



VST Brain Imaging Stroke Protocol Requirements

The Victorian Stroke Telemedicine Service (VST) is unique within Australia and provides treatment advice and management for patients who present to VST participating hospitals with suspected acute stroke symptoms.

Stroke patients brain imaging includes CT brain (CTB), CT angiography (CTA) and CT perfusion (CTP) imaging. VST utilises specialised software to measure the volume of the ischemic penumbra and the infarct core. Acute stroke treatment is time-critical ("*time is brain*") so it is important that the performance of CTP is rapid and reliable.

VST has compiled these key points for the rapid transfer of information to the VST clinical team to enhance access to effective treatment options.

All images are based on an Image Matrix of 512x512 ('true' axial).

1. **Non-contrast CT:** This should be the first scan to be performed to search for haemorrhage or any established ischaemic changes.
 - a) Axial only, 3mm slice thickness of the entire head.
 - b) Post-processing/reconstructions of sagittal, coronal or thicker images to be performed after completing and sending CT Perfusion and CT Angiogram acquisition.
2. **CT Perfusion:** *Raw CTP data only should be pushed to VST.*
 - a) Axial 5mm CTP acquisitions. This thickness reduces image transfer time.
 - b) **VST does not require the vendor post-processed maps – only the raw CTP data.** VST utilises StrokeViewer software by Nicolab to process the raw CTP imaging (vendor maps have not been validated for ischemic stroke treatment and as such VST avoids using them).
3. **CT Angiogram:**
 - a) Axial 1mm from aortic arch to cerebral vertex (entire brain).
 - b) Post-processing and reconstructions of sagittal, coronal and MIPS to be performed after sending non-contrast, CT Perfusion and CT Angiogram raw data.

Key points:

- ❖ All post-processing to be performed only after completing and sending non-contrast, CT Perfusion and CT angiogram raw data. Post processed images are not a priority of VST.
- ❖ A typical workflow may therefore be: non-contrast CT scan – *push*, then CT Perfusion – *push*, then CT Angio - *push*. Post-processing – *push*.
- ❖ If possible, axial images should be auto sent at the series level as soon as acquired. This may mean that a separate auto reconstruction is created once as per above accepted image requirements and set to auto-send at the series level.

- ❖ Export images as conventional DICOM and not as enhanced DICOM.
- ❖ Head positioning and timing of scans is extremely important. Some general advice:
 - a) Position patients chin down as far as possible in the headrest and immobilise.
 - b) Position start of perfusion slab at the superior border of orbits.
 - c) Ensure post fossa of the brain is included. This may mean lowering the start of perfusion slab.
 - d) Start position at the base of the pituitary fossa (no need to include foramen magnum) is considered ideal.
 - e) If the patient moves after the NCCT repeat topogram. Scout image to ensure accurate position of the perfusion slab.
- ❖ In addition to head positioning, the duration of CTP scan is also important. CTP scans need to be longer than 30 seconds where 60 seconds is considered ideal. However, the second 30 seconds of a scan should have a slower volume acquisition rate so reduce the radiation dose. If in doubt, please get in contact and we can provide feedback.
- ❖ Nicolab accepted image requirements as per the table below -

6. Accepted Image Requirements			
CT imaging	Non-contrast CT	CT Angio	CT perfusion
Orientation	AXIAL only	AXIAL only	AXIAL only
Slice thickness	3-5mm Recommended: 3	0.5-2mm Recommended: 1	0.5-15mm Recommended: 5
Image matrix	512x512	512x512	512x512
FoV coverage	Entire Head	Entire Head *	Entire Head
Timepoints	N/A	N/A	10-100 Recommended: 40
Contrast/bolus tags	One of these tags should be present for CTA and CT perfusion: (0018,0010), (0018,0040), (0018,0041), (0018,0042), (0018,0043), (0018,0044), (0018,0046), (0018,0047), (0018,00408)		

*CTA to include from aortic arch to cerebral vertex (entire brain).

Any questions, please contact Nicolab or the VST.

Nicole Dyball Clinical Innovation and Application Sales Specialist, Nicolab
Tel: +61 493 171 276 or Email: ndyball@nicolab.com

Or

VST – vst.support@ambulance.vic.gov.au
Tel: +61 3 9840 3776