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CL1.3

# 3. Extra-cranial carotid/ brachio-cephalic/ subclavian/ vertebral assessment

Probe types – 12 - 3MHz

Measurements – Velocities in centimetres per second (cm/s), diameter (transverse; anterior-posterior, medial-lateral) in centimetres (cm) (if dilated/pre-op), length of disease (longitudinal) in cm.

Patient positioning and scanning approach – patients can be scanned supine or in a sitting position. A supine approach with the vascular scientist sat behind the patient's head allows easy access to the neck and reduces the risk of RSI (repetitive strain injury) as the operator can rest their arm on the pillow or on the head of couch. The patient extends the neck and turns the head in the opposite direction to the side being assessed. Both sides of the neck are always assessed.

The carotid arteries can be viewed from a lateral or antero-lateral approach using the sternocleidomastoid muscle as an acoustic window<sup>2</sup>.

### **B-mode** assessment

Intimal B-mode assessment is performed to achieve an accurate picture of the anatomy and identify the location of the carotid bifurcation as well as the presence of any plaque morphology<sup>2,3</sup>.

Using B-mode, the common carotid artery (CCA) should be imaged in cross-section (transverse plane) and traced proximally to the clavicle until the subclavian artery is visualised. The distal brachio-cephalic artery may be visualised on the right side of the neck. On the left side, the origin of the CCA and subclavian arteries will not be visualised due to depth. The CCA should then be scanned along its length to the level of the bifurcation where the internal carotid artery (ICA) and external carotic artery (ECA) are visualised from their origins as far distal as possible.

The same method should then be repeated in longitudinal plane<sup>2</sup>.

### Colourflow assessment

Using the Colourflow modality, the CCA is scanned longitudinally where it is traced from the proximal section at the level of the clavicle to the distal section where the bifurcation, ICA and ECA are visualised as far distal as possible.

Colour should be used to identify ECA branches, filling defects, occlusion and velocity changes/ turbulence, although diagnosis should not be made using colour Doppler alone<sup>2,3</sup>.

# Grading plaque morphology – greyscale echogenicity

Switching to the greyscale imaging mode, a note can be made of the site, type and extent of plaque morphology.

The subclavian is visualised along its length in longitudinal section. The CCA, ICA and ECA are then viewed in cross-section and longitudinally. As soft plaque has the same echogenicity as blood, colourflow is the best modality for identification.



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Soft plaque – associated with higher lipid content or thrombus. May have an anechoic or echolucent appearance similar to that of blood/fluid<sup>2,3</sup>

Mixed plaque – variable/ heterogenous appearance of mixed or random echoes with some echogenic and some echolucent areas<sup>2,3</sup>.

Dense plaque – homogenous appearance of bright white echoes<sup>4</sup>.

Calcified plaque – acoustic shadowing cast from the hardened plaque<sup>2,3</sup>.

Irregular – broken or irregular luminal surface but not generally an indication of ulceration 16.

Ulcerative – an area of mixed plaque forming a 'crater' of at least 2mm depth. May be seen in cross-section as a 'hook' of mixed plaque surrounding soft plaque, or with blood visibly swirling within the crater<sup>2,3</sup>.

## Doppler assessment

In the absence of significant disease, peak systolic velocity (PSV) measurements are taken from the CCA (1-2cm proximal to bifurcation) <sup>1, 2</sup>, ICA and ECA. If the peak velocities are raised above 1.3m/s then the end-diastolic velocity (EDV) is also measured.

If significant plaques have been identified using B-mode and colour flow Doppler then further spectral Doppler samples are taken to investigate velocity increases and analyse the degree of stenosis in particular vessel. Stenosis in the ICA is graded using the criteria explained below. Atypical waveform profiles should also be noted<sup>2, 3</sup>.

In cross-section, the CCA is traced proximal towards the clavicle and the transducer is angled beneath the clavicle until the subclavian artery is viewed in longitudinal section. The subclavian is traced as far proximal and distal as possible making note of areas of turbulence or narrowing. The PSV is measured using Doppler ultrasound. A second Doppler reading is taken as far distal as possible and the waveform characteristics are recorded (e.g. triphasic, biphasic, monophasic, turbulent, damped etc.).

Velocities in kinked arteries are less reliable as vessel tortuosity can raise velocities  $^{17}$ . Care must be taken to ensure that the angle is correct to blood flow rather than the vessel  $^{3}$ . In reporting, it will be stated 'peak velocities indicate x% - y% stenosis but no plaque morphology noted.

## Grading degree of carotid stenosis

#### Normal Velocities:

### ICA:

- average (avg) PSV = 54 88cm/s (distal to bulb)<sup>4</sup>
- avg PSV = 74cm/s, avg EDV = 29cm/s (distal to bulb)<sup>5</sup>
- velocity slightly elevated if patient hypertensive<sup>6</sup>
- maximum PSV noted in normal = 115cm/s<sup>7</sup>



#### ECA:

- avg PSV  $\sim$ =77cm/s (normally <115cm/s)<sup>4</sup>
- avg PSV = 84cm/s, avg EDV = 16cm/s  $^5$
- ECA velocities can be elevated by an ipsilateral ICA occlusion<sup>4</sup>

### CCA:

- $\text{ avg PSV} = 60 100 \text{cm/s}^8$
- avg PSV = 108 + /- 18 cm/s (mean +/-S.D.)<sup>9</sup>
- avg PSV = 78-108 cm/s  $^{7}$
- avg PSV = 99cm/s, avg EDV = 27cm/s<sup>5</sup>
- on average, PSV in L CCA exceeds PSV in R CCA by 5cm/s 9
- velocity slightly elevated if patient hypertensive<sup>6</sup>

## Carotid Criteria

| Diameter<br>Stenosis | Morphology            | ICA PSV<br>(cm/s) | ICA EDV<br>(cm/s) | PSVica/<br>PSVcca | St<br>Mary's<br>ratio |
|----------------------|-----------------------|-------------------|-------------------|-------------------|-----------------------|
| <25%                 | Normal                | <125              | <40               | 4                 |                       |
| <30%                 | Intimal<br>Thickening | <125              | <40               |                   |                       |
| <30%                 | Plaque                | <125              | <40               |                   |                       |
| <40%                 | Plaque                | <125              | <40               |                   |                       |
| <50%                 | Plaque                | <125              | <40               | <2                | <8                    |
| 50-59%               | Plaque                | >125              | <40               | <3.2              | 8.0-10                |
| 60-69%               | Plaque                | >125              | 40-110            | 3.2-4.0           | 11-13                 |
| 70-79%               | Plaque                | >230              | 110-140           | >4.0              | 14-21                 |
| 80-89%               | Plaque                | >230              | >140              | >4.0              | 22-29                 |
| 90-95%               | Plaque                | >400              | >140              | >5.0              | >30                   |
| 96-99%               | Plaque                | Trickle flow      |                   | Hadis             | Variable              |
| 100%                 | Plaque                | Absence of f      | low               |                   | N/A                   |

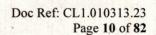
Sidhu and Allan. Ultrasound Assessment of Internal Carotid Artery Stenosis. Clinical Radiology, (1997) 52, 654-658. (Developed using data from Moneta et al. 1993, 1995). CP Oates et al. Joint recommendations for Reporting Carotid Ultrasound Investigations in the UK. EurJ Vasc Endovasc Surg (2008) 20, 1-11.

Criteria are only reliable for internal carotid artery stenosis<sup>3</sup>.

ICA peak systolic velocities are less reliable in the presence of CCA disease and ratios should be used. The use of the ICA: CCA PSV ratio normalises ICA PSV measurements<sup>2</sup> <sup>3</sup>.

Elevated velocities can be produced in the CCA, ICA<sup>19</sup> and ECA in the presence of contralateral CCA or ICA stenosis or occlusion.

A significant proximal (CCA origin or brachio-cephalic) ipsilateral stenosis can reduce velocities in the CCA, ICA and ECA.





Aortic stenosis can reduce the velocities in the CCA only.

Peak systolic velocities from large carotid bulbs may be unreliable, estimate degree of stenosis using grey scale and diameter/area reduction measurement.

## Doppler Waveforms:

- 1.CCA waveform has a low-resistance pattern (most of the CCA flow goes to the brain). Note that a small amount of post systolic flow reversal (giving rise to a triphasic waveform) is normal; reversal of flow evident for more than 50% of the duration of diastole should be regarded as abnormal (see point 5 below)<sup>10</sup>.
- 2. Normal ICA waveform has low-resistance pattern (all of the ICA flow goes to brain)<sup>18</sup>.
- 3. Normal ECA waveform has a high-resistance pattern (vessel supplies a high resistance vascular bed). Note the prominent dicrotic notch, which represents closure of the aortic valve and the onset of diastole<sup>10</sup>.
- 4. Severe proximal stenosis (innominate artery, CCA origin, aortic valve) produces a damped waveform ("tardus-parvus", where tardus infers the pulse is slow to rise and fall and parvus infers a small pulse.)<sup>4, 8</sup>. Essentially, the acceleration time to systole is increased, hence the slope of the systolic upstroke is reduced, and there is blunting and smoothing of the sharp peak representing a reduction in waveform pulsatility. This effect is usually most prominent in the CCA, but is also sometimes seen in the ICA & ECA. Note that in the case of aortic valve disease or diminished cardiac output, damping is symmetrical (seen in both CCAs)<sup>4</sup>.
- 5. Severe aortic incompetence with or without the presence of significant aortic stenosis often produces either a bisferious (two systolic peaks, well separated from the dicrotic notch, with the second peak being the same height as or higher than the first) waveform<sup>10</sup>, or persistent reverse diastolic flow in the CCA, or both. Note that these effects are not usually seen in the ICA, but are evident in both the CCA & ECA.
- 6. Significant stenosis or occlusion of the distal CCA or the ICA causes a high-resistance ipsilateral CCA waveform; reverse flow is evident and often there is complete loss of end diastolic flow. Note that significant ECA disease does not usually impact on the CCA waveform due to its relatively low flow volume<sup>4</sup>.

# **External Carotid Artery Assessment**

From searching the literature (pubmed, medline, science direct, quest) there is no evidence of a radiologically validated method for grading ECA disease using a velocity criteria.

