学位論文抄録

Analysis of draxin function in tectum and retinocollicular axon projection

（視蓋と網膜上丘軸索投射におけるドラキシンの機能解析）

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Abstract of the Thesis

Background and Purpose: Draxin is an axon guidance molecule that plays very important roles in the formation of spinal cord and all three major commissures of the forebrain (Islam et. al. Science 323, 388-393). Expression of draxin in other parts of the brain raises the possibility of draxin to play essential role in the formation of other well known axon projections. This study was aimed to reveal the role of draxin in tectum and retinocollicular axon projection.

Methods: To explore the role of draxin in tectum and retinocollicular axon projection chick and mouse models were used, respectively. Several methods like in situ hybridizations, immunohistochemistry, *in vivo* overexpression by electroporation, *in vitro* explant cultures, draxin knockout mouse and DiI tracing of axons were used.

Results: Draxin is expressed with a dorsal high to ventral low gradient in chick optic tectum and mouse superior colliculas. *In vitro* experiments show that draxin repels neurite outgrowth from chick dorsal tectum explants. *In vivo* overexpression resulted in inhibition or misrouting of axon growth in the chick tectum. Draxin also inhibit axon outgrowth from mouse retinal explants. Draxin knockout mice showed mapping defect in retinocollicular projection along the medial-lateral and anterior-posterior axis.

Discussion: Expression data, *in vitro* and *in vivo* experiments strongly suggest that draxin might play an important role in the ventrally directed axon projections in chick optic tectum. Loss of function analyses of retinocollicular projection demonstrates that draxin is essential for the correct topographic map formation. Information about the functional receptor of draxin will help us finding the underlying mechanism of the mapping defect in retinocollicular projection.

Conclusion: Draxin is an axon guidance molecule that plays critical roles in the early development of vertebrate brain.