COTTON Innovate
Weekly Newsletter from Central Institute for Cotton Research, Nagpur
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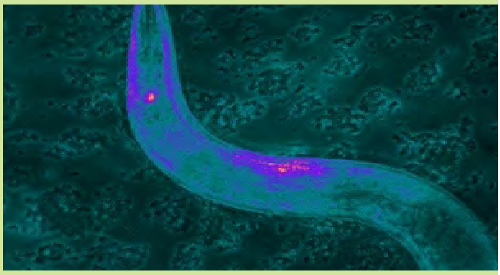
Issue : 1, Volume 11, November 2-8, 2014

Literature Scan



The Sound of Salt: A putative ion channel integral to mammalian hearing turns out to be an elusive salt-sensing chemoreceptor in nematode worms

The nematode version of a gene central to mammalian hearing turns out to encode a salt sensor, according to new research published in Nature. The study is the first to describe the function of nematode TMC-1, a protein that appears to aid in sensing (and avoiding) high concentrations of salt when expressed in specialized neurons, and may help elucidate the mechanics of mammalian hearing.

The new data suggest that TMC-1 acts as an ion channel and that it may work similarly in the mammalian auditory system. Previous work in nematodes had shown that sensing low salt concentrations relied on cyclic GMP, and ENaC sodium ion channels had been implicated for salt taste sensation in vertebrates, especially rodents. But how nematodes sensed dangerously high salt levels was unknown. Neuroscientist William Schafer and his colleagues at the MRC Laboratory of Molecular Biology in the United Kingdom and Korea University College of Medicine stumbled on TMC-1's role in salt sensation while investigating its possible function in mechanosensation. The researchers first came across TMC genes while doing expression profiling of nematode neurons involved in sensing unpleasant stimuli, including touch. Because mutations in the Tmc1 gene affect hearing in mice, Schafer and his collaborators decided to test TMC-1's role in touch sensation—which, like hearing, relies on mechanoreceptors—in worms.

Using GFP mutants, they found that TMC-1 was primarily expressed in certain sensory neurons that help worms detect and avoid unpleasant stimuli, such as heavy metals and being poked on the nose. After knocking out *tmc-1* in worms, they subjected the animals to various off-putting stimuli, such as nose touch, high salt concentrations, and copper chloride. Though *tmc-1* mutant worms still recoiled from pressure, showing that TMC-1 is not involved in nematode mechanosensation, they no longer avoided salt concentrations that climbed above 100 mM, which normal worms find noxious. Expressing tmc-1 in neurons that don't usually express the gene conferred salt sensing abilities to these cells, and Schafer and his colleagues found that tmc-1 expression also creates a sodium-dependent current, suggesting that TMC-1 acts as an ion channel. Mutational studies will help to identify which residues are important for salt sensing and which if any help form the ion channel pore. Nematode neurons might also be a great venue to express the human TMC1 and learn more about its function

Reference :

Marios Chatzigeorgiou, Sangsu Bang, Sun Wook Hwang & William R. Schafer (2013) , "*tmc-1* encodes a sodium-sensitive ion channel required for salt chemosensation in *C. elegans,*"Nature, doi: 10.1038/nature11845, 2013.

Image source

Http://www.the-scientist.com/?articles.view/articleNo/34203/title/The-Sound-of-Salt/

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Production Support : Mr. Sanjay Kushwaha

Citation : Cotton Innovate, Issue -1, Volume - 11, 2014, Central Institute for Cotton Research, Nagpur

Publication Note: This Newsletter presented online at http://www.cicr.org.in/NewsLetter.html
Cotton Innovate is the Open Access CICR Newsletter

The Cotton Innovate – CICR Newsletter is published weekly by
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