PRACTICE EXAM 16: VASCULAR TECHNOLOGY SIMULATION (170 QUESTIONS)

This standalone practice exam contains 170 questions. Allow three hours. Select the single best answer for each item. The ARDMS VT examination uses a scaled score from 300 to 700, and 555 or higher is passing. This original practice examination is not affiliated with or endorsed by ARDMS or Inteleos.

1. A patient is referred to the vascular laboratory; based on standard vascular principles, which vessel normally gives rise to the internal and external carotid arteries?

A. Common carotid artery
B. Vertebral artery
C. Subclavian artery
D. Brachiocephalic vein

2. While teaching a trainee to correlate anatomy and hemodynamics, which carotid branch normally has no cervical branches?

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

3. During peer review of a vascular ultrasound examination, a normal high-resistance peripheral arterial waveform at rest is best described as what?

A. Triphasic with brief flow reversal
B. Continuous and minimally pulsatile
C. Monophasic with delayed systole

D. Steady retrograde flow throughout diastole

4. For a patient undergoing a complete noninvasive vascular evaluation, which vein is located within the calf muscle and commonly paired with an artery?

A. Great saphenous vein
B. Posterior tibial vein
C. Small saphenous vein
D. Cephalic vein

5. When selecting the best interpretation from the available findings, which vessel normally carries blood from the gastrointestinal tract toward the liver?

A. Hepatic artery
B. Inferior vena cava
C. Portal vein
D. Hepatic vein

6. During a preprocedure review of the patient's vascular study, where is the common femoral artery normally found relative to the common femoral vein?

A. Medial to the vein
B. Posterior to the vein
C. Within the venous lumen
D. Lateral to the vein

7. While applying a validated vascular laboratory protocol, which artery is the direct continuation of the external iliac artery below the inguinal ligament?

A. Deep femoral artery
B. Superficial femoral artery

C. Common femoral artery
D. Popliteal artery

8. A patient is referred to the vascular laboratory; based on standard vascular principles, which vessel normally passes through the transverse foramina of the cervical vertebrae?

A. Vertebral artery
B. External carotid artery
C. Internal jugular vein
D. Superior thyroid artery

9. While teaching a trainee to correlate anatomy and hemodynamics, which abdominal artery typically demonstrates a low-resistance waveform after a meal?

A. External iliac artery
B. Superior mesenteric artery
C. Distal aorta
D. Common femoral artery

10. During peer review of a vascular ultrasound examination, which vessel courses anterior to the aorta and posterior to the superior mesenteric artery?

A. Right renal artery
B. Inferior mesenteric artery
C. Splenic vein
D. Left renal vein

11. For a patient undergoing a complete noninvasive vascular evaluation, which superficial vein normally drains into the common femoral vein at the groin?

A. Small saphenous vein

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

12. When selecting the best interpretation from the available findings, which cerebral artery is a branch of the internal carotid circulation?

A. Basilar artery
B. Posterior inferior cerebellar artery
C. Middle cerebral artery
D. Vertebral artery

13. During a preprocedure review of the patient's vascular study, which vessel normally gives rise to the internal and external carotid arteries?

A. Vertebral artery
B. Subclavian artery
C. Brachiocephalic vein
D. Common carotid artery

14. While applying a validated vascular laboratory protocol, which carotid branch normally has no cervical branches?

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

15. A patient is referred to the vascular laboratory; based on standard vascular principles, a normal high-resistance peripheral arterial waveform at rest is best described as what?

A. Continuous and minimally pulsatile
B. Monophasic with delayed systole
C. Triphasic with brief flow reversal
D. Steady retrograde flow throughout diastole

16. While teaching a trainee to correlate anatomy and hemodynamics, which vein is located within the calf muscle and commonly paired with an artery?

A. Posterior tibial vein
B. Great saphenous vein
C. Small saphenous vein
D. Cephalic vein

17. During peer review of a vascular ultrasound examination, which vessel normally carries blood from the gastrointestinal tract toward the liver?

A. Hepatic artery
B. Inferior vena cava
C. Hepatic vein
D. Portal vein

18. For a patient undergoing a complete noninvasive vascular evaluation, where is the common femoral artery normally found relative to the common femoral vein?

A. Medial to the vein
B. Lateral to the vein
C. Posterior to the vein
D. Within the venous lumen

19. When selecting the best interpretation from the available findings, which artery is the direct continuation of the external iliac artery below the inguinal ligament?

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

20. During a preprocedure review of the patient's vascular study, which vessel normally passes through the transverse foramina of the cervical vertebrae?

A. External carotid artery
B. Internal jugular vein
C. Superior thyroid artery
D. Vertebral artery

21. While applying a validated vascular laboratory protocol, which abdominal artery typically demonstrates a low-resistance waveform after a meal?

A. Superior mesenteric artery
B. External iliac artery
C. Distal aorta
D. Common femoral artery

22. A patient is referred to the vascular laboratory; based on standard vascular principles, which vessel courses anterior to the aorta and posterior to the superior mesenteric artery?

A. Right renal artery
B. Inferior mesenteric artery
C. Left renal vein
D. Splenic vein

23. While teaching a trainee to correlate anatomy and hemodynamics, which superficial vein normally drains into the common femoral vein at the groin?

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

24. During peer review of a vascular ultrasound examination, which cerebral artery is a branch of the internal carotid circulation?

A. Basilar artery
B. Posterior inferior cerebellar artery
C. Middle cerebral artery
D. Vertebral artery

25. For a patient undergoing a complete noninvasive vascular evaluation, which vessel normally gives rise to the internal and external carotid arteries?

A. Vertebral artery
B. Common carotid artery
C. Subclavian artery
D. Brachiocephalic vein

26. When selecting the best interpretation from the available findings, which carotid branch normally has no cervical branches?

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

27. During a preprocedure review of the patient's vascular study, a normal high-resistance peripheral arterial waveform at rest is best described as what?

A. Continuous and minimally pulsatile
B. Monophasic with delayed systole
C. Triphasic with brief flow reversal
D. Steady retrograde flow throughout diastole

28. While applying a validated vascular laboratory protocol, which vein is located within the calf muscle and commonly paired with an artery?

A. Great saphenous vein
B. Small saphenous vein
C. Cephalic vein
D. Posterior tibial vein

29. A patient is referred to the vascular laboratory; based on standard vascular principles, which vessel normally carries blood from the gastrointestinal tract toward the liver?

A. Portal vein
B. Hepatic artery
C. Inferior vena cava
D. Hepatic vein

30. While teaching a trainee to correlate anatomy and hemodynamics, where is the common femoral artery normally found relative to the common femoral vein?

A. Medial to the vein
B. Lateral to the vein
C. Posterior to the vein
D. Within the venous lumen

31. During peer review of a vascular ultrasound examination, which artery is the direct continuation of the external iliac artery below the inguinal ligament?

