FULL CAROTID PROTOCOL

Use this protocol if the disease in the CCA or ICA is ≥50% diameter reduction. Do the full assessment for both the right and left carotid territories.

(Staff in training should use this protocol for all assessments)

Select the mid range frequency probe unless the vessels are very superficial, then select the high frequency probe or if the vessels are very deep select the lower frequency probe.

1. Record Doppler waveform from the proximal to mid subclavian artery. If velocity >200cm/s try to determine whether there is a stenosis present from the images. If appropriate, assess the brachial artery bilaterally (waveforms and/or systolic pressures) to determine site of disease. Consider reporting a subclavian steal if vertebral artery flow direction is abnormal in conjunction with significant subclavian disease.
2. Using B-mode, image throughout the observable length of the Common Carotid Artery (CCA), Internal Carotid Artery (ICA) and External carotid artery (ECA) in transverse and longitudinal.
3. Plaque measurements in the bifurcation and ICA should be made according to NASCET (comparing to the normal vessel diameter distally), and record images. If this is not possible and ESCT needs to be used, state which method has been used on the report.
4. For significant disease in the CCA, use peripheral arterial disease classification methods.
5. Examine the vessels with colour flow in transverse and longitudinal, paying particular attention for filling defects or areas of high velocity.
6. Record Doppler waveforms (using a 60 degree angle) from the CCA, mid lumen within 2cm of the bifurcation.
7. Record Doppler waveforms from the ICA in the area of highest velocity, using a 60 degree angle. Measure the peak systolic and end diastolic velocity. Ensure CCA and ICA measurements used to report are obtained as close in time as possible; to ensure St Mary’s ratio is as accurate as possible, you may need to repeat the CCA measurement. Note it may be difficult to obtain a 60 degree angle, therefore measure the CCA and ICA at the same angle provided that it is <60 degrees, to reduce inaccuracies in St Marys ratio.
8. Record and report on patency of vessels distal to a significant ICA stenosis (it is important for the surgeon to know whether the distal vessel is of normal calibre). State “good flow/lumen distally” on the report. Where a long stenosis is visualised, or the pattern of disease is unusual (e.g., stenosis is mid ICA, not at the origin), it may be helpful to provide measurements of disease length in your report.
9. Use a combination of St Mary’s ratio, peak systolic ICA velocity and peak ICA/CCA velocity ratios, as appropriate, to categorise significant disease into 10% diameter reduction categories.

St Mary’s ratio %stenosis (diameter reduction)

<8 <50%

* 1. 50-59%
  2. 60-69%
  3. 70-79%
  4. 80-89%

>30 >90%

*(NASCET criteria used)*

***St Mary’s Ratio***

***ICA*** *PSV /* ***CCA*** *EDV* (St Mary’s Ratio) =

8 11 14 22 30

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

50 60 70 80 90 (% stenosis diameter reduction)

***Peak ICA Velocity (cm/s : NASCET)***

*<125cm/s:<50% >125cm/s:50-69% >230cm/s:70-89% >400cm/s:90-99% string flow:near occlusion no flow:occlusion*

***ICA*** *PSV /* ***CCA*** *PSV =*

*<2 = < 50% 2-4 = 50-69% >4 = >70%*

1. In cases of contra-lateral ICA occlusion, caution must be used in interpreting peak ICA velocities as these may be higher due to the occlusion on the other side.
2. Ensure that there is consistency between the velocity criteria and observed images. In cases where the measurements/images are difficult to interpret, consider a second opinion from another qualified member of staff. You can also request further imaging via Radiology on the report form, in this case state the reason that clarification is required/ which vessel needs patency checks etc.
3. Record Doppler waveform from the ECA, measure peak systolic velocity, if higher than expected with evidence of significant plaque on B mode report as >50% diameter reduction.
4. Assess the vertebral artery for direction of flow and record the Doppler waveform.
5. A minimal set of images demonstrating spectral Doppler flow in subclavian and vertebral arteries, ICA (at stenotic site and distal vessel), CCA and ECA should be taken.
6. Record images to demonstrate all significant plaque, comment and report the significant plaque using the following terms:

**Irregular**- plaque with a broken irregular luminal surface.

**OR Smooth**- plaque with uninterrupted luminal surface.

**Homogeneous** – plaque demonstrates a uniform echo pattern, i.e.: all bright echoes or all dark echoes.

**OR** **Heterogeneous**- plaque demonstrates a mixed, random echo pattern, i.e. some echogenic and echo lucent areas.

1. Report any other findings such as irregular heartbeat.

Reporting

Report plaque/stenosis as either: within normal limits, <25% dr, 25-49% dr.

Stenosis that is ≥50% dr is should be reported using the diagrammatic report form. Disease should be graded at 50-59%, 60-69%, 69-79% etc.

Tick the appropriate boxes at the bottom of the report form.

