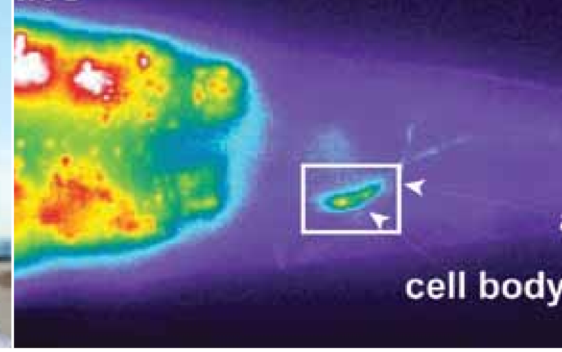

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"Our brains respond to changes in our environment with an almost infinite repertoire of behaviors. I am interested in understanding how neural circuits sense and process information to generate behaviors."

Our brain contains roughly 100 billion cells, each connected through thousands of contact points adding up to at least a quarter of a million miles of wiring—enough to reach from here to the moon. This marvel of evolutionary engineering allows us to navigate an ever-changing environment, to learn, and to remember, but its stunning complexity makes it difficult to trace how information travels from one neuron to another. Chalasani uses the nematode *Caenorhabditis elegans* as a model to understand how neural circuits transform sensory input into behaviors. *C. elegans* has exactly 959 adult somatic cells and 302 neurons connected by precisely 6,000 electrical and chemical connections. Despite its simplicity, this animal displays a number of sophisticated behaviors, making it the perfect model to explore how a simple, well-defined nervous system is able to integrate information from multiple sensory neurons and remember it for long periods of time.

Wild-type worms spend about 15 minutes searching for food when they are moved from a plate with food to a food-free plate. The duration of this search time is a function of the quality of the food and the amount of time they have spent feeding on it before being moved (more nutritious food or longer times elicit longer searches and vice versa). Chalasani found that the worms' main olfactory neurons, known as AWC neurons, are primarily responsible for this food-seeking behavior. They are activated upon removal of a stimulus and respond with the release of chemical signals, which in turn activate one target neuron (AIB) and inhibit a second target neuron (AIY). These opposite connections resemble the first connections in the visual processing system in our own eyes—photoreceptors connecting to "ON" and "OFF" bipolar cells.

In the future, Chalasani plans to extend his studies to zebrafish larvae to test whether vertebrate and invertebrate circuits use similar mechanisms to process information, hoping to gain new insight into how the human brain functions.

For more information, please visit
salk.edu/faculty/chalasani.html