Supplementary material

Scan acquisition protocol

Images were acquired using a multidetector row CT scanner (Somatom Sensation 4, Siemens, Forcheim, Germany). NCCT examinations were performed using the sequential technique (120 kVp, 258 mA) with contiguous 10-mm thick sections of the supratentorial compartment and 4-mm thick sections of the posterior fossa. CTP was performed as a 40 second cine series (80 kVp, 250 mA) beginning 5 seconds after the injection of 50 mL contrast into the cubital vein at 8 mL/s (Niopam 300 mg iodine/mL, Bracco, High Wycombe, UK) using an injection pump. Two 10-mm thick slices were obtained, one at the level of the basal ganglia with the second section immediately superior to this. Raw perfusion data were post processed by two different techniques, one based on standard deconvolution and the other on the maximum slope algorithm[29, 30] to create cerebral blood flow(CBF), cerebral blood volume (CBV) and time to peak(TTP) maps. Briefly, the standard single value deconvolution model is based on the central volume principle which considers regional vascular networks as isolated volumes, and uses the time concentration curves described with an impulse function to derive CBF and CBV. TTP is derived subsequently from these measures. The maximum slope algorithm is based on the assumption that there is complete extraction of contrast at first pass and CBF is derived from the slope of the averaged time concentration curves in parenchymal pixels and the maximum height of arterial input function curve. The images were acquired in DICOM format and managed using the VINCI® viewer. NCCT images were individually optimised for grey white contrast and perfusion maps were colour coded as per the NIH colour scale using MRIcro® processing software.

Table 1(supplement) Pairwise kappa's for perfusion abnormality and penumbral tissue

Maximum slope method			Deconvolution method		
Abnormality in Cerebral blood Flow					
	Observer 2	Observer 3		Observer 5	Observer 6
Observer 1	0.92	0.91	Observer 4	0.92	0.83
Observer 2		0.84	Observer 5		0.77
Abnormality in Cerebral Blood Volume					
	Observer 2	Observer 3		Observer 5	Observer 6
Observer 1	0.92	0.93	Observer 4	0.53	0.74
Observer 2		0.84	Observer 5		0.48
Abnormality in Time To Peak					
	Observer 2	Observer 3		Observer 5	Observer 6
Observer 1	0.92	1.00	Observer 4	0.84	0.84
Observer 2		0.92	Observer 5		0.92
Identification of penumbral tissue					
	Observer 2	Observer 3		Observer 5	Observer 6
Observer 1	0.80	1.00	Observer 4	0.90	0.61
Observer 2		0.80	Observer 5		0.70

Table 2 (supplement) Correctly identified side of the ischaemic lesion

	Neuroradiologist	Experienced observers	Less experienced observers
NCCT	86.3%	68.57%	62.16%
CBF	100%	91.1%	92.77%
CBV	97.06%	94.87%	91.67%
TTP	97.06%	95.51%	97.67%

Structured questionare CTP study

1. Are there any signs of acute ischaemic change i.e. parenchymal hypodensity, tissue swelling, hyperdense artery sign?
   Yes, left side
   Yes, right side
   Yes, both sides
   None
2. Is there any degree of acute hypodensity?
   None
   Mild
   Severe
   Moderate
3. Are there any early ischaemic changes in the MCA territory?
   None
   <=33% of MCA territory
   >33% of MCA terrtitory
4. Are there any early ischaemic changes in the ACA territory?
   >50% of ACA territory
   <=50% of ACA territory
   None
5. Are there any early ischaemic changes in the PCA territory?
   >50% of PCA territory
   <=50% PCA territory
   None
6. Specify any hyperdense artery signs.
   MCA stem
   Insular MCA
   ICA
   ACA
   PCA
   BA
   VA
   None
7. Is there an old ischaemic lesion identifiable?
   Yes
   No
8. Assume that the subject had a stroke less than three hours ago and is eligible for thrombolysis. Based only on the non-enhanced CT images above would you treat the subject with rt-PA?
   Yes
   No
9. Is there a significant abnormality in the CBF map?
   Yes, right side
   Yes, left side
   Yes, both sides
   None
10. Is there a significant abnormality in the CBV map?
    Yes, left side
    Yes, right side

Yes, both sides
None

11. Is there a significant abnormalitiy in the TTP map?
    Yes, left side
    Yes, right side
    Yes, both sides
    None
12. Considering the CBF and CBV maps, which of the following statements do you most agree with?
    Both show a matched defect
    Both are normal
    There is a mismatch with a larger defect in the CBF map
    There is a mismatch with a larger defect in the CBV map
13. Do the CT perfusion maps show focal changes relevant to acute ischaemic stroke?
    Yes
    No
14. Do the CT perfusion maps suggest the presence of ischaemic tissue at risk?
    Yes
    No
15. How did the CT perfusion maps influence your decision regarding thrombolysis in question 14?
    The perfusion maps reversed my decision
    The perfusion maps strengthened my decision
    The perfusion maps weakened my decision
    The perfusion maps did not alter my decision

Supplementary Figure 1: Images for NCCT and three CTP parameters (CBF, CBV and TTP) as seen by the observers