Molecular characterization and role of ecdysone membrane receptor

2007 Fiscal Year Final Research Report Summary

Molecular characterization and role of ecdysone membrane receptor

Research Project

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Grant-in-Aid for Scientific Research (B)

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一般

Research Field

Applied entomology

Research Institution

Kanazawa University

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Research Abstract

We clarified developmental profiles of gene expression of early response genes to 20E in the anterior silk glands during the fifth instar up to the time of cell death execution two days after gut purge. Also, we showed the gene response to 20E in vitro using anterior silk glands of gut-purged larvae. The in vivo and in vitro results indicated that a heterodimeric EcR-B1 and USP-2 may be responsible for the cell death Results also indicated involvement of E74, E75,

BHR3 and BR-C isoforms, but not Ftz-F1. We are not succeeded in gene cloning of the putative membrane ecdysone receptor yet. We examined pharmacologically the signaling pathway from mEcR to cellular responses, i.e. cell condensation, nuclear condensation, DNA fragmentation and nuclear fragmentation. Ca<2+> acts as the second messenger The mEcR is suggested to be a G-protein coupled receptor (GPCR) associated with Gαq, followed by a serial activation of phospholipase c-β, generation of inositol 3-phosphate (IP_3), and release of Ca<2+> from endoplasmic reticulum probably through IP3 receptor Then, Ca<2+> activates protein kinase C (PKC) and caspase 3-like protease. This signaling pathway culminates in nuclear fragmentation and nuclear fragmentation. Nuclear condensation is regulated by a different pathway involving calmodulin and calmodulin-dependent protein kinase II (CaMK-II). However, this pathway was not activated by Ca<2+>, and therefore it is unknown whether Gαq is involved in this pathway. In addition, inhibitors of calmodulin and CaMK-II affected the occurrence of nuclear and DNA fragmentations, indicating the caspase 3-like protease activation does not depend simply on the signaling pathway of GPCR/PLC-β/IP3/Ca<2+>/PKC.

Research Products (68 results)

[Journal Article] Dual control of midgut trehalase activity by 20-hydroxyecdysone and an inhibitory factor in the bamboo borer Omphisa fuscidentalis Hampson. 2008

[Journal Article] Characteristic expression of three heat shock-responsive genes during larval diapauses in the bamboo borere Omphisa fuscidentalis. 2008

[Journal Article] Nongenomic and genomic actions of an insect steroid coordinately regulate programmed cell death of anterior silk glands of Bombyx mori. 2008

[Journal Article] Death commitment in the anterior silk gland of the silkworm, Bombyx mori. 2008

[Journal Article] (2008) Nongenomic and genomic actions of an insect steroid coordinately regulate programmed cell death of anterior silk glands of Bombyx mori 2008

[Journal Article] Dual control of midgut trehalase activity by 20-hydroxyecdysone and an inhibitory factor in the bamboo borer Omphisa fuscidentalis Hampson 2008

[Journal Article] Characteristic expression of three heat shock-responsive genes during larval diapauses in the bamboo borere Omphisa fuscidentalis 2008

[Journal Article] Nongenomic action of an insect steroid hormone in steroid-induced programmed cell death. 2007

[Journal Article] 20-Hydroxyecdysone regulation of two isoforms of the Ets transcription factor E74 gene in programmed cell death in the silkworm anterior silk gland. 2007

[Journal Article] Hormonal mechanisms underlying termination of larval diapause by juvenile hormone in the bamboo borer, Omphisa fuscidentalis. 2007

[Journal Article] Solubilization of the ecdysone binding protein from anterior silk gland cell membranes of the silkworm, Bombyx mori. 2007

[Journal Article] Identification, characterization, and developmental regulation of two storage proteins in the bamboo borer Omphisa fuscidentalis. 2007

[Journal Article] Correlation of oxygen consumption, cytochrome c oxidase and cytochrome c oxidase subunit I gene expression in the termination of larval diapause in the bamboo borer, Omphisa fuscidentalis. 2007

[Journal Article] Hormonal mechanisms underlying termination of larval diapause by juvenile hormone in the bamboo borer, Omphisa fuscidentalis 2007

[Journal Article] Solubilization of the ecdysone binding protein from anterior silk gland cell membranes of the silkworm, Bombyx mori 2007

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[Journal Article] Correlation of oxygen consumption, cytochrome c oxidase and cytochrome c oxidase subunit I gene expression in the termination of larval diapause in the bamboo borer, Omphisa fuscidentalis 2007

[Journal Article] (2006) EcR expression in the prothoracicotropic hormone-producing neurosecretory cells of the Bombyx mori brain : An indication of the master cells of insect metamorphosis 2007

[Journal Article] EcR expression in the prothoracicotropic hormone-producing neurosecretory cells of the Bombyx mori brain: An indication of the master cells of insect metamorphosis. 2006

[Journal Article] A rapid increase in cAMP in response to 20-hydroxyecdysone in the anterior silk glands of the silkworm, Bombyx mori. 2006

[Journal Article] Developmental profile of annexin IX and its possible role in programmed cell death of the Bombyx mori anterior silk gland. 2006

[Journal Article] Coordinate responses of transcription factors to ecdysone during programmed cell death in the anterior silk gland of the silkworm, Bombyx mroi. 2006

[Journal Article] A rapid increase in cAMP in response to 20-hydroxyecdysone in the anterior silk glands of the silkworm, Bombyx mori. 2006

