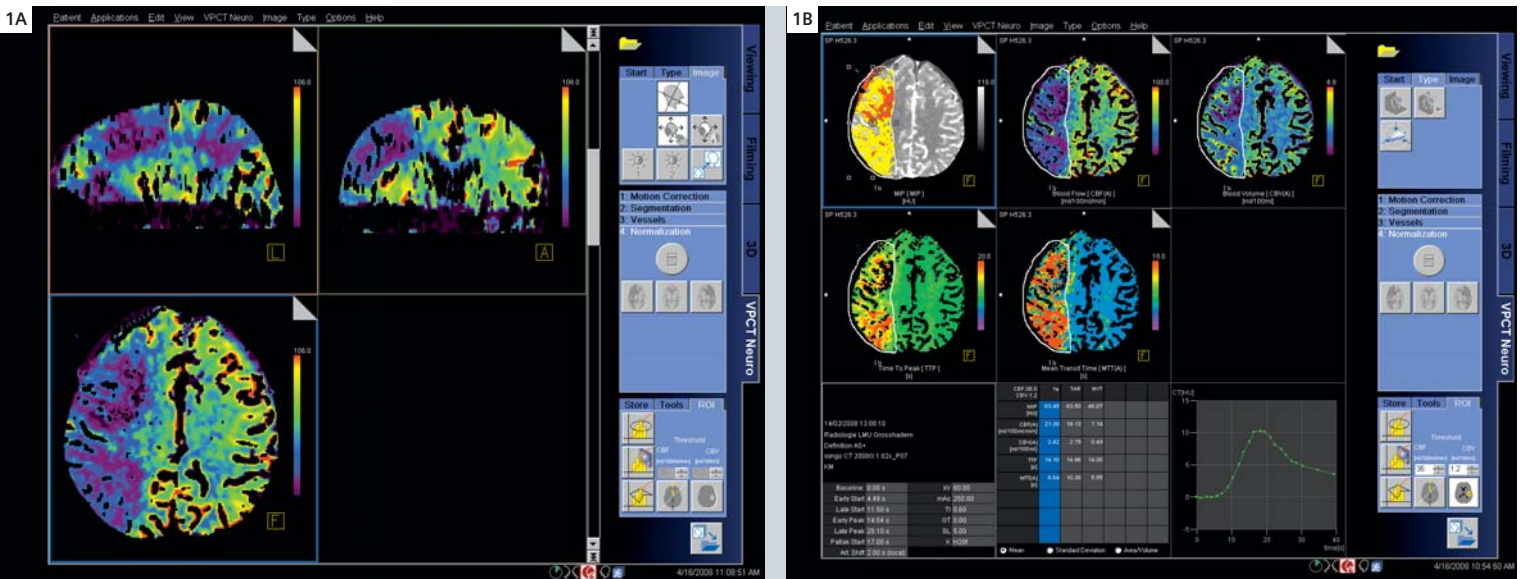


Case 7

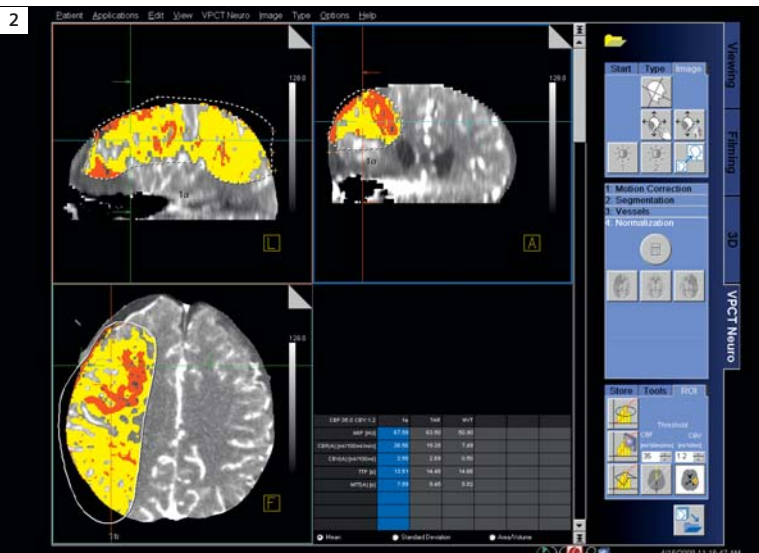
Vasospasm After SAH: Neuro Volume Perfusion CT

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1 3D view of cerebral blood flow (CBF) of the entire brain* (Fig. 1A). VPCT-Neuro post-processing visualizing maximum intensity projections (MIP, top left), cerebral blood flow (CBF top middle), cerebral blood volume (CBV, top right), time to peak (TTP, lower left), mean transit time (MTT, lower middle) color-coded parameter maps (Fig. 1B).



2 syngo Volume Perfusion CT - Neuro allows for 3 dimensional evaluation of tissue at risk, mapping infarcted tissue (core infarct) as red, and penumbra as yellow, colored overlays.

