Lab-grown stem cells regenerate monkey hearts: study

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Scientist gave the macaques in the study into organ regeneration mild immunosuppressant drugs, and monitored them for 12 weeks

In a step forward for organ regeneration, stem cells grown from a single monkey's skin cells revitalised the damaged hearts of five sick macaques, scientists reported Monday.

The experiment builds towards the goal of providing a vast and uncontroversial source of rejuvenating cells to transplant into heart attack victims, Japanese researchers wrote in the science journal *Nature*.

This would obviate the need to harvest stem cells from embryos or from transplant recipients themselves.

The team used so-called induced pluripotent stem cells (iPSCs).

These are created by stimulating mature, already specialised cells—such as a skin cell—back into a neutral, juvenile state from which they can develop into any other type of human cell.

Before the iPSC technique emerged, pluripotent stem cells were harvested from human embryos, which are destroyed in the process—a controversial practice.

There is a third category of stem cells, which can be directly harvested from humans. These "adult" stem cells exist deep inside certain organs, including the heart, to replenish damaged cells.

Adult heart stem cells have already been experimentally used in heart attack victims. And therapy with embryonic stem cells has shown promise in treating severe heart failure.

But the Japanese team said theirs was the first study to use iPSCs to fix heart damage.

Human iPSCs have long been touted as a promising source of cells for heart repair.

But growing them from the patient's own cells was "time-consuming, laborious and costly", while heart cells grown from another person's cells

may be rejected as foreign by the recipient's immune system, the researchers wrote.

In the monkey trials, the team chose a molecule in an immune-system cell that was a match in both donor and recipients, to stop the body's defence system identifying and reacting to the "intruder" cells.

They also gave the monkeys mild immunosuppressant drugs, and monitored them for 12 weeks.

The cells improved heart function, though there were problems with irregular heartbeat (arrhythmia), the team observed. Importantly, the new cells were not rejected.

"We still have some hurdles, including the risk of tumour formation, arrhythmias, cost, etc." study co-author Yuji Shiba of Japan's Shinshu University told AFP.

But he was confident that iPSC heart cells will be tested in human trials "in a few years."

Experts not involved in the study said it was a step forward, but cautioned of a long road ahead.

"I do not think stem cell treatment for heart failure will become a reality for many years," said cardiologist Tim Chico of the University of Sheffield.

More information: Yuji Shiba et al. Allogeneic transplantation of iPS cell-derived cardiomyocytes regenerates primate hearts, *Nature* (2016). DOI: 10.1038/nature19815