PRACTICE EXAM 22: VASCULAR TECHNOLOGY SIMULATION (170 QUESTIONS)

This practice examination contains 170 questions. Allow approximately three hours. Select the single best answer for each question. The official ARDMS VT examination uses a scaled score from 300 to 700, with 555 required to pass; this practice score is not an official scaled score.

1. During protocol review for normal lower-extremity venous Doppler, which conclusion is best supported by the available data?

A. triphasic arterial pulsatility
B. respiratory phasicity and augmentation
C. continuous high-velocity systolic flow
D. persistent reflux after release

2. During protocol review for small saphenous vein course, which conclusion is best supported by the available data?

A. anterior thigh toward the femoral vein
B. medial thigh toward the common femoral artery
C. deep calf beside the anterior tibial artery
D. posterior calf toward the popliteal region

3. During protocol review for normal external carotid artery waveform, which conclusion is best supported by the available data?

A. marked continuous diastolic flow like the ICA
B. respiratory phasicity without pulsatility
C. reversed systolic flow at baseline

D. relatively high resistance with brisk systolic upstroke

4. During protocol review for renal artery resistance, which conclusion is best supported by the available data?

A. high-resistance waveform with absent diastolic flow
B. venous respiratory phasicity
C. low-resistance waveform with continuous diastolic flow
D. bidirectional systolic flow

5. During protocol review for common femoral artery branches, which conclusion is best supported by the available data?

A. superficial femoral and profunda femoris arteries
B. radial and ulnar arteries
C. anterior and posterior tibial arteries
D. internal and external carotid arteries

6. During protocol review for normal lower-extremity artery at rest, which conclusion is best supported by the available data?

A. continuous monophasic low-resistance waveform
B. triphasic high-resistance waveform
C. nonphasic venous waveform
D. to-and-fro pseudoaneurysm waveform

7. During protocol review for great saphenous vein location, which conclusion is best supported by the available data?

A. deep to the femoral artery throughout the thigh
B. within the saphenous compartment along the medial limb

C. lateral to the fibula within muscle
D. inside the popliteal artery sheath

8. During protocol review for normal common carotid artery spectral waveform, which conclusion is best supported by the available data?

A. high-resistance flow with absent diastolic velocity
B. continuous nonphasic venous flow
C. low-resistance flow with persistent forward diastolic velocity
D. bidirectional flow throughout systole

9. During protocol review for hepatic vein waveform, which conclusion is best supported by the available data?

A. multiphasic flow influenced by the cardiac cycle
B. triphasic high-resistance arterial flow
C. continuous flow without cardiac variation
D. to-and-fro flow at a neck

10. During protocol review for brachial artery bifurcation, which conclusion is best supported by the available data?

A. axillary and subclavian arteries
B. anterior and posterior tibial arteries
C. common and profunda femoral arteries
D. radial and ulnar arteries

11. During protocol review for vertebral artery flow direction, which conclusion is best supported by the available data?

A. retrograde toward the arm

B. bidirectional with every heartbeat
C. antegrade toward the brain
D. absent during diastole

12. During protocol review for superior mesenteric artery fasting waveform, which conclusion is best supported by the available data?

A. high-resistance pattern with limited diastolic flow
B. low-resistance pattern identical to the renal artery
C. continuous nonpulsatile flow
D. retrograde flow throughout systole

13. During protocol review for aortic bifurcation, which conclusion is best supported by the available data?

A. right and left renal arteries
B. right and left common iliac arteries
C. superior and inferior mesenteric arteries
D. common femoral and profunda arteries

14. During protocol review for portal vein flow direction, which conclusion is best supported by the available data?

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

15. During protocol review for common femoral vein landmark, which conclusion is best supported by the available data?

A. lateral to the common femoral artery near the groin

B. medial to the common femoral artery near the groin

C. posterior to the profunda femoris artery only

D. inside the femoral artery wall in the stated examination setting

16. During protocol review for normal internal carotid artery waveform, which conclusion is best supported by the available data?

A. high resistance with little diastolic flow

B. venous phasicity with augmentation

C. to-and-fro flow at the origin

D. low resistance with substantial forward diastolic flow

17. During protocol review for celiac artery fasting waveform, which conclusion is best supported by the available data?

A. low-resistance pattern with forward diastolic flow

B. high-resistance pattern with minimal diastolic flow

C. continuous venous waveform

D. reversed systolic flow

18. During protocol review for popliteal artery branches, which conclusion is best supported by the available data?

A. radial artery and ulnar artery

B. celiac artery and superior mesenteric artery

C. anterior tibial artery and tibioperoneal trunk

D. internal carotid and external carotid arteries

19. A follow-up examination focuses on normal lower-extremity venous Doppler. Which observation deserves the correct interpretation?

A. triphasic arterial pulsatility
B. continuous high-velocity systolic flow
C. respiratory phasicity and augmentation
D. persistent reflux after release

20. A follow-up examination focuses on small saphenous vein course. Which observation deserves the correct interpretation?

A. anterior thigh toward the femoral vein
B. medial thigh toward the common femoral artery
C. deep calf beside the anterior tibial artery
D. posterior calf toward the popliteal region

21. A follow-up examination focuses on normal external carotid artery waveform. Which observation deserves the correct interpretation?

A. relatively high resistance with brisk systolic upstroke
B. marked continuous diastolic flow like the ICA
C. respiratory phasicity without pulsatility
D. reversed systolic flow at baseline

22. A follow-up examination focuses on renal artery resistance. Which observation deserves the correct interpretation?

A. high-resistance waveform with absent diastolic flow
B. low-resistance waveform with continuous diastolic flow
C. venous respiratory phasicity
D. bidirectional systolic flow

23. A follow-up examination focuses on common femoral artery branches. Which observation deserves the correct interpretation?

A. superficial femoral and profunda femoris arteries
B. radial and ulnar arteries
C. anterior and posterior tibial arteries
D. internal and external carotid arteries

24. A follow-up examination focuses on normal lower-extremity artery at rest. Which observation deserves the correct interpretation?

A. continuous monophasic low-resistance waveform
B. nonphasic venous waveform
C. to-and-fro pseudoaneurysm waveform
D. triphasic high-resistance waveform

25. A follow-up examination focuses on great saphenous vein location. Which observation deserves the correct interpretation?

A. deep to the femoral artery throughout the thigh
B. within the saphenous compartment along the medial limb
C. lateral to the fibula within muscle
D. inside the popliteal artery sheath

26. A follow-up examination focuses on normal common carotid artery spectral waveform. Which observation deserves the correct interpretation?

A. high-resistance flow with absent diastolic velocity
B. continuous nonphasic venous flow
C. low-resistance flow with persistent forward diastolic velocity
D. bidirectional flow throughout systole

27. A follow-up examination focuses on hepatic vein waveform. Which observation deserves the correct interpretation?

A. triphasic high-resistance arterial flow
B. continuous flow without cardiac variation
C. to-and-fro flow at a neck
D. multiphasic flow influenced by the cardiac cycle

28. A follow-up examination focuses on brachial artery bifurcation. Which observation deserves the correct interpretation?

A. radial and ulnar arteries
B. axillary and subclavian arteries
C. anterior and posterior tibial arteries
D. common and profunda femoral arteries

29. A follow-up examination focuses on vertebral artery flow direction. Which observation deserves the correct interpretation?

A. retrograde toward the arm
B. antegrade toward the brain
C. bidirectional with every heartbeat
D. absent during diastole

30. A follow-up examination focuses on superior mesenteric artery fasting waveform. Which observation deserves the correct interpretation?

