Oxidative Damage Caused by Hyperphenylalaninemia In Brain and Serum Of Young Rats

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Introduction: Hyperphenylalaninemia is found in patients affected by phenylketonuria (PKU), a genetic disease caused by a deficiency of phenylalanine hydroxilase. Brain damage is a common characteristic of PKU patients, whose pathophysiology is still uncertain. Aim: We evaluated oxidative damage parameters in different brain structures, cerebral-spinal fluid (CSF) and serum of rats submitted to an experimental model of PKU. Methods: Male 30-day-old Wistar rats received a single subcutaneous phenylalanine (Phe) injection (5.2 µmol/g) and/or p-chlorophenylalanine (p-Cl-Phe; 0.9 µmol/g), an inhibitor of phenylalanine hydroxylase. Control group received saline solution at the same volume. One hour after administration, cerebral cortex, striatum, hippocampus, CSF and serum were isolated and TBA-RS levels and carbonyl content were quantified. Results: TBA-RS levels were increased by the simultaneous administration of Phe and p-Cl-Phe in cerebral cortex, striatum, hippocampus and CSF, but not in serum. Carbonyl content was also increased by the combination Phe plus p-Cl-Phe in all structures and biological fluids studied. Conclusion: Our results suggest that hyperphenylalaninemia induces oxidative damage to lipid and protein in rat tissues. Our results might explain, at least in part, the brain damage observed in PKU patients.

Keywords: phenylketonuria, oxidative damage, brain
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