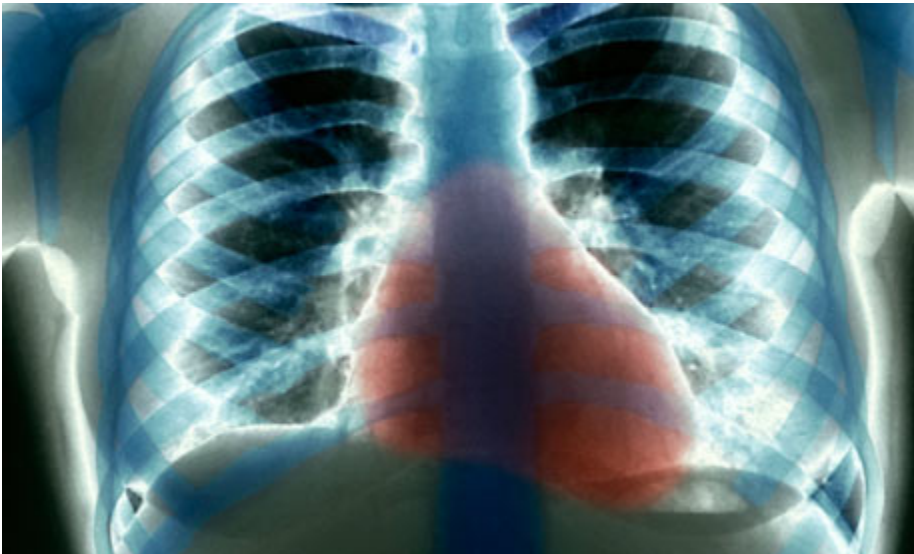


Scientists' stem cell breakthrough ends ethical dilemma

Experts in Britain and Canada find way to make stem cells without destroying embryos



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Stem cells have the potential to be turned into any tissue, including heart cells, making the growth of 'spare parts' a possibility. Photograph: Science photo library

Scientists have found a way to make an almost limitless supply of stem cells that could safely be used in patients while avoiding the ethical dilemma of destroying embryos.

In a breakthrough that could have huge implications, British and Canadian scientists have found a way of reprogramming skin cells taken from adults, effectively winding the clock back on the cells until they were in an embryonic form.

The work has been hailed as a major step forward by scientists and welcomed by pro-life organisations, who called on researchers to halt other experiments which use stem cells collected from embryos made at IVF clinics.

Sir Ian Wilmut, who led the team that cloned [Dolly the Sheep](#) and heads the [MRC Centre for Regenerative Medicine](#) at Edinburgh University where the work was done, said: "This is a significant step in the right direction. The team has made great progress and combining this work with that of other scientists working on stem cell differentiation, there is hope that the promise of regenerative medicine could soon be met."

Stem cells have the potential to be turned into any tissue in the body, an ability that has led researchers to believe they could be used to make "spare parts" to replace diseased and damaged organs and treat conditions as diverse as Parkinson's disease, diabetes and spinal cord injury.

Because the cells can be made from a patient's own skin, they carry the same DNA and so could be used without a risk of being rejected by the immune system.

Scientists showed they could make stem cells from adult cells more than a year ago, but the cells could never be used in patients because the procedure involved injecting viruses that could cause cancer. Overcoming the problem has been a major stumbling block in efforts to make stem cells fulfil their promise of transforming the future of medicine.

Now, scientists at the universities of Edinburgh and Toronto have found a way to achieve the same feat without using viruses, making so-called induced pluripotent stem (iPS) cell therapies a realistic prospect for the first time.

In 2007, researchers in Japan and America announced they had turned adult skin cells into stem cells by injecting them with a virus carrying four extra genes. Because the virus could accidentally switch on cancer genes, the cells would not be safe enough to use in patients.

In two papers published in the journal Nature, Keisuke Kaji in Edinburgh and Andras Nagy in Toronto, describe how they reprogrammed cells using a safer technique called electroporation. This allowed the scientists to do away with viruses and ferry genes into the cells through pores. Once the genes had done their job, the scientists removed them, leaving the cells healthy and intact.

Tests on stem cells made from human and mouse cells showed they behaved in the same as embryonic stem cells.

"I was very excited when I found stem cell-like cells in my culture dishes. Nobody, including me, thought it was really possible," said Kaji. "It is a step towards the practical use of reprogrammed cells in medicine, perhaps even eliminating the need for human embryos as a source of stem cells."

Nagy said: "We hope that these stem cells will form the basis for treatment for many diseases and conditions that are currently considered incurable. We have found a highly efficient and safe way to create new cells for the human body which avoids the challenge of immune rejection."

Josephine Quintavalle from the lobby group Comment on Reproductive Ethics, which opposes embryonic stem cell research, said: "What we've got here is something that will bring joy to the pro-life movement, a way of obtaining embryonic-type stem cells without having to destroy human embryos.

"There are some scientists who like to hold on to what they've got, but I don't think people are going to waste time on embryonic stem cells any more. Half of Europe is opposed to embryonic stem cell research. Ideally you want something that everybody can use without any problems. This is definitely a very, very promising way forward and a very promising solution to the embryonic stem cell battle."

It would be some time before the cells could be used in patients, Wilmut said, because scientists have yet to find reliable ways of making different tissues from stem cells.