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CORRESPONDENCE

Letters to the Editor

MR in the Diagnosis of Multiple Sclerosis

The article by Edwards et al. [1] in the November 1986 issue of *AJNR* raises concern over the use of MR in diagnosing patients with multiple sclerosis (MS). The authors appropriately emphasize the value of MR in demonstrating the important criterion of dissemination in space while overlooking the equally crucial one of dissemination in time [2]. Thus, finding white matter lesions in the brain of patients with spinal cord disease is *not* tantamount to the diagnosis of MS. The single most important problem in differential diagnosis is the fact that acute disseminated encephalomyelitis (ADEM), or one of its variants, in particular transverse myelitis, not only is characterized by the presence of multiple white matter lesions in various parts of the CNS but, as in MS, many of these lesions may remain asymptomatic [3, 4]. Furthermore, in some of these cases, recurrence of symptoms may be triggered, as they are in MS, by a variety of alterations of the interior milieu or the external environment, such as infections, heat, or even extreme fatigue.

Other investigators who have attempted to use CT or MR in an analogous situation to try to determine if patients with acute optic neuritis have other lesions of the CNS, and thus have MS [5, 6], recognized this problem by pointing out that only *serial* neuroimaging procedures and the appearance of *new* lesions may be used to support the diagnosis of MS in such instances; the same proviso must apply to patients with spinal cord disease. This caveat was clearly included among the diagnostic criteria for MS, as was the suggested proscription against the use of the term *possible MS* [2]. Incidentally, the same applies to evoked potential studies.

It is also germane to emphasize the frequently forgotten matter that neither abnormal evoked responses nor abnormalities of CSF, such as elevation of IgG or the presence of oligoclonal bands, are specific for MS; such abnormalities are found in a significant percentage of cases of ADEM [3] as well as in many other diseases of the nervous system.

It is only slowly becoming appreciated by many physicians that white matter UBOs (unidentified bright objects) on T2-weighted spin-echo MR images are completely nonspecific and are found in many diseases of the nervous system, not just MS. The regrettable practice of describing them as "compatible with the diagnosis of MS" should be nipped in the bud.

The article's final comment regarding the fact that expensive tests (e.g., visual and brainstem auditory evoked potential studies) are not justified in patients with abnormal MR scans is not only intriguing but suggests a reversed order of diagnostic priorities. MR is hardly necessary for diagnosis in the vast majority of MS patients, but if further testing is required, the high yield of visual evoked response studies (3) makes them considerably more appropriate, especially since MR can cost four or five times more.

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Reply

Dr. Poser is concerned that our article "Cranial MR in Spinal Cord MS" ignores one of the important diagnostic criteria of multiple sclerosis (MS), that of "dissemination in time." He apparently missed our statement, "The diagnosis of MS is made by confirming multiple lesions occurring at different times and in different locations within the neuraxis." Rather than ignoring this important factor, we advocate the use of the Bartel diagnostic criteria [1], which permits the use of clinical and CSF examinations in conjunction with imaging studies, such as MR. By considering all available diagnostic information, including the intermittent nature of symptoms, summarized in Table 1 of our paper, the diagnosis of MS can be made or refuted with greater certainty.

The advantage of MR is the much improved sensitivity in detecting multiple lesions in different locations in the neuraxis [2]. For this

reason we propose that MR should be used as the preferred initial test before the less sensitive brainstem evoked responses and visual evoked responses. As stated in our article, visual evoked responses may provide additional support for the diagnosis of MS in patients with normal MR studies. In this admittedly small series of 10 patients, no additional information was obtained from brainstem or visual evoked responses. Rather, MR detected multiple white matter lesions in twice as many patients as did evoked responses, prompting our conclusion that "the small amount of additional information derived from VERs and BAERs may not justify these expensive tests in patients with abnormal MR scans." Although MR studies are not cheap, they are sensitive. The most expensive test, in the long run, is one that provides little or no information, and that must be followed by other more sensitive studies to establish the diagnosis.