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

32. For a patient undergoing a complete noninvasive vascular evaluation, which vessel normally passes through the transverse foramina of the cervical vertebrae?

A. External carotid artery
B. Internal jugular vein
C. Superior thyroid artery
D. Vertebral artery

33. When selecting the best interpretation from the available findings, which abdominal artery typically demonstrates a low-resistance waveform after a meal?

A. External iliac artery
B. Distal aorta
C. Superior mesenteric artery
D. Common femoral artery

34. During a preprocedure review of the patient's vascular study, which vessel courses anterior to the aorta and posterior to the superior mesenteric artery?

A. Right renal artery
B. Left renal vein
C. Inferior mesenteric artery
D. Splenic vein

35. While applying a validated vascular laboratory protocol, which superficial vein normally drains into the common femoral vein at the groin?

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

36. A patient is referred to the vascular laboratory; based on standard vascular principles, which cerebral artery is a branch of the internal carotid circulation?

A. Basilar artery
B. Middle cerebral artery
C. Posterior inferior cerebellar artery
D. Vertebral artery

37. While teaching a trainee to correlate anatomy and hemodynamics, which duplex finding most strongly supports acute lower-extremity deep vein thrombosis?

A. Failure of the vein to compress
B. Normal respiratory phasicity
C. Complete color filling
D. Thin echogenic valve leaflets

38. During peer review of a vascular ultrasound examination, a focal arterial stenosis causes which immediate Doppler change at the narrowed segment?

A. Reduced velocity with a narrow spectrum
B. Absent systolic flow in all branches
C. Uniform venous pulsatility
D. Increased velocity with spectral broadening

39. For a patient undergoing a complete noninvasive vascular evaluation, which waveform is expected distal to a hemodynamically significant arterial obstruction?

A. Sharp triphasic high-resistance flow
B. Continuous venous phasic flow
C. Bidirectional alias-free flow
D. Damped monophasic tardus-parvus flow

40. When selecting the best interpretation from the available findings, which finding best distinguishes pseudoaneurysm flow at its neck?

A. Steady hepatopetal flow
B. Continuous high-resistance flow
C. To-and-fro spectral pattern
D. Absent color in the sac

41. During a preprocedure review of the patient's vascular study, which color Doppler appearance is commonly seen within a pseudoaneurysm sac?

A. Bidirectional yin-yang flow
B. Uniform single-color laminar flow
C. No detectable flow at any setting
D. Only respiratory phasicity

42. While applying a validated vascular laboratory protocol, which clinical condition is most associated with venous reflux and ambulatory venous hypertension?

A. Acute arterial embolism
B. Chronic venous insufficiency
C. Thoracic outlet arterial spasm
D. Renal artery stenosis

43. A patient is referred to the vascular laboratory; based on standard vascular principles, a carotid plaque surface with a focal crater extending into the plaque is termed what?

A. Calcific shadowing
B. Intimal thickening
C. Ulceration
D. Venous recanalization

44. While teaching a trainee to correlate anatomy and hemodynamics, which finding suggests an arteriovenous fistula near the communication?

A. Low-resistance arterial flow and pulsatile venous flow
B. Triphasic artery and phasic vein
C. Absent arterial and venous signals
D. Normal artery with spontaneous slow vein

45. During peer review of a vascular ultrasound examination, which duplex feature favors chronic rather than acute venous thrombus?

A. Dilated vein with soft hypoechoic material
B. Small irregular vein with echogenic wall-adherent material
C. Smooth lumen with full compressibility
D. Normal augmentation and spontaneous flow

46. For a patient undergoing a complete noninvasive vascular evaluation, what is the typical hemodynamic effect of severe proximal arterial disease on a distal pulse-volume recording?

A. Rapid upstroke and tall amplitude
B. Prominent venous respiratory variation
C. Unchanged contour with higher pressure
D. Delayed upstroke and reduced amplitude

47. When selecting the best interpretation from the available findings, which condition can produce falsely elevated ankle pressures despite peripheral arterial disease?

A. Acute venous reflux
B. Low cardiac output only
C. Medial arterial calcification
D. Superficial thrombophlebitis

48. During a preprocedure review of the patient's vascular study, which ultrasound finding is most concerning for an abdominal aortic aneurysm complication?

A. New periaortic fluid with pain
B. Laminar flow in the lumen
C. Mural thrombus without symptoms
D. Visible lumbar branches

49. While applying a validated vascular laboratory protocol, which flow direction defines portal venous reversal?

A. Hepatopetal flow toward the liver
B. Hepatofugal flow away from the liver
C. Cephalad flow in the aorta
D. Retrograde flow in the femoral artery

50. A patient is referred to the vascular laboratory; based on standard vascular principles, which duplex pattern suggests renal artery stenosis when sampled within the stenosis?

A. Uniform low velocity without disturbance
B. Focal velocity elevation with poststenotic turbulence
C. Venous pulsatility with reflux
D. Triphasic flow throughout the renal artery

51. While teaching a trainee to correlate anatomy and hemodynamics, which lesion most commonly produces subclavian steal physiology?

A. Distal radial artery stenosis
B. Internal carotid plaque
C. Inferior vena cava thrombosis
D. Proximal subclavian artery stenosis

52. During peer review of a vascular ultrasound examination, which symptom pattern is most consistent with acute limb ischemia?

A. Gradual edema with skin pigmentation
B. Warm limb with bounding pulses
C. Chronic painless varicosities
D. Sudden pain, pallor, and absent pulse

53. For a patient undergoing a complete noninvasive vascular evaluation, which duplex finding most strongly supports acute lower-extremity deep vein thrombosis?

A. Normal respiratory phasicity
B. Complete color filling
C. Failure of the vein to compress
D. Thin echogenic valve leaflets

54. When selecting the best interpretation from the available findings, a focal arterial stenosis causes which immediate Doppler change at the narrowed segment?

A. Increased velocity with spectral broadening
B. Reduced velocity with a narrow spectrum
C. Absent systolic flow in all branches
D. Uniform venous pulsatility

55. During a preprocedure review of the patient's vascular study, which waveform is expected distal to a hemodynamically significant arterial obstruction?

A. Sharp triphasic high-resistance flow

B. Damped monophasic tardus-parvus flow

C. Continuous venous phasic flow

D. Bidirectional alias-free flow

56. While applying a validated vascular laboratory protocol, which finding best distinguishes pseudoaneurysm flow at its neck?

A. Steady hepatopetal flow

B. Continuous high-resistance flow

C. Absent color in the sac

D. To-and-fro spectral pattern

57. A patient is referred to the vascular laboratory; based on standard vascular principles, which color Doppler appearance is commonly seen within a pseudoaneurysm sac?

