

論文の内容の要旨

論文題目 Retrograde BDNF signaling from Purkinje cell regulates climbing fiber synapse
elimination in the developing cerebellum

(プルキンエ細胞由来逆行性 BDNF シグナルは発達期小脳の登上線維
シナプス刈り込みを制御する)

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Elimination of early-formed redundant synapses during postnatal development is essential for functional neural circuit formation. Purkinje cells (PCs) in the neonatal cerebellum are innervated by multiple climbing fibers (CFs). A single CF is strengthened whereas the other CFs are eliminated in each PC dependent on postsynaptic activity in PCs, but the underlying mechanisms are largely unknown. Here, we report that brain-derived neurotrophic factor (BDNF) from PCs facilitates CF synapse elimination. By PC-specific deletion of BDNF combined with knockdown of BDNF receptors in CFs, we show that BDNF acts retrogradely on TrkB in CFs, and facilitates elimination of CF synapses from PC somata during the third postnatal week. We also show that BDNF shares signaling pathway with metabotropic glutamate receptor 1, a key molecule that triggers a canonical pathway for CF synapse elimination. These results indicate that unlike other synapses, BDNF mediates punishment signal for synapse elimination in the developing cerebellum.