PRACTICE EXAM 21: VASCULAR TECHNOLOGY SIMULATION (170 QUESTIONS)

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

1. Which vessel normally continues from the external iliac artery below the inguinal ligament?

A. Deep femoral vein
B. Popliteal artery
C. Common femoral artery
D. Internal iliac artery

2. A normal lower-extremity artery at rest most commonly displays which spectral pattern?

A. Continuous nonphasic flow
B. Markedly damped monophasic flow
C. Persistent venous pulsatility
D. Triphasic high-resistance flow

3. Which vein is paired with the small saphenous vein at its usual termination?

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

4. Which artery most often supplies the brain through the posterior circulation?

A. External carotid artery
B. Superior thyroid artery
C. Vertebral artery
D. Facial artery

5. Normal portal venous flow is directed in which manner?

A. Away from the liver
B. Bidirectionally with respiration
C. Toward the kidneys
D. Toward the liver

6. Which renal vessel normally has a lower-resistance waveform?

A. Renal artery
B. External carotid artery
C. Resting brachial artery
D. Distal posterior tibial artery

7. The common carotid artery usually bifurcates into which two vessels?

A. Vertebral and basilar arteries
B. Subclavian and axillary arteries
C. Facial and temporal arteries
D. Internal and external carotid arteries

8. Which vessel lies within the transverse foramina of the cervical vertebrae?

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

9. Which artery normally gives rise to the profunda femoris artery?

A. Popliteal artery
B. Common femoral artery
C. External iliac artery
D. Anterior tibial artery

10. The left renal vein normally crosses the aorta in what relationship?

A. Posterior to the spine
B. Within the aortic lumen
C. Anterior to the aorta
D. Lateral to the spleen only

11. During a focused vascular study, which vessel normally continues from the external iliac artery below the inguinal ligament?

A. Deep femoral vein
B. Popliteal artery
C. Internal iliac artery
D. Common femoral artery

12. During a focused vascular study, a normal lower-extremity artery at rest most commonly displays which spectral pattern?

A. Continuous nonphasic flow

B. Markedly damped monophasic flow
C. Triphasic high-resistance flow
D. Persistent venous pulsatility

13. During a focused vascular study, which vein is paired with the small saphenous vein at its usual termination?

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

14. During a focused vascular study, which artery most often supplies the brain through the posterior circulation?

A. External carotid artery
B. Vertebral artery
C. Superior thyroid artery
D. Facial artery

15. During a focused vascular study, normal portal venous flow is directed in which manner?

A. Away from the liver
B. Bidirectionally with respiration
C. Toward the kidneys
D. Toward the liver

16. During a focused vascular study, which renal vessel normally has a lower-resistance waveform?

A. Renal artery
B. External carotid artery

C. Resting brachial artery
D. Distal posterior tibial artery

17. During a focused vascular study, the common carotid artery usually bifurcates into which two vessels?

A. Vertebral and basilar arteries
B. Internal and external carotid arteries
C. Subclavian and axillary arteries
D. Facial and temporal arteries

18. During a focused vascular study, which vessel lies within the transverse foramina of the cervical vertebrae?

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

19. During a focused vascular study, which artery normally gives rise to the profunda femoris artery?

A. Popliteal artery
B. External iliac artery
C. Anterior tibial artery
D. Common femoral artery

20. During a focused vascular study, the left renal vein normally crosses the aorta in what relationship?

A. Anterior to the aorta
B. Posterior to the spine
C. Within the aortic lumen

D. Lateral to the spleen only

21. In a quality-review case, which vessel normally continues from the external iliac artery below the inguinal ligament?

A. Deep femoral vein
B. Popliteal artery
C. Common femoral artery
D. Internal iliac artery

22. In a quality-review case, a normal lower-extremity artery at rest most commonly displays which spectral pattern?

A. Continuous nonphasic flow
B. Triphasic high-resistance flow
C. Markedly damped monophasic flow
D. Persistent venous pulsatility

23. In a quality-review case, which vein is paired with the small saphenous vein at its usual termination?

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

24. In a quality-review case, which artery most often supplies the brain through the posterior circulation?

A. External carotid artery
B. Vertebral artery
C. Superior thyroid artery

D. Facial artery

25. In a quality-review case, normal portal venous flow is directed in which manner?

A. Away from the liver
B. Bidirectionally with respiration
C. Toward the kidneys
D. Toward the liver

26. In a quality-review case, which renal vessel normally has a lower-resistance waveform?

A. External carotid artery
B. Resting brachial artery
C. Renal artery
D. Distal posterior tibial artery

27. In a quality-review case, the common carotid artery usually bifurcates into which two vessels?

A. Vertebral and basilar arteries
B. Subclavian and axillary arteries
C. Facial and temporal arteries
D. Internal and external carotid arteries

28. In a quality-review case, which vessel lies within the transverse foramina of the cervical vertebrae?

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

29. In a quality-review case, which artery normally gives rise to the profunda femoris artery?

A. Common femoral artery
B. Popliteal artery
C. External iliac artery
D. Anterior tibial artery

30. In a quality-review case, the left renal vein normally crosses the aorta in what relationship?

A. Posterior to the spine
B. Anterior to the aorta
C. Within the aortic lumen
D. Lateral to the spleen only

31. While applying the laboratory protocol, which vessel normally continues from the external iliac artery below the inguinal ligament?

A. Common femoral artery
B. Deep femoral vein
C. Popliteal artery
D. Internal iliac artery

32. While applying the laboratory protocol, a normal lower-extremity artery at rest most commonly displays which spectral pattern?

A. Continuous nonphasic flow
B. Markedly damped monophasic flow
C. Triphasic high-resistance flow
D. Persistent venous pulsatility

33. While applying the laboratory protocol, which vein is paired with the small saphenous vein at its usual termination?

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

34. While applying the laboratory protocol, which artery most often supplies the brain through the posterior circulation?

A. External carotid artery
B. Vertebral artery
C. Superior thyroid artery
D. Facial artery

35. While applying the laboratory protocol, normal portal venous flow is directed in which manner?

A. Away from the liver
B. Bidirectionally with respiration
C. Toward the liver
D. Toward the kidneys

36. While applying the laboratory protocol, which renal vessel normally has a lower-resistance waveform?

A. External carotid artery
B. Renal artery
C. Resting brachial artery
D. Distal posterior tibial artery

37. Which compression finding most strongly supports acute lower-extremity deep venous thrombosis?

A. Complete venous coaptation
B. Normal respiratory phasicity
C. Spontaneous color filling
D. Failure of the vein to collapse

38. A tardus-parvus waveform distal to a lesion most strongly suggests what?

A. Hemodynamically significant proximal obstruction
B. Normal high-resistance flow
C. Isolated venous reflux
D. Distal arteriovenous fistula only

39. Which finding is most typical of a pseudoaneurysm neck on spectral Doppler?

A. Continuous hepatopetal flow
B. To-and-fro flow
C. Triphasic resting flow
D. Absent systolic flow only

40. Which plaque feature most increases concern for embolization?

A. Smooth homogeneous surface
B. Thin uniform intima
C. Ulcerated irregular surface
D. Artifact-free lumen

41. A patient with calf pain and a noncompressible popliteal vein most likely has which condition?

A. Deep venous thrombosis
B. Chronic arterial insufficiency
C. Normal venous anatomy
D. Isolated lymphatic edema

42. Flow reversal lasting beyond the laboratory threshold during augmentation indicates what?

A. Normal arterial resistance
B. Acute arterial embolus
C. Portal vein thrombosis
D. Venous valvular incompetence

43. Which disorder commonly produces alternating high velocities and turbulence in a renal artery?

A. Normal renal perfusion
B. Isolated venous reflux
C. Uncomplicated renal cyst
D. Fibromuscular dysplasia

44. Which carotid finding is expected distal to a severe proximal stenosis?

A. Damped low-velocity waveform
B. Uniformly increased venous pulsatility
C. Normal triphasic venous flow
D. Unchanged high-resistance tracing

45. Which abdominal aortic finding defines an aneurysmal process?

A. Uniform normal tapering
B. Focal or diffuse pathologic dilation
C. Respiratory venous variation

D. Transient color aliasing alone

46. Which venous waveform change can indicate proximal iliac obstruction?

A. Normal augmentation response
B. Complete compressibility
C. Loss of normal respiratory phasicity
D. Symmetric spontaneous flow

47. Which transcranial Doppler change may accompany cerebral vasospasm?

A. Uniform absence of all flow
B. Increasing focal flow velocity
C. Decreasing extracranial venous reflux
D. Triphasic portal flow

48. Which finding suggests chronic rather than acute venous thrombosis?

A. Dilated hypoechoic noncompressible vein
B. Normal compressible lumen
C. Uninterrupted respiratory phasicity
D. Echogenic contracted vein with collaterals

49. During a focused vascular study, which compression finding most strongly supports acute lower-extremity deep venous thrombosis?

A. Complete venous coaptation
B. Normal respiratory phasicity
C. Failure of the vein to collapse
D. Spontaneous color filling

50. During a focused vascular study, a tardus-parvus waveform distal to a lesion most strongly suggests what?

A. Hemodynamically significant proximal obstruction
B. Normal high-resistance flow
C. Isolated venous reflux
D. Distal arteriovenous fistula only

51. During a focused vascular study, which finding is most typical of a pseudoaneurysm neck on spectral Doppler?

A. Continuous hepatopetal flow
B. To-and-fro flow
C. Triphasic resting flow
D. Absent systolic flow only

52. During a focused vascular study, which plaque feature most increases concern for embolization?

A. Smooth homogeneous surface
B. Thin uniform intima
C. Artifact-free lumen
D. Ulcerated irregular surface

53. During a focused vascular study, a patient with calf pain and a noncompressible popliteal vein most likely has which condition?

A. Deep venous thrombosis
B. Chronic arterial insufficiency
C. Normal venous anatomy
D. Isolated lymphatic edema

54. During a focused vascular study, flow reversal lasting beyond the laboratory threshold during augmentation indicates what?

A. Normal arterial resistance
B. Acute arterial embolus
C. Venous valvular incompetence
D. Portal vein thrombosis

55. During a focused vascular study, which disorder commonly produces alternating high velocities and turbulence in a renal artery?

A. Normal renal perfusion
B. Fibromuscular dysplasia
C. Isolated venous reflux
D. Uncomplicated renal cyst

56. During a focused vascular study, which carotid finding is expected distal to a severe proximal stenosis?

A. Uniformly increased venous pulsatility
B. Normal triphasic venous flow
C. Unchanged high-resistance tracing
D. Damped low-velocity waveform

57. During a focused vascular study, which abdominal aortic finding defines an aneurysmal process?

A. Focal or diffuse pathologic dilation
B. Uniform normal tapering
C. Respiratory venous variation
D. Transient color aliasing alone

58. During a focused vascular study, which venous waveform change can indicate proximal iliac obstruction?

A. Loss of normal respiratory phasicity
B. Normal augmentation response
C. Complete compressibility
D. Symmetric spontaneous flow

59. During a focused vascular study, which transcranial Doppler change may accompany cerebral vasospasm?

A. Uniform absence of all flow
B. Decreasing extracranial venous reflux
C. Increasing focal flow velocity
D. Triphasic portal flow

60. During a focused vascular study, which finding suggests chronic rather than acute venous thrombosis?

A. Dilated hypoechoic noncompressible vein
B. Normal compressible lumen
C. Uninterrupted respiratory phasicity
D. Echogenic contracted vein with collaterals

61. In a quality-review case, which compression finding most strongly supports acute lower-extremity deep venous thrombosis?