A. Bidirectional yin-yang flow

B. Uniform single-color laminar flow

C. No detectable flow at any setting

D. Only respiratory phasicity

58. While teaching a trainee to correlate anatomy and hemodynamics, which clinical condition is most associated with venous reflux and ambulatory venous hypertension?

A. Acute arterial embolism

B. Thoracic outlet arterial spasm

C. Chronic venous insufficiency

D. Renal artery stenosis

59. During peer review of a vascular ultrasound examination, a carotid plaque surface with a focal crater extending into the plaque is termed what?

A. Calcific shadowing
B. Intimal thickening
C. Venous recanalization
D. Ulceration

60. For a patient undergoing a complete noninvasive vascular evaluation, which finding suggests an arteriovenous fistula near the communication?

A. Triphasic artery and phasic vein
B. Absent arterial and venous signals
C. Low-resistance arterial flow and pulsatile venous flow
D. Normal artery with spontaneous slow vein

61. When selecting the best interpretation from the available findings, which duplex feature favors chronic rather than acute venous thrombus?

A. Dilated vein with soft hypoechoic material
B. Small irregular vein with echogenic wall-adherent material
C. Smooth lumen with full compressibility
D. Normal augmentation and spontaneous flow

62. During a preprocedure review of the patient's vascular study, what is the typical hemodynamic effect of severe proximal arterial disease on a distal pulse-volume recording?

A. Delayed upstroke and reduced amplitude
B. Rapid upstroke and tall amplitude
C. Prominent venous respiratory variation
D. Unchanged contour with higher pressure

63. While applying a validated vascular laboratory protocol, which condition can produce falsely elevated ankle pressures despite peripheral arterial disease?

A. Medial arterial calcification
B. Acute venous reflux
C. Low cardiac output only
D. Superficial thrombophlebitis

64. A patient is referred to the vascular laboratory; based on standard vascular principles, which ultrasound finding is most concerning for an abdominal aortic aneurysm complication?

A. Laminar flow in the lumen
B. Mural thrombus without symptoms
C. Visible lumbar branches
D. New periaortic fluid with pain

65. While teaching a trainee to correlate anatomy and hemodynamics, which flow direction defines portal venous reversal?

A. Hepatopetal flow toward the liver
B. Cephalad flow in the aorta
C. Hepatofugal flow away from the liver
D. Retrograde flow in the femoral artery

66. During peer review of a vascular ultrasound examination, which duplex pattern suggests renal artery stenosis when sampled within the stenosis?

A. Uniform low velocity without disturbance
B. Focal velocity elevation with poststenotic turbulence
C. Venous pulsatility with reflux
D. Triphasic flow throughout the renal artery

67. For a patient undergoing a complete noninvasive vascular evaluation, which lesion most commonly produces subclavian steal physiology?

A. Proximal subclavian artery stenosis
B. Distal radial artery stenosis
C. Internal carotid plaque
D. Inferior vena cava thrombosis

68. When selecting the best interpretation from the available findings, which symptom pattern is most consistent with acute limb ischemia?

A. Gradual edema with skin pigmentation
B. Warm limb with bounding pulses
C. Chronic painless varicosities
D. Sudden pain, pallor, and absent pulse

69. During a preprocedure review of the patient's vascular study, which duplex finding most strongly supports acute lower-extremity deep vein thrombosis?

A. Normal respiratory phasicity
B. Complete color filling
C. Failure of the vein to compress
D. Thin echogenic valve leaflets

70. While applying a validated vascular laboratory protocol, a focal arterial stenosis causes which immediate Doppler change at the narrowed segment?

A. Reduced velocity with a narrow spectrum
B. Absent systolic flow in all branches
C. Uniform venous pulsatility
D. Increased velocity with spectral broadening

71. A patient is referred to the vascular laboratory; based on standard vascular principles, which waveform is expected distal to a hemodynamically significant arterial obstruction?

A. Sharp triphasic high-resistance flow
B. Damped monophasic tardus-parvus flow
C. Continuous venous phasic flow
D. Bidirectional alias-free flow

72. While teaching a trainee to correlate anatomy and hemodynamics, which finding best distinguishes pseudoaneurysm flow at its neck?

A. To-and-fro spectral pattern
B. Steady hepatopetal flow
C. Continuous high-resistance flow
D. Absent color in the sac

73. During peer review of a vascular ultrasound examination, which color Doppler appearance is commonly seen within a pseudoaneurysm sac?

A. Uniform single-color laminar flow
B. No detectable flow at any setting
C. Bidirectional yin-yang flow
D. Only respiratory phasicity

74. For a patient undergoing a complete noninvasive vascular evaluation, which clinical condition is most associated with venous reflux and ambulatory venous hypertension?

A. Acute arterial embolism
B. Chronic venous insufficiency
C. Thoracic outlet arterial spasm
D. Renal artery stenosis

75. When selecting the best interpretation from the available findings, a carotid plaque surface with a focal crater extending into the plaque is termed what?

A. Calcific shadowing
B. Intimal thickening
C. Ulceration
D. Venous recanalization

76. During a preprocedure review of the patient's vascular study, which finding suggests an arteriovenous fistula near the communication?

A. Triphasic artery and phasic vein
B. Low-resistance arterial flow and pulsatile venous flow
C. Absent arterial and venous signals
D. Normal artery with spontaneous slow vein

77. While applying a validated vascular laboratory protocol, which duplex feature favors chronic rather than acute venous thrombus?

A. Small irregular vein with echogenic wall-adherent material
B. Dilated vein with soft hypoechoic material
C. Smooth lumen with full compressibility
D. Normal augmentation and spontaneous flow

78. A patient is referred to the vascular laboratory; based on standard vascular principles, what is the typical hemodynamic effect of severe proximal arterial disease on a distal pulse-volume recording?

A. Rapid upstroke and tall amplitude
B. Prominent venous respiratory variation
C. Unchanged contour with higher pressure
D. Delayed upstroke and reduced amplitude

79. While teaching a trainee to correlate anatomy and hemodynamics, which condition can produce falsely elevated ankle pressures despite peripheral arterial disease?

A. Acute venous reflux
B. Low cardiac output only
C. Superficial thrombophlebitis
D. Medial arterial calcification

80. During peer review of a vascular ultrasound examination, which ultrasound finding is most concerning for an abdominal aortic aneurysm complication?

A. Laminar flow in the lumen
B. Mural thrombus without symptoms
C. New periaortic fluid with pain
D. Visible lumbar branches

81. For a patient undergoing a complete noninvasive vascular evaluation, which flow direction defines portal venous reversal?

A. Hepatopetal flow toward the liver
B. Hepatofugal flow away from the liver
C. Cephalad flow in the aorta
D. Retrograde flow in the femoral artery

82. When selecting the best interpretation from the available findings, which duplex pattern suggests renal artery stenosis when sampled within the stenosis?

