

哺乳動物で生成される内因性マリファナ様物質アナンダミドの生理作用の解明

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| 雑誌名 | 平成19(2007)年度 科学研究費補助金 基盤研究(C) 研究成果報告書概要 |
| 巻 | 2006 2007 |
| ページ | 4p. |
| 発行年 | 2010-02-03 |
| URL | http://doi.org/10.24517/00059824 |



2007 Fiscal Year Final Research Report Summary

Elucidation of physiological function of anandamide, an endogenous marijuana-like substance, in mammals

Research Project

Project/Area Number

18590297

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Pathological medical chemistry

Research Institution

Kanazawa University (2007)
Kagawa University (2006)

Principal Investigator

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Co-Investigator(Kenkyū-buntansha)

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Project Period (FY)

2006 – 2007

Keywords

N-Acylethanolamine / N-Acylphosphatidylethanolamine / Anandaroide / Endocannabinoid / Phospholipase D

Research Abstract

N-Acylethanolamines (NAEs) constitute a large and diverse class of signaling lipids that includes the endogenous cannabinoid anandamide. It is widely accepted that in mammalian tissues all NAEs are principally released from their corresponding N-acyl phosphatidylethanolamines (NAPEs) by the catalysis by a membrane-associated phospholipase D generally abbreviated as NAPE-PLD. Recently, NAPE-PLD was identified as a candidate enzyme involved in the biosynthesis of NAEs by us. To understand the physiological and pathophysiological significance of anandamide and other bioactive NAEs in mammals, we generated and characterized mice with a targeted disruption in the NAPE-PLD gene (NAPE-PLD-1). (1) We generated mice lacking NAPE-PLD, exon 3 of the NAPE-PLD gene was removed by Cre/loxP system. (2) NAPE-PLD-1^{-/-} were born at the expected Mendelian frequency, were viable and healthy, and showed no overt differences in their cage behavior compared to wild type littermates. (3) RT-PCR and Western blotting with anti-NAPE-PLD antibodies confirmed the absence of NAPE-PLD mRNA and protein in tissues from NAPE-PLD-1^{-/-}. (4) Tissues from NAPE-PLD-1^{-/-} showed significantly lower NAPE-PLD activity with an N-palmitoyl-PE as substrate compared to wild type tissues. (5) Significant reductions in the levels of saturated NAEs were observed in NAPE-PLD-1^{-/-} brains. On the other hand, complementary profiles of NAPEs were found in NAPE-PLD-1^{+/+} and NAPE-PLD-1^{-/-} brains, with the latter samples possessing 15-20-fold higher levels of saturated N-acyl NAPEs. These data suggest that NAPE-PLD is a principal enzyme responsible for the conversion of NAPEs to NAEs in mammals.

Research Products (56 results)

