PRACTICE EXAM 24: VASCULAR TECHNOLOGY SIMULATION (170 QUESTIONS)

This practice examination contains 170 questions modeled on the ARDMS Vascular Technology examination. Allow three hours. Select the single best answer for each question. The official examination uses a scaled score from 300 to 700, with 555 required to pass; this practice score is for study purposes only.

1. A vascular sonographer reviews a study involving vertebral artery direction. Which observation is the best interpretation?

A. retrograde flow toward the subclavian artery
B. alternating flow in every normal patient
C. antegrade flow toward the brain
D. continuous flow toward the arm

2. A vascular sonographer reviews a study involving superior mesenteric artery fasting waveform. Which observation is the best interpretation?

A. continuous venous pattern with respiration
B. to-and-fro flow without net direction
C. low-resistance pattern with abundant diastolic flow
D. high-resistance pattern with limited diastolic flow

3. A vascular sonographer reviews a study involving popliteal vein relationship. Which observation is the best interpretation?

A. usually superficial to the popliteal artery on a posterior approach
B. always lateral and deep to the artery
C. always medial to the artery

D. within the arterial lumen

4. A vascular sonographer reviews a study involving common carotid artery waveform. Which observation is the best interpretation?

A. high-resistance flow with absent diastolic flow
B. continuous nonphasic venous flow
C. bidirectional to-and-fro flow
D. low-resistance flow with persistent diastolic flow

5. A vascular sonographer reviews a study involving main portal vein direction. Which observation is the best interpretation?

A. alternating flow with each heartbeat
B. hepatopetal flow toward the liver
C. retrograde flow toward the spleen
D. hepatofugal flow away from the liver

6. A vascular sonographer reviews a study involving normal lower-extremity vein response to compression. Which observation is the best interpretation?

A. sustained retrograde arterial flow
B. persistent rigid circular lumen
C. complete lumen collapse
D. marked arterial color aliasing

7. A vascular sonographer reviews a study involving aortic spectral pattern. Which observation is the best interpretation?

A. high-resistance pulsatile flow in the fasting state
B. continuous nonpulsatile venous flow

C. low-resistance flow identical to the renal artery
D. permanent flow reversal throughout systole

8. A vascular sonographer reviews a study involving internal carotid artery waveform. Which observation is the best interpretation?

A. phasic flow varying with respiration
B. reversed systolic flow throughout
C. low-resistance flow with substantial diastolic velocity
D. high-resistance flow with little diastolic velocity

9. A vascular sonographer reviews a study involving celiac artery fasting waveform. Which observation is the best interpretation?

A. to-and-fro pattern at the origin
B. high-resistance pattern with diastolic reversal
C. continuous venous pattern without systolic peaks
D. low-resistance pattern with forward diastolic flow

10. A vascular sonographer reviews a study involving great saphenous vein location. Which observation is the best interpretation?

A. deep to the femoral artery
B. within the saphenous compartment superficial to muscular fascia
C. inside the popliteal artery wall
D. within the tibial interosseous membrane

11. A vascular sonographer reviews a study involving posterior tibial artery landmark. Which observation is the best interpretation?

A. within the popliteal fossa only

B. posterior to the medial malleolus
C. over the dorsum between metatarsals
D. anterior to the lateral malleolus

12. A vascular sonographer reviews a study involving hepatic vein waveform. Which observation is the best interpretation?

A. cardiac pulsatility with multiple phases
B. continuous nonphasic portal flow
C. steady monophasic arterial flow
D. high-resistance triphasic arterial flow

13. A vascular sonographer reviews a study involving normal lower-extremity artery. Which observation is the best interpretation?

A. continuous low-velocity monophasic flow
B. nonphasic venous waveform
C. persistent retrograde systolic flow
D. multiphasic waveform with rapid systolic upstroke

14. A vascular sonographer reviews a study involving brachial artery bifurcation. Which observation is the best interpretation?

A. common and internal carotid arteries
B. anterior and posterior tibial arteries
C. radial and ulnar arteries
D. axillary and subclavian arteries

15. A vascular sonographer reviews a study involving external carotid artery identification. Which observation is the best interpretation?

A. temporal tapping oscillations in the waveform
B. continuous flow without pulsatility
C. absence of visible branches in the neck
D. markedly lower resistance than the ICA

16. A vascular sonographer reviews a study involving renal artery waveform. Which observation is the best interpretation?

A. high-resistance flow with early diastolic reversal
B. nonphasic venous flow only
C. bidirectional flow with no net perfusion
D. low-resistance flow with continuous diastolic perfusion

17. A vascular sonographer reviews a study involving normal venous augmentation. Which observation is the best interpretation?

A. complete loss of venous signal
B. marked decrease in systolic arterial velocity
C. brief increase in antegrade venous flow
D. sustained arterial flow reversal

18. A vascular sonographer reviews a study involving intracranial MCA insonation. Which observation is the best interpretation?

A. submandibular window only
B. transtemporal window
C. suboccipital window only
D. transorbital window only

19. During protocol completion for vertebral artery direction, which finding should the sonographer identify?

A. retrograde flow toward the subclavian artery
B. antegrade flow toward the brain
C. alternating flow in every normal patient
D. continuous flow toward the arm

20. During protocol completion for superior mesenteric artery fasting waveform, which finding should the sonographer identify?

A. high-resistance pattern with limited diastolic flow
B. continuous venous pattern with respiration
C. to-and-fro flow without net direction
D. low-resistance pattern with abundant diastolic flow

21. During protocol completion for popliteal vein relationship, which finding should the sonographer identify?

A. always lateral and deep to the artery
B. always medial to the artery
C. within the arterial lumen
D. usually superficial to the popliteal artery on a posterior approach

22. During protocol completion for common carotid artery waveform, which finding should the sonographer identify?

A. high-resistance flow with absent diastolic flow
B. continuous nonphasic venous flow
C. low-resistance flow with persistent diastolic flow
D. bidirectional to-and-fro flow

23. During protocol completion for main portal vein direction, which finding should the sonographer identify?

A. alternating flow with each heartbeat
B. retrograde flow toward the spleen
C. hepatofugal flow away from the liver
D. hepatopetal flow toward the liver

24. During protocol completion for normal lower-extremity vein response to compression, which finding should the sonographer identify?

A. sustained retrograde arterial flow
B. persistent rigid circular lumen
C. complete lumen collapse
D. marked arterial color aliasing

25. During protocol completion for aortic spectral pattern, which finding should the sonographer identify?

A. high-resistance pulsatile flow in the fasting state
B. continuous nonpulsatile venous flow
C. low-resistance flow identical to the renal artery
D. permanent flow reversal throughout systole

26. During protocol completion for internal carotid artery waveform, which finding should the sonographer identify?

A. phasic flow varying with respiration
B. low-resistance flow with substantial diastolic velocity
C. reversed systolic flow throughout
D. high-resistance flow with little diastolic velocity

27. During protocol completion for celiac artery fasting waveform, which finding should the sonographer identify?

A. to-and-fro pattern at the origin
B. high-resistance pattern with diastolic reversal
C. low-resistance pattern with forward diastolic flow
D. continuous venous pattern without systolic peaks

28. During protocol completion for great saphenous vein location, which finding should the sonographer identify?

A. deep to the femoral artery
B. inside the popliteal artery wall
C. within the tibial interosseous membrane
D. within the saphenous compartment superficial to muscular fascia

29. During protocol completion for posterior tibial artery landmark, which finding should the sonographer identify?

A. posterior to the medial malleolus
B. within the popliteal fossa only
C. over the dorsum between metatarsals
D. anterior to the lateral malleolus

30. During protocol completion for hepatic vein waveform, which finding should the sonographer identify?

A. continuous nonphasic portal flow
B. cardiac pulsatility with multiple phases
C. steady monophasic arterial flow
D. high-resistance triphasic arterial flow

31. During protocol completion for normal lower-extremity artery, which finding should the sonographer identify?

A. continuous low-velocity monophasic flow
B. nonphasic venous waveform
C. multiphasic waveform with rapid systolic upstroke
D. persistent retrograde systolic flow

32. During protocol completion for brachial artery bifurcation, which finding should the sonographer identify?

A. radial and ulnar arteries
B. common and internal carotid arteries
C. anterior and posterior tibial arteries
D. axillary and subclavian arteries

33. During protocol completion for external carotid artery identification, which finding should the sonographer identify?

