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You Say Embryo, I Say Parthenote

Stem cells from unfertilized eggs may be too tightly regulated

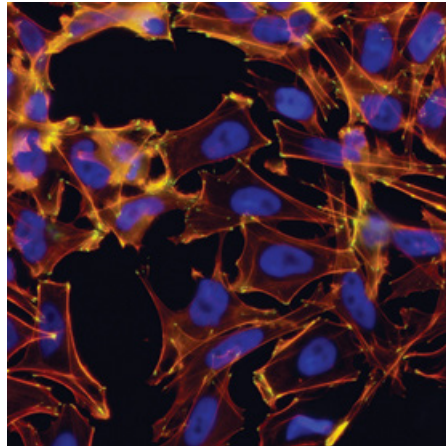
By Julia Galef | November 4, 2011

U.S. stem cell scientists breathed a sigh of relief this July when a federal judge upheld the Obama administration's expansion of stem cell research. He ruled that work on existing embryonic stem cell lines derived outside federally funded labs did not violate a ban on the destruction of embryos. Despite the legal victory, however, many investigators remain frustrated that a newer method for creating stem cells remains off-limits for funding.

Human embryonic stem cells typically come from fertilized eggs. In 2007, however, scientists at International Stem Cell, a California-based biotech firm, reported the first successful creation of human stem cell lines from unfertilized eggs. They used a process called parthenogenesis, in which researchers use chemicals to induce the egg to begin developing as if it had been fertilized. The egg—called a parthenote—behaves just like an embryo in the early stages of division. Because it contains no genetic material from a father, however, it cannot develop into a viable fetus.

Just like embryonic stem cells, parthenogenetic stem cells can be coaxed to grow into different kinds of human cells or tissue, ready to be transplanted into diseased areas of the body. International Stem Cell scientists have converted them into liver cells and plan to convert them into neurons for treating Parkinson's disease, pancreatic cells for diabetes, and other tissues. Meanwhile teams at the Massachusetts-based **Bedford Stem Cell Research Foundation** are working to improve the efficiency of methods of deriving stem cells from parthenotes.

Proving that unfertilized eggs will produce stable tissues in humans remains an obstacle, says Alan Trounson, president of the California Institute for Regenerative Medicine. "We need to see this done in other laboratories," he points out. That won't be easy. Guidelines from the National Institutes of Health and federal laws define parthenotes as embryos, which means that deriving new parthenogenetic stem cell lines is off-limits to all labs receiving federal funding—which is nearly all of them. Barring an unlikely turnabout, it will be up to a handful of private firms in the U.S. to carry the young field forward.



Parthenogenetic stem cells Image: From "Derivation of High-Purity Definitive Endoderm from Human Parthenogenetic Stem Cells using an *in vitro* Analog of the Primitive Streak," by Nikolay Turovets et al., in *Cell Transplantation*, Vol. 20, No. 6; June 2011