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Setting his sights on a cure

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Photo: Steve Zylius

For poets and lovers, the eyes are windows to the soul. But for researchers like Dr. Henry Klassen, they provide unparalleled access to the central nervous system.

With this access, the UC Irvine assistant professor of ophthalmology is discovering new ways to use stem cells to repair the retina — the only part of the body's intricate central nervous system that can be viewed without surgery. In doing so, Klassen is gleaning information about stem cells that goes beyond eye disease.
"The eye is an important proving ground for stem cell-based therapies," he says, "and provides a stepping stone to many otherwise incurable diseases of the brain and spinal cord."

For nearly 25 years, Klassen — who came to UCI in 2006 — has

focused on regenerating damaged retinal tissue to restore sight to people suffering from retinitis pigmentosa and macular degeneration, which affect millions of Americans. He serves as research director for the retinal regeneration program at UCI's Gavin Herbert Eye Institute and is affiliated with the Sue & Bill Gross Stem Cell Research Center. The Discovery Eye Foundation, which aids many UCI efforts to find cures and treatments for corneal and retinal eye disease, also supports his work.

In addition to his medical degree, Klassen holds a doctorate in neurobiology and has delved into the retina's unique architecture to understand how to repair the neural system. The retina lines the inner surface of the eye and converts light images into nerve impulses that are sent to vision centers in the brain.

In October, Klassen received $3.85 million from the California Institute for Regenerative Medicine — the state's stem cell research funding agency — to standardize a method for creating photoreceptor progenitor stem cells from immature retinas and transplanting them into the eye to repair or replace damaged light-sensing cells. The CIRM reviewers gave Klassen's proposal the highest scientific score — 93 on a scale of 100 — among all applicants in this round of grants.

"Stem cell research on the eye is moving quite quickly," says Ingrid Caras, a CIRM science officer. "The eye is an attractive study target – it's a small, contained area with no immune rejection of implanted cells, and it's much easier to monitor what's happening in the eye."

Retinitis pigmentosa is marked by the slow decay of the photoreceptors — in the shape of rods and cones — that perform the initial detection of light. The disease is caused by mutations in genes important to photoreceptor function. Eventually, the rods die, followed by the cones. People with retinitis pigmentosa first experience night blindness, then

tunnel vision and, ultimately, legal blindness.

Klassen's objective is to introduce stem cells that supplant damaged and dying rods and also resuscitate moribund cones, thus reversing the course of retinitis pigmentosa even at relatively advanced stages. The current CIRM funding makes clinical trials a possibility within three years.

"We believe it's possible to replace rods and rejuvenate cones in the degenerated retina," Klassen says. "Our methods have been validated, and I'm optimistic that stem cell-based treatments can help people with eye diseases restore their fading vision."

Provided by University of California, Irvine

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