Function of Neurons AVA, BAG, and RIM in Response to an Aversive Stimulus in Caenorhabditis elegans

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Sensory input and subsequent motor reactions are an important part of the behavioral modulation process. Although the exact relationship between these two factors is not entirely known, it can be further understood by observing the activity of key motor neuron RIM, premotor interneuron AVA, and sensory neuron BAG in the model organism Caenorhabditis elegans in response to an aversive 2.2 millimolar 1-octanol stimulus. The multicolored transgene NeuroPAL, a neuron identification system, allows for the creation of a whole-brain color image as well as a GCaMP video of neuronal firing. Neuronal data gathered from electron microscopy files using NeuroPAL and Fiji, a modified version of ImageJ, was used to generate a variety of models using GraphPad Prism to aid in the visualization of the relationship between neurons AVA, BAG, and RIM. From the analysis of calcium profile data obtained from all nematode specimens, it was determined that although there is an asynchronous relationship between the sensory and motor neurons for the last five applications of the aversive 1-octanol stimulus, AVA, RIM, and BAG show synchronization with one another during the first application of the stimulus. Thus, it was concluded that current paradigms describing the sensorimotor process may need to be altered to depict a more complex relationship between sensory and motor neurons than the direct communication paradigm.