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The New York Stem Cell Foundation

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New York Stem Cell Foundation-Druckenmiller Fellow Lead Author on Groundbreaking Study That Finds Safer New Way to Turn Adult Cells Into Stem Cells

NEW YORK, NY (October 10--New York Stem Cell Foundation (NYSCF) Druckenmiller Fellow **Justin K. Ichida, PhD** of the Harvard Stem Cell Institute is lead author on a study demonstrating the feasibility of using chemical compounds to turn adult cells into patient-specific stem cells without the use of cancer causing genes. Building on the work of Lasker Prize-winning scientist **Shinya Yamanaka**, **MD, PhD,** Dr. Ichida and his colleagues at Harvard found a new and safer way to make stem cells by using chemicals to replace two of the four genes used to turn adult cells into induced pluiripotent stem cells (iPSCs), which are very similar to embryonic stem cells.

The study, *A Small Molecule Inhibitor of Tgf-β Signaling Replaces Sox2 in Reprogramming by Inducing Nanog,* is being published in the online edition of ***Cell Stem Cell***, **embargoed for October 8, 2009 at noon EST,** and will also appear in the journal's November 6th print edition. In addition to Dr. Ichida, whose work is funded by NYSCF, contributors to the study also included NYSCF-Druckenmiller Fellows **Francesco P. Di Giorgio, PhD** and **Dieter Egli, PhD**; NYSCF Chief Scientific Officer **Kevin Eggan**, **PhD,** Assistant Professor, Stem Cell and Regenerative Biology at the Harvard University Stem Cell Institute; and NYCF's Science Advisor **Lee Rubin, PhD,** Director of Translational Medicine at the Harvard University Stem Cell Institute. **Joel Blanchard, PhD,** and **Kelvin Lam, PhD**, both in the Rubin lab, were co-authors on the paper. Their work on this project was funded through a grant from NYSCF.

"We are incredibly proud of Dr. Ichida and the other NYSCF scientists who participated in this landmark research," says **Susan L. Solomon**, NYSCF's founder and CEO. "These findings move us closer to finding safer chemical methods for reprogramming cells, and toward our ultimate goal, finding cures for such diseases as ALS and diabetes."

"Stem cells have the greatest potential to dramatically change and improve the way we treat disease," says Dr. Ichida. "We're very excited about our findings because it means that in the near future we should be able to make limitless supplies of stem cells and possibly replacement cells for patients with diseases."

Dr. Ichida and his colleagues built on the work of Dr.Yamanaka, who identified four genes that transform adult cells into iPS cells when delivered via a retrovirus that integrates into a cell's DNA and activates the conversion process.

The problem with this method is that the DNA from the virus remains in the cells. Over time, the reprogramming DNA can reactivate, causing cells to become cancerous. In fact, viruses have been shown to cause cancer in patients undergoing gene therapy by activating cancer causing genes that exist in the person's DNA.

The Harvard scientists posited that substituting small chemical molecules for the genes would accomplish the same transformation more safely by eliminating the cancer causing mechanism.

"This discovery is exciting because it demonstrates the feasibility of using chemicals to make safer patient -specific stem cells for transplantation medicine," says Dr. Ichida. "One of the most important things we learned from this study is that with respect to molecular pathways, there may be several ways to convert one type of cell into another. By using a non-biased chemical screening approach, we uncovered a previously unknown way to make stem cells. The big challenge over the next decade will be to figure out how to make the right cells for disease treatment. This approach will be important for achieving that goal."

According to Dr. Ichida, the next step is finding chemical molecules to replace the two remaining genes, so the entire process can be done chemically. This is critical for iPS cells to be used to treat a variety of diseases.

Dr. Ichida will discuss his findings at NYSCF's Fourth Annual Translational Stem Cell Research Conference on Tuesday, October 13 and Wednesday, October 14, 2009 at the Caspary Auditorium at The Rockefeller University, 1230 York Avenue at 66th Street in Manhattan. He will present during the Programming and Reprogramming session on Wednesday, October 14th from 3:50 to 5 p.m. The session, chaired by Dr. Eggan, will also include **Sheng Ding, PhD**, The Scripps Research Institute discussing *A Chemical Approach to Pluripotency and Reprogramming;* **Philip Avner, PhD**, Institut Pasteur, France, on *Developmental Programming of X-Inactivation Initiation;* and **Ihor Lemischka, PhD**, Mount Sinai School of Medicine, on *Dissecting Cell Fate Regulation in Stem Cells.*

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About The New York Stem Cell Foundation

Founded in 2005, The New York Stem Cell Foundation is dedicated to furthering stem cell research to advance the search for cures of the major diseases of our time. NYSCF opened the first privately funded stem cell laboratory in New York City in March 2006 to serve as a "safe haven" where scientists can conduct advanced stem cell research free of federal restrictions. The organization supports scientists engaged in stem cell research through grants, fellowships and symposia; runs collaborative, state-of-the-art research facilities directly focused on curing disease; and educates the public about the importance and potential benefits of stem cell research. For more information, visit www.nyscf.org.