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Scientists see the light: How vision sends its message to the brain

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Scientists have known for more than 200 years that vision begins with a series of chemical reactions when light strikes the retina, but the specific chemical processes have largely been a mystery. A team of researchers from the United States and Switzerland, have she new light on this process by "capturing" this chemical communication for future study. This research, published in the February 2009 issue of *The FASEB Journal* , may lead to the development of new treatments for some forms of blindness and vision disorders.

At the center of the discovery is the signaling of rhodopsin to transducin. Rhodopsin is a pigment in the eye that helps detect light. Transducin is a protein (sometimes called "GPCR") which ultimately signals the brain that light is present. The researchers were able to "freeze frame" the chemical communication between rhodopsin and transducin to study how this takes place and what goes wrong at the molecular level in certain disorders.

According to Krzysztof Palczewski, a senior scientist involved in the research, "The results may have important implications for discovery and development of more specific medicines to treat GPCR-linked dysfunction and disease." Examples of health problems involving GPCR dysfunction include blindness, diabetes, allergies, depression, cardiovascular defects and some forms of cancer.

To make their discovery, scientists isolated rhodopsin/transducin directly from bovine retinas. These membranes were suspended in solution and

exposed to light to start the chemical signaling process. After light exposure, any contaminating proteins were removed, and the remaining rhodopsin and transducin "locked" in their chemical communication were removed using a centrifuge. In addition to helping scientists understand how vision begins, this research may also impact disorders affecting heart beat, blood pressure, memory, pain sensation, and infection response because it is believed that they are regulated by similar chemical communications involving similar proteins.

"Until now, scientists have been in the dark when it comes to exactly how vision begins. This exciting new work shows how light becomes a chemical signal to the brain," said Gerald Weissmann, Editor-in-Chief of *The FASEB Journal*. "Now that we see the light, so to speak, entirely new types of custom-fit become possible for a wide range of diseases."

A recent and related article in *The FASEB Journal* on milestones in photochemistry is available at www.fasebj.org/cgi/content/full/22/12/4038 .

Source: Federation of American Societies for Experimental Biology

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