A. Focal velocity elevation with poststenotic turbulence
B. Uniform low velocity without disturbance
C. Venous pulsatility with reflux
D. Triphasic flow throughout the renal artery

83. During a preprocedure review of the patient's vascular study, which lesion most commonly produces subclavian steal physiology?

A. Proximal subclavian artery stenosis
B. Distal radial artery stenosis
C. Internal carotid plaque
D. Inferior vena cava thrombosis

84. While applying a validated vascular laboratory protocol, which symptom pattern is most consistent with acute limb ischemia?

A. Gradual edema with skin pigmentation
B. Sudden pain, pallor, and absent pulse
C. Warm limb with bounding pulses
D. Chronic painless varicosities

85. A patient is referred to the vascular laboratory; based on standard vascular principles, which duplex finding most strongly supports acute lower-extremity deep vein thrombosis?

A. Normal respiratory phasicity
B. Complete color filling
C. Thin echogenic valve leaflets
D. Failure of the vein to compress

86. While teaching a trainee to correlate anatomy and hemodynamics, a focal arterial stenosis causes which immediate Doppler change at the narrowed segment?

A. Reduced velocity with a narrow spectrum
B. Absent systolic flow in all branches
C. Increased velocity with spectral broadening
D. Uniform venous pulsatility

87. During peer review of a vascular ultrasound examination, which waveform is expected distal to a hemodynamically significant arterial obstruction?

A. Sharp triphasic high-resistance flow
B. Damped monophasic tardus-parvus flow
C. Continuous venous phasic flow
D. Bidirectional alias-free flow

88. For a patient undergoing a complete noninvasive vascular evaluation, which finding best distinguishes pseudoaneurysm flow at its neck?

A. To-and-fro spectral pattern
B. Steady hepatopetal flow
C. Continuous high-resistance flow
D. Absent color in the sac

89. When selecting the best interpretation from the available findings, which color Doppler appearance is commonly seen within a pseudoaneurysm sac?

A. Uniform single-color laminar flow
B. No detectable flow at any setting
C. Only respiratory phasicity
D. Bidirectional yin-yang flow

90. During a preprocedure review of the patient's vascular study, which clinical condition is most associated with venous reflux and ambulatory venous hypertension?

A. Acute arterial embolism
B. Thoracic outlet arterial spasm
C. Chronic venous insufficiency
D. Renal artery stenosis

91. While applying a validated vascular laboratory protocol, which segment of an autogenous vein bypass is especially prone to stenosis during surveillance?

A. Every segment equally without preference
B. Only the native contralateral artery
C. Anastomotic or valve-site segment
D. Only the distal deep vein

92. A patient is referred to the vascular laboratory; based on standard vascular principles, a sudden loss of flow in a previously patent dialysis graft most strongly suggests what?

A. Normal maturation
B. Acute graft thrombosis
C. Expected venous phasicity
D. Improved access function

93. While teaching a trainee to correlate anatomy and hemodynamics, which endovascular aneurysm repair finding represents persistent flow outside the graft but within the aneurysm sac?

A. Endoleak
B. Normal graft limb flow
C. Venous reflux
D. Carotid dissection

94. During peer review of a vascular ultrasound examination, during bypass surveillance, a focal velocity increase with turbulence most directly indicates what?

A. Normal uniform conduit flow
B. Complete venous compression
C. Expected postoperative edema only
D. Possible graft stenosis

95. For a patient undergoing a complete noninvasive vascular evaluation, which structure should be evaluated after carotid endarterectomy for recurrent narrowing?

A. Only the contralateral jugular vein
B. Endarterectomy site and adjacent artery
C. Only the distal radial artery
D. Only the portal venous system

96. When selecting the best interpretation from the available findings, which segment of an autogenous vein bypass is especially prone to stenosis during surveillance?

A. Every segment equally without preference
B. Only the native contralateral artery
C. Only the distal deep vein
D. Anastomotic or valve-site segment

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B. Possible graft stenosis
C. Complete venous compression
D. Expected postoperative edema only

100. While teaching a trainee to correlate anatomy and hemodynamics, which structure should be evaluated after carotid endarterectomy for recurrent narrowing?

A. Only the contralateral jugular vein
B. Only the distal radial artery
C. Endarterectomy site and adjacent artery
D. Only the portal venous system

101. During peer review of a vascular ultrasound examination, how is the ankle-brachial index calculated for one leg?

A. Higher ankle pressure divided by higher brachial pressure
B. Lower brachial pressure divided by ankle pressure
C. Ankle pressure minus brachial pressure
D. Toe pressure divided by ankle pressure

102. For a patient undergoing a complete noninvasive vascular evaluation, what is the purpose of exercise testing after a normal resting ankle-brachial index in a symptomatic patient?

A. Diagnose deep venous thrombosis directly
B. Measure carotid plaque thickness
C. Confirm portal vein direction
D. Reveal flow-limiting disease under demand

103. When selecting the best interpretation from the available findings, which maneuver is commonly used to evaluate lower-extremity venous reflux?

A. Distal augmentation followed by release
B. Continuous breath holding only
C. Rapid arm exercise only
D. Carotid compression

104. During a preprocedure review of the patient's vascular study, which test is useful when ankle arteries are noncompressible?

A. Ankle pressure alone
B. Carotid intima measurement
C. Portal velocity ratio
D. Toe-brachial index

105. While applying a validated vascular laboratory protocol, which plethysmographic change generally indicates worsening arterial perfusion distally?

A. Higher amplitude with sharp upstroke
B. Lower amplitude with rounded contour
C. Greater respiratory phasicity
D. More venous pulsatility

106. A patient is referred to the vascular laboratory; based on standard vascular principles, how is the ankle-brachial index calculated for one leg?

A. Lower brachial pressure divided by ankle pressure
B. Ankle pressure minus brachial pressure
C. Higher ankle pressure divided by higher brachial pressure
D. Toe pressure divided by ankle pressure

107. While teaching a trainee to correlate anatomy and hemodynamics, what is the purpose of exercise testing after a normal resting ankle-brachial index in a symptomatic patient?

A. Diagnose deep venous thrombosis directly
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A. Continuous breath holding only
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A. Toe-brachial index
B. Ankle pressure alone
C. Carotid intima measurement
D. Portal velocity ratio

110. When selecting the best interpretation from the available findings, which plethysmographic change generally indicates worsening arterial perfusion distally?

A. Higher amplitude with sharp upstroke
B. Lower amplitude with rounded contour
C. Greater respiratory phasicity
D. More venous pulsatility

111. During a preprocedure review of the patient's vascular study, how is the ankle-brachial index calculated for one leg?

