PRACTICE EXAM 9: VASCULAR TECHNOLOGY SIMULATION (170 QUESTIONS)

This practice exam contains 170 questions. Allow three hours, including review time, to simulate the ARDMS Vascular Technology examination. Select the single best answer for each item. The official examination uses a scaled score from 300 to 700; a score of 555 or better passes.

1. Which vessel normally arises first from the aortic arch?

A. Brachiocephalic artery
B. Left common carotid artery
C. Left subclavian artery
D. Right common carotid artery

2. During a focused vascular laboratory examination, which vessel normally arises first from the aortic arch?

A. Left common carotid artery
B. Left subclavian artery
C. Brachiocephalic artery
D. Right common carotid artery

3. Which vein lies most commonly medial to the common femoral artery at the groin?

A. Common femoral vein
B. Great saphenous vein
C. Deep femoral vein
D. External iliac vein

4. During a focused vascular laboratory examination, which vein lies most commonly medial to the common femoral artery at the groin?

A. Great saphenous vein
B. Common femoral vein
C. Deep femoral vein
D. External iliac vein

5. Which artery is the usual continuation of the external iliac artery below the inguinal ligament?

A. Superficial femoral artery
B. Deep femoral artery
C. Popliteal artery
D. Common femoral artery

6. During a focused vascular laboratory examination, which artery is the usual continuation of the external iliac artery below the inguinal ligament?

A. Superficial femoral artery
B. Deep femoral artery
C. Common femoral artery
D. Popliteal artery

7. Which waveform is expected in a normal resting high-resistance lower-extremity artery?

A. Continuous monophasic flow
B. Triphasic waveform
C. Markedly pulsatile venous flow
D. To-and-fro portal flow

8. During a focused vascular laboratory examination, which waveform is expected in a normal resting high-resistance lower-extremity artery?

A. Triphasic waveform
B. Continuous monophasic flow
C. Markedly pulsatile venous flow
D. To-and-fro portal flow

9. Which carotid branch normally shows a low-resistance Doppler waveform?

A. External carotid artery
B. Superior thyroid artery
C. Occipital artery
D. Internal carotid artery

10. During a focused vascular laboratory examination, which carotid branch normally shows a low-resistance Doppler waveform?

A. External carotid artery
B. Superior thyroid artery
C. Internal carotid artery
D. Occipital artery

11. Which vessel is identified posterior to the medial malleolus?

A. Posterior tibial artery
B. Anterior tibial artery
C. Dorsalis pedis artery
D. Peroneal artery

12. During a focused vascular laboratory examination, which vessel is identified posterior to the medial malleolus?

A. Anterior tibial artery
B. Dorsalis pedis artery
C. Posterior tibial artery
D. Peroneal artery

13. The left renal vein normally passes between which structures?

A. Celiac artery and pancreas
B. Inferior vena cava and liver
C. Splenic artery and left kidney
D. Superior mesenteric artery and aorta

14. During a focused vascular laboratory examination, the left renal vein normally passes between which structures?

A. Celiac artery and pancreas
B. Superior mesenteric artery and aorta
C. Inferior vena cava and liver
D. Splenic artery and left kidney

15. Which vein is formed by union of the splenic and superior mesenteric veins?

A. Inferior vena cava
B. Hepatic vein
C. Left renal vein
D. Portal vein

16. During a focused vascular laboratory examination, which vein is formed by union of the splenic and superior mesenteric veins?

A. Inferior vena cava
B. Hepatic vein
C. Portal vein
D. Left renal vein

17. Which artery usually gives rise to the dorsalis pedis artery?

A. Posterior tibial artery
B. Anterior tibial artery
C. Peroneal artery
D. Popliteal artery

18. During a focused vascular laboratory examination, which artery usually gives rise to the dorsalis pedis artery?

A. Anterior tibial artery
B. Posterior tibial artery
C. Peroneal artery
D. Popliteal artery

19. Which intracranial artery is insonated through the transtemporal window flowing toward the probe at typical depth?

A. Middle cerebral artery
B. Basilar artery
C. Vertebral artery
D. Ophthalmic artery

20. During a focused vascular laboratory examination, which intracranial artery is insonated through the transtemporal window flowing toward the probe at typical depth?

A. Basilar artery
B. Vertebral artery
C. Ophthalmic artery
D. Middle cerebral artery

21. What is the normal directional term for portal venous flow toward the liver?

A. Hepatofugal
B. Hepatopetal
C. Retrograde systemic
D. Bidirectional arterial

22. During a focused vascular laboratory examination, what is the normal directional term for portal venous flow toward the liver?

A. Hepatofugal
B. Retrograde systemic
C. Hepatopetal
D. Bidirectional arterial

23. Which artery commonly lies anterior to the aorta and crosses over the left renal vein?

A. Inferior mesenteric artery
B. Celiac artery
C. Superior mesenteric artery
D. Right renal artery

24. During a focused vascular laboratory examination, which artery commonly lies anterior to the aorta and crosses over the left renal vein?

A. Superior mesenteric artery
B. Inferior mesenteric artery
C. Celiac artery
D. Right renal artery

25. Which veins drain directly into the inferior vena cava just below the diaphragm?

A. Portal veins
B. Hepatic veins
C. Splenic veins
D. Superior mesenteric veins

26. During a focused vascular laboratory examination, which veins drain directly into the inferior vena cava just below the diaphragm?

A. Portal veins
B. Splenic veins
C. Superior mesenteric veins
D. Hepatic veins

27. Which superficial vein ascends along the medial leg and thigh?

A. Small saphenous vein
B. Anterior tibial vein
C. Peroneal vein
D. Great saphenous vein

28. During a focused vascular laboratory examination, which superficial vein ascends along the medial leg and thigh?

A. Small saphenous vein
B. Great saphenous vein
C. Anterior tibial vein
D. Peroneal vein

29. Where does the common carotid artery normally bifurcate?

A. At the clavicular head
B. Below the aortic arch
C. Near the upper border of the thyroid cartilage
D. At the mandibular angle only

30. During a focused vascular laboratory examination, where does the common carotid artery normally bifurcate?

A. Near the upper border of the thyroid cartilage
B. At the clavicular head
C. Below the aortic arch
D. At the mandibular angle only

31. Which artery normally supplies the thyroid gland and arises from the external carotid?

A. Superior thyroid artery
B. Vertebral artery
C. Internal thoracic artery
D. Ascending cervical artery

32. During a focused vascular laboratory examination, which artery normally supplies the thyroid gland and arises from the external carotid?

A. Vertebral artery
B. Internal thoracic artery
C. Ascending cervical artery
D. Superior thyroid artery

33. Which vessel is the direct continuation of the superficial femoral artery after the adductor hiatus?

A. Deep femoral artery
B. Anterior tibial artery
C. Popliteal artery
D. Common femoral artery

34. During a focused vascular laboratory examination, which vessel is the direct continuation of the superficial femoral artery after the adductor hiatus?

A. Deep femoral artery
B. Popliteal artery
C. Anterior tibial artery
D. Common femoral artery

35. Which paired veins accompany the corresponding calf arteries?

A. Posterior tibial veins
B. Great saphenous veins
C. Small saphenous veins
D. Common femoral veins

36. During a focused vascular laboratory examination, which paired veins accompany the corresponding calf arteries?

A. Great saphenous veins
B. Small saphenous veins
C. Posterior tibial veins
D. Common femoral veins

37. Which duplex finding most strongly indicates a hemodynamically significant focal arterial stenosis?

A. Uniform velocity throughout the segment
B. Spontaneous venous phasicity
C. Complete color filling at low scale
D. Focal velocity increase with post-stenotic turbulence

38. During a focused vascular laboratory examination, which duplex finding most strongly indicates a hemodynamically significant focal arterial stenosis?

A. Uniform velocity throughout the segment
B. Focal velocity increase with post-stenotic turbulence
C. Spontaneous venous phasicity
D. Complete color filling at low scale

39. Which finding is most consistent with acute lower-extremity deep vein thrombosis?

A. Small compressible vein with echogenic walls
B. Complete collapse under light pressure
C. Dilated noncompressible vein with hypoechoic material
D. Thin chronic web with collaterals

40. During a focused vascular laboratory examination, which finding is most consistent with acute lower-extremity deep vein thrombosis?

A. Small compressible vein with echogenic walls
B. Complete collapse under light pressure
C. Thin chronic web with collaterals
D. Dilated noncompressible vein with hypoechoic material

41. Which feature favors chronic rather than acute venous thrombosis?

A. Distended vein with soft thrombus
B. Echogenic wall-adherent material with recanalized channels
C. Free-floating hypoechoic tail
D. New complete noncompressibility

42. During a focused vascular laboratory examination, which feature favors chronic rather than acute venous thrombosis?

A. Echogenic wall-adherent material with recanalized channels
B. Distended vein with soft thrombus
C. Free-floating hypoechoic tail
D. New complete noncompressibility

43. Reversed flow in the vertebral artery most commonly suggests what condition?

A. Distal internal carotid stenosis
B. External carotid occlusion
C. Proximal subclavian artery obstruction
D. Jugular venous thrombosis

44. During a focused vascular laboratory examination, reversed flow in the vertebral artery most commonly suggests what condition?

A. Distal internal carotid stenosis
B. External carotid occlusion
C. Jugular venous thrombosis
D. Proximal subclavian artery obstruction

45. Which carotid plaque feature raises concern for surface disruption?

A. Smooth homogeneous wall contour
B. Ulcerated irregular lumen interface
C. Uniform anechoic blood pool
D. Symmetric intima-media thickness

46. During a focused vascular laboratory examination, which carotid plaque feature raises concern for surface disruption?

