Abstract

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Maternal docosahexaenoic acid-enriched diet prevents neonatal brain injury.

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BACKGROUND: Hypoxic-ischemic encephalopathy due to neonatal asphyxia is one of the most important causes of delayed neurological development. Prolonged neuronal apoptosis plays an important role in the processes contributing to neuronal degeneration. Docosahexaenoic acid (DHA), a major component of brain membrane phospholipids, prevents neuronal cell apoptosis and plays an important role as an anti-oxidant agent.

OBJECTIVE: We investigated the neuroprotective and anti-oxidant effects of maternal DHA supplementation during pregnancy in a model of neonatal hypoxic-ischemic encephalopathy.

METHODS: Pregnant rats were randomly assigned to two experimental groups: a control group or a DHA-enriched diet group. Hypoxic-ischemic encephalopathy was produced by left common carotid artery occlusion and exposure to 8% oxygen for 1.5 h. TUNEL assay, immunohistochemistry for caspase-3 and 8-hydroxy-deoxyguanosine (8-OHdG), and Western blot for caspase-3 were performed at postnatal days 8, 10 and 14. Fatty acid composition of brain was estimated on postnatal day 7.

RESULTS: Maternal diet clearly influenced brain fatty acid composition in pups. Numbers of apoptotic neuronal cells and 8-OHdG immunoreactivity were significantly decreased in the DHA-enriched group.

CONCLUSIONS: Our findings indicate that maternal DHA-enriched diet during pregnancy provides neuroprotection by inhibiting oxidative stress and apoptotic neuronal death. Dietary supplementation of DHA during pregnancy may thus be beneficial in preventing neonatal brain injury.

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