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Leukoencephalopathy in Normal and Pathologic Aging

The article by George et al. in the July/August 1986 issue of *AJNR* [1] deserves further comment. First, by excluding patients with stroke and those with hypertension requiring more than diuretic drugs (presumably patients with more severe hypertension), the authors eliminated the population in which white matter lucency (WML) is most commonly observed [2, 3]. It is not surprising, therefore, that they did not find a significant association between WML and hypertension in their demented patients. Furthermore, their findings apply to clinically diagnosed Alzheimer's disease only. Whether WML by itself is a cause for dementia cannot be answered from their data.

Second, CT scans of patients with Alzheimer's disease have not been reported to show prominent WML [4], and the pathologic changes involve mainly the cortical and deep gray matter [5]. It seems likely that patients with Alzheimer's disease and WML on CT are misdiagnosed or suffer from an additional, possibly unrelated disorder (as illustrated in all five autopsied cases). The finding of WML in these patients should prompt reconsidering the diagnosis. Further microinfarction could possibly be prevented with careful hypertension control.

We believe WML is a nondiagnostic but potentially important CT observation, corresponding to heterogeneous pathologic features. Its significance should be determined according to the clinical situation.

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Reply

We agree that white matter lucencies are commonly observed in association with stroke and hypertension, as reported by Naheedy and others. Our intent was to investigate what the implications are when lucencies are present in normal individuals and what the consequences might be for patients with Alzheimer's disease. To examine this question, we excluded patients with severe hypertension, stroke, or other neurologic conditions so as to purify the group under investigation (i.e., subjects with white matter lucencies). By using this strategy, it is true that we gave up a clear view of the role of hypertension; however, positive results are more likely to be related to the issue in question, namely what is the clinical significance of lucency in normal individuals and Alzheimer patients. For example, the frequency of gait impairment in the Alzheimer group with lucencies was increased when compared with Alzheimer patients without lucencies; the increased frequency, therefore, can be attributed to the lucency rather than to a stroke or other potentially confounding coexisting condition.

The frequency of lucencies was slightly greater in the dementia group than in normals, but not significantly so, and the severity of the lucencies was not associated with the severity of dementia. These two findings, we feel, speak against the lucency itself being a cause of dementia. Our pathologic data supported the hypothesis that the lucencies were not a part of the Alzheimer disease found but may have potentiated its dementing effects.

Dr. Babikian's statement: "Patients with Alzheimer disease and WML . . . suffer from an additional, possibly unrelated disorder" succinctly summarizes the findings in our paper. The statement "WML should prompt reconsidering the diagnosis" doesn't follow. White matter lucencies may be present in patients with Alzheimer disease as well as in cognitively normal subjects.

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CT Changes in Dementing Diseases

I read with interest the paper by Dr. LeMay concerning the CT changes in dementing diseases [1]. I agree that CT is valuable not only in diagnosing space-occupyng lesions but also in recognizing a large number of degenerative disorders. In a list of dementing diseases that present characteristic CT changes, progressive supranuclear palsy (PSP) should be included.

Many authors have reported and emphasized the CT findings of PSP, which are characteristic and well correlated with the main pathologic specimens of the disease [2–6]. They consist of atrophy of the mesencephalon and quadrigeminal plate with prominent perimesencephalic and quadrigeminal plate cisterns and dilatation of the aqueduct and posterior third ventricle. The usefulness of CT in PSP does not need further comment. I would like to point out the possible diagnostic usefulness of CT in the early phases of PSP when the hallmark of the disorder, namely the supranuclear ophthalmoplegia, is not yet present. The difficulties in the diagnosis of PSP when the syndrome is not yet clinically evident are well known to neurologists [7]. Pfaffenbach et al. [8] in a review of 44 cases of PSP found that 16 patients presented the supranuclear palsy 2 years after the onset of the disease and 15 patients after 3 years. This means that about