A. low-resistance pattern identical to the renal artery
B. continuous nonpulsatile flow
C. high-resistance pattern with limited diastolic flow
D. retrograde flow throughout systole

31. A follow-up examination focuses on aortic bifurcation. Which observation deserves the correct interpretation?

A. right and left renal arteries
B. superior and inferior mesenteric arteries
C. right and left common iliac arteries
D. common femoral and profunda arteries

32. A follow-up examination focuses on portal vein flow direction. Which observation deserves the correct interpretation?

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

33. A follow-up examination focuses on common femoral vein landmark. Which observation deserves the correct interpretation?

A. medial to the common femoral artery near the groin
B. lateral to the common femoral artery near the groin
C. posterior to the profunda femoris artery only
D. inside the femoral artery wall in the stated examination setting

34. A follow-up examination focuses on normal internal carotid artery waveform. Which observation deserves the correct interpretation?

A. high resistance with little diastolic flow
B. low resistance with substantial forward diastolic flow
C. venous phasicity with augmentation
D. to-and-fro flow at the origin

35. A follow-up examination focuses on celiac artery fasting waveform. Which observation deserves the correct interpretation?

A. high-resistance pattern with minimal diastolic flow
B. low-resistance pattern with forward diastolic flow
C. continuous venous waveform
D. reversed systolic flow

36. A follow-up examination focuses on popliteal artery branches. Which observation deserves the correct interpretation?

A. radial artery and ulnar artery
B. celiac artery and superior mesenteric artery
C. anterior tibial artery and tibioperoneal trunk
D. internal carotid and external carotid arteries

37. During protocol review for arteriovenous fistula, which conclusion is best supported by the available data?

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

38. During protocol review for portal hypertension, which conclusion is best supported by the available data?

A. triphasic peripheral arterial flow in the stated examination setting
B. isolated high-resistance renal flow in the stated examination setting
C. normal hepatopetal flow without collaterals in the stated examination setting
D. dilated portal system with reduced or reversed portal flow and collaterals

39. During protocol review for renal artery stenosis consequence, which conclusion is best supported by the available data?

A. portal hypertension through splenic reflux
B. venous claudication through calf reflux
C. carotid bruit through jugular obstruction
D. renovascular hypertension through reduced renal perfusion

40. During protocol review for aortic dissection, which conclusion is best supported by the available data?

A. intimal flap separating true and false lumens
B. isolated echogenic plaque without a flap
C. venous valve leaflet in the IVC
D. normal aortic pulsatility in the stated examination setting

41. During protocol review for hemodynamically significant arterial stenosis, which conclusion is best supported by the available data?

A. uniform velocity decrease without focal disturbance
B. complete venous compressibility in the stated examination setting
C. focal velocity increase with turbulence and distal spectral broadening
D. normal respiratory phasicity in the stated examination setting

42. During protocol review for Budd-Chiari syndrome, which conclusion is best supported by the available data?

A. superior mesenteric arterial embolism
B. hepatic venous outflow obstruction
C. isolated carotid bifurcation plaque
D. lower-extremity superficial reflux

43. During protocol review for carotid body tumor, which conclusion is best supported by the available data?

A. avascular cyst compressing the jugular vein in the stated examination setting
B. hypervascular mass that splays the internal and external carotid arteries
C. thrombus confined to the common carotid lumen
D. plaque at the subclavian origin in the stated examination setting

44. During protocol review for acute deep venous thrombosis, which conclusion is best supported by the available data?

A. dilated noncompressible vein with hypoechoic thrombus
B. small compressible vein with echogenic walls
C. triphasic arterial waveform
D. normal augmentation and complete coaptation

45. During protocol review for arterial occlusion, which conclusion is best supported by the available data?

A. focal high velocity through a patent lumen
B. normal triphasic flow throughout
C. venous reflux after Valsalva
D. no detectable flow with collateral reconstitution distally

46. During protocol review for median arcuate ligament compression, which conclusion is best supported by the available data?

A. fixed renal vein occlusion unaffected by breathing
B. carotid stenosis relieved by arm exercise
C. elevated celiac velocity that may vary with respiration
D. femoral DVT with triphasic flow

47. During protocol review for Baker cyst, which conclusion is best supported by the available data?

A. arterial plaque at the femoral bifurcation in the stated examination setting

B. aneurysm of the carotid bulb in the stated examination setting

C. fluid collection in the popliteal fossa that may mimic DVT symptoms

D. thrombus in the portal vein in the stated examination setting

48. During protocol review for chronic deep venous thrombosis, which conclusion is best supported by the available data?

A. retracted vein with echogenic wall-adherent material and collaterals

B. dilated vein with free-floating hypoechoic clot

C. completely compressible vein without residual material

D. normal respiratory phasicity only in the stated examination setting

49. During protocol review for tardus-parvus waveform, which conclusion is best supported by the available data?

A. sharp upstroke with high pulsatility in the stated examination setting

B. delayed systolic upstroke and reduced amplitude distal to obstruction

C. to-and-fro flow in a pseudoaneurysm neck

D. normal venous phasicity in the stated examination setting

50. During protocol review for nutcracker phenomenon, which conclusion is best supported by the available data?

A. right renal artery compression behind the IVC

B. portal vein compression by the spleen

C. femoral vein compression by the profunda artery

D. left renal vein compression between the SMA and aorta

51. During protocol review for thoracic outlet arterial compression, which conclusion is best supported by the available data?

A. dynamic subclavian waveform change with provocative positioning
B. fixed portal reversal after eating
C. renal venous reflux with Valsalva
D. carotid plaque disappearance on inspiration

52. During protocol review for venous reflux, which conclusion is best supported by the available data?

A. brief forward augmentation after distal compression
B. reversed flow persisting beyond the accepted provocative interval
C. arterial triphasic flow at rest
D. complete venous compression in the stated examination setting

53. During protocol review for subclavian steal physiology, which conclusion is best supported by the available data?

A. carotid flow reversal caused by distal femoral disease
B. portal reversal caused by renal stenosis
C. vertebral flow reversal caused by proximal subclavian obstruction
D. venous reflux caused by carotid plaque

54. During protocol review for May-Thurner anatomy, which conclusion is best supported by the available data?

A. right renal vein compressed by the SMA in the stated examination setting
B. left carotid compressed by the jugular vein in the stated examination setting
C. popliteal artery compressed by the tibial vein in the stated examination setting
D. left common iliac vein compressed by the right common iliac artery

55. During protocol review for deep venous obstruction clue, which conclusion is best supported by the available data?

A. brisk augmentation after distal compression
B. complete compressibility at every level
C. normal valve closure in the stated examination setting
D. loss of respiratory phasicity in a peripheral vein

56. During protocol review for pseudoaneurysm neck, which conclusion is best supported by the available data?

A. to-and-fro spectral Doppler flow
B. continuous antegrade low-resistance flow
C. triphasic arterial flow without reversal
D. respiratory phasic venous flow

57. During protocol review for carotid plaque surface ulceration, which conclusion is best supported by the available data?

A. smooth intimal surface without color penetration
B. irregular crater extending into plaque with flow entering it
C. complete acoustic shadow without visible lumen
D. normal jugular venous valve in the stated examination setting

58. During protocol review for popliteal artery aneurysm complication, which conclusion is best supported by the available data?

