable.

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Unlike the arguments made by many Jewish and Islamic groups, it seems impossible to view the conceptus as anything other than fully human; even the most elementary study of biology makes it clear that the unicellular zygote possesses, at the moment of its creation, a full complement of human genes.

The Christian viewpoints regarding human embryonic research are numerous and complex, but ethicist and theologian Stanley Hauerwas, in his Protestant critique of human embryonic stem cell research, presents a compelling case opposing the research.

While Hauerwas does not speak for Christianity, much less even for a single congregation, his argument is suitable for a critique of the main-stream Christian opposition of embryonic research. Hauerwas argues that the Church- every church- bears a heavy responsibility to care for and love every person, especially the children.

Hauerwas speaks of legalistic Americans who consider every issue as an issue of rights. Christians, Hauerwas avers, “do not believe that we have a right to do with our bodies whatever we want” (3). Directed to live a life of love and hope, Hauerwas believes Christians must not do things prohibited by God, or else they “are no longer a member of us [the church]” (3). He considers abortion and embryonic research examples of things Christians may not do. While it may be true that a Christian is forbidden from doing certain things, Hauerwas provides limited scriptural and generalized evidence for his argument. Instead, he writes that abortion is inhospitable, and isn’t congruent with the life of love and hope that he believes Christians are lead to live. Christians might respond to this argument that it is precisely because they have been directed to live a life of love and hope that they must support some form of human embryonic research. Numerous scriptural references concern care for the needy or sick; information derived from human

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embryonic stem cell research has the potential of helping both classes. It is only by discovering the means of producing large quantities of cells for cell therapies that it will be available to help people suffering from debilitating diseases. Similarly, the moral quandary of involving rationing and self-aware humans in researching testing pharmaceuticals would be unnecessary, if we can cause stem cells to proliferate in great enough abundance.

Yet one more issue must be resolved, however. What, finally, constitutes personhood? Biologically, the conceptus is fully human from the moment of fertilization, but the secular developmental school's argument for progressive personhood is the most persuasive. Robert Wennberg writes, "A person is in a strict sense a being who possesses the developed capacity to engage in acts of intellect . . . acts of emotion . . . and acts of will" (34). Human fetuses and human infants alike are genetically human, but not yet human persons. Thus, a genetically human being that does not yet possess personal qualities does not have as great a right to life as a biological human being that also has personal qualities in the form of rational thought. This conclusion neither meshes with my church nor with the laws of my country, for just as the United Methodists have silently opposed human embryonic research; the United States considers infanticide murder.

Ultimately, the use of human fetal tissue in research is justified, so long as the methods of procurement of cell colonies are very carefully regulated.

A clear distinction should be drawn between the four means of producing embryos for research, however. Creating embryos for research, especially after offering women large sums of money for donating ova, cannot be so easily condoned. While scientists are correct that without restrictions on embryo creation, they might be able to do even more

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important research, that does not necessarily imply that they should be allowed free reign.

Human embryos are developing human life, and as such, they deserve respect. Using surplus embryos from fertility clinics is consistent with this respect. Creating embryos solely for research purposes, however, reduces the human embryo merely to a resource and violates moral respect.

Yet this argument does not necessarily prevent researchers from using SCNT to create embryos for research. While, strictly, these are embryos created for research, there is no great stockpile of extraneous SCNT embryos currently in existence. Instead, there are very real problems that may be able to be solved by the use of SCNT embryos in research. For example, cell therapies potentially could be created that are genetically identical to a particular patient, nearly eliminating the chance that the transplant could be rejected.

The argument could be made that the utilization of surplus IVF embryos for research, like the creation of embryos for research, shows a lack of respect for the human embryo. Yet the utilization of surplus embryos for research shows a fulfillment rather than a lapse in the treating of human embryos with respect. Research done on IVF embryos, would, in the best of situations, be regulated to an extent that the scientists would have utterly no contact with either the IVF clinics or the progenitors of the embryos. When they proposed embryonic research, their protocol would involve embryos that already existed were considered superfluous. Rather than creating embryos strictly for the purpose of research, these embryos had been originally created because a woman or couple had hoped to have a child or children. Were they not to be used for research, these embryos would eventually become humanely euthanized. Thus, the use of them for research that,

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regulations would insist, benefited the human race in a manner unobtainable by any other means, would be far better than destroying the embryos at utterly no gain. Some would argue that these extraneous embryos could be adopted. The surplus of IVF embryos currently in existence defy claims that, should the research stop, all could be “adopted”, thus this is an illogical argument.. The use of IVF embryos in research is a respectful way for human embryos to help alleviate human suffering rather than simply be disposed of. The use of tissue harvested from aborted fetuses remains a questionable issue. Informed consent would insist that the woman undergoing the abortion procedure be completely educated in the potential use of the germ cells before agreeing to their use by researchers. This could lend moral justification to the act of abortion, for there would be a potential good coming out of the act. Yet, through careful regulation, this problem could be surpassed. Perhaps patients could be told about the opportunity to donate the fetal tissue for research only after the procedure had taken place. This regulation would remove the element of moral justification from the act of abortion, as well as ensure that no patients felt pressured in any fashion. Moreover, the firm guidelines that must be set in place that would both regulate the research to which was very important, and determine which protocols absolutely had to be done on embryonic or germ stem cells. Finally, this technology should be set aside until conclusive legislation is set in place governing it. As it is, there are many groups whose actions may be unethical, directly purchasing parts of fetuses from abortion clinics and actually advertising “healthy, perfect, fresh” tissue and specific body parts to research facilities. Thus, ending the research for the time being seems appropriate.

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Carefully legislated human embryonic stem cell research should be allowed for two reasons. First, the unborn conceptus has less of a right to life than reasoning human persons. Second, the religious ideal promulgated by Judaism as well as some Protestant congregations to ameliorate suffering and increase scientific knowledge that may one day help the sick. It is, then, the utility of the research makes the use- and subsequent end of the potential human persons- acceptable.

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