Vascular Sonography

The purpose of continuing qualifications requirements (CQR) is to assist registered technologists in documenting their continued qualifications in the disciplines of certification and registration held. To accomplish this purpose the continuing qualifications requirements are presented in three parts: the professional profile, the structured self assessment (SSA) and continuing education (CE).

The purpose of the CQR SSA is to assist registered technologists identify gaps in the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required for practice within the disciplines of certification and registration held and help direct their professional development efforts.

The Structured Self Assessment Content Specifications for Vascular Sonography is provided to assist vascular sonographers during their CQR compliance period. Its purpose is to prepare vascular sonographers for the SSA and to help education providers develop coursework for the vascular sonographers who need to address specified areas with targeted continuing education. Targeted CE is assigned only if a standard is not met in a category on the SSA.

The SSA is composed of sets of questions that are designed to evaluate an individual’s knowledge in topics related to current practice. Participants have a maximum of 105 minutes to complete the SSA. Please allow an additional 18 minutes for the tutorial, two minutes for the non-disclosure agreement (NDA), and 10 minutes for a follow-up survey.

The table below presents the major categories and subcategories covered on the SSA. The number of questions in each category are listed in bold and number of questions in each subcategory in parentheses. The potential number of targeted CE credits that would be prescribed if the standard is not met, are across from each subcategory, with the maximum amount listed at the bottom. Specific topics within each category are addressed in the content outline, which makes up the remaining pages of this document.

<table>
<thead>
<tr>
<th>Content Category</th>
<th>Number of Questions(^1)</th>
<th>Potential CE Credits</th>
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<tr>
<td>Image Production</td>
<td><strong>30</strong></td>
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<td>Basic Principles of Ultrasound</td>
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<td>and Equipment (10)</td>
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<td>Image Formation (10)</td>
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<td>Evaluation and Selection of Representative Images (10)</td>
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<td>Procedures</td>
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<td>Abdominal/Pelvic Vasculature (10)</td>
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<td>Arterial Peripheral Vasculature (10)</td>
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<td>Venous Peripheral Vasculature (10)</td>
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<tr>
<td>Extracranial Cerebral Vasculature and Other Sonographic Procedures (10)</td>
<td>4</td>
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<tr>
<td>Total</td>
<td><strong>70</strong></td>
<td>Maximum CE <strong>29</strong></td>
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</tbody>
</table>

\(^1\) The SSA includes an additional 35 unscored (pilot) questions.
Image Production

1. Basic Principles of Ultrasound and Equipment
   A. Ultrasound Unit
   B. Transducer
      1. selection
      2. care
   C. ABI/Pulse Volume Recording Equipment
      1. cuff selection
      2. treadmill
   D. Recognition of Malfunctions
   E. Generation of Signal
   F. Propagation of Signal
      1. speed
      2. frequency
      3. reflection and refraction
      4. intensity
      5. acoustic impedance
      6. attenuation
      7. resolution
   G. Spectral and Continuous Wave Doppler
   H. Color and Power Doppler
   I. Bioeffects

2. Image Formation
   A. Transducer Selection
      1. frequency
      2. type
   B. Selection and Adjustment of Technical Factors
      1. power
      2. focal zone
      3. depth
      4. compensation
      5. gain
      6. frame rate
      7. Doppler gain
      8. Doppler angle
      9. gate (sample volume) size/placement
     10. wall filter
     11. scale/pulse repetition frequency (PRF)
     12. color box (size and steering)
     13. dynamic range
     14. line density
     15. spectral baseline
   C. Measurements from Spectral Analysis
      1. peak systolic velocity (PSV)
      2. end diastolic velocity (EDV)
      3. resistive index (RI)/pulsatility index (PI)
      4. Measure of Systolic Acceleration
         a. acceleration time (AT)
         b. acceleration index (AI)
         c. tardus parvus waveform
      5. volume flow

(Image Production continues on the following page)
Image Production (continued)

3. Evaluation and Selection of Representative Images

A. Arterial and Venous Hemodynamics
   1. flow patterns (*e.g., turbulence, phasicity*)
   2. pressure
   3. velocity
   4. peripheral vascular resistance
   5. compliance

B. Criteria for Diagnostic Quality
   1. proper demonstration of anatomical structure
   2. proper demonstration of pathological conditions
   3. artifacts
   4. improvement of suboptimal images

C. Color and Spectral Analysis
   1. color aliasing
   2. direction of flow
   3. presence or absence of flow
   4. differentiation of normal and abnormal spectral waveforms

* The abbreviation “*e.g.,*” is used to indicate that examples are listed in parentheses, but that it is not a complete list of all possibilities.
Procedures

