Subtle extrapyramidal signs and incident dementia: A follow-up analysis

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We previously reported[1] that the presence of mild extrapyramidal signs (EPS) significantly predicts Alzheimer's disease (AD) in elderly individuals, independent of age, education, or gender. We now report a confirmation of our data after accrual of more cases and additional follow-up assessments.

Methods. Two hundred twenty-six normal elderly controls from the Washington Heights-Inwood Columbia Aging Project studied by Richards et al[1] were the subjects for follow-up. Data for these subjects accrued since October 1992 were added, and five additional subjects, previously with baseline data only, underwent at least one follow-up assessment. EPS were measured using a modified version of the Unified Parkinson's Disease Rating Scale (UPDRS),[2] cognitive impairment (CI) at baseline was determined by a standardized neuropsychological paradigm,[3] and incident dementia was classified according to DSM-III–R criteria.[4]

Results. The mean follow-up duration for all subjects was 2.27 years (SD = 0.91; range, 1 to 4 years). A total of 43 subjects met NINCDS-ADRDA criteria[5] for probable or possible AD during follow-up. Eleven subjects were therefore classified as new incident dementia cases since the original analysis.

EPS were classified as present if any sign was rated with a severity of at least 1 on the UPDRS at baseline. There was a significantly higher frequency of incident dementia among subjects with more than one EPS than among those with one or no EPS (chi square = 10.75, $p = 0.001$). Subjects were further stratified into four groups: group 1 = those with one or no EPS and no CI; group 2 = those with one or no EPS but with CI; group 3 = those with more than one EPS but without CI; and group 4 = those with more than one EPS and with CI. The frequency of incident dementia for each of these groups is shown in the table.

Cox proportional hazards regression analysis was used, with time to dementia onset (years) as the dependent variable and age at dementia onset as a covariate. Time to, and age at, last assessment was substituted for censored observations. Relative risk ratios, 95% confidence intervals, and p values for the four groups are shown in the table. Subjects with CI but no EPS at baseline showed a significant increase in risk of dementia. The risk was doubled in subjects with CI and EPS at baseline. However, the analysis also showed a significant risk of dementia in subjects with EPS but without CI at baseline.

Table. Summary Cox regression statistics for the effect of baseline EPS and cognitive impairment on incidence of dementia adjusted for age and duration of illness

EPS	CI	No dementia	Dementia	RR and 95% ci	*p*
No	No	101	3	1.0 (reference)	—
No	Yes	64	26	10.0 (3.0-33.3)	0.001
Yes	No	12	3	6.2 (1.2-31.4)	0.03
Yes	Yes	11	11	19.8 (5.4-72.9)	0.001

EPS Extrapyramidal signs.
CI Cognitive impairment.
RR Relative risk.
95% ci 95% confidence interval.

The presence or absence of EPS and/or CI refers to the baseline assessment.

Discussion. We confirm our previous assumption that risk of dementia in subjects with CI was doubled by the presence of EPS, and that EPS can predict dementia in the absence of CI. The association between EPS and incident dementia in previously healthy individuals implies that the basal ganglia or its pathways may be involved in the presymptomatic stages of AD, in some individuals, rather than occurring as a later disease manifestation.

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EEG during MR imaging: Differentiation of movement artifact from paroxysmal cortical activity

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It is possible to record scalp EEG during the acquisition of gradient-echo/echo-planar MR images or MR spectra without significant degradation of the MR data.[1] Functional MR imaging or spectroscopy with simultaneous EEG recording allows the study of hemodynamic and metabolic changes in vivo in human subjects during cognitive tasks in normal subjects and in patients with paroxysmal epileptiform discharges or ictal events.[2]

EEG registration in the MR scanner, however, is very susceptible to a variety of artifacts, particularly patient head movement and ballistocardiogram; the latter is related to head and body movements produced during systole. Despite having the head securely restrained, very small movements of the head produce high-amplitude, paroxysmal bursts on EEG that are impossible to differentiate from paroxysmal cortical epileptiform activity. This artifact results from currents produced by small movements of the EEG electrodes and wires within the strong magnetic field. To differentiate genuine cortical epileptiform activity from movement artifact, we have developed a head motion sensor consisting of a piezoelectric crystal contained in a 2.5-cm-diameter, 0.5-cm-high disk. This is taped to the scalp and the signal is recorded by conventional EEG amplifiers. This device is sensitive enough to produce signals of tens to hundreds