The Significance of White Matter Lucencies on CT Scan in Relation to Cognitive Impairment

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ABSTRACT: As part of a prospective clinicopathological study a cohort of "normal" elderly volunteers (n = 110) has been investigated with CT scans, psychometric testing (Extended Scale for Dementia) and neurological examination. CT scans were evaluated by a neuroradiologist for the presence or absence of white matter lucencies (WML). WML were defined as patchy or diffuse areas of decreased attenuation involving only white matter and with no change in adjacent ventricles or sulci.

The 12 subjects with WML had lower scores on the ESD than the 98 subjects without WML (mean ESD with WML 229.5±14; without WML 236.7±8.6, t-test p<.01) and the difference remains significant even after adjusting for the possible confounding effects of age (ANCOVA, P<.043).

METHOD AND RESULTS

As part of a prospective clinicopathological study a cohort of elderly volunteers (n = 105) has been investigated with CT scans, neurological examination and psychometric testing utilizing the Extended Scale for Dementia. Subjects were excluded if there was evidence of dementia or a diagnosis of stroke. CT scans were evaluated for the presence or absence of LA using the criteria listed in Table 1.

The 9 subjects with LA had lower scores on the ESD than the 96 subjects without LA (mean ESD with LA 227.1±14; without LA 237.1±8, t test, p<.02).

The sex distribution, educational attainments and other CT findings were not significantly different in subjects with and without LA. However, the subjects with LA had a mean age of 75.3±8.2 which was significantly older than the mean age of 70.8±5.4 for those without LA (t test, p<.025). The lower
Table 1: CT interpretation — criteria for distinguishing infarcts and leuko-araiosis.

<table>
<thead>
<tr>
<th>Infarct</th>
<th>LA</th>
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<tr>
<td>— well demarcated</td>
<td>— ill defined, patchy, diffuse</td>
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<tr>
<td>— wedge shaped</td>
<td>— white matter only without extension to cortex</td>
</tr>
<tr>
<td>— usually cortical extension</td>
<td>— ventricle and sulcus unchanged locally</td>
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<tr>
<td>— follows specific vascular territory</td>
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<tr>
<td>— internal capsule, basal ganglia or thalamus may be involved</td>
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<tr>
<td>— enlargement of ipsilateral ventricle or sulcus</td>
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Conclusions on ESD scores in subjects with LA when compared to subjects without LA remains significant even after adjusting for the possible confounding effects of age, sex, education and infarct on CT (ANCOVA, p < .013).

**Conclusion**

LA is a relatively common finding on the CT of non-demented elderly subjects. We found a prevalence of 8.6% in subjects selected for absence of dementia and without a history of stroke. The other major finding of this study is the demonstration that the presence of LA is associated with a measurable decline in cognitive function. The decline in ESD scores remains significant even after the results are adjusted for the potentially confounding effects of age, sex, education and coexisting infarct on CT.

LA may represent a marker for early vascular dementia. Our results suggest that white matter abnormalities play a role in the development of intellectual decline in the elderly.

**Acknowledgements**

This study was supported in part by grants from the U.S. N.I.A. (Dr. M.J. Ball), the M.R.C. of Canada (PG 21) and the N.H.R.D.P. of Canada (Dr. Merskey). We thank all the members of the U.W.O. Dementia Study Group for their support and encouragement.

**References**