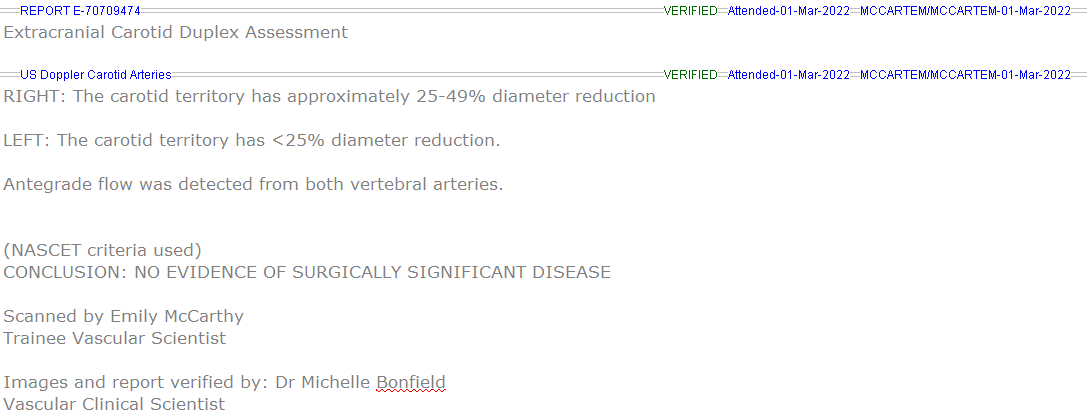
**Significant disease** – for haemodynamically significant stenosis that is ≥50%dr.

**Further imaging** – if required

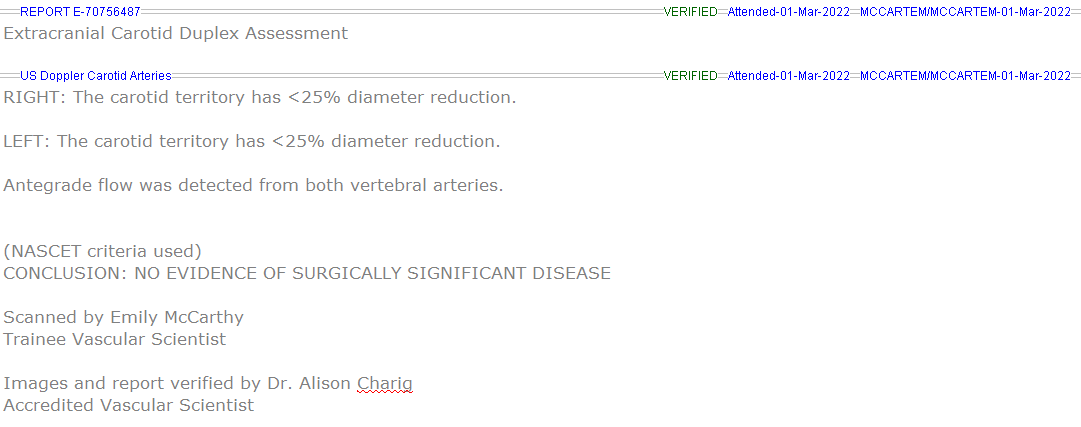
**Other** – for occluded vessels, or for large plaque burden that is not haemodynamically significant but appears to be >50% dr.