EXAMINATION PROTOCOL

Scanner	SOMATOM Definition AS+
Scan area	Head
Scan length	100 mm (VPCT)
Scan time	40 s, one scan every 1.5 s (26 scans)
Scan direction	Adaptive 4D Spiral
Tube voltage	80 kV
Tube current	200 eff. mAs
Rotation time	0.3 s
Spatial resolution	0.33 mm
Slice collimation	128 x 0.6 mm
Slice width	1.0 mm
CTDI_{vol}	189.63 mGy (VPCT) 54, 34 mGy (Head)
Reconstruction kernel	H20f
Contrast	
Volume	50 ml Enhance / 50 ml NaCl
Start delay	5 s
Postprocessing	syngo Volume Perfusion CT – Neuro (VPCT-Neuro)

*requires Adaptive 4D Spiral technology

HISTORY

A 70-year-old female patient was admitted to the emergency room with a suspected subarachnoidal hemorrhage (SAH). Initial non-enhanced cranial CT (NECT) noted a small subarachnoidal bleeding in the sylvian fissure on the right side. On intracranial CT-angiography (CTA) a giant aneurysm (17 x 11 mm) of the right middle cerebral artery (MCA) was detected. The patient was transferred to the neurosurgery department for aneurysm clipping therapy. Due to massive calcifications at the neck of the aneurysm, no appropriate position of the aneurysm clip could be achieved. Two days later the patient underwent endovascular coil embolization of the MCA aneurysm. On the sixth day after SAH, duplex sonography revealed high flow rates of the intracranial arteries and the patient was referred to the radiology department for comprehensive stroke imaging, including NECT and Volume-Perfusion-CT (VPCT) of the brain to rule out vasospasm.

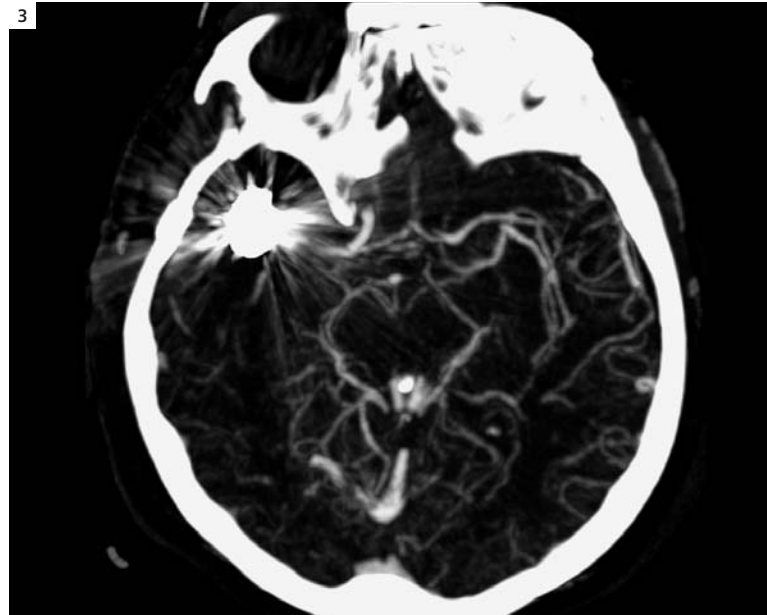
DIAGNOSIS

On NECT, small subterritorial infarctions could be delineated on the right hemisphere. VPCT demonstrated an impaired brain perfusion of large parts of the right hemisphere with prolonged mean transit time (MTT), lowered cerebral blood flow (CBF) and lowered cerebral blood volume (CBV). 2dimensional (D) and 3D quantitative assessment of the perfusion parameter maps (Figs. 1 and 2) showed small irreversible infarcted and large potential reversible ischemic parts (penumbra) of the brain parenchyma. Cerebral vasospasm six days after subarachnoidal hemorrhage have been detected. Anti vasospasm therapy was immediately intensified. NECT and VPCT on the next day revealed no additional infarctions and a normalization of the brain perfusion values could be detected.

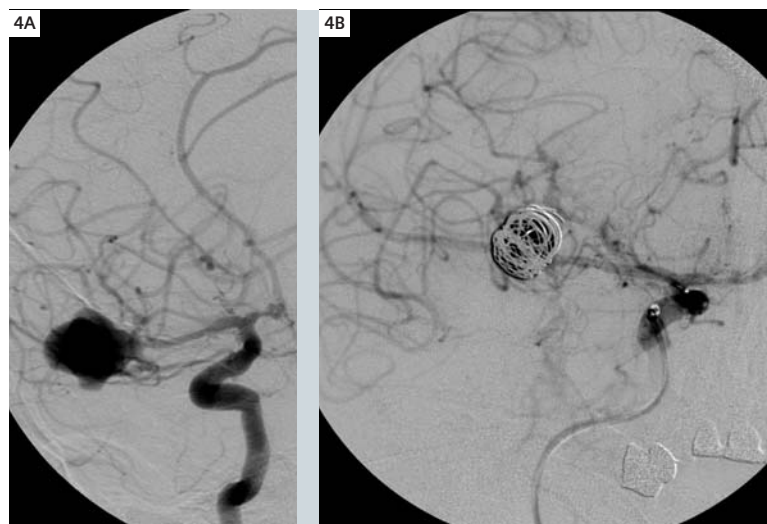
COMMENT

VPCT – Neuro offers dynamic perfusion analysis of the entire brain. In contrast to standard perfusion CT in which only small volumes of 1-4 cm width – traditionally at the base of skull – can be investigated, now subsegmental and sub-

cortical infarctions can be visualized at nearly every location of the brain, and we were able to show for the first time 3 dimensional tissue at risk (penumbra) evaluation indicating the full impact of stroke in the whole brain.



3 MIP at the circle of willis: Artifacts due to aneurysm coils at the MCA bifurcation.



4 DSA: Before endovascular coil embolisation (Fig. 4A) and after embolisation (Fig. 4B). DSA-Images courtesy of Department of Neuroradiology, University of Munich, Germany.