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CCII
Causal Essay

What Should Be Done About Stem Cell Research?

Stem cell research. The phrase hits a pressure point for many Americans, no matter what side of the debate they identify with. This controversy involves parents, politicians, priests and patients. New families pay thousands of dollars to bank umbilical cord blood they may never need, yet hundreds of thousands of embryos sit waiting in suspended animation. As scientists further explore the field of regenerative medicine, dispute continues over the ethics of stem cell research – as well as how to pay for it.

While they come from different sources, both embryonic and adult stem cells share basic properties. In its simplest state, a stem cell is unspecialized (Stem Cell Information). This means that it has no particular job to do. Certain cells manufacture blood or carry oxygen. Stem cells are not capable of this on their own, but can be manipulated to create the cells that serve these - and other - purposes. The natural process by which unspecialized cells become specialized is known as differentiation. It can result from contact with surrounding cells, or absorption of the chemicals they secrete (Stem Cell Information). Scientists are working to identify the triggers of differentiation, so they can manipulate stem cells for the sake of cell-based therapy.

Embryonic stem cells are derived from embryos at the blastocyst stage of development. These cells are self-renewing and can double their population three hundred times over (National Research Council 32). They must be properly monitored to keep them from clumping together into embryoid bodies, which differentiate and begin forming tissues. Laboratory mice injected with human embryonic stem cells manifested embryoid

bodies in the form of teratomas – benign tumors full of advanced tissues containing teeth, skin, muscle, bone, cartilage, hair follicles, lung tissue, gut and neural cells (National Research Council 33). Embryonic stem cell research is difficult and expensive but the mastery of these cells could mean potential treatment for diseases in the future, even organ re-growth and transplant. At this point embryonic stem cells have yet to yield any functioning organs, and while they show great promise when used to treat mice suffering with anything from diabetes to Parkinson's, differentiation continues to present a serious issue for researchers looking to treat humans (Stem Cell Information).

Hematopoietic stem cells, also known as adult stem cells, are harvested from adult tissues as well as umbilical cord and placenta blood (Stem Cell Information). An adult stem cell differentiates to produce the types of cell from which it came. Under the right conditions, adult stem cells can form different tissues, such as the development of liver cells from blood cells. This is an unexplained natural occurrence known as plasticity. Scientists are still experimenting with plasticity to determine whether or not it is a viable option for organ generation. Currently, adult stem cells are used in hospitals for cell-based therapies. They have the ability to migrate to an affected area, such as a brain tumor, making it easier for scientists to place them where they will be most effective (Stem Cell Information). Bone marrow transplant is one well-known stem cell therapy. Bone marrow has the ability to regenerate healthy blood in patients suffering with cancer and blood disorders. Yet it is difficult to locate a sample of bone marrow cells that is large and pure enough for treatment (National Research Council 41).

As scientists search for answers to the mystery behind differentiation, plasticity and cellular purity doctors, politicians, clergymen and taxpayers argue about the morality of

stem cell research. There is a general agreement that the use of adult stem cells is ethically sound because it involves using materials that already exist in human beings through a process that is not life threatening; however, scientists have found adult stem cells difficult to isolate and work with (National Research Council 27). Although they have shown past success and cured some illnesses, these cells must be studied further, and research is expensive and extensive.

Embryonic stem cell research entails the ruin of what could potentially become a human, and opponents find the result is not worth the means of achieving it. Religious groups present major opposition, yet the statutes of each one call for different ethical guidelines. According to Judaism, an embryo has no moral rights until forty days after its implantation in the womb. Muslims believe ensoulment takes place at the end of the fourth month of pregnancy, making it a valid life. Both religions permit research on embryos, although it must be done in an ethical manner. Roman Catholicism asserts that life begins at the moment of conception, therefore making embryonic stem cell research unethical at any state. This would call for a complete end to the production of embryos intended for science, as well as a cease to all research, aside from that on adult stem cells. Protestant religions are ambivalent on the subject, although the conservative Protestants typically reject the practice (National Research Council 44).

It is important to remember, though, that not all objectors hold particular religious or political beliefs (National Research Council 45). Opinions are widespread and varied throughout the population. Some are firmly against it, while others are begging that it is continued. Even within objecting groups there is dissent about the beginning of life itself.

The outcome of this argument is crucial in deciding the future of regenerative medicine, because public opinion has an effect on what goes on within a laboratory.