A. continuous flow without pulsatility
B. absence of visible branches in the neck
C. markedly lower resistance than the ICA
D. temporal tapping oscillations in the waveform

34. During protocol completion for renal artery waveform, which finding should the sonographer identify?

A. high-resistance flow with early diastolic reversal
B. low-resistance flow with continuous diastolic perfusion
C. nonphasic venous flow only
D. bidirectional flow with no net perfusion

35. During protocol completion for normal venous augmentation, which finding should the sonographer identify?

A. brief increase in antegrade venous flow
B. complete loss of venous signal
C. marked decrease in systolic arterial velocity
D. sustained arterial flow reversal

36. During protocol completion for intracranial MCA insonation, which finding should the sonographer identify?

A. submandibular window only
B. suboccipital window only
C. transorbital window only
D. transtemporal window

37. A vascular sonographer reviews a study involving carotid stenosis jet. Which observation is the best interpretation?

A. uniformly reduced gain without turbulence
B. complete venous compressibility
C. focal velocity elevation with spectral broadening
D. steady portal venous flow

38. A vascular sonographer reviews a study involving pseudoaneurysm sac. Which observation is the best interpretation?

A. parallel laminar venous color only
B. bidirectional swirling color flow
C. fixed high-resistance arterial color
D. uniform absence of all echoes

39. A vascular sonographer reviews a study involving intrarenal tardus-parvus. Which observation is the best interpretation?

A. brief early diastolic reversal only
B. rapid upstroke with high amplitude
C. continuous venous pulsatility
D. delayed systolic upstroke and damped amplitude

40. A vascular sonographer reviews a study involving nutcracker phenomenon. Which observation is the best interpretation?

A. right renal vein compression behind the IVC
B. portal vein compression at the hilum
C. left renal vein compression between the SMA and aorta
D. femoral vein compression by the profunda artery

41. A vascular sonographer reviews a study involving popliteal aneurysm complication. Which observation is the best interpretation?

A. mural thrombus with distal embolization
B. carotid body tumor secretion
C. jugular valve reflux only
D. portal venous hypertension

42. A vascular sonographer reviews a study involving chronic post-thrombotic change. Which observation is the best interpretation?

A. a cyst without vascular attachment
B. a small irregular vein with echogenic wall-adherent material
C. a distended anechoic vein that fully compresses
D. a normal artery with multiphasic flow

43. A vascular sonographer reviews a study involving subclavian steal. Which observation is the best interpretation?

A. increased portal venous pulsatility
B. bilateral renal venous reversal
C. continuous antegrade ECA flow only
D. retrograde or alternating ipsilateral vertebral flow

44. A vascular sonographer reviews a study involving aortic dissection. Which observation is the best interpretation?

A. an intimal flap separating true and false lumens
B. a normal posterior wall artifact
C. a simple renal cyst
D. a venous valve leaflet only

45. A vascular sonographer reviews a study involving Budd-Chiari syndrome. Which observation is the best interpretation?

A. normal portal inflow after eating
B. isolated superficial leg reflux
C. hepatic venous outflow obstruction
D. carotid bifurcation plaque only

46. A vascular sonographer reviews a study involving venous thoracic outlet syndrome. Which observation is the best interpretation?

A. isolated below-knee arterial stenosis
B. subclavian vein obstruction or thrombosis near the costoclavicular space
C. portal hypertension at the hilum
D. renal artery fibromuscular dysplasia

47. A vascular sonographer reviews a study involving distal arterial disease. Which observation is the best interpretation?

A. spontaneous phasic venous flow
B. hepatopetal portal flow
C. damped monophasic waveforms beyond a significant lesion
D. normal multiphasic waveforms throughout

48. A vascular sonographer reviews a study involving carotid near occlusion. Which observation is the best interpretation?

A. high venous pulsatility only during the current vascular laboratory examination
B. marked lumen narrowing with reduced distal caliber and variable low flow
C. normal distal ICA caliber with uniform flow on this examination
D. isolated ECA tapping artifact during the current vascular laboratory examination

49. A vascular sonographer reviews a study involving arteriovenous fistula. Which observation is the best interpretation?

A. low-resistance feeding artery and pulsatile draining vein
B. high-resistance feeding artery and silent vein
C. normal triphasic artery with nonpulsatile vein
D. absent arterial flow with compressible vein

50. A vascular sonographer reviews a study involving mesenteric ischemia. Which observation is the best interpretation?

A. complete vein compressibility
B. isolated hepatic vein reversal
C. normal venous respiratory phasicity
D. elevated focal velocities in a fasting mesenteric artery

51. A vascular sonographer reviews a study involving popliteal artery entrapment. Which observation is the best interpretation?

A. renal vein pulsatility with breathing
B. dynamic arterial compression with provocative plantar flexion
C. fixed portal vein thrombosis
D. carotid flow reversal during swallowing

52. A vascular sonographer reviews a study involving Baker cyst. Which observation is the best interpretation?

A. a pulsatile arterial sac with a neck
B. a compressible vein with augmentation
C. an avascular fluid collection in the popliteal fossa
D. a solid hypervascular carotid mass

53. A vascular sonographer reviews a study involving venous reflux testing. Which observation is the best interpretation?

A. arterial systolic acceleration
B. complete venous compressibility
C. brief antegrade augmentation only
D. retrograde flow exceeding the laboratory threshold after provocation

54. A vascular sonographer reviews a study involving pseudoaneurysm neck. Which observation is the best interpretation?

A. to-and-fro spectral flow
B. phasic respiratory venous flow
C. continuous low-resistance antegrade flow
D. triphasic peripheral arterial flow

55. A vascular sonographer reviews a study involving renal artery stenosis. Which observation is the best interpretation?

A. uniform venous phasicity
B. focal high velocity with post-stenotic turbulence
C. normal low-resistance flow everywhere
D. complete absence of a renal vein

56. A vascular sonographer reviews a study involving May-Thurner anatomy. Which observation is the best interpretation?

A. left carotid compression by the jugular vein
B. portal vein compression by the hepatic artery
C. left common iliac vein compression by the right common iliac artery
D. right renal artery compression by the SMA

57. A vascular sonographer reviews a study involving fibromuscular dysplasia. Which observation is the best interpretation?

A. portal cavernous transformation
B. calcified plaque confined to the ostium
C. venous valve incompetence only
D. alternating stenosis and dilation in the mid-distal renal artery

58. A vascular sonographer reviews a study involving acute lower-extremity DVT. Which observation is the best interpretation?

A. a fully compressible vein with spontaneous flow
B. a calcified artery with triphasic flow
C. a small vein with brisk augmentation
D. a noncompressible, enlarged vein with hypoechoic thrombus

59. A vascular sonographer reviews a study involving complete ICA occlusion. Which observation is the best interpretation?

A. no detectable flow after careful optimization
B. normal low-resistance spectral flow
C. continuous venous flow in the lumen
D. brief temporal tapping oscillations

60. A vascular sonographer reviews a study involving abdominal aortic aneurysm. Which observation is the best interpretation?

A. normal respiratory caliber change during this vascular examination
B. isolated venous enlargement on the current vascular laboratory examination
C. focal aortic dilation measured outer wall to outer wall
D. temporary color aliasing on the current vascular laboratory examination

61. A vascular sonographer reviews a study involving portal hypertension. Which observation is the best interpretation?

A. normal hepatopetal portal flow only on this examination
B. reduced or reversed portal venous flow with collateral vessels
C. triphasic pedal arterial flow during this vascular examination
D. complete jugular compressibility on the current vascular laboratory examination

62. A vascular sonographer reviews a study involving arterial thoracic outlet syndrome. Which observation is the best interpretation?

