ASPECTS Reading Requires Training and Experience

To the Editor:

We read with interest the article by Mak et al1 in which baseline CT scans of stroke patients were compared using ASPECTS2 and the >1/3 middle cerebral artery (MCA) territory rule.3 The group found only a moderate interobserver agreement with ASPECTS. However, only a brief, 30-minute training session was performed, and therefore it is not surprising that reliability was only moderate.

No details are given as to how the ASPECTS score was generated. Were all slices or just one slice evaluated at both the basal ganglia and supraganglionic levels? We acknowledge that more detailed methodology has now been published,4 which should improve reliability at less-experienced centers. Intriguingly, we note that Mak et al duplicated our observations by detecting more early changes when using ASPECTS. This is perhaps one of the biggest advantages of ASPECTS. By its nature it forces a rater to look at every part of the MCA territory individually to create a total score. We believe that the quantitative component of the ASPECTS has advantages over the >1/3 rule, which is a trichotomized scale.

When using CT to detect subtle ischemic changes, it is important to obtain maximal contrast, and the use of narrow window width is recommended.5 Mak et al used a window width of between 80 to 100 HU. We have observed decreased contrast at a width of 100 HU, making CT interpretation more difficult (J.H. Warwick Pexman, personal communication, 2003). We use a width of 80 HU, but other centers in Canada that also produce good-quality scans use widths of 60 or 70 HU. Mak et al used 10-mm supratentorial slices as we did originally. We are now using 5-mm slices, which we believe improves our accuracy.

The advantage of ASPECTS is that it provides a more robust surrogate for defining patient groups and assessing treatment strategies rather than characterizing the early ischemic changes as small versus large, as the >1/3 MCA rule does. We thank the authors for their interest in ASPECTS.

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Response

We thank Dr Coutts and colleagues for their interest in our article.1 They were concerned that brief training was not adequate for reliable CT reading using ASPECTS, and suggested that improved reading might be achieved with evaluating all available CT slices and optimizing contrast by the use of narrow window width and 5-mm slices.

We agree that more intensive training is required in ASPECTS reading and would like to point out that 4 out of our 5 raters considered all available slices, which was comparable to the original report from the ASPECTS Study Group when 4 out of 6 raters used all available slices.2 In addition, all raters in both studies interpreted the CT scans directly from films in isolation,3 without the opportunity for further review by altering the window level and width on a CT console or workstation. Overall, we believe that our results may be further improved with refinements in the reading procedure2 and possibly scanning parameters.

More significantly, we believe the characteristics of the study population account for the difference in reliability when ASPECTS is used. In the report from the ASPECTS Study Group, a relatively homogeneous patient cohort was used—all subjects were stroke patients treated with intravenous alteplase within 3 hours of stroke onset, and 57.8% (89/154) had ASPECTS ≤7.3 With such a high prevalence of extensive early ischemic changes (EIC), an excellent reliability is more likely to be achieved. Subjects in our study were a heterogeneous group of patients with ischemic stroke, transient ischemic attack, and stroke-mimics presented within 6 hours of symptom onset, and only 19.4% had ASPECTS ≤7.

We were encouraged by the increased sensitivity and the semiquantitative nature of ASPECTS in evaluating EIC3 and tried to evaluate ASPECTS outside the context of thrombolytic therapy within a 3-hour time window. However, the results of our study showed that the reliability of ASPECTS might decrease when used in less-experienced hands, in a more heterogeneous population, and in a longer time window, whereas the reliability of the >1/3 MCA territory rule was less affected under similar circumstances.1,4 We are hopeful that increased training, more standardized reading protocol, optimization of CT parameters, and review under variable window settings are able to resolve this difficulty.

We believe that plain CT brain will remain as the mainstay of acute stroke evaluation in the foreseeable future due to its accessibility. Further data on ASPECTS in less highly selected cohorts of acute stroke patients are therefore keenly awaited to support an expanding role of plain CT in acute stroke management. We thank Dr Coutts and colleagues for the opportunity to clarify our views on ASPECTS.

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