This book is dedicated to all past and future educators who devote their lives to making a difference!

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Extracranial and Intracranial

Multiple Choice

1. What is the first and largest artery off of the aortic arch?
   a. Left common carotid artery
   b. Left subclavian artery
   c. Left innominate artery
   d. Right innominate artery

2. The vertebral supplies approximately ____% blood flow to the brain.
   a. 25%
   b. 50%
   c. 65%
   d. 75%

3. Which is the third artery off of the aortic arch?
   a. Left common carotid artery
   b. Left subclavian artery
   c. Left innominate artery
   d. Right innominate artery

4. Which of the following vessels are both branches of the subclavian artery?
   a. Thyrocervical and internal thoracic
   b. Mammary and clavicular
   c. Vertebral and maxillary
   d. Angular and submental

5. At what level of the spine does the common carotid artery bifurcate?
   a. C2-C3
   b. C4-C5
   c. C6-C7
   d. T1-T2

6. The typical diameter of the internal carotid artery is:
   a. 1.4 mm
   b. 0.5 cm to 1.0 cm
   c. 1.0 cm to 1.25 cm
   d. 2.0 cm to 4.0 cm

7. Which statement is true when comparing the level of the carotid bifurcation on the right and left sides of the neck?
   a. The bifurcation is usually at the same level bilaterally.
   b. The bifurcation is usually higher on the left.
   c. The bifurcation is usually higher on the right.
   d. The different levels of the bifurcation have not been studied.

8. Atherosclerotic lesions are most common at the ____ level in the neck.
   a. Proximal common carotid
   b. Bifurcation
   c. Mid-distal internal carotid artery
   d. External carotid artery

9. Approximately how much of the blood flow to the brain is supplied by the internal carotid artery (ICA)?
   a. 25%
   b. 50%
   c. 65%
   d. 75%

10. The external carotid artery terminates:
    a. As the superior thyroid artery
    b. As the facial artery
    c. As the superficial temporal artery
    d. As the maxillary artery

11. The external carotid most often courses ____ after the bifurcation.
    a. Anterior and medial
    b. Posterior and medial
    c. Posterior and lateral
    d. Anterior and lateral

12. The internal carotid artery terminates as the:
    a. Ophthalmic and MCA
    b. ACA and PCA
    c. MCA and ACA
    d. MCA and PCoA

13. Which of the following is a true statement about the vertebral arteries (VA)?
    a. The VA are symmetric.
    b. The left VA is usually larger than the right VA.
    c. The right VA is usually larger than the left VA.
    d. The VA are of equal size.
14. What percentage of the population is thought to have a complete Circle of Willis?
   a. 5%
   b. 20%
   c. 50%
   d. 90%

15. The anterior communicating (ACoA) connects which of the following arterial segments?
   a. Right and left A-1 segments
   b. Right and left A-2 segments
   c. Right and left A-3 to A-4 segments
   d. Right and left A-5 segments

16. Which pathway is an example of collateral flow between the ICA-ECA network in the setting of an ICA occlusion?
   a. Subdural space-dural arteries
   b. PCoA-carotid and basilar arteries
   c. Supraorbital-superficial temporal arteries
   d. Meningeal anastomoses

**Fill in the Blank**

17. Classify the following arteries as (I) intracranial, (E) extracranial or (B) both, intracranial and extracranial.
   a. Internal carotid
   b. Common carotid
   c. External carotid
   d. Superior thyroid
   e. Frontal
   f. Vertebral artery
   g. Anterior cerebral
   h. Basilar

18. The brachiocephalic artery bifurcates into the right _____ and _____ arteries.

19. The subclavian artery is sometimes divided into _____ segments.

20. The most common collateral pathway between the right and left hemispheres of the brain is via the _____ artery.

21. The normal diameter of the common carotid artery is between _____ cm and _____ cm.

22. The vertebral arteries enter the skull through the _____ and join to form the basilar artery. (Hint: 2 words)

23. The enlarged area which includes the distal common and proximal internal carotid arteries is referred as the _____.

24. The internal carotid artery has ____ branches within the neck.

25. The posterior cerebral artery originates off the _____ artery.

26. Kinked arteries are most often associated with _____.

27. The _____ artery is the largest terminal branch of the ICA.

28. The ____ vessels are known as the "great vessels".

29. The S-shaped curve in the cavernous ICA is known as the _____.

30. The anterior cerebral artery originates off the _____ artery.

31. List the 8 branches of the external carotid artery:
   - S=
   - A=
   - L=
   - F=
   - O=
   - P=
   - M=
   - S=


32. Label the segments of the intracranial carotid artery:

a. 

b. 

c. 

d. 

33. List the arterial anatomy of the Circle of Willis:

a. 

b. 

c. 

d. 

e. 

f. 

g. 

h. 

i. 

j. 

34. Which portion of the brain do the following arteries supply? Designate the following arteries as feeding the anterior or posterior circulation.