There is normally little requirement for the grading of ECA disease due to its highly branched vascular network and non-cerebral involvement<sup>13,15</sup>. In cases where a patient experiences cerebral or ocular symptoms in the presence of ipsilateral ICA occlusion it may be useful to grade and characterise ECA disease as a possible cause of emboli and transient ischaemic attack (TIA). There is much published evidence extolling the



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benefit of surgical or radiological intervention for the treatment of ECA disease where there is ipsilateral ICA occlusion and a thorough examination of disease is important in these cases<sup>13,14,15</sup>.

At present staff use a visual estimation and/or use of electronic callipers to measure degree and extent of stenotic disease.

In the presence of an ICA occlusion, electronic callipers should be used in the transverse and longitudinal planes to measure degree of ECA stenosis. Length of stenosis, plaque characterisation and degree of turbulence should also be recorded in the report.

# Vertebral artery assessment

The vertebral artery (VA) can be viewed if the transducer is angled posterior. The flow direction should be the same as the carotid flow direction and is checked using the colourflow, **but more** importantly the Doppler sample volume. Vertebral flow is graded as orthograde, oscillatory (i.e. reversed in either systole or diastole alone) or retrograde<sup>2,3</sup>. If no colourflow is identified within the vessel lumen – use spectral or power Doppler to investigate as it is more sensitive than colourflow<sup>4</sup>.

### **NORMAL VELOCITIES:**

- avg PSV = 20-40 cm/s<sup>2,3</sup>

PSV<10cm/s should be regarded as potentially abnormal<sup>4</sup>

- Higher velocities may be normal in the dominant VA of an asymmetric pair.<sup>2,3</sup>

- Higher velocities may be normal with contralateral VA occlusion. <sup>2,3</sup>

# DOPPLER WAVEFORMS:

- 1. Normal VA waveform has a low-resistance pattern (supplying the brain), with cephalad flow throughout the cycle<sup>2,4</sup>.
- 2. If the VA has a high-resistance, antegrade (cephalic) flow pattern, there is probably a significant obstruction distal to the site of examination. (The second most common site of VA atheroma is intracranially, just beyond the C1 arch)<sup>3</sup>.
- 3. Severe proximal stenosis produces a damped waveform; note that the most common site of VA atheroma is the VA origin, although this can be difficult to image as it originates from the posterior aspect of the subclavian artery<sup>3</sup>.
- 4. Subclavian artery origin stenosis can have varying effects on the VA waveform shape and the direction of flow, dependent on the degree of stenosis and the presence of other collateral pathways.



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# Pre-operative carotid assessment.

Staff must follow additional criteria when performing a pre-operative scan for carotid endarterectomy.

- 1.Length of disease from the bifurcation, into the ICA, must be documented.
- 2.Bifurcation needs to be marked on the skin surface the image of the bifurcation is obtained then the probe is moved until the bifurcation is just off the leading edge of the probe, marks are made on the skin surface in transverse and longitudinal section. Where these lines transverse is the position of the bifurcation and an arrow should be drawn to mark the tip.
- 3. Take a picture of the disease and keep with our hardcopy.
- 4.Mark MCA signal see TCD section

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|  | nosis severe, Occlusion, Thrombus   |                            |                        |               |
|--|---|----------------------------|------------------------|---------------|
| Right  | Diameter (cm)   | PSV (m/s                   | ) EDV (m/s)            | Stenosis      |
| Common Plaque Disease length from BIF                      | Intimal Thickening  | 0.66                       | 0.28                   | < 30%         |
| Bifurcation Plaque Disease length from BIF                 | Intimal Thickening  |                            |                        | < 30%         |
| Internal Plaque Disease length from BIF                    | Mixed .   | 0.79<br>k ICA/Pk CCA = 1.2 | 9 0.40 Pk ICA/End CC   | < 30%         |
| External Plaque Disease length from BIF                    | Mixed   | 0.68                       |                        | < 30%         |
| Vertebral  | Open Orthograde   |                            |                        |               |
| Subclavian   | No Turbulence   | Good Signal                | Triphasic              | Widely Patent |
| Left   | Diameter (cm)   | PSV (m/s)                  | EDV (m/s)              | Stenosis      |
| Common Plaque Disease length from BIF                      | Intimal Thickening  | 0.53                       |                        | < 30%         |
| Bifurcation Plaque Disease length from BIF                 | Mixed   |                            |                        | < 30%         |
| Internal Plaque Disease length from BIF                    | Soft  | c ICA/Pk CCA = 0.0         | *                      | = 100%        |
| External Plaque Disease length from BIF                    | Intimal Thickening  | 0.70                       |                        | < 30%         |
| Vertebral  | Open Orthograde   |                            |                        |               |
| Subclavian   | No Turbulence   | Good Signal                | Triphasic              | Widely Patent |
| Stenosis based on NASCET Disease within large diameter car | methods. If marked * ALWAYS read full otid bulb is measured using direct diameter methods                                   |                            |                        |               |
| Notes  |   |                            |                        |               |
| CAROTID DUPLEX SCA   | AN  |                            |                        |               |
| RIGHT<br>Mixed plaques identified                          | in the right internal carotid artery form   | ing a less than 30%        | stenosis.              |               |
| colour flow noted in the                                   | ent material ?soft plaque ?thrombus ic<br>proximal to mid vessel suggestive of a<br>26cm/s, indicative of a more distal occ | 96-99% stenosis. V         | Vhere seen, high resis | tant          |
|  | ack Wilson  |                            |                        |               |

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| disease.   |            |
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| Suggest alternative imaging modality to confirm. |            |
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| Right  |  | Diameter (cm) | PSV (m/s)             | EDV (m/s)             | Stenosis          |
|--|--|---------------|-----------------------|-----------------------|-------------------|
| Common   |  |               | 0.87                  | 0.17                  | < 30%             |
| Plaque   | Intimal Thickening                                   |               |                       |                       | 3070              |
| Disease length from BIF  |  |               |                       |                       |                   |
| Bifurcation  |  |               |                       |                       | < 30%             |
| Plaque   | Mixed  |               |                       |                       | 7 30 70           |
| Disease length from BIF  |  |               |                       |                       |                   |
| Internal   |  |               | 0.60                  | 0.15                  | < 30%             |
| Plaque   | Mixed  |               | 0.00                  | 05                    | \ 30%             |
| Disease length from BIF  |  | Pk ICA        | /Pk CCA = 0.7         | Pk ICA/End Co         | CA = 3.5          |
| External   |  |               | 1.08                  |                       | < 40%             |
| Plaque   | Dense Mixed  |               | 1.00                  |                       | <b>\ 40%</b>      |
| Disease length from BIF  |  |               |                       |                       |                   |
| Vertebral  | Open Orthograde                                      |               |                       |                       |                   |
| Subclavian   | No Turbulence  | Go            | od Signal             | Triphasic             | Widely Patent     |
| Left   |  | Diameter (cm) | PSV (m/s)             | EDV (m/s)             | Stenosis          |
| Common   |  |               | 1.11                  | 0,21                  | < 30%             |
| Plaque   | Intimal Thickening                                   |               | ****                  | 0.41                  | \ 30%             |
|  | 이 보다는 사람들이 없는 사람이 되었다. 이번 사람들이 가장 아니는 아니는 것이 없는데 없다. |               |                       |                       |                   |
| Disease length from BIF  |  |               |                       |                       |                   |
| Disease length from BIF Bifurcation  |  |               |                       |                       | < 30%             |
|  | Dense Mixed Calcified                                |               |                       |                       | < 30%             |
| Bifurcation  | Dense Mixed Calcified                                |               |                       |                       | < 30%             |
| Bifurcation<br>Plaque  | Dense Mixed Calcified                                |               | 0.51                  | 0.15                  |                   |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed Calcified  Dense Mixed                   |               | 0.51                  | 0.15                  | < 30%<br>< 30%    |
| Bifurcation Plaque Disease length from BIF Internal  |  | Pk ICA        | 0.51<br>/Pk CCA = 0.5 | 0.15<br>Pk ICA/End CC | < 30%             |
| Bifurcation Plaque Disease length from BIF Internal Plaque   |  | Pk ICA        | /Pk CCA = 0.5         |                       | < 30%<br>CA = 2.4 |
| Bifurcation Plaque Disease length from BIF  Internal Plaque Disease length from BIF                  | Dense Mixed  | Pk ICA        |                       |                       | < 30%             |
| Bifurcation Plaque Disease length from BIF  Internal Plaque Disease length from BIF  External        |  | Pk ICA        | /Pk CCA = 0.5         |                       | < 30%<br>CA = 2.4 |
| Bifurcation Plaque Disease length from BIF  Internal Plaque Disease length from BIF  External Plaque | Dense Mixed  | Pk ICA        | /Pk CCA = 0.5         |                       | < 30%<br>CA = 2.4 |

#### Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

#### Notes

### CAROTID DUPLEX SCAN

Mixed plaques identified in the right internal carotid artery forming a less than 30% stenosis.

Mixed an dense plaques identified in the left internal carotid artery forming a less than 30% stenosis.

