



# How to use Doppler in stroke management

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# DISCLOSURE STATEMENT OF FINANCIAL INTEREST

I, Saman Perera DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.



# Indications for carotid Doppler

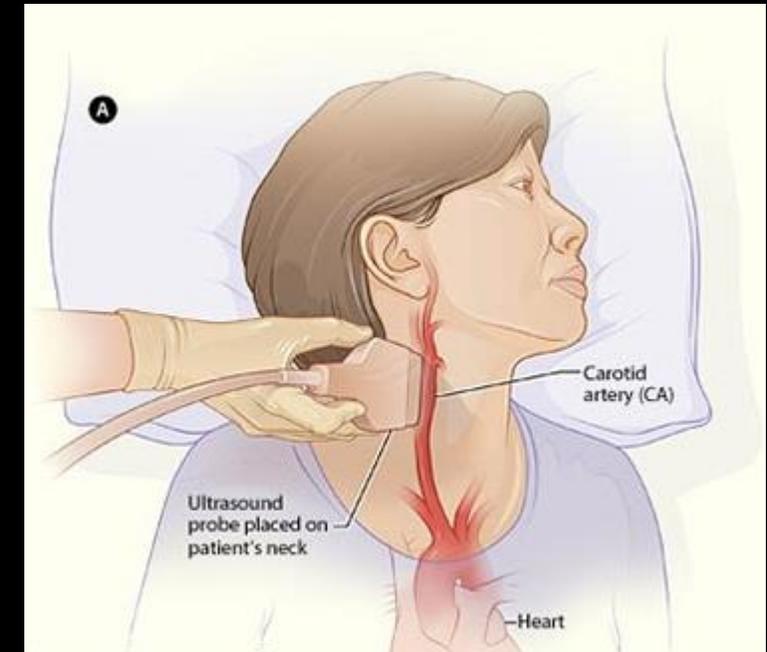
- Work up of ischaemic stroke and TIA – triaging
  - Evaluation of extracranial and intracranial arterial disease (TCD)
    - plaque characterisation
    - evaluating patency of vessels
    - Extent of any stenosis
    - type of arterial disease – atherosclerosis
      - fibromuscular hyperplasia
      - arteritis
- Intracranial arterial spasm following SAH (TCD)
- Silent emboli (TCD)
- Steal phenomena (subclavian artery stenosis/ occlusion)
- Dissection
- Stent surveillance



# Technique

## Carotid Doppler

- Ultrasound machine with vascular package
  - Colour /power/PW Doppler
  - measure peak systolic & peak diastolic velocities
  - 5-12 MHz linear array transducer
- Patient supine on couch – neck supported & turned
- Good scanning technique – optimise settings
- Angle down to visualise vert. artery origin
- Doppler angle 60 deg. or less  
(angle of transmitted beam to direction of blood flow)