A. Smooth homogeneous wall contour
B. Uniform anechoic blood pool
C. Symmetric intima-media thickness
D. Ulcerated irregular lumen interface

47. A tardus-parvus waveform in a renal artery segment indicates what?

A. Hemodynamically important proximal obstruction
B. Normal high-resistance perfusion
C. Distal arteriovenous fistula
D. Isolated venous reflux

48. During a focused vascular laboratory examination, a tardus-parvus waveform in a renal artery segment indicates what?

A. Hemodynamically important proximal obstruction
B. Normal high-resistance perfusion
C. Distal arteriovenous fistula
D. Isolated venous reflux

49. Which finding supports hemodynamically significant aortoiliac disease?

A. Triphasic ankle waveforms bilaterally
B. Monophasic common femoral waveforms bilaterally
C. Normal respiratory venous phasicity
D. Low-resistance internal carotid flow

50. During a focused vascular laboratory examination, which finding supports hemodynamically significant aortoiliac disease?

A. Triphasic ankle waveforms bilaterally
B. Normal respiratory venous phasicity
C. Monophasic common femoral waveforms bilaterally
D. Low-resistance internal carotid flow

51. Which pattern is typical of pseudoaneurysm flow at the neck?

A. Continuous hepatopetal waveform
B. Triphasic high-resistance waveform
C. Absent flow in every plane
D. To-and-fro spectral waveform

52. During a focused vascular laboratory examination, which pattern is typical of pseudoaneurysm flow at the neck?

A. Continuous hepatopetal waveform
B. To-and-fro spectral waveform
C. Triphasic high-resistance waveform
D. Absent flow in every plane

53. Which color Doppler appearance is characteristic of a patent pseudoaneurysm sac?

A. Uniform single-color laminar flow
B. No detectable flow at low scale
C. Bidirectional swirling yin-yang pattern
D. Parallel venous color bands

54. During a focused vascular laboratory examination, which color Doppler appearance is characteristic of a patent pseudoaneurysm sac?

A. Bidirectional swirling yin-yang pattern
B. Uniform single-color laminar flow
C. No detectable flow at low scale
D. Parallel venous color bands

55. Which waveform feature is expected near an arteriovenous fistula?

A. Absent diastolic arterial flow
B. Markedly increased pulsatility index
C. High velocity with reduced downstream resistance
D. Normal quiet venous phasicity

56. During a focused vascular laboratory examination, which waveform feature is expected near an arteriovenous fistula?

A. Absent diastolic arterial flow
B. Markedly increased pulsatility index
C. Normal quiet venous phasicity
D. High velocity with reduced downstream resistance

57. Which ultrasound finding is most concerning for impending abdominal aortic aneurysm rupture?

A. Stable mural thrombus alone
B. New periaortic fluid with focal wall discontinuity
C. Posterior acoustic shadow from calcium
D. Uniform residual lumen color

58. During a focused vascular laboratory examination, which ultrasound finding is most concerning for impending abdominal aortic aneurysm rupture?

A. New periaortic fluid with focal wall discontinuity
B. Stable mural thrombus alone
C. Posterior acoustic shadow from calcium
D. Uniform residual lumen color

59. Which venous Doppler finding suggests proximal iliac obstruction?

A. Normal augmentation after distal compression
B. Complete collapse with transducer pressure
C. Loss of respiratory phasicity in the common femoral vein
D. Brief valve closure after Valsalva

60. During a focused vascular laboratory examination, which venous Doppler finding suggests proximal iliac obstruction?

A. Normal augmentation after distal compression
B. Complete collapse with transducer pressure
C. Brief valve closure after Valsalva
D. Loss of respiratory phasicity in the common femoral vein

61. Which finding is most typical of significant venous valvular incompetence?

A. Prolonged retrograde flow after provocation
B. Brief flow cessation with respiration
C. Rapid antegrade augmentation only
D. Complete venous compressibility

62. During a focused vascular laboratory examination, which finding is most typical of significant venous valvular incompetence?

A. Brief flow cessation with respiration
B. Prolonged retrograde flow after provocation
C. Rapid antegrade augmentation only
D. Complete venous compressibility

63. Which plaque composition usually produces dense acoustic shadowing?

A. Heavily calcified plaque
B. Soft lipid-rich plaque
C. Fresh hypoechoic thrombus
D. Uncomplicated fibrous cap

64. During a focused vascular laboratory examination, which plaque composition usually produces dense acoustic shadowing?

A. Soft lipid-rich plaque
B. Fresh hypoechoic thrombus
C. Uncomplicated fibrous cap
D. Heavily calcified plaque

65. A focal doubling of peak systolic velocity compared with an adjacent arterial segment generally suggests what?

A. Normal laminar transition
B. Complete arterial occlusion
C. Approximately 50% diameter-reducing stenosis
D. Isolated venous hypertension

66. During a focused vascular laboratory examination, a focal doubling of peak systolic velocity compared with an adjacent arterial segment generally suggests what?

A. Normal laminar transition
B. Approximately 50% diameter-reducing stenosis
C. Complete arterial occlusion
D. Isolated venous hypertension

67. Which finding distinguishes complete arterial occlusion from near occlusion?

A. No flow despite optimized sensitive settings
B. Very low trickle flow through a channel
C. Aliasing at the narrowest segment
D. Post-stenotic spectral broadening

68. During a focused vascular laboratory examination, which finding distinguishes complete arterial occlusion from near occlusion?

A. Very low trickle flow through a channel
B. Aliasing at the narrowest segment
C. No flow despite optimized sensitive settings
D. Post-stenotic spectral broadening

69. Which condition commonly produces elevated velocities in the celiac artery during expiration?

A. Renal vein thrombosis
B. Portal vein occlusion
C. Inferior mesenteric aneurysm
D. Median arcuate ligament compression

70. During a focused vascular laboratory examination, which condition commonly produces elevated velocities in the celiac artery during expiration?

A. Renal vein thrombosis
B. Median arcuate ligament compression
C. Portal vein occlusion
D. Inferior mesenteric aneurysm

71. Which finding suggests renal parenchymal disease rather than isolated main renal artery stenosis?

A. Focal ostial aliasing on one side
B. Localized main renal velocity increase
C. Unilateral post-stenotic turbulence
D. Elevated intrarenal resistive indices bilaterally

72. During a focused vascular laboratory examination, which finding suggests renal parenchymal disease rather than isolated main renal artery stenosis?

A. Focal ostial aliasing on one side
B. Elevated intrarenal resistive indices bilaterally
C. Localized main renal velocity increase
D. Unilateral post-stenotic turbulence

73. Which transcranial Doppler change can indicate vasospasm?

A. Uniformly absent venous pulsatility
B. Falling extracranial venous velocity
C. Rising focal mean flow velocity
D. Stable low arterial velocities

74. During a focused vascular laboratory examination, which transcranial Doppler change can indicate vasospasm?

A. Rising focal mean flow velocity
B. Uniformly absent venous pulsatility
C. Falling extracranial venous velocity
D. Stable low arterial velocities

75. Which waveform supports distal arterial vasodilation caused by tissue ischemia?

A. Sharp triphasic high-resistance flow
B. Zero diastolic flow with reversal
C. Normal venous respiratory phasicity
D. Monophasic flow with continuous diastolic component

76. During a focused vascular laboratory examination, which waveform supports distal arterial vasodilation caused by tissue ischemia?

A. Sharp triphasic high-resistance flow
B. Zero diastolic flow with reversal
C. Monophasic flow with continuous diastolic component
D. Normal venous respiratory phasicity

77. Which finding is characteristic of portal hypertension?

A. Normal hepatopetal portal flow
B. Hepatofugal portal venous flow
C. Triphasic hepatic arterial flow
D. Compressible portal vein

78. During a focused vascular laboratory examination, which finding is characteristic of portal hypertension?

A. Hepatofugal portal venous flow
B. Normal hepatopetal portal flow
C. Triphasic hepatic arterial flow
D. Compressible portal vein

79. Which lesion commonly causes arm pressure asymmetry and dampened ipsilateral waveforms?

A. Distal ulnar venous reflux
B. Internal carotid tortuosity
C. Contralateral femoral occlusion
D. Proximal subclavian stenosis

80. During a focused vascular laboratory examination, which lesion commonly causes arm pressure asymmetry and dampened ipsilateral waveforms?

