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UM Prof Says Real Advances Coming Soon From Stem Cells

There's now real hope for cures for dread diseases like Alzheimer's, Lou Gehrig's and Parkinson's, according to officials of the University of Michigan's A. Alfred Taubman Medical Research Institute.

In the year since Michigan voters swept away restrictions on embryonic stem cell research, real progress has been made, institute director Eva Feldman told a crowd of more than 200 at the Detroit Economic Club.

During the speech, Feldman walked the crowd through a stem cell primer and explained how they're harvested and grown, where they hold out hope for cures for currently incurable diseases, and what a stem cell industry could mean for the Michigan economy.

Stem cells, she said, originate from the inner cell mass of the human blastocyst on day 5 of its development. They're harvested from excess blastocysts created by in-vitro fertilization, in which childless couples have their sperm and eggs mixed in a laboratory, hoping to come up with healthy blastocysts that can be implanted into the woman's womb.

The stem cells can be encouraged to develop into virtually any kind of human cell, producing cells that could be used for treatment. Stem cells from populations carrying diseases can also be studied for methods to turn that particular disease off.

Feldman announced that UM researchers have received approval to begin accepting donated excess embryos that will be used to derive the university's first human embryonic stem cell lines. The cell lines will be used to study the causes and progression of inherited diseases, to test potential treatments and to seek cures.

Feldman also said the research shows real economic potential for an industry, the life sciences, that is among the few growing in Michigan. From 1999 to 2006, life science employment in Michigan grew 11 percent while manufacturing fell 25 percent and trade, transportation and utilities fell 8 percent.

And she said UM is among the nation's leaders in life sciences research -- first in the nation in stimulus grants from the National Institutes of Health with \$99.7 million, of which \$6.8 million was for stem cell research.

She said stem cell research has the potential to create 4,000 jobs and \$250 million a year in payroll within four years.

Michigan universities' top ranking in stem cell research and the passage of Proposal 2 were behind the World Stem Cell Summit coming to Detroit next October, as well. More than 1,200 stem cell scientists and entrepreneurs are expected.

The new stem cell growth work will be conducted by the UM's Consortium for Stem Cell Therapies. Launched in March with funding commitments of about \$2 million, with a key gift from billionaire A. Alfred Taubman, the consortium involves researchers from across the UM campus, as well as collaborators at Michigan State University and Wayne State University.

Since the approval of Proposal 2, the university has worked to ensure that the research will comply with federal law and the Michigan Constitution, as well as extensive new regulations established last summer by the National Institutes of Health. To ensure full compliance, the project had to be approved by UM's Human Pluripotent Stem Cell Research Oversight Committee and the Medical School's Institutional Review Board. Both committees are composed of physicians, scientists, ethicists, attorneys and community members who evaluated whether the project would be conducted ethically, legally and to the benefit of patients. The project was approved Nov. 11.

"During last year's Proposal 2 campaign, opponents of human embryonic stem cell research claimed the constitutional amendment would lead to unregulated science," said Gary Smith, co-director of the UM consortium and an associate professor of obstetrics and gynecology. "But the fact that it has taken many months to clear all the regulatory steps required to start this project demonstrates that human embryonic stem cell science is among the most highly regulated areas of research. At long last, University of Michigan researchers will join colleagues around the world in pursuing the full promise of embryonic stem cell research."

UM will become one of only half a dozen or so locations where excess embryos can be donated, Smith said.

UM scientists said they expect to achieve their first embryonic stem-cell-line derivation by mid-2010. Lab space totaling 1,254 square feet has been secured for the work, and the labs have been outfitted with new equipment. Three new research associates have been hired for the project, and a fourth will be hired soon.

Feldman said replacing damaged nerve cells with those grown from stem cells shows real promise curing Alzheimer's, Parkinson's and Huntington's diseases.

Tests with rodents and pigs are promising for Alzheimer's, and human tests are to begin next year, Feldman said.

"This of course is my life's dream, but it is also the life's dream of my patients ... and this is the beginning of a new era of new therapies," Feldman said.

The consortium has secured all necessary approvals to begin accepting embryos that were created for reproductive purposes but are either no longer needed or are unsuitable for clinical use. In accordance with federal and state law, these gifts require the voluntary and informed consent of the donor, documented in writing.

In addition to deriving new embryonic stem cell lines, consortium researchers will refine recently developed techniques to convert adult skin cells into induced pluripotent stem cells, known as iPS cells. These reprogrammed cells display the most scientifically valuable properties of embryonic stem cells, while enabling researchers to bypass embryos altogether.

"We will pursue all forms of stem cell research so that we can achieve scientific and medical breakthroughs, no matter where they come from," said Sean Morrison, director of the UM's Center for Stem Cell Biology.

Early next year, the consortium will issue a call for proposals from UM researchers seeking funding to derive new iPS cell lines, said Sue O'Shea, consortium co-director and professor of cell and developmental biology.

A top priority of the U-M-led consortium is to derive new lines of human embryonic stem cells and iPS cells that carry the genes responsible for inherited diseases.

"There are very few university programs in the United States deriving disease-affected embryonic stem cell lines," O'Shea said. "Our special niche will be creating, studying and understanding normal and abnormal development of disease-affected stem cell lines -- both embryonic and iPS cell lines."

"Stem cell research has special application to neurological diseases," said Feldman, a professor of neurology. "Providing stem cell lines containing the genes that lead to specific diseases will be an incredible boon to medical scientists.

"It will help us understand the origin and progression of many diseases, allow us to test out new medications and therapies with an efficiency we could never have dreamed of, and ultimately find treatments for disease where none now exist," Feldman said. "This is a major step forward."

Embryonic stem cells are the body's master cells; they replicate endlessly and form the more than 200 cell types in the human body. Scientists hope these remarkably versatile cells -- and the iPS cells that mimic them -- can someday replace faulty cells or diseased tissues in failing organs. This fledgling field is known as regenerative medicine, and the new Consortium for Stem Cell Therapies positions the University of Michigan to play a leadership role in this research.

More at <http://stemcellresearch.umich.edu>, www.umich.edu/stemcell, www.drda.umich.edu/policies/um/ESCCells.html or www.med.umich.edu/taubmaninstitute.

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