DAVIES

Vascular Technology

QUESTION/ANSWER FLASHCARD STUDY SYSTEM

SECOND EDITION

ScoreCards for Image Gallery | Exam Updates | Bonus Physics Coverage

1-2-3 Step Ultrasound Education

Step 1
Review text

Step 2
Mock examination

Step 3
Q&A memory skills flashcard drill

Approved for 10 CME Credits

SDMS-Approved Continuing Education Activity

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Vascular Technology
How to Use ScoreCards viii

1 ANATOMY, PHYSIOLOGY, AND HEMODYNAMICS 1

Cerebrovascular
Aortic arch and upper extremities, cervical carotid, vertebral, and intracranial arteries (including the circle of Willis)

Venous
Deep, superficial, and perforating veins—upper and lower extremities, central veins (venae cavae, innominate/brachiocephalic vein), venous wall and valves, microscopic anatomy

Peripheral Arterial
Aortic arch, upper and lower extremities, abdominal aorta, microscopic anatomy

Abdominal and Visceral
Arterial (celiac, mesenteric, renal, hepatic arteries) and venous (vena cava, renal, portal, and mesenteric veins)
2 CEREBROVASCULAR  113
Mechanisms of Disease  113
Risk factors, atherosclerosis, dissection, thromboembolism, subclavian steal, carotid body tumor, fibromuscular dysplasia, neointimal dysplasia

Signs and Symptoms  143
Transient symptoms, stroke, physical exam (neurologic signs and symptoms, bruits, bilateral brachial pressures)

Testing and Treatment  169
Noninvasive testing (patient positioning, technique, interpretation, capabilities, and limitations for duplex imaging—B-mode, Doppler, and color Doppler—and transcranial Doppler), miscellaneous diagnostic tests (methods, interpretation, and limitations for arteriography, MR angiography, and CT), treatment and follow-up (medical—pharmacologic, risk reduction, and lifestyle modification; endovascular—angioplasty and stent; and surgery)

3 VENOUS  271
Mechanisms of Disease  271
Risk factors, deep and superficial acute venous thrombosis, chronic deep venous obstruction, chronic venous valvular insufficiency (primary and secondary), varicose veins, congenital disorders, pulmonary embolism
Signs and Symptoms  295
Acute and chronic (skin changes, lymphedema, ulceration)

Testing and Treatment (Upper and Lower Extremities)  321
Noninvasive testing (patient positioning, technique, interpretation, capabilities, and limitations for acute venous thrombosis—duplex imaging and continuous-wave Doppler—and chronic venous insufficiency and obstruction—duplex imaging and reflux plethysmography by air- and photoplethysmography), venography (methods, interpretation, capabilities, and limitations), treatment (anticoagulation, thrombolytic therapy, vena caval filter, support hose, and surgery)

4 PERIPHERAL ARTERIAL  405
Mechanisms of Disease  405
Risk factors, atherosclerosis, embolism, aneurysm, nonatherosclerotic lesions (arteritis, vasospastic disorders, dissection, entrapment syndromes)

Signs and Symptoms  429
Chronic disease (claudication, rest pain, tissue loss), acute arterial occlusion (thrombosis and embolism), vasospastic disorders, physical examination (skin changes, pulse palpation, auscultation)

Testing and Treatment (Upper and Lower Extremities)  455
Noninvasive testing (patient positioning, technique, interpretation, capabilities, and limitations for qualitative and quantitative evaluation of analog and spectral Doppler waveforms;
pressures—ABI, segmental pressures, exercise testing, and reactive hyperemia; plethysmography—volume pulse recording and photoplethysmography with digital pressures and cold stress; and duplex imaging for stenosis, occlusion, aneurysm, and intraoperative/postoperative evaluation of bypass grafts), miscellaneous diagnostic tests (methods, interpretation, and limitations for arteriography, MR angiography, and CT), treatment (medical—pharmacologic and lifestyle modification; endovascular—angioplasty and stent; and surgery—endarterectomy and bypass)

5 ABDOMINAL AND VISCERAL 579
Mechanisms of Disease 579
Risk factors, renovascular hypertension, mesenteric ischemia, portal hypertension