A. Complete venous coaptation
B. Normal respiratory phasicity
C. Failure of the vein to collapse
D. Spontaneous color filling

62. In a quality-review case, a tardus-parvus waveform distal to a lesion most strongly suggests what?

A. Normal high-resistance flow
B. Hemodynamically significant proximal obstruction
C. Isolated venous reflux
D. Distal arteriovenous fistula only

63. In a quality-review case, which finding is most typical of a pseudoaneurysm neck on spectral Doppler?

A. Continuous hepatopetal flow
B. Triphasic resting flow
C. Absent systolic flow only
D. To-and-fro flow

64. In a quality-review case, which plaque feature most increases concern for embolization?

A. Smooth homogeneous surface
B. Ulcerated irregular surface
C. Thin uniform intima
D. Artifact-free lumen

65. In a quality-review case, a patient with calf pain and a noncompressible popliteal vein most likely has which condition?

A. Chronic arterial insufficiency
B. Normal venous anatomy
C. Deep venous thrombosis
D. Isolated lymphatic edema

66. In a quality-review case, flow reversal lasting beyond the laboratory threshold during augmentation indicates what?

A. Venous valvular incompetence
B. Normal arterial resistance
C. Acute arterial embolus
D. Portal vein thrombosis

67. In a quality-review case, which disorder commonly produces alternating high velocities and turbulence in a renal artery?

A. Normal renal perfusion
B. Fibromuscular dysplasia
C. Isolated venous reflux
D. Uncomplicated renal cyst

68. In a quality-review case, which carotid finding is expected distal to a severe proximal stenosis?

A. Uniformly increased venous pulsatility
B. Normal triphasic venous flow
C. Unchanged high-resistance tracing
D. Damped low-velocity waveform

69. In a quality-review case, which abdominal aortic finding defines an aneurysmal process?

A. Uniform normal tapering
B. Respiratory venous variation
C. Focal or diffuse pathologic dilation
D. Transient color aliasing alone

70. In a quality-review case, which venous waveform change can indicate proximal iliac obstruction?

A. Loss of normal respiratory phasicity
B. Normal augmentation response
C. Complete compressibility
D. Symmetric spontaneous flow

71. In a quality-review case, which transcranial Doppler change may accompany cerebral vasospasm?

A. Uniform absence of all flow
B. Decreasing extracranial venous reflux
C. Triphasic portal flow
D. Increasing focal flow velocity

72. In a quality-review case, which finding suggests chronic rather than acute venous thrombosis?

A. Echogenic contracted vein with collaterals
B. Dilated hypoechoic noncompressible vein
C. Normal compressible lumen
D. Uninterrupted respiratory phasicity

73. While applying the laboratory protocol, which compression finding most strongly supports acute lower-extremity deep venous thrombosis?

A. Complete venous coaptation
B. Normal respiratory phasicity
C. Failure of the vein to collapse
D. Spontaneous color filling

74. While applying the laboratory protocol, a tardus-parvus waveform distal to a lesion most strongly suggests what?

A. Normal high-resistance flow

B. Hemodynamically significant proximal obstruction

C. Isolated venous reflux

D. Distal arteriovenous fistula only

75. While applying the laboratory protocol, which finding is most typical of a pseudoaneurysm neck on spectral Doppler?

A. To-and-fro flow

B. Continuous hepatopetal flow

C. Triphasic resting flow

D. Absent systolic flow only

76. While applying the laboratory protocol, which plaque feature most increases concern for embolization?

A. Smooth homogeneous surface

B. Ulcerated irregular surface

C. Thin uniform intima

D. Artifact-free lumen

77. While applying the laboratory protocol, a patient with calf pain and a noncompressible popliteal vein most likely has which condition?

A. Chronic arterial insufficiency

B. Normal venous anatomy

C. Isolated lymphatic edema

D. Deep venous thrombosis

78. While applying the laboratory protocol, flow reversal lasting beyond the laboratory threshold during augmentation indicates what?

A. Normal arterial resistance
B. Acute arterial embolus
C. Venous valvular incompetence
D. Portal vein thrombosis

79. While applying the laboratory protocol, which disorder commonly produces alternating high velocities and turbulence in a renal artery?

A. Normal renal perfusion
B. Isolated venous reflux
C. Fibromuscular dysplasia
D. Uncomplicated renal cyst

80. While applying the laboratory protocol, which carotid finding is expected distal to a severe proximal stenosis?

A. Uniformly increased venous pulsatility
B. Normal triphasic venous flow
C. Unchanged high-resistance tracing
D. Damped low-velocity waveform

81. While applying the laboratory protocol, which abdominal aortic finding defines an aneurysmal process?

A. Focal or diffuse pathologic dilation
B. Uniform normal tapering
C. Respiratory venous variation
D. Transient color aliasing alone

82. While applying the laboratory protocol, which venous waveform change can indicate proximal iliac obstruction?

A. Normal augmentation response
B. Loss of normal respiratory phasicity
C. Complete compressibility
D. Symmetric spontaneous flow

83. While applying the laboratory protocol, which transcranial Doppler change may accompany cerebral vasospasm?

A. Uniform absence of all flow
B. Increasing focal flow velocity
C. Decreasing extracranial venous reflux
D. Triphasic portal flow

84. While applying the laboratory protocol, which finding suggests chronic rather than acute venous thrombosis?

A. Echogenic contracted vein with collaterals
B. Dilated hypoechoic noncompressible vein
C. Normal compressible lumen
D. Uninterrupted respiratory phasicity

85. For a patient-centered examination, which compression finding most strongly supports acute lower-extremity deep venous thrombosis?

A. Complete venous coaptation
B. Normal respiratory phasicity
C. Failure of the vein to collapse
D. Spontaneous color filling

86. For a patient-centered examination, a tardus-parvus waveform distal to a lesion most strongly suggests what?

A. Normal high-resistance flow
B. Isolated venous reflux
C. Distal arteriovenous fistula only
D. Hemodynamically significant proximal obstruction

87. For a patient-centered examination, which finding is most typical of a pseudoaneurysm neck on spectral Doppler?

A. To-and-fro flow
B. Continuous hepatopetal flow
C. Triphasic resting flow
D. Absent systolic flow only

88. For a patient-centered examination, which plaque feature most increases concern for embolization?

A. Smooth homogeneous surface
B. Ulcerated irregular surface
C. Thin uniform intima
D. Artifact-free lumen

89. For a patient-centered examination, a patient with calf pain and a noncompressible popliteal vein most likely has which condition?

A. Chronic arterial insufficiency
B. Normal venous anatomy
C. Deep venous thrombosis
D. Isolated lymphatic edema

90. For a patient-centered examination, flow reversal lasting beyond the laboratory threshold during augmentation indicates what?

A. Normal arterial resistance
B. Acute arterial embolus
C. Portal vein thrombosis
D. Venous valvular incompetence

91. Which dialysis access finding suggests a stenosis near an anastomosis?

A. Uniform low-resistance flow
B. Smooth caliber without aliasing
C. Focal velocity acceleration with turbulence
D. Normal venous respiratory variation

92. After endovascular aneurysm repair, flow within the excluded sac indicates what?

A. Expected complete exclusion
B. Possible endoleak
C. Normal graft wall motion
D. Physiologic venous reflux

93. Which bypass graft site is especially prone to disturbed flow and stenosis?

A. Anastomosis
B. Unoperated contralateral vein
C. Normal distal capillary bed
D. Unrelated portal vein

94. A mature arteriovenous fistula normally shows which arterial response?

A. Absent diastolic flow
B. Marked triphasic resistance
C. Isolated venous pulsatility

D. High-flow low-resistance waveform

95. During a focused vascular study, which dialysis access finding suggests a stenosis near an anastomosis?

A. Uniform low-resistance flow
B. Focal velocity acceleration with turbulence
C. Smooth caliber without aliasing
D. Normal venous respiratory variation

96. During a focused vascular study, after endovascular aneurysm repair, flow within the excluded sac indicates what?

A. Expected complete exclusion
B. Normal graft wall motion
C. Possible endoleak
D. Physiologic venous reflux

97. During a focused vascular study, which bypass graft site is especially prone to disturbed flow and stenosis?

A. Anastomosis
B. Unoperated contralateral vein
C. Normal distal capillary bed
D. Unrelated portal vein

98. During a focused vascular study, a mature arteriovenous fistula normally shows which arterial response?

A. Absent diastolic flow
B. Marked triphasic resistance

C. Isolated venous pulsatility
D. High-flow low-resistance waveform

99. In a quality-review case, which dialysis access finding suggests a stenosis near an anastomosis?

A. Uniform low-resistance flow
B. Smooth caliber without aliasing
C. Focal velocity acceleration with turbulence
D. Normal venous respiratory variation

100. In a quality-review case, after endovascular aneurysm repair, flow within the excluded sac indicates what?

A. Expected complete exclusion
B. Normal graft wall motion
C. Physiologic venous reflux
D. Possible endoleak

101. How is the ankle-brachial index calculated?

A. Lowest brachial divided by ankle
B. Highest ankle pressure divided by highest brachial pressure
C. Ankle pressure minus brachial pressure
D. Brachial pressure plus ankle pressure

102. Which cuff choice is most appropriate for limb pressure measurement?

A. Bladder width proportional to limb circumference
B. Smallest cuff available
C. Same cuff for every limb
D. Cuff placed over clothing

103. A normal exercise response should generally produce what ankle pressure behavior?

A. Prolonged marked pressure decline
B. Complete waveform disappearance
C. No significant sustained pressure drop
D. Persistent venous hypertension

104. Which waveform is obtained by photoplethysmography?

A. Direct arterial pressure tracing
B. Pulse-related optical volume change
C. Cross-sectional B-mode image
D. Continuous-wave audio alone

105. Segmental pressure gradients are used primarily to do what?

A. Diagnose venous thrombus directly
B. Measure carotid plaque texture
C. Calculate portal vein diameter
D. Localize arterial obstruction by level

106. During a focused vascular study, how is the ankle-brachial index calculated?

A. Highest ankle pressure divided by highest brachial pressure
B. Lowest brachial divided by ankle
C. Ankle pressure minus brachial pressure
D. Brachial pressure plus ankle pressure

107. During a focused vascular study, which cuff choice is most appropriate for limb pressure measurement?

A. Smallest cuff available
B. Same cuff for every limb
C. Bladder width proportional to limb circumference
D. Cuff placed over clothing

