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[The Mount Sinai Hospital / Mount Sinai School of Medicine](#)

Mount Sinai researcher finds unexpected temperature sensation for a light detector

New research from Mount Sinai School of Medicine has discovered that rhodopsin, a pigment of the retina that is responsible for the first events in the perception of light, may also be involved in temperature sensation. This detection had not been revealed in previous studies.

The work emerged from a collaboration between the laboratory of Andrew Chess, M.D., Professor in the Departments of Neuroscience, Developmental and Regenerative Biology and Genetics and Genomic Sciences at Mount Sinai, and the laboratory of Craig Montell, Ph.D., Professor of Biological Chemistry at Johns Hopkins School of Medicine. Their paper, titled "Function of rhodopsin in temperature discrimination in *Drosophila*," is published in the March 11 edition of *Science*.

The research focused on rhodopsin in *Drosophila* larvae, commonly known as fruit flies. The temperature-detection function of rhodopsin allows the *Drosophila* larvae to move to their preferred temperature of 18 degrees Celsius (64.4 degrees Fahrenheit). This ability depends on a thermosensory signaling pathway that includes a heterotrimeric guanine nucleotide-binding protein, or G-protein.

"It is very surprising that rhodopsin has a role in temperature sensation, as it was thought to be completely devoted to its well-known role as a light sensor," said Dr. Chess, Mount Sinai School of Medicine. "This function of rhodopsin allows temperature discrimination in the comfortable range."

This new role for rhodopsin emerged from studies of the process that results in the activation of a temperature-sensor protein known as a TRPA1, which Dr. Montell's group has been studying.

The researchers released about 75 larvae onto a plate with two temperature zones. Half of the plate was kept at 18 degrees Celsius and the other half ranged from 14 to 32 degrees Celsius. After ten minutes, the larvae lacking rhodopsin could not discriminate temperatures in comfortable range, just like the larvae lacking TRPA1.

The mouse gene melanopsin is the closest mouse gene to *Drosophila rhodopsin*. Mouse melanopsin can functionally replace the thermosensory function of *Drosophila rhodopsin*.

The *Drosophila* larva has peripheral neurons that mediate thermosensation. These neurons are distinct from neurons that allow detection of light. Since the rhodopsins generally have low susceptibility to thermal activation, there is likely a distinct, yet-to-be-discovered, protein that allows thermal activation of rhodopsin.

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About The Mount Sinai Medical Center

The Mount Sinai Medical Center encompasses both The Mount Sinai Hospital and Mount Sinai School of Medicine. Established in 1968, Mount Sinai School of Medicine is one of few medical schools embedded in a hospital in the United States. It has more than 3,400 faculty in 32 departments and 15 institutes, and ranks among the top 20 medical schools both in National Institute of Health funding and by U.S. News & World Report. The school received the 2009 Spencer Foreman Award for Outstanding Community Service from the Association of American Medical Colleges.

The Mount Sinai Hospital, founded in 1852, is a 1,171-bed tertiary- and quaternary-care teaching facility and one of the nation's oldest, largest and most-respected voluntary hospitals. U.S. News & World Report consistently ranks The Mount Sinai Hospital among the nation's best hospitals based on reputation, patient safety, and other patient-care factors. Nearly 60,000 people were treated at Mount Sinai as inpatients last year, and approximately 530,000 outpatient visits took place.

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