A. subclavian arterial compression during provocative positioning
B. renal artery dilation during Valsalva
C. carotid occlusion during inspiration
D. portal flow reversal after fasting

63. A vascular sonographer reviews a study involving carotid body tumor. Which observation is the best interpretation?

A. a hypervascular mass splaying the ICA and ECA
B. a renal cortical cyst without flow
C. an avascular cyst behind the knee
D. a thrombus within the portal vein

64. During protocol completion for carotid stenosis jet, which finding should the sonographer identify?

A. uniformly reduced gain without turbulence
B. complete venous compressibility
C. focal velocity elevation with spectral broadening
D. steady portal venous flow

65. During protocol completion for pseudoaneurysm sac, which finding should the sonographer identify?

A. parallel laminar venous color only
B. fixed high-resistance arterial color
C. uniform absence of all echoes
D. bidirectional swirling color flow

66. During protocol completion for intrarenal tardus-parvus, which finding should the sonographer identify?

A. brief early diastolic reversal only
B. delayed systolic upstroke and damped amplitude
C. rapid upstroke with high amplitude
D. continuous venous pulsatility

67. During protocol completion for nutcracker phenomenon, which finding should the sonographer identify?

A. right renal vein compression behind the IVC
B. portal vein compression at the hilum
C. left renal vein compression between the SMA and aorta
D. femoral vein compression by the profunda artery

68. During protocol completion for popliteal aneurysm complication, which finding should the sonographer identify?

A. carotid body tumor secretion
B. mural thrombus with distal embolization
C. jugular valve reflux only
D. portal venous hypertension

69. During protocol completion for chronic post-thrombotic change, which finding should the sonographer identify?

A. a cyst without vascular attachment
B. a distended anechoic vein that fully compresses
C. a normal artery with multiphasic flow
D. a small irregular vein with echogenic wall-adherent material

70. During protocol completion for subclavian steal, which finding should the sonographer identify?

A. retrograde or alternating ipsilateral vertebral flow
B. increased portal venous pulsatility
C. bilateral renal venous reversal
D. continuous antegrade ECA flow only

71. During protocol completion for aortic dissection, which finding should the sonographer identify?

A. an intimal flap separating true and false lumens

B. a normal posterior wall artifact

C. a simple renal cyst

D. a venous valve leaflet only

72. During protocol completion for Budd-Chiari syndrome, which finding should the sonographer identify?

A. normal portal inflow after eating

B. isolated superficial leg reflux

C. carotid bifurcation plaque only

D. hepatic venous outflow obstruction

73. During protocol completion for venous thoracic outlet syndrome, which finding should the sonographer identify?

A. isolated below-knee arterial stenosis

B. subclavian vein obstruction or thrombosis near the costoclavicular space

C. portal hypertension at the hilum

D. renal artery fibromuscular dysplasia

74. During protocol completion for distal arterial disease, which finding should the sonographer identify?

A. spontaneous phasic venous flow

B. hepatopetal portal flow

C. damped monophasic waveforms beyond a significant lesion

D. normal multiphasic waveforms throughout

75. During protocol completion for carotid near occlusion, which finding should the sonographer identify?

A. high venous pulsatility only during the current vascular laboratory examination
B. normal distal ICA caliber with uniform flow on this examination
C. isolated ECA tapping artifact during the current vascular laboratory examination
D. marked lumen narrowing with reduced distal caliber and variable low flow

76. During protocol completion for arteriovenous fistula, which finding should the sonographer identify?

A. low-resistance feeding artery and pulsatile draining vein
B. high-resistance feeding artery and silent vein
C. normal triphasic artery with nonpulsatile vein
D. absent arterial flow with compressible vein

77. During protocol completion for mesenteric ischemia, which finding should the sonographer identify?

A. complete vein compressibility
B. isolated hepatic vein reversal
C. elevated focal velocities in a fasting mesenteric artery
D. normal venous respiratory phasicity

78. During protocol completion for popliteal artery entrapment, which finding should the sonographer identify?

A. renal vein pulsatility with breathing
B. dynamic arterial compression with provocative plantar flexion
C. fixed portal vein thrombosis
D. carotid flow reversal during swallowing

79. During protocol completion for Baker cyst, which finding should the sonographer identify?

A. a pulsatile arterial sac with a neck
B. an avascular fluid collection in the popliteal fossa

C. a compressible vein with augmentation
D. a solid hypervascular carotid mass

80. During protocol completion for venous reflux testing, which finding should the sonographer identify?

A. arterial systolic acceleration
B. complete venous compressibility
C. retrograde flow exceeding the laboratory threshold after provocation
D. brief antegrade augmentation only

81. During protocol completion for pseudoaneurysm neck, which finding should the sonographer identify?

A. phasic respiratory venous flow
B. continuous low-resistance antegrade flow
C. triphasic peripheral arterial flow
D. to-and-fro spectral flow

82. During protocol completion for renal artery stenosis, which finding should the sonographer identify?

A. focal high velocity with post-stenotic turbulence
B. uniform venous phasicity
C. normal low-resistance flow everywhere
D. complete absence of a renal vein

83. During protocol completion for May-Thurner anatomy, which finding should the sonographer identify?

A. left common iliac vein compression by the right common iliac artery
B. left carotid compression by the jugular vein

C. portal vein compression by the hepatic artery
D. right renal artery compression by the SMA

84. During protocol completion for fibromuscular dysplasia, which finding should the sonographer identify?

A. portal cavernous transformation
B. alternating stenosis and dilation in the mid-distal renal artery
C. calcified plaque confined to the ostium
D. venous valve incompetence only

85. During protocol completion for acute lower-extremity DVT, which finding should the sonographer identify?

A. a fully compressible vein with spontaneous flow
B. a calcified artery with triphasic flow
C. a noncompressible, enlarged vein with hypoechoic thrombus
D. a small vein with brisk augmentation

86. During protocol completion for complete ICA occlusion, which finding should the sonographer identify?

A. normal low-resistance spectral flow
B. continuous venous flow in the lumen
C. brief temporal tapping oscillations
D. no detectable flow after careful optimization

87. During protocol completion for abdominal aortic aneurysm, which finding should the sonographer identify?

A. normal respiratory caliber change during this vascular examination

B. focal aortic dilation measured outer wall to outer wall
C. isolated venous enlargement on the current vascular laboratory examination
D. temporary color aliasing on the current vascular laboratory examination

88. During protocol completion for portal hypertension, which finding should the sonographer identify?

A. reduced or reversed portal venous flow with collateral vessels
B. normal hepatopetal portal flow only on this examination
C. triphasic pedal arterial flow during this vascular examination
D. complete jugular compressibility on the current vascular laboratory examination

89. During protocol completion for arterial thoracic outlet syndrome, which finding should the sonographer identify?

A. renal artery dilation during Valsalva
B. carotid occlusion during inspiration
C. portal flow reversal after fasting
D. subclavian arterial compression during provocative positioning

90. During protocol completion for carotid body tumor, which finding should the sonographer identify?

A. a renal cortical cyst without flow
B. an avascular cyst behind the knee
C. a hypervascular mass splaying the ICA and ECA
D. a thrombus within the portal vein

91. A vascular sonographer reviews a study involving EVAR endoleak. Which observation is the best interpretation?

A. normal flow confined to graft limbs during this vascular examination
B. venous flow in the adjacent IVC during this vascular examination

C. persistent blood flow outside the graft but within the aneurysm sac
D. artifact outside the body contour on the current vascular laboratory examination

92. A vascular sonographer reviews a study involving stented carotid artery. Which observation is the best interpretation?

A. ignore spectral velocities
B. apply validated stent-specific velocity criteria
C. assume every elevated velocity is occlusion
D. apply venous thrombosis criteria

93. A vascular sonographer reviews a study involving failing hemodialysis access. Which observation is the best interpretation?

A. correlate focal lesions with access flow and clinical dysfunction
B. evaluate only the contralateral arm
C. diagnose failure from bruit alone
D. ignore outflow veins

94. A vascular sonographer reviews a study involving dialysis access stenosis. Which observation is the best interpretation?

A. uniform color filling and stable velocities
B. complete compressibility of the feeding artery
C. normal portal venous phasicity
D. focal velocity increase with color aliasing and flow disturbance

95. A vascular sonographer reviews a study involving carotid endarterectomy surveillance. Which observation is the best interpretation?

A. assess the repair site for restenosis and technical defects

B. measure only jugular vein diameter
C. use venous reflux criteria
D. avoid imaging the surgical segment

96. A vascular sonographer reviews a study involving renal transplant artery. Which observation is the best interpretation?

A. assess only superficial leg veins
B. scan only the native carotid arteries
C. evaluate the anastomosis and intrarenal perfusion
D. omit color Doppler entirely

97. A vascular sonographer reviews a study involving AV fistula maturation. Which observation is the best interpretation?

A. arterial triphasicity alone
B. adequate diameter, depth, flow, and usable segment
C. absence of any venous enlargement
D. only the patient's blood pressure

98. A vascular sonographer reviews a study involving TIPS surveillance. Which observation is the best interpretation?

A. measure ankle pressures exclusively
B. assess superficial reflux only
C. scan only the common carotid artery
D. evaluate shunt patency and velocities along its course

99. A vascular sonographer reviews a study involving venous ablation follow-up. Which observation is the best interpretation?

