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GLADSTONE INSTITUTE OF CARDIOVASCULAR DISEASE NEWS

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SHINYA YAMANAKA REPROGRAMS HUMAN ADULT CELLS INTO EMBRYONIC-LIKE STEM CELLS

Breakthrough accelerates new avenues of stem cell research

SAN FRANCISCO, CA – November 20, 2007— Acclaimed stem cell researcher Shinya Yamanaka, MD, PhD, has reported that he and his Kyoto University colleagues have successfully reprogrammed human adult cells to function like pluripotent embryonic stem (ES) cells. Because it circumvents much of the controversy and restrictions regarding generation of ES cells from human embryos, this breakthrough, reported in the journal *Cell*, should accelerate the pace of stem cell research.

Last year, Yamanaka, who is also a senior investigator at the Gladstone Institute of Cardiovascular Disease (GICD), reported that he and his Kyoto colleagues had reprogrammed mouse skin cells into pluripotent stem cells, laying the foundation to apply this methodology in human cells.

In this earlier work, published in *Cell*, Yamanaka and his colleagues identified four genetic factors that resulted in the reprogramming of adult mouse cells into induced pluripotent stem (iPS) cells capable of developing into any kind of cell. This summer, he reported in *Nature* that these iPS cells could even form a new mouse, making them functionally the same as ES

cells. According to the new research, those same genetic factors used with human adult cells resulted in iPS cells which are nearly indistinguishable from human ES cells.

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Yamanaka

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“The rapid application of this approach to human cells has dramatically changed the landscape of stem cell science,” said GICD Director Deepak Srivastava, MD. “Dr. Yamanaka’s work is monumental in its importance to the field of stem cell science and its potential impact on our ability to accelerate the benefits of this technology to the bedside. Not only does this discovery enable more research, it offers a new pathway to apply the benefits of stem cells to human disease.”

“Dr. Yamanaka and his group have made yet another extremely important contribution to the stem cell field,” said Richard Murphy, interim president of the California Institute for Regenerative Medicine (CIRM). “Their results open the door to generating alternative sources of pluripotent cells from patients, which is a major step forward. However, much work still needs to be done to fully characterize and understand the capacity of these induced pluripotent cells to study and to treat human diseases.”

While Yamanaka’s work would seem to eliminate the need for controversial research on human embryos, both he and Srivastava emphasized that research must continue. “We are still a long way from finding cures or therapies from stem cells and we don’t know what processes will be effective,” Yamanaka said.

CIRM’s Murphy added, “Dr. Yamanaka’s work, which uses viral vectors to introduce into cells pluripotency-associated genes, further emphasizes the critical need we have to continue working with naturally occurring human embryonic stem cells, which remain the gold standard against which all alternative sources of human pluripotent stem cells must be tested.”

According to Yamanaka, the next steps will be to understand how these cells can be differentiated into other types of cells and ultimately how they can be used to study disease

models and as potential therapies. “We are now finally in a position to make patient-specific stem cells for therapies without fear of immune-rejection and to make disease-specific stem cells that will reveal the underlying cause of many human diseases” he said.

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Yamanaka

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About the Gladstone Institutes

The J. David Gladstone Institutes, an independent, non-profit biomedical research organization affiliated with the University of California, San Francisco (UCSF), is dedicated to the health and welfare of humankind through research into the causes and prevention of some of the world’s most devastating diseases. Gladstone is comprised of the Gladstone Institute of Cardiovascular Disease, the Gladstone Institute of Virology and Immunology and the Gladstone Institute of Neurological Disease. More information can be found at www.gladstone.ucsf.edu.

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