



## Cardiovascular Computed Tomography Examination Content Outline

### (Outline Summary)

#	Domain	Percentage
1	Performing Pre-Exam Tasks	14%
2	Performing In-Suite Exam Functions	16%
3	Interpreting and Managing CT Findings	55%
4	Performing Post-Scan Tasks and Reporting Findings	15%

### (Detailed Outline)

<b>1</b>	<b>Performing Pre-Exam Tasks 14%</b>	<b>Knowledge, skill and/or ability related to performing pre-exam tasks</b>
1.A	Review prior focused medical history and clinical information	<ul style="list-style-type: none"> <li>• Knowledge of test relative and absolute contraindications</li> <li>• Knowledge of proper breath holding techniques</li> <li>• Knowledge of medications used in cardiovascular CT (such as beta blockers, calcium blockers, nitrates and ivabradine)</li> <li>• Knowledge of informed consent</li> <li>• Knowledge of diagnostic capabilities and limitations of the test</li> <li>• Knowledge of cardiovascular tests and alternative options</li> <li>• Knowledge of cardiovascular medicine as it pertains to cardiovascular CT, including calcium scoring</li> <li>• Knowledge of appropriate use criteria and relevant guidelines</li> <li>• Skill in communicating with patients, other physicians and other healthcare providers</li> <li>• Ability to integrate information and modify the planned procedure as required</li> <li>• Ability to identify critical information that might affect test indication, appropriateness, safety and performance</li> </ul>
1.B	Evaluate clinical indications considering appropriate use criteria	
1.C	Educate referring physician and other health care providers	
1.D	Perform or direct pre-test counseling for patient	
1.E	Screen for contraindications	
1.F	Perform or direct pre-test patient preparation and test instructions	
<b>2</b>	<b>Performing In-Suite Exam Functions 16%</b>	<b>Knowledge, skill and/or ability related to performing in-suite exam functions</b>
2.A	Supervise patient (pre-test, intra-scan, post-test)	<ul style="list-style-type: none"> <li>• Knowledge of cardiovascular CT physics</li> </ul>

	treatment optimization	<ul style="list-style-type: none"> <li>• Knowledge of contrast resolution and signal-to-noise ratios</li> <li>• Knowledge of contrast administration and contrast agents</li> <li>• Knowledge of how pacemakers affect cardiac CT scanning</li> <li>• Knowledge of pacemaker optimization options</li> <li>• Knowledge of proper ECG gating techniques and trouble-shooting</li> <li>• Knowledge of radiation dose reduction strategies</li> <li>• Knowledge of scanner capabilities and limitations</li> <li>• Knowledge of scanning protocol options</li> <li>• Knowledge of signs, symptoms and management of adverse contrast reactions</li> <li>• Knowledge of venous access and injection options, issues and complications</li> <li>• Ability to articulate instructions to technologists</li> <li>• Ability to assess scan artifacts and determine remedy</li> <li>• Ability to identify poor quality scans and make adjustments in scanning reconstruction</li> <li>• Ability to identify significance of and manage heart rate and arrhythmias</li> <li>• Ability to recognize and manage cardiovascular or other clinical distress</li> </ul>
2.B	Manage heart rate and recognize arrhythmias	
2.C	Adjust pacemaker settings as applicable for optimal scanning	
2.D	Select scanning protocol and troubleshoot scanning acquisition problems	
2.E	Perform scan quality assessment	
2.F	Practice radiation safety principles	
<b>3</b>	<b>Interpreting and Managing CT Findings 55%</b>	<b>Knowledge, skill and/or ability related to interpreting and managing CT findings</b>
3.A	Check for scan artifacts	<ul style="list-style-type: none"> <li>• Knowledge of standard nomenclature for coronary segments and dominance</li> <li>• Knowledge of various artifacts, their sources and their potential remedies (including artifacts related to bright structures, image processing artifacts and motion artifacts)</li> <li>• Ability to adjust scan parameters for cardiac vein scanning</li> <li>• Ability to apply proper acquisition modes (including LVADs)</li> <li>• Ability to apply protocols pertinent to cardiac chambers</li> <li>• Ability to apply protocols pertinent to cardiac function and assessment</li> <li>• Ability to apply protocols pertinent to valvular evaluation</li> <li>• Ability to assess pulmonary number, size, location and anomalies</li> <li>• Ability to correctly recognize and categorize coronary stenoses, location, severity, significance and risk</li> <li>• Ability to differentiate high risk from low risk coronary anomalies</li> </ul>
3.B	Assess coronary anatomy	
3.C	Quantify coronary artery stenosis	
3.D	Assess coronary stents	
3.E	Assess coronary artery bypass grafts	
3.F	Assess chronic total occlusions	
3.G	Perform plaque characterizations (e.g., identify high risk plaque)	
3.H	Assess coronary anomalies	
3.I	Assess pulmonary veins	
3.J	Assess cardiac veins	
3.K	Assess cardiac chambers	
3.L	Assess cardiac function	
3.M	Assess pericardium	

