



Acute Stroke Imaging Protocol for Endovascular Treatment

Background

A key decision during hyperacute stroke care is determining if a patient is a candidate for Endovascular Treatment (EVT). This is based on clinical and radiological criteria. The imaging selection criteria requires both a non-contrast CT (NCCT), and Multiphase Computed Tomography Angiography (mCTA). Where available, CT Perfusion¹ should also be completed in the late window (i.e., 6-24 from time last known well), and may be completed in the early time window (i.e., 0-6 from time last known well).

ENITS² is the recommended viewing platform for the CT/mCTA/CTP¹ protocols. ENITS is currently used for all Telestroke consults. As access to EVT is expanding, other community hospitals with stroke imaging capability will be adopting the imaging protocol to support clinical decisions regarding patient care.

CT images from the referring site's scanner are automatically transferred to the ENITS server for review; however, transferring large numbers of images takes time. The goal is to have the minimum number of standard images sent to ENITS that provides the stroke specialists the necessary images for decision making within a short time.

Images are available for review using a secure web-based, diagnostic quality enterprise DICOM viewer, eUnity™. Scans transferred to the ENITS server remain available for review for about one week. For stroke cases, the CT/mCTA/CTP² protocol images are transferred to the ENITS server within approximately 10 minutes after completion of the CT scan. This will ensure that the imaging for EVT consultation is available for review on ENITS by the consulting Neurologist/other neuro specialist **within 15 minutes or less** after the patient has completed their CT scan. Note that the goal is to have patients with acute stroke in the CT scanner within 10 minutes of their hospital arrival.

¹ Although access to Automated CT Perfusion is preferred and strongly recommended, it may not be available at all hospitals.

² Emergency Neuro Imaging Transfer System (ENITS) is connected to 113 Ontario hospitals and approximately 350 modalities receiving greater than 3,000 exams annually. ENITS exams are time sensitive to support the emergency consultative process facilitated by Critical Care Ontario.

Process for New Sites to Assess ENITS Image Transfer Rates and Quality in Support of the Acute Stroke CT/mCTA/CTP³ Protocol

1. Submit a request for “ENITS support to assess image transfer rates” to the London Health Sciences Help Desk by calling 1-877-465-7167 or send an email to HelpDesk@lhsc.on.ca
2. The ENITS team will contact the requestor to coordinate the assessment of a test study. The test study will be assessed for total transfer time (time from receipt of the first acquired image until the completed study is received in the ENITS database). The number of series/images received will also be validated.
3. The ENITS team will provide study coordinates to the Telestroke Medical Director (or designated back up) for evaluation and feedback on the quality of the imaging as it appears on ENITS.
4. Once the assessment is complete, a confirmation email concluding the assessment will be provided to the requestor by the Telestroke Medical Director (or designated back up).

The process described above supports the onboarding of new hospitals to the ENITS platform. Regional Stroke Centres/Networks are responsible for assuring the ongoing imaging quality with their partner hospitals, and referral hospitals are expected to provide stroke imaging services within regional protocols established to enhance access to stroke treatments.

Training Materials

Please visit the link below for ENITS Training Materials and Information <http://swodin.ca/content/ENITS>

³ Although access to Automated CT Perfusion is preferred and strongly recommended, it may not be available at all hospitals.

Appendix A

Acute Stroke CT/mCTA/CTP⁴ Protocol

Minimum Image Set for Initial Telestroke or Endovascular Treatment Consultation

Reformatted scans are derived from 0.5- or 0.6-mm axial images from aortic arch to the vertex. Do not transfer these thin axial images to ENITS.

The following images, in this order, should be sent to the ENITS server:

1. **Non-enhanced CT head**
 - a. Axial 3 mm images
 - b. Coronal 3 mm images
 - c. Sagittal 3 mm images

2. **Automated CT Perfusion as per RAPIDAI Protocol⁴**

3. **CTA neck & head**
(acquired from aortic arch to the vertex, peak bolus and ~ 10 second delays)
 - a. First phase
 - i. Axial 2 mm thick x 2 mm (head and neck)
 - ii. Coronal 5 mm thick x 2 mm MIP (head and neck)
 - iii. Sagittal 5 mm thick x 2 mm MIP (head and neck)
 - iv. Axial 30 mm thick x 2 mm MIP (head only)

 - b. Second phase (delay)
 - i. Axial 2 mm thick x 2 mm (neck and head)
 - ii. Axial 30 mm MIP x 2 mm (head only)

 - c. Third phase (delay) [optional]
 - i. Axial 30 mm MIP x 2 mm (head only)

Notes:

3D-reconstructions are not required. Multiphase CTA includes only the head with thick MIPs (30 mm). However, ideally the delayed CTA (second phase) should also include the 2 mm axial cuts from the arch to the vertex in addition to the thick axial MIPs of the head

⁴ Although access to Automated CT Perfusion is preferred and strongly recommended, it may not be available at all hospitals.

Perfusion Imaging: The [Canadian Stroke Best Practice Recommendations strongly recommend](#) use of automated imaging software to generate CT perfusion maps to select patients for Endovascular therapy, especially in the late time windows (i.e., 6-24 hours from time last known well). Sites using CT perfusion imaging should utilize software that provides reproducible objective measurements of ischemic core and penumbra. To date, iSchemaView RAPID automated CT Perfusion software is the only perfusion software to have been validated in clinical trials, Health Canada approved, and recommended by the [Ontario Health Technology Advisory Committee](#). If available, the RAPID Summary Maps should be also sent to ENITS. With future updates to the CSBPR, recommendations regarding the use of CTP may be updated to align.