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Brain glutathione levels in patients with epilepsy measured by in vivo (1)H-MRS

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Abstract

Objective: Glutathione in its reduced form (GSH) is the most important free radical scavenging compound in the mammalian nervous system that prevents membrane lipid peroxidation. It is suspected that epileptic seizures are accompanied by a massive production of reactive oxygen species, i.e., oxidative stress.

Methods: Using an (1)H MRS technique developed at the authors' site, the authors measured glutathione levels in a volume of interest (VOI) of 25 x 25 x 25 mm placed in structurally normal-appearing tissue in the parietooccipital region of each hemispheres in patients with and without active epilepsy, and in a age-matched control group.

Results: The GSH/water ratio in patients with epilepsy was significantly reduced in the parietooccipital region of both hemispheres ($1.6 \pm 1.0 \times 10^{-5}$) compared to the GSH/water ratio in healthy controls ($2.4 \pm 1.1 \times 10^{-5}$). There was no significant difference between the hemisphere with epileptogenic focus and the hemisphere without epileptogenic focus. The GSH/water ratios of the patients without active epilepsy were not different from the GSH/water ratios of patients with active epilepsy.

Conclusion: The authors found evidence for a widespread impairment of the glutathione system in patients with epilepsy independent from seizure activity.

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