The economically-minded also pose questions: If the mystery behind differentiation is solved and the use of embryonic stem cells becomes a viable option for treating patients, who would reap the benefits? Had Christopher Reeve been alive today, he would most certainly have received any stem cell treatments available and walked again. What about the middle class elderly woman suffering with Parkinson's? Is there hope for a healing, or will treatment be so astronomically expensive that she will not even consider pursuing it? Once stem cells have been developed to their full medical potential, there will undoubtedly be a handful of companies ready to patent and license embryos (Kuhn). Due to the enormous amount of time and money that goes into harvesting, producing and then marketing the embryos, there is a chance that these lifesaving techniques will become little more than another celebrity fad. If researchers and politicians have a genuine drive to see embryonic stem cell usage realized, they will have to put the legislation in place that will prevent a stem cell monopoly market, and make stem cells as affordable as possible (Kuhn).

The factor that could determine whether or not embryonic stem cell research continues is funding, from both public and private sources. On August 9, 2001 President George W. Bush cut federal funding from all embryonic stem cell research in the United States, except to complete the work begun before that date - approximately sixty remaining lines (National Research Council 46). The president made his decision on the grounds that destruction of one life to save another was not morally sound, and instead allocated $250

million dollars to the study of umbilical cord, placenta, and other adult stem cells (Congressional Digest 229).

There is no ban on private funding, which the main source of livelihood for embryonic stem cell research today. Two supporting companies include Geron Corporation and Advanced Cell Technology, and they are providing the funds needed for a particular stem cell manipulation called somatic cell nuclear transfer, or cloning (Congressional Digest 227). This is another experiment that raises many eyebrows. The American public continues to wait in its own "suspended animation," with little more say than the occasional thought-provoking internet blog, as the political higher-ups duke it out for moral authority.

These conflicts are born out of a single question – is it morally correct to use a human being for experimental testing, if that research leads to the destruction of life? The first hurdle on finding the road to an answer is to define what life is and where it begins. This is arguably the most difficult to figure out, by today's standards. For the sake of the argument, we would need to examine what it means to "live." In the embryonic stage, a person cannot survive outside of the womb. Yet in its supported situation, it can grow and change from a dependent being to an independent one.

It is true that an embryo is a clump of cells that is absent of any functioning organs, feelings, or human likeness. A rock is a clump of cells also. It has the ability to change, by being split or eroded, but does not contain within itself the ability to develop into anything more than its original physical makeup. It is in this change that we begin to see what life is. A tree does contain the necessary properties that allow it to grow and change, but it cannot achieve logical thought or reasoning. This is what separates human life from the rest. An

embryo contains the components necessary to develop into an independent being that has the ability to rationalize and form judgments. The ability to grow does not begin at a certain checkpoint in its existence, because the genetic code that allows for development is complete when the egg and sperm cell unite (Fetal Development). The process of human development, "life" as we know it, begins when a person is conceived.

Even if an answer to the "when life begins" question could be derived in a way that is acceptable in a society where "it's all relative," it would still be difficult to determine if embryonic stem cell research is right or wrong. According to cognitive relativism, the way we describe different things is based on our personal perception of them. Since everyone's perception is different, no description takes authority over another. It is simply one's interpretation of the facts (Relativism 13). Moral relativism takes root in this concept, but carries over to the area of right and wrong. It says that what someone judges to be correct and incorrect is based on their personal standards (Relativism 149).

This would lead one to believe that "if a man thinks something is right, it is right for him" (Relativism 150) and there is no set standard of right or wrong. Everyone recognizes the need to find a cure for Parkinson's Disease; the lack of a moral standard makes it acceptable to test on human embryos, even if it means ending the life of what would otherwise be a normal human being at a particular stage in their development. Embryonic stem cell research is not the first issue of ethical science that has been challenged by relativist thinking:

> It has always been true that human beings are the most suitable subjects for medical experiments. Once the physicians realized they had an almost limitless pool of varied kinds of humans at their disposal, some very respectable professors seized

upon the unique opportunity. They reported their findings at meetings and to medical societies, and no one protested.

This situation seems, at face value, similar to today's embryonic stem cell research. It jeopardizes medical ethics, but no one protests because it employs the best test subjects science can ask for – humans. Yet the quote above is an excerpt from page 38 of Konnilyn C. Feig's book, Hitler's Death Camps: The Sanity of Madness, in the section that discusses the use of Jewish prisoners for experimentation.

The science behind thanatology and embryonic stem cell research is the same – to use something that displays human reactions to learn how different catalysts – including disease and poison – affect it. Many amazing medical advances were made when German scientists moved into concentration camps. They used their Jewish test subjects to find anecdotes for poison and treatments for wounds and disease (Feig 38). Yet one would have to search far and wide to find a living person who believes the tests performed in concentration camps were medically ethical and morally sound. Relativism inhibits moral sensibility, that natural feeling that tells us something is wrong. The Nazis decided the Jewish people were inferior because of their race, which made it perfectly acceptable– by their standards – to perform painful, life-threatening experiments on them (Feig 38).

