

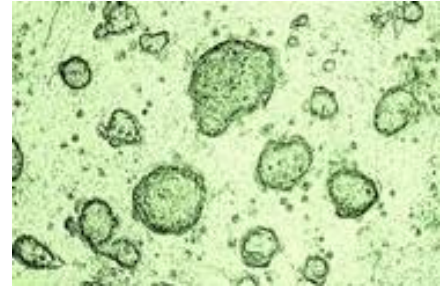
Why Embryonic Stem Cells Are Obsolete

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Embryonic stem cells

Scientists may be growing impatient, but President Obama has been rightly taking his time in addressing a campaign promise to lift the ban on federal funding for research using new lines of stem cells to be taken from human embryos. Even for strong backers of embryonic stem cell research, the decision is no longer as self-evident as it was, because there is markedly diminished need for expanding these cell lines for either patient therapy or basic research. In fact, during the first six weeks of Obama's term, several events reinforced the notion that embryonic stem cells, once thought to hold the cure for Alzheimer's, Parkinson's, and diabetes, are obsolete. The most sobering: a report from Israel published in *PLoS Medicine* in late February that shows embryonic stem cells injected into patients can cause disabling if not deadly tumors.



The report describes a young boy with a fatal neuromuscular disease called ataxia telangiectasia, who was treated with embryonic stem cells. Within four years, he developed headaches and was found to have multiple tumors in his brain and spinal cord that genetically matched the female embryos used in his therapy.

His experience is neither an anomaly nor a surprise, but one feared by many scientists. These still-mysterious cell creations have been removed from the highly ordered environment of a fast-growing embryo, after all. Though they are tamed in a petri dish to be disciplined, mature cells, research in animals has shown repeatedly that sometimes the injected cells run wildly out of control—dashing hopes of tiny, human embryos benignly spinning off stem cells to save grown-ups, without risk or concern.

That dream was still alive only a few weeks before this report. Within days of Obama's inauguration, the Food and Drug Administration approved its first-ever embryonic stem cell study in humans: the biotech company Geron's plan to inject highly purified human embryonic cells into eight to 10 patients with acute spinal cord injuries. (The cells are from a stem cell line approved by Bush because it predated his ban.) The FDA should now be compelled to take another look: Are eight to 10 patients enough, or one year of monitoring sufficient, to assess safety? And doctors who participate in the trial will have to ask what every doctor must ask before performing research on a human subject: Were I this patient, would I participate? Would I encourage my loved ones to do so?

Even as the future of embryonic stem cells has dimmed, adult stem cell research has scored major wins evident just in the past few months. These advances involve human stem cells that are not derived from human embryos. In fact, adult stem cells, which occur in small quantities in organs throughout the body for natural growth and repair, have become stars despite great skepticism early on. Though this is a more difficult task, scientists have learned to coax them to mature into many cell types, like brain and heart cells, in the laboratory. (Such stem cells can be removed almost as easily as drawing a unit of blood, and they have been used successfully for years in bone marrow transplants.)

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To date, most of the stem cell triumphs that the public hears about involve the infusion of adult stem cells. We've just recently seen separate research reports of patients with spinal cord injury and [multiple sclerosis](#) benefiting from adult stem cell therapy. These cells have the advantage of being the patient's natural own, and the worst they seem to do after infusion is die off without bringing the hoped-for benefit. They do not have the awesome but dangerous quality of eternal life characteristic of embryonic stem cells.

A second kind of stem cell that has triumphed is an entirely new creation called iPS (short for induced pluripotent stem cell), a blockbuster discovery made in late 2007. These cells are created by reprogramming DNA from adult [skin](#). The iPS cells are embryonic-like in that they can turn into any cell in the body—and so bypass the need for embryos or eggs. In late February, scientists reported on iPS cells that had been transformed into mature nerve cells. While these cells might become a choice for patient therapy in time, scientists are playing this down for now. Why? These embryonic-like cells also come with the risk of cancer.

James Thomson, the stem cell pioneer from the University of Wisconsin who was the first to grow human embryonic stem cells in 1998, is an independent codiscoverer of iPS cells along with Japanese scientists. Already these reprogrammed cells have eclipsed the value of those harvested from embryos, he has said, because of significantly lower cost, ease of production, and genetic identity with the patient. They also bring unique application to medical and pharmaceutical research, because cells cultivated from patients with certain diseases readily become laboratory models for developing and testing therapy. That iPS cells overcome ethical concerns about creating and sacrificing embryos is an added plus.

The importance of stem cells for medical research has never been greater, and the scientific and public clamor for unimpeded research is fully understandable. But it's important that Obama and everyone supporting a lifting of the ban be clear with the public on what is involved in this decision; it's more complex than advertised. The ban Bush became famous for restricted the use of federal research dollars just to adult stem cells and embryonic stem cells already in existence at the time of his executive order. Lifting this ban so that researchers can use frozen embryos that would otherwise be discarded—they've been donated by couples who have had [in vitro fertilization](#) treatments—has drawn wide and bipartisan support from Congress. It's an easy lift.

The more ethically charged decision—less understood by the public and one Congress has avoided—involves the ban on *creating* human embryos in the laboratory solely for research purposes. In fact, President Clinton is the one who balked at allowing scientists to use government money for embryo creation and research on stem cells harvested from such embryos; Bush only affirmed the Clinton ban. The scientific community has been able to attract nonfederal money for such work, and it is going on all the time in stem cell institutes. Scientists want relief from the inconvenience and expense of keeping that work and the money that supports it separate from federal dollars.

Reversing the executive orders of two prior presidents on embryo creation, which even the Congress has been unwilling to tackle, is a far bigger issue than lifting the ban on the use of IVF embryos slated for destruction. Obama stands for transparency, and it's important for him to make sure the public understands his decision, including that all stem cells are not the same or created equally.