Molecular mechanisms of programmed cell death by ecdysteroid in bombyx anterior silk gland

2004 Fiscal Year Final Research Report Summary

MOLECULAR MECHANISMS OF PROGRAMMED CELL DEATH BY ECDYSTEROID IN BOMBYX ANTERIOR SILK GLAND

Research Project

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14360033

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Grant-in-Aid for Scientific Research (B)

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Single-year Grants

Section

一般

Research Field

蚕糸・昆虫利用学

Research Institution

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ecdysteroid / silkworm / anterior silk gland / programmed cell death / steroid hormone / membrane receptor / non-genomic action

Research Abstract

Programmed cell death (PCD) of anterior silk glands of the silkworm, Bombyx mori, is induced by 20E elicits its effects via binding with a heterodimeric nuclear receptor (EcR/USP) and acting as a transcriptional factor. In the PCD, however, we found various events associated with the cell death, which cannot be interpreted from the point of view of 20E action via nuclear receptor, and therefore we assumed the presence of a non-genomic action of 20E via ecdysone membrane receptor (mEcR). We confirmed the presence of the binding sites of ecdysteroids on membrane proteins. The responsible protein is embedded in plasma membrane and possesses a high binding activity with ecdysteroids. In addition, we found that 20E increases an intracellular cAMP level as rapidly as 30 seconds after 20E challenge. We also demonstrated that activation of protein kinase C and caspase 3 is involved in the 20E-induced PCD. The PCD precedes via plasma membrane blebbing, cellular shrinkage, DNA

oligonucleosomal fragmentation, nuclear condensation, nuclear fragmentation and apoptotic body formation. Blebbing, cell shrinkage and apoptotic body formation are under the control of genomic action of 20E while other events are under the non-genomic action of 20E, probably through mEcR. The present results suggest that a single steroid hormone exerts its physiological effects through both genomic and nongenomic pathways.

Research Products (14 results)

All | 2005 | 2004 | 2003 | 2002

All | Journal Article

- [Journal Article] Death commitment in the anterior silk gland of the silkworm, Bombyx mori — 2005
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- [Journal Article] Presence of membrane ecdysone receptor in the anterior silk gland of the silkworm Bombyx mori — 2004
- [Journal Article] Ecdysteroid control of cell cycle and cellular commitment in insect wing imaginal discs — 2004
- [Journal Article] Commencement of pupal commitment in late penultimate instar and its hormonal control in wing imaginal discs of the silkworm, Bombyx mori — 2004
- [Journal Article] Presence of membrane ecdysone receptor in the anterior silk gland of the silkworm, Bombyx mori. — 2004
- [Journal Article] Ecdysteroid control of cell cycle and cellular commitment in insect wing imaginal discs. — 2004
- [Journal Article] Commencement of pupal commitment in late penultimate in star and its hormonal control in wing imaginal discs of the silkworm, Bombyx mori. — 2004
- [Journal Article] Regulation of prothoracic gland ecdysteroidogenesis activity leading to pupal metamorphosis — 2003
- [Journal Article] Regulation of prothoracic gland ecdysteroidogenesis activity leading to pupal metamorphosis. — 2003
- [Journal Article] Pupal commitment and its hormonal control in wing imaginal discs — 2002
- [Journal Article] Pupal commitment and its hormonal control in wing imaginal discs. — 2002
- [Journal Article] Sensitivities to juvenile hormone and ecdysteroid in the diapause larvae of Omphisa fuscidentalis based on the hemolymph trehalose dynamics index. — 2002
- [Journal Article] Intensity of larval diapause in the bamboo borer, Omphisa fuscidentalis. — 2002

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