

Ethical Issues: At Last--Pluripotent Stem Cells from Somatic Cells

The on line ethics news source, *BioEdge*¹, announced recently that two separate teams in Japan and the US have simultaneously reprogrammed ordinary human fibroblasts to behave like embryonic stem cells. This finally brings to light the long hoped for possibility of achieving the same potential benefits offered by somatic nuclear transfer that create stem cells in blastocysts without the major ethical or political obstacles that have confronted proposals for therapeutic cloning of human stem cells.

The research breakthrough was reported simultaneously in *Cell*² by a Japanese team and in *Science* by a team from the University of Wisconsin. The new process creates pluripotent stem cells (iPSCs) using a retrovirus to introduce 4 genes into adult human fibroblasts. The new technique appears to be simpler, more efficient and less expensive than the techniques presently employs. One potential drawback, however, is that the newly developed cells may become cancerous.

Historically, the two major ethical objections to using cloned human embryos for therapeutic purposes have been the necessity to destroy human life (the blastocyst) and the potential for exploiting women for their eggs. Somatic cells derived by this new technique are “pluripotent”, which means they have the potential to develop into one of several different tissue types, but not the potential for full human development, as with embryonic stem cells (human cloning). The ethical argument against somatic nuclear transfer (SNRT) has been that the blastocyst created to be destroyed for its stem cells, though created artificially, is “totipotent”, which means that it can differentiate into any cell type in the body, plus the placenta. SNRT cells have the same potential as an embryo created naturally of developing into a fully developed human being, given the proper environment and stimulus to do so. Thus the ethical concern over the creation and destruction of vulnerable human life.

This breakthrough may one day provide welcome relief to the ethical debate that has raged in this country for years over allowing government funding for human therapeutic cloning and stem cell research. For now, however, most researchers still feel that continued efforts and funding for human embryonic stem cell research will be needed until new techniques are proven to be better and safer standards than already exist. On the other hand, some scientists may shift direction quickly, especially if they have funding to do so. California’s stem cell institute has \$3 billion at its disposal and the institute may already be looking for opportunities to reprogram and modifying its research standards on grants to support efforts to create somatic pluripotent cells. There is a window of opportunity for pluripotent cell research, but the door to holding the course in somatic nuclear stem cell research remains very open and the ethical debate will likely continue for quite some time.³

¹ Stem cell breakthrough: more efficient, more ethical. <http://www.bioedge.org>. Nov 21, 2007

² Takahashi K, et al. Induction of Pluripotent Stem Cells from Adult Human Fibroblasts by Defined Factors. *Cell*. Nov 19, 2007. <http://www.cell.com>

³ Manier J. Major leap for stem cells. *Chicago Tribune*. November 21, 2007