A. Proximal subclavian stenosis
B. Distal ulnar venous reflux
C. Internal carotid tortuosity
D. Contralateral femoral occlusion

81. Which sonographic feature favors carotid dissection?

A. Smooth concentric intima-media thickening
B. Mobile intimal flap with separate flow channels
C. Calcific plaque at the bulb only
D. Uniform low-resistance flow bilaterally

82. During a focused vascular laboratory examination, which sonographic feature favors carotid dissection?

A. Smooth concentric intima-media thickening
B. Calcific plaque at the bulb only
C. Mobile intimal flap with separate flow channels
D. Uniform low-resistance flow bilaterally

83. Which finding is most consistent with popliteal artery entrapment?

A. Fixed venous reflux during Valsalva
B. Constant carotid velocity elevation
C. Portal flow reversal after eating
D. Dynamic arterial compression during plantar flexion

84. During a focused vascular laboratory examination, which finding is most consistent with popliteal artery entrapment?

A. Fixed venous reflux during Valsalva
B. Dynamic arterial compression during plantar flexion
C. Constant carotid velocity elevation
D. Portal flow reversal after eating

85. Which feature supports inflammatory superficial thrombophlebitis?

A. Tender noncompressible superficial vein with surrounding edema
B. Compressible deep vein without symptoms
C. Normal phasic common femoral flow
D. Painless patent artery with triphasic flow

86. During a focused vascular laboratory examination, which feature supports inflammatory superficial thrombophlebitis?

A. Compressible deep vein without symptoms
B. Normal phasic common femoral flow
C. Tender noncompressible superficial vein with surrounding edema
D. Painless patent artery with triphasic flow

87. Which finding is expected distal to a severe arterial stenosis?

A. Higher pulsatility with early reversal
B. Dampened delayed systolic upstroke
C. Uniformly increased wall motion
D. Normal sharp triphasic contour

88. During a focused vascular laboratory examination, which finding is expected distal to a severe arterial stenosis?

A. Dampened delayed systolic upstroke
B. Higher pulsatility with early reversal
C. Uniformly increased wall motion
D. Normal sharp triphasic contour

89. Which duplex feature suggests thrombus within an aneurysm rather than flowing lumen?

A. Anechoic channel with color filling
B. Pulsatile spectral signal in the sac
C. Echogenic material without internal Doppler signal
D. Aliasing through the residual channel

90. During a focused vascular laboratory examination, which duplex feature suggests thrombus within an aneurysm rather than flowing lumen?

A. Anechoic channel with color filling
B. Pulsatile spectral signal in the sac
C. Aliasing through the residual channel
D. Echogenic material without internal Doppler signal

91. Which finding indicates a hemodynamically significant dialysis graft stenosis?

A. Uniform graft velocity and color fill
B. Focal velocity acceleration with lumen narrowing
C. Expected arterialized venous outflow
D. Patent anastomosis without turbulence

92. During a focused vascular laboratory examination, which finding indicates a hemodynamically significant dialysis graft stenosis?

A. Uniform graft velocity and color fill
B. Expected arterialized venous outflow
C. Patent anastomosis without turbulence
D. Focal velocity acceleration with lumen narrowing

93. Which waveform is expected in the artery feeding a functioning dialysis fistula?

A. High-resistance waveform with reversal
B. Absent systolic flow throughout
C. Low-resistance waveform with increased diastolic flow
D. Normal portal venous waveform

94. During a focused vascular laboratory examination, which waveform is expected in the artery feeding a functioning dialysis fistula?

A. Low-resistance waveform with increased diastolic flow
B. High-resistance waveform with reversal
C. Absent systolic flow throughout
D. Normal portal venous waveform

95. Which finding suggests stenosis in an infrainguinal bypass graft?

A. Focal graft velocity increase and disturbed flow
B. Uniform laminar flow along the graft
C. Expected low velocity in a large graft
D. Triphasic native inflow without change

96. During a focused vascular laboratory examination, which finding suggests stenosis in an infrainguinal bypass graft?

A. Uniform laminar flow along the graft
B. Focal graft velocity increase and disturbed flow
C. Expected low velocity in a large graft
D. Triphasic native inflow without change

97. After carotid endarterectomy, which early finding requires urgent communication?

A. Mild smooth wall thickening
B. Expected caliber enlargement
C. Patent low-resistance internal carotid flow
D. Mobile intraluminal thrombus at the repair site

98. During a focused vascular laboratory examination, after carotid endarterectomy, which early finding requires urgent communication?

A. Mild smooth wall thickening
B. Expected caliber enlargement
C. Mobile intraluminal thrombus at the repair site
D. Patent low-resistance internal carotid flow

99. Which endovascular aneurysm repair finding represents persistent sac perfusion?

A. Graft limb patency
B. Sac shrinkage
C. Endoleak
D. Normal triphasic limb flow

100. During a focused vascular laboratory examination, which endovascular aneurysm repair finding represents persistent sac perfusion?

A. Graft limb patency
B. Endoleak
C. Sac shrinkage
D. Normal triphasic limb flow

101. Which test best evaluates segmental severity of lower-extremity arterial disease?

A. Segmental pressures with pulse volume recordings
B. Venous reflux examination
C. Carotid duplex only
D. Portal vein Doppler

102. During a focused vascular laboratory examination, which test best evaluates segmental severity of lower-extremity arterial disease?

A. Venous reflux examination
B. Carotid duplex only
C. Portal vein Doppler
D. Segmental pressures with pulse volume recordings

103. Which maneuver helps evaluate thoracic outlet arterial compression?

A. Provocative arm positioning with waveform monitoring
B. Supine Valsalva during calf compression
C. Fasting portal velocity measurement
D. Trendelenburg carotid scanning

104. During a focused vascular laboratory examination, which maneuver helps evaluate thoracic outlet arterial compression?

A. Supine Valsalva during calf compression
B. Fasting portal velocity measurement
C. Provocative arm positioning with waveform monitoring
D. Trendelenburg carotid scanning

105. Which response is normal after distal limb exercise in a healthy artery?

A. Pressure remains markedly depressed for minutes
B. Waveforms become persistently absent
C. Venous reflux becomes continuous
D. Ankle pressure returns promptly toward baseline

106. During a focused vascular laboratory examination, which response is normal after distal limb exercise in a healthy artery?

A. Pressure remains markedly depressed for minutes
B. Ankle pressure returns promptly toward baseline
C. Waveforms become persistently absent
D. Venous reflux becomes continuous

107. Which physiologic test is most useful when ankle arteries are noncompressible?

A. Ankle pressure alone
B. Toe pressure or toe-brachial index
C. Carotid pressure ratio
D. Portal pulsatility index

108. During a focused vascular laboratory examination, which physiologic test is most useful when ankle arteries are noncompressible?

A. Toe pressure or toe-brachial index
B. Ankle pressure alone
C. Carotid pressure ratio
D. Portal pulsatility index

109. Which plethysmographic change suggests arterial inflow obstruction?

A. Brisk upstroke with prominent peak
B. Normal respiratory venous variation
C. Increased amplitude after occlusion
D. Reduced waveform amplitude with delayed systolic rise

110. During a focused vascular laboratory examination, which plethysmographic change suggests arterial inflow obstruction?

A. Brisk upstroke with prominent peak
B. Normal respiratory venous variation
C. Reduced waveform amplitude with delayed systolic rise
D. Increased amplitude after occlusion

111. Which maneuver is used to provoke lower-extremity venous reflux?

A. Sustained proximal arterial compression
B. Rapid ankle pressure inflation only
C. Distal compression followed by sudden release
D. Quiet breathing without augmentation

112. During a focused vascular laboratory examination, which maneuver is used to provoke lower-extremity venous reflux?

A. Sustained proximal arterial compression
B. Distal compression followed by sudden release
C. Rapid ankle pressure inflation only
D. Quiet breathing without augmentation

113. Which test assesses hand perfusion before radial artery harvest?

A. Palmar arch evaluation with digital waveforms
B. Carotid bruit auscultation only
C. Portal vein respiratory testing
D. Calf venous reflux timing

114. During a focused vascular laboratory examination, which test assesses hand perfusion before radial artery harvest?

A. Carotid bruit auscultation only
B. Portal vein respiratory testing
C. Calf venous reflux timing
D. Palmar arch evaluation with digital waveforms

115. Which finding suggests a pressure cuff is too narrow?

A. Artificially elevated measured pressure
B. Consistently absent venous signal
C. Artificially reduced arterial diameter
D. Reversed portal flow

116. During a focused vascular laboratory examination, which finding suggests a pressure cuff is too narrow?

A. Consistently absent venous signal
B. Artificially reduced arterial diameter
C. Artificially elevated measured pressure
D. Reversed portal flow

117. Which physiologic pattern supports small-vessel disease in the foot?

A. Normal toe and ankle waveforms
B. Abnormal toe waveforms despite acceptable ankle pressures
C. Triphasic brachial signals
D. Normal venous augmentation

118. During a focused vascular laboratory examination, which physiologic pattern supports small-vessel disease in the foot?

A. Normal toe and ankle waveforms
B. Triphasic brachial signals
C. Normal venous augmentation
D. Abnormal toe waveforms despite acceptable ankle pressures

119. Which method evaluates reactive hyperemia in an arterial study?

A. Continuous venous compression
B. Temporary cuff occlusion followed by release
C. Sustained breath holding only
D. Carotid tapping throughout

120. During a focused vascular laboratory examination, which method evaluates reactive hyperemia in an arterial study?

A. Continuous venous compression
B. Sustained breath holding only
C. Temporary cuff occlusion followed by release
D. Carotid tapping throughout

121. What is the safest needle visualization principle during ultrasound guidance?

A. Keep the needle tip continuously identified
B. Track only the needle hub
C. Advance whenever tissue moves
D. Ignore the beam orientation

122. During a focused vascular laboratory examination, what is the safest needle visualization principle during ultrasound guidance?

A. Track only the needle hub
B. Advance whenever tissue moves
C. Ignore the beam orientation
D. Keep the needle tip continuously identified

123. Before ultrasound-guided arterial access, what should be confirmed?

A. Only the patient's height
B. Portal vein direction
C. Carotid intima thickness
D. Target patency and absence of obstructing plaque

124. During a focused vascular laboratory examination, before ultrasound-guided arterial access, what should be confirmed?

A. Target patency and absence of obstructing plaque
B. Only the patient's height
C. Portal vein direction
D. Carotid intima thickness

125. Which ultrasound finding confirms guidewire location within a vessel?

A. Shadow outside the vessel only
B. Loss of all vessel compressibility
C. Echogenic linear structure coursing in the lumen
D. Stationary skin artifact

126. During a focused vascular laboratory examination, which ultrasound finding confirms guidewire location within a vessel?

