LOWER EXTREMITY VENOUS DUPLEX EXAMINATION PROTOCOL FOR EVALUATION / DIAGNOSIS OF DEEP VEIN THROMBOSIS

[illegible] presence of pathology involving the lower extremity deep venous system (common femoral vein, deep femoral vein, superficial femoral vein, popliteal vein, peroneal veins and posterior tibial veins).

COMMON INDICATIONS:

[illegible]

PUBLISHED INDICATIONS:

The indications for peripheral venous ultrasound examinations include, but are not limited to:

1. Evaluation of possible venous thromboembolic disease or venous obstruction in symptomatic or high-risk asymptomatic individuals.
2. Assessment of [illegible], and varicosities.
3. [illegible]
4. [illegible] proc[illegible] so the [illegible] Practice Guideline for [illegible] Vascular Mapping for Preoperative Planning of Dialysis Access).
5. Evaluation of veins prior to venous access.
6. Follow-up for patients with known venous thrombosis near the anticipated end of anticoagulation to determine if residual venous thrombosis is present.

[illegible]

PATIENT COMMUNICATION AND POSITIONING:

Upon arrival in the vascular department, the patient should be made comfortable and relaxed with their surroundings. The sonographer should give the patient an introduction and explain the procedure as well as verify physician order and appropriate indication for exam to be performed. [illegible] possible [illegible] which [illegible] a ser[illegible] pat[illegible] grapher may elect to examine the patient [illegible]

PATIENT ASSESSMENT:

Patient assessment [illegible] before the examination is performed. The sonographer [illegible] to [illegible] when [illegible]

EXAMINATION GUIDELINES:

- The sonographer selects the appropriate preset on the [illegible] ultrasound [illegible] (L[illegible]-10MHz) [illegible] for regi[illegible] periph[illegible] system [illegible] is placed on the patient's leg on the side to be examined.
- Complete examination of the peripheral venous system includes bilateral evaluation of the CFV, Deep FV, Superficial FV, Popliteal Vein, Peroneal Veins and Posterior Tibial Veins. Limited exams performed for this testing category must include imaging and PW Doppler of the contralateral CFV. The lower extremity venous system is imaged from [illegible] transverse and longitudinal planes from multiple [illegible] access [illegible] (ie. homogeneous or heterogeneous). The entire vessel length must be examined in order to exclude the presence of DVT. If pathology is present, plaque appearance, location, extent, severity, and residual lumen should be documented whenever possible. Additional pathology (including lymph nodes and Baker's cyst) must be documented and measured when present.
- [illegible] as listed [illegible] Color [illegible] thrombus [illegible] Doppler [illegible] most accurate location to assess by PW Doppler. Color Doppler images will also be utilized to assess for areas of complete occlusion and to locate deep and tortuous vessels.
- PW Doppler waveforms must be obtained from representative locations throughout the vessel, as listed on the image protocol. Doppler waveforms will be utilized to assess for normal [illegible] and for occluded vessel segments.
- [illegible] plane [illegible] should [illegible] between [illegible] the entire course of the vessel. [illegible] samples should be taken in multiple locations as indicated in the image protocol. Additional sample locations if thrombus or abnormal waveform patterns are present. Samples should be obtained in the CFV and Popliteal Vein. In the presence of thrombus, spectral analysis should include samples from the area at and distal to the occlusion.

[illegible] DIN[illegible]

[illegible] reports are provided to the interpreting physician.

- All studies are digitally recorded and include, but not limited to: Gray scale image of the CFV, Deep FV, Superficial FV, Popliteal Vein, Peroneal Veins and Posterior Tibial Veins in the transverse plane [illegible] compression [illegible] Color [illegible] Peroneal Veins [illegible] taken [illegible] dures [illegible] involving pathology if present.
- When available, previous studies should be obtained for comparison.
- Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician for use in rendering a diagnosis and for archival purposes.

Suggested Image Protocol: Lower Extremity Venous Duplex (DVT Protocol)

1. Trans CFV/GSV/Saphe-Fem junction with and without compression
2. [illegible] with and without compression
3. Long [illegible]
4. [illegible] (include [illegible] augmentation maneuver)
5. [illegible] proximal with and without compression
6. Long SFV Proximal with Color
7. Trans SFV mid with and without compression
8. Long SFV Mid with Color
9. Trans SFV Distal with and without compression
10. Long [illegible] Distal [illegible]
11. [illegible] compression
12. [illegible]
13. Long POP with PW Doppler (include distal augmentation maneuver)
14. Trans proximal calf vessels with and without compression – include posterior tibial gastrocnemius, soleus, anterior tibial and peroneal veins as well as any perforator vessels when accessible and as clinically indicated.
15. If unilateral exam – IMAGE and PW DOPPLER contra-lateral CFV

