INTERNATIONAL
PHD PROGRAM
IN NEUROSCIENCE

Zenith

ZENITH SEMINARS

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PATTERNED CONVERGENCE OF VESTIBULAR AFFERENTS

As sensory information moves through the brain, higher-order areas exhibit more complex tuning than lower areas. Though models predict that complexity arises via convergent inputs from neurons with diverse response properties, in most vertebrate systems convergence has only been inferred rather than tested directly. Here we measure sensory computations in zebrafish vestibular neurons across multiple axes *in vivo*. We establish that whole-cell physiological recordings reveal tuning of individual vestibular afferent inputs and their postsynaptic targets. Strong, sparse synaptic inputs can be distinguished by their amplitudes, permitting analysis of afferent convergence *in vivo*. An independent approach, serial-section electron microscopy, supports the inferred connectivity. We find that afferents with similar or differing preferred directions converge on central vestibular neurons, conferring more simple or complex tuning, respectively. Together these results provide a direct, quantifiable demonstration of feedforward input convergence *in vivo*.

Bagnall received her PhD in Neuroscience at the University of California, San Diego, where she worked at the Salk Institute studying intrinsic, synaptic, and circuit function in the mouse vestibular brainstem and cerebellum. During a postdoc, she mapped the thalamic projection to inhibitory neurons in barrel cortex. At Northwestern, she found that the spinal circuit in zebrafish contains parallel but distinct premotor pathways for independent control of dorsal and ventral musculature. Currently, her lab at Washington University studies how sensory information about orientation and movement drives appropriate body movements to adjust posture.

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