A. isolated portal hypertension
B. carotid body tumor formation
C. mural thrombus with distal embolization
D. renal cortical infarction only

59. During protocol review for compartment syndrome perfusion, which conclusion is best supported by the available data?

A. clinical emergency despite potentially preserved large-artery signals
B. benign condition excluded by any Doppler signal
C. venous disorder diagnosed by reflux alone
D. carotid disorder diagnosed by bruit

60. During protocol review for pseudoaneurysm sac, which conclusion is best supported by the available data?

A. uniform absence of color in every setting
B. laminar single-color venous flow
C. yin-yang bidirectional color pattern
D. triphasic spectral tracing only

61. During protocol review for fibromuscular dysplasia, which conclusion is best supported by the available data?

A. isolated ostial plaque at the aortic origin
B. alternating stenosis and dilation in the mid-to-distal renal artery
C. uniform venous wall thickening in the stated examination setting
D. complete renal vein thrombosis in the stated examination setting

62. During protocol review for mesenteric ischemia after a meal, which conclusion is best supported by the available data?

A. arm claudication from vertebral reversal
B. leg edema from superficial reflux
C. headache from temporal arteritis
D. postprandial abdominal pain from inadequate flow reserve

63. During protocol review for aneurysm measurement, which conclusion is best supported by the available data?

A. inner lumen only along an oblique plane
B. color jet width parallel to flow in the stated examination setting
C. outer wall to outer wall perpendicular to the vessel axis
D. spectral envelope height in the stated examination setting

64. A follow-up examination focuses on arteriovenous fistula. Which observation deserves the correct interpretation?

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

65. A follow-up examination focuses on portal hypertension. Which observation deserves the correct interpretation?

A. triphasic peripheral arterial flow in the stated examination setting
B. dilated portal system with reduced or reversed portal flow and collaterals
C. isolated high-resistance renal flow in the stated examination setting
D. normal hepatopetal flow without collaterals in the stated examination setting

66. A follow-up examination focuses on renal artery stenosis consequence. Which observation deserves the correct interpretation?

A. portal hypertension through splenic reflux
B. venous claudication through calf reflux
C. carotid bruit through jugular obstruction
D. renovascular hypertension through reduced renal perfusion

67. A follow-up examination focuses on aortic dissection. Which observation deserves the correct interpretation?

A. isolated echogenic plaque without a flap
B. intimal flap separating true and false lumens
C. venous valve leaflet in the IVC
D. normal aortic pulsatility in the stated examination setting

68. A follow-up examination focuses on hemodynamically significant arterial stenosis. Which observation deserves the correct interpretation?

A. uniform velocity decrease without focal disturbance
B. complete venous compressibility in the stated examination setting
C. focal velocity increase with turbulence and distal spectral broadening
D. normal respiratory phasicity in the stated examination setting

69. A follow-up examination focuses on Budd-Chiari syndrome. Which observation deserves the correct interpretation?

A. superior mesenteric arterial embolism
B. isolated carotid bifurcation plaque
C. lower-extremity superficial reflux
D. hepatic venous outflow obstruction

70. A follow-up examination focuses on carotid body tumor. Which observation deserves the correct interpretation?

A. hypervascular mass that splays the internal and external carotid arteries
B. avascular cyst compressing the jugular vein in the stated examination setting
C. thrombus confined to the common carotid lumen
D. plaque at the subclavian origin in the stated examination setting

71. A follow-up examination focuses on acute deep venous thrombosis. Which observation deserves the correct interpretation?

A. dilated noncompressible vein with hypoechoic thrombus
B. small compressible vein with echogenic walls
C. triphasic arterial waveform
D. normal augmentation and complete coaptation

72. A follow-up examination focuses on arterial occlusion. Which observation deserves the correct interpretation?

A. focal high velocity through a patent lumen
B. normal triphasic flow throughout
C. no detectable flow with collateral reconstitution distally
D. venous reflux after Valsalva

73. A follow-up examination focuses on median arcuate ligament compression. Which observation deserves the correct interpretation?

A. fixed renal vein occlusion unaffected by breathing
B. carotid stenosis relieved by arm exercise
C. femoral DVT with triphasic flow
D. elevated celiac velocity that may vary with respiration

74. A follow-up examination focuses on Baker cyst. Which observation deserves the correct interpretation?

A. arterial plaque at the femoral bifurcation in the stated examination setting
B. fluid collection in the popliteal fossa that may mimic DVT symptoms
C. aneurysm of the carotid bulb in the stated examination setting
D. thrombus in the portal vein in the stated examination setting

75. A follow-up examination focuses on chronic deep venous thrombosis. Which observation deserves the correct interpretation?

A. dilated vein with free-floating hypoechoic clot
B. completely compressible vein without residual material
C. retracted vein with echogenic wall-adherent material and collaterals
D. normal respiratory phasicity only in the stated examination setting

76. A follow-up examination focuses on tardus-parvus waveform. Which observation deserves the correct interpretation?

A. sharp upstroke with high pulsatility in the stated examination setting
B. to-and-fro flow in a pseudoaneurysm neck
C. normal venous phasicity in the stated examination setting
D. delayed systolic upstroke and reduced amplitude distal to obstruction

77. A follow-up examination focuses on nutcracker phenomenon. Which observation deserves the correct interpretation?

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

78. A follow-up examination focuses on thoracic outlet arterial compression. Which observation deserves the correct interpretation?

A. fixed portal reversal after eating
B. dynamic subclavian waveform change with provocative positioning
C. renal venous reflux with Valsalva
D. carotid plaque disappearance on inspiration

79. A follow-up examination focuses on venous reflux. Which observation deserves the correct interpretation?

A. reversed flow persisting beyond the accepted provocative interval
B. brief forward augmentation after distal compression
C. arterial triphasic flow at rest
D. complete venous compression in the stated examination setting

80. A follow-up examination focuses on subclavian steal physiology. Which observation deserves the correct interpretation?

A. carotid flow reversal caused by distal femoral disease
B. vertebral flow reversal caused by proximal subclavian obstruction
C. portal reversal caused by renal stenosis
D. venous reflux caused by carotid plaque

81. A follow-up examination focuses on May-Thurner anatomy. Which observation deserves the correct interpretation?

A. right renal vein compressed by the SMA in the stated examination setting
B. left carotid compressed by the jugular vein in the stated examination setting
C. popliteal artery compressed by the tibial vein in the stated examination setting
D. left common iliac vein compressed by the right common iliac artery

82. A follow-up examination focuses on deep venous obstruction clue. Which observation deserves the correct interpretation?

A. brisk augmentation after distal compression
B. complete compressibility at every level
C. loss of respiratory phasicity in a peripheral vein
D. normal valve closure in the stated examination setting

83. A follow-up examination focuses on pseudoaneurysm neck. Which observation deserves the correct interpretation?

A. continuous antegrade low-resistance flow
B. to-and-fro spectral Doppler flow
C. triphasic arterial flow without reversal
D. respiratory phasic venous flow

84. A follow-up examination focuses on carotid plaque surface ulceration. Which observation deserves the correct interpretation?

A. smooth intimal surface without color penetration
B. complete acoustic shadow without visible lumen
C. normal jugular venous valve in the stated examination setting
D. irregular crater extending into plaque with flow entering it

85. A follow-up examination focuses on popliteal artery aneurysm complication. Which observation deserves the correct interpretation?

A. isolated portal hypertension
B. carotid body tumor formation
C. mural thrombus with distal embolization
D. renal cortical infarction only

86. A follow-up examination focuses on compartment syndrome perfusion. Which observation deserves the correct interpretation?

