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Simple eye grown from stem cells

Embryonic stem cells from mice have been transformed into a rudimentary eye, raising hopes of growing parts of the human eye to investigate and treat blindness

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Scientists have used stem cells to grow a rudimentary eye in the laboratory in a landmark study that raises the prospect of creating tissues to treat blindness and tease apart how diseases can destroy eyesight.

The Japanese team is the first to make significant progress in turning embryonic stem cells into an organ as complex as the eye.

Writing in the journal Nature, the scientists describe how they used embryonic stem cells from mice to grow an "optic cup", a structure that forms the retina and contains the light-sensitive cells and neurons needed to see properly.

The work gives researchers hope for growing parts of the human eye to investigate the progression of devastating diseases that lead to blindness, and to screen for drugs that might slow or even reverse the conditions.

It also raises the more distant prospect of creating banks of healthy retina cells to transplant into patients whose vision has been damaged by illness or accidents.

"We hope that such transplantation may recover vision, at least to some partial extent, in patients who lost their eyesight," said Yoshiki Sasai, who led the study at the RIKEN Centre for Developmental Biology in Kobe, Japan.

Transplants of light-sensitive cells could be used to treat retinitis pigmentosa, a condition that leads to the degeneration of the retina in one in 3,500 people. Those affected experience a gradual loss of vision that often culminates in blindness.

"This is a step I never thought I would see," said Prof Robin Ali, a molecular geneticist at the UCL Institute of Ophthalmology in London. "This is the first time anyone has been able to make a complex structure from embryonic stem cells."

Remarkably, the rudimentary eye and the different types of cells it contained took shape spontaneously from a floating cluster of embryonic stem cells the scientists had cultured. The early-stage eye measured 2mm across, comparable in size to the eye of a newborn mouse.

The feat could be repeated with human cells within two years, Sasai told the Guardian.

In 2006, Ali showed that transplants of light-sensitive cells from newborn mice were successfully integrated into the retinas of adult mice, though his team has yet to publish results on whether the treatment boosted the animals' vision.

"One big challenge with our approach is where do you get your cells from? This work shows it might be possible to grow sheets of cells to use in transplants," Ali said.