A regulatory mechanism of synaptic transmission by a chaperone-like factor

1997 Fiscal Year Final Research Report Summary

A regulatory mechanism of synaptic transmission by a chaperone-like factor

Research Project

Project/Area Number

08680838

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Neurochemistry/Neuropharmacology

Research Institution

Kanazawa University

Principal Investigator

HOSONO Ryuji Kanazawa University, School of Medicine, Professor, 医学部, 教授 (40019617)

Project Period (FY)

1996 – 1997

Keywords

UNC-18 / Ce syntaxin / synaptic vesicle / C.elegans / synaptic transmissio

Research Abstract

The unc-18 gene contributes to the synaptic transmission. n-Sec-1, the mammalian UNC-18 homolog is believed to be associated with a synaptic plasma membrane protein prior to synaptic vesicle docling. If this were the case for the C.elegans UNC-18, the gene mutations would result in constitutive fusions of synaptic vesicles. However, the gene mutations result in the accunulation of synaptic vesicles and neurotransmitters. To

examine the conflicting observations, we analyzed the binding of wild-type and mutant UNC-18 to syntaxin.
UNC-18 is a hydrophilic, globular, and neutral protein with pI 6.95. In the Sf21 cells the protein is predominantly localized in the cytoplasm, indicating its intrinsic solubility. To investigate further the inracellular distribution of UNC-18, we isolated synaptic vesicles by the percoll gradient fractionation. UNC-18 was detected on synaptic vesicles by Western blotting. We cloned C.elegans cDNAs encoding the mammalian syntaxinA homolog (Ce syntaxin). We tested the binding of UNC-18 to GST-Ce syntaxin fusion protein. UNC-18 binds to the recombinant syntaxin in vitro with high affinity. These findings indicate that the protein is periplasmic associating with both synaptic and plasma membrane, although intrinsically soluble. In vesicle traffic UNC-18 may be regulator with plasma membrane through syntaxin. UNC-18 may cause a conformational change of syntaxin. Therefore the protein allows it to bind to synaptic vesicles.
To test hypotesis, we sequenced cDNAs of 15 unc-18 mutants. We found two missense mutations and the binding ability of mutant UNC-18 proteins to Ce syntaxin is being teted.

Research Products (9 results)

All Other

All Publications (9 results)

[Publications] Toshihiro Sassa: "The Synaptic Protein UNC-18 is Phosphorylated by Protein kinase C." Neurochemi.Int.29. 543-552 (1996)

[Publications] Hisamitsu Ogawa: "Expression,Purification,and Characterization of Recombinant C.elegans UNC-18" Neurochemi.Int.29. 553-563 (1996)

[Publications] 細野 隆次: "センチュウにおける性決定の分子遺伝学" 科学. 66. 633-640 (1996)

[Publications] Hisamitsu Ogawa: "Functional Properties of the unc-64 Gene Encoding a Caenorhabditis elegans Syntaxin" J.Biol.Chem.273. 2192-2198 (1998)

[Publications] 細野 隆次: "ネオ生物学「線虫」C.elegansニューロン" 共立出版, 153 (1997)

[Publications] 細野 隆次: "「医学のための基礎分子細胞生物学」神経" 南山堂, 122 (1997)

[Publications] T.Sassa: "The synaptic protein UNC-18 is phosphorylated by protein kinase C." Neurochem.Int.29. 543-552 (1996)

[Publications] H.Ogawa: "Expression, purification, and characterization of recombinant C.elegans." Neurochem.Int.29. 553-563 (1996)

[Publications] H.Ogawa: "Functional properties of the unc-64 gene encoding a Caenorhabditis clgans syntaxin." J.Biol.Chem.273. 2192-2198 (1998)

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-08680838/086808381997kenkyu_seika_hokoku_

Published: 1999-03-15