N[illegible]

- [illegible] PW Doppler images should include distal augmentation maneuvers when no DVT is seen and/or suspected.
- *If DVT is noted during compression, DO NOT augment the blood flow. Demonstrate resting flow with color and PW Doppler images.*
- [illegible] it may be necessary to image the [illegible]

LOWER EXTREMITY VENOUS DUPLEX EXAMINATION PROTOCOL

FOR EVALUATION & DIAGNOSIS OF VENOUS INSUFFICIENCY

PURPOSE:

[illegible] the lower extr[illegible] venous [illegible] fem[illegible] superfici[illegible] veins, [illegible] ous vein, lesser saphenous vein and [illegible] venous system).

COMMON INDICATIONS:

- Leg Pain
- Leg Swelling
- [illegible]

[illegible]S:

[illegible] indications for peripheral venous ultrasound examinations include, but are not limited to:

1. Evaluation of possible venous thromboembolic disease or venous obstruction in symptomatic or high-risk asymptomatic individuals.
2. Assessment of venous insufficiency, reflux, and varicosities.
3. Assessment of dialysis access.
4. Venous mapping [illegible] procedures (see also the ACR–AIUM Practice Guideline for [illegible] Performance [illegible] mapping [illegible] preoperative [illegible] of Dialysis Access).
[illegible] ac[illegible] ven[illegible] near [illegible] anticipated end of [illegible] if residual venous thrombosis is present.

*ACR–AIUM–SRU PRACTICE GUIDELINE FOR THE PERFORMANCE OF PERIPHERAL VENOUS ULTRASOUND EXAMINATION; Peripheral Venous Ultrasound; Revised 2010 (Res. 31)**

PATIENT COMMUNICATION AND POSITIONING:

[illegible] should [illegible] spher[illegible] the pa[illegible] the [illegible] in ord[illegible] appropriate indication for exam to be performed. The patient should be placed in a supine position (if possible) for performance of the venous duplex exam. The patient should be placed in a way which allows for maximum access to the vessels to be examined, preferably a semi-erect position or reverse-Trendelenberg position. In some cases, due to limitations of the patient, the sonographer may elect to examine the patient sitting/standing erect.

PATIENT ASSESSMENT:

[illegible] ted [illegible] mina[illegible] udes [illegible] as to the characteristics of historical [illegible] (e.g., nature of onset, duration, and frequency), whenever possible. A physical exam should also be included.

EXAMINATION GUIDELINES:

- The sonographer selects the appropriate presets on the YOUR EQUIPMENT ultrasound [illegible] er [illegible] 5-1[illegible] Ge[illegible] uld b[illegible] for re[illegible] for [illegible] per[illegible] system.
- [illegible] coupling gel is placed on the patient's leg on the side to be examined.
- Complete examination of the peripheral venous system includes bilateral evaluation of the CFV, Deep FV, Superficial FV, Popliteal Vein, Peroneal Veins and Posterior Tibial Veins. Limited exams are not performed for this testing category. The lower extremity venous system is imaged from the groin to the ankle and [illegible] transverse and [illegible] ches [illegible] erior [illegible]
- [illegible] ained [illegible] the characteristics of thrombus formation and disease present (ie. homogeneous or heterogeneous thrombus, Baker's cyst formation, lymph nodes).The entire vessel length must be examined in order to exclude the presence of DVT. If pathology is present, plaque appearance, location, extent, severity, and residual lumen should be documented whenever possible. Additional pathology including lymph nodes and Baker's cysts must be documented and [illegible] when [illegible]
- Co[illegible] docu[illegible] ited [illegible] to ch[illegible] mbus formations and rule out the [illegible] acute deep vein thrombosis. Color Doppler will also be utilized to assess flow for locations of aliasing and as guide for the most accurate location to assess by PW Doppler. Color Doppler images will also be utilized to assess for areas of complete occlusion and to locate deep and tortuous vessels.
- PW Doppler waveforms must be obtained from representative locations throughout the vessel [illegible] Doppler waveforms [illegible] to assess [illegible] no[illegible] us [illegible] ve[illegible] for ve[illegible] el se[illegible]
- [illegible] analysis is performed in a sagittal plane and should be obtained at a consistent angle of insonation, between 45 and 60 degrees. To ensure complete interrogation, track the cursor throughout the entire course of the vessel. Representative samples should be taken in multiple locations as indicated in the image protocol. Additional sample locations should be recorded if thrombus or abnormal waveform patterns are present. Samples should be obtained in the [illegible] and Popliteal vein [illegible] co[illegible] us in[illegible] [illegible] should [illegible] es fr[illegible]

