

Embryonic Stem Cell Research

A young woman becomes paralyzed due to a gymnastics accident. An aging man struggling to remember his wife's name because of Alzheimer's disease. A musician forced to stop performing due to Lou Gehrig's disease. A father who can no longer play football with his children because a heart attack weakened his heart. Multiple sclerosis. Diabetes. Muscular dystrophy. Parkinson's disease. Macular degeneration. Heart disease. Cancer. All these ailments – and more – can be helped, and indeed, cured in the future with stem cell therapies.

What are stem cells? Stem cells are primal, non-specialized cells that have the unique ability to produce any kind of cell in the body. Stem cells are classified into three types: totipotent, pluripotent, and multipotent. Totipotent stem cells can grow into a complete individual organism. An example of this is blastomeres, which are formed from fertilized eggs that have gone through a few divisions but have yet to specialize. A single blastomere cell can grow into a complete organism plus extra-embryonic tissues, like the placenta. Pluripotent stem cells cannot grow into a complete organism, but they can differentiate into any type of cell. Multipotent stem cells are the most limited and can only become certain types of cells, such as blood cells or bone cells.

Stem cells are also divided into two categories by their source and are known as somatic or embryonic stem cells. Somatic stem cells, commonly known as adult stem cells, are found among differentiated cells of a specific structure and are usually multipotent. These stem cells are already being used in the treatment of hundreds of diseases and conditions, including Hunter

syndrome and leukemia. Embryonic stem cells, on the other hand, are harvested from the inner mass of a blastocyst and are pluripotent – they can grow into any of the more than 200 cells in the human body. These stem cells are far more promising than somatic stem cells, which have a limited lifespan and can produce only a limited number of cell types.

Embryonic stem cells clearly have the potential to be immensely useful in the treatment of numerous diseases. One of the most promising aspects of stem cells is their ability to produce any cell in the body. As most of you probably know, once an organism reaches maturation, nerve cells do not divide further. Thus, any diseases or injuries of the nervous system – spinal cord injuries, Lou Gehrig's disease, or muscular dystrophy – can be remedied in the future with the help of stem cells. In fact, sufferers from such debilitating and restrictive conditions will once again be able to lead normal, healthy lives with the help of stem cell research. Research has been done that shows promising results for paraplegics and quadriplegics, very probably allowing them to walk once again. With the help of embryonic stem cell research, people afflicted with Lou Gehrig's disease, like Stephen Hawking, and Alzheimer's patients, like the late Ronald Reagan, and Parkinson's sufferers, like Michael J. Fox and Muhammad Ali, will all be able to live normal lives.

Stem cells are not only good for nervous afflictions. Organ transplants are another important benefit of stem cell technology in the future. Nowadays, the demand for organ transplants far exceeds the supply. Thousands of people each year are placed on waiting lists for heart, lung, liver, and kidney transplants. Hundreds of them die from the lack of an available organ. With stem cells, it will become possible to grow organs. Not only will this satisfy the

increasing demand, but also these organs will run no risk of rejection – a constant danger for regular organ transplants. Still another important benefit of stem cell therapy in the future include a great extension of the human lifespan. With stem cells, it becomes possible for us to use them to replenish the aging tissues in our vital organs. Living for 150, even 200 years may not be that far off in the future.

Since this is the case, then why is there controversy surrounding embryonic stem cell research? It is clear that such research could yield breakthroughs in medicine. Countless numbers of patients now condemned to a confined lifestyle could, in the future, be relieved of their limitations. The opposition to embryonic stem cell research is, in fact, mostly based upon misconceptions that are widely held.

Embryonic stem cells can divide almost indefinitely. To begin a line from which other stem cells can grow, it is necessary to harvest them from the inner mass cells of a blastocyst, the first stage of an embryo – defined as a mass of between 40 and 150 cells. Upon doing so, the blastocyst must be terminated. Some opponents to embryonic stem cell research feel that this is akin to killing a human being. However, at this level of embryonic development, it remains possible for it to divide into two separate, smaller embryos that can mature into identical twins. In rarer cases, two blastocysts can also fuse together to produce one single organism, with collections of cells with different DNA. Because of these facts, blastocysts cannot be considered individuals. Moreover, at this stage of development, they are far from having developed nervous systems and thus, biologically, cannot have feelings. In fact, the smallest insect is more human than an embryo.

More importantly, however, the blastocysts used for embryonic stem cell research are from leftover in vitro fertilization clinics. Thousands of these embryos are destroyed, because fertility therapy produces many more embryos than the number actually used. The fertility clinic works on the presumption that most of the embryos created will die. Since the leftover embryos are slated for destruction, why not use them for research? Instead of wasting this resource by simply throwing them out – why not make use of it for research that will revolutionize medicine?

It is very clear that embryonic stem cell research has a promising outlook. Curing a plethora of diseases and treating a myriad of injuries are not far off in the future. With such potential, who in his or her right mind could oppose stem cell research? Who would deny the millions of patients affected every single day of their lives by various ailments? Who could say, "No, I do not want that gymnast to walk again" or "No, I do not want that father to play with his kids"? Who could say, "I do not want that musician to perform" or "I do not want that man to recover his memory?"