# CERTIFICATION EXAMINATIONS BLUEPRINT

# VASCULAR SONOGRAPHER

**October 2016**

This Blueprint applies to the examinations that will take place in 2017. It may be modified prior to future examinations, in which case notice will be provided.

# INTRODUCTION

As part of the requirements to qualify for the Canadian Registered Vascular Sonographer (CRVS) credential, candidates are required to successfully complete both the Core Sonographic Skills Examination and the Vascular Sonographer Examination, which consists of four components as follows: Cerbrovascular, Peripheral Venous, Peripheral Arterial and Abdominal Vascular.

The content of this blueprint is based on the National Competency Profile (NCP) Version 5.0 for the Vascular Sonographer and was revalidated in 2016. This examination blueprint identifies the competencies upon which questions will be based. Numbers and letters that appear in the blueprint refer to the corresponding competencies in the NCP.

This blueprint also identifies the total number of questions in each component of the examination and the approximate distribution of those questions among the examinable competencies.

**VASCULAR SONOGRAPHY**

| THE VASCULAR EXAMINATION CONSISTS OF 180 QUESTIONS IN THE FOLLOWING CATEGORIES: CEREBROVASCULAR, PERIPHERAL VENOUS, PERIPHERAL ARTERIAL & ABDOMINAL VASCULAR<br>TIME ALLOWED: 180 MINUTES | | |
|---|---|---|
| | **CEREBROVASCULAR SECTION 50 QUESTIONS** | |
| **2.2 Professional judgement** | | **1-3%** |
| e | Evaluate for contraindications to procedure and address as appropriate. | |
| g | Identify and respond to urgent sonographic findings. | |
| **3.3 Related techniques and procedures** | | **1-3%** |
| c | Perform palpation of areas of interest. | |
| d | Perform provocative maneuvers. | |
| e | Assess for signs and symptoms of vascular disease. | |
| **4.2 Use of equipment** | | **3-5%** |
| c | Perform sonographic examinations using pulsed wave Doppler. | |
| d | Perform sonographic examinations using colour Doppler. | |
| e | Perform sonographic examinations using power Doppler. | |
| h | Orient and manipulate transducer. | |
| i | Select optimal acoustic window. | |
| j | Use and optimize harmonic imaging. | |
| m | Identify artifacts and adjust instrument controls to optimize image. | |
| n | Measure structures. | |
| p | Measure Doppler waveforms. | |
| q | Perform calculations manually. | |
| s | Record patient position and plane of section on images. | |
| **5.1 Examination planning** | | **1-3%** |
| a | Interpret history, signs & symptoms and other relevant information. | |
| c | Modify scope of examination based on clinical history. | |
| d | Formulate sonographic scanning strategies. | |
| e | Integrate knowledge of anatomy and disease processes. | |
| **5.2 Integration of relevant, available diagnostic data** | | **1-3%** |
| a | Correlate results from laboratory tests. | |
| c | Correlate results from radiography. | |
| d | Correlate results from angiography. | |
| e | Correlate results from computerized tomography. | |
| g | Correlate results from magnetic resonance studies. | |
| q | Correlate results from auscultation. | |
| **5.3 Image quality** | | **2-4%** |
| a | Adjust patient positioning to advantage. | |
| d | Evaluate images for quality. | |
| e | Modify scope of examination based on sonographic findings. | |
| f | Evaluate completeness of examination. | |
| g | Recognize equipment limitations. | |
| h | Recognize technical limitations. | |