A. clinical emergency despite potentially preserved large-artery signals
B. benign condition excluded by any Doppler signal
C. venous disorder diagnosed by reflux alone
D. carotid disorder diagnosed by bruit

87. A follow-up examination focuses on pseudoaneurysm sac. Which observation deserves the correct interpretation?

A. uniform absence of color in every setting
B. laminar single-color venous flow
C. yin-yang bidirectional color pattern
D. triphasic spectral tracing only

88. A follow-up examination focuses on fibromuscular dysplasia. Which observation deserves the correct interpretation?

A. isolated ostial plaque at the aortic origin
B. uniform venous wall thickening in the stated examination setting
C. complete renal vein thrombosis in the stated examination setting
D. alternating stenosis and dilation in the mid-to-distal renal artery

89. A follow-up examination focuses on mesenteric ischemia after a meal. Which observation deserves the correct interpretation?

A. arm claudication from vertebral reversal
B. postprandial abdominal pain from inadequate flow reserve
C. leg edema from superficial reflux
D. headache from temporal arteritis

90. A follow-up examination focuses on aneurysm measurement. Which observation deserves the correct interpretation?

A. outer wall to outer wall perpendicular to the vessel axis
B. inner lumen only along an oblique plane
C. color jet width parallel to flow in the stated examination setting
D. spectral envelope height in the stated examination setting

91. During protocol review for renal transplant artery, which conclusion is best supported by the available data?

A. anastomosis and entire accessible artery with intrarenal waveforms
B. native carotid bifurcation only in the stated examination setting
C. portal vein without renal parenchyma
D. lower-extremity venous reflux only in the stated examination setting

92. During protocol review for bypass graft stenosis, which conclusion is best supported by the available data?

A. uniform velocities with normal contour
B. complete absence of a graft lumen
C. normal venous augmentation in the stated examination setting
D. focal velocity increase and abnormal velocity ratio

93. During protocol review for dialysis steal syndrome, which conclusion is best supported by the available data?

A. portal flow reversal from cirrhosis
B. reduced distal arterial perfusion related to access flow
C. carotid stenosis from plaque in the stated examination setting
D. deep venous reflux after ablation

94. During protocol review for venous ablation follow-up, which conclusion is best supported by the available data?

A. recanalization of every treated segment as normal in the stated examination setting
B. triphasic flow inside the treated vein in the stated examination setting
C. treated vein closure and absence of thrombus extension into deep veins
D. loss of deep venous compressibility as expected in the stated examination setting

95. During protocol review for EVAR endoleak, which conclusion is best supported by the available data?

A. normal flow confined to the graft lumen in the stated examination setting
B. venous flow in the inferior vena cava in the stated examination setting
C. persistent blood flow outside the graft but within the aneurysm sac
D. artifact removed by lowering gain in the stated examination setting

96. During protocol review for dialysis access inflow, which conclusion is best supported by the available data?

A. arterialized low-resistance waveform with increased volume flow
B. normal resting high-resistance waveform
C. absent diastolic flow in every patent access
D. venous respiratory waveform only

97. During protocol review for stent surveillance, which conclusion is best supported by the available data?

A. only grayscale diameter without Doppler
B. in-stent and edge velocities compared with adjacent segments
C. venous compression through the metal
D. no evaluation when artifact is present

98. During protocol review for TIPS evaluation, which conclusion is best supported by the available data?

A. ankle pressures and digital PPG only in the stated examination setting
B. carotid plaque morphology only in the stated examination setting
C. upper-extremity venous compression only in the stated examination setting
D. flow direction and velocities through the shunt and portal branches

99. During protocol review for dialysis access outflow stenosis, which conclusion is best supported by the available data?

A. uniform laminar flow without velocity change
B. complete compression of the anastomosis in the stated examination setting
C. focal velocity acceleration with turbulence in the draining vein
D. triphasic flow in the outflow vein

100. During protocol review for prosthetic graft infection concern, which conclusion is best supported by the available data?

A. uniform graft wall appearance alone
B. perigraft fluid or gas with compatible clinical findings
C. normal triphasic distal flow in the stated examination setting
D. expected color fill throughout in the stated examination setting

101. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.85
B. 0.15
C. 1.15
D. 6.67

102. During protocol review for segmental pressure drop, which conclusion is best supported by the available data?

A. identical pressures prove acute DVT in the stated examination setting
B. higher distal pressure proves aneurysm in the stated examination setting
C. all pressure differences are artifact in the stated examination setting
D. a meaningful decrease between adjacent cuff levels suggests intervening disease

103. During protocol review for upper-extremity arterial pressures, which conclusion is best supported by the available data?

A. use ankle pressure as the only reference
B. apply venous tourniquets throughout in the stated examination setting
C. ignore side-to-side differences in the stated examination setting
D. compare bilateral brachial and forearm pressures with waveforms

104. During protocol review for venous PPG refill time, which conclusion is best supported by the available data?

A. prolonged refill always proves acute DVT
B. triphasic refill indicates arterial stenosis
C. shortened refill suggests venous reflux
D. no refill is normal after exercise

105. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 0.85
C. 1.15
D. 6.67

106. During protocol review for ankle-brachial index calculation, which conclusion is best supported by the available data?

A. highest ankle pressure divided by highest brachial pressure
B. lowest brachial pressure divided by ankle pressure
C. ankle pressure minus brachial pressure
D. brachial pressure plus toe pressure

107. During protocol review for proper pressure cuff width, which conclusion is best supported by the available data?

A. narrower than the artery lumen
B. identical for every limb size
C. twice the entire limb length
D. approximately 20 percent wider than the limb diameter

108. During protocol review for exercise ABI purpose, which conclusion is best supported by the available data?

A. diagnose carotid plaque morphology in the stated examination setting
B. measure venous reflux exclusively in the stated examination setting
C. unmask flow-limiting disease when resting results are normal or borderline
D. confirm portal hypertension in the stated examination setting

109. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.85
B. 0.15
C. 1.15
D. 6.67

110. During protocol review for reactive hyperemia testing, which conclusion is best supported by the available data?

A. measures carotid intima thickness
B. assesses arterial reserve after temporary occlusion
C. confirms venous valve anatomy
D. classifies endoleaks in the stated examination setting

111. A follow-up examination focuses on toe pressure advantage. Which observation deserves the correct interpretation?

A. toe arteries always have higher pressure than brachial arteries
B. toe pressure diagnoses DVT in the stated examination setting
C. digital arteries are less often noncompressible than ankle arteries
D. toe cuffs eliminate motion artifact in the stated examination setting

112. A follow-up examination focuses on segmental pressure drop. Which observation deserves the correct interpretation?

A. identical pressures prove acute DVT in the stated examination setting
B. a meaningful decrease between adjacent cuff levels suggests intervening disease
C. higher distal pressure proves aneurysm in the stated examination setting
D. all pressure differences are artifact in the stated examination setting

113. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.85
B. 0.15
C. 1.15
D. 6.67

114. A follow-up examination focuses on venous PPG refill time. Which observation deserves the correct interpretation?

A. prolonged refill always proves acute DVT
B. triphasic refill indicates arterial stenosis
C. no refill is normal after exercise
D. shortened refill suggests venous reflux

115. A follow-up examination focuses on pulse volume recording distal disease. Which observation deserves the correct interpretation?

A. damped contour with delayed upstroke and reduced amplitude
B. sharp peak with normal dicrotic features
C. respiratory phasic venous tracing in the stated examination setting
D. to-and-fro pseudoaneurysm tracing in the stated examination setting

116. A follow-up examination focuses on ankle-brachial index calculation. Which observation deserves the correct interpretation?