SCAN REPORTS

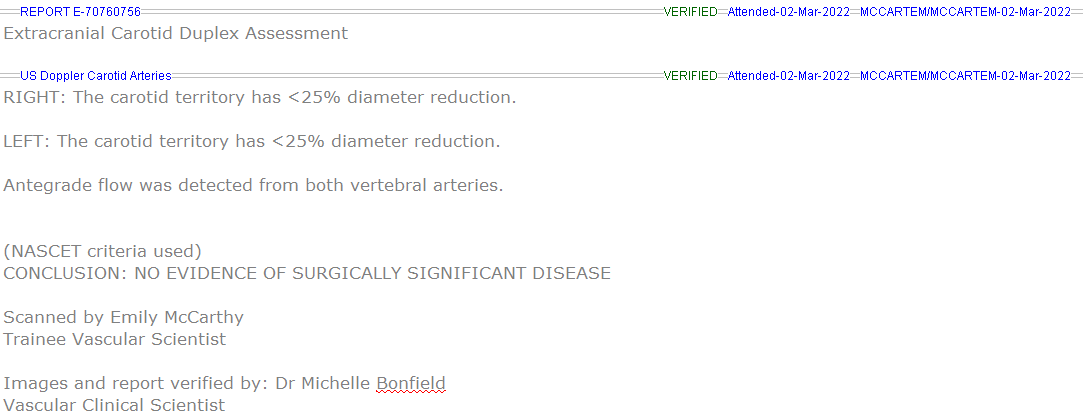
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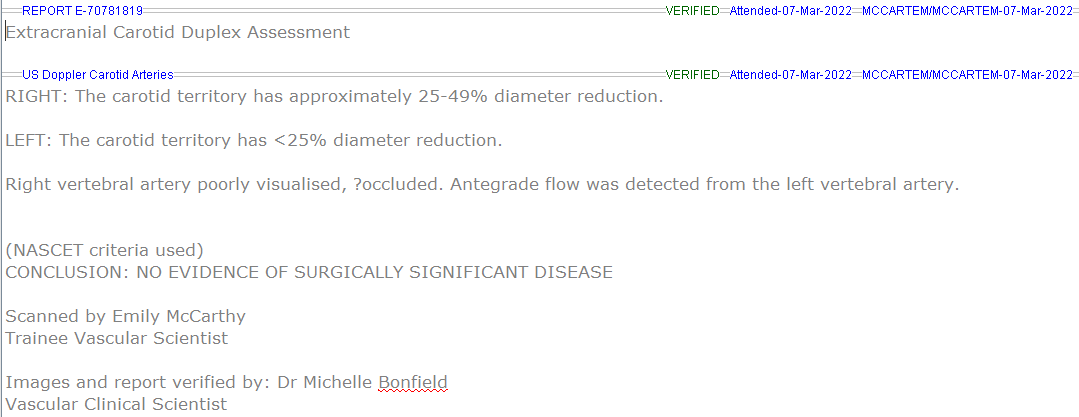
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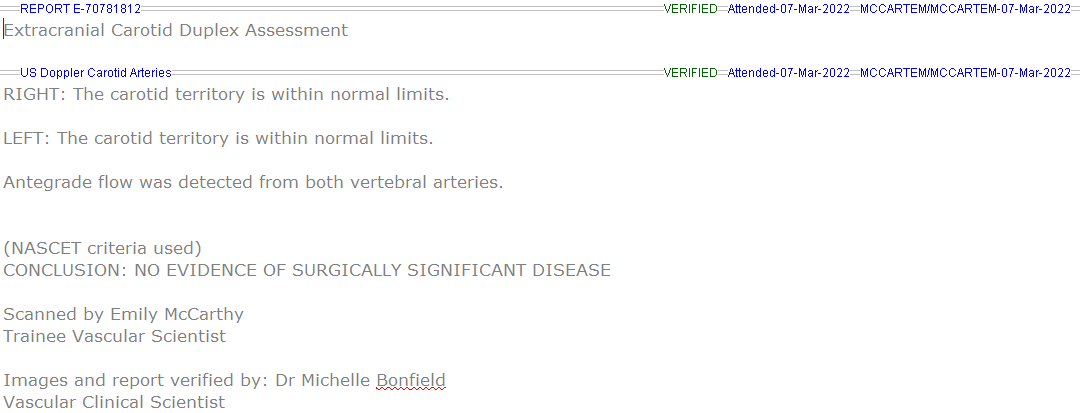
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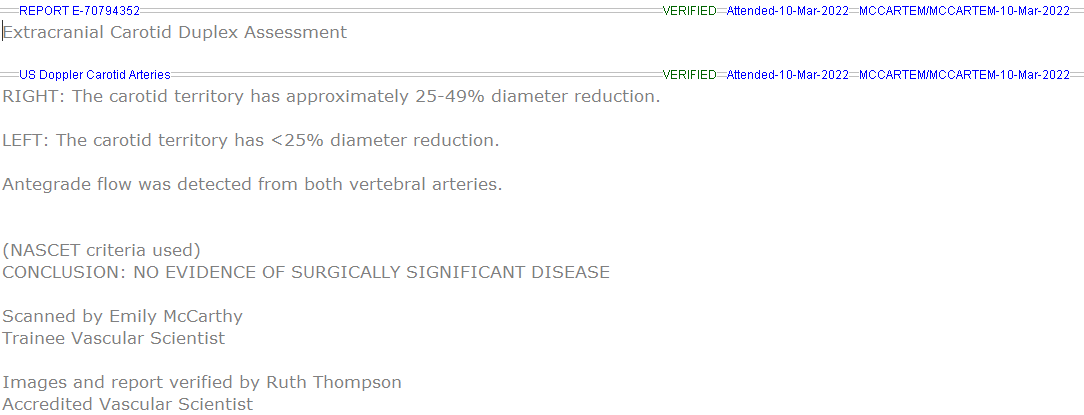
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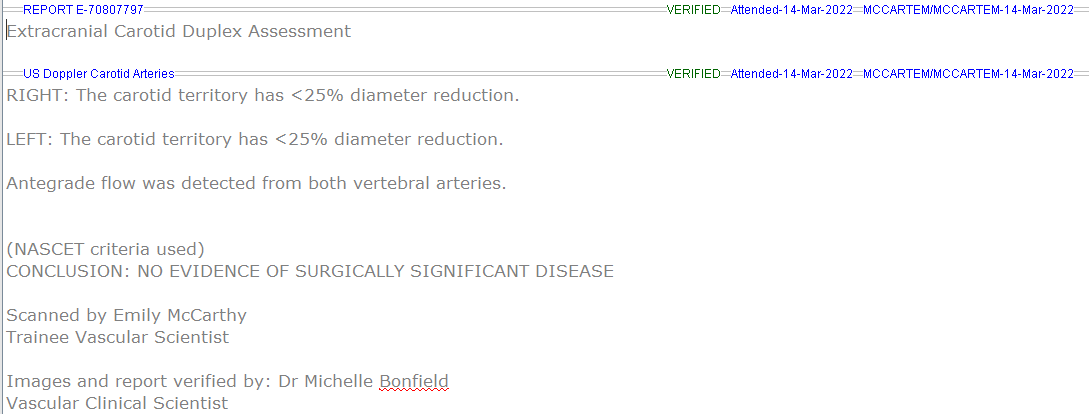
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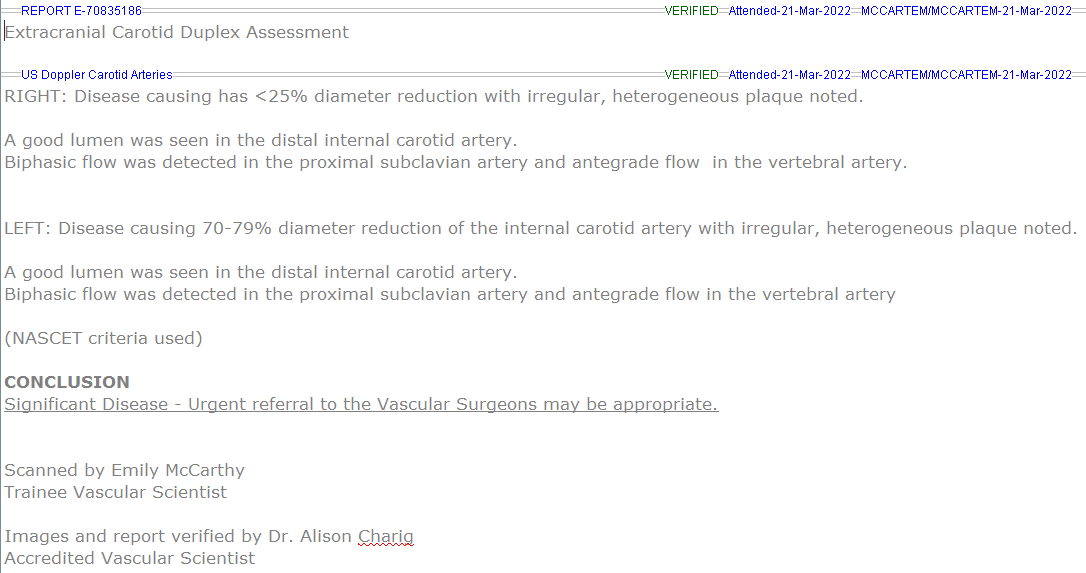
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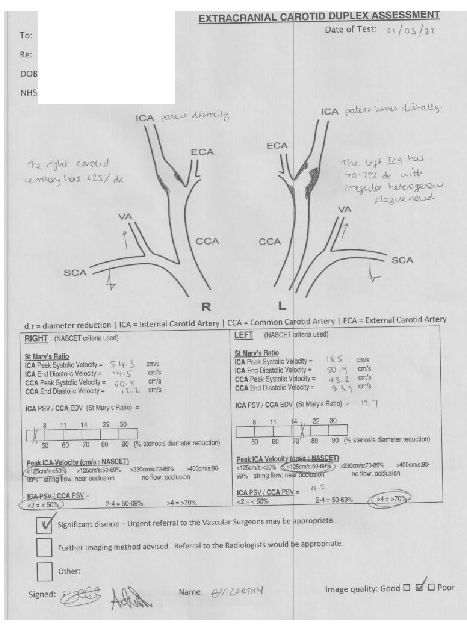