Assessed by

Jack Wilson

Printed on 25/11/2021 at 1:06 pm

Checked by

| Reason TIA o  | clinic  |                          |                        |                       |
|---|---|--------------------------|------------------------|-----------------------|
| Outcome Sten  | osis moderate, Occlusion, Thrombus  |                          |                        |                       |
| Right   | Diameter (cm)   | PSV (m/s)                | EDV (m/s)              | Stenosi               |
| <b>Common</b> Plaque  Disease length from BIF   | Intimal Thickening  | 0.74                     | 0.15                   | < 30%                 |
| Bifurcation Plaque Disease length from BIF  | Mixed   |                          |                        | < 50%                 |
| Internal Plaque Disease length from BIF   | Mixed   | 1.01 ICA/Pk CCA = 1.4    | 0.24<br>Pk ICA/End C   | 50% - 59%<br>CA = 6.7 |
| External Plaque Disease length from BIF   | Mixed   | 1.06                     |                        | < 30%                 |
| Vertebral   | Open Orthograde   |                          |                        |                       |
| Subclavian  | No Turbulence   | Good Signal              | Triphasic              | Widely Patent         |
| Left  | Diameter (cm)   | PSV (m/s)                | EDV (m/s)              | Stenosis              |
| <b>Common</b><br>Plaque<br>Disease length from BIF  | Mixed   | 0.53                     |                        | < 30%                 |
| <b>Bifurcation</b> Plaque Disease length from BIF   | Mixed   |                          |                        | < 40%                 |
| Internal<br>Plaque  | Dense Mixed Soft  |                          | *                      | = 100%                |
| Disease length from BIF  External  Plaque  Disease length from BIF  | Mixed   | ICA/Pk CCA = 0.0<br>1.25 |                        | < 30%                 |
| Vertebral   | Open Orthograde   |                          |                        |                       |
| Subclavian  | No Turbulence   | Good Signal              | Triphasic              | Widely Patent         |
| Notes  CAROTID DUPLEX SCA  RIGHT  Smooth mixed plaques in diameter reduction imagilibrit bifurcation. Distal ICA ap | otid bulb is measured using direct diameter methods a  N  dentified in the right internal carotid arte ng suggests a 50-59% stenosis. Total | as recommended in Oates  | velocities, however di | rect                  |
| LEFT<br>The left internal carotid a   | rtery is occluded with mixed and dense  | e plaques and som        | e echolucent materia   | l -                   |
|   |   |                          |                        |                       |
| Assessed by Ja  | ack Wilson  |                          |                        |                       |

| ?Soft plaque ?Thrombus with no flow identified us<br>Some areas of very weak monophasic flow identified ?Artefact. | sing colour,<br>fied in the di | spectral and pow<br>stal vessel, PSV | rer doppler for ~3<br>11cm/s ?Collate | .69cm.<br>ral reform |  |
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| SUGGEST VASCULAR SURGICAL OPINION.<br>SUGGEST ALTERNATIVE IMAGING  |                                |                                      |                                       |                      |  |
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| Outcome Stend                               | osis moderate, Stenosis severe, Occlusion   | , Calcified, Thrombu   | S                      |              |
|---|---|--|------------------------|--------------|
| Right                                       | Diameter (cm)   | PSV (m/s)  | EDV (m/s)              | Stenosi      |
| Common                                      |   | 1.33   | 0.38                   | < 309        |
| Plaque                                      | Mixed   | 1.55   | 0.56                   | _ 307        |
| Disease length from BIF                     |   |  |                        |              |
| Bifurcation                                 |   |  |                        | 60% - 699    |
| Plaque                                      | Dense Mixed Calcified   |  |                        |              |
| Disease length from BIF                     |   |  |                        |              |
| Internal                                    |   | 6.07   | 3.26                   | 90% - 95%    |
| Plaque                                      | Dense Mixed   |  |                        |              |
| Disease length from BIF                     | 1.40cm Pk   | ICA/Pk CCA = 4.6   | Pk ICA/End CC          | A = 16.0     |
| External                                    |   | 2.96   |                        | < 409        |
| Plaque                                      | Mixed   |  |                        |              |
| Disease length from BIF                     |   |  |                        |              |
| Vertebral                                   | Open Orthograde   |  |                        |              |
| Subclavian                                  |   | Cond Cinnel  | Triphagia              | Widely Dates |
| June 19 19 19 19 19 19 19 19 19 19 19 19 19 | No Turbulence   | Good Signal  | Triphasic              | Widely Paten |
| Left  | Diameter (cm)   | PSV (m/s)  | EDV (m/s)              | Stenos       |
| Common                                      |   | 1.00   | 0.17                   | < 309        |
| Plaque                                      | Mixed   |  |                        |              |
| Disease length from BIF                     |   |  |                        |              |
| Bifurcation                                 |   |  |                        | 50% - 599    |
| Plaque                                      | Dense Mixed Calcified   |  |                        |              |
| Disease length from BIF                     |   |  |                        |              |
| Internal                                    |   |  | *                      | = 1009       |
| Plaque                                      | Dense Mixed Soft Calcified  |  |                        |              |
| Disease length from BIF                     | Pk  | ICA/Pk CCA = 0.0   | Pk ICA/End CC          | A = 0.0      |
| External                                    |   | 4.16   |                        | < 309        |
| Plaque                                      | Mixed   |  |                        |              |
| Disease length from BIF                     |   |  |                        |              |
| Vertebral                                   | Open Orthograde   |  |                        |              |
| Subclavian                                  | No Turbulence   | Good Signal  | Triphasic              | Widely Paten |
|   | nethods. If marked * ALWAYS read full r<br>tid bulb is measured using direct diameter methods a |  | et al (2009).          |              |
| Notes                                       |   |  |                        | •            |
| CAROTID DUPLEX SCA                          |   |  |                        |              |
| RIGHT                                       |   |  |                        |              |
|   | d plaques identified in the right carotid   |  |                        | 1            |
|   | reduction imaging. Mixed and dense p  |  |                        |              |
| artery forming a 90-95% patent.             | stenosis. Total disease length ~1.4cm   | including the bifurd   | ation. Distal ICA appe | ears         |
| LEFT  |   |  |                        |              |
|   |   | the state of the s |                        |              |
| Assessed by Ja                              | ack Wilson  |  |                        |              |

| Mixed, dense and calcified place<br>on direct diameter reduction im-<br>and calcified plaques and some<br>colour, spectral and power dop | aging. The left internate echolucent material | I carotid artery app | ears occluded with | mixed, dense |  |
|--|---|----------------------|--------------------|--------------|--|
| SUGGEST VASCULAR SURG  | ICAL OPINION.                                 |                      |                    |              |  |
|  |   |                      |                    |              |  |
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| Assessed by Jack Wi  |   |                      |                    |              |  |
| Printed on 16/11/2021 at 8:46 a  | am  | Checked b            | y                  |              |  |
|  |   |                      |                    |              |  |

| Reason  | ΓIA clinic                          |               |                 |           |            |               |
|---|-------------------------------------|---------------|-----------------|-----------|------------|---------------|
| Outcome (   | Calcified, disease - mild           |               |                 |           |            |               |
| Right   |                                     | Diameter (cm) | PSV (m/s        | ) EDV     | V (m/s)    | Stenosi       |
| <b>Common</b> Plaque Disease length from BI             | Mixed<br>F                          |               | 1.0             | L         | 0.19       | < 30%         |
| Bifurcation Plaque Disease length from BI               | Dense Mixed                         |               |                 |           |            | < 40%         |
| Internal<br>Plaque                                      | Mixed                               |               | 0.53            | 3         | 0.18       | < 30%         |
| Disease length from BI                                  | F                                   | Pk 1          | CA/Pk CCA = 0.5 | Pk I      | CA/End CCA | = 2.8         |
| External Plaque Disease length from BII                 | Mixed<br>F                          |               | 1.21            |           |            | < 30%         |
| Vertebral   | Open Orthograde                     |               |                 |           |            |               |
| Subclavian  | No Turbulence                       |               | Good Signal     | Triphasic |            | Widely Patent |
| Left  |                                     | Diameter (cm) | PSV (m/s)       | EDV       | / (m/s)    | Stenosis      |
| <b>Common</b><br>Plaque<br>Disease length from BII      | Mixed<br>F                          |               | 0.93            |           | 0.21       | < 30%         |
| <b>Bifurcation</b><br>Plaque<br>Disease length from BII | Dense Mixed Calcified               |               |                 |           |            | < 40%         |
| Internal<br>Plaque                                      | Mixed                               |               | 0.70            |           | 0.24       | < 30%         |
| Disease length from BIF                                 |                                     | Pk I          | CA/Pk CCA = 0.8 | Pk IC     | CA/End CCA | = 3.3         |
| External Plaque Disease length from BIF                 | Mixed                               |               | 1.20            |           |            | < 30%         |
| Vertebral   | Open Orthograde                     |               |                 |           |            |               |
| Subclavian  | No Turbulence                       |               | Good Signal     | Triphasic |            | Widely Patent |
| Notes<br>CAROTID DUPLEX S                               | carotid bulb is measured using dire |               |                 |           | enosis,    |               |
| A Line  |                                     | s Chillennia  |                 |           |            |               |
| Assessed by   | Jack Wilson                         |               |                 |           |            |               |
| Printed on 16/11/2021                                   | at 8:47 am                          | Che           | ecked by        |           |            |               |

| Diameter (cm) Mixed   | PSV (m/s)  |  | Stenosis   |
|---|--|--|--|
| Mixed   | 1.20   | 0.26   |  |
|   |  | 0.40   | < 30%  |
| Mixed   |  |  | < 40%  |
| Mixed   | 0.89   |  | < 30%  |
| Mixed   |  |  | < 30%  |
| Open Orthograde   |  |  |  |
| No Turbulence   | Good Signal  | Triphasic  | Widely Patent  |
| Diameter (cm)   | PSV (m/s)  | EDV (m/s)  | Stenosis   |
| Mixed   | 1.04   | 0.23   | < 30%  |
| Mixed   |  |  | 40% - 49%  |
| Mixed Pk  |  | 0.27<br>Pk ICA/End CCA   | < 40%<br>A = 4.3   |
| Mixed   | 1.29   |  | 50% - 59%  |
| Open Orthograde   |  |  |  |
| No Turbulence   | Good Signal  | Biphasic   | Widely Patent  |
| bulb is measured using direct diameter methods a the right internal carotid artery forming the left carotid bifurcation forming a | ng a less than 30%   | o stenosis.  | 16   |
|   |  |  |  |
|   | Mixed  Open Orthograde No Turbulence  Diameter (cm)  Mixed  Mixed  Mixed  Pk  Mixed  Open Orthograde No Turbulence  thods. I bulb is measured using direct diameter methods at the right internal carotid artery forming the left carotid bifurcation forming a orming a less than 40% stenosis. | Mixed  Open Orthograde No Turbulence  Diameter (cm)  Mixed  PSV (m/s)  1.04  Mixed  1.00  Mixed  Pk ICA/Pk CCA = 1.0  1.29  Mixed  Open Orthograde No Turbulence  Good Signal  the right internal carotid artery forming a less than 30% the left carotid bifurcation forming a 40–49% stenosis. Forming a less than 40% stenosis. | Mixed  Open Orthograde No Turbulence  Diameter (cm)  PSV (m/s)  1.04  0.23  Mixed  1.00  Open Orthograde  Mixed  1.00  Pk ICA/Pk CCA = 1.0  Pk ICA/End CCA  1.29  Mixed  Open Orthograde  No Turbulence  Good Signal  Biphasic  thods. bulb is measured using direct diameter methods as recommended in Oates et al (2009).  the right internal carotid artery forming a less than 30% stenosis. the left carotid bifurcation forming a 40-49% stenosis. Plaques extends into the orming a less than 40% stenosis. |