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| **5.4 Technical analysis** | | **7-9%** |
| a | Differentiate artifact from anatomic and pathologic findings. | |
| b | Differentiate normal variants from pathology. | |
| c | Use spatial reasoning to interpret images. | |
| d | Identify and prioritize differential findings. | |
| e | Formulate impression based on findings. | |
| **7.8 Vascular sonography** | | **4-6%** |
| a | Perform sonographic examination of structures of interest using techniques listed in Appendix 1.8 | |
| b | Recognize sonographic appearance of normal structures. | |
| c | Differentiate sonographic appearance of normal structures from anomalous and pathologic conditions. | |
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| | **PERIPHERAL VENOUS SECTION 35 QUESTIONS** | |
| **2.2 Professional judgement** | | **1-3%** |
| e | Evaluate for contraindications to procedure and address as appropriate. | |
| g | Identify and respond to urgent sonographic findings. | |
| **3.3 Related techniques and procedures** | | **1-3%** |
| c | Perform palpation of areas of interest. | |
| d | Perform provocative maneuvers. | |
| g | Assess for signs and symptoms of vascular disease. | |
| **4.2 Use of equipment** | | **1-3%** |
| c | Perform sonographic examinations using pulsed wave Doppler. | |
| d | Perform sonographic examinations using colour Doppler. | |
| e | Perform sonographic examinations using power Doppler. | |
| h | Orient and manipulate transducer. | |
| i | Select optimal acoustic window. | |
| j | Use and optimize harmonic imaging. | |
| m | Identify artifacts and adjust instrument controls to optimize image. | |
| n | Measure structures. | |
| p | Measure Doppler waveforms. | |
| s | Record patient position and plane of section on images. | |
| **5.1 Examination planning** | | **1-3%** |
| a | Interpret history, signs & symptoms and other relevant information. | |
| c | Modify scope of examination based on clinical history. | |
| d | Formulate sonographic scanning strategies. | |
| e | Integrate knowledge of anatomy and disease processes. | |
| **5.2 Integration of relevant, available diagnostic data** | | **1-3%** |
| a | Correlate results from laboratory tests. | |
| c | Correlate results from radiography. | |
| e | Correlate results from computerized tomography. | |
| f | Correlate results from nuclear medicine studies. | |

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| **5.3 Image quality** | | **2-4%** |
| a | Adjust patient positioning to advantage. | |
| b | Use breathing techniques to advantage. | |
| d | Evaluate images for quality. | |
| e | Modify scope of examination based on sonographic findings. | |
| f | Evaluate completeness of examination. | |
| g | Recognize equipment limitations. | |
| h | Recognize technical limitations. | |
| **5.4 Technical analysis** | | **5-7%** |
| a | Differentiate artifact from anatomic and pathologic findings. | |
| b | Differentiate normal variants from pathology. | |
| c | Use spatial reasoning to interpret images. | |
| d | Identify and prioritize differential findings. | |
| e | Formulate impression based on findings. | |
| **7.8 Vascular sonography** | | **3-5%** |
| a | Perform sonographic examination of structures of interest using techniques listed in Appendix 1.8. | |
| b | Recognize sonographic appearance of normal structures. | |
| c | Differentiate sonographic appearance of normal structures from anomalous and pathologic conditions. | |
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| | **PERIPHERAL ARTERIAL SECTION 50 QUESTIONS** | |
| **2.2 Professional judgement** | | **1-3%** |
| e | Evaluate for contraindications to procedure and address as appropriate. | |
| g | Identify and respond to urgent sonographic findings. | |
| **3.3 Related techniques and procedures** | | **1-3%** |
| b | Perform palpation of pulses. | |
| c | Perform palpation of areas of interest. | |
| d | Perform provocative maneuvers. | |
| g | Assess for signs and symptoms of vascular disease. | |
| h | Perform photoplethysmography. | |
| i | Perform arterial pressure testing and calculate indices. | |
| j | Perform vascular exercise testing. | |
| k | Perform continuous wave Doppler velocimetry in peripheral vessels. | |
| **4.2 Use of equipment** | | **2-4%** |
| c | Perform sonographic examinations using pulsed wave Doppler. | |
| d | Perform sonographic examinations using colour Doppler. | |
| e | Perform sonographic examinations using power Doppler. | |
| f | Perform sonographic examinations using continuous wave Doppler. | |
| h | Orient and manipulate transducer. | |
| i | Select optimal acoustic window. | |
| j | Use and optimize harmonic imaging. | |
| m | Identify artifacts and adjust instrument controls to optimize image. | |
| n | Measure structures. | |
| p | Measure Doppler waveforms. | |
| q | Perform calculations manually. | |
| s | Record patient position and plane of section on images. | |