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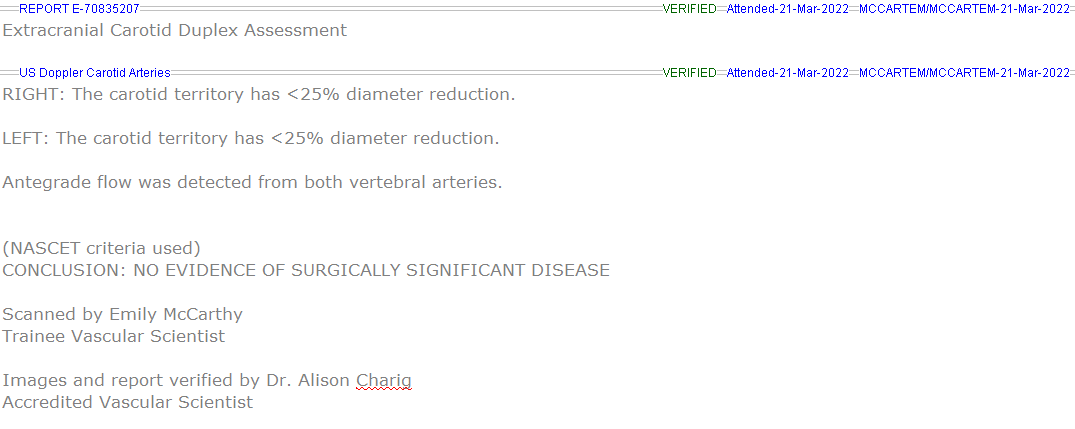


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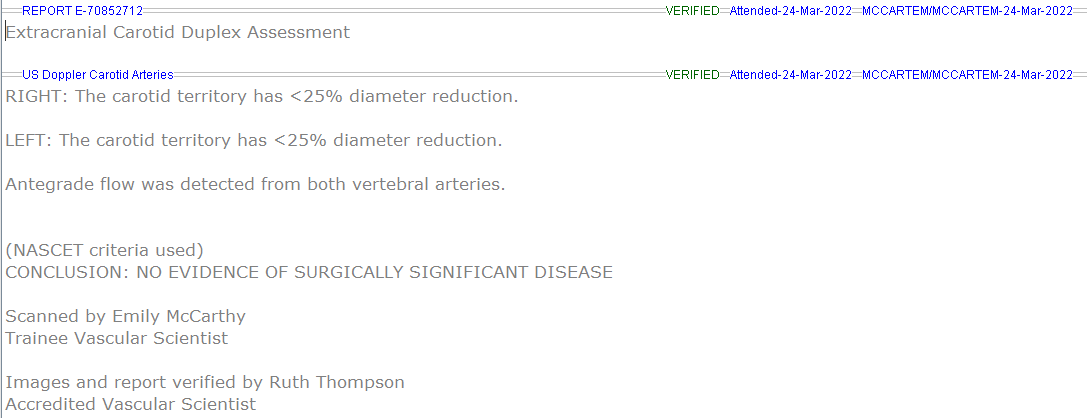