A. measure carotid intima only
B. confirm treated-vein closure and exclude deep venous thrombosis
C. document only pedal arterial pressures
D. avoid the saphenofemoral junction

100. A vascular sonographer reviews a study involving prosthetic bypass graft surveillance. Which observation is the best interpretation?

A. evaluate inflow, graft body, anastomoses, and outflow
B. scan only the mid-graft segment
C. measure only the contralateral limb
D. omit velocity measurements entirely

101. A vascular sonographer reviews a study involving exercise ABI. Which observation is the best interpretation?

A. diagnose acute DVT directly
B. measure portal venous direction
C. replace all duplex imaging
D. unmask flow-limiting disease when resting results are normal

102. A vascular sonographer reviews a study involving venous PPG refill. Which observation is the best interpretation?

A. measure aortic diameter
B. identify renal artery origins
C. assess venous filling after calf-muscle emptying
D. calculate carotid stenosis directly

103. A vascular sonographer reviews a study involving reactive hyperemia. Which observation is the best interpretation?

A. reverse portal flow in healthy patients
B. temporarily increase flow demand after cuff release
C. produce permanent arterial occlusion
D. eliminate all venous flow

104. A vascular sonographer reviews a study involving segmental pressure drop. Which observation is the best interpretation?

A. identical pressures at every level
B. a higher distal pressure after exercise
C. a meaningful pressure decrease between adjacent cuff levels
D. normal venous respiratory phasicity

105. A vascular sonographer reviews a study involving photoplethysmography. Which observation is the best interpretation?

A. detect superficial changes in blood volume using infrared light
B. image thrombus using magnetic fields
C. record only cardiac electrical activity
D. measure deep arterial diameter with x-rays

106. A vascular sonographer reviews a study involving toe-brachial index. Which observation is the best interpretation?

A. calf pressure divided by toe pressure
B. higher brachial pressure divided by toe pressure
C. toe pressure divided by ankle pressure only
D. toe systolic pressure divided by the higher brachial pressure

107. A vascular sonographer reviews a study involving noncompressible ankle arteries. Which observation is the best interpretation?

A. report a falsely high ABI as normal
B. increase cuff pressure indefinitely
C. omit all distal perfusion assessment
D. obtain toe pressures or another alternative physiologic test

108. A vascular sonographer reviews a study involving pulse volume recording. Which observation is the best interpretation?

A. measure venous valve diameter
B. display portal vein anatomy
C. reflect limb volume change during the cardiac cycle
D. directly image the arterial wall

109. A vascular sonographer reviews a study involving proper pressure cuff. Which observation is the best interpretation?

A. a rigid cuff that cannot encircle the limb
B. a width approximately 20 percent greater than limb diameter
C. the narrowest cuff available
D. a cuff covering only one quarter of the limb

110. A vascular sonographer reviews a study involving ABI interpretation. Which observation is the best interpretation?

A. ankle systolic pressure divided by the higher brachial pressure
B. higher brachial pressure divided by ankle pressure
C. ankle pressure divided by lower brachial pressure
D. toe pressure divided by calf pressure

111. During protocol completion for exercise ABI, which finding should the sonographer identify?

A. measure portal venous direction
B. replace all duplex imaging
C. unmask flow-limiting disease when resting results are normal
D. diagnose acute DVT directly

112. During protocol completion for venous PPG refill, which finding should the sonographer identify?

A. identify renal artery origins
B. calculate carotid stenosis directly
C. measure aortic diameter
D. assess venous filling after calf-muscle emptying

113. During protocol completion for reactive hyperemia, which finding should the sonographer identify?

A. produce permanent arterial occlusion
B. temporarily increase flow demand after cuff release
C. eliminate all venous flow
D. reverse portal flow in healthy patients

114. During protocol completion for segmental pressure drop, which finding should the sonographer identify?

A. a meaningful pressure decrease between adjacent cuff levels
B. a higher distal pressure after exercise
C. normal venous respiratory phasicity
D. identical pressures at every level

115. During protocol completion for photoplethysmography, which finding should the sonographer identify?

A. record only cardiac electrical activity

B. detect superficial changes in blood volume using infrared light
C. measure deep arterial diameter with x-rays
D. image thrombus using magnetic fields

116. During protocol completion for toe-brachial index, which finding should the sonographer identify?

A. toe systolic pressure divided by the higher brachial pressure
B. higher brachial pressure divided by toe pressure
C. toe pressure divided by ankle pressure only
D. calf pressure divided by toe pressure

117. During protocol completion for noncompressible ankle arteries, which finding should the sonographer identify?

A. increase cuff pressure indefinitely
B. omit all distal perfusion assessment
C. report a falsely high ABI as normal
D. obtain toe pressures or another alternative physiologic test

118. During protocol completion for pulse volume recording, which finding should the sonographer identify?

A. display portal vein anatomy
B. directly image the arterial wall
C. reflect limb volume change during the cardiac cycle
D. measure venous valve diameter

119. During protocol completion for proper pressure cuff, which finding should the sonographer identify?

A. a width approximately 20 percent greater than limb diameter

B. the narrowest cuff available
C. a cuff covering only one quarter of the limb
D. a rigid cuff that cannot encircle the limb

120. During protocol completion for ABI interpretation, which finding should the sonographer identify?

A. ankle pressure divided by lower brachial pressure
B. ankle systolic pressure divided by the higher brachial pressure
C. toe pressure divided by calf pressure
D. higher brachial pressure divided by ankle pressure

121. A vascular sonographer reviews a study involving preprocedure timeout. Which observation is the best interpretation?

A. begin before identity confirmation
B. substitute room number for identity
C. omit laterality verification
D. confirm patient, procedure, site, and relevant consent

122. A vascular sonographer reviews a study involving procedure anticoagulation review. Which observation is the best interpretation?

A. stop prescribed drugs independently
B. rely only on patient age
C. check relevant medication and laboratory information before intervention
D. ignore all medication history

123. A vascular sonographer reviews a study involving pseudoaneurysm compression. Which observation is the best interpretation?

A. apply focused pressure to the communicating neck while monitoring flow

B. avoid reassessing the parent artery
C. compress the entire limb without imaging
D. press only on the distal vein

124. A vascular sonographer reviews a study involving intraoperative duplex. Which observation is the best interpretation?

A. replace sterile technique on the current vascular laboratory examination
B. evaluate only unrelated veins during this vascular examination
C. provide immediate assessment of repair patency and residual defects
D. delay all findings until discharge on this examination

125. A vascular sonographer reviews a study involving procedural image documentation. Which observation is the best interpretation?

A. delete unsuccessful guidance images
B. save preprocedure, guidance, and postprocedure findings as required
C. omit laterality and annotations
D. retain only an unlabeled image

126. A vascular sonographer reviews a study involving sterile transducer use. Which observation is the best interpretation?

A. apply nonsterile gel to the puncture site
B. place a bare probe in the field
C. reuse a contaminated cover
D. use an appropriate sterile cover and sterile coupling medium

127. A vascular sonographer reviews a study involving tumescent anesthesia in ablation. Which observation is the best interpretation?

A. fill the deep artery with fluid
B. surround the target vein and separate it from nearby tissues
C. eliminate the need for imaging
D. increase heat transfer to the skin

128. A vascular sonographer reviews a study involving venous ablation guidance. Which observation is the best interpretation?

A. ignore the deep venous junction
B. use arterial pressure cuffs alone
C. image only the opposite limb
D. track the catheter and treatment segment in real time

129. A vascular sonographer reviews a study involving ultrasound-guided vascular access. Which observation is the best interpretation?

A. aim through the posterior wall intentionally
B. follow only the needle shaft shadow
C. maintain continuous visualization of the needle tip
D. advance without seeing the target

130. A vascular sonographer reviews a study involving pseudoaneurysm thrombin injection. Which observation is the best interpretation?

A. visualize the needle tip and keep it away from the native artery
B. inject without imaging guidance in the vessel being evaluated during this examination
C. place the needle in the parent artery during this vascular examination
D. compress the contralateral carotid artery during the current vascular laboratory examination

131. A vascular sonographer reviews a study involving post-thrombin assessment. Which observation is the best interpretation?

A. omit distal perfusion checks
B. assume treatment success without Doppler
C. confirm sac thrombosis and parent-artery patency
D. document only the skin puncture

132. A vascular sonographer reviews a study involving post-access complication check. Which observation is the best interpretation?