| | All | 2008 | 2007 | 2006 | Other |
|--|-----|--|------|---------------------------|-------|
| | All | Journal Article (16 results) (of which Peer Reviewed: 8 results) | | Presentation (40 results) | |
| [Journal Article] The expression of osteopontin is increased in vessels with blood-brain barrier impairment | | 2008 | | | ▼ |
| [Journal Article] The stimulatory effect of phosphatidylethanolamine on N-acylphosphatidylethanolamine-hydrolyzing phospholipase D (NAPE-PLD). | | 2008 | | | ▼ |
| [Journal Article] The expression of osteopontin is increased in vessels with blood-brain barrier impairment | | 2008 | | | ▼ |
| [Journal Article] The stimulatory effect of phosphatidylethanolamine on N-acylphosphatidylethanolamine-hydrolyzing phospholipase D (NAPE-PLD)1 | | 2008 | | | ▼ |
| [Journal Article] Discovery and characterization of a Ca ²⁺ -independent phosphatidylethanolamine N-acyltransferase generating the anandamide precursor and its congeners | | | 2007 | | ▼ |
| [Journal Article] Proteolytic activation and glycosylation of N-acylethanolamine-hydrolyzing acid amidase, a lysosomal enzyme involved in the endocannabinoid metabolism. | | | 2007 | | ▼ |
| [Journal Article] Biosynthetic pathways of the endocannabinoid anandamide. | | | 2007 | | ▼ |
| [Journal Article] Predominant expression of lysosomal N-acylethanolamine-hydrolyzing acid amidase in macrophages revealed by immunochemical studies. | | | 2007 | | ▼ |
| [Journal Article] Accumulation of triosephosphate isomerase, with sequence homology to Beta amyloid peptides, in vessel walls of the newborn piglet hippocampus. | | | 2007 | | ▼ |
| [Journal Article] Discovery and characterization of a Ca ²⁺ -independent phosphatidylethanolamine N-acyltransferase generating the anandamide precursor and its congeners | | | 2007 | | ▼ |
| [Journal Article] Proteolytic activation and glycosylation of N-acylethanolamine-hydrolyzing acid amidase, a lysosomal enzyme involved in the endocannabinoid metabolism | | | 2007 | | ▼ |
| [Journal Article] Biosynthetic pathways of the endocannabinoid anandamide | | | 2007 | | ▼ |
| [Journal Article] Predominant expression of lysosomal N-acylethanolamine-hydrolyzing acid amidase in macrophages revealed by immunochemical studies | | | 2007 | | ▼ |
| [Journal Article] Accumulation of triosephosphate isomerase, with sequence homology to Beta amyloid peptides, in vessel walls of the newborn Piglet hippocampus | | | 2007 | | ▼ |
| [Journal Article] Functional analysis of the purified anandamide-generating phospholipase D as a member of the metallo-β-lactamase family | | 2006 | | | ▼ |
| [Journal Article] Functional analysis of the purified anandamide -generating phospholipase D as a member of the metallo-B-lactamase family | | 2006 | | | ▼ |

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| [Presentation] レシチン・レチノール・アシル転移酵素構造類似タンパク質のホスファチジルエタノールアミンN-アシル転移酵素としての同定 | 2007 | ▼ |
| [Presentation] 生体膜成分とリン脂質によるN-アシルホスファチジルエタノールアミン水解ホスホリパーゼD(NAPE-PLD)の活性化 | 2007 | ▼ |
| [Presentation] N-アシルエタノールアミン水解酸性アミダーゼの免疫化学的解析 | 2007 | ▼ |
| [Presentation] Identification of the protein with a homology to lecithin-retinol acyltransferase as phosphatidylethanolamine N-acyltransferase | 2007 | ▼ |
| [Presentation] Activation of N-acylphosphatidylethanolamine-hydrolyzing phospholipase D (NAPE-PLD) by membrane lipids and phosphatidylethanolamine | 2007 | ▼ |
| [Presentation] Immunocheraical studies of N-acylethanolamine -hydrolyzing acid amidase | 2007 | ▼ |
| [Presentation] 抗炎症脂質N-アシルエタノールアミンを加水分解する酸性アミダーゼのマクロファージにおける発現 | 2007 | ▼ |
| [Presentation] Discovery of a calcium-independent phosphatidylethanolamine N-acyltransferase | 2007 | ▼ |
| [Presentation] Immunochemical studies reveal predominant expression of lysosomal N-acylethanolamine-hydrolyzing acid amidase in macrophages | 2007 | ▼ |
| [Presentation] Discovery of a calcium-independent phosphatidylethanolamine N-acyltransferase (iNAT) | 2007 | ▼ |
| [Presentation] N-アシルPEを生成する新規N-アシル転移酵素の同定と性状解析 | 2007 | ▼ |
| [Presentation] Identification and characterization of a novel phosphatidylethanolamine Nacyltransferase generating N-acylphosphatidylethanolamine | 2007 | ▼ |
| [Presentation] 内因性マリファナ様物質アナンダミドの生合成に係わる新規N-アシル転移酵素の同定と性状解析 | 2007 | ▼ |
| [Presentation] Identification and characterization of a phosphatidylethanolamine N-acyltransferase generating the anandamide an endogenous marijuana-like substance | 2007 | ▼ |
| [Presentation] 新規リソソーム酵素としてのN-アシルエタノールアミン水解酸性アミダーゼの性状解析 | 2007 | ▼ |
| [Presentation] Characteization of N-acylethanolamine -hydrolyzing acid amidase as a novel lysosomal enzyme | 2007 | ▼ |
| [Presentation] アナンダミド前駆体N-アシルホスファチジルエタノールアミンのマクロファージ貪食抑制効果 | 2007 | ▼ |
| [Presentation] Inhibitory effect of N-acylphosphatidylethanolamine on macrophage phagocytosis | 2007 | ▼ |
| [Presentation] レシチン・レチノール・アシルトランスフェラーゼにホモロジーを示す機能未知のタンパク質はホスファチジルエタノールアミンN-アシルトランスフェラーゼとして作用する | 2007 | ▼ |
| [Presentation] The protein with a homology to lecithin-retinol acyltransferase functions as a phosphatidylethanolamine N-acyltransferase | 2007 | ▼ |
| [Presentation] Expression analysis of N-acylethanolamine-generating phospholipase D in rat brain | 2006 | ▼ |
| [Presentation] Molecular. cloning and characterization of a novel lysosomal enzyme hydrolyzing anandamide and other bioactive N-acylethanolamines | 2006 | ▼ |
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| [Presentation] マクロファージにおける酸性アミダーゼによる抗炎症脂質N-アシルエタノールアミンの加水分解 | 2006 | ▼ |
| [Presentation] Purification and characterization of recombinant NAPE-PLD expressed in Escherichiacoli | 2006 | ▼ |
| [Presentation] Purification and characterization of recombinant NAPE-PLD expressed in Escherichia coli | 2006 | ▼ |

