

**Protocol for Extracranial Cerebrovascular Duplex Ultrasound Examination**  
(Updated April 2016)

**Purpose**

Extracranial cerebrovascular Duplex ultrasound examinations are carried out to assess for the presence of pathology and the haemodynamic status of the common carotid artery (CCA), internal carotid artery (ICA) external carotid artery (ECA) and vertebral artery.

**Common Clinical Indications**

Common clinical indications for performance of this examination can include:

- Transient ischemic attacks (TIA)
- Amaurosis fugax
- Carotid bruit
- Cerebrovascular Accident (CVA)
- Follow-up of known carotid stenosis
- Post intervention follow-up e.g. carotid endarterectomy, stent or bypass
- Trauma in the distribution of the carotid artery e.g. suspected dissection, arteriovenous fistula or pseudoaneurysm
- Pre-operative assessment for high risk patients e.g. coronary artery bypass surgery (CABG)
- Pulsatile neck masses
- Evaluation of suspected subclavian steal syndrome

**Contraindications and Limitations**

Contraindications for extracranial cerebrovascular duplex ultrasound are few; however, some limitations exist and may include the following:

- Patients with short, thick muscular necks
- Patients who have had recent surgery, ultrasound visualisation may be limited due to oedema, haematoma, surgical staples, dressings etc.
- Calcified plaque may cause acoustic shadowing limiting Doppler and B-mode image assessment.
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements

A significant stenosis is noted by using the standard criteria:

**Table 1. Criteria for Extracranial carotid artery duplex assessment (8)**

Percentage Stenosis (NASCET)	Internal carotid peak systolic velocity cm/sec	Peak systolic velocity ratio ICA PSV /CCA PSV	ICA PSV /CCA EDV (St Mary's Ratio)
<50	<125	<2	<8
50-59	>125	2-4	8-10
60-69	>125	2-4	11-13
70-79 80-89	>230	>4	14-21 22-25
>90 but less than near occlusion	>400	>5	>30
Near occlusion	High, low - string	Variable	Variable
Occlusion	No flow	Not applicable	Not applicable

#### CCA and BULB stenoses

For stenoses in the CCA and bulb ( before bifurcation) which visually appear to be over >50% or with focal aliasing, a PSV ratio is calculated. This is obtained by calculating the ratio of maximum PSV within the stenosis to PSV in a proximal fairly clear segment.

PSV ratio	%Diameter stenosis
2.5	50
3	60
3.5	70

( Grading is based on evidence from lower limb arteries: Ultrasound in Medicine and Biology, Vol 18, 1992, p433)

#### Reporting:

The report is a recording and interpretation of observations made during the extracranial carotid arterial duplex ultrasound examination; it should be written by the CVS undertaking the examination and viewed as an integral part of the whole examination (5).

<http://www.bmus.org/policiesguides/CarotidRecommendationsPublishedPaperCO.pdf>

9 National Institute for Health and Clinical Excellence Stroke Diagnosis and initial management of acute and transient ischaemic attack (TIA) July 2008  
[www.nice.org.uk](http://www.nice.org.uk)

10 Society for Vascular Technology Professional Standards Committee Image Storage Guideline April 2012 <http://www.svtgbi.org.uk/assets/Uploads/News--PI/Final-SVT-Image-Storage-Guidelines-April-2012-PDF.pdf>