A. lowest brachial pressure divided by ankle pressure
B. ankle pressure minus brachial pressure
C. brachial pressure plus toe pressure
D. highest ankle pressure divided by highest brachial pressure

117. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 0.85
C. 1.15
D. 6.67

118. A follow-up examination focuses on exercise ABI purpose. Which observation deserves the correct interpretation?

A. diagnose carotid plaque morphology in the stated examination setting
B. measure venous reflux exclusively in the stated examination setting
C. unmask flow-limiting disease when resting results are normal or borderline
D. confirm portal hypertension in the stated examination setting

119. A follow-up examination focuses on noncompressible ankle arteries. Which observation deserves the correct interpretation?

A. report a normal ABI without qualification
B. increase cuff pressure indefinitely
C. diagnose venous reflux from the ABI
D. consider toe pressures or alternative physiologic testing

120. A follow-up examination focuses on reactive hyperemia testing. Which observation deserves the correct interpretation?

A. assesses arterial reserve after temporary occlusion
B. measures carotid intima thickness
C. confirms venous valve anatomy
D. classifies endoleaks in the stated examination setting

121. During protocol review for post-thrombin assessment, which conclusion is best supported by the available data?

A. confirm parent artery occlusion in the stated examination setting
B. confirm sac thrombosis and parent artery patency with distal perfusion
C. expect increased neck flow in the stated examination setting
D. avoid checking pedal signals in the stated examination setting

122. During protocol review for pseudoaneurysm thrombin injection guidance, which conclusion is best supported by the available data?

A. place the needle blindly into the parent artery in the stated examination setting
B. inject without confirming flow in the stated examination setting
C. keep the needle tip visible within the sac away from the neck
D. compress the distal artery throughout injection in the stated examination setting

123. During protocol review for intraoperative carotid assessment, which conclusion is best supported by the available data?

A. evaluate lumen, residual plaque, flap, and flow after repair
B. assess only jugular compressibility in the stated examination setting
C. measure ankle pressure only in the stated examination setting
D. ignore spectral Doppler in the stated examination setting

124. During protocol review for venous ablation guidance, which conclusion is best supported by the available data?

A. place the catheter within a deep artery
B. ignore the saphenofemoral junction in the stated examination setting
C. confirm catheter position and tumescent anesthesia around the target vein
D. omit postprocedure deep-vein assessment in the stated examination setting

125. During protocol review for vasovagal response during procedure, which conclusion is best supported by the available data?

A. continue without monitoring in the stated examination setting
B. place the patient upright immediately in the stated examination setting
C. increase compression without evaluation in the stated examination setting
D. stop, assess the patient, and summon appropriate clinical support

126. During protocol review for sterile transducer preparation, which conclusion is best supported by the available data?

A. use nonsterile gel inside an open wound in the stated examination setting
B. use a sterile cover and sterile coupling medium without contaminating the field
C. place the cable across the field uncovered in the stated examination setting
D. omit probe disinfection in the stated examination setting

127. During protocol review for needle visualization, which conclusion is best supported by the available data?

A. align the beam to improve reflection from the needle
B. use the steepest possible angle in the stated examination setting
C. turn off all gain in the stated examination setting
D. image only after advancement in the stated examination setting

128. During protocol review for biopsy or access guidance, which conclusion is best supported by the available data?

A. advance the needle beyond the image plane
B. maximize output without reason in the stated examination setting
C. ignore anticoagulation history in the stated examination setting
D. visualize the needle continuously and plan a path avoiding vessels

129. During protocol review for manual pseudoaneurysm compression, which conclusion is best supported by the available data?

A. compress only the distal artery in the stated examination setting
B. compress the neck while monitoring sac and distal arterial flow
C. avoid Doppler monitoring in the stated examination setting
D. stop when sac flow increases in the stated examination setting

130. During protocol review for procedure timeout, which conclusion is best supported by the available data?

A. perform after needle insertion in the stated examination setting
B. replace informed consent in the stated examination setting
C. verify patient, procedure, site, and required resources before starting
D. omit when the patient is known

131. During protocol review for intraoperative completion duplex, which conclusion is best supported by the available data?

A. replace all surgical inspection in the stated examination setting
B. identify residual stenosis, flap, thrombosis, or technical defect
C. measure only venous reflux in the stated examination setting
D. exclude flow evaluation in the stated examination setting

132. During protocol review for postprocedure hematoma, which conclusion is best supported by the available data?

A. assume every mass is thrombosed in the stated examination setting
B. use compression without checking perfusion in the stated examination setting
C. evaluate size, internal flow, and relationship to nearby vessels
D. ignore expanding symptoms in the stated examination setting

133. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 1.15
C. 6.67
D. 0.85

134. During protocol review for transducer frequency choice, which conclusion is best supported by the available data?

A. use the highest frequency that provides adequate penetration
B. always use the lowest available frequency
C. frequency does not affect resolution
D. high frequency always penetrates deepest

135. During protocol review for comparison with prior studies, which conclusion is best supported by the available data?

A. change criteria between examinations
B. ignore surgical history in the stated examination setting
C. compare only image brightness
D. use consistent technique and note interval changes

136. During protocol review for ALARA principle, which conclusion is best supported by the available data?

A. maximize output for every examination in the stated examination setting
B. ignore thermal and mechanical indices in the stated examination setting
C. use the lowest output and shortest exposure that answer the clinical question
D. extend dwell time routinely in the stated examination setting

137. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.85
B. 0.15
C. 1.15
D. 6.67

138. During protocol review for aliasing in pulsed Doppler, which conclusion is best supported by the available data?

A. decrease PRF further in the stated examination setting
B. increase the velocity scale or shift baseline when appropriate
C. increase Doppler angle beyond 60 degrees
D. turn off spectral display in the stated examination setting

139. During protocol review for quality assurance phantom, which conclusion is best supported by the available data?

A. replace all preventive maintenance
B. track system performance consistently over time
C. diagnose vascular disease directly
D. calibrate blood pressure cuffs only

140. During protocol review for range ambiguity, which conclusion is best supported by the available data?

A. echoes from a previous pulse assigned to the wrong depth
B. incorrect velocity from angle correction in the stated examination setting
C. shadow from plaque in the stated examination setting
D. venous reflux after Valsalva in the stated examination setting

141. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 1.15
C. 0.85
D. 6.67

142. During protocol review for resistive index, which conclusion is best supported by the available data?

A. end-diastolic divided by peak systolic velocity in the stated examination setting
B. peak systolic plus end-diastolic velocity in the stated examination setting
C. mean velocity divided by vessel diameter in the stated examination setting
D. peak systolic minus end-diastolic velocity divided by peak systolic velocity

143. During protocol review for appropriate use, which conclusion is best supported by the available data?

A. perform every possible protocol regardless of indication
B. omit history review in the stated examination setting
C. substitute ultrasound for all modalities in the stated examination setting
D. match the examination and protocol to the clinical indication

144. During protocol review for color blooming, which conclusion is best supported by the available data?

A. reduce excessive color gain
B. increase color gain further
C. lower wall filter to zero always
D. increase persistence indefinitely

145. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 1.15
C. 0.85
D. 6.67

146. During protocol review for infection prevention, which conclusion is best supported by the available data?

A. reuse contaminated gel containers in the stated examination setting
B. clean and disinfect equipment according to use and policy
C. skip hand hygiene with gloves in the stated examination setting
D. store soiled probes with clean probes

147. During protocol review for spectral broadening from technique, which conclusion is best supported by the available data?