A. Lower brachial pressure divided by ankle pressure
B. Higher ankle pressure divided by higher brachial pressure
C. Ankle pressure minus brachial pressure
D. Toe pressure divided by ankle pressure

112. While applying a validated vascular laboratory protocol, what is the purpose of exercise testing after a normal resting ankle-brachial index in a symptomatic patient?

A. Reveal flow-limiting disease under demand
B. Diagnose deep venous thrombosis directly
C. Measure carotid plaque thickness
D. Confirm portal vein direction

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D. More venous pulsatility

116. For a patient undergoing a complete noninvasive vascular evaluation, how is the ankle-brachial index calculated for one leg?

A. Higher ankle pressure divided by higher brachial pressure
B. Lower brachial pressure divided by ankle pressure
C. Ankle pressure minus brachial pressure
D. Toe pressure divided by ankle pressure

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C. Reveal flow-limiting disease under demand
D. Confirm portal vein direction

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C. Portal velocity ratio
D. Toe-brachial index

120. A patient is referred to the vascular laboratory; based on standard vascular principles, which plethysmographic change generally indicates worsening arterial perfusion distally?

A. Higher amplitude with sharp upstroke
B. Greater respiratory phasicity
C. Lower amplitude with rounded contour
D. More venous pulsatility

121. While teaching a trainee to correlate anatomy and hemodynamics, before an ultrasound-guided vascular access procedure, what is the most important initial verification?

A. Correct patient, procedure, and access site
B. Only the transducer frequency
C. Only the room temperature
D. Only the image depth

122. During peer review of a vascular ultrasound examination, for real-time ultrasound-guided needle placement, where should the needle tip be maintained?

A. Beyond the displayed field
B. Within continuous visualization
C. Behind acoustic shadowing
D. Outside the target vessel

123. For a patient undergoing a complete noninvasive vascular evaluation, which technique reduces contamination during ultrasound-guided vascular access?

A. Uncovered transducer with lotion
B. Nonsterile gel inside the field
C. Sterile cover and sterile gel
D. Routine towel without disinfection

124. When selecting the best interpretation from the available findings, during intraoperative duplex assessment, a focal color aliasing jet most strongly prompts what action?

A. Ignore the finding as expected
B. Turn off all Doppler modes
C. Assess only the opposite limb
D. Obtain spectral Doppler at the site

125. During a preprocedure review of the patient's vascular study, before an ultrasound-guided vascular access procedure, what is the most important initial verification?

A. Correct patient, procedure, and access site
B. Only the transducer frequency
C. Only the room temperature
D. Only the image depth

126. While applying a validated vascular laboratory protocol, for real-time ultrasound-guided needle placement, where should the needle tip be maintained?

A. Beyond the displayed field
B. Within continuous visualization
C. Behind acoustic shadowing
D. Outside the target vessel

127. A patient is referred to the vascular laboratory; based on standard vascular principles, which technique reduces contamination during ultrasound-guided vascular access?

A. Uncovered transducer with lotion
B. Nonsterile gel inside the field
C. Sterile cover and sterile gel
D. Routine towel without disinfection

128. While teaching a trainee to correlate anatomy and hemodynamics, during intraoperative duplex assessment, a focal color aliasing jet most strongly prompts what action?

A. Ignore the finding as expected
B. Obtain spectral Doppler at the site
C. Turn off all Doppler modes
D. Assess only the opposite limb

129. During peer review of a vascular ultrasound examination, before an ultrasound-guided vascular access procedure, what is the most important initial verification?

A. Only the transducer frequency
B. Only the room temperature
C. Only the image depth
D. Correct patient, procedure, and access site

130. For a patient undergoing a complete noninvasive vascular evaluation, for real-time ultrasound-guided needle placement, where should the needle tip be maintained?

A. Within continuous visualization
B. Beyond the displayed field
C. Behind acoustic shadowing
D. Outside the target vessel

131. When selecting the best interpretation from the available findings, which technique reduces contamination during ultrasound-guided vascular access?

A. Sterile cover and sterile gel
B. Uncovered transducer with lotion
C. Nonsterile gel inside the field
D. Routine towel without disinfection

132. During a preprocedure review of the patient's vascular study, during intraoperative duplex assessment, a focal color aliasing jet most strongly prompts what action?

A. Ignore the finding as expected
B. Turn off all Doppler modes
C. Assess only the opposite limb
D. Obtain spectral Doppler at the site

133. While applying a validated vascular laboratory protocol, which control primarily changes the strength of returning echoes displayed throughout the image?

A. Pulse repetition frequency
B. Wall filter
C. Overall gain
D. Doppler angle cursor

134. A patient is referred to the vascular laboratory; based on standard vascular principles, what is the principal effect of increasing pulse repetition frequency in pulsed-wave Doppler?

A. Lowers the transmit frequency automatically
B. Raises the Nyquist limit
C. Eliminates all spectral broadening
D. Increases acoustic impedance

135. While teaching a trainee to correlate anatomy and hemodynamics, which adjustment helps reduce color Doppler aliasing?

A. Lower the color scale further
B. Increase the color velocity scale
C. Increase persistence greatly
D. Move the focal zone away

136. During peer review of a vascular ultrasound examination, why should the Doppler insonation angle be kept at or below 60 degrees for velocity measurements?

A. Small angle errors cause less velocity error
B. Flow becomes physically faster
C. Aliasing becomes impossible
D. The vessel diameter increases

137. For a patient undergoing a complete noninvasive vascular evaluation, which artifact causes duplicated anatomy across a strong reflector?

A. Aliasing
B. Range ambiguity
C. Mirror-image artifact
D. Spectral window filling

138. When selecting the best interpretation from the available findings, what does the wall filter remove from a Doppler signal?

A. High-frequency arterial flow only
B. All color information
C. Transmit pulse energy
D. Low-frequency high-amplitude motion

139. During a preprocedure review of the patient's vascular study, which principle directs using the lowest acoustic output consistent with diagnostic imaging?

A. ALARA
B. Bernoulli principle
C. Poiseuille relationship
D. Doppler shift equation

140. While applying a validated vascular laboratory protocol, what does a tissue-mimicking phantom help evaluate in vascular laboratory quality assurance?

A. Patient blood pressure accuracy only
B. System performance and image consistency
C. Physician credential validity
D. Sterile supply inventory

141. A patient is referred to the vascular laboratory; based on standard vascular principles, which control primarily changes the strength of returning echoes displayed throughout the image?

A. Pulse repetition frequency
B. Wall filter
C. Doppler angle cursor
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143. During peer review of a vascular ultrasound examination, which adjustment helps reduce color Doppler aliasing?

A. Increase the color velocity scale
B. Lower the color scale further
C. Increase persistence greatly
D. Move the focal zone away

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B. Increase persistence greatly
C. Increase the color velocity scale
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A. Patient blood pressure accuracy only
B. Physician credential validity
C. System performance and image consistency
D. Sterile supply inventory

157. During peer review of a vascular ultrasound examination, which action best confirms patient identity before a vascular examination?

