

Acknowledgment

The authors thank J.J. Bot and M.A.A. van Walderveen for referring patients, and B. Young for valuable help with preparing the manuscript.

References

1. Kurtzke JF. Rating neurologic impairment in multiple sclerosis: an expanded disability status scale (EDSS). *Neurology* 1983;33:1444–1452.
2. Whitaker JN, McFarland HF, Rudge P, Reingold SC. Outcomes assessment in multiple sclerosis clinical trials: a critical analysis. *Mult Scler* 1995;1:37–47.
3. Rudick RA, Antel J, Confavreux C, et al. Clinical outcomes assessment in multiple sclerosis. *Ann Neurol* 1996;40:469–479.
4. Rudick RA, Antel J, Confavreux C, et al. Recommendations from the National Multiple Sclerosis Society Clinical Outcomes Assessment Task Force. *Ann Neurol* 1997;42:379–382.
5. Cutter GC, Baier ML, Rudick RA, et al. Development of a Multiple Sclerosis Functional Composite as a clinical trial outcome measure. *Brain* 1999;122:871–882.
6. Poser CM, Paty D, Scheinberg L, et al. New diagnostic criteria for multiple sclerosis: guidelines for research protocols. *Ann Neurol* 1983;13:227–231.
7. Lublin FD, Reingold SC. Defining the clinical course of multiple sclerosis: results of an international survey. *Neurology* 1996;46:907–911.
8. Bohannon RW. Comfortable and maximum walking speed of adults aged 20–79 years: reference values and determinants. *Age Ageing* 1997;26:15–19.
9. Mathiowetz V, Weber G, Kashman N, Volland G. Adult norms for 9-hole peg test of finger dexterity. *Occup Ther J Res* 1985a;5:24–38.
10. Goodkin DE, Hertsgaard D, Seminary J. Upper extremity function in multiple sclerosis: improving assessment sensitivity with box-and-block and nine-hole peg tests. *Arch Phys Med Rehab* 1988;69:850–854.
11. Gronwall DMA. Paced auditory serial addition task: a measure of recovery from concussion. *Percept Mot Skills* 1977;44:367–373.
12. Wiens AN, Fuller KH, Crossen JR. Paced auditory serial addition test: adult norms and moderator variables. *J Clin Exp Neuropsychol* 1997;19:473–483.
13. Thompson AJ, Polman CH, Miller DH, et al. Primary progressive multiple sclerosis. *Brain* 1997;120:1085–1096.
14. Fischer JS, Jak AJ, Kniker JE, Rudick RA, Cutter GC. Administration and scoring manual for the Multiple Sclerosis Functional Composite measure (MSFC). New York: Demos, 1999.
15. Fischer JS, Cohen JA, Cutter GC, et al. Intra- and inter-rater reliability of the Multiple Sclerosis Functional Composite. *Neurology* 1999;52:548. Abstract.
16. Cohen JA, Cutter GC, Simonian NA, et al. Utilization of the Multiple Sclerosis Functional Composite as an outcome measure in the phase 3 trial of interferon beta-1a (Avonex) in secondary progressive multiple sclerosis (IMPACT). *Neurology* 1999;52:548. Abstract.

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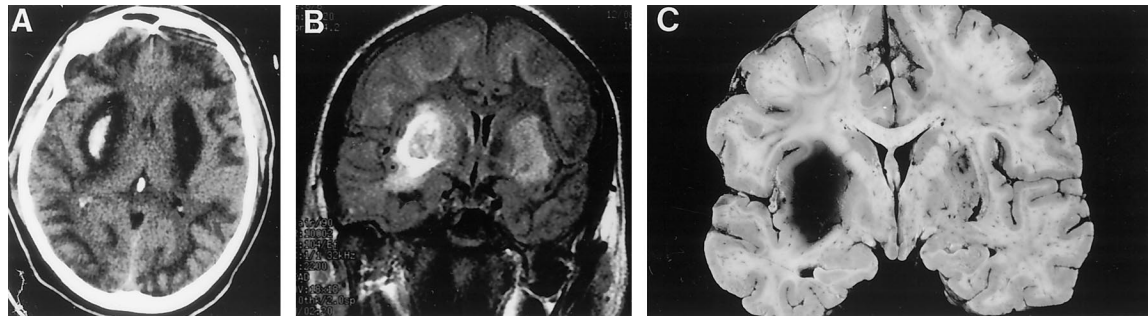


Figure. CT scan at day 3 (A); MRI at day 9 (B); and postmortem specimen at day 10 (C). All three show diffuse subcortical and putamenal necrosis with right putamenal hemorrhage. The sparing of centrum semiovale is a characteristic feature.

Severe white matter injury and bilateral putamenal necrosis with hemorrhage in methanol ingestion

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A 48-year-old white man ingested an unknown quantity of methanol, resulting in severe metabolic acidosis. He was deeply comatose at 72 hours and died at 10 days.

Nonenhanced computed tomography of the brain showed low attenuation, primarily in the subcortical white matter of both cerebral hemispheres, as well as abnormal hypodensity of the putamen. Additional focus of hemorrhage involved the right putamen (figure A). MRI flair sequence demonstrated an increased signal, especially in the subcortical white matter of both cerebral hemispheres. The brighter signal involving the putamen represents

edema, as well as coexistent blood products on the right (figure B). This was consistent with primarily subcortical white matter infarction and bilateral putamenal necrosis with right-sided hemorrhage, documented on postmortem examination (figure C).

The presence of subcortical white matter (with relative sparing of centrum semiovale) and putamenal injury is typical of severe methanol toxicity.¹ This is likely related to methanol metabolism to formates, hypoxemia, severe acidosis, and coexistent circulatory depression.²

References

1. Kuteifan K, Oesterle H, Tajahmady T, Guttub AM, Laplatte G. Necrosis and hemorrhage of the putamen in methanol poisoning shown on MRI. *Neuroradiology* 1998;40:158–160.
2. McLean DR, Jacobs H, Mielke BW. Methanol poisoning: a clinical and pathological study. *Ann Neurol* 1980;8:161–167.

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Neurology 2000;54;1239
DOI 10.1212/WNL.54.6.1239

This information is current as of March 28, 2000

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