Testing and Treatment 605
Duplex imaging and angiography

6 MISCELLANEOUS CONDITIONS, TESTS, AND STANDARDS 657
Preoperative vein mapping, pseudoaneurysms, arteriovenous fistulae, dialysis access, organ transplants (renal and liver), impotence, preoperative arterial mapping (radial, epigastric, and mammary), temporal arteritis, thoracic outlet syndrome, trauma
## QUALITY ASSURANCE

Statistics  
Sensitivity, specificity, positive and negative predictive values, accuracy

Patient Safety  
Infection control and medical emergencies

## PHYSIOLOGY AND FLUID DYNAMICS

Arterial Hemodynamics 751  
Venous Hemodynamics 799  
Other 829

## IMAGE GALLERY

Image-Based Cases and Questions

## APPLICATION FOR CME CREDITS

SCORECARDS QUESTIONS CROSS-REFERENCED TO THE ARDMS EXAM CONTENT OUTLINE 995
As part of our 1-2-3 Step Ultrasound Education and Test Preparation program, *ScoreCards for Vascular Technology* systematically prepares you to pass the Vascular Technology exam for the Registered Vascular Technologist (RVT) credential. It also helps you to master the facts, problem-solving skills, and habits of mind that form the foundation of success not only on your registry exams but also in your career as an ultrasound professional. And it’s fun.

*ScoreCards* covers core concepts and principles topic by topic—facts you must master to pass the RVT exam. At the bottom of every question page is a “footer key,” indicating the study topic’s place within the exam coverage—from cerebrovascular to peripheral arterial, pathology to protocols—so you always know where you are and how you are doing. And at the end of the book you’ll find a handy list of all the flashcards cross-referenced to the task-oriented ARDMS exam topics.*

In addition, all questions specifically designed to prep you for the ARDMS “Advanced Item Type” (AIT) questions are identified. This is a new class of question that tests practical sonographic skills by simulating hands-on clinical experience. (See “Examinations and Certifications” at www.ARDMS.org.)

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*We use the last best ARDMS content outline for test preparation, updated to ensure complete coverage. The latest exam outlines from ARDMS provide a generalized categorical overview together with very specific clinical tasks, but they can miss key intermediate topics you must know to pass your exam—hence our hybrid approach to study outlines. Here you get it both ways: The table of contents reflects the key topics you need to know to pass the exam; at the end of the book, “*ScoreCards* Questions Cross-Referenced to the ARDMS Exam Content Outline” lists the questions under the ARDMS exam outline categories that were current as of press time.*
The AIT questions include three types, which are identified where applicable in a ScoreCard’s footer key as indicated in quotation marks below:

- **“AIT–SIC” (Semi-Interactive Console) items**: These questions require the examinee to use a semi-interactive console to correct a problem with the image presented. In the ScoreCards system, similar questions are addressed similarly, by asking candidates what is wrong with an image or how to correct a problem. SIC questions are currently used in the SPI exam. We have included some here to provide bonus Physics coverage for Vascular.

- **“AIT–Hotspot” items**: require examinees to indicate the answer to a question by pointing at or marking directly on an image. In ScoreCards, similar questions ask examinees to indicate the label on an image that corresponds to the correct answer. Hotspot questions appear on the RVT specialty exam.

- **“AIT–PACSim” items**: For reading physicians taking the Physician in Vascular Interpretation (PVI) exam, there are the highly interactive case-based Picture Archive and Communication Simulation (PACSim) questions. These simulate a reading station and require examinees to read a patient’s clinical history, evaluate existing image(s), and complete a diagnostic ultrasound report by selecting from the options presented.

*ScoreCards for Vascular Technology* also contains an image gallery of challenging case-based problems and coverage of physiology and fluid dynamics—the vascular-specific physical principles that you must know to pass the Vascular Technology exam. These physical principles are key to understanding the physiologic bases of the indirect vascular tests, Doppler technology and its clinical applications, and other clinically important issues and applications.
Here are some tips for maximizing the value of the ScoreCards system:

**Take it with you.** The pocket-sized ScoreCards study system is designed to be portable. Use it on breaks or between patients. You can review a dozen question/answer items in five minutes.