A. Ask only for the room number
B. Use two approved patient identifiers
C. Rely only on the schedule
D. Recognize the patient's face

158. For a patient undergoing a complete noninvasive vascular evaluation, what should the sonographer do when the examination order conflicts with the patient's symptoms?

A. Clarify the order before proceeding
B. Silently change the ordered study
C. Ignore the symptoms entirely
D. Document nothing until discharge

159. When selecting the best interpretation from the available findings, which documentation practice best supports longitudinal vascular surveillance?

A. Change protocols at each visit
B. Omit prior comparisons
C. Record only normal segments
D. Use consistent landmarks and measurement methods

160. During a preprocedure review of the patient's vascular study, which information is essential when communicating a critical vascular finding?

A. Only the scanner model
B. Patient identity, finding, and read-back confirmation
C. Only the appointment time
D. Only the room location

161. While applying a validated vascular laboratory protocol, why should relevant symptoms and prior vascular interventions be documented?

A. They replace duplex imaging
B. They eliminate consent requirements
C. They guide protocol and interpretation
D. They determine transducer disinfection

162. A patient is referred to the vascular laboratory; based on standard vascular principles, which action best confirms patient identity before a vascular examination?

A. Use two approved patient identifiers
B. Ask only for the room number
C. Rely only on the schedule
D. Recognize the patient's face

163. While teaching a trainee to correlate anatomy and hemodynamics, what should the sonographer do when the examination order conflicts with the patient's symptoms?

A. Silently change the ordered study
B. Ignore the symptoms entirely
C. Document nothing until discharge
D. Clarify the order before proceeding

164. During peer review of a vascular ultrasound examination, which documentation practice best supports longitudinal vascular surveillance?

A. Use consistent landmarks and measurement methods
B. Change protocols at each visit
C. Omit prior comparisons
D. Record only normal segments

165. For a patient undergoing a complete noninvasive vascular evaluation, which information is essential when communicating a critical vascular finding?

A. Only the scanner model
B. Only the appointment time
C. Patient identity, finding, and read-back confirmation
D. Only the room location

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B. Only the scanner model
C. Only the appointment time
D. Only the room location

Practice Exam 16: Answer Key and Explanations

1. A — The common carotid bifurcates into the internal and external carotid arteries. The vertebral and subclavian arteries have different branches, while the brachiocephalic vein is venous. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

2. C — The internal carotid artery ordinarily has no branches in the neck. The external carotid supplies multiple cervical and facial branches, including the superior thyroid artery. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

3. A — Normal resting limb arteries commonly show rapid systolic forward flow, brief early-diastolic reversal, and a smaller late-diastolic forward component. This produces a triphasic high-resistance waveform. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

4. B — Posterior tibial veins are deep paired veins accompanying the posterior tibial artery. The great and small saphenous veins are superficial lower-extremity conduits, while the cephalic vein is superficial in the upper extremity. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

5. C — The portal vein transports nutrient-rich venous blood from the gastrointestinal tract and spleen into the liver. Hepatic veins drain the liver to the inferior vena cava, and the hepatic artery supplies oxygenated arterial blood. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical

6. D — At the groin, the common femoral artery is normally lateral to the common femoral vein. Remembering the lateral-to-medial order of nerve, artery, vein, and lymphatics helps establish correct anatomy. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

7. C — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. The deep and superficial femoral arteries arise distally, and the superficial femoral continues as the popliteal artery. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

8. A — The vertebral artery ascends through cervical transverse foramina before entering the skull. The carotid system and internal jugular vein follow different cervical courses, and the superior thyroid is an external carotid branch. The competing choices describe a different vessel, mechanism, or testing

purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

9. B — After eating, intestinal metabolic demand increases and the superior mesenteric artery becomes lower resistance with greater diastolic flow. Resting limb arteries and the distal aorta generally retain higher-resistance characteristics. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

10. D — The left renal vein crosses anterior to the aorta and posterior to the superior mesenteric artery. This anatomic relationship is central to recognizing the so-called nutcracker compression location. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

11. B — The great saphenous vein joins the common femoral vein at the saphenofemoral junction. The small saphenous usually drains near the popliteal fossa, while tibial and peroneal veins are deep. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

12. C — The middle cerebral artery is a major terminal branch of the internal carotid artery. The vertebral arteries unite into the basilar artery, and the posterior inferior cerebellar artery usually arises from a vertebral artery. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according

13. D — The common carotid bifurcates into the internal and external carotid arteries. The vertebral and subclavian arteries have different branches, while the brachiocephalic vein is venous. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

14. A — The internal carotid artery ordinarily has no branches in the neck. The external carotid supplies multiple cervical and facial branches, including the superior thyroid artery. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

15. C — Normal resting limb arteries commonly show rapid systolic forward flow, brief early-diastolic reversal, and a smaller late-diastolic forward component. This produces a triphasic high-resistance waveform. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

16. A — Posterior tibial veins are deep paired veins accompanying the posterior tibial artery. The great and small saphenous veins are superficial lower-extremity conduits, while the cephalic vein is superficial in the upper extremity. In practice, the complete examination still requires correlation with

symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

17. D — The portal vein transports nutrient-rich venous blood from the gastrointestinal tract and spleen into the liver. Hepatic veins drain the liver to the inferior vena cava, and the hepatic artery supplies oxygenated arterial blood. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical

18. B — At the groin, the common femoral artery is normally lateral to the common femoral vein. Remembering the lateral-to-medial order of nerve, artery, vein, and lymphatics helps establish correct anatomy. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

19. B — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. The deep and superficial femoral arteries arise distally, and the superficial femoral continues as the popliteal artery. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

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21. A — After eating, intestinal metabolic demand increases and the superior mesenteric artery becomes lower resistance with greater diastolic flow. Resting limb arteries and the distal aorta generally retain higher-resistance characteristics. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

22. C — The left renal vein crosses anterior to the aorta and posterior to the superior mesenteric artery. This anatomic relationship is central to recognizing the so-called nutcracker compression location. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

23. A — The great saphenous vein joins the common femoral vein at the saphenofemoral junction. The small saphenous usually drains near the popliteal fossa, while tibial and peroneal veins are deep. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

24. C — The middle cerebral artery is a major terminal branch of the internal carotid artery. The vertebral arteries unite into the basilar artery, and the posterior inferior cerebellar artery usually arises from a vertebral artery. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according

25. B — The common carotid bifurcates into the internal and external carotid arteries. The vertebral and subclavian arteries have different branches, while the brachiocephalic vein is venous. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

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27. C — Normal resting limb arteries commonly show rapid systolic forward flow, brief early-diastolic reversal, and a smaller late-diastolic forward component. This produces a triphasic high-resistance waveform. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