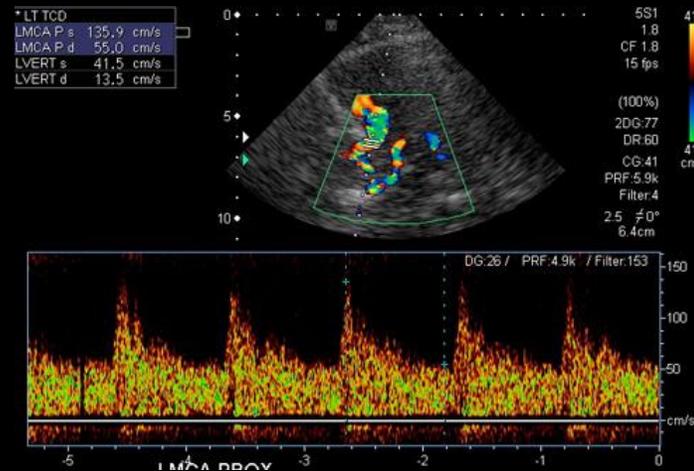




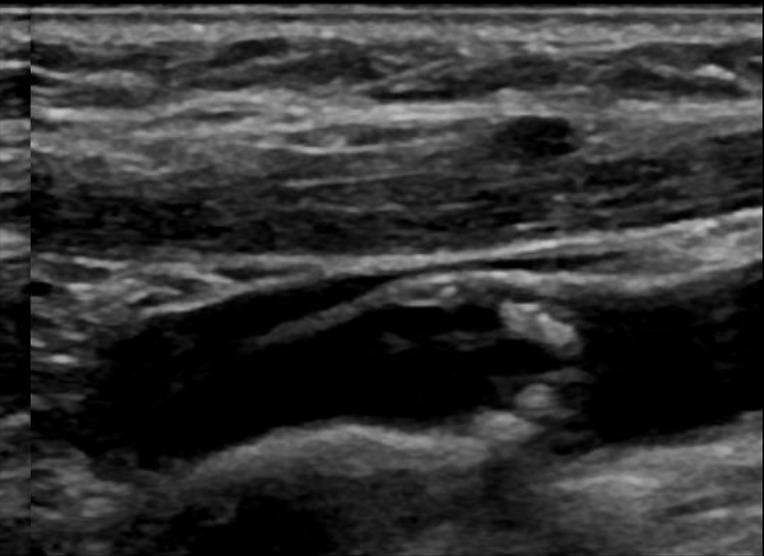
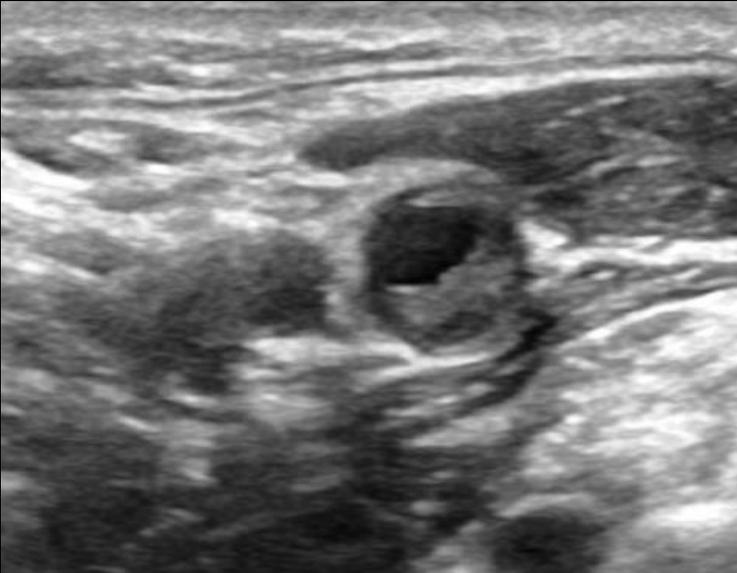
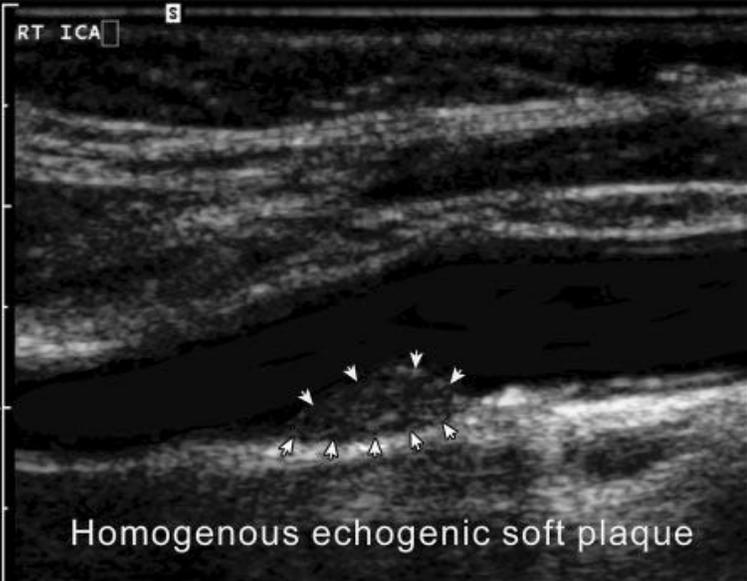
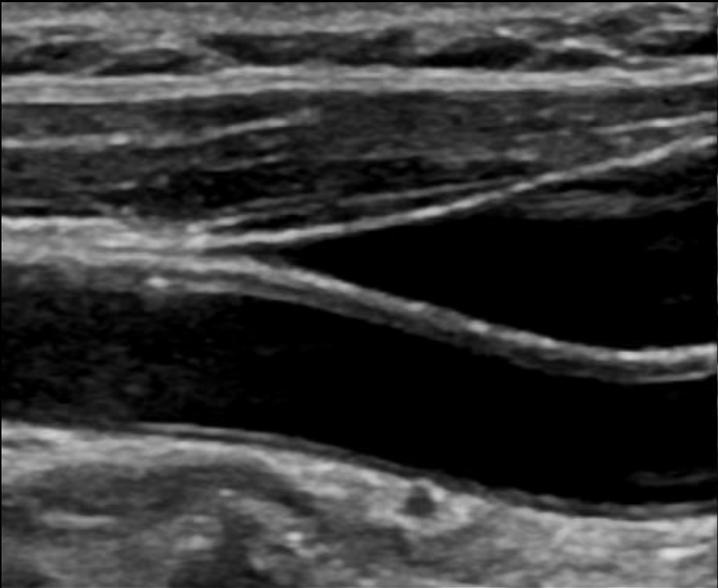
# Technique