A. Shadow outside the vessel only
B. Echogenic linear structure coursing in the lumen
C. Loss of all vessel compressibility
D. Stationary skin artifact

127. During thrombin injection of a pseudoaneurysm, what requires continuous monitoring?

A. Parent artery patency and sac thrombosis
B. Only systemic venous phasicity
C. Carotid wall thickness
D. Portal respiratory variation

128. During a focused vascular laboratory examination, during thrombin injection of a pseudoaneurysm, what requires continuous monitoring?

A. Only systemic venous phasicity
B. Parent artery patency and sac thrombosis
C. Carotid wall thickness
D. Portal respiratory variation

129. What is the purpose of intraoperative completion duplex after bypass?

A. Measure chronic venous reflux only
B. Diagnose unrelated carotid disease
C. Detect technical defects before wound closure
D. Replace all clinical monitoring

130. During a focused vascular laboratory examination, what is the purpose of intraoperative completion duplex after bypass?

A. Measure chronic venous reflux only
B. Diagnose unrelated carotid disease
C. Replace all clinical monitoring
D. Detect technical defects before wound closure

131. Which practice helps maintain sterility during an ultrasound-guided procedure?

A. Use ordinary gel beneath the needle
B. Touch the field with an uncovered probe
C. Use a sterile probe cover and sterile gel
D. Reuse a contaminated cover

132. During a focused vascular laboratory examination, which practice helps maintain sterility during an ultrasound-guided procedure?

A. Use ordinary gel beneath the needle
B. Use a sterile probe cover and sterile gel
C. Touch the field with an uncovered probe
D. Reuse a contaminated cover

133. Which adjustment reduces color aliasing when true velocity is high?

A. Increase the color velocity scale
B. Lower the pulse repetition frequency
C. Raise baseline without changing scale
D. Increase persistence maximally

134. During a focused vascular laboratory examination, which adjustment reduces color aliasing when true velocity is high?

A. Lower the pulse repetition frequency
B. Raise baseline without changing scale
C. Increase persistence maximally
D. Increase the color velocity scale

135. Which Doppler angle practice best supports reproducible velocity measurement?

A. Use 90 degrees for every vessel
B. Keep the correction cursor parallel to flow at 60 degrees or less
C. Align the cursor with the vessel wall regardless of flow
D. Change the angle between serial measurements

136. During a focused vascular laboratory examination, which Doppler angle practice best supports reproducible velocity measurement?

A. Use 90 degrees for every vessel
B. Align the cursor with the vessel wall regardless of flow
C. Keep the correction cursor parallel to flow at 60 degrees or less
D. Change the angle between serial measurements

137. What is the effect of increasing wall filter?

A. Removal of low-frequency Doppler shifts
B. Improved display of slow venous flow
C. Increased penetration of B-mode
D. Elimination of all aliasing

138. During a focused vascular laboratory examination, what is the effect of increasing wall filter?

A. Improved display of slow venous flow
B. Increased penetration of B-mode
C. Elimination of all aliasing
D. Removal of low-frequency Doppler shifts

139. Which control most directly changes the frequency of emitted pulses?

A. Pulse repetition frequency
B. Overall B-mode gain
C. Dynamic range
D. Gray-map selection

140. During a focused vascular laboratory examination, which control most directly changes the frequency of emitted pulses?

A. Overall B-mode gain
B. Pulse repetition frequency
C. Dynamic range
D. Gray-map selection

141. Which action follows the ALARA principle?

A. Use maximum output throughout imaging
B. Maintain prolonged spectral Doppler sampling
C. Use minimum output and exposure needed
D. Disregard displayed output indicators

142. During a focused vascular laboratory examination, which action follows the ALARA principle?

A. Use maximum output throughout imaging
B. Maintain prolonged spectral Doppler sampling
C. Disregard displayed output indicators
D. Use minimum output and exposure needed

143. Which phantom test evaluates distance measurement accuracy?

A. Imaging known targets at calibrated separations
B. Measuring patient blood pressure
C. Counting stored reports
D. Reviewing appointment duration

144. During a focused vascular laboratory examination, which phantom test evaluates distance measurement accuracy?

A. Measuring patient blood pressure
B. Counting stored reports
C. Reviewing appointment duration
D. Imaging known targets at calibrated separations

145. What commonly causes spectral broadening artifact?

A. Appropriately centered small gate
B. Correct angle alignment
C. Excessively large Doppler sample volume
D. Low output power alone

146. During a focused vascular laboratory examination, what commonly causes spectral broadening artifact?

A. Appropriately centered small gate
B. Excessively large Doppler sample volume
C. Correct angle alignment
D. Low output power alone

147. Which change improves detection of very slow venous flow?

A. Raise scale and wall filter
B. Increase transducer pressure
C. Reduce color gain to zero
D. Lower scale and wall filter

148. During a focused vascular laboratory examination, which change improves detection of very slow venous flow?

A. Lower scale and wall filter

B. Raise scale and wall filter
C. Increase transducer pressure
D. Reduce color gain to zero

149. What does color Doppler blooming indicate?

A. The vessel is definitely stenosed
B. Color gain is excessively high
C. The transducer frequency is too low only
D. The wall filter is always too high

150. During a focused vascular laboratory examination, what does color Doppler blooming indicate?

A. The vessel is definitely stenosed
B. The transducer frequency is too low only
C. Color gain is excessively high
D. The wall filter is always too high

151. Which quality measure compares test results with a reference standard?

A. Room turnover time
B. Patient arrival interval
C. Accuracy correlation
D. Transducer cable length

152. During a focused vascular laboratory examination, which quality measure compares test results with a reference standard?

A. Room turnover time
B. Accuracy correlation
C. Patient arrival interval

D. Transducer cable length

153. Which transducer is generally preferred for superficial carotid imaging?

A. Low-frequency phased array
B. Continuous-wave pencil probe only
C. Low-frequency curvilinear array
D. High-frequency linear array

154. During a focused vascular laboratory examination, which transducer is generally preferred for superficial carotid imaging?

A. High-frequency linear array
B. Low-frequency phased array
C. Continuous-wave pencil probe only
D. Low-frequency curvilinear array

155. What should be done when a transducer cable has exposed wiring?

A. Cover it temporarily and continue
B. Immerse the connector in disinfectant
C. Remove it from service and report the defect
D. Use maximum output to test it

156. During a focused vascular laboratory examination, what should be done when a transducer cable has exposed wiring?

A. Cover it temporarily and continue
B. Remove it from service and report the defect
C. Immerse the connector in disinfectant
D. Use maximum output to test it

157. Before beginning a vascular examination, which action is essential?

A. Verify patient identity using approved identifiers
B. Rely only on room location
C. Use the diagnosis as identity
D. Ask another patient to confirm

158. During a focused vascular laboratory examination, before beginning a vascular examination, which action is essential?

A. Rely only on room location
B. Use the diagnosis as identity
C. Ask another patient to confirm
D. Verify patient identity using approved identifiers

159. Which history detail is most relevant before a lower-extremity arterial study?

A. Preferred sleeping position only
B. Remote dental procedure
C. Location and timing of exertional symptoms
D. Dominant writing hand alone

160. During a focused vascular laboratory examination, which history detail is most relevant before a lower-extremity arterial study?

A. Location and timing of exertional symptoms
B. Preferred sleeping position only
C. Remote dental procedure
D. Dominant writing hand alone

161. How should a critical vascular finding be documented?

A. Mention it only at shift change
B. Record the finding, recipient, time, and read-back per policy
C. Delete preliminary images
D. Wait for routine report signing

162. During a focused vascular laboratory examination, how should a critical vascular finding be documented?

A. Mention it only at shift change
B. Delete preliminary images
C. Wait for routine report signing
D. Record the finding, recipient, time, and read-back per policy

163. Which preparation is commonly requested for a mesenteric duplex study?

A. Heavy meal immediately beforehand
B. Fasting to reduce bowel gas and postprandial flow effects
C. Continuous exercise before scanning
D. Full bladder for every patient

164. During a focused vascular laboratory examination, which preparation is commonly requested for a mesenteric duplex study?

A. Heavy meal immediately beforehand
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C. Fasting to reduce bowel gas and postprandial flow effects
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165. What is the best response when the ultrasound order conflicts with the patient's symptoms?

A. Perform an unrelated study without notice
B. Change the order silently
C. Ignore the symptoms completely
D. Clarify the requested examination before proceeding

166. During a focused vascular laboratory examination, what is the best response when the ultrasound order conflicts with the patient's symptoms?

A. Clarify the requested examination before proceeding
B. Perform an unrelated study without notice
C. Change the order silently
D. Ignore the symptoms completely

167. Which documentation supports reproducible serial surveillance?

A. Record vessel segment, method, angle, and measured values
B. Save one unlabeled image
C. Report only that flow was seen
D. Omit prior-study comparison

168. During a focused vascular laboratory examination, which documentation supports reproducible serial surveillance?

A. Save one unlabeled image
B. Report only that flow was seen
C. Record vessel segment, method, angle, and measured values
D. Omit prior-study comparison

169. What should occur before scanning a painful postoperative limb?

A. Apply maximal pressure immediately

B. Remove dressings without authorization

C. Ignore infection-control requirements

D. Explain the examination and assess tolerance and precautions

170. During a focused vascular laboratory examination, what should occur before scanning a painful postoperative limb?

A. Apply maximal pressure immediately

B. Explain the examination and assess tolerance and precautions

C. Remove dressings without authorization

D. Ignore infection-control requirements

Practice Exam 9: Answer Key and Explanations

1. A — In the usual arch configuration, the brachiocephalic artery is the first branch. It subsequently divides into the right common carotid and right subclavian arteries. The left common carotid and left subclavian arise separately and more distally from the arch. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side.