108. During a focused vascular study, a normal exercise response should generally produce what ankle pressure behavior?

A. Prolonged marked pressure decline
B. Complete waveform disappearance
C. Persistent venous hypertension
D. No significant sustained pressure drop

109. During a focused vascular study, which waveform is obtained by photoplethysmography?

A. Direct arterial pressure tracing
B. Pulse-related optical volume change
C. Cross-sectional B-mode image
D. Continuous-wave audio alone

110. During a focused vascular study, segmental pressure gradients are used primarily to do what?

A. Localize arterial obstruction by level
B. Diagnose venous thrombus directly
C. Measure carotid plaque texture
D. Calculate portal vein diameter

111. In a quality-review case, how is the ankle-brachial index calculated?

A. Lowest brachial divided by ankle
B. Ankle pressure minus brachial pressure
C. Highest ankle pressure divided by highest brachial pressure
D. Brachial pressure plus ankle pressure

112. In a quality-review case, which cuff choice is most appropriate for limb pressure measurement?

A. Bladder width proportional to limb circumference
B. Smallest cuff available
C. Same cuff for every limb
D. Cuff placed over clothing

113. In a quality-review case, a normal exercise response should generally produce what ankle pressure behavior?

A. Prolonged marked pressure decline
B. Complete waveform disappearance
C. Persistent venous hypertension
D. No significant sustained pressure drop

114. In a quality-review case, which waveform is obtained by photoplethysmography?

A. Direct arterial pressure tracing
B. Pulse-related optical volume change
C. Cross-sectional B-mode image
D. Continuous-wave audio alone

115. In a quality-review case, segmental pressure gradients are used primarily to do what?

A. Localize arterial obstruction by level
B. Diagnose venous thrombus directly
C. Measure carotid plaque texture
D. Calculate portal vein diameter

116. While applying the laboratory protocol, how is the ankle-brachial index calculated?

A. Lowest brachial divided by ankle
B. Ankle pressure minus brachial pressure
C. Brachial pressure plus ankle pressure
D. Highest ankle pressure divided by highest brachial pressure

117. While applying the laboratory protocol, which cuff choice is most appropriate for limb pressure measurement?

A. Smallest cuff available
B. Same cuff for every limb
C. Bladder width proportional to limb circumference
D. Cuff placed over clothing

118. While applying the laboratory protocol, a normal exercise response should generally produce what ankle pressure behavior?

A. Prolonged marked pressure decline
B. No significant sustained pressure drop
C. Complete waveform disappearance
D. Persistent venous hypertension

119. While applying the laboratory protocol, which waveform is obtained by photoplethysmography?

A. Direct arterial pressure tracing

B. Pulse-related optical volume change
C. Cross-sectional B-mode image
D. Continuous-wave audio alone

120. While applying the laboratory protocol, segmental pressure gradients are used primarily to do what?

A. Localize arterial obstruction by level
B. Diagnose venous thrombus directly
C. Measure carotid plaque texture
D. Calculate portal vein diameter

121. Before ultrasound-guided pseudoaneurysm thrombin injection, what must be documented?

A. Only the patient's height
B. Portal vein waveform only
C. Contralateral carotid plaque
D. Sac and neck anatomy with parent-vessel flow

122. During venous ablation guidance, the sonographer must particularly identify what structure?

A. Portal bifurcation only
B. Intracranial arteries only
C. Deep venous system and treatment vein
D. Contralateral renal cortex

123. What is the sonographer's immediate role after an ultrasound-guided vascular procedure?

A. Provide independent surgical consent
B. Prescribe anticoagulation
C. Ignore the access site

D. Document flow and check for complications

124. Manual compression therapy for pseudoaneurysm is guided toward which location?

A. Unrelated femoral vein
B. Distal tibial artery
C. The communicating neck
D. Abdominal aortic bifurcation

125. During a focused vascular study, before ultrasound-guided pseudoaneurysm thrombin injection, what must be documented?

A. Only the patient's height
B. Sac and neck anatomy with parent-vessel flow
C. Portal vein waveform only
D. Contralateral carotid plaque

126. During a focused vascular study, during venous ablation guidance, the sonographer must particularly identify what structure?

A. Deep venous system and treatment vein
B. Portal bifurcation only
C. Intracranial arteries only
D. Contralateral renal cortex

127. During a focused vascular study, what is the sonographer's immediate role after an ultrasound-guided vascular procedure?

A. Provide independent surgical consent
B. Prescribe anticoagulation
C. Document flow and check for complications

D. Ignore the access site

128. During a focused vascular study, manual compression therapy for pseudoaneurysm is guided toward which location?

A. Unrelated femoral vein
B. The communicating neck
C. Distal tibial artery
D. Abdominal aortic bifurcation

129. In a quality-review case, before ultrasound-guided pseudoaneurysm thrombin injection, what must be documented?

A. Sac and neck anatomy with parent-vessel flow
B. Only the patient's height
C. Portal vein waveform only
D. Contralateral carotid plaque

130. In a quality-review case, during venous ablation guidance, the sonographer must particularly identify what structure?

A. Portal bifurcation only
B. Intracranial arteries only
C. Contralateral renal cortex
D. Deep venous system and treatment vein

131. In a quality-review case, what is the sonographer's immediate role after an ultrasound-guided vascular procedure?

A. Document flow and check for complications
B. Provide independent surgical consent

C. Prescribe anticoagulation
D. Ignore the access site

132. In a quality-review case, manual compression therapy for pseudoaneurysm is guided toward which location?

A. Unrelated femoral vein
B. Distal tibial artery
C. The communicating neck
D. Abdominal aortic bifurcation

133. What is the best first adjustment for color aliasing caused by a scale set too low?

A. Increase wall filter excessively
B. Increase the color velocity scale
C. Turn off color Doppler
D. Decrease pulse repetition frequency

134. Which control most directly changes Doppler sample volume length?

A. Monitor brightness
B. Image annotation
C. Patient table height
D. Gate size

135. Why should the Doppler angle cursor align with the direction of flow?

A. To enlarge vessel diameter
B. To eliminate all artifacts
C. To improve velocity estimation accuracy
D. To change patient blood pressure

136. Which artifact may create false duplication of a vessel across a strong reflector?

A. Posterior enhancement
B. Mirror-image artifact
C. Range ambiguity only
D. Acoustic shadowing

137. What is the safest response when a patient becomes acutely symptomatic during scanning?

A. Finish every protocol image first
B. Leave the patient unattended
C. Withhold documentation
D. Stop, assess, and activate appropriate clinical help

138. Which practice reduces work-related musculoskeletal injury?

A. Neutral posture with equipment positioned close
B. Sustained shoulder abduction
C. Twisting while reaching
D. Maximum grip pressure

139. During a focused vascular study, what is the best first adjustment for color aliasing caused by a scale set too low?

A. Increase wall filter excessively
B. Increase the color velocity scale
C. Turn off color Doppler
D. Decrease pulse repetition frequency

140. During a focused vascular study, which control most directly changes Doppler sample volume length?

A. Monitor brightness
B. Image annotation
C. Patient table height
D. Gate size

141. During a focused vascular study, why should the Doppler angle cursor align with the direction of flow?

A. To improve velocity estimation accuracy
B. To enlarge vessel diameter
C. To eliminate all artifacts
D. To change patient blood pressure

142. During a focused vascular study, which artifact may create false duplication of a vessel across a strong reflector?

A. Posterior enhancement
B. Range ambiguity only
C. Mirror-image artifact
D. Acoustic shadowing

143. During a focused vascular study, what is the safest response when a patient becomes acutely symptomatic during scanning?

A. Finish every protocol image first
B. Stop, assess, and activate appropriate clinical help
C. Leave the patient unattended
D. Withhold documentation

144. During a focused vascular study, which practice reduces work-related musculoskeletal injury?

A. Sustained shoulder abduction
B. Twisting while reaching
C. Neutral posture with equipment positioned close
D. Maximum grip pressure

145. In a quality-review case, what is the best first adjustment for color aliasing caused by a scale set too low?

A. Increase wall filter excessively
B. Turn off color Doppler
C. Decrease pulse repetition frequency
D. Increase the color velocity scale

146. In a quality-review case, which control most directly changes Doppler sample volume length?

A. Gate size
B. Monitor brightness
C. Image annotation
D. Patient table height

147. In a quality-review case, why should the Doppler angle cursor align with the direction of flow?

A. To enlarge vessel diameter
B. To eliminate all artifacts
C. To improve velocity estimation accuracy
D. To change patient blood pressure

148. In a quality-review case, which artifact may create false duplication of a vessel across a strong reflector?

A. Posterior enhancement
B. Mirror-image artifact
C. Range ambiguity only
D. Acoustic shadowing

149. In a quality-review case, what is the safest response when a patient becomes acutely symptomatic during scanning?

A. Stop, assess, and activate appropriate clinical help
B. Finish every protocol image first
C. Leave the patient unattended
D. Withhold documentation

150. In a quality-review case, which practice reduces work-related musculoskeletal injury?

A. Sustained shoulder abduction
B. Twisting while reaching
C. Maximum grip pressure
D. Neutral posture with equipment positioned close

151. While applying the laboratory protocol, what is the best first adjustment for color aliasing caused by a scale set too low?

A. Increase wall filter excessively
B. Turn off color Doppler
C. Decrease pulse repetition frequency
D. Increase the color velocity scale

152. While applying the laboratory protocol, which control most directly changes Doppler sample volume length?

A. Monitor brightness
B. Image annotation
C. Gate size
D. Patient table height

153. While applying the laboratory protocol, why should the Doppler angle cursor align with the direction of flow?

A. To enlarge vessel diameter
B. To improve velocity estimation accuracy
C. To eliminate all artifacts
D. To change patient blood pressure

154. While applying the laboratory protocol, which artifact may create false duplication of a vessel across a strong reflector?

A. Mirror-image artifact
B. Posterior enhancement
C. Range ambiguity only
D. Acoustic shadowing

155. While applying the laboratory protocol, what is the safest response when a patient becomes acutely symptomatic during scanning?

