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Miller School Study on Glia of Touch Receptors Published in Neuron Journal

A study by researchers at the University of Miami Miller School of Medicine, "A Glial ClC Cl- Channel Mediates Nose Touch Responses in *C. Elegans,*" has been published online in *Neuron*, a biweekly peer-reviewed scientific journal in the field of neuroscience.

From left, Laura Bianchi, Ph.D., Lei Wang, Ph.D., Bianca Graziano, M.D., and Jesus Fernandez-Abascal, Ph.D.

Laura Bianchi, Ph.D., professor of physiology and biophysics, faculty in the neuroscience program, and principal investigator, led the study. Other members of her research team were Jesus Fernandez-Abascal, Ph.D., a postdoctoral student and first author of the study, Christina K. Johnson, Ph.D., former graduate student in the lab, Bianca Graziano, M.D., a graduate student, Lei Wang, Ph.D., a postdoctoral student, and Nicole Encalada, a former technician in the lab.

The investigation sought to understand whether and how the glia of touch receptors regulate mechanosensation. Glia are known to control neuronal function but little to nothing has been known about their role in touch receptors. Dr. Bianchi's laboratory used the powerful model organism *C. elegans* for

these studies. *C. elegans* is a tiny soil nematode that is used to uncover fundamental biological processes.

Science of Touch

Key findings of the study shed new light on the biology of touch and pain. The investigation shows how a protein found in glia that mediates chloride efflux plays a key role in controlling the function of nerve cells that detect painful touch stimuli. The underlying mechanism involves the regulation of calcium and other signaling molecules in the nerve cell via the release of an inhibitory neurotransmitter from glia.

This finding can open new venues for the development of analgesics. More broadly, this work adds to the understanding of how glia and nerve cells talk to each other in the nervous system, suggesting novel approaches to treat neurological disorders and psychiatric conditions.

Five C. elegans nematodes expressing green fluorescent protein in sensory neurons (left) and red fluorescent protein in glia (middle). The right panel shows the merge of the first two panels. The neurons and glia shown here were the focus of the Bianchi's lab study. Photo credit to Lei Wang.

"Our work demonstrates for the first time that a chloride channel is needed in glia to regulate responses to touch stimulation," Dr. Bianchi said. "Our data support an exquisite cooperation between mechanosensory neurons and associated glia

in mediating the animal's sensitivity to touch. Given the fact that components of the involved signaling pathways have been reported in touch receptors and nociceptors in mammals, and that mammalian chloride channels are also expressed in glia and other accessory cells, we propose that the mechanism we have uncovered is conserved across species."

Response to Stimuli

Dr. Bianchi and her team look toward to finding out how glia respond to touch and, particularly painful touch stimuli. The team will further investigate whether the communication between nerve cells and glia in touch receptors occurs in both directions and, if so, learn more about the molecular mechanism underlying this two-way communication.

"These studies are likely to identify other potential new targets for the treatment of certain types of pain and neurological disorders," Dr. Bianchi said. "We are shedding new light on the biology of touch and pain that have historically only focused on the response of nerve cells to painful stimuli. Our work highlights that glia must be also investigated."

The study will also appear in the February 2022 print issue of *Neuron*.

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