A. omit color and spectral Doppler
B. assess only carotid intima thickness
C. measure portal vein diameter alone
D. evaluate for hematoma, pseudoaneurysm, fistula, or thrombosis

133. A vascular sonographer reviews a study involving color gain. Which observation is the best interpretation?

A. leave gain at zero
B. increase until speckle appears, then reduce slightly
C. maximize gain regardless of noise
D. adjust only grayscale depth

134. A vascular sonographer reviews a study involving mirror-image artifact. Which observation is the best interpretation?

A. recognize duplicated anatomy across a strong reflector
B. increase gain until duplication worsens
C. measure the artifact as pathology
D. diagnose every duplicate as a second vessel

135. A vascular sonographer reviews a study involving spectral aliasing. Which observation is the best interpretation?

A. decrease wall filter without limit
B. increase Doppler gain only
C. enlarge the color box
D. raise PRF or shift the baseline appropriately

136. A vascular sonographer reviews a study involving acoustic output. Which observation is the best interpretation?

A. use the lowest output and shortest exposure that answer the clinical question
B. maximize output for every patient during the current vascular laboratory examination
C. ignore displayed safety indices in the vessel being evaluated during this examination
D. extend dwell time unnecessarily in the vessel being evaluated during this examination

137. A vascular sonographer reviews a study involving range ambiguity. Which observation is the best interpretation?

A. reduce image depth only on the current vascular laboratory examination
B. increase persistence without review on the current vascular laboratory examination
C. recognize echoes assigned to an incorrect depth at high PRF
D. assume every echo depth is exact on this examination

138. A vascular sonographer reviews a study involving wall filter. Which observation is the best interpretation?

A. use it to change insonation angle
B. set low enough to preserve slow flow without excessive clutter
C. set maximum for every venous exam
D. remove all motion information

139. A vascular sonographer reviews a study involving twinkle or flash artifact. Which observation is the best interpretation?

A. distinguish motion-related color from true intraluminal flow
B. accept all color as blood flow
C. turn off grayscale imaging
D. diagnose occlusion from color alone

140. A vascular sonographer reviews a study involving Doppler angle. Which observation is the best interpretation?

A. align the cursor across the vessel wall on the current vascular laboratory examination
B. ignore the flow direction under standard testing conditions in the current vascular laboratory
C. keep the correction cursor aligned with flow and at 60 degrees or less
D. set every vessel to 90 degrees during the current vascular laboratory examination

141. A vascular sonographer reviews a study involving quality assurance trend. Which observation is the best interpretation?

A. compare unrelated exam types only
B. track standardized measurements and investigate systematic drift
C. discard all prior measurements
D. change protocols every day

142. A vascular sonographer reviews a study involving color aliasing. Which observation is the best interpretation?

A. increase color gain until noise fills the box
B. decrease wall filter to zero always
C. increase transmit frequency only
D. increase the color scale or pulse-repetition frequency

143. A vascular sonographer reviews a study involving sample volume. Which observation is the best interpretation?

A. include every adjacent vessel in the vessel being evaluated during this examination
B. use maximum width for all stenoses on the current vascular laboratory examination
C. place it within the lumen and size it for the measurement goal
D. place it outside the vessel during the current vascular laboratory examination

144. A vascular sonographer reviews a study involving cross-talk artifact. Which observation is the best interpretation?

A. change patient identity
B. increase gain further
C. raise wall filter to maximum
D. reduce excessive spectral gain

145. During protocol completion for color gain, which finding should the sonographer identify?

A. increase until speckle appears, then reduce slightly
B. leave gain at zero
C. maximize gain regardless of noise
D. adjust only grayscale depth

146. During protocol completion for mirror-image artifact, which finding should the sonographer identify?

A. increase gain until duplication worsens
B. recognize duplicated anatomy across a strong reflector
C. measure the artifact as pathology
D. diagnose every duplicate as a second vessel

147. During protocol completion for spectral aliasing, which finding should the sonographer identify?

A. decrease wall filter without limit

B. increase Doppler gain only
C. enlarge the color box
D. raise PRF or shift the baseline appropriately

148. During protocol completion for acoustic output, which finding should the sonographer identify?

A. maximize output for every patient during the current vascular laboratory examination
B. ignore displayed safety indices in the vessel being evaluated during this examination
C. use the lowest output and shortest exposure that answer the clinical question
D. extend dwell time unnecessarily in the vessel being evaluated during this examination

149. During protocol completion for range ambiguity, which finding should the sonographer identify?

A. reduce image depth only on the current vascular laboratory examination
B. recognize echoes assigned to an incorrect depth at high PRF
C. increase persistence without review on the current vascular laboratory examination
D. assume every echo depth is exact on this examination

150. During protocol completion for wall filter, which finding should the sonographer identify?

A. set low enough to preserve slow flow without excessive clutter
B. use it to change insonation angle
C. set maximum for every venous exam
D. remove all motion information

151. During protocol completion for twinkle or flash artifact, which finding should the sonographer identify?

A. accept all color as blood flow
B. distinguish motion-related color from true intraluminal flow
C. turn off grayscale imaging

D. diagnose occlusion from color alone

152. During protocol completion for Doppler angle, which finding should the sonographer identify?

A. align the cursor across the vessel wall on the current vascular laboratory examination
B. ignore the flow direction under standard testing conditions in the current vascular laboratory
C. set every vessel to 90 degrees during the current vascular laboratory examination
D. keep the correction cursor aligned with flow and at 60 degrees or less

153. During protocol completion for quality assurance trend, which finding should the sonographer identify?

A. compare unrelated exam types only
B. discard all prior measurements
C. track standardized measurements and investigate systematic drift
D. change protocols every day

154. During protocol completion for color aliasing, which finding should the sonographer identify?

A. increase the color scale or pulse-repetition frequency
B. increase color gain until noise fills the box
C. decrease wall filter to zero always
D. increase transmit frequency only

155. During protocol completion for sample volume, which finding should the sonographer identify?

A. place it within the lumen and size it for the measurement goal
B. include every adjacent vessel in the vessel being evaluated during this examination
C. use maximum width for all stenoses on the current vascular laboratory examination
D. place it outside the vessel during the current vascular laboratory examination

156. During protocol completion for cross-talk artifact, which finding should the sonographer identify?

A. change patient identity
B. reduce excessive spectral gain
C. increase gain further
D. raise wall filter to maximum

157. A vascular sonographer reviews a study involving prior study review. Which observation is the best interpretation?

A. ignore all earlier images
B. compare unrelated vessels only
C. compare relevant findings using the same landmarks and criteria
D. change measurement conventions silently

158. A vascular sonographer reviews a study involving preliminary findings. Which observation is the best interpretation?

A. withhold urgent abnormalities
B. discuss another patient's results
C. provide an independent final diagnosis
D. communicate within scope and according to laboratory policy

159. A vascular sonographer reviews a study involving pain during compression. Which observation is the best interpretation?

A. ignore the patient's response
B. apply unlimited force
C. stop documenting limitations
D. modify technique while obtaining the safest diagnostic information

160. A vascular sonographer reviews a study involving archiving check. Which observation is the best interpretation?

A. assume transfer succeeded in the vessel being evaluated during this examination
B. verify that required images and measurements reached the correct patient record
C. store under a temporary identity on the current vascular laboratory examination
D. delete measurements after scanning during the current vascular laboratory examination

161. A vascular sonographer reviews a study involving critical finding communication. Which observation is the best interpretation?

A. follow the facility's urgent notification and read-back policy
B. tell only another patient
C. omit time and recipient documentation
D. wait for the routine final report

162. A vascular sonographer reviews a study involving patient history. Which observation is the best interpretation?

A. use the referral label alone on the current vascular laboratory examination
B. record age only in the vessel being evaluated during this examination
C. connect symptoms, laterality, onset, interventions, and risk factors to the protocol
D. avoid asking about procedures during the current vascular laboratory examination

163. A vascular sonographer reviews a study involving infection precautions. Which observation is the best interpretation?

A. apply standard precautions and additional measures indicated by risk
B. reuse contaminated materials on the current vascular laboratory examination
C. omit hand hygiene on the current vascular laboratory examination
D. assume vascular patients are noninfectious on this examination

164. A vascular sonographer reviews a study involving fasting abdominal vascular study. Which observation is the best interpretation?

A. provide food immediately before scanning
B. confirm preparation and document when fasting was not possible
C. omit preparation from the record
D. cancel every nonfasting study automatically

165. A vascular sonographer reviews a study involving professional communication. Which observation is the best interpretation?