| 11 · 12 · 12 · 13 · 14 · 15 · 15 · 15 · 15 · 15 · 15 · 15 |  |             |                   |           |             |                |
|---|--|-------------|-------------------|-----------|-------------|----------------|
| Right   | Di                                     | ameter (cm) | PSV (m/s)         | EDV       | / (m/s)     | Stenosis       |
| Common Plaque Disease length from BIF                     | Mixed                                  |             | 0.66              |           | 0.20        | < 30%          |
| Bifurcation Plaque Disease length from BIF                | Mixed                                  |             |                   |           |             | < 30%          |
| Internal Plaque Disease length from BIF                   | Mixed                                  | PL TCA      | 0.45 Pk CCA = 0.7 |           | 0.13        | < 30%          |
| External Plaque Disease length from BIF                   | Mixed                                  |             | 0.60              |           | A, Lild CCA | < 30%          |
| Vertebral   | Open Orthograde                        |             |                   |           |             |                |
| Subclavian  | No Turbulence                          | Goo         | od Signal         | Triphasic |             | Widely Patent  |
| Left  | Di                                     | ameter (cm) | PSV (m/s)         | EDV       | (m/s)       | Stenosis       |
| Common Plaque Disease length from BIF                     | Mixed                                  |             | 0.70              |           | 0.21        | < 30%          |
| Bifurcation Plaque Disease length from BIF                | Mixed                                  |             |                   |           |             | < 30%          |
| Internal Plaque Disease length from BIF                   | Mixed                                  | Pk ICA/     | 0.55 Pk CCA = 0.8 | Pk IC     | 0.19        | < 30%<br>= 2.6 |
| External Plaque Disease length from BIF                   | Mixed                                  |             | 0.59              |           |             | < 30%          |
| Vertebral   | Open Orthograde                        |             |                   |           |             |                |
| Subclavian  | No Turbulence                          | God         | od Signal         | Triphasic |             | Widely Patent  |
| Notes CAROTID DUPLEX SCA                                  | otid bulb is measured using direct dia |             |                   |           | enosis,     |                |
| Assessed by Ja Printed on 16/11/2021 at                   | ack Wilson<br>8:45 am                  | Check       | ed by             |           |             |                |

|  | clinic<br>nal thickening         |               |             |                       |                   |
|--|----------------------------------|---------------|-------------|-----------------------|-------------------|
| Outcome Intin  | nai thickening                   |               |             |                       |                   |
| Right  |                                  | Diameter (cm) | PSV (m/s)   | EDV (m/s)             | Stenos            |
| Common Plaque Disease length from BIF  | Intimal Thickening               |               | 1.15        | 0.32                  | < 30%             |
| Bifurcation Plaque Disease length from BIF   | Intimal Thickening               |               |             |                       | < 30%             |
| Internal Plaque Disease length from BIF  | Intimal Thickening               | Pk            | 0.75        | 0.36<br>Pk ICA/End Co | < 309             |
| External Plaque Disease length from BIF  | Intimal Thickening               |               | 1.22        |                       | < 30%             |
| Vertebral  | Open Orthograde                  |               |             |                       |                   |
| Subclavian   | No Turbulence                    |               | Good Signal | Triphasic             | Widely Patent     |
| Left   |                                  | Diameter (cm) | PSV (m/s)   | EDV (m/s)             | Stenosi           |
| <b>Common</b><br>Plaque<br>Disease length from BIF   | Intimal Thickening               |               | 1.30        | 0.34                  | < 30%             |
| Bifurcation Plaque Disease length from BIF   | Intimal Thickening               |               |             |                       | < 30%             |
| Internal Plaque Disease length from BIF  | Intimal Thickening               | Pk            | 0.88        | 0.32                  | < 30%<br>CA = 2.6 |
| External Plaque Disease length from BIF  | Intimal Thickening               |               | 1.33        |                       | < 30%             |
| Vertebral  | Open Orthograde                  |               |             |                       |                   |
| Subclavian   | No Turbulence                    |               | Good Signal | Triphasic             | Widely Patent     |
| Stenosis based on NASCET r Disease within large diameter card  Notes  CAROTID DUPLEX SCA  Intimal thickening identification in the company in | otid bulb is measured using dire |               |             |                       | on in             |
| Assessed by Ja   | ack Wilson<br>8:43 am            | Ch            | ecked by    |                       |                   |

| Right  |                                 |               |                  | 그의 이 일반 여행을 가장하는 그 보다. |             |               |
|--|---------------------------------|---------------|------------------|------------------------|-------------|---------------|
|  |                                 | Diameter (cm) | PSV (m/s         | ) E                    | DV (m/s)    | Stenosi       |
| Common Plaque Disease length from BIF  | Intimal Thickening              |               | 0.90             | 0                      | 0.24        | < 30%         |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed Calcified           |               |                  |                        |             | < 40%         |
| Internal   |                                 |               | 0.7              | 5                      | 0.26        | < 40%         |
| Plaque  Disease length from BIF  | Dense Mixed                     | Pk            | ICA/Pk CCA = 0.8 | Pk                     | ICA/End CCA | = 3.1         |
| External Plaque Disease length from BIF  | Mixed                           |               | 0.2              | 1                      |             | < 30%         |
| Vertebral  | Open Orthograde                 |               |                  |                        |             |               |
| Subclavian   | No Turbulence                   |               | Good Signal      | Triphasic              |             | Widely Patent |
| Left   |                                 | Diameter (cm) | PSV (m/s         | ) E                    | DV (m/s)    | Stenosis      |
| Common Plaque Disease length from BIF  | Mixed                           |               | 0.77             | 7                      | 0.21        | < 30%         |
| Bifurcation  |                                 |               |                  |                        |             | < 40%         |
| Plaque Disease length from BIF   | Dense Mixed                     |               |                  |                        |             |               |
| Internal Plaque  | Dense Mixed                     |               | 0.5              | 8                      | 0.17        | < 40%         |
| Disease length from BIF  |                                 | Pk            | ICA/Pk CCA = 0.8 | Pk                     | ICA/End CCA | = 2.8         |
| External Plaque Disease length from BIF  | Mixed                           |               | 1,0              | 7                      |             | < 30%         |
| Vertebral  | Open Orthograde                 |               |                  |                        |             |               |
| Subclavian   | No Turbulence                   |               | Good Signal      | Triphasic              |             | Widely Patent |
| Stenosis based on NASCET m Disease within large diameter carol  Notes  CAROTID DUPLEX SCAI  Mixed and dense plaques stenosis, bilaterally. | tid bulb is measured using dire |               |                  |                        | nan 40%     |               |
|  |                                 |               |                  |                        |             |               |

TIA clinic

Reason

Reason

TIA clinic

Outcome

Calcified, disease - mild

| Right   |                       | Diameter (cm) | PSV (m/s              | 5)        | EDV (m/s)              | Stenosi        |
|---|-----------------------|---------------|-----------------------|-----------|------------------------|----------------|
| Common Plaque Disease length from BIF             | Mixed                 |               | 0.8                   | 3         | 0.19                   | < 30%          |
| Bifurcation Plaque Disease length from BIF        | Dense Mixed Calcified |               |                       |           |                        | < 40%          |
| Internal Plaque Disease length from BIF           | Dense Mixed Calcified | Pk            | 0.5 ICA/Pk CCA = 0.7  |           | 0.20 Pk ICA/End CCA =  | < 40%<br>= 3.0 |
| External Plaque Disease length from BIF           | Dense Mixed           |               | 1.2                   |           |                        | < 30%          |
| Vertebral   | Open Orthograde       |               |                       |           |                        |                |
| Subclavian  | No Turbulence         |               | Good Signal           | Triphasic |                        | Widely Patent  |
| Left  |                       | Diameter (cm) | PSV (m/s              | ;)        | EDV (m/s)              | Stenosis       |
| Common<br>Plaque<br>Disease length from BIF       | Dense Mixed           |               | 0.7                   | 6         | 0.19                   | < 30%          |
| <b>Bifurcation</b> Plaque Disease length from BIF | Dense Mixed Calcified |               |                       |           |                        | < 40%          |
| Internal Plaque Disease length from BIF           | Mixed                 | Pk            | 0.9  ICA/Pk CCA = 1.2 |           | 0.31  Pk ICA/End CCA = | < 30%<br>: 4.8 |
| External Plaque Disease length from BIF           | Mixed                 |               | 0.9                   | 3         |                        | < 30%          |
| Vertebral   | Open Orthograde       |               |                       |           |                        |                |
| Subclavian  | No Turbulence         |               | Good Signal           | Triphasic |                        | Widely Patent  |

### Notes

# CAROTID DUPLEX SCAN

Mixed, dense and calcified plaques identified in the right internal carotid artery forming a less than 40% stenosis.