[Journal Article] Developmental profile of annexin IX and its possible role in prograннned cell death of the Bombyx mori anterior silk gland 2006

[Journal Article] Coordinate responses of transcription factors to ecdysone during programmed cell death in the anterior silk gland of the silkworm, Bombyx mori 2006

[Journal Article] Membrane-bound sorbitol 6-phosphatase in fat body cells controls the dynamics of sorbitol 6-phosphate, a major hemolymph sugar in the silkworm. 2005

[Journal Article] Nutritional status affects 20-hydroxyecdysone concentration and progression of oogenesis in Drosophila melanogaster. 2005

[Journal Article] Membrane-bound sorbitol 6-phosphatase in fat body cells controls the dynamics of sorbitol 6-phosphate, a major hemolymph sugar in The silkworm. Insect Biochem 2005

[Journal Article] Nutritional status affects 20-hydroxyecdysone concentration and progression of oogenesis in Drosophila melanogaster 2005

[Journal Article] Death commitment in the anterior silk gland of the silkworm, Bombyx mart 2005

[Journal Article] Nongenomic action of an insect steroid hormone in steroid-induced programmed cell death

[Presentation] 20-ヒドロキシエクジソン(20E)によるカイコガ直腸嚢膨張の誘導 2008

[Presentation] 20-Hydroxyecdysone-(20E-)induced genes expression in the brain and their functional analysis by RNAi during development of the silkworm, Bombyx mori. 2007

[Presentation] Spatial distribution of 20-hydroxyecdysone (20E)-responsive genes in the brain of silkworm, Bombyx mori. 2007

[Presentation] カイコガ(Bombyx mori)幼虫の脳における変態調節機構に関与する遺伝子の網羅的解析. 2007

[Presentation] 20-Hydroxyecclysone- (20E-) induced genes expression in the brain and their functional analysis by RNAi during development of the silkworm, Bombyx mart 2007

[Presentation] Spatial distribution of 20-hydroxyecdysone (20E)-responsive genes in the brain of silkworm, Bombyx mori 2007

[Presentation] Genomic and nongenomic actions of an insect steroid, 20-hydroxy-ecdysone in programmed cell death of Bombyx anterior silk gland 2007

[Presentation] Genomic and nongenomic actions of an insect steroid, 20-hydroxyecdysone in programmed cell death of Bombyx anterior silk gland 2007

[Presentation] エクジステロイドによるカイコガ蛹での直腸嚢膨張の誘導 2007

[Presentation] Calmodulin antagonist inhibits nuclear condensation in 20E-induced programmed cell death in Bombyx anterior silk glands. 2007

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[Presentation] Juvenile hormone governs developmental events through controlling the timing of ecdysone secretion. 2007

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[Presentation] Expression and functional analysis of the 20-hydroxyecdysone(20E)-induced brain genes during development of the silkworm Bombyx mori. 2006

[Presentation] カイコガ幼虫脳において網羅的解析により同定したエクジソン応答遺伝子の発現および機能解析. 2006

[Presentation] カイコガにおける昆虫インスリン様ホルモンbombyxinのシグナル伝達機構. 2006

[Presentation] 20-ヒドロキシエクジソンに誘導される予定細胞死における初期Ca^<2+>シグナル 2006

[Presentation] 20E誘導性予定細胞死シグナルカスケードにおけるCa^<2+>の関与 2006

[Presentation] ボンビキシンによるマルピーギ管でのMAPキナーゼシグナルの活性化 2006

[Presentation] Identification and characterization of two storage proteins in diapause larvae of the bamboo borer, Omphisa fuscidentalis. 2006

[Presentation] Identification and characterization of two storage proteins in diapause larvae of the bamboo borer, Omphisa fuscidentalis 2006

[Presentation] Interaction of genomic and nongenomic actions of 20-hydroxyecdysone in 20E-dependent developmental events. 2006

[Presentation] Interaction of genomic and nongenomic actions of 20-hydroxyecdysone in 20E-dependent developmental events 2006

[Presentation] The prothoracicotropic hormone-producing cells(PTPCs)are the master cells of insect metamorphosis: Exclusive expression of ecdysone receptor genes at the PTPCs in silkworm larval brain. 2006

[Presentation] Comprehensive analysis of gene expression induced by 20-hydroxy-ecdysone(20E)in the silkworm brain: Analysis with microarray. 2006

[Presentation] The prothoracicotropic hormone-producing cells (PTPCs) are the master cells of insect metamorphosis : Exclusive expression of ecdysone receptor genes at the PTPCs in silkworm larval brain 2006

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[Presentation] Omphisa fuscidentalis休眠幼虫に見られる管状組織とその中の油状物質の同定. 2006

[Presentation] Expression and functional analysis of the 20-hydroxyecdysone (20E) -induced brain genes during development of the silkworm Bombyx mart 2006

[Presentation] Masafumi Iwami: Comprehensive analysis of gene expression induced by 20-hydroxyecdysone(20E)in the silkworm brain: Identification of two novelgenes. 2005

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[Presentation] Genomic and nongenomic actions of 20E in programmed cell death of Bombyx anterior silk gland. 2005

[Presentation] Genomic and nongenomic actions of 20E in programmed cell death of Bombyx anterior silk gland 2005

[Presentation] カイコガ脂肪体の予定細胞死. 2005

[Presentation] カイコ変態時に脳においてエクジソンにより誘導される遺伝子の網羅的解析-昆虫生理学的アプローチによる脳機能の解明. 2005

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