ISSUES IN PERSPECTIVE

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Stem Cell Research: New Alternatives

Stem cells are the building blocks of the human body. Stem cell research has enormous potential to deal with disease and various genetic disorders. The most controversial aspect of stem cell research is embryonic stem cells, which necessitate the killing of the embryo to retrieve the stem cells. In 2010, scientists reported on a new technique that provides an alternative to using human embryonic stem cells for research. Basically, the process enables scientists to convert ordinary skin cells into cells that appear virtually identical to embryonic stem cells. This same strategy can then be used to "coax" those same cells to morph into specific tissues that would be a perfect match for transplantation into patients. The work was done by a research team at the Children's Hospital Boston led by Dr. Derrick J. Rossi. The new approach involves molecules known as a "messenger RNA," which the DNA inside cells use to create proteins they need to carry out various vital functions. This approach converted the skin cells into stem cells in about half the time of previous methods—about 17 days—with up to 100 times more efficiency. Detailed tests then confirmed that the cells had not experienced any disturbing changes in their DNA caused by previous methods and they were virtually identical to embryonic stem cells. Rob Stein of the *Washington Post* argues that "The cells produced by the Harvard team, known as induced pluripotent stem cells, or iPS cells, would avoid that ethical objection and could in some ways be superior to embryonic stem cells. For example, iPS cells could enable scientists to take an easily obtainable skin cell from any patient and use it to create perfectly matched cells, tissue and potentially even entire organs for transplants that would be immune to rejection." Richard M. Doerflinger of the US Conference of Catholic Bishops is certainly correct when he contends that "With each new study it becomes more and more plausible to claim that scientists must rely on destruction of human embryos to achieve rapid progress in regenerative medicine."

The issue of stem cell research fundamentally raises this important ethical question: Does the human embryo have moral value? Reproductive and Genetic Technologies have empowered humans to a degree unimaginable only a few years ago. These technologies are also empowering parents to decide what kinds of children they want. Therefore, these technologies raise profound ethical questions, including ethical questions about the human embryo. We cannot ignore them. Consider these technological developments that press the ethical value of the human embryo:

1. **THE USE OF DONOR EGGS IN IN VITRO FERTILIZATION**
   Used in 12% of all IVF cases, the result is the mind bending phrase, "bio-genetic child," meaning a child who is both biologically and genetically related to each of its parents, but, for the first time in history, separating those components. Ethical questions with using donor eggs:

   - Should the woman who donates her eggs be paid?
   - Should we accept the practice of selling eggs with specific personal attributes in mind?
   - Should we permit parents (or other mothers) to choose the person they want to donate the eggs?

- Should the basis be IQ, appearance, heritage or race?
- Are we getting close to eugenics if we, as a civilization, permit this?
- Do the children of such a procedure have the right to know that the egg which was fertilized is not the egg of their mother who raised them?
- Should there be "open-identity" donation procedures?
- Should we, as a civilization, provide opportunities for children to establish a relationship with their donor egg mother or donor sperm father?

2. **PREIMPLANTATION GENETIC DIAGNOSIS (PGD)**
   Through IVF, eggs are fertilized and allowed to divide for 3 days (at the 8-cell stage). The cells of the embryo are tested for defective genes carried by the mother or father. Embryos free of defective genes are then implanted in the mother's uterus or frozen. Ethical questions with PGD:

   - Is it wise to allow widespread use of PGD? (It is currently used in about 10% of IVF procedures in the US.)
   - Could PGD be used to determine other traits or characteristics? Could it become a tool in fact for eugenics?
   - Should there be limits to the empowerment of parents using PGD?
   - Who would set those limits?

3. **CYTOPLASMIC HYBRID EMBRYO**
   Recently, the UK's Human Fertilization and Embryology Authority cleared the production of cytoplasmic hybrids for stem cell research. The nucleus of an animal ovum is replaced with human DNA, producing an embryo that is 99.9% human. Ethical questions:

   - Does such a procedure violate a deeply ingrained principle of "species distinction" between humans and animals? Is there a "creation-order distinction" being violated here?
   - Do "interspecies embryos" pose a slippery slope of unintended consequences?
   - Does this procedure challenge human dignity?

Conclusion**:** We must consider life as a continuum: "Human development begins at fertilization, the process during which a male . . . sperm unites with a female [egg] to form a single cell called a *zygote*. This highly specialized, totipotent cell marked the beginning of each of us as a unique individual. [A *zygote* is defined] "as the beginning of a new human being." "Although most developmental changes occur during the embryonic and fetal periods, some important changes occur during later periods of development: infancy, childhood, adolescence, and adulthood. Although it is customary to divide human development into *prenatal* (before birth) and *postnatal* (after birth) periods, birth is merely a dramatic event during development resulting in a change in environment. *Development does not stop at birth*." [Moore, Keith L. and Persaud, T.V.N. *The Developing Human: Clinically Oriented Embryology*. 6th edition. Philadelphia: W.B. Saunders Company, 1998, pp. 2 and 18.] At the very least, human civilization must have a conversation about the ethical implications of the procedures discussed in this *Perspective*. As a part of the conversation, I believe we should also revisit the ethical value of the human embryo.

See Rob Stein in the *Washington Post* (30 September 2010) and Dan Vergano in *USA Today* (4 October 2010).