A. Finish every protocol image first
B. Leave the patient unattended
C. Withhold documentation
D. Stop, assess, and activate appropriate clinical help

156. While applying the laboratory protocol, which practice reduces work-related musculoskeletal injury?

A. Neutral posture with equipment positioned close
B. Sustained shoulder abduction
C. Twisting while reaching
D. Maximum grip pressure

157. What should be confirmed before beginning any vascular examination?

A. Only room temperature
B. Patient identity and ordered examination
C. Only insurance status
D. Only the machine model

158. How should a critical vascular finding be communicated?

A. Only at the end of the week
B. Informally without documentation
C. Promptly through the established escalation protocol
D. Directly to unrelated visitors

159. When technical limitations affect an examination, what is required?

A. Delete all acquired images
B. Document the limitation and its effect
C. Report the study as fully normal
D. Conceal the limitation

160. Why should prior vascular studies be reviewed when available?

A. To compare interval change and guide the protocol

B. To copy the prior conclusion
C. To avoid obtaining history
D. To replace current imaging

161. During a focused vascular study, what should be confirmed before beginning any vascular examination?

A. Only room temperature
B. Only insurance status
C. Patient identity and ordered examination
D. Only the machine model

162. During a focused vascular study, how should a critical vascular finding be communicated?

A. Only at the end of the week
B. Informally without documentation
C. Directly to unrelated visitors
D. Promptly through the established escalation protocol

163. During a focused vascular study, when technical limitations affect an examination, what is required?

A. Delete all acquired images
B. Document the limitation and its effect
C. Report the study as fully normal
D. Conceal the limitation

164. During a focused vascular study, why should prior vascular studies be reviewed when available?

A. To copy the prior conclusion
B. To avoid obtaining history

C. To replace current imaging
D. To compare interval change and guide the protocol

165. In a quality-review case, what should be confirmed before beginning any vascular examination?

A. Patient identity and ordered examination
B. Only room temperature
C. Only insurance status
D. Only the machine model

166. In a quality-review case, how should a critical vascular finding be communicated?

A. Only at the end of the week
B. Informally without documentation
C. Promptly through the established escalation protocol
D. Directly to unrelated visitors

167. In a quality-review case, when technical limitations affect an examination, what is required?

A. Delete all acquired images
B. Report the study as fully normal
C. Conceal the limitation
D. Document the limitation and its effect

168. In a quality-review case, why should prior vascular studies be reviewed when available?

A. To compare interval change and guide the protocol
B. To copy the prior conclusion
C. To avoid obtaining history
D. To replace current imaging

169. While applying the laboratory protocol, what should be confirmed before beginning any vascular examination?

A. Only room temperature
B. Only insurance status
C. Patient identity and ordered examination
D. Only the machine model

170. While applying the laboratory protocol, how should a critical vascular finding be communicated?

A. Only at the end of the week
B. Promptly through the established escalation protocol
C. Informally without documentation
D. Directly to unrelated visitors

Practice Exam 21: Answer Key and Explanations

1. C — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. This landmark separates pelvic from lower-extremity arterial naming. The popliteal artery is farther distal, the internal iliac remains within the pelvis, and the deep femoral vein is a venous structure rather than the expected arterial continuation.

2. D — Normal resting limb arteries generally show a high-resistance triphasic waveform: rapid forward systolic flow, brief early-diastolic reversal, and a small late-diastolic forward component. Continuous or damped monophasic flow suggests altered resistance or proximal disease. Venous pulsatility describes venous hemodynamics and is not the normal peripheral arterial pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

3. B — The small saphenous vein usually ascends in the posterior calf and joins the popliteal vein near the popliteal fossa. Its anatomy can vary, so tracing is important. The great saphenous vein typically joins the common femoral vein, while the external iliac vein lies proximal to the inguinal ligament. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

4. C — The vertebral arteries arise from the subclavian arteries and unite to form the basilar artery, providing the posterior cerebral circulation. External carotid branches primarily supply the face, scalp, and neck. The superior thyroid and facial arteries are external carotid branches and do not form the

principal posterior intracranial pathway. Correlation with the complete examination prevents an isolated observation from being.

5. D — Normal portal venous flow is hepatopetal, meaning it travels toward the liver. Reversal to hepatofugal flow may accompany advanced portal hypertension. Respiratory variation may be present, but persistent bidirectionality is not the defining normal direction. Portal blood does not normally travel toward the kidneys as its principal destination. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

6. A — The renal artery supplies a continuously perfused parenchymal organ, so its normal waveform has substantial forward diastolic flow and relatively low resistance. External carotid and resting limb arteries usually show higher-resistance patterns. Comparing organ demand and downstream arteriolar resistance explains why renal arterial diastolic flow remains prominent throughout the cardiac cycle.

7. D — The common carotid artery divides into the internal and external carotid arteries, usually near the upper thyroid cartilage level. The internal carotid supplies the anterior cerebral circulation, while the external carotid serves extracranial tissues. The other pairs represent different vascular segments or branches and do not form the carotid bifurcation.

8. A — The vertebral artery typically enters the cervical transverse foramina and ascends toward the foramen magnum. This bony relationship helps identify it sonographically. The internal jugular vein lies in the carotid sheath, the external carotid remains anterior in the neck, and the subclavian vein courses beneath the clavicle rather than through vertebral foramina.

9. B — The profunda femoris, or deep femoral artery, normally branches from the common femoral artery in the proximal thigh. The common femoral then continues as the superficial femoral artery. The external iliac is proximal to the inguinal ligament, while the popliteal and anterior tibial arteries are distal segments. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

10. C — The left renal vein usually passes anterior to the aorta and beneath the superior mesenteric artery before entering the inferior vena cava. This relationship is important when evaluating compression. A retroaortic variant exists, but it is not the usual course. The vessel is neither intraluminal nor limited to a lateral splenic position.

11. D — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. This landmark separates pelvic from lower-extremity arterial naming. The popliteal artery is farther distal, the internal iliac remains within the pelvis, and the deep femoral vein is a venous structure rather than the expected arterial continuation.

12. C — Normal resting limb arteries generally show a high-resistance triphasic waveform: rapid forward systolic flow, brief early-diastolic reversal, and a small late-diastolic forward component. Continuous or damped monophasic flow suggests altered resistance or proximal disease. Venous pulsatility describes venous hemodynamics and is not the normal peripheral arterial pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

13. A — The small saphenous vein usually ascends in the posterior calf and joins the popliteal vein near the popliteal fossa. Its anatomy can vary, so tracing is important. The great saphenous vein typically joins the common femoral vein, while the external iliac vein lies proximal to the inguinal ligament. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

14. B — The vertebral arteries arise from the subclavian arteries and unite to form the basilar artery, providing the posterior cerebral circulation. External carotid branches primarily supply the face, scalp, and neck. The superior thyroid and facial arteries are external carotid branches and do not form the principal posterior intracranial pathway. Correlation with the complete examination prevents an isolated observation from being.

15. D — Normal portal venous flow is hepatopetal, meaning it travels toward the liver. Reversal to hepatofugal flow may accompany advanced portal hypertension. Respiratory variation may be present, but persistent bidirectionality is not the defining normal direction. Portal blood does not normally travel toward the kidneys as its principal destination. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

16. A — The renal artery supplies a continuously perfused parenchymal organ, so its normal waveform has substantial forward diastolic flow and relatively low resistance. External carotid and resting limb arteries usually show higher-resistance patterns. Comparing organ demand and downstream arteriolar resistance explains why renal arterial diastolic flow remains prominent throughout the cardiac cycle.

17. B — The common carotid artery divides into the internal and external carotid arteries, usually near the upper thyroid cartilage level. The internal carotid supplies the anterior cerebral circulation, while the external carotid serves extracranial tissues. The other pairs represent different vascular segments or branches and do not form the carotid bifurcation.

18. C — The vertebral artery typically enters the cervical transverse foramina and ascends toward the foramen magnum. This bony relationship helps identify it sonographically. The internal jugular vein lies in the carotid sheath, the external carotid remains anterior in the neck, and the subclavian vein courses beneath the clavicle rather than through vertebral foramina.

19. D — The profunda femoris, or deep femoral artery, normally branches from the common femoral artery in the proximal thigh. The common femoral then continues as the superficial femoral artery. The external iliac is proximal to the inguinal ligament, while the popliteal and anterior tibial arteries are distal segments. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

20. A — The left renal vein usually passes anterior to the aorta and beneath the superior mesenteric artery before entering the inferior vena cava. This relationship is important when evaluating compression. A retroaortic variant exists, but it is not the usual course. The vessel is neither intraluminal nor limited to a lateral splenic position.

21. C — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. This landmark separates pelvic from lower-extremity arterial naming. The popliteal artery is

farther distal, the internal iliac remains within the pelvis, and the deep femoral vein is a venous structure rather than the expected arterial continuation.

22. B — Normal resting limb arteries generally show a high-resistance triphasic waveform: rapid forward systolic flow, brief early-diastolic reversal, and a small late-diastolic forward component. Continuous or damped monophasic flow suggests altered resistance or proximal disease. Venous pulsatility describes venous hemodynamics and is not the normal peripheral arterial pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

23. A — The small saphenous vein usually ascends in the posterior calf and joins the popliteal vein near the popliteal fossa. Its anatomy can vary, so tracing is important. The great saphenous vein typically joins the common femoral vein, while the external iliac vein lies proximal to the inguinal ligament. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

24. B — The vertebral arteries arise from the subclavian arteries and unite to form the basilar artery, providing the posterior cerebral circulation. External carotid branches primarily supply the face, scalp, and neck. The superior thyroid and facial arteries are external carotid branches and do not form the principal posterior intracranial pathway. Correlation with the complete examination prevents an isolated observation from being.

25. D — Normal portal venous flow is hepatopetal, meaning it travels toward the liver. Reversal to hepatofugal flow may accompany advanced portal hypertension. Respiratory variation may be present, but persistent bidirectionality is not the defining normal direction. Portal blood does not normally travel toward the kidneys as its principal destination. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

26. C — The renal artery supplies a continuously perfused parenchymal organ, so its normal waveform has substantial forward diastolic flow and relatively low resistance. External carotid and resting limb arteries usually show higher-resistance patterns. Comparing organ demand and downstream arteriolar resistance explains why renal arterial diastolic flow remains prominent throughout the cardiac cycle.

27. D — The common carotid artery divides into the internal and external carotid arteries, usually near the upper thyroid cartilage level. The internal carotid supplies the anterior cerebral circulation, while the external carotid serves extracranial tissues. The other pairs represent different vascular segments or branches and do not form the carotid bifurcation.

28. C — The vertebral artery typically enters the cervical transverse foramina and ascends toward the foramen magnum. This bony relationship helps identify it sonographically. The internal jugular vein lies in the carotid sheath, the external carotid remains anterior in the neck, and the subclavian vein courses beneath the clavicle rather than through vertebral foramina.

29. A — The profunda femoris, or deep femoral artery, normally branches from the common femoral artery in the proximal thigh. The common femoral then continues as the superficial femoral artery. The external iliac is proximal to the inguinal ligament, while the popliteal and anterior tibial arteries are

distal segments. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

30. B — The left renal vein usually passes anterior to the aorta and beneath the superior mesenteric artery before entering the inferior vena cava. This relationship is important when evaluating compression. A retroaortic variant exists, but it is not the usual course. The vessel is neither intraluminal nor limited to a lateral splenic position.

31. A — The external iliac artery becomes the common femoral artery after passing beneath the inguinal ligament. This landmark separates pelvic from lower-extremity arterial naming. The popliteal artery is farther distal, the internal iliac remains within the pelvis, and the deep femoral vein is a venous structure rather than the expected arterial continuation.