A. place a very large gate across disturbed walls
B. maximize gain until the window fills
C. increase angle beyond 70 degrees in the stated examination setting
D. use an appropriate sample volume centered in laminar flow

148. During protocol review for wall filter effect, which conclusion is best supported by the available data?

A. a high filter always improves venous sensitivity
B. an excessively high filter can remove slow flow signals
C. it changes grayscale depth only in the stated examination setting
D. it eliminates angle error in the stated examination setting

149. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 1.15
C. 0.85
D. 6.67

150. During protocol review for acoustic shadowing, which conclusion is best supported by the available data?

A. attenuation behind a strongly reflecting or absorbing structure
B. enhancement behind fluid in the stated examination setting
C. mirror duplication across a reflector
D. aliasing from low PRF in the stated examination setting

151. During protocol review for power Doppler, which conclusion is best supported by the available data?

A. sensitive display of low flow without directional information
B. precise velocity measurement with spectral tracing
C. directional display immune to motion
D. grayscale-only tissue imaging in the stated examination setting

152. During protocol review for critical result workflow, which conclusion is best supported by the available data?

A. leave an unconfirmed voicemail only
B. wait until the next routine visit
C. follow the laboratory's documented escalation and read-back process
D. tell the patient a final diagnosis independently

153. A renal waveform has a peak systolic velocity of 120 cm/s and end-diastolic velocity of 18 cm/s. What is the resistive index?

A. 0.15
B. 0.85
C. 1.15
D. 6.67

154. A follow-up examination focuses on transducer frequency choice. Which observation deserves the correct interpretation?

A. always use the lowest available frequency
B. frequency does not affect resolution
C. high frequency always penetrates deepest
D. use the highest frequency that provides adequate penetration

155. A follow-up examination focuses on comparison with prior studies. Which observation deserves the correct interpretation?

A. change criteria between examinations
B. ignore surgical history in the stated examination setting
C. compare only image brightness
D. use consistent technique and note interval changes

156. A follow-up examination focuses on ALARA principle. Which observation deserves the correct interpretation?

A. use the lowest output and shortest exposure that answer the clinical question
B. maximize output for every examination in the stated examination setting
C. ignore thermal and mechanical indices in the stated examination setting
D. extend dwell time routinely in the stated examination setting

157. During protocol review for image archiving, which conclusion is best supported by the available data?

A. save only one representative image in the stated examination setting
B. delete technically difficult segments in the stated examination setting
C. verify required images, labels, measurements, and waveforms are stored
D. archive without patient identifiers in the stated examination setting

158. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

A. delete the image because it is outside the order
B. document and communicate it according to laboratory policy
C. provide a definitive unrelated diagnosis
D. ignore any potentially important mass

159. During protocol review for image archiving, which conclusion is best supported by the available data?

A. save only one representative image in the stated examination setting
B. delete technically difficult segments in the stated examination setting
C. archive without patient identifiers in the stated examination setting
D. verify required images, labels, measurements, and waveforms are stored

160. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

A. document and communicate it according to laboratory policy
B. delete the image because it is outside the order
C. provide a definitive unrelated diagnosis
D. ignore any potentially important mass

161. During protocol review for image archiving, which conclusion is best supported by the available data?

A. save only one representative image in the stated examination setting
B. verify required images, labels, measurements, and waveforms are stored
C. delete technically difficult segments in the stated examination setting
D. archive without patient identifiers in the stated examination setting

162. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

A. delete the image because it is outside the order
B. provide a definitive unrelated diagnosis
C. document and communicate it according to laboratory policy
D. ignore any potentially important mass

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D. archive without patient identifiers in the stated examination setting

164. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

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B. delete the image because it is outside the order
C. provide a definitive unrelated diagnosis
D. ignore any potentially important mass

165. During protocol review for image archiving, which conclusion is best supported by the available data?

A. save only one representative image in the stated examination setting
B. delete technically difficult segments in the stated examination setting
C. archive without patient identifiers in the stated examination setting
D. verify required images, labels, measurements, and waveforms are stored

166. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

A. delete the image because it is outside the order
B. provide a definitive unrelated diagnosis
C. document and communicate it according to laboratory policy
D. ignore any potentially important mass

167. During protocol review for image archiving, which conclusion is best supported by the available data?

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C. verify required images, labels, measurements, and waveforms are stored
D. archive without patient identifiers in the stated examination setting

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B. document and communicate it according to laboratory policy
C. provide a definitive unrelated diagnosis
D. ignore any potentially important mass

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B. save only one representative image in the stated examination setting
C. delete technically difficult segments in the stated examination setting
D. archive without patient identifiers in the stated examination setting

170. During protocol review for unexpected incidental finding, which conclusion is best supported by the available data?

A. delete the image because it is outside the order
B. provide a definitive unrelated diagnosis
C. ignore any potentially important mass
D. document and communicate it according to laboratory policy

Practice Exam 22: Answer Key and Explanations

1. B — Normal peripheral venous flow varies with respiration and increases with distal augmentation, demonstrating patency between the compression site and sample location. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

2. D — The small saphenous vein usually ascends in the posterior calf and commonly drains near the popliteal fossa. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

3. D — The external carotid supplies muscular and facial beds, producing a higher-resistance waveform than the internal carotid artery. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

4. C — The kidneys require continuous perfusion, so normal renal arteries display low resistance and sustained forward flow during diastole. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

5. A — The common femoral artery divides into the superficial femoral artery and the profunda femoris artery in the proximal thigh. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

6. B — A healthy resting limb has high peripheral resistance and elastic recoil, producing forward systole, brief early-diastolic reversal, and late forward flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

7. B — The great saphenous vein courses in the superficial saphenous compartment and is commonly followed along the medial leg and thigh. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

8. C — The common carotid supplies both external and internal carotid beds, so its normal waveform has an intermediate-to-low resistance pattern with forward diastolic flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation.

9. A — Hepatic venous waveforms are characteristically pulsatile and multiphasic because right atrial pressure changes are transmitted into the hepatic veins. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

10. D — The brachial artery divides near the antecubital fossa into the radial and ulnar arteries supplying the forearm and hand. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

11. C — Normal vertebral arterial flow is antegrade, traveling cranially through the transverse foramina toward the basilar circulation. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

12. A — During fasting, the superior mesenteric circulation has relatively high resistance; after eating, diastolic flow rises as bowel perfusion increases. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

13. B — The distal abdominal aorta bifurcates into the right and left common iliac arteries, typically near the fourth lumbar vertebral level. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

14. D — Normal portal venous flow is hepatopetal, carrying nutrient-rich blood from the gastrointestinal tract and spleen toward the liver. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

15. B — At the groin, the common femoral vein usually lies medial to the common femoral artery, a useful orientation landmark. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism,

artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

16. D — The internal carotid supplies the brain, a continuously perfused low-resistance vascular bed, so forward diastolic flow is normally prominent. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

17. A — The celiac artery supplies the liver and spleen, which maintain low-resistance circulation even during fasting. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

18. C — The popliteal artery first gives rise to the anterior tibial artery and then continues as the tibioperoneal trunk. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

19. C — Normal peripheral venous flow varies with respiration and increases with distal augmentation, demonstrating patency between the compression site and sample location. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

20. D — The small saphenous vein usually ascends in the posterior calf and commonly drains near the popliteal fossa. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

21. A — The external carotid supplies muscular and facial beds, producing a higher-resistance waveform than the internal carotid artery. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

22. B — The kidneys require continuous perfusion, so normal renal arteries display low resistance and sustained forward flow during diastole. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

23. A — The common femoral artery divides into the superficial femoral artery and the profunda femoris artery in the proximal thigh. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

24. D — A healthy resting limb has high peripheral resistance and elastic recoil, producing forward systole, brief early-diastolic reversal, and late forward flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

25. B — The great saphenous vein courses in the superficial saphenous compartment and is commonly followed along the medial leg and thigh. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

26. C — The common carotid supplies both external and internal carotid beds, so its normal waveform has an intermediate-to-low resistance pattern with forward diastolic flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation.

