Somatotopy within the Internal Capsule Illustrated by Diffusion Tensor Tractography

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A 65-year-old man, known for active cigarette smoking, suddenly developed, shortly after awakening, a left paresis of the face, arm and leg associated with hypoesthesia and hemineglect. CT perfusion and angiography scans revealed a right internal carotid artery occlusion (fig. 1a) with a large penumbra within the right middle cerebral artery (MCA) territory and a definitive infarct within the posterior limb of the internal capsule (fig. 1d–f). Rt-PA intravenous injection was initiated at 80 min from symptom onset. Clinical evolution was characterized by recovery of hypoesthesia, hemineglect and face and arm strength. An MRI obtained at day 34 after stroke onset confirmed the restricted right capsular infarct and revealed an almost complete rescue of the penumbra

within the right MCA territory on T₂-weighted images (fig. 1c). Diffusion tensor imaging demonstrated fiber discontinuation within the posteromedial part of the posterior limb of the right internal capsule, when fibers passing through the anterolateral part were relatively spared (fig. 1g–j).

References

- 1 Mukherjee P, Berman JI, Chung SW, Hess CP, Henry RG: Diffusion tensor MR imaging and fiber tractography: theoretic underpinnings. *AJNR Am J Neuroradiol* 2008;29:632–641.
- 2 Kretschmann HJ: Localisation of the corticospinal fibres in the internal capsule in man. *J Anat* 1988;160:219–225.

Fig. 1. **a** CT angiography. Note the right internal carotid artery occlusion. **b** Native CT scan demonstrating early infarct signs within the internal capsule (white arrow). **c** T₂-weighted MRI demonstrating a restricted right capsular infarct. **c–e** CT perfusion demonstrating a large penumbra within the right MCA territory, defined by a decrease in cerebral blood flow and a preserved cerebral blood volume (**d–f**, white arrowheads), and a definitive infarct within the posterior limb of the internal capsule,

defined by a decrease in cerebral blood flow and a decreased cerebral blood volume (**d–f**, white arrows). Regions of interest defined within the posterior limb of the internal capsule on ADC maps (**g** and **h**) allowed to determine the fiber tracks [1] (**i–j**) and showed an almost complete interruption of posteromedial fibers (blue) corresponding to the lower limb representation [2] that was related to a residual crural monoparesis.