32. C — Normal resting limb arteries generally show a high-resistance triphasic waveform: rapid forward systolic flow, brief early-diastolic reversal, and a small late-diastolic forward component. Continuous or damped monophasic flow suggests altered resistance or proximal disease. Venous pulsatility describes venous hemodynamics and is not the normal peripheral arterial pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

33. D — The small saphenous vein usually ascends in the posterior calf and joins the popliteal vein near the popliteal fossa. Its anatomy can vary, so tracing is important. The great saphenous vein typically joins the common femoral vein, while the external iliac vein lies proximal to the inguinal ligament. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

34. B — The vertebral arteries arise from the subclavian arteries and unite to form the basilar artery, providing the posterior cerebral circulation. External carotid branches primarily supply the face, scalp, and neck. The superior thyroid and facial arteries are external carotid branches and do not form the principal posterior intracranial pathway. Correlation with the complete examination prevents an isolated observation from being.

35. C — Normal portal venous flow is hepatopetal, meaning it travels toward the liver. Reversal to hepatofugal flow may accompany advanced portal hypertension. Respiratory variation may be present, but persistent bidirectionality is not the defining normal direction. Portal blood does not normally travel toward the kidneys as its principal destination. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

36. B — The renal artery supplies a continuously perfused parenchymal organ, so its normal waveform has substantial forward diastolic flow and relatively low resistance. External carotid and resting limb arteries usually show higher-resistance patterns. Comparing organ demand and downstream arteriolar resistance explains why renal arterial diastolic flow remains prominent throughout the cardiac cycle.

37. D — Failure of a vein to compress fully is the primary sonographic sign of acute deep venous thrombosis. Normal veins should coapt with gentle transducer pressure. Respiratory phasicity and color filling can support patency, but neither overrides abnormal compression. Complete coaptation argues against thrombus at the tested segment rather than supporting thrombosis.

38. A — Tardus-parvus describes delayed systolic upstroke and reduced pulsatility distal to a significant proximal arterial obstruction. Energy loss across the lesion dampens the downstream waveform. Normal high-resistance flow has a brisk upstroke. Venous reflux is a different system, and an arteriovenous fistula more often lowers resistance and increases diastolic flow. Correlation with the complete examination prevents an isolated observation from being.

39. B — A pseudoaneurysm neck typically demonstrates bidirectional to-and-fro flow: blood enters the sac during systole and returns toward the parent artery during diastole. Color Doppler may show swirling within the sac. Hepatopetal flow concerns the portal system, triphasic flow describes normal limb arteries, and isolated absent systolic flow is not characteristic.

40. C — An ulcerated, irregular plaque surface can expose thrombogenic material and create a source for artery-to-artery embolization. Smooth homogeneous plaque is generally less suspicious for surface disruption. A thin uniform intima is normal, while an artifact-free lumen is a technical observation rather than a pathologic feature associated with embolic risk. Correlation with the complete examination prevents an isolated observation from being.

41. A — Calf symptoms combined with failure of the popliteal vein to compress strongly support deep venous thrombosis. Arterial insufficiency is evaluated with arterial waveforms and pressures, not venous compressibility. Lymphatic edema may enlarge a limb but does not ordinarily make the vein noncompressible. Normal venous anatomy should collapse under appropriate pressure.

42. D — Sustained retrograde venous flow after a provocative maneuver indicates valvular incompetence and reflux when it exceeds the laboratory's validated duration criterion. Normal valves close promptly. The maneuver evaluates venous hemodynamics, not arterial resistance. Acute arterial embolus and portal thrombosis require different examinations and do not explain lower-extremity reflux. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

43. D — Fibromuscular dysplasia can create serial stenoses and dilatations, producing focal velocity increases, spectral broadening, and turbulence, often in the mid-to-distal renal artery. Normal renal perfusion lacks focal acceleration. Venous reflux concerns venous valves, and a simple renal cyst does not ordinarily cause a beaded arterial waveform pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

44. A — A severe proximal carotid stenosis may reduce pressure and flow distally, producing a damped waveform with delayed acceleration and diminished velocity. The effect depends on collateral circulation and lesion severity. Venous pulsatility and triphasic venous flow are not appropriate descriptors. An unchanged waveform would not reflect substantial hemodynamic energy loss.

45. B — An abdominal aortic aneurysm is a pathologic focal or diffuse dilation of the aorta relative to expected caliber. Measurement must be perpendicular to the vessel axis using the laboratory's protocol. Normal tapering is not aneurysmal. Respiratory variation is venous behavior, and color aliasing alone may reflect settings rather than dilation.

46. C — Loss of expected respiratory phasicity in a common femoral venous waveform can suggest more proximal iliac or caval obstruction, especially when asymmetric. It is an indirect sign and should prompt additional assessment. Normal augmentation, complete compressibility, and symmetric spontaneous flow generally support patency rather than indicating an upstream obstructive process.

47. B — Cerebral vasospasm narrows an arterial segment and commonly raises measured flow velocity when adequate flow persists. Interpretation should incorporate trends, vessel identity, and supporting indices. Complete absence may reflect occlusion or technical limitation. Extracranial venous reflux and portal flow patterns do not describe intracranial arterial vasospasm. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

48. D — Chronic post-thrombotic change often appears echogenic and organized, with a contracted or irregular vein, wall thickening, recanalized channels, and collateral vessels. Acute thrombus more often distends the vein and may be relatively hypoechoic. A compressible lumen and normal phasicity favor patency rather than chronic obstruction. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

49. C — Failure of a vein to compress fully is the primary sonographic sign of acute deep venous thrombosis. Normal veins should coapt with gentle transducer pressure. Respiratory phasicity and color filling can support patency, but neither overrides abnormal compression. Complete coaptation argues against thrombus at the tested segment rather than supporting thrombosis.

50. A — Tardus-parvus describes delayed systolic upstroke and reduced pulsatility distal to a significant proximal arterial obstruction. Energy loss across the lesion dampens the downstream waveform. Normal high-resistance flow has a brisk upstroke. Venous reflux is a different system, and an arteriovenous fistula more often lowers resistance and increases diastolic flow. Correlation with the complete examination prevents an isolated observation from being.

51. B — A pseudoaneurysm neck typically demonstrates bidirectional to-and-fro flow: blood enters the sac during systole and returns toward the parent artery during diastole. Color Doppler may show swirling within the sac. Hepatopetal flow concerns the portal system, triphasic flow describes normal limb arteries, and isolated absent systolic flow is not characteristic.

52. D — An ulcerated, irregular plaque surface can expose thrombogenic material and create a source for artery-to-artery embolization. Smooth homogeneous plaque is generally less suspicious for surface disruption. A thin uniform intima is normal, while an artifact-free lumen is a technical observation rather than a pathologic feature associated with embolic risk. Correlation with the complete examination prevents an isolated observation from being.

53. A — Calf symptoms combined with failure of the popliteal vein to compress strongly support deep venous thrombosis. Arterial insufficiency is evaluated with arterial waveforms and pressures, not venous compressibility. Lymphatic edema may enlarge a limb but does not ordinarily make the vein noncompressible. Normal venous anatomy should collapse under appropriate pressure.

54. C — Sustained retrograde venous flow after a provocative maneuver indicates valvular incompetence and reflux when it exceeds the laboratory's validated duration criterion. Normal valves close promptly. The maneuver evaluates venous hemodynamics, not arterial resistance. Acute arterial embolus and portal thrombosis require different examinations and do not explain lower-extremity reflux. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

55. B — Fibromuscular dysplasia can create serial stenoses and dilatations, producing focal velocity increases, spectral broadening, and turbulence, often in the mid-to-distal renal artery. Normal renal perfusion lacks focal acceleration. Venous reflux concerns venous valves, and a simple renal cyst does not ordinarily cause a beaded arterial waveform pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

56. D — A severe proximal carotid stenosis may reduce pressure and flow distally, producing a damped waveform with delayed acceleration and diminished velocity. The effect depends on collateral circulation and lesion severity. Venous pulsatility and triphasic venous flow are not appropriate descriptors. An unchanged waveform would not reflect substantial hemodynamic energy loss.

57. A — An abdominal aortic aneurysm is a pathologic focal or diffuse dilation of the aorta relative to expected caliber. Measurement must be perpendicular to the vessel axis using the laboratory's protocol. Normal tapering is not aneurysmal. Respiratory variation is venous behavior, and color aliasing alone may reflect settings rather than dilation.

58. A — Loss of expected respiratory phasicity in a common femoral venous waveform can suggest more proximal iliac or caval obstruction, especially when asymmetric. It is an indirect sign and should prompt additional assessment. Normal augmentation, complete compressibility, and symmetric spontaneous flow generally support patency rather than indicating an upstream obstructive process.

59. C — Cerebral vasospasm narrows an arterial segment and commonly raises measured flow velocity when adequate flow persists. Interpretation should incorporate trends, vessel identity, and supporting indices. Complete absence may reflect occlusion or technical limitation. Extracranial venous reflux and portal flow patterns do not describe intracranial arterial vasospasm. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

60. D — Chronic post-thrombotic change often appears echogenic and organized, with a contracted or irregular vein, wall thickening, recanalized channels, and collateral vessels. Acute thrombus more often distends the vein and may be relatively hypoechoic. A compressible lumen and normal phasicity favor patency rather than chronic obstruction. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

61. C — Failure of a vein to compress fully is the primary sonographic sign of acute deep venous thrombosis. Normal veins should coapt with gentle transducer pressure. Respiratory phasicity and color filling can support patency, but neither overrides abnormal compression. Complete coaptation argues against thrombus at the tested segment rather than supporting thrombosis.

62. B — Tardus-parvus describes delayed systolic upstroke and reduced pulsatility distal to a significant proximal arterial obstruction. Energy loss across the lesion dampens the downstream waveform. Normal high-resistance flow has a brisk upstroke. Venous reflux is a different system, and an arteriovenous fistula more often lowers resistance and increases diastolic flow. Correlation with the complete examination prevents an isolated observation from being.

63. D — A pseudoaneurysm neck typically demonstrates bidirectional to-and-fro flow: blood enters the sac during systole and returns toward the parent artery during diastole. Color Doppler may show swirling within the sac. Hepatopetal flow concerns the portal system, triphasic flow describes normal limb arteries, and isolated absent systolic flow is not characteristic.

64. B — An ulcerated, irregular plaque surface can expose thrombogenic material and create a source for artery-to-artery embolization. Smooth homogeneous plaque is generally less suspicious for surface disruption. A thin uniform intima is normal, while an artifact-free lumen is a technical observation rather than a pathologic feature associated with embolic risk. Correlation with the complete examination prevents an isolated observation from being.

65. C — Calf symptoms combined with failure of the popliteal vein to compress strongly support deep venous thrombosis. Arterial insufficiency is evaluated with arterial waveforms and pressures, not venous compressibility. Lymphatic edema may enlarge a limb but does not ordinarily make the vein noncompressible. Normal venous anatomy should collapse under appropriate pressure.