A. discuss confidential cases publicly
B. guarantee a normal result
C. use unexplained technical jargon only
D. explain the examination clearly without promising a diagnosis

166. A vascular sonographer reviews a study involving technical limitation. Which observation is the best interpretation?

A. silently omit the vessel
B. invent a normal result
C. document the limitation and its effect on the examination
D. delete all obtained images

167. A vascular sonographer reviews a study involving image labeling. Which observation is the best interpretation?

A. label every image as normal
B. include vessel, side, orientation, and relevant measurement information
C. omit laterality from paired anatomy
D. use unlabeled screenshots

168. A vascular sonographer reviews a study involving fall-risk patient. Which observation is the best interpretation?

A. rush the transfer without help
B. leave the patient standing alone
C. disable safety devices
D. adapt transfers and positioning using appropriate assistance

169. A vascular sonographer reviews a study involving unexpected incidental finding. Which observation is the best interpretation?

A. erase the image
B. make a definitive diagnosis outside scope
C. document it and follow the laboratory's communication pathway
D. ignore all nonvascular anatomy

170. A vascular sonographer reviews a study involving patient identification. Which observation is the best interpretation?

A. use two approved identifiers before the examination
B. ask only a family member
C. identify by diagnosis alone
D. use room number alone

Practice Exam 24: Answer Key and Explanations

1. C — A normal vertebral artery carries blood cranially toward the basilar circulation. Direction is judged relative to the transducer and compared with the adjacent carotid vessels, not by color alone. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

2. D — Before eating, the bowel vascular bed has relatively high resistance, producing a sharp systolic peak and little diastolic flow in the SMA. Postprandial demand lowers resistance. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

3. A — With the patient examined from behind the knee, the popliteal vein commonly lies closer to the transducer than the popliteal artery, though position may vary. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

4. D — The common carotid supplies both the low-resistance internal carotid bed and the higher-resistance external carotid bed, so its normal spectrum is intermediate but retains forward diastolic flow. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

5. B — Normal portal venous flow is hepatopetal, carrying blood from the gastrointestinal tract and spleen toward hepatic sinusoids. Spectral flow is normally continuous with mild respiratory variation. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

6. C — Normal veins are thin walled and should collapse completely under adequate transducer pressure. Failure to compress is the principal direct ultrasound sign suggesting venous thrombus. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

7. A — The normal abdominal aorta demonstrates a strongly pulsatile, relatively high-resistance waveform when fasting. Branch flow demands and reflected waves shape the brief diastolic components. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

8. C — The internal carotid supplies the brain, a continuously perfused low-resistance vascular bed. Its spectral waveform therefore shows brisk systolic flow and sustained forward flow throughout diastole. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

9. D — The celiac axis supplies the liver and spleen, organs with relatively low vascular resistance. Even while fasting, the normal celiac waveform maintains appreciable forward diastolic flow. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct

vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

10. B — The great saphenous vein travels in a characteristic fascial compartment between superficial and muscular fascia. Recognizing the saphenous eye helps distinguish it from tributaries. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

11. B — The posterior tibial artery is accessible behind the medial malleolus. This predictable landmark is commonly used for Doppler pressures and pedal pulse assessment. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

12. A — Hepatic veins communicate closely with the right atrium, so normal pressure changes during the cardiac cycle create a multiphasic venous waveform. Respiration also influences venous return. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

13. D — At rest, a healthy peripheral muscular artery usually has a multiphasic waveform: rapid systolic acceleration, brief early diastolic reversal, and sometimes late forward flow due to elastic recoil. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

14. C — The brachial artery normally divides near the antecubital fossa into the radial and ulnar arteries. The bifurcation level can vary, including a high origin. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

15. A — Gentle tapping over a superficial temporal artery transmits small oscillations through the external carotid system. The maneuver helps distinguish the ECA from the ICA when anatomy is difficult. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

16. D — Normal kidneys receive blood throughout the cardiac cycle. The renal artery is therefore a low-resistance artery with forward diastolic flow, reflecting continuous parenchymal perfusion. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

17. C — Distal compression propels venous blood toward the heart, producing a short surge of antegrade flow. A weak or absent response can indicate obstruction between the compression site and

sample location. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one

18. B — The middle cerebral artery is commonly evaluated through the transtemporal window. Depth, direction, and neighboring vessel responses help confirm identification rather than color alone. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

19. B — A normal vertebral artery carries blood cranially toward the basilar circulation. Direction is judged relative to the transducer and compared with the adjacent carotid vessels, not by color alone. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

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36. D — The middle cerebral artery is commonly evaluated through the transtemporal window. Depth, direction, and neighboring vessel responses help confirm identification rather than color alone. This differentiates normal anatomy and hemodynamics from venous patterns, artifacts, and disease. Correct vessel identification should combine location, waveform, direction, and physiologic response rather than relying on one feature.

37. C — A hemodynamically important stenosis narrows the lumen, accelerating blood locally. Disturbed flow and spectral broadening commonly appear within and just beyond the lesion. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

38. B — Opposing inflow and outflow within a pseudoaneurysm sac commonly create the yin-yang color pattern. This supports, but does not replace, neck waveform confirmation. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

39. D — A severe proximal renal arterial stenosis attenuates and delays the systolic pressure wave reaching intrarenal branches, creating a tardus-parvus pattern. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

40. C — Anterior nutcracker anatomy involves compression of the left renal vein between the superior mesenteric artery and aorta, potentially causing venous hypertension and collateralization. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation.

Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

41. A — Popliteal aneurysms can thrombose or embolize to tibial vessels, threatening limb perfusion. Duplex documents diameter, patent lumen, mural thrombus, and distal flow. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

42. B — Chronic thrombus becomes more echogenic, retracts, and may leave wall thickening, synechiae, recanalized channels, and an incompletely compressible irregular lumen. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

43. D — A proximal subclavian obstruction lowers pressure beyond the lesion and may draw blood retrograde down the ipsilateral vertebral artery to supply the arm. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

44. A — A dissection creates a second flow channel when blood enters through an intimal tear. A mobile or fixed flap separating lumens is the central sonographic feature. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

45. C — Budd-Chiari syndrome results from obstruction of hepatic venous outflow. Abnormal or absent hepatic vein flow, thrombosis, collaterals, and caudate lobe changes may be present. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

46. B — Venous thoracic outlet pathology affects the axillosubclavian vein, producing thrombosis, collateral veins, loss of phasicity, or positional flow limitation. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies. Clinical correlation and laboratory protocol remain essential for final

47. C — A significant upstream arterial lesion reduces pulsatility and delays systolic acceleration downstream. Waveforms become damped and monophasic as energy is lost across the obstruction. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

48. B — Near occlusion can reduce flow rather than create the highest velocity because the residual lumen is extremely small. Distal ICA collapse or caliber reduction is an important clue. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

49. A — An abnormal artery-to-vein connection lowers downstream resistance, increases arterial diastolic flow, and transmits pulsatility and turbulence into the draining vein. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

50. D — Mesenteric stenosis commonly produces focal spectral acceleration and turbulence. Examination is typically performed fasting to limit bowel gas and standardize expected resistance. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

51. B — Popliteal artery entrapment may produce positional arterial narrowing or occlusion in young patients. Provocative maneuvers and comparison with symptoms help reveal dynamic compression. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

52. C — A Baker cyst is a synovial fluid collection typically found between the semimembranosus and medial gastrocnemius tendons. Lack of internal flow helps distinguish it from vascular lesions. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

53. D — Reflux is pathologic retrograde venous flow elicited by an accepted maneuver such as distal compression-release or Valsalva. Duration must be measured using the laboratory's validated criteria. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

54. A — Blood enters a pseudoaneurysm during systole and returns toward the parent artery during diastole, producing the characteristic to-and-fro waveform in the communicating neck. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

55. B — A renal artery narrowing produces localized acceleration and downstream disturbed flow. Indirect intrarenal tardus-parvus changes may support a proximal hemodynamically important lesion. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation.

Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

56. C — May-Thurner anatomy describes compression of the left common iliac vein between the crossing right common iliac artery and the spine, predisposing to left-sided venous obstruction. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

57. D — Fibromuscular dysplasia is nonatherosclerotic and commonly affects mid-to-distal renal arteries. Angiography may show a string-of-beads pattern; duplex may detect turbulence and velocity shifts. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

58. D — Acute thrombus often distends the vein and may appear hypoechoic. The decisive direct finding is failure of the venous walls to coapt during compression. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

59. A — Occlusion requires demonstrating lumen-filling material and absence of flow despite appropriate low-flow settings, multiple planes, and power or color Doppler optimization. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

60. C — Aneurysm assessment requires maximum orthogonal diameter using a consistent outer-wall convention. Longitudinal and transverse imaging reduce errors from tortuosity or oblique measurement. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

61. B — Elevated portal resistance may slow portal flow, cause hepatofugal direction, and open portosystemic collateral pathways. Findings must be integrated with hepatic morphology and clinical data. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

62. A — Arterial thoracic outlet testing evaluates positional changes in subclavian or axillary flow. A change must be interpreted with symptoms because asymptomatic compression can occur. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

63. A — A carotid body tumor arises at the bifurcation and characteristically splays the internal and external carotid arteries. Color Doppler often shows prominent vascularity. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

64. C — A hemodynamically important stenosis narrows the lumen, accelerating blood locally. Disturbed flow and spectral broadening commonly appear within and just beyond the lesion. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

65. D — Opposing inflow and outflow within a pseudoaneurysm sac commonly create the yin-yang color pattern. This supports, but does not replace, neck waveform confirmation. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

66. B — A severe proximal renal arterial stenosis attenuates and delays the systolic pressure wave reaching intrarenal branches, creating a tardus-parvus pattern. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

67. C — Anterior nutcracker anatomy involves compression of the left renal vein between the superior mesenteric artery and aorta, potentially causing venous hypertension and collateralization. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

68. B — Popliteal aneurysms can thrombose or embolize to tibial vessels, threatening limb perfusion. Duplex documents diameter, patent lumen, mural thrombus, and distal flow. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

69. D — Chronic thrombus becomes more echogenic, retracts, and may leave wall thickening, synechiae, recanalized channels, and an incompletely compressible irregular lumen. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

70. A — A proximal subclavian obstruction lowers pressure beyond the lesion and may draw blood retrograde down the ipsilateral vertebral artery to supply the arm. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine

grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

71. A — A dissection creates a second flow channel when blood enters through an intimal tear. A mobile or fixed flap separating lumens is the central sonographic feature. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

72. D — Budd-Chiari syndrome results from obstruction of hepatic venous outflow. Abnormal or absent hepatic vein flow, thrombosis, collaterals, and caudate lobe changes may be present. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

73. B — Venous thoracic outlet pathology affects the axillosubclavian vein, producing thrombosis, collateral veins, loss of phasicity, or positional flow limitation. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies. Clinical correlation and laboratory protocol remain essential for final

74. C — A significant upstream arterial lesion reduces pulsatility and delays systolic acceleration downstream. Waveforms become damped and monophasic as energy is lost across the obstruction. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

75. D — Near occlusion can reduce flow rather than create the highest velocity because the residual lumen is extremely small. Distal ICA collapse or caliber reduction is an important clue. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

76. A — An abnormal artery-to-vein connection lowers downstream resistance, increases arterial diastolic flow, and transmits pulsatility and turbulence into the draining vein. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

77. C — Mesenteric stenosis commonly produces focal spectral acceleration and turbulence. Examination is typically performed fasting to limit bowel gas and standardize expected resistance. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

78. B — Popliteal artery entrapment may produce positional arterial narrowing or occlusion in young patients. Provocative maneuvers and comparison with symptoms help reveal dynamic compression. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

79. B — A Baker cyst is a synovial fluid collection typically found between the semimembranosus and medial gastrocnemius tendons. Lack of internal flow helps distinguish it from vascular lesions. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

80. C — Reflux is pathologic retrograde venous flow elicited by an accepted maneuver such as distal compression-release or Valsalva. Duration must be measured using the laboratory's validated criteria. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

81. D — Blood enters a pseudoaneurysm during systole and returns toward the parent artery during diastole, producing the characteristic to-and-fro waveform in the communicating neck. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

82. A — A renal artery narrowing produces localized acceleration and downstream disturbed flow. Indirect intrarenal tardus-parvus changes may support a proximal hemodynamically important lesion. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

83. A — May-Thurner anatomy describes compression of the left common iliac vein between the crossing right common iliac artery and the spine, predisposing to left-sided venous obstruction. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

84. B — Fibromuscular dysplasia is nonatherosclerotic and commonly affects mid-to-distal renal arteries. Angiography may show a string-of-beads pattern; duplex may detect turbulence and velocity shifts. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

85. C — Acute thrombus often distends the vein and may appear hypoechoic. The decisive direct finding is failure of the venous walls to coapt during compression. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine

grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

86. D — Occlusion requires demonstrating lumen-filling material and absence of flow despite appropriate low-flow settings, multiple planes, and power or color Doppler optimization. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

87. B — Aneurysm assessment requires maximum orthogonal diameter using a consistent outer-wall convention. Longitudinal and transverse imaging reduce errors from tortuosity or oblique measurement. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

88. A — Elevated portal resistance may slow portal flow, cause hepatofugal direction, and open portosystemic collateral pathways. Findings must be integrated with hepatic morphology and clinical data. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

89. D — Arterial thoracic outlet testing evaluates positional changes in subclavian or axillary flow. A change must be interpreted with symptoms because asymptomatic compression can occur. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

90. C — A carotid body tumor arises at the bifurcation and characteristically splays the internal and external carotid arteries. Color Doppler often shows prominent vascularity. The competing choices describe normal physiology, another vascular bed, or a nonspecific observation. Diagnosis should combine grayscale, color, spectral findings, symptoms, and comparison with the contralateral side or prior studies.

91. C — An endoleak is continued perfusion of the excluded aneurysm sac. Duplex uses grayscale, color, and spectral Doppler to identify and characterize flow around the endograft. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

92. B — Carotid stents alter vessel compliance and may raise baseline velocities. Laboratories should use validated stent-specific criteria and compare with prior studies rather than blindly applying native-vessel thresholds. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated

93. A — Access dysfunction can arise from inflow, anastomotic, conduit, or outflow disease. Duplex findings should be correlated with access flow, cannulation problems, pressures, and dialysis performance. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

94. D — Access stenosis produces focal acceleration, aliasing, and downstream turbulence. Interpretation also considers access flow and the location relative to inflow, anastomosis, and outflow. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

95. A — After endarterectomy, duplex evaluates the reconstructed carotid lumen, residual plaque, intimal flap, restenosis, and distal flow using postoperative criteria appropriate to the laboratory. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

96. C — Transplant evaluation includes the renal artery from its iliac inflow through the anastomosis and intrarenal branches, plus venous outflow and parenchymal perfusion. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

97. B — Dialysis fistula usability depends on more than patency. Duplex assesses access flow, vein diameter and depth, stenosis, branches, and an adequate cannulation segment. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

98. D — TIPS surveillance examines the portal vein, shunt segments, and hepatic venous outflow. Velocity changes, absent flow, or directional abnormalities can suggest dysfunction. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

99. B — Post-ablation duplex documents the treated segment and checks the adjacent deep system for thrombus extension. The examination should follow the facility's timing and reporting protocol. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

100. A — A complete bypass evaluation follows the entire reconstructed circuit. Inflow disease, graft stenosis, anastomotic lesions, and outflow disease can each threaten patency. Postoperative anatomy changes expected velocities and landmarks, so the operative report and validated laboratory criteria

matter. A complete circuit assessment is safer than judging patency from a single image or isolated velocity.

101. D — Exercise increases lower-extremity flow demand. A stenosis that appears compensated at rest may cause a postexercise pressure decrease and delayed recovery, revealing functional limitation. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

102. C — Venous PPG records skin blood-volume changes as exercise empties the calf and veins refill. Abnormally rapid refill may indicate reflux, with tourniquets helping localize superficial contribution. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

103. B — Reactive hyperemia follows temporary arterial occlusion and causes transient vasodilation and increased flow demand. It can expose hemodynamically important disease when exercise is not feasible. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

104. C — A significant pressure drop between adjacent segments helps localize hemodynamically important arterial disease. Results should be interpreted with waveforms, cuff fit, and clinical context. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

105. A — Photoplethysmography uses emitted and reflected infrared light to detect small changes in cutaneous blood volume. It supports digital pressure and venous refill assessments. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

106. D — The toe-brachial index parallels ABI methodology but uses digital systolic pressure as the numerator. It is particularly helpful when ankle arteries are noncompressible. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

107. D — Medial arterial calcification can prevent cuff compression and create an artificially elevated ABI. Toe vessels are often more compressible, so toe pressures and waveforms provide useful alternatives. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

108. C — Pulse volume recordings detect changes in limb volume produced by arterial inflow. Waveform contour and amplitude help localize disease and are less affected by arterial calcification than

cuff pressures. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique

109. B — A cuff that is too narrow can overestimate systolic pressure, while an excessively wide cuff can distort results. Correct cuff sizing is essential for reliable segmental pressures. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

110. A — The ankle-brachial index compares ankle systolic pressure with the higher of the two brachial pressures, reducing error from unilateral upper-extremity disease. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

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114. A — A significant pressure drop between adjacent segments helps localize hemodynamically important arterial disease. Results should be interpreted with waveforms, cuff fit, and clinical context. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

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120. B — The ankle-brachial index compares ankle systolic pressure with the higher of the two brachial pressures, reducing error from unilateral upper-extremity disease. Pressure values must be correlated with waveform contour, cuff size, symptoms, and exercise response. A single number can mislead when arteries are calcified, upper-extremity disease is present, or technique is inconsistent.