**Study, test yourself, review.** As you study vascular technology, ScoreCards drills you on key facts and figures, it tests your knowledge of those facts in practical situations, and it provides clear explanations and references for further study. Each Q&A card is keyed to a helpful study outline so that you always know where you are, how you are doing, and how important the topic is to your overall success on the exam.

**Triangulate on your target.** By itself, the ScoreCards study system is a powerful, convenient, and fun way of learning and testing yourself. It is especially effective when used with Vascular Technology: An Illustrated Review (Step 1: review text) and Vascular Technology Review (Step 2: mock examination). Just as each ScoreCard tells you which study topic it covers, it also indicates exactly where in the Step 1 text you can find further information about the subject. So do the Davies mock examinations. This integrated, systematic strategy triangulates on your target—exam and career success!

**Shuffle it!** After using the flipcard format for a while, consider removing the spiral binding and mixing up the cards to vary the order in which they challenge you.

**Earn CME credit.** The ScoreCards study system is an SDMS-approved CME activity that can help meet the CME requirements necessary to maintain your registry status once you pass your exams. Use the CME application that follows the last question in this book. You may use the CME application anywhere, anytime, at your convenience.
Check our website. The latest news about your exams, continuing medical education, and diagnostic testing—as well as catalogs of additional resources and online help—is just a click away. Visit us at DaviesPublishing.com.

Whether you are a budding vascular technologist or a seasoned cross-training sonographer, mastery of these ScoreCards forms a solid foundation for success. For best results, we strongly urge you to combine ScoreCards with Vascular Technology: An Illustrated Review and either Vascular Technology Review (the book form of the mock exam) or Vascular Technology CD-ROM Mock Exam.
Identify the vessels labeled A–G in this illustration of the aortic arch.

a. ________________________________
b. ________________________________
c. ________________________________
d. ________________________________
e. ________________________________
f. ________________________________
g. ________________________________

Anatomy, Physiology, and Hemodynamics / Cerebrovascular / AIT—Hotspot
A. Right common carotid artery.
B. Right subclavian artery
C. Innominate (brachiocephalic) artery.
D. Left common carotid artery.
E. Left subclavian artery.
F. External carotid arteries.
G. Internal carotid arteries.

This classic pattern of the aortic arch is seen in approximately 70% of individuals. The first of these branches is the innominate or brachiocephalic trunk, which usually courses 3–4 cm before dividing into the right common carotid and subclavian arteries. The second branch is the left common carotid artery. The common carotid arteries divide into the left and right internal and external carotid arteries. The last branch of the aortic arch is the left subclavian artery.

The most common anatomic variant of the aortic arch is:

a. an origin of the left vertebral from the aortic arch
b. an origin of the right subclavian from the aortic arch
c. a common origin of the innominate and left common carotid arteries
d. an origin of the right common carotid from the aortic arch
C. A common origin of the innominate and left common carotid arteries.

A frequent origin of the innominate and left common carotid arteries is by far the most common variant anatomy of the aortic arch, occurring in approximately 22% of individuals.

After it crosses the lateral margin of the first rib the subclavian artery becomes known as the:

a. brachiocephalic artery
b. axillary artery
c. brachial artery
d. vertebral artery
B. Axillary artery.

The subclavian artery continues as the axillary artery after it passes the lateral margin of the first rib. The axillary artery in turn becomes the brachial artery.
The sophisticated ScoreCards flip-and flashcard study system yields maximum gain with minimum pain, and it’s fun. Exercise your ability to think fast and recall key facts wherever you are—at lunch, on weekend outings, or between patients. Written by well-known experts, these handy ScoreCards deliver nearly 500 questions keyed to the registry’s own exam outline, plus answers, explanations, and quick references. More than sixty image-based cases prepare you to tackle scans on the exam. Step 3 in Davies’ CME-approved 1-2-3 Step Ultrasound Education and Test Preparation program, Scorecards for Vascular Technology is very effective in combination with Vascular Technology: An Illustrated Review (Step 1—review text), Vascular Technology Review, and Ultrasound Physics Review (Step 2—mock exams).