## Trans cranial Doppler (TCD)

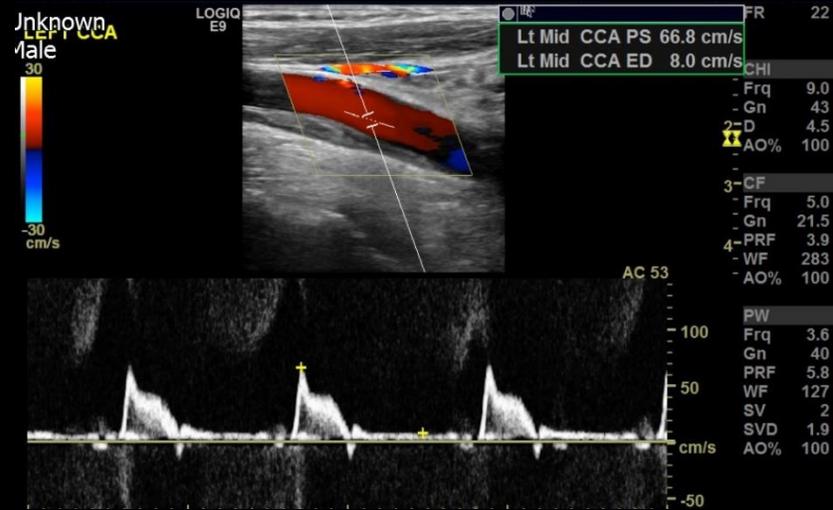
- 2MHz transducer
- 3 main windows
  - Trans temporal
  - Trans orbital
  - Trans foraminal