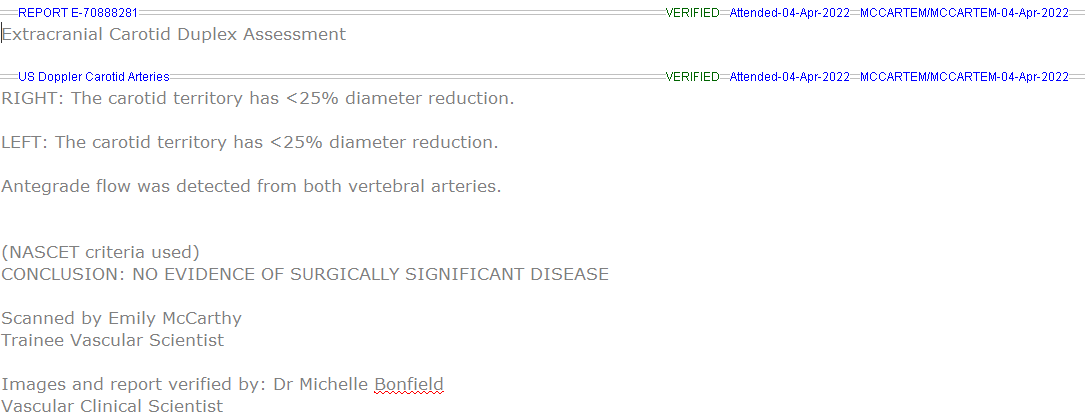
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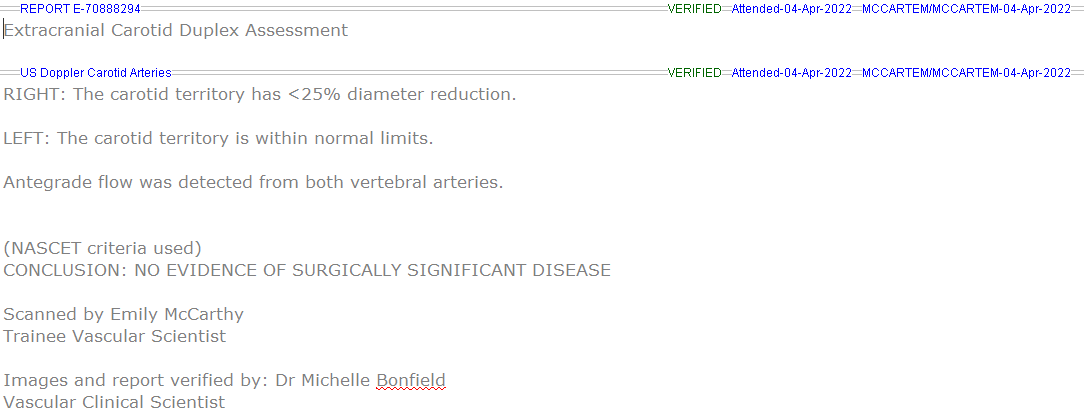
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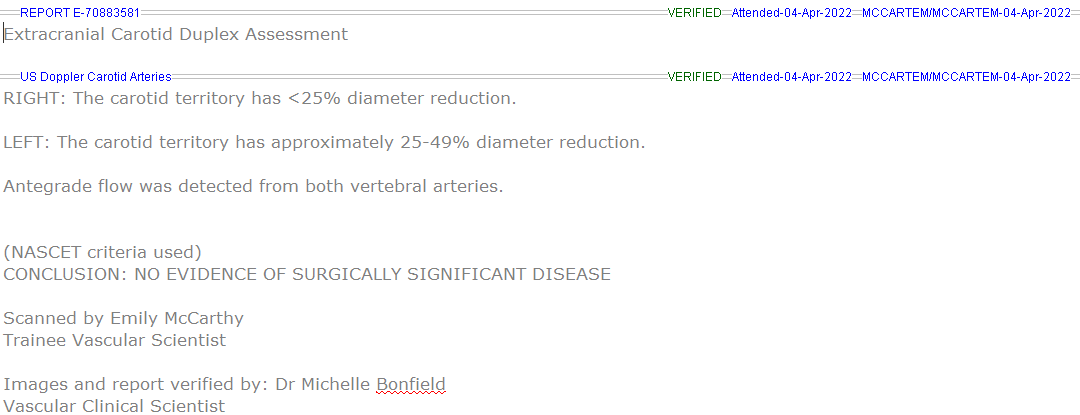
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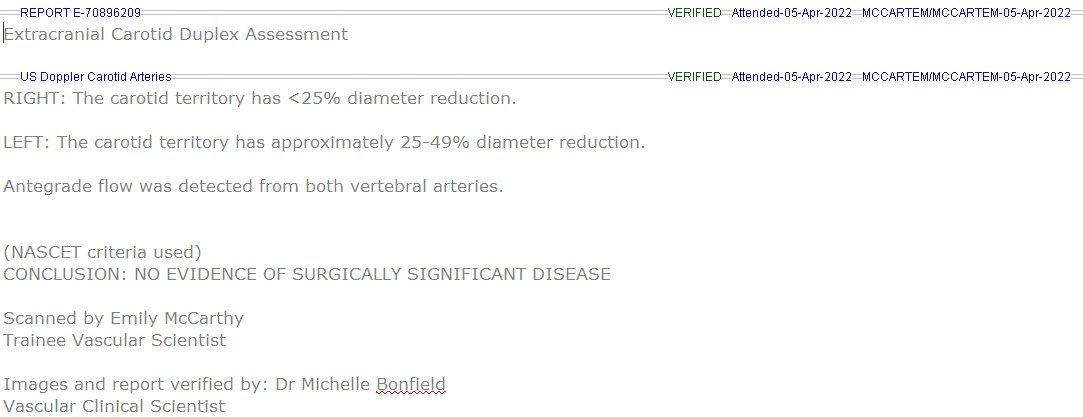
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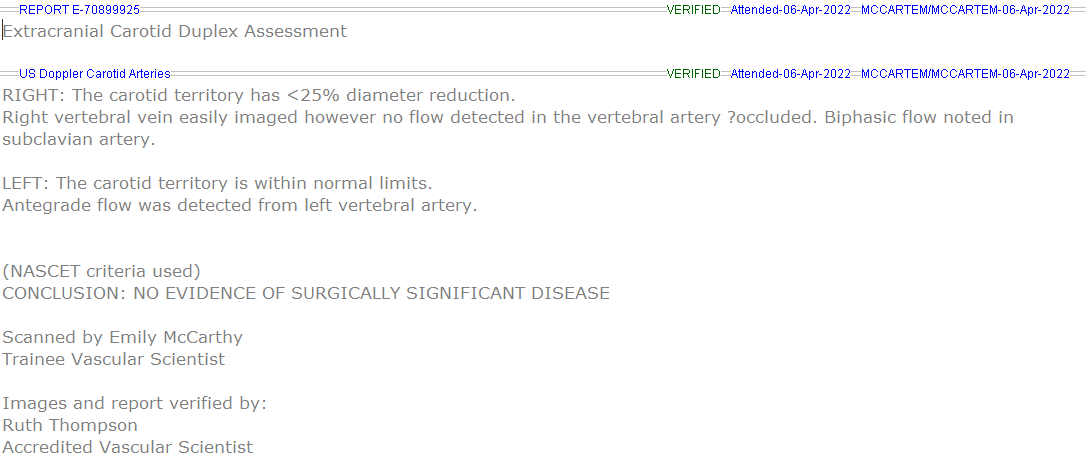