2. C — In the usual arch configuration, the brachiocephalic artery is the first branch. It subsequently divides into the right common carotid and right subclavian arteries. The left common carotid and left subclavian arise separately and more distally from the arch. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and.

3. A — At the groin the common femoral vein generally lies medial to the common femoral artery. Recognizing this relationship supports correct vessel identification and compression technique. The great saphenous joins superficially, while the deep femoral and external iliac occupy different levels. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral.

4. B — At the groin the common femoral vein generally lies medial to the common femoral artery. Recognizing this relationship supports correct vessel identification and compression technique. The great saphenous joins superficially, while the deep femoral and external iliac occupy different levels. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history.

5. D — The external iliac artery becomes the common femoral artery as it passes beneath the inguinal ligament. The common femoral later bifurcates into the superficial femoral and deep femoral arteries. The popliteal artery is a distal continuation beyond the adductor hiatus. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral.

6. C — The external iliac artery becomes the common femoral artery as it passes beneath the inguinal ligament. The common femoral later bifurcates into the superficial femoral and deep femoral arteries. The popliteal artery is a distal continuation beyond the adductor hiatus. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history.

7. B — A healthy resting limb artery typically shows rapid systolic forward flow, brief early-diastolic reversal, and late-diastolic forward flow. This triphasic pattern reflects good arterial compliance and high peripheral resistance. Continuous monophasic flow suggests altered resistance or disease, while the other patterns are venous. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler.

8. A — A healthy resting limb artery typically shows rapid systolic forward flow, brief early-diastolic reversal, and late-diastolic forward flow. This triphasic pattern reflects good arterial compliance and high peripheral resistance. Continuous monophasic flow suggests altered resistance or disease, while the other patterns are venous. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with.

9. D — The internal carotid supplies the brain, a continuously perfused low-resistance vascular bed, so forward diastolic flow is normally prominent. External carotid branches supply higher-resistance facial and scalp beds and generally demonstrate more pulsatility and less sustained diastolic flow. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when.

10. C — The internal carotid supplies the brain, a continuously perfused low-resistance vascular bed, so forward diastolic flow is normally prominent. External carotid branches supply higher-resistance facial and scalp beds and generally demonstrate more pulsatility and less sustained diastolic flow. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior.

11. A — The posterior tibial artery travels behind the medial malleolus with its paired veins and is accessible there for Doppler assessment. The anterior tibial continues onto the dorsum as dorsalis pedis. The peroneal artery courses deeper along the fibula. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when.

12. C — The posterior tibial artery travels behind the medial malleolus with its paired veins and is accessible there for Doppler assessment. The anterior tibial continues onto the dorsum as dorsalis pedis. The peroneal artery courses deeper along the fibula. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior.

13. D — The left renal vein crosses anterior to the aorta and posterior to the superior mesenteric artery before entering the inferior vena cava. This anatomic corridor is clinically important because compression there can produce nutcracker physiology. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

14. B — The left renal vein crosses anterior to the aorta and posterior to the superior mesenteric artery before entering the inferior vena cava. This anatomic corridor is clinically important because compression there can produce nutcracker physiology. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

15. D — The main portal vein is usually formed posterior to the pancreatic neck by union of the splenic and superior mesenteric veins. It carries nutrient-rich blood toward the liver. Hepatic veins instead drain the liver into the inferior vena cava. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side.

16. C — The main portal vein is usually formed posterior to the pancreatic neck by union of the splenic and superior mesenteric veins. It carries nutrient-rich blood toward the liver. Hepatic veins instead drain the liver into the inferior vena cava. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and.

17. B — The anterior tibial artery crosses the ankle and continues as the dorsalis pedis artery on the foot. The posterior tibial passes behind the medial malleolus, while the peroneal remains deeper and lateral. The popliteal divides proximally into tibial pathways. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side.

18. A — The anterior tibial artery crosses the ankle and continues as the dorsalis pedis artery on the foot. The posterior tibial passes behind the medial malleolus, while the peroneal remains deeper and lateral. The popliteal divides proximally into tibial pathways. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and.

19. A — The middle cerebral artery is commonly found through the transtemporal window and normally flows toward the transducer at standard depths. The basilar and vertebral arteries are usually assessed through the suboccipital window, while the ophthalmic artery is examined transorbitally. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side.

20. D — The middle cerebral artery is commonly found through the transtemporal window and normally flows toward the transducer at standard depths. The basilar and vertebral arteries are usually assessed through the suboccipital window, while the ophthalmic artery is examined transorbitally. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and.

21. B — Hepatopetal means flowing toward the liver and describes normal main portal venous direction. Hepatofugal denotes flow away from the liver and may occur with significant portal hypertension. The remaining terms do not correctly describe normal portal venous direction. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when.

22. C — Hepatopetal means flowing toward the liver and describes normal main portal venous direction. Hepatofugal denotes flow away from the liver and may occur with significant portal hypertension. The remaining terms do not correctly describe normal portal venous direction. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior.

23. C — The superior mesenteric artery arises from the anterior aorta and passes over the left renal vein. This relationship creates the anatomic angle implicated in renal vein compression. The other arteries have different origins or courses. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

24. A — The superior mesenteric artery arises from the anterior aorta and passes over the left renal vein. This relationship creates the anatomic angle implicated in renal vein compression. The other arteries have different origins or courses. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

25. B — The hepatic veins carry blood from the liver directly into the inferior vena cava near the diaphragm. Portal, splenic, and superior mesenteric veins belong to the portal circulation and deliver blood to the liver rather than directly to the cava. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral.

26. D — The hepatic veins carry blood from the liver directly into the inferior vena cava near the diaphragm. Portal, splenic, and superior mesenteric veins belong to the portal circulation and deliver blood to the liver rather than directly to the cava. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history.

27. D — The great saphenous vein travels anterior to the medial malleolus and ascends along the medial leg and thigh to join the common femoral vein. The small saphenous courses posteriorly, while tibial and peroneal veins are deep paired veins. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when.

28. B — The great saphenous vein travels anterior to the medial malleolus and ascends along the medial leg and thigh to join the common femoral vein. The small saphenous courses posteriorly, while tibial and peroneal veins are deep paired veins. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior.

29. C — The common carotid typically bifurcates near the C3-C4 level, around the upper border of the thyroid cartilage, although normal variation exists. The clavicle and aortic arch are too proximal, and the mandibular angle is usually more distal. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

30. A — The common carotid typically bifurcates near the C3-C4 level, around the upper border of the thyroid cartilage, although normal variation exists. The clavicle and aortic arch are too proximal, and the mandibular angle is usually more distal. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

31. A — The superior thyroid artery is usually the first anterior branch of the external carotid and supplies the upper thyroid. Its presence can help distinguish the external carotid from the internal carotid, which has no cervical branches. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

32. D — The superior thyroid artery is usually the first anterior branch of the external carotid and supplies the upper thyroid. Its presence can help distinguish the external carotid from the internal carotid, which has no cervical branches. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

33. C — After passing through the adductor hiatus, the superficial femoral artery becomes the popliteal artery. The popliteal later divides into tibial pathways. The deep femoral branches proximally, and the common femoral is located above the bifurcation. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

34. B — After passing through the adductor hiatus, the superficial femoral artery becomes the popliteal artery. The popliteal later divides into tibial pathways. The deep femoral branches proximally, and the common femoral is located above the bifurcation. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

35. A — Deep calf arteries are commonly accompanied by paired venae comitantes, including the posterior tibial veins. The great and small saphenous veins are superficial single trunks, while the common femoral vein is normally a single proximal vessel. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

36. C — Deep calf arteries are commonly accompanied by paired venae comitantes, including the posterior tibial veins. The great and small saphenous veins are superficial single trunks, while the common femoral vein is normally a single proximal vessel. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

37. D — A significant narrowing accelerates blood locally and often produces spectral broadening and turbulence downstream. Comparing the stenotic velocity with an adjacent normal segment strengthens interpretation. Uniform velocity and normal venous findings do not demonstrate focal arterial narrowing. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

38. B — A significant narrowing accelerates blood locally and often produces spectral broadening and turbulence downstream. Comparing the stenotic velocity with an adjacent normal segment strengthens interpretation. Uniform velocity and normal venous findings do not demonstrate focal arterial narrowing. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

39. C — Acute thrombus often makes the vein enlarged and noncompressible, with relatively hypoechoic intraluminal material. Chronic disease more often produces wall thickening, echogenic residual material, webs, reduced caliber, and collateral channels. Compression remains the primary diagnostic maneuver. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

40. D — Acute thrombus often makes the vein enlarged and noncompressible, with relatively hypoechoic intraluminal material. Chronic disease more often produces wall thickening, echogenic residual material, webs, reduced caliber, and collateral channels. Compression remains the primary diagnostic maneuver. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

41. B — Chronic thrombotic change commonly appears echogenic, contracted, wall adherent, and partly recanalized, sometimes with collaterals. Acute thrombus more often distends the vein and is relatively hypoechoic. Clinical history and the full examination remain important. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

42. A — Chronic thrombotic change commonly appears echogenic, contracted, wall adherent, and partly recanalized, sometimes with collaterals. Acute thrombus more often distends the vein and is relatively hypoechoic. Clinical history and the full examination remain important. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