Mixed plaques identified in the left internal carotid artery forming a less than 30% stenosis.

| Assessed by           | Jack Wilson |  |
|-----------------------|-------------|--|
| Printed on 16/11/2021 | at 8:35 am  |  |

| Subclavian No Turbulence Good Signal Triphasic Widel  Left Diameter (cm) PSV (m/s) EDV (m/s)  Common 0.63 0.11  Plaque Dense Mixed Disease length from BIF  Bifurcation Plaque Dense Mixed Calcified Disease length from BIF  Internal Plaque Disease length from BIF Plaque Disease length from BIF Plaque Disease length from BIF  External Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.  |   |  | Diameter (cm)   | PSV (m/s           | 5)          | EDV (m/s)      | Stenosi       |
|--|---|--|-----------------|--------------------|-------------|----------------|---------------|
| Plaque Disease length from BIF  Internal   | Plaque  | Dense Mixed  |                 | 0.7                | 70          | 0.13           | < 40%         |
| Plaque Disease length from BIF Pk ICA/Pk CCA = 0.8 Pk ICA/End CCA = 4.2  External 1.02 Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Triphasic Widel  Left Diameter (cm) PSV (m/s) EDV (m/s)  Common 0.63 0.11  Plaque Dense Mixed Disease length from BIF  Bifurcation Plaque Dense Mixed Calcified Disease length from BIF  Internal Plaque Dense Mixed Calcified Disease length from BIF  External Plaque Dense Mixed Calcified Disease length from BIF  Dense Mixed Calcified Disease length from BIF  One Mixed Disease length from BIF  External Plaque Dense Mixed Calcified Disease length from BIF  External Plaque Dense Mixed Calcified Disease length from BIF  External Plaque Disease length from BIF  External Plaque Mixed Disease length from BIF  External Plaque Disease length from BIF  External Plaque Mixed Disease length from BIF  External Disease length from BIF  External Plaque Mixed Disease length from BIF  External Plaque Mixed Disease length from BIF  External Disease River Disease Disease Disease River D | Plaque  | Dense Mixed Calcified  |                 |                    |             |                | < 50%         |
| External Plaque Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Triphasic Widel  Left Diameter (cm) PSV (m/s) EDV (m/s)  Common Plaque Disease length from BIF  Bifurcation Plaque Disease length from BIF  Internal Plaque Disease length from BIF  Internal Plaque Disease length from BIF  Internal Plaque Disease length from BIF  Onense Mixed Calcified Disease length from BIF  Internal Plaque Disease length from BIF  Onense Mixed Calcified Disease length from BIF  Internal Plaque Disease length from BIF Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.   | Plaque  | Dense Mixed  | Pk i            |                    |             |                | < 40%         |
| Subclavian  No Turbulence  Good Signal Triphasic Widel  Left  Diameter (cm)  PSV (m/s)  EDV (m/s)  EDV (m/s)  Common  Plaque Disease length from BIF  Bifurcation Plaque Disease length from BIF  Internal Plaque Disease length from BIF  Plaque Disease length from BIF  Dense Mixed Calcified Plaque Disease length from BIF  Plaque Disease length from BIF  O.66  O.16  External Plaque Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Widel  Oxidation  Widel  Oxidation  Widel  Oxidation  No Turbulence Oxidation  Oxidation  No Turbulence Oxidation  No Turbulence Oxidation  Widel  Oxidation  Oxida | Plaque  | Mixed  |                 |                    |             |                | < 30%         |
| Left Diameter (cm) PSV (m/s) EDV (m/s)  Common 0.63 0.11  Plaque Dense Mixed Disease length from BIF  Bifurcation Plaque Dense Mixed Calcified Disease length from BIF  Internal Plaque Dense Mixed Calcified Disease length from BIF  Plaque Disease length from BIF Pk ICA/Pk CCA = 1.0 Pk ICA/End CCA = 6.0  External Plaque Disease length from BIF  External Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Wideled  Stenosis based on NASCET methods.  | ertebral  | Open Orthograde  |                 |                    |             |                |               |
| Common 0.63 0.11  Plaque Dense Mixed Disease length from BIF  Bifurcation Plaque Dense Mixed Calcified Disease length from BIF  Internal Plaque Dense Mixed Calcified Disease length from BIF  Plaque Dense Mixed Calcified Pk ICA/Pk CCA = 1.0 Pk ICA/End CCA = 6.0  External Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.   | ubclavian   | No Turbulence  |                 | Good Signal        | Triphasic   |                | Widely Patent |
| Plaque Dense Mixed Disease length from BIF  Bifurcation Plaque Dense Mixed Calcified Disease length from BIF  Internal 0.66 0.16 Plaque Dense Mixed Calcified Disease length from BIF Pk ICA/Pk CCA = 1.0 Pk ICA/End CCA = 6.0  External 0.71 Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.  | eft   |  | Diameter (cm)   | PSV (m/s           | 5)          | EDV (m/s)      | Stenosi       |
| Plaque Dense Mixed Calcified Disease length from BIF  Internal 0.66 0.16 Plaque Dense Mixed Calcified Disease length from BIF Pk ICA/Pk CCA = 1.0 Pk ICA/End CCA = 6.0  External 0.71 Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.  | Plaque  | Dense Mixed  |                 | 0.6                | i <b>3</b>  | 0.11           | < 30%         |
| Plaque Dense Mixed Calcified Disease length from BIF Pk ICA/Pk CCA = 1.0 Pk ICA/End CCA = 6.0  External 0.71 Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.   | Plaque  | Dense Mixed Calcified  |                 |                    |             |                | < 50%         |
| Disease length from BIF  Pk ICA/Pk CCA = 1.0  Pk ICA/End CCA = 6.0  External  Plaque  Plaque  Disease length from BIF  Vertebral  Open Orthograde  Subclavian  No Turbulence  Good Signal  Biphasic  Widel  Stenosis based on NASCET methods.  |   |  |                 | 0.6                | 6           | 0.16           | < 50%         |
| Plaque Mixed Disease length from BIF  Vertebral Open Orthograde  Subclavian No Turbulence Good Signal Biphasic Widel  Stenosis based on NASCET methods.  |   | Dense Mixed Calcified  | Pk :            | ICA/Pk CCA = 1.0   |             | Pk ICA/End CCA | A = 6.0       |
| Subclavian         No Turbulence         Good Signal         Biphasic         Widel           Stenosis based on NASCET methods.  | Plaque  | Mixed  |                 | 0.7                | 1           |                | < 30%         |
| Stenosis based on NASCET methods.  | ertebral  | Open Orthograde  |                 |                    |             |                |               |
| Stenosis based on NASCET methods.  Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).  | ubclavian   | No Turbulence  |                 | Good Signal        | Biphasic    |                | Widely Patent |
| Notes  CAROTID DUPLEX SCAN  Mixed and dense plaques identified in the right internal carotid artery forming a less than 40% stenosis.  Mixed, dense and calcified plaques identified in the left internal carotid artery forming a less than 50% stenosis.   | isease within large diameter carot lotes CAROTID DUPLEX SCAN lixed and dense plaques lixed, dense and calcified | d bulb is measured using direct of the state | ernal carotid a | rtery forming a le | ess than 40 | 0% stenosis.   |               |

Stroke

| Right  | Diameter (cm)   | PSV (m/s)                             | EDV (m/s)            | Stenosi       |
|--|---|---------------------------------------|----------------------|---------------|
| Common Plaque Disease length from BIF  | Dense Mixed   | 0.70                                  | 0.23                 | < 30%         |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed Calcified                                 |                                       |                      | < 40%         |
| internal Plaque Disease length from BIF  | Dense Mixed Calcified                                 | 0.72                                  |                      | < 40%         |
| External Plaque Disease length from BIF  | Dense Mixed   | 1CA/Pk CCA = 1.0<br>0.82              | Pk ICA/End CCA       | < 40%         |
| /ertebral<br>Subclavian  | Open Orthograde                                       |                                       |                      |               |
| and an analysis and an analysi | No Turbulence   | Good Signal                           | Triphasic            | Widely Patent |
| _eft   | Diameter (cm)   | PSV (m/s)                             | EDV (m/s)            | Stenosis      |
| Common Plaque Disease length from BIF  | Mixed   | 0.78                                  | 0.17                 | < 30%         |
| <b>Bifurcation</b> Plaque Disease length from BIF  | Dense Mixed Calcified                                 |                                       |                      | < 40%         |
| nternal Plaque Disease length from BIF   | Mixed Pk  | 0.58 ICA/Pk CCA = 0.7                 | 0.21 Pk ICA/End CCA  | < 30%         |
| External Plaque Disease length from BIF  | Mixed   | 1.45                                  |                      | < 30%         |
| /ertebral  | Open Orthograde                                       |                                       |                      |               |
| Subclavian   | No Turbulence   | Good Signal                           | Triphasic            | Widely Patent |
| Notes CAROTID DUPLEX SCA Mixed, dense and calcified tenosis.   | otid bulb is measured using direct diameter methods a | al carot <mark>i</mark> d artery forr | ning a less than 40% |               |

| Outcome   | Stenosis mild, Calcified, disease - mild                                    | 1                          |                     |                |               |
|---|---|----------------------------|---------------------|----------------|---------------|
| Right   | Diame   | ter (cm) PSV               | (m/s)               | EDV (m/s)      | Stenosi       |
| Common  |   |                            | 0.93                | 0.24           | < 30%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from B                                   | (F  |                            |                     |                |               |
| Bifurcation   |   |                            |                     |                | 40% - 49%     |
| Plaque  | Dense Mixed Calcified   |                            |                     |                |               |
| Disease length from BI                                  | (F  |                            |                     |                |               |
| Internal  |   |                            | 1.12                | 0.27           | < 30%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from B                                   | (F  | Pk ICA/Pk CCA =            | 1.2                 | Pk ICA/End CCA | = 4.7         |
| External  |   |                            | 1.02                |                | < 30%         |
| Plaque  | Mixed   |                            | 1.02                |                |               |
| Disease length from BI                                  | (F  |                            |                     |                |               |
| Vertebral   | Open Orthograde   |                            |                     |                |               |
| Subclavian  | No Turbulence   | Good Signal                | Triphasi            | c              | Widely Patent |
|   |   |                            |                     |                |               |
| Left  | Diame   | ter (cm) PSV               | (m/s)               | EDV (m/s)      | Stenosis      |
| Common  |   |                            | 0.75                | 0.21           | < 30%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from BI                                  |   |                            |                     |                |               |
| Bifurcation   |   |                            |                     |                | < 40%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from BI                                  | iF .  |                            |                     | Shirt Ha       |               |
| Internal  |   |                            | 0.64                | 0.21           | < 30%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from BI                                  | IF  | Pk ICA/Pk CCA =            | 0.9                 | Pk ICA/End CCA | = 3.0         |
| External  |   |                            | 1.01                |                | < 30%         |
| Plaque  | Mixed   |                            |                     |                |               |
| Disease length from BI                                  | (F  |                            |                     |                |               |
| Vertebral   | Open Orthograde   |                            |                     |                |               |
| Subclavian  | No Turbulence   | Good Signal                | Triphasi            | c              | Widely Patent |
| Stenosis based on NASC<br>Disease within large diameter | ET methods.  r carotid bulb is measured using direct diameter               | r methods as recommended i | in Oates et al (200 | 9).            |               |
| Notes   | ,                                     |                            |                     |                |               |
| CAROTID DUPLEX  | SCAN  |                            |                     |                | . 7           |
|   | cified plaques identified in the right into the right internal carotid arte |                            |                     |                |               |
| Mixed plaques identif                                   | ied in the left internal carotid artery                                     | y forming a less than      | 30% stenosis        | <b>3.</b>      |               |
|   |   |                            |                     |                |               |
| Assessed by   | Jack Wilson   |                            |                     |                |               |

