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Stem Cell Research: The Future of Medicine

“Stem cell research is the key to developing cures for degenerative conditions like Parkinson's and motor neuron disease from which I and many others suffer. The fact that the cells may come from embryos is not an objection, because the embryos are going to die anyway.”

-Stephen Hawking

A vast amount of people are suffering from incurable diseases and afflictions every tick of the clock, and every second more people are being diagnosed with these infallible illnesses. While there is currently no permanent treatment for these conditions, stem cell research has the potential to shed light on some of these conditions, possibly opening the door for future cures. Stem cell research is a controversial field that entails converting special cells into functioning specialized cells, like bone or brain cells. Although stem cell research is controversial, it should be supported because it can be used to repair and eventually replace dysfunctional body parts, give purpose to unused embryos from *in vitro* clinics, as well as to manufacture cures for currently incurable diseases.

In order to fully understand the concept of stem cells and their purpose, one must be aware of the process and vocabulary related to the subject. Stem cells are unique cells that are

able to change into specialized cells and have a multitude of applications. Stem cell based treatment is also known as regenerative medicine. Proliferation is the process of which stem cells divide and renew over long periods of time. Differentiation is the process where unspecialized stem cells give rise to specialized cells. Induced pluripotent stem cells are cells that are artificially reprogrammed to replicate a stem cell-like state. Embryonic stem cells are stem cells acquired from embryos fertilized in *in vitro* clinics. *In vitro* clinics are clinics that fertilize eggs using sperm outside of the body. Cell culture refers to the growing of cells in the lab.

Stem cells can be acquired from a few sources, but the most efficient source of stem cells for research is embryos. Many *in vitro* clinics dispose of a multitude of embryos each year, due to them not being used; “At present, there are about 400,000 human embryos in the freezers of *in vitro* fertilization clinics. Many are destined to be thawed and discarded and thus die” (Rowley). Disregarding any moral issues, this disposal of embryos is unnecessary and a waste of research specimens. Instead of discarding them, the embryos should be donated (with permission from the parents), to scientific research as specimens to help with stem cell research; “The parents...could allow them to die, or they could donate the embryos for research that someday might benefit patients with incurable diseases. This is a high purpose, one that promotes both human health and understanding” (Rowley). By utilizing these embryos that would otherwise be discarded, scientists would not have to worry about trying to get or make specimens (from adult stem cells), and will have a decent supply that will help save time while boosting research, since one detriment to this research field is lack of specimens.

Aside from embryos, stem cells are also commonly extracted from adults. “Everybody produces stem cells, in bone marrow, and more organs in the body. They all produce stem cells so they can replace old cells that naturally die” (Adler). Stem cells from the organs and bone

marrow are generally only able to produce cells related to the respective region (liver stem cells can only create liver cells [hepatocytes], bone marrow stem cells can only create bone cells [osteocytes], etc.), however if they are differentiated to induced pluripotent stem cells, they can be used for anything. While this can be a difficult and time consuming process, it can help alleviate the controversy because adult cells are easier to obtain and do not require embryos, completely eliminating the pro-life controversy barrier.

The most significant aspect of stem cells is their versatility; they are able to be manipulated into any other type of specialized cell, giving them the ability to be cultured and implanted to help fix or heal injuries and diseases, most importantly ones that do not currently have cures. “With a little guidance from scientists, these stem cells have shown that they can become new organs, new blood vessels, and even new ligaments for those with ACL tears” (Embryonic), indicating that almost any part of the human body can be re-grown and replaced, if necessary, by utilizing and advancing stem cell technology. Not only can stem cells be used to cure ailments like intense burns or amputations, they can also be used to treat ailments such as deafness or blindness;

Sometimes hearing loss is caused by the death of nerve cells...There is currently no standard treatment to restore hearing lost due to auditory neuron death...scientists raised human embryonic stem cells in a tissue culture environment meant to recapitulate normal development of the mammalian ear [cells] grown...can become either hair cells or auditory neurons (Highlights).

The vast array of possibilities makes stem cell research a vital aspect of the medical field, allowing many discoveries to be made, and cures to be created.

Although stem cell research is a highly sought after in the field of science, it holds as one of the most controversial debates since it deals with highly sensitive life and death matters, but the opposing audience contends that life begins at conception; that life is life, and no life should be purposefully governed and utilized for research and solely for the purpose of research.

Philosopher Immanuel Kant theorized,

Act as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as means only...But a man is not a thing, that is to say something which can be used merely as means, but must in all his actions be always considered as an end in himself. I cannot, therefore, dispose in any way of a man in my own person so as to mutilate him, to damage or kill him (Mulvaney).

This means that a human life should never be a means only, that to deem whether an action is right and just through the law of autonomy, human life may not be treated as an object that is disposable and insignificant. To isolate and extract material from an embryo, even with the consent of its maker, robs it of the potential life (or, depending on your belief, ends its life), treating the embryo as if it was designed and created to simply be used, giving any living person's free will to harbor its potential.

Another aspect of this controversy is the concern of whether it is considered murder when an embryo is disposed of after research, or even disposed of by *in vitro* clinics, and whether these embryos may implement treatments that could actually cure disease. This is another standpoint in which the opposing side argues, for there are those who do consider an embryo life, therefore consider its destruction an act of murder. Even though the embryos used in the research are typically fertilized in a lab, and will not be transferred to a woman's uterus (Childress 102), this

method does not belittle the fact that the embryos have begun the process of becoming something more than just a cell, of becoming a full-fledged human being. Also the opposing side shares the skepticism of the potential treatments stem cells may advocate. They are convinced that these promising outcomes have blinded the public about the ethical and moral implications this research ensues.

It is known that stem cell research carry the great capacity to treat many devastating diseases known to man-kind, but it erupts many religious viewpoints, some vehemently debating whether this research is moving towards playing the parallel role of God or not. This kind of research can replenish and repair important cells in the body, potentially even re-grow larger portions, in such a fascinating way that it may ultimately duplicate an entire body part. “When perfected, this technology offered the theoretical potential of rejuvenating an entire human body back to a youthful state” (West). With enough time and investment, the field may even elongate the lifespan of humans. These possible achievements are beyond the benchmark of today’s reality, and to achieve the possibility of living longer than humanly possible would disrupt the normality of how human being have always lived, possibly leading to the elongation of a standard life by decades. On top of that, some argue that this could ultimately lead to pseudo-immortality by continually re-growing and replacing failing organs and body parts.

Stem cell research is a futuristic field, dealing with limb regeneration and organ growing. It is a field that although is important for the progression of medical science, it is premature in its momentum due to the fact that it has to deal with moral issues and opposition trying to prevent progress. The controversy over what constitutes life, when life begins, and whether the destruction of embryos is considered murder, are all heavily debated concepts that impede advancements of research and refrain from enshrining just one method of approach. Even so,

there are methods, such as the utilization of induced pluripotent stem cells that could annihilate these debates, eliminating the opposition and enforcing support for the research. As Dr. Adler stated, "Stem cell research is not controversial at all. There are many benefits and absolutely no reason it shouldn't be supported". Despite these controversies, if research could be allowed the resources and funds for advancing, it could revolutionize the world of medicine and once again increase human longevity, far past any previously conceived notions.

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