43. C — A pressure-reducing stenosis or occlusion proximal to the vertebral origin can draw blood retrograde down the vertebral artery to supply the arm, producing subclavian steal physiology. Carotid and jugular lesions do not create this classic pattern. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

44. D — A pressure-reducing stenosis or occlusion proximal to the vertebral origin can draw blood retrograde down the vertebral artery to supply the arm, producing subclavian steal physiology. Carotid and jugular lesions do not create this classic pattern. Reliable interpretation also requires technically

adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

45. B — An irregular plaque surface with a distinct crater communicating with the lumen suggests ulceration and possible embolic potential. Smooth homogeneous contour and uniform blood filling do not indicate surface disruption. Careful multiplanar imaging helps avoid artifact. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

46. D — An irregular plaque surface with a distinct crater communicating with the lumen suggests ulceration and possible embolic potential. Smooth homogeneous contour and uniform blood filling do not indicate surface disruption. Careful multiplanar imaging helps avoid artifact. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

47. A — Tardus-parvus morphology combines a delayed systolic upstroke with reduced systolic amplitude and reflects dampening beyond a significant proximal stenosis. It is an indirect downstream sign. Venous reflux and isolated fistula physiology produce different waveform changes. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

48. A — Tardus-parvus morphology combines a delayed systolic upstroke with reduced systolic amplitude and reflects dampening beyond a significant proximal stenosis. It is an indirect downstream sign. Venous reflux and isolated fistula physiology produce different waveform changes. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

49. B — Bilateral monophasic common femoral waveforms suggest inflow disease proximal to both groins, often involving the aorta or iliac arteries. Normal triphasic distal waveforms would argue against major inflow compromise. The other findings involve different vascular systems. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

50. C — Bilateral monophasic common femoral waveforms suggest inflow disease proximal to both groins, often involving the aorta or iliac arteries. Normal triphasic distal waveforms would argue against major inflow compromise. The other findings involve different vascular systems. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

51. D — Blood entering the pseudoaneurysm during systole and returning toward the parent artery during diastole creates the characteristic to-and-fro neck waveform. Swirling color may appear within the sac. Complete absence of flow suggests thrombosis rather than a patent pseudoaneurysm. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when.

52. B — Blood entering the pseudoaneurysm during systole and returning toward the parent artery during diastole creates the characteristic to-and-fro neck waveform. Swirling color may appear within the sac. Complete absence of flow suggests thrombosis rather than a patent pseudoaneurysm. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior.

53. C — A patent pseudoaneurysm often shows bidirectional swirling color, commonly called the yin-yang sign, because blood circulates within the sac. The diagnosis is strengthened by demonstrating neck continuity and a to-and-fro spectral waveform. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

54. A — A patent pseudoaneurysm often shows bidirectional swirling color, commonly called the yin-yang sign, because blood circulates within the sac. The diagnosis is strengthened by demonstrating neck continuity and a to-and-fro spectral waveform. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

55. C — An arteriovenous fistula provides a low-resistance pathway, increasing arterial velocity and diastolic flow near the communication. The draining vein may become pulsatile and arterialized. Absent diastolic flow and increased resistance contradict this physiology. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

56. D — An arteriovenous fistula provides a low-resistance pathway, increasing arterial velocity and diastolic flow near the communication. The draining vein may become pulsatile and arterialized. Absent diastolic flow and increased resistance contradict this physiology. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

57. B — Periaortic fluid or hematoma combined with focal wall disruption is an urgent sign of possible leakage or rupture. Mural thrombus and calcification are common chronic aneurysm features and do not alone establish rupture. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

58. A — Periaortic fluid or hematoma combined with focal wall disruption is an urgent sign of possible leakage or rupture. Mural thrombus and calcification are common chronic aneurysm features and do not alone establish rupture. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

59. C — Common femoral venous flow should vary with respiration. Persistent continuous flow, especially when asymmetric, suggests proximal obstruction such as iliac thrombosis or compression. Normal augmentation and compressibility address patency but do not exclude a more proximal lesion. In

practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

60. D — Common femoral venous flow should vary with respiration. Persistent continuous flow, especially when asymmetric, suggests proximal obstruction such as iliac thrombosis or compression. Normal augmentation and compressibility address patency but do not exclude a more proximal lesion. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

61. A — Sustained retrograde flow following Valsalva or distal augmentation indicates failure of valve closure and supports reflux. Compressibility evaluates thrombus, while antegrade augmentation demonstrates a patent pathway but does not itself prove valvular competence. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

62. B — Sustained retrograde flow following Valsalva or distal augmentation indicates failure of valve closure and supports reflux. Compressibility evaluates thrombus, while antegrade augmentation demonstrates a patent pathway but does not itself prove valvular competence. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

63. A — Calcium strongly attenuates and reflects ultrasound, commonly creating bright echoes with posterior acoustic shadowing. Soft plaque and fresh thrombus tend to be less echogenic and usually do not produce dense shadowing. Shadowing can obscure the residual lumen. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

64. D — Calcium strongly attenuates and reflects ultrasound, commonly creating bright echoes with posterior acoustic shadowing. Soft plaque and fresh thrombus tend to be less echogenic and usually do not produce dense shadowing. Shadowing can obscure the residual lumen. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

65. C — A focal velocity ratio near 2:1 commonly supports an approximately 50% diameter reduction in many peripheral arterial criteria sets. Exact thresholds are laboratory and vessel specific, so morphology, color findings, and downstream waveforms must also be considered. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

66. B — A focal velocity ratio near 2:1 commonly supports an approximately 50% diameter reduction in many peripheral arterial criteria sets. Exact thresholds are laboratory and vessel specific, so morphology, color findings, and downstream waveforms must also be considered. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

67. A — True occlusion requires failure to detect flow after optimizing gain, scale, wall filter, power Doppler, and insonation approach. Demonstrable trickle flow establishes patency and near occlusion. Aliasing or post-stenotic disturbance also implies residual flow. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

68. C — True occlusion requires failure to detect flow after optimizing gain, scale, wall filter, power Doppler, and insonation approach. Demonstrable trickle flow establishes patency and near occlusion. Aliasing or post-stenotic disturbance also implies residual flow. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

69. D — The median arcuate ligament may compress the proximal celiac artery more during expiration as the diaphragm rises, producing respiratory variation in velocity and vessel contour. The other conditions do not characteristically create this dynamic celiac pattern. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

70. B — The median arcuate ligament may compress the proximal celiac artery more during expiration as the diaphragm rises, producing respiratory variation in velocity and vessel contour. The other conditions do not characteristically create this dynamic celiac pattern. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

71. D — Bilateral elevation of intrarenal resistance suggests diffuse parenchymal or small-vessel disease, especially when kidneys show structural changes. Focal ostial acceleration and post-stenotic turbulence are direct signs of main renal artery narrowing. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

72. B — Bilateral elevation of intrarenal resistance suggests diffuse parenchymal or small-vessel disease, especially when kidneys show structural changes. Focal ostial acceleration and post-stenotic turbulence are direct signs of main renal artery narrowing. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

73. C — Vasospasm narrows the arterial lumen and can produce a focal rise in mean velocity. Interpretation should consider velocity ratios, trends, insonation quality, and hyperemia because elevated flow states can also increase velocity. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

74. A — Vasospasm narrows the arterial lumen and can produce a focal rise in mean velocity. Interpretation should consider velocity ratios, trends, insonation quality, and hyperemia because elevated flow states can also increase velocity. Reliable interpretation also requires technically adequate images,

consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

75. D — Ischemic tissue lowers distal resistance, often producing monophasic arterial flow with persistent forward diastolic flow. A crisp triphasic pattern reflects normal high resistance at rest. Venous phasicity is not an arterial resistance indicator. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

76. C — Ischemic tissue lowers distal resistance, often producing monophasic arterial flow with persistent forward diastolic flow. A crisp triphasic pattern reflects normal high resistance at rest. Venous phasicity is not an arterial resistance indicator. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

77. B — Advanced portal hypertension may reverse portal flow away from the liver, termed hepatofugal flow, and can produce collateral pathways. Normal portal flow is hepatopetal. Direction must be verified with correct color map and spectral baseline settings. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

78. A — Advanced portal hypertension may reverse portal flow away from the liver, termed hepatofugal flow, and can produce collateral pathways. Normal portal flow is hepatopetal. Direction must be verified with correct color map and spectral baseline settings. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

79. D — A proximal subclavian stenosis reduces pressure delivered to the affected arm, creating interarm pressure differences and dampened downstream arterial waveforms. Severe disease may alter vertebral flow direction. The alternative lesions do not explain the full upper-extremity pattern. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

80. A — A proximal subclavian stenosis reduces pressure delivered to the affected arm, creating interarm pressure differences and dampened downstream arterial waveforms. Severe disease may alter vertebral flow direction. The alternative lesions do not explain the full upper-extremity pattern. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

81. B — Dissection may create an intimal flap separating true and false lumens, with differing flow patterns or mural hematoma. Atherosclerotic calcification at the bulb and symmetric normal flow do not establish dissection. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

82. C — Dissection may create an intimal flap separating true and false lumens, with differing flow patterns or mural hematoma. Atherosclerotic calcification at the bulb and symmetric normal flow do not establish dissection. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

83. D — Popliteal artery entrapment can be provoked by plantar flexion or dorsiflexion, causing dynamic lumen narrowing, velocity change, or temporary occlusion. Testing must correlate symptoms and compare neutral with provocative positions. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated.

