CSF Flow Dynamics in Chiari I Malformation

We read with interest the article by Hofmann et al (1) in the January 2000 issue of the *AJNR*. In this study, authors used phase-contrast imaging in the axial plane to measure quantitatively the CSF and spinal cord motion at the C2 level in 18 patients with Chiari I malformation and in 18 healthy subjects. The authors concluded that in patients with Chiari I malformation, foramen magnum obstruction leads to increased systolic spinal cord motion and impaired diastolic spinal cord recoil and diastolic CSF motion. Although they found their results of spinal cord motion to be in keeping with one of our earlier studies (2), they concluded that their observations of CSF flow dynamics were different from our subsequent quantitative study (3) and the study of Armonda et al (4), both obtained with sagittal phase-contrast imaging.

In our 1995 publication (3), we used the analysis of CSF flow waveforms obtained by phase-contrast velocity measurements to compare the amplitude and temporal patterns of CSF flow in Chiari I patients and normal subjects at four different sites around the foramen magnum. It is apparent from the text and Figure 1 of the article by Hofmann et al (1) that their CSF flow measurements were not at our region 2 (immediately below the foramen magnum). It is at the region 2 that we found impaired systolic and unaltered diastolic CSF flow pulsations. It appears that Hofmann et al never measured CSF flow pulsations immediately below the level of foramen magnum and therefore may not be able to compare our results of region 2 with their own results. In fact, their results are similar to those we obtained at the region 3 (C2–C3 disk level) of our study. At region 3, we observed increased systolic and impaired diastolic flow pulsations that were more marked in patients with syringomyelia. Therefore, although the axial phase-contrast technique employed by Hofmann et al may be more sensitive for flow amplitude measurements than previous studies, their results are similar to previous studies obtained by sagittal imaging.

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Reply

R.A. Bhadelia contends that in our study we measured anterior CSF flow at a level that cannot be compared to their midsagittal measuring point immediately below the foramen magnum. Judging from their Figure 3, it was our impression that our slice position at the level of the base of the odontoid was best compared with their measuring point 2, not 3, which was distinctly lower. Beyond that, sagittal measurements are not directly comparable to our axial method, which comprises the anterior and posterior compartment as a whole. Discrepancies may be explained by the fact that midsagittal measurements leave parasagittal flow undetected.

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Neuroradiological Imaging and Neuropsychological Testing in Multiple Sclerosis

In the February 2000 issue of the *AJNR*, the article written by Rovaris et al (1) caught our attention. We admire the authors' use of neuropsychological tests for measuring cognitive functions in their study of multiple sclerosis. They seem to be aware of the sensitivity of neuropsychological tests in measuring cognition (2).

We also applaud the concept of incorporating comprehensive neuropsychological testing rather than using one or two for the research protocol.

To their credit, the authors not only cited research that confirmed a relationship with MR imaging, neuropsychological tests, and multiple sclerosis (3) but also data that did not (4).

We hope that the *AJNR* continues to publish research studies that incorporate neuroradiologic imaging and neuropsychological instruments.

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Editor's Note:

Inadvertently omitted from Dr. Aya Tokmaru's letter which appeared in the May 2000 issue of the journal was the citation to a paper which she was referring to in the communication. The specific reference was:

Kato T, Okuyama K. **Assessment of maturation and impairment of brain by I-123 iodoamphetamine SPECT and MR imaging in children.** *The Showa University Journal of Medical Sciences* 1993;5:99–115.

Interested readers are referred both to her letter; (AJNR [2000]; 21:990), the above reference, and her article which appeared in the (*AJNR* [1999];20: 845–852). Dr Kato would like to also draw our readers' attention to the following reference:

Kato T, Matuo T, Mikami I, Nose K. **Assessment of sagittal brain maturation and impairment in children with I-123 Iodoamphetamine SPECT.** *Radiology* (supp). 1992;85:107.

Robert M. Quencer, M.D.
Editor-in-Chief

Re: Tarang N, Luana ''Pilon'', Jay Keystone, and Walter Kucharczyk. Persistent MR Contrast Enhancement of Calcified Neurocysticercosis Lesions. *AJNR Am J Neuroradiol* 19:79–82, January 1998.

This is a formal request for correction of the spelling of the second author's name, ''Luana Pillon''. Correction of the surname of the second author should be ''Pillon''. I appreciate your help in this matter.

Dr. Luana Pillon