**VASCULAR SONOGRAPHY**

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| **5.1 Examination planning** | | **1-3%** |
| a | Interpret history, signs & symptoms and other relevant information. | |
| c | Modify scope of examination based on clinical history. | |
| d | Formulate sonographic scanning strategies. | |
| e | Integrate knowledge of anatomy and disease processes. | |
| **5.2 Integration of relevant, available diagnostic data** | | **1-3%** |
| a | Correlate results from laboratory tests. | |
| c | Correlate results from radiography. | |
| d | Correlate results from angiography. | |
| e | Correlate results from computerized tomography. | |
| g | Correlate results from magnetic resonance studies. | |
| q | Correlate results from auscultation. | |
| **5.3 Image quality** | | **1-3%** |
| a | Adjust patient positioning to advantage. | |
| b | Use breathing techniques to advantage. | |
| d | Evaluate images for quality. | |
| e | Modify scope of examination based on sonographic findings. | |
| f | Evaluate completeness of examination. | |
| g | Recognize equipment limitations. | |
| h | Recognize technical limitations. | |
| **5.4 Technical analysis** | | **7-9%** |
| a | Differentiate artifact from anatomic and pathologic findings. | |
| b | Differentiate normal variants from pathology. | |
| c | Use spatial reasoning to interpret images. | |
| d | Identify and prioritize differential findings. | |
| e | Formulate impression based on findings. | |
| **7.8 Vascular sonography** | | **4-6%** |
| a | Perform sonographic examination of structures of interest using techniques listed in Appendix 1.8 | |
| b | Recognize sonographic appearance of normal structures. | |
| c | Differentiate sonographic appearance of normal structures from anomalous and pathologic conditions. | |
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| | **ABDOMINAL VASCULAR SECTION 45 QUESTIONS** | |
| **2.2 Professional judgement** | | **1-3%** |
| e | Evaluate for contraindications to procedure and address as appropriate. | |
| g | Identify and respond to urgent sonographic findings. | |
| **3.3 Related techniques and procedures** | | **1-3%** |
| c | Perform palpation of areas of interest. | |
| d | Perform provocative maneuvers. | |
| g | Assess for signs and symptoms of vascular disease. | |

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| **4.2 Use of equipment** | | **2-4%** |
| c | Perform sonographic examinations using pulsed wave Doppler. | |
| d | Perform sonographic examinations using colour Doppler. | |
| e | Perform sonographic examinations using power Doppler. | |
| h | Orient and manipulate transducer. | |
| i | Select optimal acoustic window. | |
| j | Use and optimize harmonic imaging. | |
| m | Identify artifacts and adjust instrument controls to optimize image. | |
| n | Measure structures. | |
| p | Measure Doppler waveforms. | |
| q | Perform calculations manually. | |
| s | Record patient position and plane of section on images. | |
| **5.1 Examination planning** | | **1-3%** |
| a | Interpret history, signs & symptoms and other relevant information. | |
| c | Modify scope of examination based on clinical history. | |
| d | Formulate sonographic scanning strategies. | |
| e | Integrate knowledge of anatomy and disease processes. | |
| **5.2 Integration of relevant, available diagnostic data** | | **1-3%** |
| a | Correlate results from laboratory tests. | |
| c | Correlate results from radiography. | |
| d | Correlate results from angiography. | |
| e | Correlate results from computerized tomography. | |
| g | Correlate results from magnetic resonance studies. | |
| q | Correlate results from auscultation. | |
| **5.3 Image quality** | | **3-5%** |
| a | Adjust patient positioning to advantage. | |
| b | Use breathing techniques to advantage. | |
| d | Evaluate images for quality. | |
| e | Modify scope of examination based on sonographic findings. | |
| f | Evaluate completeness of examination. | |
| g | Recognize equipment limitations. | |
| h | Recognize technical limitations. | |
| **5.4 Technical analysis** | | **7-9%** |
| a | Differentiate artifact from anatomic and pathologic findings. | |
| b | Differentiate normal variants from pathology. | |
| c | Use spatial reasoning to interpret images. | |
| d | Identify and prioritize differential findings. | |
| e | Formulate impression based on findings. | |
| **7.8 Vascular sonography** | | **4-6%** |
| a | Perform sonographic examination of structures of interest using techniques listed in Appendix 1.8. | |
| b | Recognize sonographic appearance of normal structures. | |
| d | Differentiate sonographic appearance of normal structures from anomalous and pahtologic conditions. | |

