Ann Neurol. 1994 Dec;36(6):882-8. doi: 10.1002/ana.410360613.

Coenzyme Q10 and nicotinamide block striatal lesions produced by the mitochondrial toxin malonate

M F Beal [1], D R Henshaw, B G Jenkins, B R Rosen, J B Schulz

Affiliations

Affiliation

1 Neurochemistry Laboratory, Massachusetts General Hospital, Boston 02114.

PMID: 7998775 DOI: 10.1002/ana.410360613

Abstract

A potential mechanism of neuronal injury in neurodegenerative diseases is a defect in energy metabolism that may lead to slow excitotoxic neuronal death. Consistent with this possibility, we showed that specific inhibitors of the electron transport chain produce excitotoxic lesions in vivo. In the present study we examined whether agents that improve energy metabolism can block lesions produced by the mitochondrial toxin malonate. Striatal lesions produced by the complex II inhibitor malonate were blocked in a dose-dependent manner by oral pretreatment with coenzyme Q10. Administration of nicotinamide by Alzet pump for 1 week attenuated malonate-induced lesions, but riboflavin had no effect. Administration of nicotinamide intraperitoneally just prior to and following induction of the lesions produced dose-dependent neuroprotection. A combination of coenzyme Q10 with nicotinamide was more effective than either compound alone, as shown by both lesion size and magnetic resonance imaging in vivo. Both coenzyme Q10 and nicotinamide blocked adenosine triphosphate depletions and lactate increases. These results confirm that mitochondrial toxins produce striatal excitotoxic lesions by a mechanism involving energy depletion in vivo. Furthermore, they suggest novel neuroprotective strategies that may be useful in the treatment of both mitochondrial encephalopathies and neurodegenerative diseases.

Related information

Cited in Books
PubChem Compound (MeSH Keyword)

LinkOut - more resources

Full Text Sources
Wiley

Other Literature Sources
The Lens - Patent Citations