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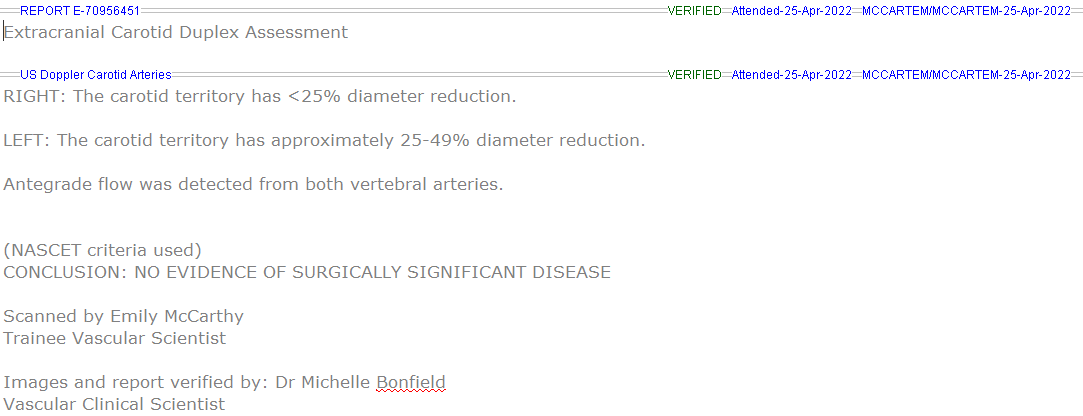
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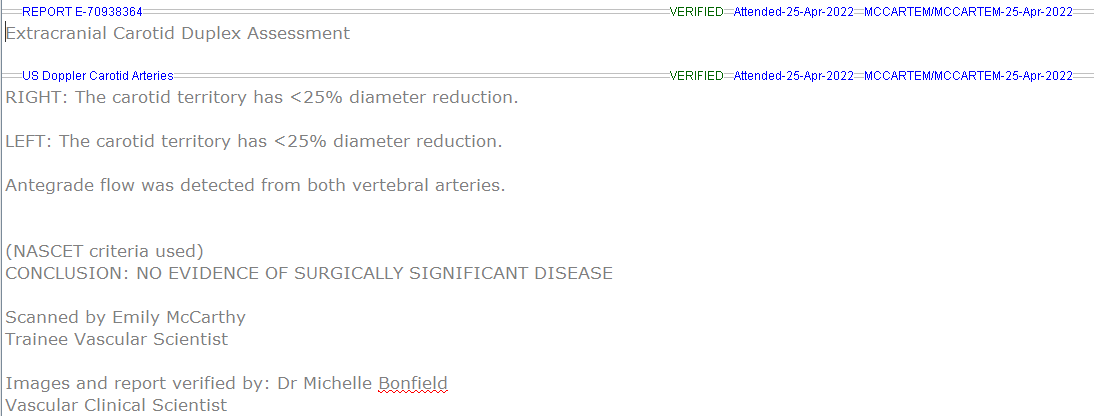
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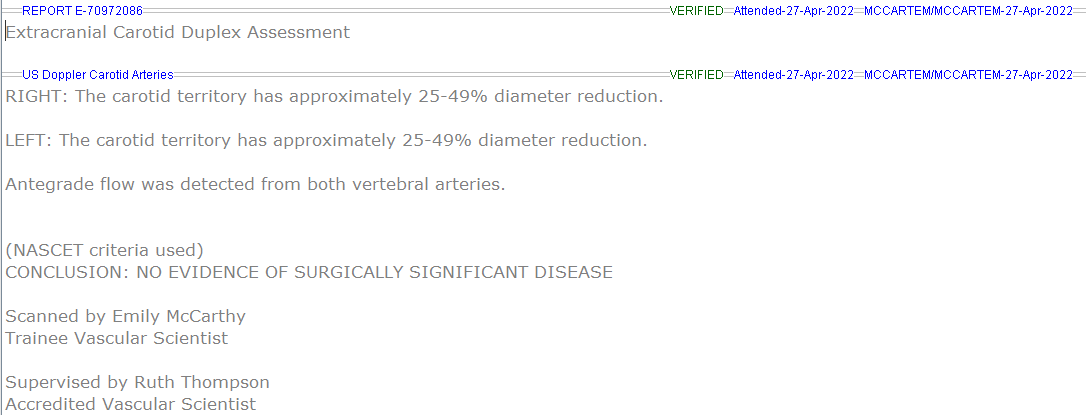
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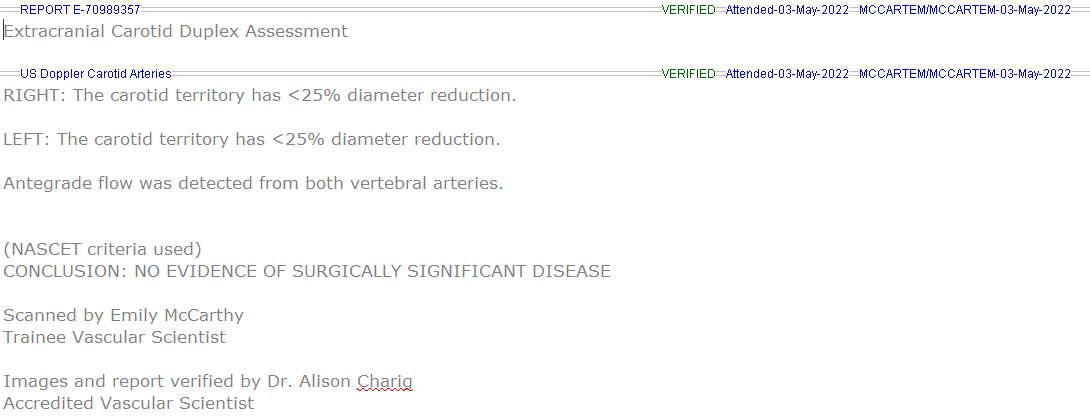
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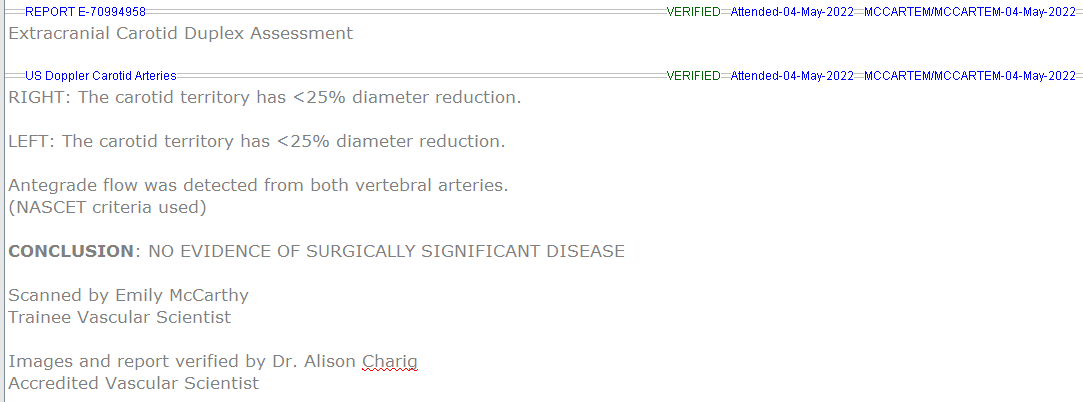
