



Sonographer Scanning Cheat Sheet: Carotid Extracranial Duplex US

Procedure Overview: A carotid duplex ultrasound assessment can be utilized to evaluate disease in the extracranial carotid, the vertebral, and the subclavian arteries. Spectral analysis of velocity waveforms permits classification of disease in the internal carotid artery based on the extent of diameter reduction.

Required Pre-Procedure Prep: Obtain patient verbal consent. Obtain patient history including, but not limited to cardiovascular symptoms, history of tobacco usage, and previous carotid artery surgery. Instruct the patient to lie in a supine position.

Proper Probe: Linear array probe with a frequency of 7 - 14 MHz that has tri-duplex capabilities.

Protocol for Carotid Extracranial Duplex Ultrasound (93880)

This protocol aligns with the Mindray I-Works protocol: Imagen Carotid

You may “Suspend” the protocol at any time to take additional images or handle pathology, then restart I-Works.

Proper imaging of vessels:

Grey scale Trv- vessels should be round not obliqued and centered in screen

Trv w/color- color box should be straight, not steered

COLOR BOX- should always be taller than wide. Straight for Trv. Steered appropriately for Sag.

Grey scale Sag- vessel should be perpendicular to probe and straight across the screen to best visualize intimal wall layer

Sag Color- the vessel should be angled and box steered accordingly

Sag Doppler- be sure angle correct is 45-60 degrees and that the internal stick is perfectly parallel to the anterior wall for proper quantification of velocity measurements

Measurements- measure the PSV and EDV for each vessel

Stenosis- walk the sample volume through the narrowing to find the highest velocity. Sample before, through and after stenosis. Document post stenotic turbulence if present. Cine any area of stenosis > 50% in longitudinal and transverse.



Begin Exam with RIGHT SIDE:

1. Trv CCA Prox (if not using I-Works, be sure to label appropriately RT or LT)
2. Trv CCA Mid
3. Trv CCA Distal
4. Trv Bulb
5. Trv Bif
6. Trv Bif add Color
7. Sag CCA Prox
8. Sag CCA Prox add Color
9. Sag CCA Prox color and Doppler
10. Sag CCA Mid
11. Sag CCA Mid add Color
12. Sag CCA Mid color and Doppler
13. Sag CCA Distal
14. Sag CCA Distal add Color
15. Sag CCA Distal color and Doppler
16. Sag Bulb
17. Sag Bulb Color
18. Sag ECA Prox
19. Sag ECA Prox Color
20. Sag ECA Prox color and Doppler
21. Sag ICA Prox
22. Sag ICA Prox Color
23. Sag ICA Prox color and Doppler
24. Sag ICA Mid
25. Sag ICA Mid Color
26. Sag ICA Mid color and Doppler
27. Sag ICA Distal
28. Sag ICA Distal Color
29. Sag ICA Distal color and Doppler
30. Sag VA
31. Sag VA Color
32. Sag VA color and Doppler

****Repeat for Left side****

****DOCUMENT on your Tech report the ICA/CCA ratio for each side. (Use highest velocities from each)**



Diagnosis for Carotid Stenosis

IAC Vascular Testing strongly recommends the use of these modified criteria for carotid interpretation at this time. Broad acceptance of this recommendation will enhance the accuracy of the detection of clinically-relevant ICA stenoses and further reduce the variability in grading of ICA stenosis on duplex studies by IAC-accredited vascular labs.

Strongly Recommended Modification of the SRU Consensus Conference Criteria for Internal Carotid Artery Stenosis for Implementation in IAC-Accredited Vascular Laboratories

Degree of Stenosis, %	Primary Parameters		Additional Parameters	
	ICA PSV, cm/sec	Plaque Estimate, %*	ICA/CCA PSV Ratio	ICA EDV, cm/sec
Normal	<180	None	<2.0	<40
<50	<180	<50	<2.0	<40
50-69%**	180–230	>50	2.0–4.0	40–100
>70 but less than near occlusion	>230	>50	>4.0	>100
Near occlusion	High, low, or undetectable	Visible	Variable	Variable
Total occlusion	Undetectable	Visible, no detectable lumen	Not applicable	Not applicable

*Plaque estimate (diameter reduction) with grayscale and color Doppler US.

**PSV 125-180 cm/sec and ICA/CCA PSV Ratio ≥ 2.0 is also consistent with 50-69% stenosis

Modified from diagnostic criteria proposed by Society of Radiologists in Ultrasound (SRU) Consensus Conference²



Common Pathologies

- Carotid Plaque: If present, classify as one of the following and note texture, surface, and location.
 - Homogeneous: Soft plaque, uniform echo pattern
 - Heterogeneous: Complex echo pattern with multiple echoes and different densities
 - Calcified: High density echoes with posterior shadowing
- Stenosis: Appears as an area of visualized plaque, focal velocity acceleration within an area of visualized plaque, and post-stenotic turbulence distal to the stenosis.
- Occlusive Disease: Appears as a total blockage of the carotid artery. Power doppler is implemented to determine if trickle flow is present. Document the severity of the occlusion and locate any collateral pathways.
- Carotid Dissection: Appears as an internal flap (separation of the three arterial layers) with color Doppler showing two separate compartments with opposite directions of flow. Spectral analysis depicts opposite blood flow within both compartments.
- Carotid Body Tumor: Appears as a hypoechoic, solid, hypervascular nodule adjacent to the carotid bulb.