Chronic Rapeseed oil diet reinforces the Neuroprotective effect of an Anti-epileptic Drug (Carbamazepine), using free seizure tests in Mice.

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In vivo and in vitro studies have emphasized the beneficial effect of omega3 (from fish or vegetable oils sources) on cardiac and neuronal excitability, suggesting that omega3 (precursor or Long-chains) supplementation may be of clinical relevance in the prevention of both cardiovascular and brain dysfunctions including epileptic seizures.

We have previously shown that dietary intake of rapeseed, an Alpha-Linolenic Acid (ALA) rich oil, could help to control neuronal disorders in mice (1), using both the MDDAS (Magnesium Deficiency-Dependent Audiogenic Seizure) and MES (Maximum Electroshock Seizure) tests.

Furthermore, Carbamazepine (CBZ), an anti-epileptic drug, is known to give a similar neuroprotective pattern in the MDDAS test.

Hereafter, we studied whether a chronic CBZ treatment was improved using omega-3 vs omega-6 Mg-deficient diets (rapeseed vs sunflower/corn as 5% fat) for 21 days in 2 groups of mice. Then, CBZ (25 mg/kg) was injected IP, once daily for 10 days. Mg-deficient diets, MDDAS and MES tests were as previously described (1). Increasing doses of NMDA were IP injected in both groups.

The results showed that on the last day of treatment, no convulsive mice appeared in either the MDDAS and MES test (CBZ pharmacological effect). Four days later, in the MDDAS test: (i) All the mice were still protected in the omega3 (rapeseed) group whereas 50% had seizures in the omega6 group (with 2/3 fatal issues); (ii) The pattern of seizures showed a significant increase in the first two step durations as compared to CBZ untreated mice; (iii) NMDA-minimal lethal dose in NMDA test was higher in the omega3 CBZ treated group.

In conclusion, the synergic effect of omega3 diet and CBZ might involve the direct effect of CBZ on NMDA receptor, by counteracting the omega6 cascade with a specific decrease of arachidonic acid (2). With Grants from Onidol.