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Long-term light sheet imaging reveals kinesin light chain function in zebrafish axonal development

Precise regulation of cargo trafficking and axonal transport is critical for neuronal development and function. Cargos are delivered to specific locations through the activity of diverse kinesins and their cargo-linking adaptor proteins. However, the roles of these kinesins and adaptor proteins as well as the mechanisms of cargo localization during neuronal morphogenesis remain poorly understood. To elucidate the specialized functions of kinesin light chain (KLC), a subunit of kinesin-1, we developed an assay to determine effects of KLC manipulation using transgenic zebrafish (Tg:ngn1-GFP-caax) with fluorescently labeled sensory neurons. Image stacks are acquired on a home-built mSPIM system. Preliminary image analysis reveal visible developmental defects in the axonal projections of Rohon-Beard sensory neurons in embryos treated with Kinesore, a KLC-binding drug. A significant difference in the axonal projection density as well as branching angles during development can be observed. Moreover, Kinesore treated embryos also exhibit posterior lateral line pathfinding and fasiculation defects. We are currently developing a custom image analysis workflow to perform phenotyping on the fly. We aim to incorporate the workflow into an upright V-SPIM system based on the Flamingo framework to enable mid-throughput screening for up to 25 samples at a time. The platform will be used to screen KLC null mutants for defects in sensory neuron development.

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Terms and Conditions

Yes

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