Human ES Cells in Europe

Political and religious disagreements about stem cells and their use are everywhere, but nowhere is there a more bewildering array of positions than in Europe, where four different models are emerging. The first model, developing in the United Kingdom, permits the generation and use of human embryonic stem (ES) cells as well as therapeutic cloning, with certain restrictions. The second, visible in the Netherlands, permits the generation and use of human ES cells but forbids therapeutic cloning. The third, seen in Germany, forbids the generation of new human ES cell lines and therapeutic cloning, but allows, under exceptional conditions, the use of existing human ES cell lines for research only. The fourth, evident in Ireland and Austria, forbids all generation and use of human ES cells and therapeutic cloning as well.

Given this spectrum of regulations, European Union (EU) Research Commissioner Philippe Busquin assumed a Herculean task when he set out to establish guidelines for the funding of human ES cell research in the EU’s 6th Framework Program in 2002. The guidelines appear to be a compromise that does not permit the generation of new embryos solely for the purpose of producing new human ES cell lines. At the same time, the compromise permits scientists to produce new human ES cell lines, for an eventual therapeutic intervention, from supernumerary embryos that were donated before 27 June 2002, were derived from in vitro fertilization, and are no longer required for implantation into the uterus.

Some politicians argue that the EU should not fund research that is considered illegal and/or unethical in some member countries with financial contributions from those dissenting countries. However, the funds that the EU has at its disposal are European funds, meaning that member states may not attach conditions to their contributions in an effort to circumvent European decisions. Yet stem cell research is advancing so rapidly that new discoveries might allow us to avoid at least some of the current ethical problems. For example, the sacrifice of surplus embryos is a commonly cited argument used by those who are opposed to the generation of new cell lines. The ethical issue at stake is whether the death of a supernumerary embryo is valued more highly than its death for an admittedly foreign purpose: its subsequent use for the benefit of seriously ill patients. However, recent and surprising results suggest that there may be new ways of generating stem cells. ES cells from mice can differentiate, in culture conditions, into oocyte-like cells that are potential recipients for nuclear transfer. This would not only reduce the need for oocyte donations but would also allow the generation of patient-specific stem cells that would not be rejected by the patient’s immune system.

Of course, the validity of such an alternative has yet to be proven; but then again, the benefits of therapeutic cloning as well as those of therapeutic intervention using human ES cells also remain unclear, because the experimental evidence is insufficient. At least two sets of data are required to prove the underlying principles and therapeutic value. The capacity of ES cells to form teratomas necessitates the development of satisfactory methods to separate the intended differentiated end products from their stem cell precursors. Subsequently, differentiated cells derived from human ES cells should be used for therapeutic interventions in appropriate animal model systems for researching, for example, Parkinson’s disease, diabetes, or heart diseases. The scientific community has to deliver these crucial sets of data. It is encouraging that the British Medical Research Council is spearheading an attempt to combine the worldwide available and future human ES cell lines in a repository. A sufficient collection and characterization of human ES cells might prevent immune rejection in the majority of patients, provided that therapeutic use is made feasible.

The rich cultural heritage in Europe provides opportunities to explore different paths for handling human stem cells that are acceptable to its respective member societies. At the moment, it is difficult to predict which path will turn out to be the most successful. It is the turn of the scientists now to answer the open questions.

Peter Gruss is president of the Max Planck Society in Munich, Germany.
Human ES Cells in Europe
Peter Gruss

Science 301 (5636), 1017.
DOI: 10.1126/science.301.5636.1017