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http://www.eyesight.org

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LIGHT-SENSITIVE PHOTOSWITCHES COULD RESTORE SIGHT TO THOSE WITH MACULAR DEGENERATION - Article by robert sanders: University of California, Berkeley

Berkeley — A research center newly created by the University of California, Berkeley, and Lawrence Berkeley National Laboratory (LBNL) aims to put light-sensitive switches in the body's cells that can be flipped on and off as easily as a remote control operates a TV.

Optical switches like these could trigger a chemical reaction, initiate a muscle contraction, activate a drug or stimulate a nerve cell - all at the flash of a light.

One major goal of the UC Berkeley-LBNL Nanomedicine Development Center is to equip cells of the retina with photoswitches, essentially making blind nerve cells see, restoring light sensitivity in people with degenerative blindness such as macular degeneration.

"We're asking the question, 'Can you control biological nanomolecules - in other words, proteins - with light?'" said center director and neurobiologist Ehud Y. Isacoff, professor of molecular and cell biology and chair of the Graduate Group in Biophysics at UC Berkeley. "If we can control them by light, then we could develop treatments for eye or skin diseases, even blood diseases, that can be activated by light. This challenge lies at the frontier of nanomedicine."

The nanoscience breakthrough at the core of the research was developed at UC Berkeley and LBNL over the past several years by neuroscientist Richard Kramer, professor of molecular and cell biology, Dirk Trauner, professor of chemistry, and Isacoff - all three members of the Physical Bioscience Division of LBNL. It involves altering an ion channel commonly found in nerve cells so that

the channel turns the cell on when zapped by green light and turns the cell off when hit by ultraviolet light.

The researchers demonstrated in 2004 that they could turn cultured nerve cells on and off with this optical switch. Since then, with UC Berkeley Professor of Vision Science and Optometry John Flannery, they've injected photoswitches into the eyes of rats that have a disease that kills their rods and cones, and have restored some light sensitivity to the remaining retinal cells.

"The research will focus on one major application: restoring the response to light in the eyes of people who have lost their photoreceptor cells, in particular, the rods and cones in the most sensitive part of the retina," Isacoff said. "We plan to develop the tools to create a new layer of optically active cells for the retina."

"Now we have photochemical tools for an on switch and an off switch for nerve cells," Kramer said. "This will allow us to simulate the natural activity of the healthy retina, which has on cells and off cells that respond to light in opposite ways."

"I'm struck by how versatile this approach seems to be," Isacoff said, noting its applications for screening, diagnosing and treating disease. "I'm convinced that we'll come up with a therapy that will work in the clinic." However, patient trials for this potential therapy are at least 5 - 10 years down the road.

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NEI AWARDS OCULAR IONTOPHORESIS RESEARCH GRANT TO ACIONT COLLABORATORS
www.aciont.com.

Salt Lake City, UT – The National Eye Institute (NEI) awarded a $1.2 million research grant to the University of Cincinnati and the University of Utah to study ocular *iontophoretic drug delivery and an innovative, noninvasive ocular *pharmacokinetics research methodology. The grant has several research objectives including the evaluation of how transscleral iontophoresis—through varied electrical current settings, ocular device configurations and pharmaceutical formulations—influences the transport of drugs within the eye.

The main investigator of the grant is S. Kevin Li, Ph.D., of the University of Cincinnati. Other grant investigators from separate research departments from the University of Utah include Paul S. Bernstein, M.D., Ph.D., William I. Higuchi, Ph.D. and Eun-Kee Jeong, Ph.D.. Drs. Bernstein, Higuchi and Li have been collaborators of Aciont Inc. in ocular drug delivery since 2002. Higuchi and Li also are co-inventors of numerous drug delivery patents pending and issued to Aciont Inc.

“To deliver a drug to its target site at the back of the eye effectively poses a challenge to both ophthalmic scientists and medical professionals,” said Dr. Li. The grant investigators believe that the successful development of an effective, noninvasive and patient-friendly drug delivery system to deliver drugs to the posterior segment of the eye would improve significantly the outcome of treatments for posterior eye diseases such as uveitis, macular edema, age-related macular degeneration and diabetic retinopathy. “This research is a stepping stone for advancing the field of ocular iontophoresis; knowledge from basic academic research such as this should help reinforce the novelty of our Visulex^Æ technology platform,” said John Higuchi, President of Aciont.

*Comments from Liz Trauernicht: Iontophoresis is the introduction of an ionized substance (as a drug) through intact skin by the application of a direct electric current. Pharmacokinetics is the study of the bodily absorption, distribution, metabolism, and excretion of drugs.

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To speak to a support representative directly, you may call 1-888-633-3937. If you reach our voice mail, please speak slowly and distinctly.

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make our services available as a support system for macular degeneration patients in the following ways:

1. We provide toll-free lines for personal contact assistance.
2. We mail brochures and other printed materials upon request.
3. We support an award-winning web site that provides the latest up-to-date information.
4. We fund research proposal grants to provide therapies for both the wet and dry form of AMD. Contributions marked "research" are used 100% for research.

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MDF was founded in 1992 by Edmund J. Aleksandrovich Ph.D (a victim of macular degeneration). It provides MD patients and their families with the information necessary to understand the disease, the latest news concerning ways to cope with the disease, and supports the efforts of researchers to find a cure.

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