121. D — A procedural timeout prevents wrong-patient, wrong-site, and wrong-procedure events. The team verifies identity, planned intervention, laterality, consent, allergies, and required resources. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

122. C — Bleeding and thrombosis risks depend partly on anticoagulants, antiplatelet agents, laboratory results, and the planned procedure. The care team determines appropriate management. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

123. A — Ultrasound-guided compression aims to stop flow through the pseudoaneurysm neck while preserving native arterial patency. Repeated imaging evaluates success and distal perfusion. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

124. C — Intraoperative duplex can identify residual stenosis, flap, thrombus, or poor flow before the operation ends, allowing the surgeon to revise a correctable defect. Real-time imaging, sterile technique,

patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

125. B — Complete procedural documentation establishes baseline anatomy, records guidance and device position, and demonstrates the immediate result or complication. Images require accurate labels and laterality. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

126. D — A sterile probe cover and sterile gel preserve the procedural field during percutaneous guidance. Standard precautions and facility infection-control policies remain necessary. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

127. B — Tumescent fluid compresses the treated vein, improves catheter-wall contact, provides local anesthesia, and insulates surrounding structures from thermal injury. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans. Clinical correlation and laboratory protocol remain essential for final interpretation

128. D — During venous ablation, ultrasound identifies the target vein, guides access and catheter position, supports tumescent anesthesia placement, and monitors adjacent deep veins. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

129. C — Continuous tip visualization helps the operator enter the intended vessel while avoiding posterior-wall puncture and nearby structures. Needle orientation and probe alignment are adjusted together. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

130. A — Real-time ultrasound guidance confirms needle position within the pseudoaneurysm sac while avoiding the neck and parent artery. Flow is monitored during treatment for thrombosis and complications. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

131. C — After thrombin treatment, ultrasound should document cessation of pseudoaneurysm flow while confirming patency of the native artery and evaluating distal perfusion. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer

supports the authorized operator and documents required views without independently changing medication or treatment plans.

132. D — A focused post-access examination looks for common vascular complications at and beyond the puncture site. Grayscale, color, and spectral Doppler findings are integrated. Real-time imaging, sterile technique, patient monitoring, and immediate reassessment reduce procedural risk. The sonographer supports the authorized operator and documents required views without independently changing medication or treatment plans.

133. B — Optimizing color gain just below the noise threshold improves sensitivity without creating false color outside the vessel. Gain should be reassessed when depth or scale changes. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

134. A — Mirror artifact occurs when sound follows an indirect path involving a strong reflector, creating a duplicated structure at an incorrect location. Changing the acoustic window can clarify it. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains

135. D — Pulsed-wave spectral aliasing reflects sampling above the Nyquist limit. Increasing PRF, shifting baseline, lowering transmit frequency, or using continuous-wave Doppler when available can help. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

136. A — Diagnostic ultrasound safety follows prudent output and exposure principles. The operator monitors thermal and mechanical indices and adjusts power, time, and mode appropriately. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

137. C — When pulses are emitted before earlier echoes return, the system may assign a returning echo to the wrong pulse and therefore the wrong depth. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

138. B — The wall filter suppresses low-frequency Doppler shifts from tissue motion. A filter set too high can erase true slow venous or end-diastolic flow. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

139. A — Probe or tissue motion can create bursts of color unrelated to blood flow. Correlation with grayscale anatomy, spectral Doppler, and repeated imaging prevents misinterpretation. The adjustment

should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

140. C — Velocity calculation depends strongly on the cosine of the insonation angle. Small cursor errors become magnified at high angles, so consistent alignment and angles at or below 60 degrees improve reproducibility. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations

141. B — A quality assurance program uses consistent tests, documentation, and corrective action. Trending results can reveal gradual equipment degradation or operator variability before clinical quality is affected. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

142. D — Color aliasing occurs when Doppler shift exceeds the Nyquist limit. Raising scale or PRF reduces aliasing, although true high velocity should still be documented spectrally. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

143. C — Sample-volume position and size affect the recorded velocity distribution. Center-stream sampling supports reproducible measurements, while broader gates may demonstrate disturbed flow. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

144. D — Spectral cross-talk mirrors the waveform across the baseline, often because gain is excessive or the insonation geometry is nearly perpendicular. Gain reduction usually helps. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

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153. C — A quality assurance program uses consistent tests, documentation, and corrective action. Trending results can reveal gradual equipment degradation or operator variability before clinical quality is affected. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

154. A — Color aliasing occurs when Doppler shift exceeds the Nyquist limit. Raising scale or PRF reduces aliasing, although true high velocity should still be documented spectrally. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

155. A — Sample-volume position and size affect the recorded velocity distribution. Center-stream sampling supports reproducible measurements, while broader gates may demonstrate disturbed flow. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

156. B — Spectral cross-talk mirrors the waveform across the baseline, often because gain is excessive or the insonation geometry is nearly perpendicular. Gain reduction usually helps. The adjustment should improve signal quality without creating false flow or erasing clinically important information. Recheck the result in grayscale, color, and spectral modes and document limitations when optimization remains inadequate.

157. C — Reviewing prior studies helps identify true interval change, guides targeted imaging, and reveals prior technical limitations. Comparisons require consistent anatomy, technique, and diagnostic criteria. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

158. D — The sonographer documents technical observations and communicates findings according to credentialing, supervision, and facility policy. Final interpretation remains with the authorized interpreting clinician. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

159. D — Compression is important in venous testing, but severe pain, surgery, wounds, or suspected injury may require modified pressure or alternative views. Limitations must be documented. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

160. B — Before completing the examination, the sonographer confirms images, cine clips, measurements, labels, and worksheets are linked to the correct patient and available for interpretation. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

161. A — Critical findings require prompt communication through the established escalation pathway. Documentation should include the finding, recipient, date and time, and confirmation or read-back when required. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

162. C — A focused vascular history clarifies the clinical question and may require protocol modification. Symptoms, timing, laterality, surgery, medication, and relevant risk factors guide the examination. This approach protects patient safety, preserves an auditable record, and supports accurate

interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

163. A — Standard precautions apply to every patient. Hand hygiene, equipment cleaning, gloves, and additional transmission-based precautions protect patients and staff and follow facility policy. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

164. B — Fasting commonly reduces bowel gas and standardizes mesenteric hemodynamics. Urgent circumstances may prevent preparation, so the sonographer adapts technique and records the limitation. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

165. D — Clear, respectful explanations improve cooperation and reduce anxiety. The sonographer describes what the patient will experience while avoiding unauthorized interpretation or promises about results. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

166. C — Body habitus, wounds, pain, dressings, bowel gas, or inability to position may limit a study. Transparent documentation tells the interpreting clinician what was and was not evaluated. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

167. B — Accurate labels allow the interpreter to reconstruct the examination and compare serial studies. Incorrect laterality or anatomy can create serious diagnostic and treatment errors. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

168. D — Patient condition determines safe positioning and transfer methods. Assistance, rails, brakes, gait devices, and monitoring should be used according to assessed risk and facility policy. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

169. C — Vascular examinations may reveal masses, cysts, or other incidental abnormalities. Appropriate images and communication allow the interpreting clinician to determine significance and recommend follow-up. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.

170. A — Two approved identifiers reduce wrong-patient errors. Room location is not an identifier. Identity confirmation should precede imaging, documentation, medication-related review, and any invasive participation. This approach protects patient safety, preserves an auditable record, and supports accurate interpretation. The alternatives create identification, privacy, scope-of-practice, or communication failures that can directly affect care.