

Alterations in glutathione levels in Parkinson's disease and other neurodegenerative disorders affecting basal ganglia.

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Reduced glutathione (GSH) and oxidized glutathione (GSSG) levels were measured in various brain areas (substantia nigra, putamen, caudate nucleus, globus pallidus, and cerebral cortex) from patients dying with Parkinson's disease, progressive supranuclear palsy, multiple-system atrophy, and Huntington's disease and from control subjects with no neuropathological changes in substantia nigra. GSH levels were reduced in substantia nigra in Parkinson's disease patients (40% compared to control subjects) and GSSG levels were marginally (29%) but insignificantly elevated; there were no changes in other brain areas. The only significant change in multiple-system atrophy was an increase of GSH (196%) coupled with a reduction of GSSG (60%) in the globus pallidus. The only change in progressive supranuclear palsy was a reduced level of GSH in the caudate nucleus (51%). The only change in Huntington's disease was a reduction of GSSG in the caudate nucleus (50%). Despite profound nigral cell loss in the substantia nigra in Parkinson's disease, multiple-system atrophy, and progressive supranuclear palsy, the level of GSH in the substantia nigra was significantly reduced only in Parkinson's disease. This suggests that the change in GSH in Parkinson's disease is not solely due to nigral cell death, or entirely explained by drug therapy, for multiple-system atrophy patients were also treated with levodopa. The altered GSH/GSSG ratio in the substantia nigra in Parkinson's disease is consistent with the concept of oxidative stress as a major component in the pathogenesis of nigral cell death in Parkinson's disease.