TYPE OF EXAM

1. Abdominal/Pelvic Vasculature
   A. Arterial
      1. aorta
      2. celiac
      3. hepatic
      4. splenic
      5. superior mesenteric/inferior mesenteric
      6. renal
      7. common iliac
      8. internal iliac
      9. external iliac
   B. Venous
      1. inferior vena cava
      2. hepatic
      3. portal
      4. splenic
      5. superior mesenteric
      6. renal
      7. pelvic varices
      8. common iliac
      9. internal iliac
     10. external iliac
   C. Transplant
      1. liver
      2. kidney

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

1. Practice Parameters
   (e.g., AIUM, ACR, IAC)
      • clinical indications
      • patient preparation
      • patient positioning
      • instrumentation (e.g., transducer, stand-off pads)
      • technical factors
      • evaluation and documentation of visualized anatomy
      • optimizing image quality
      • annotate images

2. Anatomy and Physiology
   • normal
   • normal variant
   • abnormal
   • measurements

3. Abnormalities
   • pathology
   • congenital anomalies
   • lab values
   • differential diagnosis

4. Doppler Applications/Blood Flow Characteristics

(Procedures continue on the following page.)
Procedures (continued)

TYPE OF EXAM

2. Arterial Peripheral Vasculature
   A. Upper Extremity
      1. subclavian
      2. axillary
      3. brachial
      4. radial
      5. ulnar
      6. digital (including Allen test)
   B. Lower Extremity
      1. external iliac
      2. common femoral
      3. superficial femoral
      4. deep femoral
      5. popliteal
      6. tibioperoneal trunk
      7. posterior tibial
      8. anterior tibial
      9. peroneal
     10. dorsalis pedis
   C. Stress/Pressure Testing
      1. PVR (pulse volume recording)
      2. segmental pressures – upper extremities
      3. segmental pressures – lower extremities
      4. ABI (ankle brachial index)
      5. post-exercise testing

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

1. Practice Parameters
   (e.g., AIUM, ACR, IAC)
   • clinical indications
   • patient preparation
   • patient positioning
   • instrumentation (e.g., transducer, stand-off pads)
   • technical factors
   • evaluation and documentation of visualized anatomy
   • optimizing image quality
   • annotate images

2. Anatomy and Physiology
   • normal
   • normal variant
   • abnormal
   • measurements

3. Abnormalities
   • pathology
   • congenital anomalies
   • lab values
   • differential diagnosis

4. Doppler Applications/Blood Flow Characteristics

(Procedures continue on the following page.)
Procedures (continued)

TYPE OF EXAM

3. Venous Peripheral Vasculature
   A. Upper Extremity Venous
      1. internal jugular
      2. subclavian
      3. axillary
      4. brachial
      5. cephalic
      6. basilic
      7. radial
      8. ulnar
   B. Lower Extremity Venous
      1. external iliac
      2. common femoral
      3. femoral
      4. deep femoral
      5. popliteal
      6. great saphenous
      7. small saphenous
      8. tibioperoneal trunk
      9. calf veins
   C. Venous Testing
      1. vein mapping (upper and lower)
      2. reflux assessment (e.g., perforators, varicose veins, valve competency, ablations)

FOCUS OF QUESTIONS

Questions for each section of the exam may address any of the following factors, as appropriate:

1. Practice Parameters (e.g., AIUM, ACR, IAC)
   • clinical indications
   • patient preparation
   • patient positioning
   • instrumentation (e.g., transducer, stand-off pads)
   • technical factors
   • evaluation and documentation of visualized anatomy
   • optimizing image quality
   • annotate images

2. Anatomy and Physiology
   • normal
   • normal variant
   • abnormal
   • measurements

3. Abnormalities
   • pathology
   • congenital anomalies
   • lab values
   • differential diagnosis

4. Doppler Applications/Blood Flow Characteristics

(Procedures continue on the following page.)
Procedures (continued)

**TYPE OF EXAM**

4. Extracranial Cerebral Vasculature and Other Sonographic Procedures
   A. Carotid Artery (CCA, ICA, ECA)
   B. Vertebral Artery
   C. Subclavian Artery
   D. Other Sonographic Procedures
      1. bypass grafts
      2. endografts
      3. dialysis access grafts/fistulae
      4. stents
      5. angioplasty
      6. thrombolysis
      7. post catheterization (e.g., pseudoaneurysm treatment, compression, guided thrombin injection)
      8. IVC filters
      9. TIPS
     10. lines
     11. post endarterectomy

**FOCUS OF QUESTIONS**

Questions for each section of the exam may address any of the following factors, as appropriate:

1. **Practice Parameters** (e.g., AIUM, ACR, IAC)
   - clinical indications
   - patient preparation
   - patient positioning
   - instrumentation (e.g., transducer, stand-off pads)
   - technical factors
   - evaluation and documentation of visualized anatomy
   - optimizing image quality
   - annotate images

2. **Anatomy and Physiology**
   - normal
   - normal variant
   - abnormal
   - measurements

3. **Abnormalities**
   - pathology
   - congenital anomalies
   - lab values
   - differential diagnosis

4. **Doppler Applications/Blood Flow Characteristics**