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Stem Cell Research: Are There Ethical Alternatives to Destroying Human Embryos?

Case Study by Dennis Sullivan, MD

Bob and Nancy Wilson are a middle-aged couple living in a large Midwestern city. They have two children: their daughter, Jenna, is in the 10th grade at a private Christian school. David, their son, has just turned 14. Somewhat shy for his age, he has been raised in a home-school environment, but does go to the Christian school for sports.

Recently, David has become extremely tired much of the time. Normally active in soccer, he has not had enough energy to participate, and had to temporarily leave the team. He feels hungry much the time, and must run to the bathroom to urinate frequently. A recent visit to their family doctor confirmed the diagnosis of juvenile diabetes. Diabetes results from a failure of the pancreas to make insulin, an important hormone necessary to transport sugars into the body's cells.

Bob and Nancy feel overwhelmed with the need to give David regular insulin injections, along with all the training that this will require of their shy and retiring son. They are desperately searching for alternatives. Recently, they heard about research at the nearby medical school, where embryonic stem cells are used to replace the defective insulin-producing cells of the pancreas. The research has successfully reversed diabetes in an animal model, and the university is looking for human volunteers.

Human stem cells are the “starter” cells that act as precursors of mature bodily tissues. Such cells have not yet differentiated (become specialized) into their mature forms. All human beings possess such cells. Adult cells once developed from stem cells by the process of cell division, with daughter cells successively becoming more complex than their precursors. However, adult cells that constitute bodily organs have mostly lost the ability to divide. Mature cells in the brain, spinal cord, skeletal muscle, heart muscle, and pancreas no longer have the ability to divide when they are damaged. Despite some limited exceptions, these cells are incapable of replacement.

What if there were stem cells that could replace these damaged cells? Such an idea could prolong one's lifespan, or at least improve one's quality of life. The biological possibilities are intriguing. In our particular example, the proposed research would use human embryos as a source of cells that could be grown into new pancreatic cells, possibly as a cure for diabetes.

When they investigated this possibility, Bob and Nancy learned that this is a large study with many volunteers the same age as David. The researchers explained that frozen embryos left over from fertility treatments have been made available to the university for this research. Such embryos would be disaggregated at the five-day stage, with their component cells extracted and grown in tissue culture. Using specialized growth media, these cells can be steered into becoming the beta cells (insulin-producing cells) of the pancreas. If the treatment works, the new cells would cause David's pancreas to produce insulin once again. Bob and Nancy are especially encouraged that the research will be covered by a large grant, and all of his health care costs will be taken care of while he is in the study.

Bob and Nancy have come to you, their pastor. You are the leader of an Evangelical Lutheran Church, and you have followed the ethical controversies over stem cell research for some time. Bob and Nancy are seeking your counsel, because they have some ethical concerns about the destruction of human embryos.

Questions for discussion:

1. What is the ethical issue here? With present technology, human embryonic stem cells can only be derived from human embryos produced through in-vitro fertilization (IVF) techniques. Harvesting these cells requires the destruction of the embryos. In the view of many, this is a violation of the sanctity of life and is morally equivalent to abortion. Are frozen embryos human beings, or just “potential life?” If the embryos “will just be discarded anyway,” does that alter your decision?
2. Bob and Nancy have already asked some others in the church about this possibility, and were told by some: “If you go through with this, that’s murder, and we’ll never speak to you again!” What do you think of this answer? How would you respond to Bob and Nancy if they decide their son should join this study, even if you personally disagree?
3. Although the procedures are not totally worked out, it appears likely that cells obtained from living adult donors or cadavers may not be as “end-stage” as once thought. For example, adult bone marrow cells may be “de-differentiated” to turn them into other cells, such as neurons or muscle. What impact does this promising scenario have on the present case?
4. This is an experimental study. What guarantees would you propose that Bob and Nancy receive before they agree to this? How much risk should they ask their son to undergo? What estimated percentage of success is acceptable? Is such research even ethical for a minor, who by law cannot directly give his own informed consent?

Taking the Discussion Further:

1. Is it possible to produce embryonic stem cells without actually destroying embryos? One proposal relies on a recognized procedure from reproductive technology, but used in a different way than usual. Removing a single cell from a three-day old embryo does not seem to affect the viability of the embryo (this idea has already been successfully done for genetic testing). The removed cell could be used as a starter cell for a stem cell line, leaving the embryo intact to be implanted later. Would this be an ethically acceptable way to produce embryonic stem cells?
2. Another recent proposal suggests that “non-viable” embryos, that is, embryos that have stopped dividing, may be a source of embryonic stem cells. The idea here is that such embryos are “already dead” in some sense, so they could be ethically destroyed. The resulting stem cells might be stimulated to divide in cell culture. Even if one holds to the idea that embryos are human persons, this idea might be analogous to taking organs and tissue from brain dead patients. Would this be an ethical alternative to the destruction of embryos?
3. Finally, another recent suggestion involves the same technology as used in somatic cell nuclear transfer (cloning). Somatic cell nuclear transfer starts with an adult cell nucleus from, say, someone’s outer skin, and inserting it into an ooplast (enucleated oocyte). This is then stimulated to become a zygote capable of cell division and embryogenesis.

Dr. William Hurlbut has proposed a new idea, called “Altered Nuclear Transfer,” that would alter the inserted DNA *before* creation of cloned embryos. The resulting entities would never have the ability to

implant in the wall of the uterus. Dr. Hurlbut (an ethical conservative) has referred to such entities as “biological artifacts,” not true embryos. On his view, this would therefore theoretically be a source of “embryonic” stem cells without violating conservative principles on the sanctity of human life. What is your response to this alternative?

4. No matter what your reaction to these proposed alternatives, are you worried about the larger picture here? What do you think of our society’s overall attitude toward human life? Does our country (and the world beyond our borders) continue to respect human dignity? Or have we become, in the words of Wesley J. Smith, a “culture of death?”

Links and References for Further Research:

Center for Bioethics at Cedarville University: http://www.cedarville.edu/centerforbioethics/files/stem_cell.cfm

Center for Bioethics and Human Dignity: <http://www.cbhd.org/resources/stemcells/>

Boston Globe - New technique eyed in stem-cell debate:

http://www.boston.com/business/technology/biotechnology/articles/2004/11/21/new_technique_eyed_in_stem_cell_debate/