3.N	Assess native/artificial valves	<ul style="list-style-type: none"> <li>• Ability to identify non diagnostic scans or segments</li> <li>• Ability to interpret calcium score (including Agatston score, plaque volume, plaque mass, percentile)</li> <li>• Ability to measure size and categorize pericardial thickness</li> <li>• Ability to measure size and function of cardiac chambers</li> <li>• Ability to recognize and classify segmental and global cardiac function and pathology</li> <li>• Ability to recognize aortic pathology</li> <li>• Ability to recognize appendage pathology</li> <li>• Ability to recognize cardiac chamber pathologies</li> <li>• Ability to recognize cardiac devices (including variety and impact on interpretation)</li> <li>• Ability to recognize cardiac vein pathology</li> <li>• Ability to recognize congenital heart disease</li> <li>• Ability to recognize coronary anomalies</li> <li>• Ability to recognize high risk plaque features (such as high plaque volume, positive remodeling, spotty calcification, napkin ring sign, low attenuation plaque)</li> <li>• Ability to recognize indications for cardiac vein assessment</li> <li>• Ability to recognize indications for pulmonary vein assessment</li> <li>• Ability to recognize mediastinal and hilar pathology</li> <li>• Ability to recognize myocardium pathology (e.g., infarction, perfusion, aneurysm, masses, viability)</li> <li>• Ability to recognize non coronary calcium (such as .MAC)</li> <li>• Ability to recognize pathology related to device (e.g, pacer, ICD, hemodynamic support, etc.)</li> <li>• Ability to recognize pathology of other non-vascular structures (such as bones, other soft tissue, etc.)</li> <li>• Ability to recognize pleural effusions</li> <li>• Ability to recognize pulmonary nodules/tumors</li> <li>• Ability to recognize pulmonary vein pathology Ability to recognize septum pathology</li> <li>• Ability to recognize the differences in scanning and interpreting bypasses of different types and locations</li> <li>• Ability to recognize the differences in scanning and interpreting stents of different sizes and types</li> <li>• Ability to recognize the differences in scanning parameters for known chronic total occlusions</li> <li>• Ability to recognize the limitations of distinguishing subtotal and total occlusions</li> <li>• Ability to recognize the pertinent anatomic considerations when interpreting known chronic total</li> </ul>
3.O	Assess myocardium	
3.P	Assess appendage	
3.Q	Assess septum (atrial/ventricular)	
3.R	Assess percutaneous valvuloplasty procedures (e.g., feasibility of, TAVR, etc.)	
3.S	Assess congenital heart disease	
3.T	Assess aorta	
3.U	Assess pulmonary artery	
3.V	Assess vascular anomalies	
3.W	Assess common lung disease, pulmonary nodules/tumors and pleural effusions	
3.X	Assess mediastinal and hilar pathology	
3.Y	Assess other non-vascular structures (e.g., bones, soft tissue)	
3.Z	Assess calcium scoring	

		<p>occlusions</p> <ul style="list-style-type: none"> <li>• Ability to recognize therapeutic and prognostic implications of coronary pathology</li> <li>• Ability to recognize vascular pathology</li> </ul>
<b>4</b>	<b>Performing Post-Scan Tasks and Reporting Findings 15%</b>	<b>Knowledge, skill and/or ability related to performing post-scan tasks and reporting findings</b>
4.A	Supervise reconstruction protocols	<ul style="list-style-type: none"> <li>• Knowledge of the storage parameters for raw and reconstructed data</li> </ul>
4.B	Actively perform post-processing (i.e., manipulation and reformatting at workstation)	<ul style="list-style-type: none"> <li>• Knowledge of reformatting types, including strengths and limitations</li> </ul>
4.C	Evaluate and treat adverse contrast reactions and extravasations	<ul style="list-style-type: none"> <li>• Knowledge of DICOM and PACS storage capabilities and limitations</li> </ul>
4.D	Evaluate and manage contrast-induced nephropathy	<ul style="list-style-type: none"> <li>• Knowledge of image quality resolutions (such as contrast, temporal, spatial and field-of-view)</li> <li>• Ability to reconstruct raw data</li> <li>• Ability to utilize full capacity of workstation tools</li> <li>• Ability to reconstruction and post-processing options and indications for use</li> <li>• Ability to actively reformat multi planar images to improve image quality and diagnostic accuracy</li> </ul>