27. D — Hepatic venous waveforms are characteristically pulsatile and multiphasic because right atrial pressure changes are transmitted into the hepatic veins. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

28. A — The brachial artery divides near the antecubital fossa into the radial and ulnar arteries supplying the forearm and hand. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

29. B — Normal vertebral arterial flow is antegrade, traveling cranially through the transverse foramina toward the basilar circulation. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

30. C — During fasting, the superior mesenteric circulation has relatively high resistance; after eating, diastolic flow rises as bowel perfusion increases. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a

different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

31. C — The distal abdominal aorta bifurcates into the right and left common iliac arteries, typically near the fourth lumbar vertebral level. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

32. D — Normal portal venous flow is hepatopetal, carrying nutrient-rich blood from the gastrointestinal tract and spleen toward the liver. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

33. A — At the groin, the common femoral vein usually lies medial to the common femoral artery, a useful orientation landmark. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

34. B — The internal carotid supplies the brain, a continuously perfused low-resistance vascular bed, so forward diastolic flow is normally prominent. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

35. B — The celiac artery supplies the liver and spleen, which maintain low-resistance circulation even during fasting. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

36. C — The popliteal artery first gives rise to the anterior tibial artery and then continues as the tibioperoneal trunk. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

37. A — An arteriovenous connection lowers downstream resistance, increases feeding-artery diastolic flow, and transmits pulsatility and arterialized velocity to the draining vein. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

38. D — Portal hypertension may enlarge portal veins, reduce or reverse hepatopetal flow, and create portosystemic collateral pathways. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

39. D — Reduced renal perfusion activates renin-mediated mechanisms that can produce difficult-to-control renovascular hypertension. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic data, and clinical.

40. A — Dissection creates a tear and intimal flap that divides the aorta into true and false flow channels with potentially different Doppler characteristics. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

41. C — A narrowing accelerates flow through the reduced lumen and commonly creates aliasing, turbulence, and spectral broadening at and beyond the lesion. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

42. B — Budd-Chiari syndrome results from obstruction of hepatic venous outflow involving hepatic veins, the inferior vena cava, or both. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

43. B — A carotid body tumor is typically hypervascular and located at the bifurcation, where it separates or splays the internal and external carotid arteries. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation.

44. A — Acute thrombus often makes the vein enlarged and noncompressible, while recently formed clot may be relatively hypoechoic. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

45. D — True occlusion produces no flow within the obstructed segment despite optimized settings; collateral pathways may restore damped flow beyond it. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives

describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

46. C — Median arcuate ligament compression can narrow the proximal celiac artery, often producing respiratory variation in velocity and vessel configuration. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

47. C — A Baker cyst is a fluid-filled popliteal lesion that can cause posterior knee pain or swelling and clinically resemble venous thrombosis. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

48. A — Chronic thrombosis commonly produces echogenic organized material, wall thickening, recanalized channels, collateral veins, and a smaller irregular lumen. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

49. B — A significant proximal obstruction dampens and delays the downstream systolic pressure wave, producing the tardus-parvus contour. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

50. D — The left renal vein may be compressed between the superior mesenteric artery and aorta, causing venous hypertension and collateralization. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

51. A — Arterial thoracic outlet compression is dynamic; provocative arm positions may reduce subclavian flow, dampen the waveform, or reproduce symptoms. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

52. B — Pathologic reflux is sustained retrograde venous flow after a maneuver that challenges valve closure, not the brief transient response of normal valves. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

53. C — Proximal subclavian obstruction can lower pressure beyond the lesion and draw blood retrograde through the ipsilateral vertebral artery to supply the arm. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

54. D — May-Thurner syndrome involves compression of the left common iliac vein by the overlying right common iliac artery against the spine. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

55. D — Continuous peripheral venous flow with loss of respiratory variation can indicate a more proximal obstruction between the sample and the heart. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

56. A — A pseudoaneurysm neck demonstrates blood entering the sac during systole and returning toward the artery during diastole, creating to-and-fro flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

57. B — Ulceration is an irregular depression in the plaque surface that may fill with color flow and increases embolic potential. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

58. C — Popliteal aneurysms may thrombose or generate distal emboli, threatening tibial runoff and limb perfusion even without rupture. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

59. A — Compartment pressure can compromise microvascular tissue perfusion before large-artery Doppler signals disappear, so normal signals do not exclude the emergency. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

60. C — Swirling blood in a pseudoaneurysm sac often produces the characteristic red-and-blue yin-yang appearance on color Doppler. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel,

mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

61. B — Renal fibromuscular dysplasia classically affects the mid-to-distal artery and may create alternating narrowed and dilated segments rather than ostial plaque. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

62. D — Chronic mesenteric arterial disease commonly causes postprandial pain because intestinal demand rises after eating but stenotic vessels cannot supply adequate flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

63. C — Aneurysm surveillance requires reproducible maximum diameter measurements perpendicular to the vessel axis, commonly from outer wall to outer wall. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

64. A — An arteriovenous connection lowers downstream resistance, increases feeding-artery diastolic flow, and transmits pulsatility and arterialized velocity to the draining vein. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

65. B — Portal hypertension may enlarge portal veins, reduce or reverse hepatopetal flow, and create portosystemic collateral pathways. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

66. D — Reduced renal perfusion activates renin-mediated mechanisms that can produce difficult-to-control renovascular hypertension. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic data, and clinical.

67. B — Dissection creates a tear and intimal flap that divides the aorta into true and false flow channels with potentially different Doppler characteristics. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

68. C — A narrowing accelerates flow through the reduced lumen and commonly creates aliasing, turbulence, and spectral broadening at and beyond the lesion. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

69. D — Budd-Chiari syndrome results from obstruction of hepatic venous outflow involving hepatic veins, the inferior vena cava, or both. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

70. A — A carotid body tumor is typically hypervascular and located at the bifurcation, where it separates or splays the internal and external carotid arteries. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation.

71. A — Acute thrombus often makes the vein enlarged and noncompressible, while recently formed clot may be relatively hypoechoic. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

72. C — True occlusion produces no flow within the obstructed segment despite optimized settings; collateral pathways may restore damped flow beyond it. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

73. D — Median arcuate ligament compression can narrow the proximal celiac artery, often producing respiratory variation in velocity and vessel configuration. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

74. B — A Baker cyst is a fluid-filled popliteal lesion that can cause posterior knee pain or swelling and clinically resemble venous thrombosis. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

75. C — Chronic thrombosis commonly produces echogenic organized material, wall thickening, recanalized channels, collateral veins, and a smaller irregular lumen. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The

alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

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82. C — Continuous peripheral venous flow with loss of respiratory variation can indicate a more proximal obstruction between the sample and the heart. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

83. B — A pseudoaneurysm neck demonstrates blood entering the sac during systole and returning toward the artery during diastole, creating to-and-fro flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

84. D — Ulceration is an irregular depression in the plaque surface that may fill with color flow and increases embolic potential. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

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87. C — Swirling blood in a pseudoaneurysm sac often produces the characteristic red-and-blue yin-yang appearance on color Doppler. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

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89. B — Chronic mesenteric arterial disease commonly causes postprandial pain because intestinal demand rises after eating but stenotic vessels cannot supply adequate flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

90. A — Aneurysm surveillance requires reproducible maximum diameter measurements perpendicular to the vessel axis, commonly from outer wall to outer wall. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives

describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

91. A — Transplant evaluation includes the arterial anastomosis, main transplant artery, renal vein, and intrarenal perfusion patterns. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