84. B — Popliteal artery entrapment can be provoked by plantar flexion or dorsiflexion, causing dynamic lumen narrowing, velocity change, or temporary occlusion. Testing must correlate symptoms and compare neutral with provocative positions. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings.

85. A — Superficial thrombophlebitis typically produces pain, tenderness, wall thickening, intraluminal thrombus, noncompressibility, and surrounding inflammatory change in a superficial vein. Deep veins must also be assessed because concurrent deep thrombosis can occur. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

86. C — Superficial thrombophlebitis typically produces pain, tenderness, wall thickening, intraluminal thrombus, noncompressibility, and surrounding inflammatory change in a superficial vein. Deep veins must also be assessed because concurrent deep thrombosis can occur. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

87. B — A severe upstream lesion dissipates pulse energy and delays systolic acceleration, causing a dampened tardus-parvus or monophasic distal waveform. A sharp triphasic contour argues against major proximal obstruction at that level. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

88. A — A severe upstream lesion dissipates pulse energy and delays systolic acceleration, causing a dampened tardus-parvus or monophasic distal waveform. A sharp triphasic contour argues against major proximal obstruction at that level. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

89. C — Mural thrombus may appear echogenic or heterogeneous and lacks internal flow when Doppler settings are sufficiently sensitive. The remaining patent lumen should fill with color and produce spectral signals. Multiple planes help distinguish thrombus from artifact. In practice, the sonographer

should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

90. D — Mural thrombus may appear echogenic or heterogeneous and lacks internal flow when Doppler settings are sufficiently sensitive. The remaining patent lumen should fill with color and produce spectral signals. Multiple planes help distinguish thrombus from artifact. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

91. B — A graft stenosis produces focal narrowing, marked velocity acceleration, aliasing, and often downstream turbulence. Interpretation also considers access flow and velocity ratios. Arterialized venous outflow is expected in a functioning access and is not alone abnormal. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

92. D — A graft stenosis produces focal narrowing, marked velocity acceleration, aliasing, and often downstream turbulence. Interpretation also considers access flow and velocity ratios. Arterialized venous outflow is expected in a functioning access and is not alone abnormal. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

93. C — A mature fistula creates a low-resistance shunt, so the feeding artery demonstrates increased volume flow and prominent forward diastolic flow. High resistance may suggest access dysfunction or poor outflow. Portal venous morphology is unrelated. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

94. A — A mature fistula creates a low-resistance shunt, so the feeding artery demonstrates increased volume flow and prominent forward diastolic flow. High resistance may suggest access dysfunction or poor outflow. Portal venous morphology is unrelated. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

95. A — A focal velocity rise with visible narrowing and disturbed flow supports bypass graft stenosis. Surveillance requires assessment of inflow, the entire conduit, both anastomoses, and outflow. Uniform laminar flow does not indicate a focal lesion. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

96. B — A focal velocity rise with visible narrowing and disturbed flow supports bypass graft stenosis. Surveillance requires assessment of inflow, the entire conduit, both anastomoses, and outflow. Uniform laminar flow does not indicate a focal lesion. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

97. D — A mobile thrombus at a fresh carotid repair poses an embolic risk and warrants immediate communication according to laboratory policy. Mild wall irregularity or caliber change may be postoperative. The complete study and clinical condition guide escalation. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant.

98. C — A mobile thrombus at a fresh carotid repair poses an embolic risk and warrants immediate communication according to laboratory policy. Mild wall irregularity or caliber change may be postoperative. The complete study and clinical condition guide escalation. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies..

99. C — An endoleak is continued blood flow outside the stent graft but within the aneurysm sac. Surveillance evaluates leak presence, source, sac size, and graft limb patency. Sac shrinkage generally supports successful exclusion rather than persistent perfusion. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

100. B — An endoleak is continued blood flow outside the stent graft but within the aneurysm sac. Surveillance evaluates leak presence, source, sac size, and graft limb patency. Sac shrinkage generally supports successful exclusion rather than persistent perfusion. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

101. A — Segmental limb pressures and pulse volume recordings localize hemodynamically important arterial disease by comparing pressure drops and waveform morphology at multiple levels. Venous, carotid, and portal examinations answer different clinical questions. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

102. D — Segmental limb pressures and pulse volume recordings localize hemodynamically important arterial disease by comparing pressure drops and waveform morphology at multiple levels. Venous, carotid, and portal examinations answer different clinical questions. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

103. A — Thoracic outlet assessment compares arterial waveforms or photoplethysmographic signals during neutral and provocative arm positions while reproducing symptoms cautiously. Positional loss alone can occur in healthy people, so clinical correlation is essential. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

104. C — Thoracic outlet assessment compares arterial waveforms or photoplethysmographic signals during neutral and provocative arm positions while reproducing symptoms cautiously. Positional loss alone can occur in healthy people, so clinical correlation is essential. Reliable interpretation also requires

technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

105. D — In a healthy arterial system, exercise increases flow but ankle pressure recovers rapidly. A substantial postexercise pressure drop with delayed recovery can unmask hemodynamically significant disease that is not evident at rest. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

106. B — In a healthy arterial system, exercise increases flow but ankle pressure recovers rapidly. A substantial postexercise pressure drop with delayed recovery can unmask hemodynamically significant disease that is not evident at rest. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

107. B — Digital arteries are less commonly affected by medial calcification than ankle arteries, so toe pressures and toe-brachial indices can provide useful perfusion information when ankle pressures are artificially elevated or noncompressible. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

108. A — Digital arteries are less commonly affected by medial calcification than ankle arteries, so toe pressures and toe-brachial indices can provide useful perfusion information when ankle pressures are artificially elevated or noncompressible. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

109. D — Pulse volume recordings distal to significant inflow disease lose amplitude, have a rounded delayed upstroke, and may lose the dicrotic notch. These contour changes complement pressure measurements and are less affected by noncompressible arteries. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

110. C — Pulse volume recordings distal to significant inflow disease lose amplitude, have a rounded delayed upstroke, and may lose the dicrotic notch. These contour changes complement pressure measurements and are less affected by noncompressible arteries. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

111. C — Manual distal compression followed by release creates an antegrade bolus and then challenges valve closure. Retrograde flow persisting beyond the laboratory threshold supports reflux. Patient position and technique should follow validated protocol. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

112. B — Manual distal compression followed by release creates an antegrade bolus and then challenges valve closure. Retrograde flow persisting beyond the laboratory threshold supports reflux. Patient position and technique should follow validated protocol. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

113. A — Palmar arch testing evaluates whether ulnar collateral flow can maintain digital perfusion if the radial artery is removed or used. Digital photoplethysmographic waveforms are observed during selective arterial compression. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated protocol.

114. D — Palmar arch testing evaluates whether ulnar collateral flow can maintain digital perfusion if the radial artery is removed or used. Digital photoplethysmographic waveforms are observed during selective arterial compression. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings without careful reassessment.

115. A — A cuff that is too narrow requires excessive pressure to occlude the artery and can falsely elevate the recorded systolic pressure. Correct cuff width and placement are essential for reliable segmental and ankle measurements. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

116. C — A cuff that is too narrow requires excessive pressure to occlude the artery and can falsely elevate the recorded systolic pressure. Correct cuff width and placement are essential for reliable segmental and ankle measurements. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

117. B — Distal small-vessel disease may impair toe pressures and photoplethysmographic waveforms even when ankle pressures appear acceptable, particularly when calcification makes ankle vessels unreliable. Toe findings better reflect distal perfusion. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated protocol.

118. D — Distal small-vessel disease may impair toe pressures and photoplethysmographic waveforms even when ankle pressures appear acceptable, particularly when calcification makes ankle vessels unreliable. Toe findings better reflect distal perfusion. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings without careful reassessment.

119. B — Inflating a cuff to temporarily occlude arterial inflow and then releasing it produces reactive hyperemia. The resulting pressure and waveform response can reveal disease by increasing flow

demand, although exercise testing is often preferred when feasible. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

120. C — Inflating a cuff to temporarily occlude arterial inflow and then releasing it produces reactive hyperemia. The resulting pressure and waveform response can reveal disease by increasing flow demand, although exercise testing is often preferred when feasible. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

121. A — Continuous identification of the needle tip reduces the chance of unintended vessel, nerve, or organ injury. In-plane or out-of-plane technique may be used, but the operator must distinguish the tip from the shaft before advancing. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

122. D — Continuous identification of the needle tip reduces the chance of unintended vessel, nerve, or organ injury. In-plane or out-of-plane technique may be used, but the operator must distinguish the tip from the shaft before advancing. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

123. D — Preaccess ultrasound should identify the artery, vein, bifurcation, plaque, thrombus, depth, and surrounding structures. Selecting a patent segment without obstructive anterior-wall plaque improves access safety and success. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated protocol before assigning.

124. A — Preaccess ultrasound should identify the artery, vein, bifurcation, plaque, thrombus, depth, and surrounding structures. Selecting a patent segment without obstructive anterior-wall plaque improves access safety and success. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings without careful reassessment.

125. C — A guidewire appears as an echogenic linear structure within the vessel lumen and should be followed in more than one plane when practical. Visualization helps prevent extraluminal advancement or entry into an unintended branch. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

126. B — A guidewire appears as an echogenic linear structure within the vessel lumen and should be followed in more than one plane when practical. Visualization helps prevent extraluminal advancement or entry into an unintended branch. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

127. A — Ultrasound monitoring documents needle position, progressive sac thrombosis, and continued parent artery and distal arterial patency. Thrombin entering the native artery can cause embolic occlusion, so real-time observation is critical. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated.

