Stem cell research breaks new ground in 2010

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Two US companies this year broke new ground by winning regulatory approval to start the first experiments using embryonic stem cells on humans suffering from spinal cord injury and blindness.

The potent but hotly debated cells can transform into nearly any cell in the human body, opening a path toward eliminating such ills as Parkinson's disease, paralysis, diabetes, heart disease, and maybe even the ravages of aging.

And more human experiments are on the way as scientists refine new methods to get around the controversy that surrounds embryonic stem cell research, which has generated controversy because it involves the destruction of early human life.

"After a decade of intense controversy, the field is finally ready to start proving itself and to actually start helping patients suffering from a range of horrific diseases," said Bob Lanza, chief scientist at Advanced Cell Technology.

His company was cleared in November by the US Food and Drug Administration to begin testing a therapy derived from embryonic stem cells to treat a rare form of blindness that strikes in childhood, known as Stargardt's disease.

Clinical trials are expected to start in the coming months, and results could be known within six weeks.

In October, Geron Corporation announced it had begun the first-ever test of human embryonic stem cells in a patient suffering from spinal cord injury. In all about a dozen patients are expected to participate in the year-long study.

The primary aim of both ACT's and Geron's studies is to gauge safety, not necessarily to restore mobility or vision.

The major concern with stem cell therapies is that the transforming cells could form tumors. But if the methods appear safe, both companies aim to expand their trials to wider populations in the hopes of eventually curing paralysis and blindness.

Twelve years ago, American scientist James Thomson's team isolated human embryonic stem cells for the first time, and the field has been cloaked in controversy ever since.

Former president George W. Bush outlawed federal funding for the research because it involves the disposal of human embryos, a ban that President Barack Obama reversed shortly after taking office in 2009.

But in August of this year, Judge Royce Lamberth blocked US government funding for embryonic stem cell research after ruling in favor of a coalition of groups, including several Christian organizations.

While the funding has since been permitted to go ahead pending appeal, the legal wrangling has left some scientists wary of the future.

"The on-again-off-again situation will only stall the progress of everyone's work," said Tim Kamp, head of the University of Wisconsin's Stem Cell and Regenerative Medicine Center, back in September.

To get around the problems associated with embryonic stem cell

research, scientists in 2010 forged new paths toward creating induced pluripotent cells, which can transform into skin, blood or heart cells. Embryonic stem cells are pluripotent cells.

The field of induced pluripotent cells (iPS) faces its own challenges, as studies have shown they are less efficient and more unpredictable than embryonic cells.

But Canadian researchers described this year in the journal Nature their method of turning adult human skin cells into blood without manipulating them back into pluripotent cells, making the process more time efficient and potentially safer.

And a Harvard University scientist, Derrick Rossi, discovered a way to avoid risky genetic modification and instead use RNA molecules to reprogram adult human cells into pluripotent cells without altering the DNA.

Describing his peer-reviewed research published in September, Rossi said it was a "safe, efficient strategy... that has wide ranging applicability for basic research, disease modeling and regenerative medicine."

Lanza said the advances, while they still face rigorous testing, offer promise toward treating a host of diseases, and could one day eliminate the need for amputation of limbs, blood transfusions and transplants from strangers.

"Some time in the future, perhaps in the lifetime of most of your readers, you'll get in an accident and lose a kidney and they will take a skin cell and just grow you up a new organ," said Lanza. "That field is just roaring ahead."