Dual Effects Elicited by Fructose on Acetylcholinesterase Activity in Cerebral Cortex of Young Rats

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Introduction: Increased fructose concentrations are found in fructosemia, whose main clinical findings include neurological abnormalities. Aim: We investigated the in vitro and in vivo effects of fructose on acetylcholinesterase (AchE) activity in brain structures of developing rats. Methods: For the in vitro experiments, cerebral cortex homogenates were incubated in the absence or presence of fructose at increasing concentrations (0.1 – 5 mM). For the in vivo experiments, rats were killed 1h after a single fructose injection (5 µmol/g; subcutaneously) and cerebral cortex, striatum and hippocampus were isolated. Control group received the same volume of saline solution (0.9 g%). Results: Fructose provoked an inhibition of AchE activity in vitro in cerebral cortex of 30-day-old-rats, even at low concentrations (0.1 mM). On the other hand, AchE activity was increased in cerebral cortex from rats with 30 and 60-days old receiving fructose administration. However, AchE activity was unaffected by fructose administration in cerebral cortex, striatum or hippocampus of 15-day-old. Conclusion: Our results point to a dual effect elicited by fructose on AchE activity. It may be speculated that this effect is involved in the neurological dysfunction observed in patients with fructosemia.

Keywords: fructose, acetylcholinesterase, brain

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