Role of arachdonate cascade in apoptosis of neronal cells

2001 Fiscal Year Final Research Report Summary

Role of arachdonate cascade in apoptosis of neronal cells

Research Project

Project/Area Number

10680580

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Structural biochemistry

Research Institution

Kanazawa University

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glutathion / glutamate / arachidonic acid / apoptosis / necrosis / glioma cells / lipid peroxidation / giant DNA fragmentation

Research Abstract

Glutamate caused GSH depletion inducing apoptosis through endogenously produced active oxygen species and thereby 1-2 Mbp giant DNA and high molecular weight DNA fragmentation prior to the internucleosomal DNA fragmentation seen in C6 rat glioma cells. During apoptosis induced by GSH-depletion, reactive oxygen species (ROS) caused lipid peroxidation associated with PK-C activation. AA promoted cell death by changing the apoptosis to

necrosis through lipid peroxidation initiated by lipid hydroperoxides produced by 12-lipoxygenase under the GSH depletion in C6 cells. Some ROS such as hydroperoxide produced by unknown pathway make hydroxy radicals and induce 8-OH-dG formation in the cells. The conversion of apoptosis to necrosis may be a possible event under GSH depleted conditions and a model of glial cell death. GSH depletion caused by glutamate induces 8-OH-dG formation. Polyunsaturated fatty acids enhanced lipid peroxidation associated with 8-OH-dG formation through a chain reaction. BSO, an inhibitor for GSH synthesis, also induced lipid peroxidation and consequently leads to 1-2 Mbp giant DNA fragmentation. Polyunsaturated fatty acids enhanced the giant DNA fragmentation and 3'-OH temini in chromosomal DNA promoting lipid peroxidation by a chain reaction under the GSH depletion induced by both glutamate and BSO. Ultraviolet (UV) radiation activated caspase-3 associated with cleavage of poly (ADP-ribose) polymerase in T-24 carcinoma cells,. UV induced apoptosis through no producing ROS, at least DCFH reactive ROS, activation of caspase-3 and internucleosomal DNA fragmentation. It is suggested that mechanism of cell death on GSH depletion -induced apoptosis is different from that of UV-induced apoptosis.

Research Products (20 results)

All | Other

All | Publications (20 results)

[Publications] Higuchi, Y., Matsukawa, S.: "Active oxygen-mediated chromosomal 1-2 Mbp giant DNA fragmentation into internucleosomal DNA fragmentation in apoptosis of glioma cells induced by glutamate"Free Radic. Biol. Med.. 24. 418-426 (1998)

[Publications] Higuchi, Y., Matsukawa, S.: "Glutathione depletion induces chromosomal giant DNA and high molecular weight DNA fragmentation associated with apoptosis through lipid peroxidation and protein kinase C activation in C6 glioma cells"Arch. Biochem. Biophys.. 393. 33-42 (1999)

[Publications] Higuchi, Y.: "Polyunsaturated fatty acids promote 8-hydroxy-2-deoxyguanosine formation through lipid peroxidation under the glutamate-induced GSH depletion in rat glioma cells"Arch. Biochem. Biophys.. 392. 65-70 (2001)

[Publications] Kitamura, K., Nishimura Y., Kubotera, N., Higuchi, Y., Yamaguchi, M.: "Transient activation of the microl homeobox gene family in the sea urchin (Hemicentrotus pulcherrimus) micromere"Dev. Genes Evol.. 212. 1-10 (2001)

[Publications] Higuchi, Y., Yoshimoto, T.: "Arachidonic acid converts the glutathione depletion-induced apoptosis to necrosis by promoting lipid peroxidation and reducing caspase-3 activity in rat glioma cells"Arch. Biochem. Biophys. 2002(印刷中).

[Publications] 樋口善博, 松川茂: "グルタミン酸による巨大DNA断片化をともなうグリア細胞アポトーシスにおけるビタミンEの抑制作用"ビタミンE研究の進歩. VIII. 121-127 (1998)

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[Publications] Higuchi, Y., Yoshimoto, T.: "Chromosomal DNA fragmentation during mammalian cell death caused by oxidative stress. Recent Res. Develop. Biophys & Biochem"Research Signpost(印刷中). (2001)

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[Publications] Higuchi, Y.Matsukawa,: "Active oxygen-mediated chromosomal 1-2 Mbp giant DNA fragmentation into internucleosomal DNA fragmentation in apoptosis of glioma cells induced by glutamate"Free Radic. Biol. Med.. 24. 418-426 (1998)

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[Publications] Kitamura, K., Nishimura, Y., Kubotera, N., Higuchi, Y. and Yamaguchi, M.: "Transient activation of the micro1 homeobox gene family in the sea urchin (Hemicentrotus pulcherrimus) micromere"Dev. Genes Evol.. 212. 1-10 (2001)

[Publications] Higuchi, Y., Yoshimoto, T: "(Review article) Chromosomal DNA fragmentation during mammalian cell death caused by oxidative stress"Recent Res. Develop. Biophys & Bichem., Research Signpost.. in press. (2001)

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