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Detection of vessel occlusion in acute stroke is facilitated by color-coded 4D-CTA

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Abstract:

Purpose: To perform a pilot study to explore the effect of a new post-processing technique for 4D-CTA on speed and accuracy of the detection of intracranial vessel occlusions in acute stroke. This technique color-codes the contrast arrival time in the cerebral vasculature in 4D-CTA so that abnormally delayed vascular territories are easily detected.

Methods and Materials: We selected 10 patients without and 10 patients with a single vessel occlusion, confirmed by consensus reading, on CTA from our database of acute ischaemic stroke patients, so that occlusions of the ICA, MCA, ACA and PCA of varying subtlety were included. Whole-brain CT perfusion was performed on a 320 detector-row scanner. Color-coded 4D-CTA images were obtained by centering the color scale of vessel time-to-peak (TTP) on the modus of the TTP histogram. Temporal MIP of 4D-CTA with and without color-coding were evaluated in random order for the presence of vessel occlusion by two neuroradiologists. Time-to-detection and accuracy of detection of vessel occlusions were evaluated.

Results: One false-positive vessel occlusion was rated on color-mapping by both observers. Overall, the average time-to-detection decreased from 37.0s to 19.4s ($p < 0.03$) and the average accuracy of vessel occlusion detection increased from 0.825 to 0.85 with color-mapping.

Conclusion: Color-mapping of cerebral vasculature in 4D-CTA improves the speed and may improve the accuracy of the detection of vessel occlusions in acute stroke patients.

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Author Disclosure Information:

M. Meijs: Research/Grant Support; Toshiba Japan. **S. Pegge:** None. **M. Prokop:** None. **B. van Ginneken:** None. **F.J.A. Meijer:** None. **R. Manniesing:** Grant Recipient; Toshiba Japan.

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