# Plaque morphology



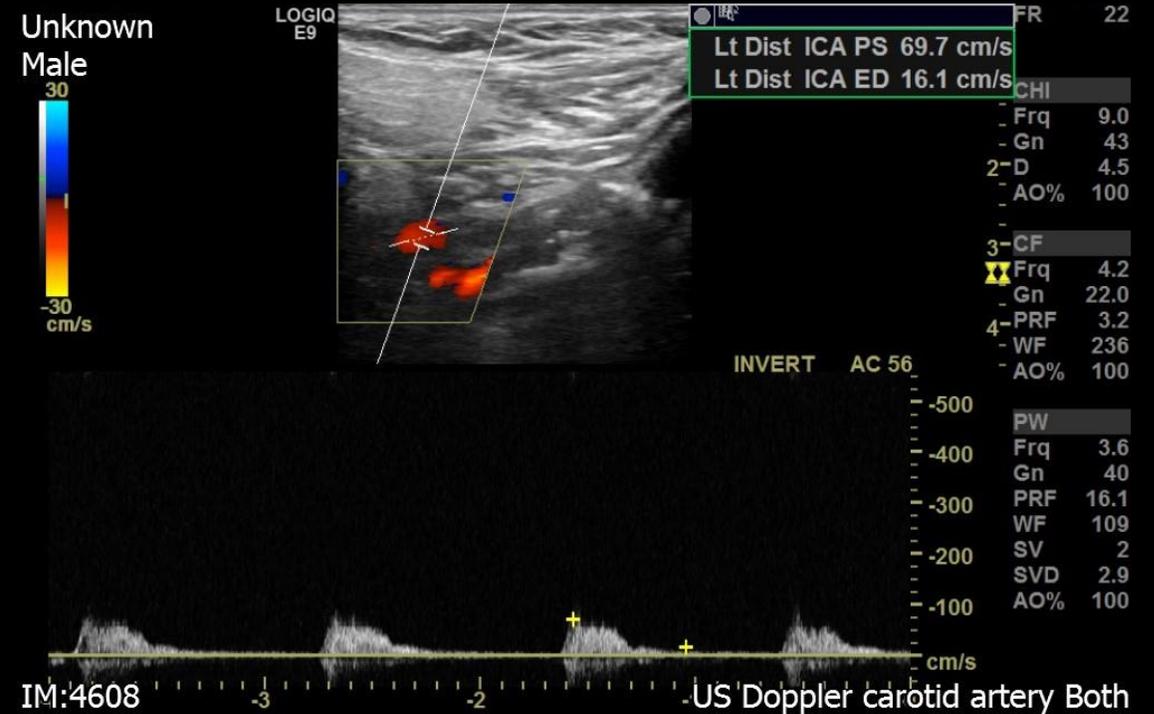
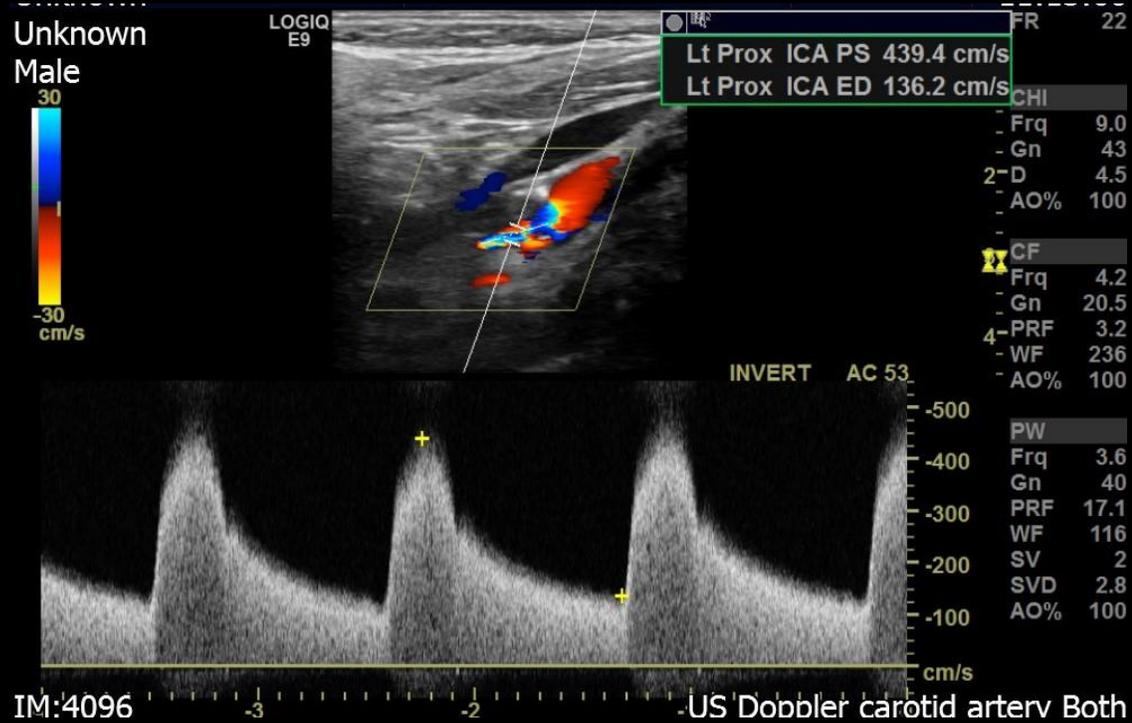
# Normal carotid Doppler