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| [Presentation] Molecular characterization of a novel lysosomal enzyme hydrolyzing anandamide and other bioactive N-acylethanolamines | 2006 ▼ |
| [Presentation] Purification and characterization of the recombinant anandamide-generating phospholipase D | 2006 ▼ |
| [Presentation] Molecular characterization of a novel lysosomal enzyme hydrolyzing anandamide and other bioactive N-acylethanolamines | 2006 ▼ |
| [Presentation] Purification and characterization of the recombinant anandamide-generating phospholipase D | 2006 ▼ |
| [Presentation] アナンドアミドを含むN-アシルエタノールアミンを遊離する新規ホスホリパーゼDの組換え酵素の大腸菌からの精製と性状解析 | 2006 ▼ |
| [Presentation] Purification and characterization of the recombinant enzyme of a novel phospholipase D releasing anandamide and other N-acylethanolamine from Escherichia coli | 2006 ▼ |
| [Presentation] アナンドアミドを遊離する新規ホスホリパーゼDの組換え体の精製と性状解析 | 2006 ▼ |
| [Presentation] Molecular biological studies on the anandamide-generating phospholipase D (NAPE-PLD) | 2006 ▼ |
| [Presentation] N-アシルホスファチジルエタノールアミンを特異的に加水分解するホスホリパーゼD (NAPE-PLD)の組換え酵素の性状解析 | 2006 ▼ |
| [Presentation] Purification and characterization of the recombinant enzyme of a novel phospholipase D releasing anandamide | 2006 ▼ |
| [Presentation] Molecular biological studies on the anandamide-generating phospholipase D (NAPE-PLD) | 2006 ▼ |
| [Presentation] Characterization of the recombinant N-acylphosphatidylethanolamine-hydrolyzing phospholipase D (NAPE-PLD) | 2006 ▼ |
| [Presentation] Expression of anti-inflammatory lipid N-acylethanolamine -hydrolyzing acid amidase in macrophages | ▼ |
| [Presentation] Hydrolysis of anti-inflammatory lipid N-acylethanolamine by acid amidase in macrophages | ▼ |

URL: https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-18590297/185902972007kenkyu_seika_hokoku

Published: 2010-02-03