



Cognitive Patterns in Alzheimer's Disease Plus/Minus White Matter Hyperintensities Versus Vascular Cognitive Disorders



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Background

Findings

Discussion and Conclusions

- White Matter Hyperintensities (WMH) are common in healthy aging and Alzheimer's disease (AD).
- Beyond a threshold of 10 cm³, cognitive impairment becomes detectable (Boone KB et al. Arch Neurol 1992, DeCarli C et al. Neurology 1995).
- Unclear is whether differences in executive function, initiation, and recognition memory, reported to differentiate pure AD from Vascular Cognitive Disorders (VCD), can likewise differentiate pure AD from AD with significant WMH (Tierney MC et al. Arch Neurol 2001).**
- Here we compare neuropsychological testing data between four groups: AD minus WMH (AD-WMH), AD plus WMH (AD+WMH, i.e. having more than 10 cm³ WMH), VCD, and normal controls (NC).

- Age and education did not differ significantly among the three disease groups.
- Speed of processing (Trails A), and executive function as reflected by phonemic fluency (FAS) was more impaired AD-WMH as compared to VCD subjects; however, neither test differentiated AD+WMH from VCD or AD-WMH.
- There was a trend towards better recognition memory among VCD vs. AD-WMH subjects, but no difference between AD+WMH and either group.
- DRS memory subscale scores were better among VCD vs. AD with and without WMH.

- Phonemic fluency, speed of processing, and recognition recall (as reflected in trend to dissociation on CVLT-recognition) all differentiated pure AD from VCD. **However, none differentiated AD with WMH from VCD.**
- DRS memory subscore did differentiate these three groups. While it has elements of recognition memory, its incorporation of free recall may explain its ability to segregate AD+WMH from CVD, as free recall is commonly and strongly associated with AD.
- These findings suggest that significant co-occurring WMH render AD less distinguishable from VCD.
- Neuropsychologically, AD plus WMH may thus be likened to an "intermediate" state on the continuum between the two ends of the AD-Vascular dementia spectrum.**

Purpose and Hypothesis

To investigate if the neuropsychological distinctions between pure AD, AD with WMH, and VCD.

Methods and Analysis

- Data was analyzed from 463 participants in the Sunnybrook Dementia Study (184 AD-WMH, 78 AD+WMH, 89 VCD, 112 NC).
- Cognitive testing included the Mini-Mental Status Exam (MMSE), Mattis Dementia Rating Scale (DRS), Trail-Making Test parts A and B (Trails A, Trails B), phonemic fluency (FAS), and California Verbal Learning Test Recognition Memory (CVLT-recognition).
- Comparisons between groups by multivariate analysis of covariance (MANCOVA) are summarized in Table 1, with age, education, and severity (MMSE) entered as covariates in the model.

	AD-WMH	AD+WMH	VCD	NC
Age	71 (10)	77 (5.9)	75 (7.2)	70 (8.4)
YOE	14.1 (4.0)	13.7 (3.6)	13.4 (3.6)	15 (3.1)
MMSE	22.3 (4.8)	22.8 (4.2)	24.4 (4.8)	25.0 (4.6)
DRS	114 (18)	115 (14)	123 (18)	140 (2.8)
- initiation	27.5 (7.3)	27.8 (6.8)	29.2 (7.9)	36.5 (1.0)
- attention	33.6 (4.0)	34.5 (2.8)	34.4 (3.0)	36.1 (1.0)
- conceptualization	33.3 (4.9)	33.4 (4.3)	34.4 (5.0)	37.7 (1.7)
- construction	5.0 (1.4)	5.2 (1.0)	5.1 (1.4)	5.8 (0.5)
- memory	14.6 (4.2)	14.4 (3.9)	19.0 (4.8)	24.2 (1.0)
Trails A	61.1 (35)	69.5 (32)	66.2 (52)	32.2 (9.1)
Trails B	181.3(77)	221 (82)	173 (107)	73 (27)
CVLT				
- recognition	11.5 (3.4)	11.8 (3.2)	12.7 (2.9)	14.4 (2.0)
FAS	28.8 (12.7)	26.8 (12.5)	27.2 (14.5)	47.6 (12.4)

mean (standard deviation)
 * p < .05
 ** p < .01
 *** p < .001

Table 1: MANCOVA comparison of neuropsychological testing among pure AD (AD-WMH), AD with significant WMH (AD+WMM), VCD and normal .

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