Good News for the Heart: Ethical Stem Cell Treatments Showing Most Promise

by Rebecca Oas, Ph.D. (Originally published on ZENIT.org, December 7, 2011)

According to data from the World Health Organization, cardiovascular disease is the number one killer globally, resulting in an estimated 17.3 million deaths in 2008 alone (1). Such a mind-boggling number may make it difficult to appreciate the fact that each death means the loss of a human person, and a painful vacuum left in the lives of loved ones.

As difficult as this destructive illness may be both on a worldwide and on a personal level, some are beginning to see hope: Because cardiovascular disease accounts for 30% of global deaths, there are worldwide efforts to develop new and better treatments and improve prevention.

As these efforts have exploded over the last decade, stem cell therapy has emerged as perhaps the fastest growing area of interest in biomedical research, and funds from international venture capitalists and other investors have followed quickly behind. Among some of the more fascinating findings are those which demonstrate that some adult stem cells can be coaxed to become a specific cell type, and can then be used to regenerate diseased or injured tissues. Such research has raised hopes that conditions once thought incurable might prove to be treatable after all.

Due to the promise of this potentially lucrative field, however, the debates over the ethics of different types of research and treatments have at times dominated the headlines. While treating patients with stem cells is not in itself ethically problematic, the primary moral issues revolve around the method of obtaining the cells.

Stem cells obtained from early-stage human embryos are pluripotent, meaning they can give rise to every cell type in the human body, but to obtain them requires the destruction of the embryo, which the Catholic Church rightly condemns. Although in vitro fertilization (which is also contrary to Church teaching) has sadly led to a huge and growing "reserve" of frozen human embryos, the moral issues involved in the use of embryonic stem cells, combined with the difficulty in securing funding for research in countries such as the United States, have resulted in an emphasis on finding alternatives to research that requires the destruction of these tiny human beings. Examples of these alternatives include stem cells derived from adult tissues, amniotic fluid, and umbilical cord blood. Adult human cells can also be induced to take on a pluripotent identity through the manipulation of gene expression, allowing researchers to achieve many of the benefits of embryonic stem cells without having to destroy embryos to obtain them. This latter process of creating induced pluripotent stem cells is an especially exciting area of study.

Since cardiovascular disease is projected to remain the leading cause of death in the foreseeable future, the use of stem cells to repair damaged cardiac tissue has been a key area of research. It was among the top priorities for Geron, a company which had been considered a forerunner in the area of human embryonic stem cell research until its recent decision to discontinue that part of its business and focus instead on cancer drugs (2).

On the same day as the Geron announcement, however, we also learned of two studies that had obtained promising results using adult cardiac stem cells isolated from the patients themselves (3). At different hospitals, heart tissue biopsies were taken from two patients who had previously experienced heart attacks. Each patient received an infusion containing his own cardiac stem cells (which had been cultured and expanded), and incredibly, the patients actually generated new heart tissue following treatment. As both men were considered to be at high risk for further heart failure, and the damage from their previous heart attacks was previously believed to be irreversible, the resulting regeneration was all the more notable.

Such stories are good news for those who hope to see new and potentially life-saving medical treatments that do not raise ethical questions. It is important to recognize, however, that the success of a research project or medical trial is no guarantee of its moral acceptability, since we do not believe that the ends justify the means. And interestingly, a recent development in the field might point to a further, if implicit, vindication of the often unpopular stand that the Catholic Church has taken against embryo-destructive research.

The journal Biotechnology and Bioengineering recently published a study on the use of human embryonic-derived cells for cardiac cell replacement in rats (4). The primary advantage of this approach is that the cells could be used "as is" and not require expansion, which had been a necessary and challenging step in previous approaches. But this method has a serious drawback in that, unlike bone marrow or cardiac stem cells isolated from the same patient, the cells derived from embryos face the prospect of rejection by the patient's immune system. The authors of the study, noting this obstacle, suggest that a more suitable cell type to use could be induced pluripotent stem cells, which, as we've seen, do not result in the destruction of one human being to save another.

So, for many reasons we should find hope in the latest research which indicates that adult stem cells and induced pluripotent stem cells may perform as well as, or better than, human embryonic stem cells in developing new treatments. Still, much work remains to be done to bring these treatments to the clinical trial stage. Industry standards are some way from being set, and many variables influence researchers' decisions regarding the methods they choose to develop new approaches for fighting disease: their own preliminary results, the findings of other groups, the availability of funding, restrictions imposed by national and international governing bodies, and restrictions on their ability to patent discoveries.

When confronted with increased regulatory obstacles surrounding the use of human embryos and embryonic stem cell lines, many companies have sought alternatives. Contrary to commonly expressed fears within the scientific community, countries such as the United States which impose stronger restrictions on embryonic stem cell usage in research and medicine have not ceased to be competitive in the global market for medical advances. And interestingly, the lab which pioneered the development of induced pluripotent stem cells is located in Japan, which has been classified as having a "permissive" policy on human embryonic stem cell research (5).

It is therefore important that we continue to exert pressure on our leaders in government to recognize the dignity of human life at all stages and support the efforts of those who seek to perform or fund biomedical research that utilizes an approach that respects human life. The current news seems to strongly indicate that, contrary to frequently-stated fears, adherence to moral principles need not jeopardize one's ability to be competitive in research, and to achieve exciting and encouraging results. It is not only possible but necessary to make the pro-life argument on a pragmatic as well as moral basis: it may be possible to change a mind, even without a change of heart.

(Endnotes)

1. World Health Organization: Cardiovascular Diseases fact sheet http://www.who.int/mediacentre/factsheets/fs317/en/index.html
2. Johnson, Linda A. "Geron halting stem cell research, laying off staff." The Associated Press. November 14, 2011. http://news.yahoo.com/geron-halting-stem-cell-research-laying-off-staff-233946222.html
3. Hellerman, Caleb. "Studies: Stem cells reverse heart damage." http://www.cnn.com/2011/11/14/health/stem-cells-heart-damage-reverse/index.html
4. Simpson, David L., Nolan L. Boyd, Sunjay Kaushal, Steve L. Stice, Samuel C. Dudley Jr. "Use of Human Embryonic Stem Cell Derived-Mesenchymal Cells for Cardiac Repair." Biotechnology and Bioengineering. Vol. 109, No. 1, January, 2012.
5. Hoffman, William. "World Stem Cell Map", University of Minnesota, 2011. http://mbbnet.umn.edu/scmap/competescmap.html

Rebecca Oas, Ph.D., is a Fellow of HLI America, an educational initiative of Human Life International. She writes for HLI America's Truth and Charity Forum.