66. A — Sustained retrograde venous flow after a provocative maneuver indicates valvular incompetence and reflux when it exceeds the laboratory's validated duration criterion. Normal valves close promptly. The maneuver evaluates venous hemodynamics, not arterial resistance. Acute arterial embolus and portal thrombosis require different examinations and do not explain lower-extremity reflux. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

67. B — Fibromuscular dysplasia can create serial stenoses and dilatations, producing focal velocity increases, spectral broadening, and turbulence, often in the mid-to-distal renal artery. Normal renal perfusion lacks focal acceleration. Venous reflux concerns venous valves, and a simple renal cyst does not ordinarily cause a beaded arterial waveform pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

68. D — A severe proximal carotid stenosis may reduce pressure and flow distally, producing a damped waveform with delayed acceleration and diminished velocity. The effect depends on collateral circulation and lesion severity. Venous pulsatility and triphasic venous flow are not appropriate descriptors. An unchanged waveform would not reflect substantial hemodynamic energy loss.

69. C — An abdominal aortic aneurysm is a pathologic focal or diffuse dilation of the aorta relative to expected caliber. Measurement must be perpendicular to the vessel axis using the laboratory's protocol. Normal tapering is not aneurysmal. Respiratory variation is venous behavior, and color aliasing alone may reflect settings rather than dilation.

70. A — Loss of expected respiratory phasicity in a common femoral venous waveform can suggest more proximal iliac or caval obstruction, especially when asymmetric. It is an indirect sign and should prompt additional assessment. Normal augmentation, complete compressibility, and symmetric spontaneous flow generally support patency rather than indicating an upstream obstructive process.

71. D — Cerebral vasospasm narrows an arterial segment and commonly raises measured flow velocity when adequate flow persists. Interpretation should incorporate trends, vessel identity, and supporting indices. Complete absence may reflect occlusion or technical limitation. Extracranial venous reflux and portal flow patterns do not describe intracranial arterial vasospasm. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

72. A — Chronic post-thrombotic change often appears echogenic and organized, with a contracted or irregular vein, wall thickening, recanalized channels, and collateral vessels. Acute thrombus more often distends the vein and may be relatively hypoechoic. A compressible lumen and normal phasicity favor patency rather than chronic obstruction. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

73. C — Failure of a vein to compress fully is the primary sonographic sign of acute deep venous thrombosis. Normal veins should coapt with gentle transducer pressure. Respiratory phasicity and color filling can support patency, but neither overrides abnormal compression. Complete coaptation argues against thrombus at the tested segment rather than supporting thrombosis.

74. B — Tardus-parvus describes delayed systolic upstroke and reduced pulsatility distal to a significant proximal arterial obstruction. Energy loss across the lesion dampens the downstream waveform. Normal high-resistance flow has a brisk upstroke. Venous reflux is a different system, and an arteriovenous fistula more often lowers resistance and increases diastolic flow. Correlation with the complete examination prevents an isolated observation from being.

75. A — A pseudoaneurysm neck typically demonstrates bidirectional to-and-fro flow: blood enters the sac during systole and returns toward the parent artery during diastole. Color Doppler may show swirling within the sac. Hepatopetal flow concerns the portal system, triphasic flow describes normal limb arteries, and isolated absent systolic flow is not characteristic.

76. B — An ulcerated, irregular plaque surface can expose thrombogenic material and create a source for artery-to-artery embolization. Smooth homogeneous plaque is generally less suspicious for surface disruption. A thin uniform intima is normal, while an artifact-free lumen is a technical observation rather than a pathologic feature associated with embolic risk. Correlation with the complete examination prevents an isolated observation from being.

77. D — Calf symptoms combined with failure of the popliteal vein to compress strongly support deep venous thrombosis. Arterial insufficiency is evaluated with arterial waveforms and pressures, not venous compressibility. Lymphatic edema may enlarge a limb but does not ordinarily make the vein noncompressible. Normal venous anatomy should collapse under appropriate pressure.

78. C — Sustained retrograde venous flow after a provocative maneuver indicates valvular incompetence and reflux when it exceeds the laboratory's validated duration criterion. Normal valves close promptly. The maneuver evaluates venous hemodynamics, not arterial resistance. Acute arterial embolus and portal thrombosis require different examinations and do not explain lower-extremity reflux. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

79. C — Fibromuscular dysplasia can create serial stenoses and dilatations, producing focal velocity increases, spectral broadening, and turbulence, often in the mid-to-distal renal artery. Normal renal perfusion lacks focal acceleration. Venous reflux concerns venous valves, and a simple renal cyst does not ordinarily cause a beaded arterial waveform pattern. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

80. D — A severe proximal carotid stenosis may reduce pressure and flow distally, producing a damped waveform with delayed acceleration and diminished velocity. The effect depends on collateral circulation and lesion severity. Venous pulsatility and triphasic venous flow are not appropriate descriptors. An unchanged waveform would not reflect substantial hemodynamic energy loss.

81. A — An abdominal aortic aneurysm is a pathologic focal or diffuse dilation of the aorta relative to expected caliber. Measurement must be perpendicular to the vessel axis using the laboratory's protocol. Normal tapering is not aneurysmal. Respiratory variation is venous behavior, and color aliasing alone may reflect settings rather than dilation.

82. B — Loss of expected respiratory phasicity in a common femoral venous waveform can suggest more proximal iliac or caval obstruction, especially when asymmetric. It is an indirect sign and should prompt additional assessment. Normal augmentation, complete compressibility, and symmetric spontaneous flow generally support patency rather than indicating an upstream obstructive process.

83. B — Cerebral vasospasm narrows an arterial segment and commonly raises measured flow velocity when adequate flow persists. Interpretation should incorporate trends, vessel identity, and supporting indices. Complete absence may reflect occlusion or technical limitation. Extracranial venous reflux and portal flow patterns do not describe intracranial arterial vasospasm. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

84. A — Chronic post-thrombotic change often appears echogenic and organized, with a contracted or irregular vein, wall thickening, recanalized channels, and collateral vessels. Acute thrombus more often distends the vein and may be relatively hypoechoic. A compressible lumen and normal phasicity favor patency rather than chronic obstruction. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

85. C — Failure of a vein to compress fully is the primary sonographic sign of acute deep venous thrombosis. Normal veins should coapt with gentle transducer pressure. Respiratory phasicity and color filling can support patency, but neither overrides abnormal compression. Complete coaptation argues against thrombus at the tested segment rather than supporting thrombosis.

86. D — Tardus-parvus describes delayed systolic upstroke and reduced pulsatility distal to a significant proximal arterial obstruction. Energy loss across the lesion dampens the downstream waveform. Normal high-resistance flow has a brisk upstroke. Venous reflux is a different system, and an arteriovenous fistula more often lowers resistance and increases diastolic flow. Correlation with the complete examination prevents an isolated observation from being.

87. A — A pseudoaneurysm neck typically demonstrates bidirectional to-and-fro flow: blood enters the sac during systole and returns toward the parent artery during diastole. Color Doppler may show swirling within the sac. Hepatopetal flow concerns the portal system, triphasic flow describes normal limb arteries, and isolated absent systolic flow is not characteristic.

88. B — An ulcerated, irregular plaque surface can expose thrombogenic material and create a source for artery-to-artery embolization. Smooth homogeneous plaque is generally less suspicious for surface disruption. A thin uniform intima is normal, while an artifact-free lumen is a technical observation rather than a pathologic feature associated with embolic risk. Correlation with the complete examination prevents an isolated observation from being.

89. C — Calf symptoms combined with failure of the popliteal vein to compress strongly support deep venous thrombosis. Arterial insufficiency is evaluated with arterial waveforms and pressures, not venous compressibility. Lymphatic edema may enlarge a limb but does not ordinarily make the vein noncompressible. Normal venous anatomy should collapse under appropriate pressure.

90. D — Sustained retrograde venous flow after a provocative maneuver indicates valvular incompetence and reflux when it exceeds the laboratory's validated duration criterion. Normal valves close promptly. The maneuver evaluates venous hemodynamics, not arterial resistance. Acute arterial embolus and portal thrombosis require different examinations and do not explain lower-extremity reflux. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

91. C — A hemodynamically important access stenosis commonly produces focal velocity acceleration, aliasing, spectral broadening, and post-stenotic turbulence. Interpretation also considers access flow and comparison ratios under the laboratory protocol. Uniform flow without a focal disturbance is less suspicious. Respiratory venous variation does not adequately evaluate an arteriovenous access anastomosis. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

92. B — Detectable flow within an excluded aneurysm sac after endovascular repair raises concern for an endoleak. The sonographer should document the location, direction, and timing of flow and assess sac size according to protocol. Complete exclusion should show no sac perfusion. Graft wall motion and venous reflux do not explain intrasac flow.

93. A — Bypass graft anastomoses are common sites of intimal hyperplasia, caliber mismatch, disturbed flow, and stenosis. Surveillance therefore includes careful imaging and velocity sampling at proximal and distal anastomoses and throughout the conduit. The contralateral vein, capillary bed, and portal vein are not components of the evaluated arterial bypass graft. Correlation with the complete examination prevents an isolated observation from being.

94. D — A functioning arteriovenous fistula provides a low-resistance outflow pathway, so the feeding artery normally shows increased volume flow and prominent forward diastolic flow. Absent diastolic flow or marked triphasic resistance may indicate inadequate access flow. Venous pulsatility alone does not describe the expected feeding-artery hemodynamic response. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

95. B — A hemodynamically important access stenosis commonly produces focal velocity acceleration, aliasing, spectral broadening, and post-stenotic turbulence. Interpretation also considers access flow and comparison ratios under the laboratory protocol. Uniform flow without a focal disturbance is less suspicious. Respiratory venous variation does not adequately evaluate an arteriovenous access anastomosis. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

96. C — Detectable flow within an excluded aneurysm sac after endovascular repair raises concern for an endoleak. The sonographer should document the location, direction, and timing of flow and assess sac size according to protocol. Complete exclusion should show no sac perfusion. Graft wall motion and venous reflux do not explain intrasac flow.

97. A — Bypass graft anastomoses are common sites of intimal hyperplasia, caliber mismatch, disturbed flow, and stenosis. Surveillance therefore includes careful imaging and velocity sampling at proximal and distal anastomoses and throughout the conduit. The contralateral vein, capillary bed, and portal vein are not components of the evaluated arterial bypass graft. Correlation with the complete examination prevents an isolated observation from being.

98. D — A functioning arteriovenous fistula provides a low-resistance outflow pathway, so the feeding artery normally shows increased volume flow and prominent forward diastolic flow. Absent diastolic flow or marked triphasic resistance may indicate inadequate access flow. Venous pulsatility alone does not describe the expected feeding-artery hemodynamic response. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

99. C — A hemodynamically important access stenosis commonly produces focal velocity acceleration, aliasing, spectral broadening, and post-stenotic turbulence. Interpretation also considers access flow and comparison ratios under the laboratory protocol. Uniform flow without a focal disturbance is less suspicious. Respiratory venous variation does not adequately evaluate an arteriovenous access anastomosis. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

100. D — Detectable flow within an excluded aneurysm sac after endovascular repair raises concern for an endoleak. The sonographer should document the location, direction, and timing of flow and assess sac size according to protocol. Complete exclusion should show no sac perfusion. Graft wall motion and venous reflux do not explain intrasac flow.

