Pro-Science and Pro-Life: The Most Promising Stem Cell Research Does NOT Require the Destruction of Human Embryos

Medical research involving "stem cells" is often presented as a false dilemma. It is a falsehood that one must be either pro-science or pro-life; that in order to advance medical and scientific research, one must push aside ethical issues relating to the creation, cloning, and destruction of human embryos. This common misperception is not just oversimplified and misleading – it is also outdated.

Today, scientists can create the most powerful type of stem cells without destroying embryos. Researchers have generated a new kind of stem cell that shares the helpful characteristics of embryonic cells, while avoiding the many moral and practical problems. The new, non-embryonic cells have shown tremendous promise in clinical studies, and scientists have only begun to explore their potential. They add to an already lengthy roster of medical treatments utilizing "adult" stem cells.

What are "Stem Cells"?

Stem cells are unspecialized cells that can replicate themselves and produce more specialized cells. The most powerful stem cells are "pluripotent," which means capable of developing into any type of cell.

Stem cells come from a variety of sources. **Embryonic stem cells** are those obtained by destroying a human embryo in the early stages of its development. **Adult stem cells** refer to stem cells from adult tissue, umbilical cord blood, or placenta.

In the past, it was believed that embryonic stem cells were unique in their ability to transform into any type of cell. We now know that this is not the case. Researchers have learned to manipulate the genes of adult cells and convert them into the equivalent of embryonic stem cells.

These breakthrough new cells – known as "induced pluripotent stem cells" or **"iPS cells"** – were created from adult skin cells. Like embryonic stem cells, they can be transformed into any type of tissue, including lung, brain, heart and muscle.

Proven Benefits of Adult Stem Cells

A flurry of research has followed upon the published discovery of iPS cells in late 2007. Clinical studies in mice have already shown progress in treating symptoms of Parkinson's disease and sickle cell anemia, and in restoring blood circulation and function to damaged limbs. More studies are underway.

For many years prior to the discovery of iPS cells, the other types of adult stem cells have provided important medical benefits. Blood-forming cells from bone marrow have been used in transplants for 30 years. Adult stem cells are in widespread use treating many types of cancer, heart disease, and spinal cord injury. Clinical trials have benefitted patients suffering from conditions including corneal damage, sickle-cell anemia, and multiple sclerosis.

Adult stem cells, including iPS cells, permit doctors to treat a patient using cells from the patient's own body. The advantage is that the cells will not be rejected by the immune system, as would be the case with stem cells from an embryo.

Another advantage of adult stem cells is that they are not as likely as embryonic cells to form tumors – and the advantage now extends to iPS cells. In September 2008, Harvard University scientists announced that they had succeeded in engineering iPS cells so they were not prone to causing cancerous tumors. This feat has so far eluded researchers working with embryonic stem cells, and it raises the possibility that iPS cells may be used in human studies much sooner than once thought.

Problems with *Embryonic* Stem Cell Research

Embryonic stem cell research requires the destruction of a human embryo. In some cases, an embryo is created for the express purpose of destroying and harvesting its cells. Supporters of embryonic stem cell research seek to avoid the moral and ethical objections by arguing that the end – the possibility of a breakthrough that might advance medicine – justifies the means – destroying human embryos to harvest stem cells. This dubious argument loses all credibility in light of the research developments involving non-embryonic stem cells.

In addition, major practical hurdles continue to confront embryonic stem cell research. Embryonic stem cells are valued for their capacity to grow and reproduce very rapidly, but that growth is difficult to control. In simple terms, **embryonic cells are prone to forming cancerous tumors**. To date, concern about tumors has prevented studies of embryonic stem cell treatments in human patients.

Immune system rejection is another problem with treating patients using cells from a destroyed embryo. The **high risk of the patient's immune system rejecting tissue grown from the embryo** would mean a lifetime course of immunosuppressive drugs. The tissue rejection problem has led some researchers down a worrisome path. Their "solution" is to create an embryo cloned from a patient's own cells, terminate the cloned embryo after roughly 5-7 days development, and harvest the embryonic stem cells. The clone's stem cells could then be used to grow transplant tissues or even whole body parts. They call this process **"therapeutic" cloning.**

"Therapeutic" cloning has progressed relatively slowly. The cloning process requires large quantities of human eggs and, so far, there is a **shortage of donors**. This is hardly surprising: egg donation is a time-consuming process that poses medical risks to the donor. She is subject to multiple office visits, daily hormone injections, and a surgical procedure under anesthesia to harvest the eggs. Even under normal doses, the hormone injections can lead to occasional serious (in rare cases, fatal) complications caused by excessive stimulation of the ovaries. To make matters worse, the commercial value of cloning research means that the doctor would have a financial incentive to administer high doses of egg-stimulating drugs, in order to produce as many eggs as possible. Given the health risks to women and the speculative benefits of the research, the National Academy of Science advises against compensation for women who donate eggs for research purposes, and such compensation has been banned by California and Massachusetts, two large centers of stem cell research.

A shortage of human eggs available for cloning led researchers in the United Kingdom to use cow's eggs instead, creating a human-animal hybrid embryo. Termed a "chimera," the hybrid embryo was reportedly destroyed after five days. The "ends" justifying the "means" argument can be stretched very far indeed.

Conclusion

Recent developments may well make embryonic stem cells obsolete. At a minimum, scientists must be encouraged to harness the enormous potential of powerful new stem cells created without destroying human embryos. With limited dollars available for medical research, legislators should ensure that taxpayer dollars fund research that has tremendous potential for breakthrough cures: adult stem cell research.