

A Discussion of the Challenges Using ESCs

Unfortunately, there are real challenges to expanding the use of ESCs to model human diseases. One reason is that ESCs can only be derived from cells of embryos that are at an early stage of development; another is that human diseases involve cells that have a long history of differentiation events and are often multigenic (caused by the interplay of many genes). Further complicating matters is the risk of immune rejection by the patients receiving ESCs as part of a treatment. Transplanted cells derived from ESCs are from another individual and are therefore not the same genotype as the patient, so, just like any other tissue transplant, they can be rejected by the patient's immune system.ⁱ Also, various social and ethical issues are raised by the use of ESCs in therapies because they are derived from human blastocysts, also known as embryos (Gilbert et al. 2005; Siegel 2008; NSF 2012).ⁱⁱ If we could obtain similarly pluripotent stem cells from individuals diagnosed with known diseases, perhaps those cells could be used to study these diseases and identify new therapies. When hunting for pluripotent cells, finding a way to induce them could be an answer.

Literature Cited

Gilbert, S. G., A. Tyler and E. Zackin. 2005. *Bioethics and the New Embryology: Springboards for Debate*. Sinauer Associates, Sunderland, MA.

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ⁱ One reason diseases of the brain are being targeted is that the brain and the eyes are among the few places where immune rejection is not a big problem. The blood-brain barrier of the brain's endothelial cells keeps the brain and the eyes shielded from the immune system.

ⁱⁱ In 2010, two stem cell scientists filed a lawsuit against the U.S. government to ban federal funding for human ESC research. This lawsuit halted all human ESC research in the United States for months. Consider reading Wadman 2011 as well as listening to a Web conference with one of the plaintiffs, Theresa Deisher, recorded in 2011 while the court case *Sherley v. Sebelius* was ongoing.