101. B — The ankle-brachial index is calculated by dividing the selected ankle systolic pressure by the higher brachial systolic pressure, following the laboratory's protocol for vessel selection. Subtraction or addition does not produce an index. Reversing the ratio would distort interpretation and can mask

physiologically meaningful reductions in ankle pressure. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

102. A — Accurate physiologic pressure measurement requires a cuff bladder appropriately sized to the limb, commonly guided by a proportional relationship to circumference. An undersized cuff can falsely elevate pressure, while an oversized cuff may distort results. Using one cuff for all limbs or placing it over clothing compromises transmission and reproducibility.

103. C — In a healthy limb, exercise increases demand without causing a substantial sustained fall in ankle pressure. A significant post-exercise decline with delayed recovery supports flow-limiting arterial disease. Complete waveform loss is more severe and not normal. Venous hypertension is assessed through different physiologic mechanisms and does not define the normal arterial exercise response.

104. B — Photoplethysmography detects light absorption changes associated with pulsatile blood-volume variation in superficial tissue. It does not directly measure intravascular pressure or create a cross-sectional B-mode image. Although the tracing reflects the pulse, it is distinct from continuous-wave Doppler audio and depends on proper sensor contact and peripheral perfusion. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

105. D — Segmental limb pressures compare systolic pressures at multiple levels to help localize hemodynamically significant arterial obstruction. A meaningful pressure drop between adjacent cuffs suggests disease between those levels, interpreted with waveforms and cuff limitations. The method does not directly image thrombus, characterize carotid plaque, or measure portal vein diameter. Correlation with the complete examination prevents an isolated observation from being.

106. A — The ankle-brachial index is calculated by dividing the selected ankle systolic pressure by the higher brachial systolic pressure, following the laboratory's protocol for vessel selection. Subtraction or addition does not produce an index. Reversing the ratio would distort interpretation and can mask physiologically meaningful reductions in ankle pressure. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

107. C — Accurate physiologic pressure measurement requires a cuff bladder appropriately sized to the limb, commonly guided by a proportional relationship to circumference. An undersized cuff can falsely elevate pressure, while an oversized cuff may distort results. Using one cuff for all limbs or placing it over clothing compromises transmission and reproducibility.

108. D — In a healthy limb, exercise increases demand without causing a substantial sustained fall in ankle pressure. A significant post-exercise decline with delayed recovery supports flow-limiting arterial disease. Complete waveform loss is more severe and not normal. Venous hypertension is assessed through different physiologic mechanisms and does not define the normal arterial exercise response.

109. B — Photoplethysmography detects light absorption changes associated with pulsatile blood-volume variation in superficial tissue. It does not directly measure intravascular pressure or create a cross-sectional B-mode image. Although the tracing reflects the pulse, it is distinct from continuous-

wave Doppler audio and depends on proper sensor contact and peripheral perfusion. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

110. A — Segmental limb pressures compare systolic pressures at multiple levels to help localize hemodynamically significant arterial obstruction. A meaningful pressure drop between adjacent cuffs suggests disease between those levels, interpreted with waveforms and cuff limitations. The method does not directly image thrombus, characterize carotid plaque, or measure portal vein diameter. Correlation with the complete examination prevents an isolated observation from being.

111. C — The ankle-brachial index is calculated by dividing the selected ankle systolic pressure by the higher brachial systolic pressure, following the laboratory's protocol for vessel selection. Subtraction or addition does not produce an index. Reversing the ratio would distort interpretation and can mask physiologically meaningful reductions in ankle pressure. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

112. A — Accurate physiologic pressure measurement requires a cuff bladder appropriately sized to the limb, commonly guided by a proportional relationship to circumference. An undersized cuff can falsely elevate pressure, while an oversized cuff may distort results. Using one cuff for all limbs or placing it over clothing compromises transmission and reproducibility.

113. D — In a healthy limb, exercise increases demand without causing a substantial sustained fall in ankle pressure. A significant post-exercise decline with delayed recovery supports flow-limiting arterial disease. Complete waveform loss is more severe and not normal. Venous hypertension is assessed through different physiologic mechanisms and does not define the normal arterial exercise response.

114. B — Photoplethysmography detects light absorption changes associated with pulsatile blood-volume variation in superficial tissue. It does not directly measure intravascular pressure or create a cross-sectional B-mode image. Although the tracing reflects the pulse, it is distinct from continuous-wave Doppler audio and depends on proper sensor contact and peripheral perfusion. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

115. A — Segmental limb pressures compare systolic pressures at multiple levels to help localize hemodynamically significant arterial obstruction. A meaningful pressure drop between adjacent cuffs suggests disease between those levels, interpreted with waveforms and cuff limitations. The method does not directly image thrombus, characterize carotid plaque, or measure portal vein diameter. Correlation with the complete examination prevents an isolated observation from being.

116. D — The ankle-brachial index is calculated by dividing the selected ankle systolic pressure by the higher brachial systolic pressure, following the laboratory's protocol for vessel selection. Subtraction or addition does not produce an index. Reversing the ratio would distort interpretation and can mask physiologically meaningful reductions in ankle pressure. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

117. C — Accurate physiologic pressure measurement requires a cuff bladder appropriately sized to the limb, commonly guided by a proportional relationship to circumference. An undersized cuff can falsely

elevate pressure, while an oversized cuff may distort results. Using one cuff for all limbs or placing it over clothing compromises transmission and reproducibility.

118. B — In a healthy limb, exercise increases demand without causing a substantial sustained fall in ankle pressure. A significant post-exercise decline with delayed recovery supports flow-limiting arterial disease. Complete waveform loss is more severe and not normal. Venous hypertension is assessed through different physiologic mechanisms and does not define the normal arterial exercise response.

119. B — Photoplethysmography detects light absorption changes associated with pulsatile blood-volume variation in superficial tissue. It does not directly measure intravascular pressure or create a cross-sectional B-mode image. Although the tracing reflects the pulse, it is distinct from continuous-wave Doppler audio and depends on proper sensor contact and peripheral perfusion. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

120. A — Segmental limb pressures compare systolic pressures at multiple levels to help localize hemodynamically significant arterial obstruction. A meaningful pressure drop between adjacent cuffs suggests disease between those levels, interpreted with waveforms and cuff limitations. The method does not directly image thrombus, characterize carotid plaque, or measure portal vein diameter. Correlation with the complete examination prevents an isolated observation from being.

121. D — Preprocedural assessment should define the pseudoaneurysm sac, neck, parent artery, adjacent vein, and surrounding structures, with Doppler documentation of flow. This information supports procedural planning and helps identify hazards. Height alone is insufficient. Portal and carotid findings are unrelated to a femoral pseudoaneurysm injection unless separately clinically indicated. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

122. C — Ultrasound guidance for venous ablation requires mapping the treatment vein, its junctions, nearby deep veins, and surrounding anatomy. Imaging supports access, catheter positioning, tumescent anesthesia distribution, and postprocedural assessment. Portal, intracranial, and renal structures do not guide a lower-extremity superficial venous ablation procedure and would not address its principal safety concerns.

123. D — After a vascular procedure, the sonographer obtains the protocol-required images, documents flow and treatment effect, and evaluates for complications such as thrombosis, bleeding, or unintended vessel compromise. The sonographer does not independently provide surgical consent or prescribe medication. Ignoring the access site would miss important immediate postprocedural findings. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

124. C — Ultrasound-guided compression is directed at the pseudoaneurysm neck to interrupt sac inflow while preserving parent-artery patency. Real-time imaging monitors thrombosis and distal circulation. Compressing an unrelated vein or distant artery would not treat the communication and could cause harm. Patient tolerance and contraindications must be considered throughout the procedure. Correlation with the complete examination prevents an isolated observation from being.

125. B — Preprocedural assessment should define the pseudoaneurysm sac, neck, parent artery, adjacent vein, and surrounding structures, with Doppler documentation of flow. This information supports procedural planning and helps identify hazards. Height alone is insufficient. Portal and carotid findings are unrelated to a femoral pseudoaneurysm injection unless separately clinically indicated. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

126. A — Ultrasound guidance for venous ablation requires mapping the treatment vein, its junctions, nearby deep veins, and surrounding anatomy. Imaging supports access, catheter positioning, tumescent anesthesia distribution, and postprocedural assessment. Portal, intracranial, and renal structures do not guide a lower-extremity superficial venous ablation procedure and would not address its principal safety concerns.

127. C — After a vascular procedure, the sonographer obtains the protocol-required images, documents flow and treatment effect, and evaluates for complications such as thrombosis, bleeding, or unintended vessel compromise. The sonographer does not independently provide surgical consent or prescribe medication. Ignoring the access site would miss important immediate postprocedural findings. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

128. B — Ultrasound-guided compression is directed at the pseudoaneurysm neck to interrupt sac inflow while preserving parent-artery patency. Real-time imaging monitors thrombosis and distal circulation. Compressing an unrelated vein or distant artery would not treat the communication and could cause harm. Patient tolerance and contraindications must be considered throughout the procedure. Correlation with the complete examination prevents an isolated observation from being.

129. A — Preprocedural assessment should define the pseudoaneurysm sac, neck, parent artery, adjacent vein, and surrounding structures, with Doppler documentation of flow. This information supports procedural planning and helps identify hazards. Height alone is insufficient. Portal and carotid findings are unrelated to a femoral pseudoaneurysm injection unless separately clinically indicated. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

130. D — Ultrasound guidance for venous ablation requires mapping the treatment vein, its junctions, nearby deep veins, and surrounding anatomy. Imaging supports access, catheter positioning, tumescent anesthesia distribution, and postprocedural assessment. Portal, intracranial, and renal structures do not guide a lower-extremity superficial venous ablation procedure and would not address its principal safety concerns.

131. A — After a vascular procedure, the sonographer obtains the protocol-required images, documents flow and treatment effect, and evaluates for complications such as thrombosis, bleeding, or unintended vessel compromise. The sonographer does not independently provide surgical consent or prescribe medication. Ignoring the access site would miss important immediate postprocedural findings. Correlation with the complete examination prevents an isolated observation from being overinterpreted.

132. C — Ultrasound-guided compression is directed at the pseudoaneurysm neck to interrupt sac inflow while preserving parent-artery patency. Real-time imaging monitors thrombosis and distal circulation. Compressing an unrelated vein or distant artery would not treat the communication and

could cause harm. Patient tolerance and contraindications must be considered throughout the procedure. Correlation with the complete examination prevents an isolated observation from being.

133. B — When color aliasing results from an inappropriately low scale, increasing the color velocity scale or pulse repetition frequency expands the displayed velocity range. Decreasing it worsens aliasing. Turning color off removes information rather than optimizing it, and an excessive wall filter can erase legitimate low-velocity flow without correcting the underlying scale problem.