PRESENTATION AND EXAM FINDINGS:

- Preliminary technologist reports are provided to the interpreting physician.
- All studies are [illegible] ude [illegible] not li[illegible] e c[illegible] CF[illegible] Ve[illegible] iones[illegible] s [illegible] d w[illegible] mpr[illegible] teal V[illegible] Veins and Posterior Tibial Veins in the longitudinal plane; Spectral analysis samples taken throughout the CFV and Popliteal Vein, with distal and proximal augmentation procedures and/or valsalva maneuvers.
- In addition to deep venous structures, the examination must include documentation of superficial venous [illegible] the GSV and LSV [illegible] documentation of [illegible] s [illegible] en[illegible] uffic[illegible] [illegible] ving [illegible] sen[illegible] [illegible] es s[illegible] obtained for comparison.
- Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician for use in rendering a diagnosis and for archival purposes.

Suggested Image List: Lower Extremity Venous Duplex (Insufficiency Protocol)

1. Trans CFV with and without compression
2. Long CFV with Color
3. [illegible] augmentation [illegible]
4. [illegible] and without [illegible]
5. [illegible] and with[illegible]sion
6. Long SFV Proximal with Color
7. Long SFV Proximal with PW Doppler (with augmentation maneuvers)
8. Trans SFV Mid with and without compression
9. Long SFV Mid with Color
10. Trans SFV Distal with and without compression
11. [illegible]
12. [illegible] com[illegible]
13. [illegible]
14. Long POP with PW Doppler (with augmentation maneuvers)
15. Trans Proximal calf vessels with and without compression
16. Trans PTV with and without compression
17. Long PTV with Color
18. Long CFV/GSV junction with Color
19. [illegible] PW Doppler with a[illegible]
20. [illegible] and wi[illegible]sion
21. [illegible] and without compression
22. Trans GSV Distal with and without compression
23. Long GSV Proximal with Color - Color images must be documented at lower levels if reflux is not noted initially at proximal segment.
24. Long GSV Proximal with PW Doppler (with augmentation maneuvers) - PW Doppler [illegible] lower [illegible]ted [illegible]
25. [illegible] and wi[illegible]sion
26. Trans LSV distal with and without compression
27. Long LSV Proximal with Color
28. Long LSV Proximal with PW Doppler (with augmentation maneuvers)
29. 2D/Color/PW Documentation of any perforator veins as indicated.
30. 2D/Color/PW Documentation and measurements of [illegible] and any [illegible]

- *All PW Doppler images should include distal augmentation maneuvers when no DVT is seen.*
- *Proximal augmentation and valsalva maneuvers must be utilized with PW Doppler as necessary to prove insufficiency of vessels.*
- *If DVT is noted [illegible] DO NOT augment [illegible]. Demonstrate [illegible] images.*
- *If [illegible] images [illegible]*

LOWER EXTREMITY VENOUS DUPLEX EXAMINATION PROTOCOL
FOR EVALUATION & DIAGNOSIS OF VENOUS MAPPING PROCEDURES

[illegible] femoral vein, superficial femoral vein, popliteal vein, [illegible] veins and posterior tibial veins, greater saphenous vein, lesser saphenous vein and superficial venous system).

COMMON INDICATIONS:

[illegible] venous procedures (vein graft, vein harvest, venous ablation)

PUBLISHED INDICATIONS:

The indications for peripheral venous ultrasound examinations include, but are not limited to:

1. Evaluation of possible venous thromboembolic disease or venous obstruction in symptomatic [illegible]

[illegible] varicosities [illegible]

[illegible] procedures (see also the ACR–AIUM Practice Guideline for [illegible] Performance of Ultrasound Vascular Mapping for Preoperative Planning of Dialysis Access).

5. Evaluation of veins prior to venous access.

6. Follow-up for patients with known venous thrombosis near the anticipated end of anticoagulation to determine if residual venous thrombosis is present.

