## Scientists create embryonic stem cell lines using adult cells, but pro-lifers still critical

In the last month, two important papers have documented the success of creating embryonic stem cells from adult human cells. The experiments are definitely breakthroughs, but because the mechanisms are still so early in their development, there are several challenges to overcome. The process works through somatic-cell nuclear transfer.

Scientists remove the nucleus, the center of the cell that contains its DNA from a human egg. They then insert the nucleus of a patient's somatic cells, those are any cells except egg or sperm. The new DNA (now a full complement of chromosomes, instead of half) convinces the egg it's been fertilized and a embryo begins to develop. Scientists then take those early cells and chemically coax them into becoming the targeted cell type. In the case of the most recent experiment the embryonic stem cells were made into functioning, insulin-producing beta cells for a type 1 diabetic woman.

Gathering the raw materials is a problem Gautam Naik reports for Wall Street Journal:

Another challenge is access to the human eggs required for "rebooting" a patient's DNA into an embryonic form. If the technology ever does get used commercially, doctors will need to obtain thousands of eggs to treat thousands of patients.

The rate of success was only about 7% of the 512 eggs that underwent the nuclear transfer, according to the Journal. Embryonic stem cells have an advantage over induced pluripotent stem cells because they are genetically matched to their donor and completely naive. Induced pluripotency is the chemical reversal of adult stem cells into proto-cells. They can have some bugs. But, embryonic stem cells are a lot more expensive reports Monya Baker at Nature:

Creating a different embryonic stem cell line for each patient would probably not be necessary, says Robert Lanza, chief scientific officer at Advanced Cell Technology in Marlborough, Massachussetts, and a co-author on the Cell Stem Cell paper. Instead, he imagines, scientists would create banks of cell lines that could serve patients needing replacement tissues.

And, creating embryonic stem cells through somatic cell nuclear transfer doesn't eliminate the ethical issues commonly linked to embryonic stem cells Naik writes:

Some people oppose the idea of extracting stem cells from an embryo—whether created by sperm and egg or via cloning—because they believe it is tantamount to destroying a life. Cloning also is contentious because a rogue scientist potentially could use it to transplant a cloned human embryo into a womb to try to clone a person.

But, scientists think that cloning a human is still very unlikely, at least in the near term because the practice is widely agreed to be unethical and even illegal in some countries and because the process is so

technically difficult. As Shoukhrat Mitalipov an Oregon-based stem cell scientist who reported success with somatic cell nuclear transfer last year told Nature:

"We never got any offspring in the monkey, and we tried hard," he says. Over several years, his team transplanted hundreds of cloned monkey embryos from laboratory dishes into healthy monkeys; only one embryo implanted successfully, and it stopped developing after two months.

## Additional Resources:

- Cloned embryonic stem cells re-ignite ethics debate, Genetic Literacy Project
- Promise of "easy" stem cells comes under investigation, Genetic Literacy Project