92. D — Duplex surveillance identifies graft stenosis by focal acceleration, spectral disturbance, and comparison with adjacent graft velocities. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

93. B — Dialysis steal occurs when access flow contributes to inadequate hand perfusion, often requiring comparison of distal flow with and without access compression. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

94. C — Post-ablation ultrasound confirms intended treated-vein closure while checking the deep system for thrombus extension or other complications. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

95. C — An endoleak is continued perfusion of the excluded aneurysm sac outside the endograft lumen and requires classification and surveillance. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

96. A — A functioning arteriovenous access lowers resistance and increases inflow velocity and volume, creating a strongly diastolic arterial waveform. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

97. B — Stent surveillance uses color and spectral Doppler through the stent and its edges, looking for focal acceleration or disturbed flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

98. D — TIPS surveillance assesses shunt patency, velocity changes, portal flow direction, and indirect signs of malfunction. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

99. C — Outflow narrowing accelerates venous velocity, creates turbulence, and may elevate access pressures or reduce effective dialysis flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

100. B — Unexpected perigraft fluid, gas, inflammatory change, or pseudoaneurysm can raise concern for infection when correlated with the clinical presentation. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

101. A — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

102. D — A substantial pressure decrease between adjacent limb levels localizes hemodynamically significant arterial disease to the intervening segment. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

103. D — Bilateral pressure and waveform comparison helps localize upper-extremity inflow or segmental arterial disease. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic data, and.

104. C — Venous photoplethysmography evaluates refilling after calf-muscle emptying; abnormally rapid refill supports incompetent venous valves. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic data.

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response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

106. A — The ABI compares the higher ankle artery pressure with the higher brachial pressure, creating a standardized ratio of limb to systemic pressure. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

107. D — An appropriately sized cuff distributes pressure effectively; a cuff that is too small can falsely elevate the measured pressure. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

108. C — Exercise increases limb demand; a postexercise pressure decline can reveal arterial disease not apparent under resting conditions. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

109. A — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

110. B — Temporary occlusion followed by release increases flow demand, allowing physiologic assessment of the limb's capacity to augment perfusion. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

111. C — Toe vessels are less affected by medial calcification, making toe pressure useful when ankle arteries cannot be compressed reliably. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

112. B — A substantial pressure decrease between adjacent limb levels localizes hemodynamically significant arterial disease to the intervening segment. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

113. A — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

114. D — Venous photoplethysmography evaluates refilling after calf-muscle emptying; abnormally rapid refill supports incompetent venous valves. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic data.

115. A — Arterial obstruction progressively rounds and delays the PVR systolic upstroke while reducing amplitude and eliminating normal contour features. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

116. D — The ABI compares the higher ankle artery pressure with the higher brachial pressure, creating a standardized ratio of limb to systemic pressure. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with.

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119. D — Medial arterial calcification can prevent cuff compression and falsely elevate ABI, so toe pressures or other methods are more informative. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

120. A — Temporary occlusion followed by release increases flow demand, allowing physiologic assessment of the limb's capacity to augment perfusion. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives

describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

121. B — After thrombin injection, ultrasound should document loss of sac flow while ensuring the native artery and distal circulation remain patent. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

122. C — Continuous needle visualization and separation from the pseudoaneurysm neck reduce the risk of thrombin entering the native artery. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

123. A — Intraoperative carotid imaging can identify residual narrowing, intimal flap, thrombus, or abnormal flow that may require immediate revision. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

124. C — Ultrasound confirms intraluminal catheter position, safe distance from deep junctions, and circumferential tumescent coverage before energy delivery. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

125. D — Patient safety takes priority; symptoms such as bradycardia, hypotension, pallor, or syncope require prompt assessment and team response. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

126. B — A sterile cover, appropriate sterile gel, and careful cable management protect the procedural field while maintaining image quality. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

127. A — Needle conspicuity improves when the insonation geometry produces a stronger specular reflection and the needle remains within the imaging plane. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

128. D — Real-time visualization and a safe planned trajectory reduce unintended vascular injury during image-guided access or biopsy procedures. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

129. B — Ultrasound-guided compression targets the neck to interrupt sac inflow while preserving and repeatedly checking distal perfusion. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

130. C — A standardized timeout prevents wrong-patient, wrong-site, and wrong-procedure events and confirms team readiness before intervention. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

131. B — Completion duplex provides immediate hemodynamic and anatomic assessment so a correctable technical defect can be addressed before closure. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow.

132. C — Ultrasound distinguishes a simple hematoma from active bleeding, pseudoaneurysm, or arteriovenous fistula and helps guide escalation. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

133. D — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

134. A — Higher frequency improves spatial resolution but reduces penetration, so selection must match vessel depth and patient habitus. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

135. D — Reproducible technique and criteria allow meaningful assessment of progression, improvement, or postintervention change across serial studies. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives

describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

136. C — ALARA guides prudent ultrasound use by minimizing acoustic exposure while still acquiring the diagnostic information needed for patient care. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

137. A — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

138. B — Aliasing occurs when Doppler shift exceeds the Nyquist limit; increasing PRF or scale, shifting baseline, or using another mode can help. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

139. B — Regular phantom testing can reveal changes in resolution, sensitivity, distance accuracy, dead zone, or uniformity before clinical image quality degrades. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

140. A — At high pulse repetition frequency, late returning echoes may be attributed to a later pulse and displayed at an incorrect depth. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

141. C — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

142. D — The resistive index normalizes the difference between systolic and diastolic velocities to peak systolic velocity and reflects downstream resistance. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

143. D — Appropriate use begins with the clinical question and selects a focused examination likely to provide meaningful information for management. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

144. A — Excessive color gain causes color to spill beyond vessel boundaries; lowering gain until random extraluminal color disappears improves lumen definition. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

145. C — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

146. B — Consistent hand hygiene, transducer reprocessing, gel handling, and surface cleaning reduce cross-contamination risks in vascular laboratories. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

147. D — An oversized or poorly positioned sample volume records a wider range of velocities and can create artificial spectral broadening. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

148. B — The wall filter suppresses low-frequency Doppler shifts; setting it too high can erase genuine slow venous or diastolic flow. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

149. C — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

150. A — Calcification may markedly attenuate the beam, creating a dark distal shadow that can obscure the lumen and limit Doppler evaluation. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a

different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging.

151. A — Power Doppler depicts the strength of moving blood signals and is sensitive to slow flow, but it does not show direction or velocity. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation.

152. C — Critical findings require prompt communication through the approved chain, documentation of recipient and time, and confirmation that the message was understood. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale.

153. B — Resistive index equals PSV minus EDV divided by PSV; using 120 and 18 produces 0.85. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler, physiologic.

154. D — Higher frequency improves spatial resolution but reduces penetration, so selection must match vessel depth and patient habitus. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral.

155. D — Reproducible technique and criteria allow meaningful assessment of progression, improvement, or postintervention change across serial studies. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

156. A — ALARA guides prudent ultrasound use by minimizing acoustic exposure while still acquiring the diagnostic information needed for patient care. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

157. C — Complete, correctly labeled archives allow interpretation, comparison, quality review, and defensible documentation of the examination performed. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color flow, spectral Doppler.

158. B — Potentially important incidental observations should be documented and escalated through policy so the interpreting clinician can determine appropriate follow-up. This is the single best choice because it integrates anatomy, hemodynamics, and standard vascular laboratory technique. The alternatives describe a different vessel, mechanism, artifact, or clinical response and therefore do not fit the stated finding. Correlation with grayscale imaging, color.

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