

# 3D ‘mini-retinas’ grown from human stem cells

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Representative photo of a stem cell.

**B**ERLIN: Scientists have developed an efficient way to make 3D "mini retinas", which mimic the organ's tissue organisation, from mouse or human stem cells.

The research offers new perspectives on the growth, injury and repair of retina — the part of the eye that is sensitive to light.

"The goal isn't just to make the closest thing next to a real retina, but also to possibly harness the flexibility of the system to create more diverse ways of studying retina tissue," said Mike Karl of the German Centre for Neurodegenerative Diseases (DZNE).

Stem cell technologies have the potential to develop therapies for the treatment of diseases such as age-related blindness.

Stem cell biologists have been working to understand the regeneration of neurons from lower vertebrates to humans, which can aid regenerative medicine in more indirect ways.

For example, the 3D retinal organoids developed in Karl's lab efficiently replicate the formation of the retina.

This specifically includes the light-detecting cone cells, which now can be produced in high quantities in their mini-retinas.

Cone photoreceptors, which are responsible for high acuity and colour vision, are the most precious retinal cell type with regard to potential future cell replacement therapies in patients affected by retinal degeneration.

Researchers' comparative studies on pluripotent stem cell-derived human and mouse retina organoids and mouse retina in vivo support the power of the new organoid protocol.

"Tissue heterogeneity is a major challenge in organoid systems, and here our work provides new insight, which will help to develop specific organoid-based models, specifically to reliably study retinal disease mechanism," said Karl.

The Karl Lab's change to the mini-retina protocol involves cutting a retina organoid grown from stem cells into three pieces at an early stage of eye development.

Each of these pieces, which look like little half moons, eventually grows into the full suite of cells found in the retina, thereby increasing the yield of retinal organoids up to 4-fold compared to previous protocols.

A trisection also spurs the surviving organoids to grow to reach sizes similar to uncut organoids.

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These mini-retinas swim around in the dish and because they are not attached to a surface, better reflect the structure of retinal tissue during development.

The study was published in the journal Stem Cell

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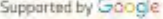


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