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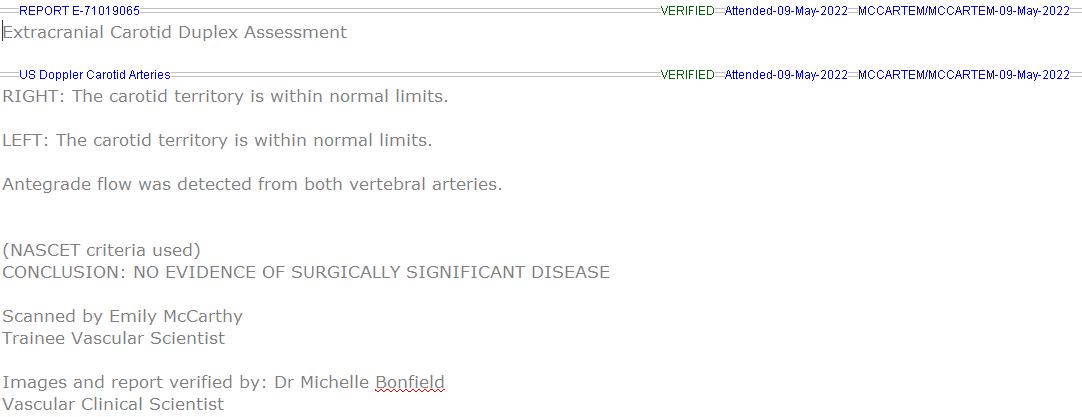
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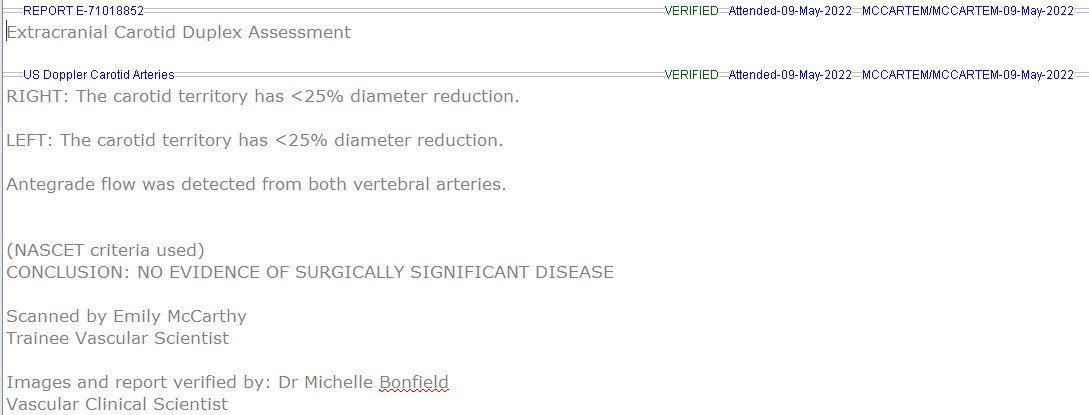
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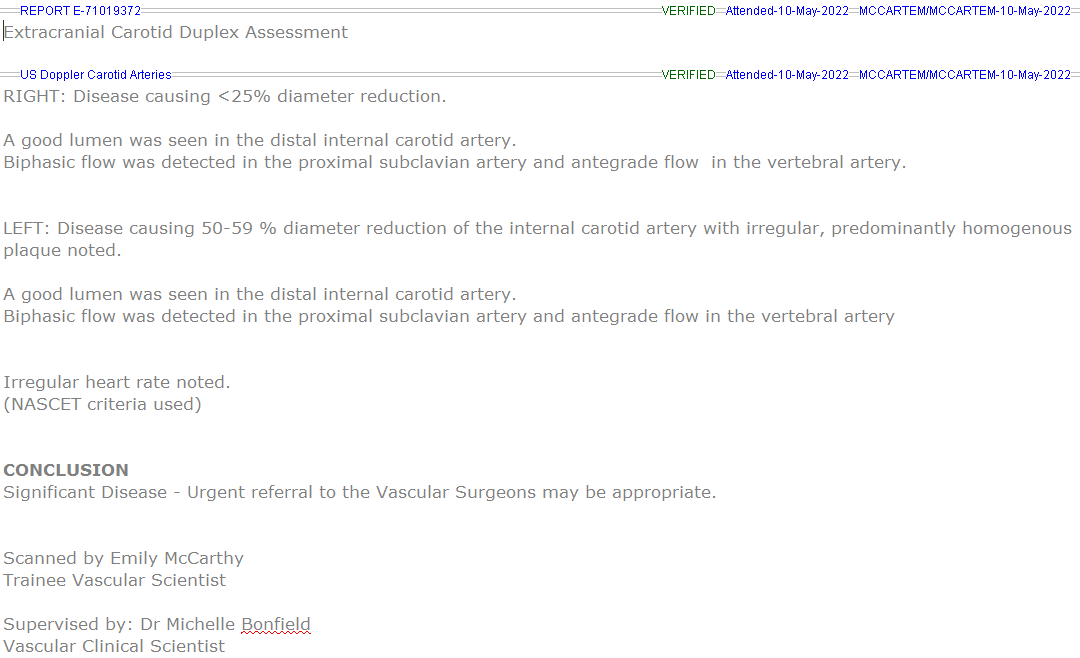
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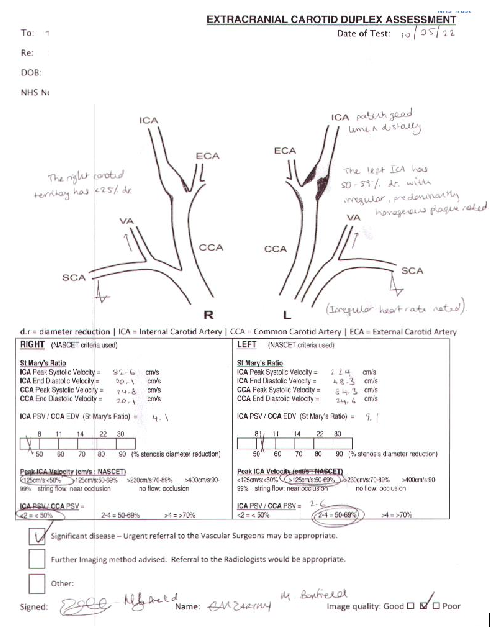