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|--|--|-------------------------|---|--------------|
| Right  | Diameter (cm)  | PSV (m/s)               | EDV (m/s)                                 | Stenos       |
| Common<br>Plaque<br>Disease length from BIF  | Mixed  | 0.59                    | 0.18                                      | < 309        |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed  |                         |   | < 409        |
| nternal Plaque Disease length from BIF   | Mixed  | 0.50                    |   | . < 309      |
| External   |  | k ICA/Pk CCA = 0.8      | Pk ICA/End CCA                            |              |
| Plaque Disease length from BIF   | Mixed  | 0.97                    |   | < 309        |
| /ertebral  | Open Orthograde  |                         |   |              |
| Subclavian   | No Turbulence  | Good Signal             | Triphasic                                 | Widely Paten |
| _eft   | Diameter (cm)  | PSV (m/s)               | EDV (m/s)                                 | Stenos       |
| Common  Plaque  Disease length from BIF  | Mixed  | 0.63                    | 0.23                                      | < 309        |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed  |                         |   | < 409        |
| nternal<br>Plaque  | Dense Mixed  | 0.47                    | 0.18                                      | < 309        |
| Disease length from BIF  | Pi   | k ICA/Pk CCA = 0.7      | Pk ICA/End CCA                            | = 2.0        |
| Plaque Disease length from BIF   | Mixed  | 0.80                    |   | < 30%        |
| /ertebral  | Open Orthograde  |                         |   |              |
| Subclavian   | No Turbulence  | Good Signal             | Triphasic                                 | Widely Paten |
| Stenosis based on NASCET n<br>Disease within large diameter card   | nethods.<br>tid bulb is measured using direct diameter methods | as recommended in Oates | et al (2009).                             |              |
| Notes  |  |                         |   |              |
| CAROTID DUPLEX SCA   | N  |                         |   |              |
| Mixed plaques identified   | in the right internal carotid artery, form                     | ning a less than 30%    | 6 stenosis.                               |              |
| Mixed and dense plaques  | s identified in the left internal carotid a                    | rtery, forming a less   | s than 30% stenosis.                      |              |
|  |  |                         |   |              |

| Outcome Ca                       | lcified, disease - mild                               |                       |                       |               |
|----------------------------------|---|-----------------------|-----------------------|---------------|
|                                  |   |                       |                       |               |
| Right                            | Diameter (cm)   | PSV (m/               | s) EDV (m/s)          | Stenos        |
| Common                           |   | 0.7                   | 71 0.17               | < 309         |
| Plaque Disease length from BIF   | Mixed   |                       |                       |               |
| Bifurcation                      |   |                       |                       |               |
| Plaque                           | Dense Mixed   |                       |                       | < 309         |
| Disease length from BIF          |   |                       |                       |               |
| Internal                         |   | 0.5                   | 0.20                  | < 309         |
| Plaque                           | Mixed   |                       |                       |               |
| Disease length from BIF          |   | c ICA/Pk CCA = 0.8    | Pk ICA/End CC         | A = 3.4       |
| External Plaque                  | Mixed   | 1.0                   | )5                    | < 30%         |
| Disease length from BIF          |   |                       |                       |               |
| Vertebral                        | Open Orthograde                                       |                       |                       |               |
| Subclavian                       | No Turbulence   | Good Signal           | Triphasic             | Widely Patent |
| Left                             | Diameter (cm)   | PSV (m/s              | s) EDV (m/s)          | Stenosi       |
|                                  |   |                       |                       |               |
| Common<br>Plaque                 | Mixed   | 0.7                   | 75 0.18               | < 30%         |
| Disease length from BIF          |   |                       |                       |               |
| Bifurcation                      |   |                       |                       | < 50%         |
| Plaque Disease length from BIF   | Dense Mixed Calcified                                 |                       |                       |               |
| Internal                         |   | 0.7                   | 75 0.21               | < 30%         |
| Plaque Disease length from BIF   | Dense Mixed Calcified                                 | c ICA/Pk CCA = 1.0    | Pk ICA/End CC         |               |
|                                  |   |                       |                       |               |
| External Plaque                  | Mixed   | 0.9                   | 98                    | < 30%         |
| Disease length from BIF          |   |                       |                       |               |
| Vertebral                        | Open Orthograde                                       |                       |                       |               |
| Subclavian                       | No Turbulence   | Good Signal           | Triphasic             | Widely Patent |
| Stenosis based on NASCET         |   |                       |                       |               |
| Disease within large diameter ca | arotid bulb is measured using direct diameter methods | as recommended in Oat | es et al (2009).      |               |
| Notes                            |   |                       |                       |               |
| CAROTID DUPLEX SC                | AN  |                       |                       |               |
|                                  | d in the right and left internal carotid arte         | eries forming a les   | ss than 30% stenosis, |               |
| bilaterally.                     |   |                       |                       |               |
|                                  |   |                       |                       |               |
| Assessed by                      | Jack Wilson   |                       |                       |               |
|                                  |   |                       |                       |               |

| Reason   | clinic   |                  |                         |                  |                                     |                |
|--|--|------------------|-------------------------|------------------|-------------------------------------|----------------|
| Outcome Calc   | rified, disease - mild                         |                  |                         |                  |                                     |                |
| Right  |  | Diameter (cm)    | PSV (m/                 | s) EDV           | (m/s)                               | Stenosis       |
| C <mark>ommon</mark><br>Plaque<br>Disease length from BIF                                  | Intimal Thickening                             |                  | 1.0                     | 06               | 0.14                                | < 30%          |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed Calcified                          |                  |                         |                  |                                     | < 50%          |
| Internal Plaque Disease length from BIF  | Dense Mixed                                    | Pk               | 0.9 ICA/Pk CCA = 0.8    |                  | 0.18<br>A/End CCA =                 | < 40%          |
| External Plaque Disease length from BIF  | Dense Mixed Calcified                          |                  | 1.:                     | 36               |                                     | < 40%          |
| Vertebral  | Open Orthograde                                |                  |                         |                  | 5. Kg - 12                          |                |
| Subclavian   | No Turbulence                                  |                  | Good Signal             | Triphasic        |                                     | Widely Patent  |
| Left   |  | Diameter (cm)    | PSV (m/                 | s) EDV           | (m/s)                               | Stenosis       |
| Common Plaque Disease length from BIF  | Intimal Thickening                             |                  | 0.7                     | 73               | 0.11                                | < 30%          |
| Bifurcation Plaque Disease length from BIF   | Dense Mixed                                    |                  |                         |                  |                                     | < 50%          |
| Internal Plaque Disease length from BIF  | Dense Mixed                                    | Pk               | 0.9<br>ICA/Pk CCA = 1.3 |                  | 0. <b>1</b> 9<br><b>A/End CCA =</b> | < 40%<br>: 8.6 |
| External Plaque Disease length from BIF  | Mixed  |                  | 1.                      | 10               |                                     | < 30%          |
| Vertebral  | Open Orthograde                                |                  |                         |                  |                                     |                |
| Subclavian   | No Turbulence                                  |                  | Good Signal             | Triphasic        |                                     | Widely Patent  |
| Stenosis based on NASCET of Disease within large diameter care.  Notes  CAROTID DUPLEX SCA | otid <mark>bul</mark> b is measured using dire |                  |                         |                  |                                     |                |
| Mixed and dense plaque<br>stenosis, bilaterally.   | es identified in the right a                   | and leπ internal | carotid arteries f      | orming a less th | an 40%                              |                |
|  |  |                  |                         |                  |                                     |                |
| Assessed by J  | ack Wilson                                     |                  |                         |                  | And the second second               |                |

| ked                      |  | 0.6  | 59   | 0.13   | < 30%  |
|--------------------------|--|--|--|--|--|
|                          |  |  |  |  |  |
| æd                       |  |  |  |  | < 30%  |
| red                      | Pk Ti  |  |  | 0.21   | < 30%  |
| ked                      |  |  |  |  | < 30%  |
| en Orthograde Turbulence |  | Good Signal  | Biphasic   |  | Widely Patent  |
|                          | Diameter (cm)  | PSV (m/s   | s)   | EDV (m/s)  | Stenosi  |
| eed                      |  | 0.6  | 53   | 0.17   | < 30%  |
| red                      |  | ——————————————————————————————————————   |  |  | < 30%  |
| nse Mixed Calcified      | PL TO  |  |  | 0.24   | < 40%  |
| ked                      |  |  |  | TOTAL CON -  | < 30%  |
| en Orthograde            |  |  |  |  |  |
| Turbulence               |  | Good Signal  | Biphasic   |  | Widely Patent  |
|                          | en Orthograde Turbulence  ded  red  red  red  red  en Orthograde  Turbulence  ted  ted  ted  ted | en Orthograde Turbulence  Diameter (cm)  ded  red  red  red  red  red  red  re | Pk ICA/Pk CCA = 1.1  O.6  ded  en Orthograde  Turbulence  Diameter (cm)  PSV (m/  O.6  ded  Pk ICA/Pk CCA = 1.4  O.7  ded  en Orthograde  Turbulence  Good Signal  O.7 | Pk ICA/Pk CCA = 1.1  0.66  ced  en Orthograde Turbulence  Diameter (cm)  PSV (m/s)  0.63  ced  en Mixed Calcified  Pk ICA/Pk CCA = 1.4  0.75  ced  en Orthograde Turbulence  Good Signal  Biphasic  Biphasic  Signal  Biphasic  Biphasic  Cods  Cods | red  Pk ICA/Pk CCA = 1.1  Pk ICA/End CCA =  0.66  Red  Ph ICA/Pk CCA = 1.1  Pk ICA/End CCA =  0.66  Red  Pk ICA/Pk CCA = 1.1  Pk ICA/End CCA =  0.67  PSV (m/s)  EDV (m/s)  0.17  Red  Red  Red  Pk ICA/Pk CCA = 1.4  Pk ICA/Pk CCA = 1.4  Pk ICA/Pk CCA = 0.75  Red  Red  Red  Red  Red  Red  Red  Re |

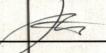
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Printed on 16/11/2021 at 9:27 am

stenosis.

