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Modulation of Sensory Mechanoreceptor Neurons in *Caenorhabditis elegans* by Insulin and Other Signals

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Gentle touch is sensed in the nematode *Caenorhabditis elegans* by six touch receptor neurons (TRNs). Transduction requires a heterotrimeric channel comprised of two DEG/ENaC proteins, MEC-4 and MEC-10, in a 2:1 ratio. Touch sensitivity is modulated by several different factors and on at least two different time scales. In the short term repeated stimuli result in two forms of habituation, one involving intrinsic regulation and the other requiring synaptic regulation. In addition long-term affects (resulting after several hours) are produced by vibration, which acts through integrins and other focal adhesion molecules in the TRNs to increase sensitivity and low oxygen, high salt, and entry into the dauer state, which affect neurohormonal regulation by the products of two different insulin genes of the TRNs to reduce sensitivity. These long-term modifications act through the transcription factor DAF-16 to change the amount of surface MEC-4. These changes, which are integrated at several levels within the animal and in the TRNS, allow the animals to respond differently to touch under various environmental conditions and to prioritize sensory signals.