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35. C — The great saphenous vein joins the common femoral vein at the saphenofemoral junction. The small saphenous usually drains near the popliteal fossa, while tibial and peroneal veins are deep. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

36. B — The middle cerebral artery is a major terminal branch of the internal carotid artery. The vertebral arteries unite into the basilar artery, and the posterior inferior cerebellar artery usually arises from a vertebral artery. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according

37. A — Complete venous compression is the primary duplex criterion for excluding thrombus at an accessible segment. Failure to compress strongly supports thrombosis, whereas normal phasicity and color filling argue against occlusion. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

38. D — Conservation of flow through a narrowed lumen produces a focal velocity increase. Disturbed flow and a range of velocities generate spectral broadening, while distal disease may instead create damped waveforms. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

39. D — A significant upstream obstruction delays systolic acceleration and reduces pulsatility distally, producing a damped monophasic tardus-parvus pattern. A sharp triphasic waveform indicates preserved inflow. This distinction matters because choosing the wrong mechanism can lead to an incorrect

protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

40. C — Blood enters a pseudoaneurysm during systole and returns toward the parent artery during diastole, creating the characteristic to-and-fro neck waveform. The sac often shows swirling color flow. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

41. A — Swirling blood within a pseudoaneurysm commonly creates adjacent red and blue regions called the yin-yang sign. The neck waveform and grayscale anatomy are needed for confirmation. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

42. B — Incompetent venous valves permit retrograde flow during provocation, increasing ambulatory venous pressure and contributing to edema, skin changes, and ulceration. The other disorders primarily involve arterial circulation. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

43. C — An ulcer is a focal excavation or crater in the plaque surface that communicates with the lumen. Calcification describes composition and may shadow, while intimal thickening lacks a crater. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

44. A — A fistula shunts arterial blood directly into a vein. The feeding artery loses resistance and gains diastolic flow, while the draining vein becomes arterialized, pulsatile, and turbulent. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

45. B — Chronic thrombosis commonly leaves an irregular, contracted vein with echogenic adherent residual material, wall thickening, collaterals, or recanalized channels. Acute thrombus more often distends the vein. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

46. D — Severe proximal inflow disease reduces energy reaching the limb, producing a rounded delayed upstroke, lower amplitude, and loss of the normal dicrotic notch in distal pulse-volume recordings. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

47. C — Noncompressible calcified tibial arteries resist cuff compression and can yield falsely high ankle pressures and ankle-brachial indices. Toe pressures or waveform analysis may better assess perfusion. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable

interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

48. A — New periaortic fluid in a symptomatic patient raises concern for leakage or rupture and requires urgent escalation. Laminar flow and branch visualization are not rupture signs; mural thrombus alone is common. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular

49. B — Normal portal venous flow is hepatopetal, directed toward the liver. Hepatofugal flow moves away from the liver and may occur with advanced portal hypertension or collateralization. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

50. B — A hemodynamically important renal artery narrowing accelerates flow locally and often creates poststenotic turbulence. Intrarenal tardus-parvus waveforms may support a proximal lesion but are indirect. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

51. D — A significant proximal subclavian stenosis lowers pressure beyond the lesion and can draw blood retrograde through the ipsilateral vertebral artery to supply the arm. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

52. D — Acute arterial occlusion classically causes sudden pain, pallor, pulselessness, paresthesia, paralysis, and poikilothermia. This differs from chronic venous disease, which usually develops more gradually. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

53. C — Complete venous compression is the primary duplex criterion for excluding thrombus at an accessible segment. Failure to compress strongly supports thrombosis, whereas normal phasicity and color filling argue against occlusion. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

54. A — Conservation of flow through a narrowed lumen produces a focal velocity increase. Disturbed flow and a range of velocities generate spectral broadening, while distal disease may instead create damped waveforms. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's

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56. D — Blood enters a pseudoaneurysm during systole and returns toward the parent artery during diastole, creating the characteristic to-and-fro neck waveform. The sac often shows swirling color flow. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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60. C — A fistula shunts arterial blood directly into a vein. The feeding artery loses resistance and gains diastolic flow, while the draining vein becomes arterialized, pulsatile, and turbulent. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

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62. A — Severe proximal inflow disease reduces energy reaching the limb, producing a rounded delayed upstroke, lower amplitude, and loss of the normal dicrotic notch in distal pulse-volume recordings. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation

combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

63. A — Noncompressible calcified tibial arteries resist cuff compression and can yield falsely high ankle pressures and ankle-brachial indices. Toe pressures or waveform analysis may better assess perfusion. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

64. D — New periaortic fluid in a symptomatic patient raises concern for leakage or rupture and requires urgent escalation. Laminar flow and branch visualization are not rupture signs; mural thrombus alone is common. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

65. C — Normal portal venous flow is hepatopetal, directed toward the liver. Hepatofugal flow moves away from the liver and may occur with advanced portal hypertension or collateralization. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

66. B — A hemodynamically important renal artery narrowing accelerates flow locally and often creates poststenotic turbulence. Intrarenal tardus-parvus waveforms may support a proximal lesion but are indirect. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

67. A — A significant proximal subclavian stenosis lowers pressure beyond the lesion and can draw blood retrograde through the ipsilateral vertebral artery to supply the arm. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

68. D — Acute arterial occlusion classically causes sudden pain, pallor, pulselessness, paresthesia, paralysis, and poikilothermia. This differs from chronic venous disease, which usually develops more gradually. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

69. C — Complete venous compression is the primary duplex criterion for excluding thrombus at an accessible segment. Failure to compress strongly supports thrombosis, whereas normal phasicity and color filling argue against occlusion. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's

70. D — Conservation of flow through a narrowed lumen produces a focal velocity increase. Disturbed flow and a range of velocities generate spectral broadening, while distal disease may instead create damped waveforms. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

71. B — A significant upstream obstruction delays systolic acceleration and reduces pulsatility distally, producing a damped monophasic tardus-parvus pattern. A sharp triphasic waveform indicates preserved inflow. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

72. A — Blood enters a pseudoaneurysm during systole and returns toward the parent artery during diastole, creating the characteristic to-and-fro neck waveform. The sac often shows swirling color flow. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

73. C — Swirling blood within a pseudoaneurysm commonly creates adjacent red and blue regions called the yin-yang sign. The neck waveform and grayscale anatomy are needed for confirmation. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

74. B — Incompetent venous valves permit retrograde flow during provocation, increasing ambulatory venous pressure and contributing to edema, skin changes, and ulceration. The other disorders primarily involve arterial circulation. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

75. C — An ulcer is a focal excavation or crater in the plaque surface that communicates with the lumen. Calcification describes composition and may shadow, while intimal thickening lacks a crater. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

