56th Annual Drosophila Research Conference, The genetics society of America, 4-8th March 2015

482A

The transmembrane protein Off-track 2 is implicated in the guidance of embryonic motor neurons.

David J Robinson, Samantha Alsbury.

University of Greenwich, Medway Campus, Central Avenue, Chatham Maritime, Kent. ME4 4TB. UK.

An essential component of nervous system development entails the projection of axons from neuronal cell bodies to other cells, including other neurons and muscles, resulting in functional circuitry. Drosophila have been indispensible in identifying the proteins underlying axon guidance, which depends on receptors on the surface of growth cones detecting attractive and repulsive ligands. A substantial proportion of this research has utilized embryonic motor neurons, which, in numbering just ~40 per hemisegment, constitute a particularly intelligible system. Bioinformatic analyses of the Drosophila proteome have revealed uncharacterized proteins that might be implicated in axon guidance. These possess the same domains as established molecules and are localized to the cell surface. Proteins meeting these criteria that are also paralogous to established axon guidance molecules and that are expressed in similar spatiotemporal patterns are especially promising candidates. Off-track 2, the focus of the current study, is one such candidate, which has recently been shown to co-precipitate with the putative axon guidance molecule, Off-track. The excision of a P-element located 28 bp upstream of the 5' UTR of off-track 2 resulted in the appearance of several nucleotides within the promoter region that differ from those of the parent or wild type sequences. Immunohistochemistry revealed that embryos of this line exhibit highly penetrant phenotypes within a number of motor neuron branches; most notably, the ISNb fails to defasciculate from the ISN in ~75% of hemisegments, though several other branches, including the FB and SB, are absent almost to the same extent. The phenotypes of this line mirror those of embryos with a deficiency spanning the gene, suggesting the altered nucleotides resulted in a loss-of-function, presumably by disrupting transcription. Driving Off-track 2 in somatic musculature caused stalling of the ISNb at various choice points, resulting in reduced innervation of the ventral lateral muscles. While these findings suggest Off-track 2 contributes to the pathfinding behavior of embryonic motor neurons, ongoing work is focused on determining the precise role of Off-track 2 in axon guidance.