Correspondence

Letters to the Editor

MR Imaging, CT Scan, and Clinical Examination in Multiple Sclerosis

I read with interest the paper by Sheldon et al. [1] comparing MR imaging, clinical, and CT examination in 74 patients affected by multiple sclerosis (MS). Their conclusion that MR is more sensitive than CT in detecting lesions in MS is questionable. In fact, these authors found MR positive in 85% of patients with definite MS, which is the same percentage found by Barrett et al. [2] in a high-resolution CT study. Furthermore, MR should not be compared with routinely infused CT scan, but with CT scan enhanced with the double-delayed high-dose (DDHD) technique [3]. The DDHD enhanced CT scan is the most sensitive technique for detecting MS plaques, especially in the exacerbation phases [4]. Sears et al. [4], using the DDHD method, found 36 new lesions in eight patients with MS with an average number of four additional lesions in each case. The authors have suggested that enhanced CT lesions in MS are due to vasoactive plaques with disruption of the blood brain barrier. In a group of patients with definite MS and recent clinical exacerbation, Barrett et al. [2] found abnormal enhancement in 89% of the cases. Therefore, in clinical exacerbations, the CT scan seems to be more sensitive than MR in detecting active lesions. However, it is doubtful that current MR can distinguish between vasoactive and vasoinactive MS plaques and furnish information about the phase of the disease.

Also, when comparing the two techniques, the effect of steroid therapy on contrast-enhancing CT scan lesions in MS must be considered. It has been reported that steroid treatment, especially with high-dose IV administration, markedly reduces or eliminates the enhanced plaques [5]. Therefore, comparison between MR and CT scan is not correct in patients undergoing steroid treatment.

Finally, both CT scan and MR have a high positive percentage only in patients with definite MS. In patients with possible or probable MS, the sensitivity of the two techniques is limited. Detection of plaques by CT or MR in patients with possible or probable MS cannot predict the evolution of this disease. In fact, cases of benign form or clinically silent MS have been discovered at autopsy [6–8]. Additional longitudinal studies are needed to establish whether cases of possible or probable MS with positive CT scan and/or MR have greater probability of becoming definite MS than do cases without lesions. The clinical criteria suggested by Poser et al. [9] still remains the most useful in the diagnosis of MS.

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Reply

Dr. Ambrosetto raises the question as to the sensitivity of MR versus CT in detecting lesions in patients with multiple sclerosis (MS). Other articles [1–3] and ours have reported that MR tends to show more lesions in those patients for whom the CT is positive (plain or

single-dose contrast material), as well as lesions in patients for whom the CT is normal. Eighty-five percent of our patients with definite MS had plaques on MR. Fifty-nine patients had MR and CT examinations. The latter were obtained with plain and single-dose IV contrast (100 ml of Vascoray) from 2 weeks before to 1 week after the MR examination. Eighty-three percent of the patients had plaques on the MR exam and only 25% on the CT. Dr. Ambrosetto cites an article [4] in which CT showed a similar incidence of positive examinations in 34 patients with definite MS. However, in this report, a positive examination included cerebral atrophy, a criterion that was not considered in our or previous MR-CT comparisons. If only the sensitivity of plaque detection is considered, this study reports 47% incidence of hypodense plaques and 44% incidence of plaque enhancement, a sensitivity of detection well below that of MR but which is in the range reported by others [5–7].

Double-dose delayed-contrast CT appears to be more sensitive than single-dose CT in the detection of MS plaques [4, 8]; however, one report found no significant difference in sensitivity between the two methods [4]. Our article did not compare MR with this technique. This was studied by another group [9]. They reported an incidence of plaque detection on MR examination in 75% of patients with definite MS. The double-dose delayed-contrast CT study showed lesions in 60% of these patients. In acute lesions, they report equal sensitivity between MR and double-dose delayed-contrast CT.

Contrast CT evaluates the blood-brain barrier, and since the enhancing lesions are due to a breakdown of this barrier, they are considered a result of active disease [4, 8]. MR can detect active lesions during an acute exacerbation (93% in our series), but cannot characterize them as active on a single study. Serial examinations demonstrating increasing size and/or number of lesions would indicate active plaques.

Steroid therapy decreases the incidence of enhanced plaques on contrast CT (both single and double-dose) [10]. MR can still detect these lesions and is excellent for evaluating the effect of therapy.

Currently, MR is more sensitive than CT (single- or double-dose contrast) in detecting chronic MS plaques and is as sensitive as double-dose contrast CT in detecting acute lesions [9]. The latter examination probably has a slight advantage in determining that the lesion is acute. This would require a comparison of several MR studies for the same determination. MR has the advantage in that it does not use ionizing radiation, does not require contrast administration with its inherent risk, and its sensitivity is not reduced by steroid administration. Thus, it lends itself to repeated follow-up studies to evaluate the results of therapy.

We agree with Dr. Ambrosetto about the limited sensitivity of both imaging techniques in patients with possible or probable MS and also that the clinical criteria are the most useful in diagnosing definite MS.

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Importance of Sagittally Reformatted Images in CT Evaluation of Spondylolisthesis

We read with interest the recent paper by Teplick et al. [1] concerning axial CT findings in patients with spondylolisthesis and spondylolysis. This paper confirms a belief widely accepted by ourselves and other experienced radiologists that axial CT is superior to conventional radiography in evaluating these patients. However, we take issue with their conclusion that "in almost every case axial views alone can furnish the necessary information on spondylolysis and spondylolisthesis."

Teplick and his colleagues are not logically justified in making this conclusion, since by their own admission sagittal or coronal reformatting was performed only "in the exceptional case." By contrast, in the large series reported by Elster and Jensen [2] and Rothman and Glenn [3], sagittal or coronal reformatting was applied to every case. Had Teplick et al. reformatted more than an occasional case, they might be convinced, as we are, of the importance of sagittally reformatted images in evaluating these patients.

The "necessary information" needed to evaluate symptomatic patients with spondylolysis and spondylolisthesis must include more than merely identifying a pars defect or degenerative facet disease. At least two-thirds of these patients have a second significant structural abnormality, such as spinal stenosis, disk herniation, or foraminal narrowing, which may account for their pain [2]. Furthermore, these associated lesions are statistically clustered near the level of the spondylolisthesis.

While axial CT may at times adequately identify these associated lesions, we have encountered many situations where axial CT is misleading or insufficient. For example, the greatest degree of central spinal stenosis in spondylolisthesis does not occur in the axial plane parallel to an interspace, but rather at some angle to it. Sagittally reformatted images allow more accurate measurements and better three-dimensional appreciation of these spatial relationships. Similarly, diagnosis of a herniated disk at the same level as a spondylolisthesis can be treacherous by axial images alone [2, 3]. In 23 surgically confirmed cases, Elster and Jensen found irregular contour and protrusion beyond the posterior margin of the inferior vertebra on sagittal images to be more reliable than axial CT criteria for diagnosing disk herniation at the level of spondylolisthesis.

We feel strongly, therefore, that sagittal reformatting of axial CT images should be performed liberally in the evaluation of symptomatic patients with spondylolisthesis. This is particularly true when more than a minimal subluxation is present. Teplick et al. have surpassed