Vision restored in rabbits following stem cell transplantation

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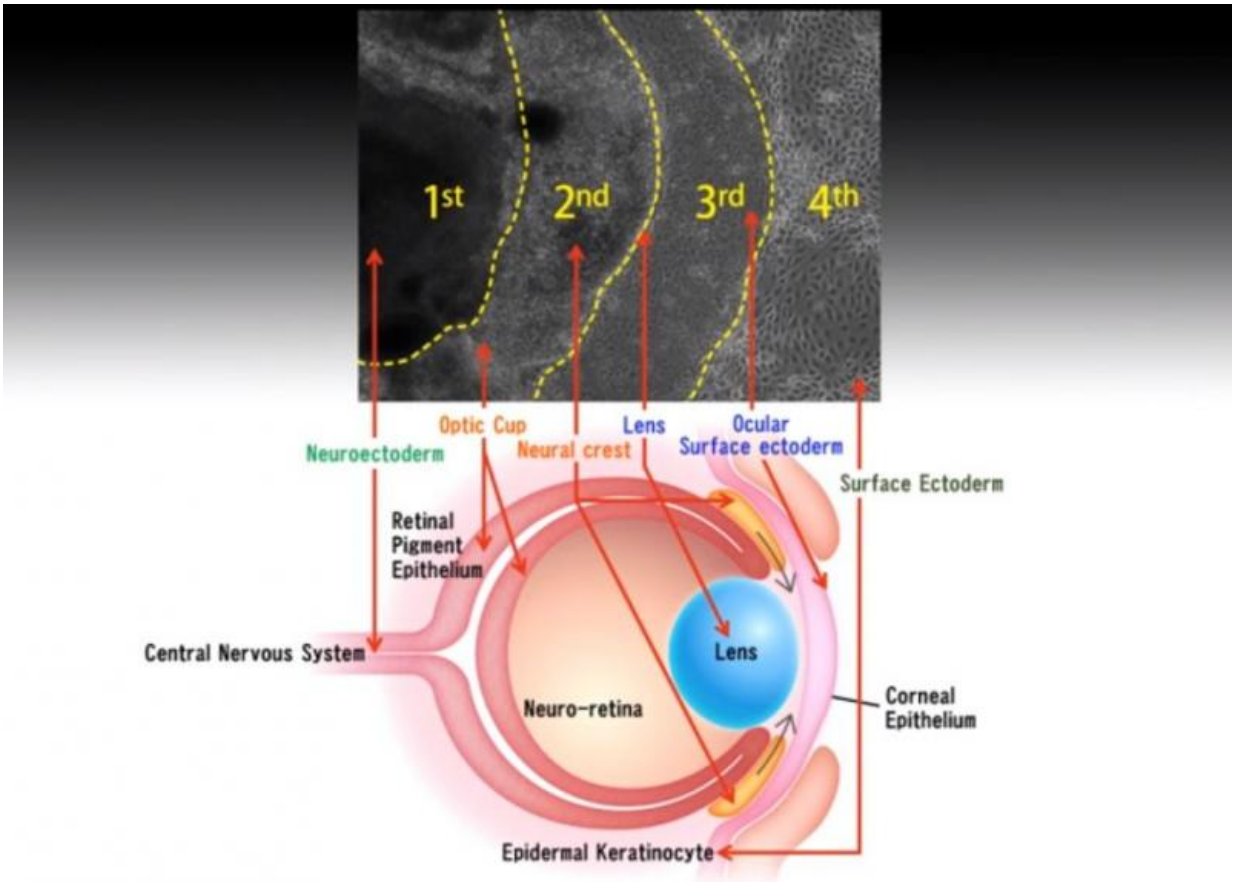

Scientists have demonstrated a method for generating several key types of eye tissue from human stem cells in a way that mirrors whole eye

development.

When transplanted to an animal model of corneal blindness, these tissues are shown to repair the front of the eye and restore vision, which scientists say could pave the way for human clinical trials of anterior eye transplantation to restore lost or damaged vision.

A collaborative team comprising researchers from Cardiff University and Osaka University in Japan describe their findings today in *Nature*.

The eye is composed of highly specialized tissues that are derived from a variety of cell lineages during development.

Previous studies have demonstrated that particular cell types, such as those that constitute the retina or cornea, can be created in the laboratory from pluripotent stem cells. However, these studies do not represent the complexity of whole eye development.

This latest study reports the generation of multiple cell lineages of the eye, including the lens, cornea, and conjunctiva, using human induced pluripotent stem cells.

The scientists have been able to show that the corneal epithelial cells can be cultivated and transplanted onto the eyes of rabbits with experimentally induced blindness to surgically repair the front of the eye.

Study co-author Professor Andrew Quantock, from Cardiff University's School of Optometry and Vision Sciences, said: "This research shows that various types of human stem cells are able to take on the characteristics of the cornea, lens and retina.

"Importantly, it demonstrates that one cell type—the corneal

epithelium—could be further grown in the lab and then transplanted on to a rabbit's eye where it was functional, achieving recovered vision.

"Our work not only holds potential for developing cells for treatment of other areas of the eye, but could set the stage for future human clinical trials of anterior eye transplantation to restore visual function."

Around 4000 corneal grafts are performed by the NHS annually, which rely on human organ donation.

More information: Co-ordinated ocular development from human iPS cells and recovery of corneal function, *Nature*, nature.com/articles/doi:10.1038/nature17000

Provided by Cardiff University