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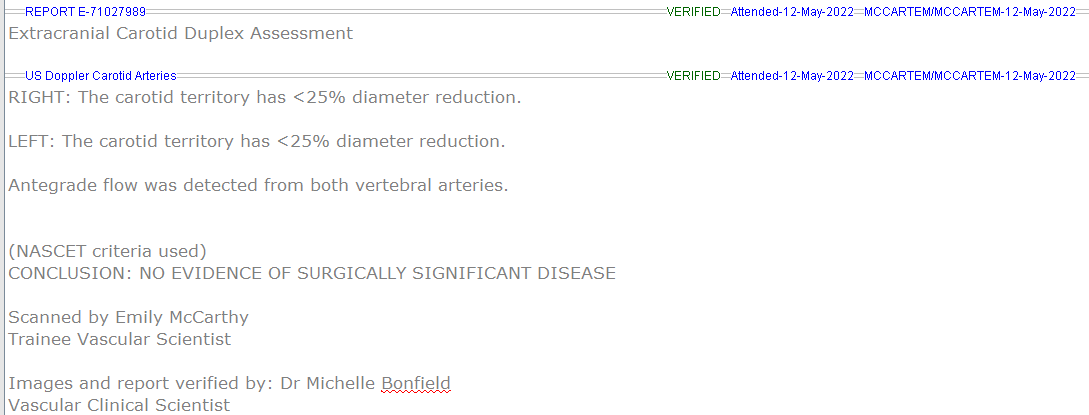


23)





24)



25)