<table>
<thead>
<tr>
<th>Artery</th>
<th>Anterior or Posterior?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basilar</td>
<td></td>
</tr>
<tr>
<td>MCA</td>
<td></td>
</tr>
<tr>
<td>ACoA</td>
<td></td>
</tr>
<tr>
<td>PCA</td>
<td></td>
</tr>
<tr>
<td>ACA</td>
<td></td>
</tr>
<tr>
<td>Vert</td>
<td></td>
</tr>
<tr>
<td>PCoA</td>
<td></td>
</tr>
<tr>
<td>ICA</td>
<td></td>
</tr>
</tbody>
</table>

35. What is the “carotid body” and where is it located?

36. What are the 4 divisions of the internal carotid artery?

37. Define the term “fetal origin of the PCA” used to describe one type of anatomic variation.

38. Arrange the PCoA, MCA and ACoA arteries in order from most common to least common site(s) for an intracranial aneurysm.

39. List five branches of the vertebral artery. Which is the largest branch?

40. Name one ECA branch the ophthalmic artery can join to provide collateralized flow.
41. Name 3 branches of the ophthalmic artery.

42. Describe how the size of the A-1 segment of the anterior cerebral artery and the anterior communicating artery are related.

43. Define the term "hypoplastic artery".

44. List the 4 most common missing arterial segments from the Circle of Willis.

45. List the 3 categories of collateral circulation in the brain.

Abdominal Vasculature

Multiple Choice

1. What is the typical distance between the superior mesenteric and celiac trunk?
   a. 0.5 cm  
   b. 1.0 cm  
   c. 1.5 cm  
   d. 2.0 cm

2. Which organs are fed by the superior mesenteric artery (SMA)?
   a. Kidney and adrenal gland  
   b. Intestines and pancreas  
   c. Gallbladder and pancreas  
   d. Colon and rectum

3. Which organs are fed by the inferior mesenteric artery (IMA)?
   a. Kidney and adrenal  
   b. Intestines and pancreas  
   c. Gallbladder and pancreas  
   d. Colon and rectum

4. What is the average diameter of the abdominal aorta?
   a. 1.0 cm  
   b. 2.0 cm  
   c. 3.0 cm  
   d. 4.0 cm

5. The ____ vein is responsible for returning blood flow from the kidneys.
   a. Renal  
   b. Portal  
   c. Suprarenal  
   d. Nephrotic

6. The internal iliac vein drains which region?
   a. Abdominal wall  
   b. Inferior vena cava  
   c. Legs  
   d. Pelvis

7. The phrenic veins return blood from the:
   a. Diaphragm  
   b. Liver  
   c. Pancreas  
   d. Spine

8. Where is the usual location of the right ovarian vein?
   a. Suprahepatic  
   b. Infrahepatic  
   c. Intrahepatic  
   d. Middle hepatic level

9. Which 2 veins drain directly into the common iliac vein?
   a. Common femoral and external iliac veins  
   b. External and internal iliac veins  
   c. Internal iliac and deep femoral veins  
   d. Great saphenous and common femoral veins

10. The left renal artery is located ____ on the left side of the renal vein.
    a. Anteriorly  
    b. Laterally  
    c. Inferiorly  
    d. Posteriorly

Fill in the Blank

11. The SMA and celiac trunk can share a _____.
    (Hint: 2 words)

12. Blood flow is returned to the ____ venous system by the portal veins.

13. The aortic diameter often ____ from its proximal to distal segment.
14. The splenic and superior mesenteric veins join to form the ____ vein.

15. Each hepatic vein drains a different ____ of the liver.

16. The ____ is the widest vein in the body.

17. Label the segmental, interlobar and interlobular arteries in the following duplex image.

19. Label the 5 main branches off the abdominal aorta:

   a. __________________________
   b. __________________________
   c. __________________________
   d. __________________________
   e. __________________________

20. Label the 3 hepatic vein branches:

   a. __________________________
   b. __________________________
   c. __________________________

21. Label the branches of the portal vein:

   a. __________________________
   b. __________________________
   c. __________________________
8. The axillary and ____ veins join to form the subclavian vein.

9. The suprascapular and transverse cervical veins drain into the ____ vein.

10. In the following duplex image, the superficial veins run above the deep fascia in the _____. (Hint: 2 words)

11. The ____ vein is an important collateral pathway in the event of subclavian vein thrombus.

12. Label the two veins in the drawing below that join to form the innominate vein.

13. Label the veins in the following image:

14. Label the veins in the following image:

15. Which of the deep veins run along the thumb side of the forearm?

16. Which of the deep veins run along the same side as the fifth digit of the forearm?

17. List the veins that are typically duplicated in the upper extremity.
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Each section is organized with a combination of:
- Multiple choice questions
- Fill in the blank questions
- Essay questions
- Optimization questions
- Digital clips throughout for disease recognition, reporting and optimization

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— Janice Scharf, RDMS, CRGS, BSc

QR codes can be found throughout this book for viewing pathology videos and duplex findings using your smartphone or tablet.