博士論文(要約)

Molecular genetic study of the function of KIF3B in brain development

（脳の発達における KIF3B の機能に関する分子遺伝学的研究）

アルサバン アシュワック ハッサン エス

ALSABBAN ASHWAQ HASSAN S

Summary

The mammalian brain, comprising a collection of neural networks, controls all of the functions and abilities of the body. Brain functions are modulated by a series of wiring events during embryonic and postnatal development. For neuronal communication, synapse formation, remodelling and stabilization transactions (known as bidirectional synaptic plasticity) are critical and mediated by the regulation of trafficking of different types of cargos during development. Kinesin-superfamily proteins (KIFs), which move along MTs powered by the hydrolysis of adenosine triphosphate (ATP), are molecular motors that involved in transporting specific cargos along neuronal axons and/or dendrites. KIF3B, a member of the kinesin molecular motor protein family (KIF), controls the plus-end-targeted transport of cargo along microtubules. Some KIF3B cargo, such as fodrin-associated vesicles, APC/PAR3 and N-cadherin/ β-catenin vesicles, is essential for neurite formation, polarity and spine plasticity. KIF3B forms a heterodimer with KIF3A. This heterodimer binds to KAP3 (kinesin

superfamily-associated protein 3), thus forming a heterotrimeric (KIF3A/KIF3B/KAP3) complex (KIF3 complex). KIF3 complex is ubiquitously expressed in the brain and has been known to play fundamental roles in intracellular transport (ICT) and cilia intraflagellar transport (IFT). Here, we show that KIF3B is essential for neuronal circuit formation in the brain. This study provides strong evidence that KIF3B plays crucial roles in brain development.