

## Japan researchers say kidney tissue grown from stem cells (Update)

January 23 2013, by Harumi Ozawa

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A scientist is pictured on August 27, 2010 working on stem cells in a laboratory. Researchers in Japan said Wednesday they have succeeded in growing human kidney tissue from stem cells for the first time in a potential breakthrough for millions with damaged organs who are dependent on dialysis.

Researchers in Japan said Wednesday they have succeeded in growing human kidney tissue from stem cells for the first time, in a potential first step towards helping millions who depend on dialysis.

Kidneys have a complex structure that is not easily repaired, but the latest findings put scientists on the road to fixing a diseased or distressed organ, they said.

More than 300,000 people in Japan alone rely on dialysis because their kidneys do not function properly. Researchers said the latest breakthrough may one day mean that kidney tissue generated from a patient's own body could markedly improve how a damaged organ works.

Kenji Osafune of Kyoto University said his team had managed to take stem cells—the "blank slates" capable of being programmed to become any kind of cell in the body—and nudge them specifically in the direction of kidney tissue.

"It was a very significant step," he told AFP.

Osafune said they had succeeded in generating intermediate mesoderm tissue from the stem cells, a middle point between the blank slate and the finished kidney tissue.

"There are about 200 types of cells in the human body, but this tissue grows into only three types of cells," namely adrenal cells, reproductive gland cells and kidney cells, he said, adding that as much as 90 percent of cultures in their research developed into viable mesoderm tissue.

This embryonic intermediary can be grown either in test tubes or in a living host into specific kidney cells.

Osafune stressed there are still many hurdles to overcome before applying his work to actual medical treatment. "It is not known yet if simply transplanting regenerated cells would really cure kidney ailment," he said.

He and his team created part of a urinary tubule, a small tube in the kidney that plays a role in the production of urine.

While the research is not aimed at growing an entire working kidney, he said the method his team had developed would help scientists learn more about intermediate mesoderm development and may provide a source of cells for regenerative therapy.

"I would say that we have arrived at the preliminary step on the road to the clinical level," he said.

Stem cell work has been controversial until relatively recently because embryos were the only source, and their harvesting led to the destruction of what some people consider a human life.

This research has used induced Pluripotent Stem (iPS) cells, a biotechnology where a fully-developed adult cell is effectively re-engineered to return it to its infant state.

Last year Shinya Yamanaka, director of the Centre for iPS Cell Research and Application of which Osafune is a part, was a co-recipient of the Nobel Prize for medicine for his pioneering work on the iPS cells.

Yamanaka and Britain's John Gurdon were jointly honoured for work on the key ingredient in the vision of regenerative medicine.

Work involving iPS cells is seen as a way scientists can generate materials either to experiment on, or to use within the body—perhaps as a means of repairing or even replacing damaged or diseased organs.

Osafune's achievement, while significant, brings researchers effectively to the foot of a mountain they must climb if they want to grow a working kidney, warned Takahashi Yokoo, lecturer at Jikei University School of

Medicine in Tokyo.

"Yes, a tubule structure was generated, but an enormous amount of research is still necessary to create an orderly structure that produces urine," Yokoo, a kidney expert not involved with Osafune's study, told AFP.

"We must refrain from hyping optimism among patients because to do so is to ignore the most difficult part of the efforts to create kidneys.

"We are hopeful about the latest achievement. This study puts us at the starting line for a big mission ahead."

Osafune's research is published in online science journal *Nature Communications*.

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