So what does our "inherent morality" tell us about life? In its most basic interpretation, intentionally causing pain or death is wrong. However, with the confusion of relative perception in our society, the destruction of human embryos has become as bad as ceasing research that would allow sick people to live healthy lives. The need for human test subjects is so great that some would say it overrides the ethics of testing. Yet how effective is a treatment which, even in its basic form, can kill the person it is trying to

treat? When American doctors from Bristol-Meyers and Squibb developed treatment techniques they knew were risky, they would not run tests on their own patients, but instead resorted to prisoners – namely, minorities (Feig 38).

Embryos display all the necessary properties in their earliest stages to qualify them as "human," yet we have a perceived superiority over them because of our stage of development. Scientific records of stem cell research mishaps, such as the discovery of teratoma tumors (National Research Council 33), makes it clear that embryonic stem cell research ends the natural progression of human life, thereby killing that person. Since no human being has the right to kill another human being, no matter what their perception is of the people around them, embryonic stem cell research is wrong. Not only is the testing wrong, but the millions of dollars being spent on it could be channeled into adult stem cell research, which could turn out even more safe and viable treatment options. Stem cells provide endless opportunities for modern medicine to treat and cure many diseases, but doctors will only prove truly successful when they can heal the sick and preserve the living – including embryos.

Ceasing all types of stem cell research because of a heated debate is irresponsible, especially considering the potential they offer. Thankfully, scientists have made a breakthrough that columnist and physician Charles Krauthammer calls, "a morally neutral alternative" (Stem Cell Update). They have discovered certain stem cells that contain the properties of both adult and embryonic stem cells. These special cells are found in the amniotic fluid that surrounds a baby in the womb. Amniotic stem cells grow quickly, like embryonic stem cells – they can double their number in thirty-six hours (Weise). They are easily manipulated, like adult stem cells, and have been turned into muscle, bone, blood,

nerve cells and more. Dario Fauza, a researcher at Boston Children's Hospital, has converted amniotic stem cells into cartilage which he used to repair the tracheae of unborn lambs (Fetal Repair Kit). Amniotic stem cells are not embryos, so they lack a genetic code and do not form teratoma tumors when implanted into mice (Weise). This makes them safer than embryonic stem cells and viable for treatment in humans.

Amniotic stem cell research is still in its youngest stages. Further testing is required, as well as a large supply of cells. Since amniotic fluid is always available, public funding currently denied to embryonic stem cell research should be put into collection banks open to store and study amniotic stem cells. Cord blood banks already exist for mothers who want to donate their baby's umbilical cord blood to research. Extraction is harmless to both mother and child (it is performed immediately after the cord is separated from the baby) and donation is free of cost. Parents only have to pay if they wish to store the blood for their own purposes (National Marrow Donor Program).

Similar procedures should be in effect for amniotic stem cell donation. Up to this point scientists have removed amniotic fluid through a process known as amniocentesis, in which a small amount of fluid is removed from the uterus with a long, hollow needle. Yet this procedure has proved to be dangerous, and doctors now believe that both the fluid and placental tissue can be successfully removed at birth, without the danger of miscarriage (Weise). Mothers willing to donate should be able to search out a collection bank through a local hospital, fill out the necessary forms, and receive a simple health evaluation prior to her due date. When it comes time to give birth, her decision to donate will appear on the medical record, and the doctors can harvest the necessary specimens. This is similar to the methods already in place for cord blood donation (National Marrow Donor Program). It

would be useful to allow mothers an "all-in-one" option, in which they can donate all the useful contents of their afterbirth, including amniotic fluid, placental tissue and umbilical cord blood, to science.

Researcher Anthony Atala of Wake Forest University's Regenerative Medicine and Tissue Engineering Institute in North Carolina is optimistic about the potential of amniotic stem cells – "If you banked 100,000 specimens, you'd be able to provide cells for 99% of the U.S. population with a perfect match for genetic transplantation" (Weise). The fact that 100,000 samples would be enough to cater to over 200,000,000 people further attests to their remarkable regenerative properties. Yet the greatest characteristic of amniotic stem cells lies in their ability to settle the country's long-standing dispute over stem cell research. In their multi-faceted makeup they contain "the best of both worlds," and if the United States puts the right amount of money and effort into this infant science they may be able to reap its healing benefits in the time span of one generation.

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