Response to Letter Regarding Article, "Intracranial Carotid Calcification on Cranial Computed Tomography: Visual Scoring Methods, Semiautomated Scores, and Volume Measurements in Patients With Stroke"

We thank Bos et al1 for their interest in our analysis of visual and computational methods of quantifying intracranial carotid artery (ICA) calcification.2 We agree that ICA calcification appears to be an important risk factor for stroke,3 rather as coronary calcification is a risk factor for myocardial infarction.

Our work was motivated by an interest in finding pragmatic and reliable methods for assessing ICA calcification in a wide range of settings. At present, computational measurement of ICA calcification is hindered by the proximity of the ICA to the bone of the pituitary fossa, which the software that we used was not able to distinguish from ICA calcification and required a lot of time-consuming human editing to obtain accurate ICA calcification values. Some large epidemiological studies may be fortunate to have substantial funding for image analysis time, but others may not, and therefore, we suggest that a rapid visual assessment can provide a reasonable alternative. Also, the visual score can be obtained in routine clinical practice by a radiologist or a stroke physician who understands the method, whereas the computational analysis method requires a trained analyst who can run the software (at least at present).

Bos et al1 suggest that computational methods are better than visual assessments. This may be true in some circumstances but not in all. Indeed, in our experience, the 2 approaches are complementary. In the case of visual and volumetric assessment of white-matter hyperintensities (WMH), one does not replace the other. WMH volumes obtained are dependent on the analysis program used, which may miss true lesions and include artifacts and other pathologies, such as ischemic strokes, that have to be edited out manually4 (a critique of image analysis methods that affect the accuracy of WMH volume measures is described elsewhere5). Visual scores, on the other hand, may seem to provide a rather coarse score, but there is close correlation between visual and volume WMH measurement,6 and visual scores are not affected by other pathologies, do not require image registration or other analysis steps that may affect the apparent WMH volumes, can be performed on legacy data, and are extremely rapid to do.

On this basis, we suggest that the visual and volume measures of ICA calcification should also be seen as complementary, the former rapid and feasible in clinical practice and research and the latter slower and more of a research application at present. Each has strengths and weaknesses that should be appreciated, so that the methods can be applied in situations where they are most appropriate. We hope that more studies of ICA calcification and stroke risk can now follow.

Disclosures

None.

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