128. B — Ultrasound monitoring documents needle position, progressive sac thrombosis, and continued parent artery and distal arterial patency. Thrombin entering the native artery can cause embolic occlusion, so real-time observation is critical. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings.

129. C — Completion duplex can identify residual stenosis, intimal flap, thrombus, poor anastomotic geometry, or inadequate flow while surgical correction remains immediately possible. It complements, rather than replaces, operative judgment and postoperative surveillance. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

130. D — Completion duplex can identify residual stenosis, intimal flap, thrombus, poor anastomotic geometry, or inadequate flow while surgical correction remains immediately possible. It complements, rather than replaces, operative judgment and postoperative surveillance. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

131. C — A sterile transducer cover and sterile coupling gel help preserve the sterile field during invasive guidance. Standard nonsterile gel or an uncovered probe can introduce contamination. Local infection-control policy also governs preparation and handling. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

132. B — A sterile transducer cover and sterile coupling gel help preserve the sterile field during invasive guidance. Standard nonsterile gel or an uncovered probe can introduce contamination. Local infection-control policy also governs preparation and handling. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

133. A — Increasing the color scale or pulse repetition frequency expands the measurable velocity range and reduces aliasing. Lowering the scale worsens aliasing. Baseline shift changes display allocation but does not increase the total Nyquist range. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

134. D — Increasing the color scale or pulse repetition frequency expands the measurable velocity range and reduces aliasing. Lowering the scale worsens aliasing. Baseline shift changes display allocation but does not increase the total Nyquist range. Reliable interpretation also requires technically adequate

images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

135. B — Velocity error increases sharply as the insonation angle approaches 90 degrees. Aligning the correction cursor with the actual flow direction and maintaining an angle of 60 degrees or less improves accuracy and reproducibility. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

136. C — Velocity error increases sharply as the insonation angle approaches 90 degrees. Aligning the correction cursor with the actual flow direction and maintaining an angle of 60 degrees or less improves accuracy and reproducibility. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

137. A — The wall filter suppresses low-frequency signals from vessel wall and tissue motion. Setting it too high can erase genuine slow flow, especially venous or end-diastolic signals. It does not directly improve penetration or eliminate velocity aliasing. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the.

138. D — The wall filter suppresses low-frequency signals from vessel wall and tissue motion. Setting it too high can erase genuine slow flow, especially venous or end-diastolic signals. It does not directly improve penetration or eliminate velocity aliasing. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No.

139. A — Pulse repetition frequency determines how often pulses are transmitted and affects the maximum unaliased Doppler velocity and imaging depth. Gain and gray mapping change display appearance but do not set transmission timing. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

140. B — Pulse repetition frequency determines how often pulses are transmitted and affects the maximum unaliased Doppler velocity and imaging depth. Gain and gray mapping change display appearance but do not set transmission timing. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

141. C — ALARA means keeping acoustic exposure as low as reasonably achievable while obtaining diagnostic information. Operators should minimize output power and dwell time, particularly with spectral Doppler, without compromising the necessary examination. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

142. D — ALARA means keeping acoustic exposure as low as reasonably achievable while obtaining diagnostic information. Operators should minimize output power and dwell time, particularly with spectral Doppler, without compromising the necessary examination. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

143. A — A tissue-equivalent phantom contains targets at known distances. Comparing displayed measurements with those reference separations evaluates vertical and horizontal distance accuracy. Patient and workflow measures do not test scanner spatial calibration. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's.

144. D — A tissue-equivalent phantom contains targets at known distances. Comparing displayed measurements with those reference separations evaluates vertical and horizontal distance accuracy. Patient and workflow measures do not test scanner spatial calibration. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory.

145. C — A large sample volume includes a wider range of velocities from different streamlines and can fill the spectral window artificially. Gate size, placement, gain, and beam-vessel geometry should be optimized before interpreting turbulence. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

146. B — A large sample volume includes a wider range of velocities from different streamlines and can fill the spectral window artificially. Gate size, placement, gain, and beam-vessel geometry should be optimized before interpreting turbulence. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

147. D — Slow venous flow produces low-frequency shifts. Lowering the pulse repetition frequency and wall filter makes these signals easier to display. Excess pressure may collapse the vein, while excessive gain reduction hides flow. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

148. A — Slow venous flow produces low-frequency shifts. Lowering the pulse repetition frequency and wall filter makes these signals easier to display. Excess pressure may collapse the vein, while excessive gain reduction hides flow. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

149. B — Excess color gain allows noise and color to extend beyond the vessel walls, creating blooming and an apparent oversized lumen. Gain should be increased to noise and then reduced slightly for a

stable display. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms.

150. C — Excess color gain allows noise and color to extend beyond the vessel walls, creating blooming and an apparent oversized lumen. Gain should be increased to noise and then reduced slightly for a stable display. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign.

151. C — Comparing vascular laboratory classifications with angiography, surgery, or another accepted reference helps estimate sensitivity, specificity, predictive values, and overall accuracy. Operational timing measures may be useful administratively but do not establish diagnostic agreement. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

152. B — Comparing vascular laboratory classifications with angiography, surgery, or another accepted reference helps estimate sensitivity, specificity, predictive values, and overall accuracy. Operational timing measures may be useful administratively but do not establish diagnostic agreement. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

153. D — A high-frequency linear array provides strong near-field detail and a rectangular field suitable for superficial carotid vessels. Lower-frequency arrays penetrate deeper but sacrifice resolution. A pencil probe does not provide anatomic B-mode imaging. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and.

154. A — A high-frequency linear array provides strong near-field detail and a rectangular field suitable for superficial carotid vessels. Lower-frequency arrays penetrate deeper but sacrifice resolution. A pencil probe does not provide anatomic B-mode imaging. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should.

155. C — Exposed wiring creates electrical, infection-control, and equipment risks. The transducer should be removed from clinical service, labeled according to policy, and reported for inspection or replacement rather than temporarily patched and reused. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the.

156. B — Exposed wiring creates electrical, infection-control, and equipment risks. The transducer should be removed from clinical service, labeled according to policy, and reported for inspection or replacement rather than temporarily patched and reused. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override.

157. A — Using approved identifiers, commonly name and date of birth, prevents wrong-patient examinations and reporting errors. Room number, diagnosis, or another patient's statement is not a reliable identity check. Institutional policy determines the exact process. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient’s symptoms.

158. D — Using approved identifiers, commonly name and date of birth, prevents wrong-patient examinations and reporting errors. Room number, diagnosis, or another patient's statement is not a reliable identity check. Institutional policy determines the exact process. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient’s history and prior studies. No isolated sign.

159. C — Claudication location, walking distance, rest pain, wounds, prior interventions, medications, and risk factors help tailor the arterial examination and interpret findings. Unrelated history does not meaningfully address limb perfusion. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient’s symptoms, and the laboratory’s validated protocol.

160. A — Claudication location, walking distance, rest pain, wounds, prior interventions, medications, and risk factors help tailor the arterial examination and interpret findings. Unrelated history does not meaningfully address limb perfusion. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient’s history and prior studies. No isolated sign should override contradictory findings without careful reassessment.

161. B — Critical-result communication should be prompt and traceable. Documentation generally includes the finding, person notified, time, and confirmation or read-back according to institutional policy. Routine reporting alone may delay necessary care. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient’s symptoms, and the laboratory’s validated.

162. D — Critical-result communication should be prompt and traceable. Documentation generally includes the finding, person notified, time, and confirmation or read-back according to institutional policy. Routine reporting alone may delay necessary care. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient’s history and prior studies. No isolated sign should override contradictory findings.

163. B — Fasting commonly improves visualization by reducing bowel gas and avoids the normal postprandial increase in mesenteric flow that can alter velocities and resistance. Laboratory protocol determines duration and medication instructions. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient’s symptoms, and the laboratory’s validated.

164. C — Fasting commonly improves visualization by reducing bowel gas and avoids the normal postprandial increase in mesenteric flow that can alter velocities and resistance. Laboratory protocol determines duration and medication instructions. Reliable interpretation also requires technically

adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings.

165. D — When the order and clinical presentation do not match, the sonographer should clarify the intended examination with the responsible clinician according to policy. Silent substitution or ignoring relevant symptoms risks an incomplete or incorrect study. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's.

166. A — When the order and clinical presentation do not match, the sonographer should clarify the intended examination with the responsible clinician according to policy. Silent substitution or ignoring relevant symptoms risks an incomplete or incorrect study. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated.

167. A — Clear labels, standardized segments, technique, Doppler angle, measurements, and comparison with prior results allow subsequent examinations to reproduce the method and evaluate change. Unlabeled or vague documentation weakens surveillance. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated protocol.

168. C — Clear labels, standardized segments, technique, Doppler angle, measurements, and comparison with prior results allow subsequent examinations to reproduce the method and evaluate change. Unlabeled or vague documentation weakens surveillance. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings without careful reassessment.

169. D — The sonographer should explain the procedure, review surgical precautions, inspect the area, assess pain and tolerance, and modify pressure or positioning appropriately. Dressings and wounds require authorization and infection-control measures. In practice, the sonographer should integrate this finding with grayscale anatomy, color and spectral Doppler data, the contralateral side when relevant, the patient's symptoms, and the laboratory's validated.

170. B — The sonographer should explain the procedure, review surgical precautions, inspect the area, assess pain and tolerance, and modify pressure or positioning appropriately. Dressings and wounds require authorization and infection-control measures. Reliable interpretation also requires technically adequate images, consistent measurements, awareness of artifacts, and correlation with the patient's history and prior studies. No isolated sign should override contradictory findings.