76. B — A fistula shunts arterial blood directly into a vein. The feeding artery loses resistance and gains diastolic flow, while the draining vein becomes arterialized, pulsatile, and turbulent. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

77. A — Chronic thrombosis commonly leaves an irregular, contracted vein with echogenic adherent residual material, wall thickening, collaterals, or recanalized channels. Acute thrombus more often distends the vein. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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91. C — Vein graft stenoses often develop at anastomoses, retained valve sites, or areas of intimal hyperplasia. Surveillance examines the entire conduit plus inflow and outflow rather than focusing on unrelated vessels. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

92. B — Abrupt absence of access flow strongly suggests thrombosis and requires urgent clinical communication. Normal maturation should increase usable flow, and ordinary respiratory phasicity does not explain loss of graft flow. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

93. A — An endoleak is persistent blood flow within the excluded aneurysm sac but outside the endograft lumen. Its source and timing determine the type and clinical significance. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

94. D — A focal velocity increase and disturbed flow within a bypass graft suggest luminal narrowing. Comparison with adjacent segments, waveform changes, and serial examinations helps determine hemodynamic significance. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

95. B — Post-endarterectomy surveillance evaluates the treated segment and adjacent carotid artery for residual or recurrent stenosis, intimal flap, thrombosis, or other complications. Unrelated peripheral and portal vessels do not answer the question. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

101. A — The ankle-brachial index uses the higher dorsalis pedis or posterior tibial systolic pressure for that leg divided by the higher brachial systolic pressure. This standardizes limb pressure against systemic pressure. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

102. D — Exercise increases lower-extremity flow demand. A pressure drop or delayed recovery can reveal arterial obstruction that is not evident at rest, especially in a patient with exertional symptoms. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

103. A — Distal compression and release challenges venous valves and creates a controlled flow response. Retrograde flow after release indicates valve incompetence when measured with the laboratory's validated criteria. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

104. D — Digital arteries are often less affected by medial calcification than tibial arteries. Toe pressure and the toe-brachial index therefore provide useful perfusion information when ankle pressures are artificially elevated. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

105. B — As arterial perfusion worsens, pulse-volume recordings lose amplitude, develop a delayed rounded upstroke, and lose normal contour features. Respiratory phasicity and venous pulsatility describe venous signals. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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121. A — A formal verification or time-out confirms the correct patient, planned procedure, side, site, and team agreement before puncture. Equipment optimization remains important but cannot replace this safety step. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

122. B — Continuous identification of the needle tip helps prevent posterior-wall puncture and injury to adjacent structures. The operator adjusts probe and needle alignment rather than advancing a tip that cannot be seen. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

123. C — A properly disinfected transducer, sterile probe cover, sterile gel, and appropriate barrier precautions protect the sterile field. Ordinary lotion or nonsterile gel can introduce contamination. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

124. D — Focal aliasing can identify accelerated or disturbed flow at a technical defect. Spectral Doppler, grayscale imaging, and evaluation of adjacent segments help determine whether revision is needed. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

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133. C — Overall gain amplifies received echo signals and changes brightness throughout the image. Pulse repetition frequency and wall filter affect Doppler display, while the angle cursor supports velocity calculation. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

134. B — Increasing pulse repetition frequency raises the Nyquist limit and can reduce aliasing, although depth and system constraints limit the available setting. It does not change tissue acoustic impedance. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

135. B — Raising the color velocity scale increases the displayed Nyquist limit and reduces aliasing. Lowering the scale worsens aliasing, while persistence and focal-zone location address other image characteristics. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

136. A — Velocity calculation depends on the cosine of the insonation angle. Near 90 degrees, small angle errors create very large velocity errors; standardized angles at or below 60 degrees improve reproducibility. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

137. C — A strong specular reflector can redirect echoes and make the system place a duplicated structure deeper than the reflector, producing a mirror image. Aliasing is a sampling phenomenon. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

138. D — The wall filter suppresses low-frequency, high-amplitude signals from vessel-wall and tissue motion. An excessively high setting can also remove legitimate low-velocity blood flow. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

139. A — ALARA means keeping ultrasound exposure as low as reasonably achievable while obtaining necessary diagnostic information. Output power and dwell time should be minimized appropriately. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

140. B — A tissue-mimicking phantom can evaluate depth calibration, resolution, sensitivity, and consistency over time. Trending results helps detect equipment deterioration before it compromises clinical examinations. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

154. B — The wall filter suppresses low-frequency, high-amplitude signals from vessel-wall and tissue motion. An excessively high setting can also remove legitimate low-velocity blood flow. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made. Clinical correlation and complete protocol documentation remain essential for a defensible

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157. B — Two approved identifiers reduce wrong-patient errors and should be matched with the order before beginning. Room number, appearance, or schedule position alone is not a reliable identifier. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

158. A — A mismatch between the order and clinical presentation should be clarified through the appropriate clinical channel. The sonographer should not independently substitute an unauthorized examination or ignore relevant symptoms. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

159. D — Consistent landmarks, technique, labels, and measurement methods make serial comparisons meaningful. Prior studies should be reviewed when available, and both normal and abnormal required segments should be documented. This distinction matters because choosing the wrong mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated procedure.

160. B — Critical-result communication should identify the patient, clearly state the urgent finding, document the recipient and time, and use read-back when required. Equipment details do not replace clinical communication. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

161. C — Symptoms, surgery, stents, grafts, and prior results help select the correct protocol, target important segments, and interpret altered anatomy. They supplement rather than replace the examination. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

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166. B — Symptoms, surgery, stents, grafts, and prior results help select the correct protocol, target important segments, and interpret altered anatomy. They supplement rather than replace the examination. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

167. B — Two approved identifiers reduce wrong-patient errors and should be matched with the order before beginning. Room number, appearance, or schedule position alone is not a reliable identifier. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.

168. C — A mismatch between the order and clinical presentation should be clarified through the appropriate clinical channel. The sonographer should not independently substitute an unauthorized examination or ignore relevant symptoms. This distinction matters because choosing the wrong

mechanism can lead to an incorrect protocol or interpretation. Findings should be confirmed in multiple views and documented according to the vascular laboratory's validated

169. D — Consistent landmarks, technique, labels, and measurement methods make serial comparisons meaningful. Prior studies should be reviewed when available, and both normal and abnormal required segments should be documented. In practice, the complete examination still requires correlation with symptoms, grayscale anatomy, color flow, spectral waveforms, and the laboratory protocol before a final interpretation is made.

170. A — Critical-result communication should identify the patient, clearly state the urgent finding, document the recipient and time, and use read-back when required. Equipment details do not replace clinical communication. The competing choices describe a different vessel, mechanism, or testing purpose. Reliable interpretation combines the stated finding with adjacent segments, technical quality, and the patient's clinical presentation.