134. D — The spectral Doppler gate-size control determines the axial length of the sample volume from which frequency shifts are analyzed. A larger gate includes more velocities and may increase spectral broadening. Monitor brightness, annotations, and table height affect display or ergonomics but do not directly change the physical sampling length within the vessel.

135. C — Doppler velocity calculation depends on the cosine of the insonation angle, so the cursor should represent the actual flow direction. Misalignment creates systematic velocity error, especially at larger angles. Cursor alignment does not enlarge the vessel, eliminate every artifact, or alter the patient's true blood pressure; it improves measurement validity.

136. B — A mirror-image artifact occurs when sound reflects along an indirect path involving a strong specular interface, producing a duplicated structure on the opposite side of the reflector. Posterior enhancement increases brightness behind low-attenuation material. Shadowing reduces distal echoes, while range ambiguity misplaces echoes axially and does not specifically create symmetric duplication.

137. D — Patient safety takes priority over protocol completion. The sonographer should stop scanning, assess the patient's immediate condition within scope, summon appropriate clinical assistance, and follow emergency procedures. Continuing solely to finish images, leaving the patient alone, or withholding documentation can delay care and undermine accurate communication of the event and findings.

138. A — Ergonomic scanning keeps the shoulder near neutral, the patient and machine close, the wrist aligned, and reach minimized. Sustained abduction, trunk rotation, and excessive grip increase cumulative musculoskeletal load. Adjusting bed height, chair position, and equipment placement before scanning protects the sonographer without sacrificing examination quality or patient access. Correlation with the complete examination prevents an isolated observation from being.

139. B — When color aliasing results from an inappropriately low scale, increasing the color velocity scale or pulse repetition frequency expands the displayed velocity range. Decreasing it worsens aliasing. Turning color off removes information rather than optimizing it, and an excessive wall filter can erase legitimate low-velocity flow without correcting the underlying scale problem.

140. D — The spectral Doppler gate-size control determines the axial length of the sample volume from which frequency shifts are analyzed. A larger gate includes more velocities and may increase spectral broadening. Monitor brightness, annotations, and table height affect display or ergonomics but do not directly change the physical sampling length within the vessel.

141. A — Doppler velocity calculation depends on the cosine of the insonation angle, so the cursor should represent the actual flow direction. Misalignment creates systematic velocity error, especially at larger angles. Cursor alignment does not enlarge the vessel, eliminate every artifact, or alter the patient's true blood pressure; it improves measurement validity.

142. C — A mirror-image artifact occurs when sound reflects along an indirect path involving a strong specular interface, producing a duplicated structure on the opposite side of the reflector. Posterior enhancement increases brightness behind low-attenuation material. Shadowing reduces distal echoes, while range ambiguity misplaces echoes axially and does not specifically create symmetric duplication.

143. B — Patient safety takes priority over protocol completion. The sonographer should stop scanning, assess the patient's immediate condition within scope, summon appropriate clinical assistance, and follow emergency procedures. Continuing solely to finish images, leaving the patient alone, or withholding documentation can delay care and undermine accurate communication of the event and findings.

144. C — Ergonomic scanning keeps the shoulder near neutral, the patient and machine close, the wrist aligned, and reach minimized. Sustained abduction, trunk rotation, and excessive grip increase cumulative musculoskeletal load. Adjusting bed height, chair position, and equipment placement before scanning protects the sonographer without sacrificing examination quality or patient access. Correlation with the complete examination prevents an isolated observation from being.

145. D — When color aliasing results from an inappropriately low scale, increasing the color velocity scale or pulse repetition frequency expands the displayed velocity range. Decreasing it worsens aliasing. Turning color off removes information rather than optimizing it, and an excessive wall filter can erase legitimate low-velocity flow without correcting the underlying scale problem.

146. A — The spectral Doppler gate-size control determines the axial length of the sample volume from which frequency shifts are analyzed. A larger gate includes more velocities and may increase spectral broadening. Monitor brightness, annotations, and table height affect display or ergonomics but do not directly change the physical sampling length within the vessel.

147. C — Doppler velocity calculation depends on the cosine of the insonation angle, so the cursor should represent the actual flow direction. Misalignment creates systematic velocity error, especially at larger angles. Cursor alignment does not enlarge the vessel, eliminate every artifact, or alter the patient's true blood pressure; it improves measurement validity.

148. B — A mirror-image artifact occurs when sound reflects along an indirect path involving a strong specular interface, producing a duplicated structure on the opposite side of the reflector. Posterior enhancement increases brightness behind low-attenuation material. Shadowing reduces distal echoes, while range ambiguity misplaces echoes axially and does not specifically create symmetric duplication.

149. A — Patient safety takes priority over protocol completion. The sonographer should stop scanning, assess the patient's immediate condition within scope, summon appropriate clinical assistance, and follow emergency procedures. Continuing solely to finish images, leaving the patient alone, or

withholding documentation can delay care and undermine accurate communication of the event and findings.

150. D — Ergonomic scanning keeps the shoulder near neutral, the patient and machine close, the wrist aligned, and reach minimized. Sustained abduction, trunk rotation, and excessive grip increase cumulative musculoskeletal load. Adjusting bed height, chair position, and equipment placement before scanning protects the sonographer without sacrificing examination quality or patient access. Correlation with the complete examination prevents an isolated observation from being.

151. D — When color aliasing results from an inappropriately low scale, increasing the color velocity scale or pulse repetition frequency expands the displayed velocity range. Decreasing it worsens aliasing. Turning color off removes information rather than optimizing it, and an excessive wall filter can erase legitimate low-velocity flow without correcting the underlying scale problem.

152. C — The spectral Doppler gate-size control determines the axial length of the sample volume from which frequency shifts are analyzed. A larger gate includes more velocities and may increase spectral broadening. Monitor brightness, annotations, and table height affect display or ergonomics but do not directly change the physical sampling length within the vessel.

153. B — Doppler velocity calculation depends on the cosine of the insonation angle, so the cursor should represent the actual flow direction. Misalignment creates systematic velocity error, especially at larger angles. Cursor alignment does not enlarge the vessel, eliminate every artifact, or alter the patient's true blood pressure; it improves measurement validity.

154. A — A mirror-image artifact occurs when sound reflects along an indirect path involving a strong specular interface, producing a duplicated structure on the opposite side of the reflector. Posterior enhancement increases brightness behind low-attenuation material. Shadowing reduces distal echoes, while range ambiguity misplaces echoes axially and does not specifically create symmetric duplication.

155. D — Patient safety takes priority over protocol completion. The sonographer should stop scanning, assess the patient's immediate condition within scope, summon appropriate clinical assistance, and follow emergency procedures. Continuing solely to finish images, leaving the patient alone, or withholding documentation can delay care and undermine accurate communication of the event and findings.

156. A — Ergonomic scanning keeps the shoulder near neutral, the patient and machine close, the wrist aligned, and reach minimized. Sustained abduction, trunk rotation, and excessive grip increase cumulative musculoskeletal load. Adjusting bed height, chair position, and equipment placement before scanning protects the sonographer without sacrificing examination quality or patient access. Correlation with the complete examination prevents an isolated observation from being.

157. B — Before scanning, the sonographer verifies the patient's identity using approved identifiers, confirms the ordered examination and indication, reviews relevant history, and explains the procedure. Room conditions and equipment matter operationally, but they do not replace identity verification. Insurance status alone does not establish that the correct patient and examination are matched.

158. C — A critical finding should be communicated promptly to the responsible provider through the laboratory's approved escalation pathway, with documentation of the finding, recipient, date, time, and any required read-back. Delayed, informal, or unauthorized disclosure risks patient harm and breaches professional standards. Communication should remain accurate, concise, and within organizational policy.

159. B — Technical limitations should be documented clearly, including their cause and how they restrict visualization or interpretation. Appropriate alternative positions, windows, or modalities may be considered. Deleting all images, declaring an incompletely assessed study normal, or concealing limitations can mislead the interpreting clinician and compromise continuity, quality assurance, and patient care.

160. A — Prior studies provide a baseline for vessel size, velocities, graft status, thrombus evolution, and other interval changes. They help tailor the current protocol but do not replace new imaging or independent assessment. Copying an earlier conclusion can perpetuate error, and reviewing priors does not eliminate the need for a current clinical history.

161. C — Before scanning, the sonographer verifies the patient's identity using approved identifiers, confirms the ordered examination and indication, reviews relevant history, and explains the procedure. Room conditions and equipment matter operationally, but they do not replace identity verification. Insurance status alone does not establish that the correct patient and examination are matched.

162. D — A critical finding should be communicated promptly to the responsible provider through the laboratory's approved escalation pathway, with documentation of the finding, recipient, date, time, and any required read-back. Delayed, informal, or unauthorized disclosure risks patient harm and breaches professional standards. Communication should remain accurate, concise, and within organizational policy.

163. B — Technical limitations should be documented clearly, including their cause and how they restrict visualization or interpretation. Appropriate alternative positions, windows, or modalities may be considered. Deleting all images, declaring an incompletely assessed study normal, or concealing limitations can mislead the interpreting clinician and compromise continuity, quality assurance, and patient care.

164. D — Prior studies provide a baseline for vessel size, velocities, graft status, thrombus evolution, and other interval changes. They help tailor the current protocol but do not replace new imaging or independent assessment. Copying an earlier conclusion can perpetuate error, and reviewing priors does not eliminate the need for a current clinical history.

165. A — Before scanning, the sonographer verifies the patient's identity using approved identifiers, confirms the ordered examination and indication, reviews relevant history, and explains the procedure. Room conditions and equipment matter operationally, but they do not replace identity verification. Insurance status alone does not establish that the correct patient and examination are matched.

166. C — A critical finding should be communicated promptly to the responsible provider through the laboratory's approved escalation pathway, with documentation of the finding, recipient, date, time, and any required read-back. Delayed, informal, or unauthorized disclosure risks patient harm and breaches professional standards. Communication should remain accurate, concise, and within organizational policy.

167. D — Technical limitations should be documented clearly, including their cause and how they restrict visualization or interpretation. Appropriate alternative positions, windows, or modalities may be considered. Deleting all images, declaring an incompletely assessed study normal, or concealing limitations can mislead the interpreting clinician and compromise continuity, quality assurance, and patient care.

168. A — Prior studies provide a baseline for vessel size, velocities, graft status, thrombus evolution, and other interval changes. They help tailor the current protocol but do not replace new imaging or independent assessment. Copying an earlier conclusion can perpetuate error, and reviewing priors does not eliminate the need for a current clinical history.

169. C — Before scanning, the sonographer verifies the patient's identity using approved identifiers, confirms the ordered examination and indication, reviews relevant history, and explains the procedure. Room conditions and equipment matter operationally, but they do not replace identity verification. Insurance status alone does not establish that the correct patient and examination are matched.

170. B — A critical finding should be communicated promptly to the responsible provider through the laboratory's approved escalation pathway, with documentation of the finding, recipient, date, time, and any required read-back. Delayed, informal, or unauthorized disclosure risks patient harm and breaches professional standards. Communication should remain accurate, concise, and within organizational policy.