[illegible] PREPARATION AND POSITIONING:

Upon arrival in the vascular department, the patient should be made comfortable and relaxed with their surroundings. The sonographer should give the patient an introduction and explain the procedure as well as verify physician order and appropriate indication for exam to be performed. The patient should be placed in a [illegible] position if possible [illegible] venous [illegible] in a way which allows [illegible] access [illegible] vessels [illegible] in [illegible] the patient [illegible]

PATIENT ASSESSMENT:

Patient assessment must be completed before the examination is performed. The sonographer [illegible] to the [illegible]

EXAMINATION GUIDELINES:

- [illegible] should allow for [illegible] peripheral venous system.
- Ultrasound coupling gel is placed on the patient's leg on the side to be examined.
- Complete examination of the peripheral venous system includes bilateral evaluation of the CFV, Deep FV, Superficial FV, Popliteal Vein, Peroneal Veins and Posterior Tibial Veins. [illegible]
- [illegible] obtained to determine the characteristics of thrombus formation and disease present (ie. homogeneous or heterogeneous thrombus, Baker's cyst formation, lymph nodes).The entire vessel length must be examined in order to exclude the presence of DVT. If pathology is present, appearance, location, extent, severity, and residual lumen should be documented whenever possible. [illegible] images must include diameter measurements at representative locations, as specified in the image protocol. Additional 2D/Color and PW Doppler imaging and measurements of any vessel aneurysm or varicosities must be documented.
- Color Doppler images must be documented, as listed in the image protocol. [illegible] utilized to assess for areas of complete [illegible] deep and tortuous vessels.
- PW Doppler waveforms must be obtained from representative locations throughout the vessel, as listed on the image protocol. Doppler waveforms will be utilized to assess for normal variations in hemodynamics, to evaluate for venous insufficiency and for identification of [illegible]
- [illegible] multiple locations as indicated in the image protocol. Additional sample locations should be recorded if thrombus or abnormal waveform patterns are present. Samples should be obtained in the CFV, [illegible] and Popliteal veins. [illegible]

PRESENTATION AND EXAM FINDINGS:

- Preliminary technologist [illegible] provided to the interpreting physician [illegible] include but not limited to [illegible] CFV [illegible] Popliteal Vein, Peroneal [illegible] Color image of the CFV, [illegible] Popliteal Vein, Peroneal Veins and Posterior Tibial Veins in the longitudinal plane; Spectral analysis samples taken throughout the CFV and Popliteal Vein, with distal and proximal augmentation procedures and/or valsalva maneuvers.
- In addition to deep venous structures, the examination must include documentation of superficial venous structures including the GSV and LSV as well as documentation of [illegible] insufficiency. Diameter measurements of [illegible] included.
- [illegible] ving [illegible] sen[illegible] [illegible] es should be obtained for comparison.
- Present record of diagnostic images, data, explanations, and technical worksheet to the interpreting physician for use in rendering a diagnosis and for archival purposes.

[illegible] Venous [illegible] Venous Mapping Protocol)

1. Trans CFV with and without compression
2. Long CFV with Color
3. Long CFV with PW Doppler (with augmentation maneuvers)
4. Trans SFV and CFV confluence with and without compression
5. Trans SFV Proximal with and without compression
6. Long SFV [illegible] Color
7. [illegible] PW Doppler (with augmentation maneuvers)
8. [illegible] SFV Mid with and without compression
9. Long SFV Mid with Color
10. Trans SFV Distal with and without compression
11. Long SFV Distal with PW Color
12. Trans POP with and without compression
13. Long POP with Color
14. Long POP [illegible] (with augmentation maneuvers)
15. [illegible] with and without compression
16. Trans PTV with and without compression
17. Long PTV with Color
18. Long CFV/GSV junction with Color
19. Long CFV/GSV junction with PW Doppler (with augmentation maneuvers)
20. Trans GSV [illegible] with and without compression [illegible]
21. [illegible] without compression -obtain diameter measurements
22. Trans GSV Distal with and without compression-obtain diameter measurements
23. Long GSV Proximal with Color - Color images must be documented at lower levels if reflux is not noted initially at proximal segment.
24. Long GSV Proximal with PW Doppler (with augmentation maneuvers) - PW Doppler waveforms must be documented at lower levels if reflux is not noted initially at proximal segment.
25. [illegible] with and without compression- [illegible] [illegible] nent [illegible]
26. Trans LSV distal with and without compression
27. Long LSV Proximal with Color
28. Long LSV Proximal with PW Doppler (with augmentation maneuvers)
29. 2D/Color/PW Documentation of any perforator veins as indicated
30. 2D/Color/PW Documentation and measurements of varicosities and any aneurysms [illegible]

NOTE:

- ***All PW Doppler images should include distal augmentation maneuvers when no DVT is seen.***
- ***Proximal augmentation and valsalva maneuvers must be utilized in conjunction with PW Doppler to [illegible]***
- ***2D/Color [illegible] ablated [illegible]***
- ***[illegible] DO N[illegible] blood flow. Demonstrate resting flow with [illegible] PW Doppler images.***
- ***If there is extensive DVT, it may be necessary to image the iliac vessels and IVC.***