

## The Identity Determination and Differentiation of the Central Nerve System

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The *Drosophila* CNS develops from neuroblasts which originate from three (medial, intermediate and lateral) columns of the ventral neuroectodermal cells that are located in either side of the CNS midline cells along the dorsal-ventral (D/V) axis. It is not well known how diversity of the CNS is generated along the D/V axis. The roles of CNS midline cells and *spitz/Egfr* signaling genes in the lineage determination of the MP2 neurons in the ventral neuroectoderm were studied by using molecular markers for the neuroectoderm, selected neuroblasts, neurons, and axon pathways of the MP2 lineage. It is shown that the CNS midline cells and *spitz/Egfr* signaling genes are essential for identity determination of the MP2 which originates from the ventral neuroectoderm. The CNS midline cells are also required for proper maintenance of the divided MP2 neurons and correct formation of MP2 axon pathways. Overexpression of *sim* in the CNS midline cells activates ectopic expression of the MP2 markers, *achaete*, *deadpan*, and *prospero*. Analysis of the MAPK activation pattern and genetic interaction between *sim* and *Egfr* revealed that the CNS midline cells activate the EGFR signaling pathway, and that activated *Egfr* mediates identity determination and differentiation of the MP2 neurons. This analysis indicates that the CNS midline cells and *spitz/Egfr* signaling genes contribute extrinsically to proper establishment of the MP2 lineage via the EGFR signaling pathway.