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Reason

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| Outcome Calc  | ified, disease - mild            |                      |          |  |               |
|---|----------------------------------|----------------------|----------|--|---------------|
| Right   |                                  | Diameter (cm)        | PSV (m/s | ) EDV (m/s)  | Stenosi       |
| <b>Common</b><br>Plaque<br>Disease length from BIF  | Mixed                            |                      | 0.7      | 0.17   | < 30%         |
| <b>Bifurcation</b> Plaque Disease length from BIF   | Dense Mixed                      |                      |          |  | < 30%         |
| Internal Plaque Disease length from BIF   | Mixed                            | Pk ICA/              | 0.57     | 7 0.20   | < 30%         |
| External Plaque Disease length from BIF   | Mixed                            |                      | 1.0      |  | < 30%         |
| Vertebral   | Open Orthograde                  |                      |          |  |               |
| Subclavian  | No Turbulence                    | Goo                  | d Signal | Triphasic  | Widely Patent |
| Left  |                                  | Diameter (cm)        | PSV (m/s | EDV (m/s)  | Stenosis      |
| Common Plaque Disease length from BIF   | Mixed                            |                      | 0.75     | 0.18   | < 30%         |
| <b>Bifurcation</b> Plaque Disease length from BIF   | Dense Mixed Calcified            |                      |          |  | < 50%         |
| Internal Plaque Disease length from BIF   | Dense Mixed Calcified            | Pk ICA/              | 0.75     | 0.21   | < 30%         |
| External Plaque Disease length from BIF   | Mixed                            |                      | 0.98     |  | < 30%         |
| Vertebral   | Open Orthograde                  |                      |          |  |               |
| Subclavian  | No Turbulence                    | Goo                  | d Signal | Triphasic .  | Widely Patent |
| Stenosis based on NASCET n Disease within large diameter card Notes CAROTID DUPLEX SCA Mixed plaques identified | tid bulb is measured using direc |                      |          |  |               |
| bilaterally.  |                                  | mar deroud direction |          | The state of the s |               |
|   |                                  |                      |          |  |               |
| Assessed by Ja  | ack Wilson                       |                      |          |  |               |

| Outcome disea   | ase - mild                                |                              |                   |                |               |
|---|---|------------------------------|-------------------|----------------|---------------|
| Right   | 7.  | Diameter (cm)                | PSV (m/s)         | EDV (m/s)      | Stenosi       |
| Common  |   |                              |                   |                |               |
| Plaque Disease length from BIF                                | Dense Mixed                               |                              | 1.09              | 0.26           | < 40%         |
| Bifurcation   |   |                              |                   |                | < 30%         |
| Plaque<br>Disease length from BIF                             | Mixed                                     |                              |                   |                | 307           |
| internal  |   | 1960年为第二十 <del>年</del>       | 0.76              | 0.23           | < 30%         |
| Plaque  | Mixed                                     |                              |                   |                |               |
| Disease length from BIF                                       |   | Pk ICA                       | Pk CCA = 0.7      | Pk ICA/End CCA | 1 = 2.9       |
| external  |   |                              | 1.82              |                | < 30%         |
| Plaque<br>Disease length from BIF                             | Mixed                                     |                              |                   |                |               |
| /ertebral   | Open Orthograde                           |                              |                   |                |               |
| Subclavian  | No Turbulence                             | Go                           | od Signal         | Triphasic      | Widely Patent |
| _eft  |   | Diameter (cm)                | PSV (m/s)         | EDV (m/s)      | Stenosis      |
| Common  |   |                              | 0.87              | 0.22           | < 30%         |
| Plaque  | Mixed                                     |                              |                   |                |               |
| Disease length from BIF                                       |   |                              |                   |                |               |
| Sifurcation   |   |                              |                   |                | < 30%         |
| Plaque  | Dense Mixed                               |                              |                   |                |               |
| Disease length from BIF                                       |   |                              |                   |                |               |
| nternal   |   |                              | 0.54              | 0.18           | < 30%         |
| Plaque  | Dense Mixed                               |                              |                   |                |               |
| Disease length from BIF                                       |   | Pk ICA/                      | Pk CCA = 0.6      | Pk ICA/End CCA | = 2.5         |
| xternal   |   |                              | 1.70              |                | < 30%         |
| Plaque<br>Disease length from BIF                             | Mixed                                     |                              |                   |                |               |
| 'ertebral   | Open Orthograde                           |                              |                   |                |               |
| ubclavian   | No Turbulence                             | God                          | od Signal         | Triphasic      | Widely Patent |
| tenosis based on NASCET no bisease within large diameter care |   | rect diameter methods as rec | ommended in Oates | et al (2009).  |               |
| lotes   |   |                              |                   |                |               |
| CAROTID DUPLEX SCA  | N .                                       |                              |                   |                |               |
| Mixed plaques identified                                      | in the right internal ca                  | rotid artery, forming a      | less than 30%     | % stenosis.    |               |
| Mixed and dense plaques                                       | s in the left internal ca                 | arotid artery, forming a     | a less than 30%   | % stenosis.    |               |
|   |   |                              |                   |                |               |
|   | N. A. |                              |                   |                |               |
| Assessed by Ja  | ack Wilson                                |                              |                   |                |               |
|   |   |                              |                   |                |               |

| Reason TIA                                 |  |               |            |                      |                   |
|--|--|---------------|------------|----------------------|-------------------|
| Outcome Cal                                | cified, disease - mild   |               |            |                      |                   |
| Right                                      |  | Diameter (cm) | PSV (m/s)  | EDV (m/s)            | Stenosi           |
| Common Plaque Disease length from BIF      | Dense Mixed  |               | 0.75       | 0.18                 | < 40%             |
| Bifurcation Plaque Disease length from BIF | Dense Mixed Calcified  |               |            |                      | < 50%             |
| Internal Plaque Disease length from BIF    | Dense Mixed Calcified  | Pk ICA        | 0.53       | 0.13<br>Pk ICA/End C | < 40%             |
| External Plaque Disease length from BIF    | Mixed  |               | 0.75       |                      | < 30%             |
| Vertebral                                  | Open Orthograde  |               |            |                      |                   |
| Subclavian                                 | No Turbulence  | G             | ood Signal | Triphasic            | Widely Patent     |
| Left                                       |  | Diameter (cm) | PSV (m/s)  | EDV (m/s)            | Stenosis          |
| Common Plaque Disease length from BIF      | Mixed  |               | 0.76       | 0.11                 | < 30%             |
| Bifurcation Plaque Disease length from BIF | Dense Mixed Calcified  |               |            |                      | < 40%             |
| Internal Plaque Disease length from BIF    | Dense Mixed Calcified  | Pk IC/        | 0.57       | 0.16<br>Pk ICA/End C | < 40%<br>CA = 5.2 |
| External Plaque Disease length from BIF    | Mixed  |               | 0.73       |                      | < 30%             |
| Vertebral                                  | Open Orthograde  |               |            |                      |                   |
| Subclavian                                 | No Turbulence  | G             | ood Signal | Triphasic            | Widely Patent     |
| Notes CAROTID DUPLEX SC.                   | rotid bulb is measured using direct of AN ried plaques identified in the |               |            |                      | than              |
| Assessed by                                | Jack Wilson  |               |            |                      |                   |
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Reason TIA clinic Stenosis moderate, Stenosis severe, Calcified **Outcome** Diameter (cm) PSV (m/s) EDV (m/s) Stenosis Right Common 0.80 0.18 < 40% Dense Mixed Calcified Plaque Disease length from BIF **Bifurcation** 40% - 49% Dense Mixed Calcified Plaque Disease length from BIF Internal 2.12 0.44 60% - 69% Plaque Dense Mixed Calcified Pk ICA/End CCA = 11.8 Pk ICA/Pk CCA = 2.7 Disease length from BIF 50% - 59% 3.19 Dense Mixed Calcified Plaque Disease length from BIF **Vertebral** Open Orthograde Subclavian Widely Patent No Turbulence Good Signal **Triphasic** EDV (m/s) Diameter (cm) PSV (m/s) **Stenosis** Left 0.20 < 50% Common 0.82 Dense Mixed Calcified Plaque Disease length from BIF 60% - 69% **Bifurcation** Plaque Dense Mixed Calcified Disease length from BIF Internal 90% - 95% 5.96 Dense Mixed Calcified Pk ICA/End CCA = 29.8 Pk ICA/Pk CCA = 7.3 Disease length from BIF < 50% External 1.60 Dense Mixed Calcified Disease length from BIF **Vertebral** Open Orthograde Subclavian Widely Patent No Turbulence Good Signal **Triphasic** Stenosis based on NASCET methods. Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009). Notes CAROTID DUPLEX SCAN RIGHT Mixed, dense and calcified plaques identified in the right internal carotid artery forming a 60-69% stenosis. Total disease length ~2.10cm. Distal ICA appears patent. LEFT Mixed, dense and calcified plaques identified in the left carotid bifurcation forming a 60-69% stenos is based on diameter reduction imaging. Plaque extends into the left internal carotid artery forming a 90-95%

Assessed by Jack Wilson

SUGGEST VASCULAR SURGICAL OPINION

stenosis. Total disease length ~2.41cm. Distal ICA appears patent.