*The table below applies to Specific Competency 7.8.a, and lists the techniques the Vascular Sonographer should be able to utilize when examining the structures and characteristics noted.*

| STRUCTURE / CHARACTERISTIC | TECHNIQUES | | | | | |
|---|---|---|---|---|---|---|
| | real time assessment | measure (2D) | pulsed wave Doppler assessment | measure - pulsed wave Doppler | colour Doppler assessment | continuous wave Doppler assessment |
| **Abdominal vascular** | | | | | | |
| Aorta | C | C | C | C | C | |
| Celiac trunk | C | A | S | S | S | |
| Hepatic artery | C | C | C | C | C | |
| Superior mesenteric artery | C | A | S | S | S | |
| Inferior mesenteric artery | S | A | A | A | A | |
| Renal artery | C | A | S | S | S | |
| Hepatic veins | C | C | C | C | C | |
| Portal veins | C | C | C | C | C | |
| Inferior vena cava | C | S | S | S | S | |
| **Extracranial arteries** | | | | | | |
| Common carotid artery | C | A | C | C | C | |
| Internal carotid artery | C | A | C | C | C | |
| External carotid artery | C | A | C | C | C | |
| Vertebral artery | C | A | C | C | C | |
| Intracranial arteries | A | A | A | A | A | |
| **Peripheral arteries, upper extremity** | | | | | | |
| Innominate artery | S | S | S | S | S | |
| Subclavian artery | C | C | C | C | C | |
| Axillary artery | S | S | S | S | S | S |
| Brachial artery | S | S | S | S | S | S |
| Forearm arteries | S | S | S | S | S | S |
| **Peripheral arteries, lower extremity** | | | | | | |
| Iliac arteries | C | C | C | C | C | |
| Common femoral artery | C | C | C | C | C | C |
| Femoral artery | C | C | C | C | C | C |
| Popliteal artery | C | C | C | C | C | C |
| Calf arteries | C | | S | S | S | C |
| **Peripheral veins, upper extremity** | | | | | | |
| Jugular vein | S | | S | | S | |
| Innominate vein | S | | S | | S | |
| Subclavian vein | S | | S | | S | |
| Axillary vein | S | | S | | S | |
| Brachial vein | S | A | S | | S | |

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|---|---|---|---|---|---|---|
| Forearm veins | A | A | A | | A | |
| Basilic vein | S | A | S | | S | |
| Cephalic vein | S | A | S | | S | |
| **Peripheral veins, lower extremity** | | | | | | |
| Iliac veins | C | | C | | C | |
| Common femoral vein | C | | C | | C | |
| Femoral vein | C | | C | | C | |
| Popliteal vein | C | | C | | C | |
| Calf veins | S | | S | | S | |
| Saphenous veins | C | A | C | | C | |
| **Grafts and stents** | | | | | | |
| Aortic bypass and endografts | A | A | A | A | A | |
| Iliac grafts and stents | A | A | A | A | A | |
| Lower extremity bypass grafts and stents | A | A | A | A | A | |
| Hemodialysis grafts and fistulas | A | A | A | A | A | |
| Transjugular intrahepatic portosystemic shunts (TIPS) | A | A | A | A | A | |