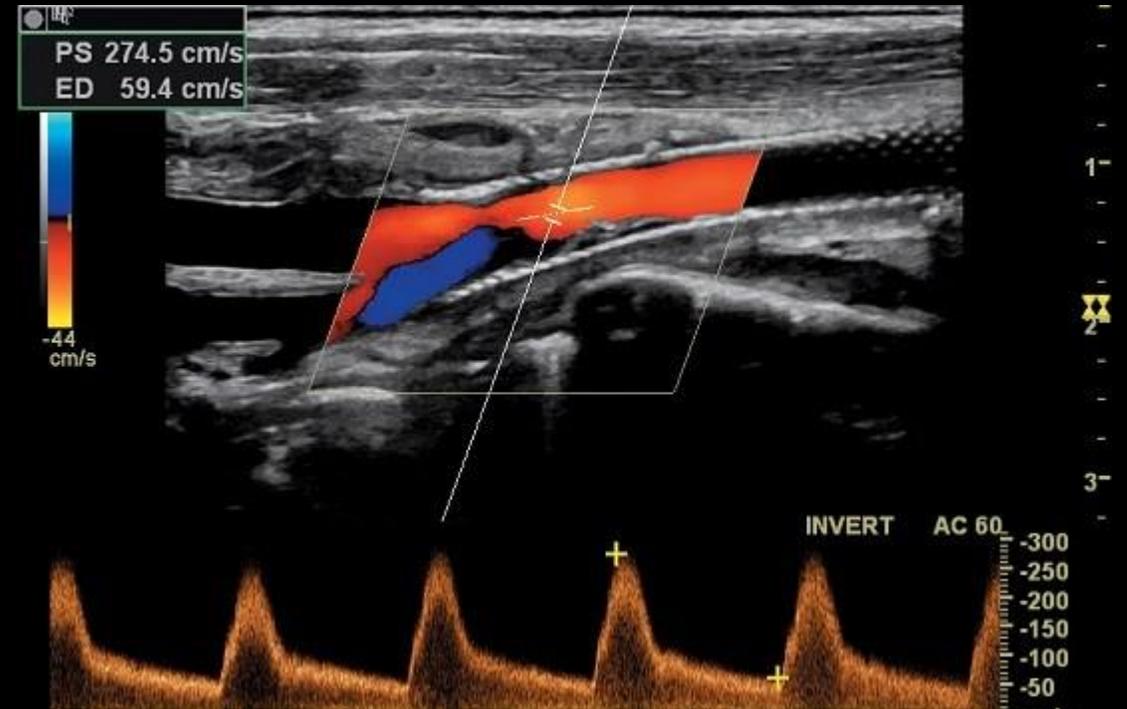
Degree of Stenosis (%)	Primary Parameters		Additional Parameters*	
	ICA PSV (cm/sec)	Degree of Plaque <sup>†</sup> (%)	ICA/CCA PSV Ratio	ICA EDV (cm/sec)
Normal	<125	None	<2.0	<40
<50	<125	<50	<2.0	<40
50–69	125–230	≥50	2.0–4.0	40–100
≥70 but less than near occlusion	>230	≥50	>4.0	>100
Near occlusion	High, low, or undetectable	Visible	Variable	Variable
Total occlusion	Undetectable	Visible, no detectable lumen	NA	NA

# High grade stenosis ICA



# Stent surveillance

- The stent will expand over time  
(days to weeks)
- Grey scale & colour flow assessment  
Pre & post stent - may need a sector probe
- Consider re stenosis only when  
systolic velocity > 200cm/sec





# Conclusion

## Carotid Doppler

- A powerful modality for evaluating the carotid and vertebral arteries
- Detecting and characterising atherosclerotic plaques
- High specificity for high grade stenosis.
- Low cost
- Non invasive
  
- Low sensitivity esp. to moderate grade stenosis
- Incomplete imaging of a complete vessel esp. vertebral
- Difficult access in some patients



Thank you for your attention