

# ORNL, Southern Cal set sights on preventing blindness

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Blindness in millions of people with diseases that starve eye tissue and nerves of oxygen might be averted with a procedure being developed by researchers at Oak Ridge National Laboratory, the University of Southern California and the University of Tennessee.

The technique uses a new class of smart prosthetic implants to provide [oxygen](#) to retinal tissue being deprived of oxygen because of restricted blood flow. This condition occurs predominantly in patients with [, which affects an estimated 5.5 million people each year.](http://www.nei.nih.gov/health/diabetic/retinopathy.asp)

Elias Greenbaum of the Department of Energy's ORNL noted that this research builds upon the highly successful artificial retina project (<http://artificialretina.energy.gov/>) officially kicked off in 2004. For this project, Greenbaum and colleagues at ORNL are joined by Mark Humayun of the Doheny Eye Institute and Keck School of Medicine at the University of Southern California and Dan Close of the University of Tennessee.

"We have assembled a team of researchers with precisely the right capabilities to tackle this problem of [immense proportions](#)," said Greenbaum, lead author of a paper published in *IEEE Transactions on Biomedical Engineering*. Animal studies for the metabolic prosthesis technique are under way.

The procedure involves surgically implanting a feedback-controlled

three-electrode electrolysis system that stimulates production of oxygen near the retina. The electrodes provide small amounts of current in very short pulses - about 200 microseconds. This results in a rapid production of oxygen and suppressed production of chlorine, which is potentially harmful.

"What we've been able to do is find a way to provide oxygen to the retina while avoiding the formation of potentially harmful chlorine," Greenbaum said.

By using three electrodes and a feedback loop made possible by implanting a "ground" electrode behind the patient's ear, the research team is able to maintain constant pH in the area being treated. At the same time, any pH drift can be exported to a surface-accessible region where it can be easily dealt with, according to the researchers.

Others involved in this project are Charlene Sanders, Hugh O'Neill and Barbara Evans, who, like Greenbaum, are members of ORNL's Chemical Sciences Division.

Source: Oak Ridge National Laboratory ([news](#) : [web](#))

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