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| Reason TIA   |   |                         |   |               |
|--|---|-------------------------|---|---------------|
| Outcome Thro   | mbus  |                         |   |               |
| Right  | Diameter (cm)   | PSV (m/s)               | EDV (m/s)   | Stenosi       |
| Common   |   | 0.84                    | 0.26  | < 30%         |
| Plaque Disease length from BIF                                   | Mixed   |                         |   |               |
| Bifurcation  |   |                         |   | < 40%         |
| Plaque   | Dense Mixed Soft  |                         |   | 40%           |
| Disease length from BIF  |   |                         |   |               |
| Internal<br>Plaque   |   | 0.81                    | 0.25  | < 30%         |
| Disease length from BIF  | Mixed   | k ICA/Pk CCA = 1.0      | Pk ICA/End CCA  | = 3.1         |
| External   |   | 5.46                    |   | 70% - 79%     |
| Plaque<br>Disease length from BIF                                | Soft  |                         |   |               |
| Vertebral  | Open Orthograde   |                         |   |               |
| Subclavian   | No Turbulence   | Good Signal             | Biphasic  | Widely Patent |
| Left   | Diameter (cm)   | PSV (m/s)               | EDV (m/s)   | Stenosi       |
| Common   |   | 1.02                    | 0.29  | < 30%         |
| Plaque   | Mixed   |                         |   |               |
| Disease length from BIF  |   |                         |   |               |
| Bifurcation Plaque   | Mixed   |                         | <b>建筑特别。</b>  | < 40%         |
| Disease length from BIF  |   |                         |   |               |
| Internal   |   | 0.98                    | 0.27  | < 30%         |
| Plaque Disease length from BIF                                   | Mixed   | k ICA/Pk CCA = 1.0      | Pk ICA/End CCA  |               |
|  |   |                         |   |               |
| External<br>Plaque   | Mixed   | 2.04                    |   | < 30%         |
| Disease length from BIF  |   |                         |   |               |
| Vertebral  | Open Orthograde   |                         |   |               |
| Subclavian   | No Turbulence   | Good Signal             | Triphasic   | Widely Patent |
| Stenosis based on NASCET r<br>Disease within large diameter card | nethods.<br>htid bulb is measured using direct diameter methods                   | as recommended in Oates | et al (2009).   |               |
| Notes  | 11 11 12 12 13 17 11 11   |                         |   |               |
| CAROTID DUPLEX SCA   | N .   |                         |   |               |
|  | in the right internal carotid artery form<br>s with some echolucent material ?Sof |                         |   |               |
|  | g a less than 40% stenosis, echoluce  |                         | 하는 1000 화가 있다는 그 아이들은 1000 1000 1000 1000 1000 1000 1000 10 |               |
|  | in the left internal carotid artery formir  | ng a less than 30% s    | stenosis.   |               |
| Assessed by J  | ack Wilson  |                         |   |               |
| 0.000000   |   | hecked by               |   |               |

|   | ΓIA clinic                               |                         |                       |                |               |
|---|--|-------------------------|-----------------------|----------------|---------------|
| Outcome I   | ntimal thickening, disease - mile        | 8                       |                       |                |               |
| Right   |  | Diameter (cm)           | PSV (m/s)             | EDV (m/s)      | Stenos        |
| Common  |  |                         | 1.06                  | 0.27           | < 309         |
| Plaque<br>Disease length from BI  | Intimal Thickening                       |                         |                       |                |               |
| Bifurcation   |  |                         |                       |                | < 309         |
| Plaque Disease length from BI   | Intimal Thickening F                     |                         |                       |                |               |
| Internal  |  |                         | 1.03                  | 0.85           | < 300         |
| Plaque  Disease length from BI  | Intimal Thickening F                     | Pk ICA                  | /Pk CCA = 1.0         | Pk ICA/End CCA | = 3.8         |
| External  |  |                         |                       |                |               |
| Plaque Disease length from BI   | Intimal Thickening                       |                         | 0.90                  |                | < 309         |
| Vertebral   | Open Orthograde                          |                         |                       |                |               |
| Subclavian  | No Turbulence                            | Go                      | ood Signal T          | riphasic       | Widely Paten  |
| Left  |  | Diameter (cm)           | PSV (m/s)             | EDV (m/s)      | Stenosi       |
| Common  |  |                         | 1.00                  |                | < 309         |
| Plaque<br>Disease length from BI  | Mixed<br>F                               |                         | 1.00                  | 0.24           | < 30%         |
| Bifurcation   |  |                         |                       |                | < 409         |
| Plaque<br>Disease length from BI  | Mixed<br>F                               |                         |                       |                |               |
| Internal  |  |                         | 0.76                  | 0.25           | < 309         |
| Plaque  | Intimal Thickening                       |                         |                       |                |               |
| Disease length from BI  |  | Pk ICA                  | /Pk CCA = 0.8         | Pk ICA/End CCA | = 3,2         |
| External  | Normal                                   |                         | 1.34                  |                | < 259         |
| Plaque Disease length from BI   |  |                         |                       |                |               |
| Vertebral   | Open Orthograde                          |                         |                       |                |               |
| Subclavian  | No Turbulence                            | Go                      | ood Signal T          | riphasic       | Widely Patent |
| Stenosis based on NASC Disease within large diameter Notes CAROTID DUPLEX S | carotid bulb is measured using direct of | liameter methods as red | commended in Oates et | al (2009).     |               |
| Intimal thickening ider   | ntified in the right internal car        |                         |                       |                | l             |
|   |  |                         |                       |                |               |
|   |  |                         |                       |                |               |
| Assessed by   | Jack Wilson                              |                         |                       |                |               |

| Outcome Intin  | nal thickening, disease - r      | mild          |             |           |               |
|--|----------------------------------|---------------|-------------|-----------|---------------|
| Right  |                                  | Diameter (cm) | PSV (m/s)   | EDV (m/s) | Stenos        |
| Common Plaque Disease length from BIF  | Intimal Thickening               |               | 1.17        | 0.29      | < 309         |
| Bifurcation Plaque Disease length from BIF   | Intimal Thickening               |               |             |           | < 30°         |
| Internal Plaque Disease length from BIF  | Intimal Thickening               | Pk I          | 0.70        | 0.25      | < 30°         |
| External Plaque Disease length from BIF  | Intimal Thickening               |               | 1.44        |           | < 30%         |
| Vertebral<br>Subclavian  | Open Orthograde                  |               |             |           |               |
| Subciavian   | No Turbulence                    |               | Good Signal | Triphasic | Widely Patent |
| Left   |                                  | Diameter (cm) | PSV (m/s)   | EDV (m/s) | Stenosi       |
| Common Plaque Disease length from BIF  | Intimal Thickening               |               | 1.01        | 0.31      | < 309         |
| Bifurcation Plaque Disease length from BIF   | Mixed                            |               |             |           | < 309         |
| Internal Plaque Disease length from BIF  | Intimal Thickening               | Pk1           | 0.77        | 0.27      | < 30%         |
| External Plaque Disease length from BIF  | Intimal Thickening               |               | 0.99        |           | < 30%         |
| /ertebral  | Open Orthograde                  |               |             |           |               |
| Subclavian   | No Turbulence                    |               | Good Signal | Triphasic | Widely Patent |
| Stenosis based on NASCET r Disease within large diameter card Notes  CAROTID DUPLEX SCA Intimal thickening identification and the card uminal diameter, bilatera | otid bulb is measured using dire |               |             |           | ation in      |
|  |                                  |               |             |           |               |

| Right  | Diameter (cm)   | PSV (m/          | s) EDV (m  | /s) Stenosi           |
|--|---|------------------|------------|-----------------------|
| Common   |   | 0.               | 83         | ).14 < 30%            |
| Plaque   | Dense Mixed   |                  |            |                       |
| Disease length from BIF                              |   |                  |            |                       |
| lifurcation  |   |                  |            | < 50%                 |
| Plaque Disease length from BIF                       | Soft  |                  |            |                       |
| nternal  |   |                  |            |                       |
| Plaque   | Soft  | 2.               | /b         | ).81 <b>70% - 79%</b> |
| Disease length from BIF                              | 3.00cm Pk   | ICA/Pk CCA = 3.3 | Pk ICA/I   | End CCA = 19.7        |
| xternal  |   | 1.               | 39         | < 30%                 |
| Plaque   | Mixed   |                  |            |                       |
| Disease length from BIF                              |   |                  |            |                       |
| 'ertebral  | Open Orthograde   | 1                |            |                       |
| ubclavian  | No Turbulence   | Good Signal      | Triphasic  | Widely Patent         |
| _eft   | Diameter (cm)   | PSV (m/          | 's) EDV (m | /s) Stenosi           |
| Common   |   | 1.               | 56 0       | 0.23 < 50%            |
| Plaque<br>Disease length from BIF                    | Mixed   |                  |            |                       |
| ifurcation   |   |                  |            | < 40%                 |
| Plaque<br>Disease length from BIF                    | Dense Mixed   |                  |            |                       |
| nternal  |   | 2.               | 70 0       | .BO <b>60% - 69%</b>  |
| Plaque Disease length from BIF                       | Dense Mixed Soft 1.40cm Pk  | ICA/Pk CCA = 1.7 | DIA TCA (I | End CCA = 11.7        |
|  | 1.70011   |                  |            |                       |
| xternal<br>Plaque                                    | Mixed   | 1.               | 56         | < 40%                 |
| Disease length from BIF                              |   |                  |            |                       |
| 'ertebral  | Open Orthograde   |                  |            |                       |
| ubclavian  | No Turbulence   | Good Signal      | Triphasic  | Widely Patent         |
| Notes  CAROTID DUPLEX SCA  Previous right carotid en | tid bulb is measured using direct diameter methods                        |                  |            | carotid               |
| artery forming a 70-79%                              | stenosis based on velocity grading crit<br>cm. Distal ICA appears patent. |                  |            |                       |
| EFT  |   |                  | 4.7 (1)    |                       |

| Mixed and dense plaques with some internal carotid artery forming a 60-6 reduction imaging. Total disease len | 69% stenosis based on v | elocity grading criter | us identified in the left<br>ia and direct diameter |     |
|---|-------------------------|------------------------|---|-----|
| SUGGEST VASCULAR SURGICAL   | OPINION.                |                        |   |     |
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|   |                         | Carlotte and the       |   |     |
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|   |                         |                        |   |     |
| Assessed by Jack Wilson Printed on 16/11/2021 at 8:48 am  |                         | Checked by             |   |     |