Canon Protocol

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Canon: 4 cm Systems

Aquilion Prime, Aquilion Prime SP, Aquilion Serve SP

This patient preparation protocol aligns with the 2016 SCCT Guidelines for the performance and acquisition of coronary computed tomographic angiography.[1]

Patient Preparation

The referring physician or provider should review the patient's history and screen them prior to the CCTA for any contraindications such as contrast allergies, pregnancy, renal impairment, and clinical instabilities (acute myocardial infarction, heart failure, and severe hypotension).[1]

Note: Cleerly is unable to analyze coronary artery bypass grafts. If a CABG study is submitted, Cleerly will reject the scan. However, pacemakers and stents are acceptable for analysis.

If a patient cannot cooperate with scan preparation, acquisition, and/or breath-hold instructions then it is best advised to forgo the CCTA scan. It is pertinent that the patient collaborates with CT technologists to achieve a high quality scan.

Patients should be informed of the preparation at the time of scheduling their CCTA. It is recommended that patients discontinue solid foods at least 3–4 hours before their scan to reduce nausea and a potential spike in heart rate, however water and clear fluids are acceptable and encouraged to consume. The patient should discontinue caffeine or stimulants 12 hours before the scan as this can decrease the ability to lower and stabilize the heart rate. The patient may continue to take routine medications under the direction of their physician. Since Nitroglycerin may be administered, it is important to discontinue the use of erectile dysfunction medication 72 hours before the scan (24 hours for sildenafil) and 24 hours post scan.[1]

The 2016 SCCT guidelines for the performance and acquisition of CCTAs recommends the use of Nitroglycerin and beta-blockers to enhance image quality. Cleerly recommends a Nitroglycerin dose of 0.8 mg, as it falls within guideline parameters and represents an optimal range to achieve consistent coronary vasodilation for improved visualization. A best practice is to wait 5 minutes post Nitroglycerin administration to ensure proper vasodilation. Beta-blockers can be prescribed by the patient's referring physician or upon arrival at the discretion of a qualified medical professional. The guidelines recommend to pre-medicate patients with 50 mg metoprolol by mouth 12 hours before the scan and another 50–100 mg metoprolol by mouth 1 hour before the scan. Slow-release forms of beta-blockers should not be used. Supplement IV beta-blockers can be administered to help reduce the patient's heart rate immediately prior to the exam. If Supplemental IV beta-blockers are called for, then it is common practice to administer 5 mg of IV metoprolol followed by 5 minutes of monitoring. If the target heart rate is not reached and the patient's vitals allow for it, this process can be repeated for a total dose of up to 20–25 mg.[1]

Even if the patient's heart rate is within the target threshold, it is common practice to administer a small dose of beta-blockers to stabilize and to avoid an elevated heart rate due to contrast administration.[1]

It is essential to educate and instruct the patient of what to expect during the scan such as breathing instructions, IV contrast administration, and scan duration. Convey clear expectations for the patient. For example, explain what the patient can expect before, during, and after the scan and the purpose of beta-blockers and Nitroglycerin. Brief the patient on potential side effects of the contrast and medication. By informing the patient this can drastically reduce anxiety thus help produce excellent image quality.

Guidelines Suggested ECG-Gated Acquisition

- Prospective gating should be utilized if the heart rate is at, or below, the target heart rate and if there is minimal variance (< 4 bpm).
- Retrospective gating should be utilized if the heart rate is greater than the target heart rate and/or if there is significant variance (> 4 bpm).

Rotation Time	Target Heart Rate
0.35 seconds	≤ 60 bpm

Acquisition

Scanogram	BMI ≤ 30	BMI > 30
AP kV	120	120
AP mA	30	30
Lateral kV	120	120
Lateral mA	100	100

Bolus Tracking	BMI ≤ 30	BMI > 30
mA	50	50
Monitoring Delay(s)	10	10
Monitoring Inter-Scan Delay (ISD)	2.0	2.0
Enhancement Threshold (HU)	180–220	180–220
Diagnostic Delay	0	0
ROI Placement	Descending Aorta	Descending Aorta

Prospective

	BMI ≤ 30	BMI > 30
Scan Type	Helical	Helical
Cardiac Mode	Prospective	Prospective
Scan FOV	220 (L)	220 (L)
Rotation Time(s)	0.35	0.35
kV	100	120
	If calcified plaque is present, then use 120 kVp.	
AEC Type	Cardiac CTA Standard	Cardiac CTA Standard
mA	AEC	AEC
Start-End Phase	60–80%	60–80%
Cardiac Gating	Yes	Yes
Slice Thickness (mm)	0.5	0.5

Retrospective

	BMI ≤ 30	BMI > 30
Scan Type	Helical	Helical
Cardiac Mode	Retrospective	Retrospective
Scan FOV	220 (L)	220 (L)
Rotation Time(s)	0.35	0.35
kV	100	120
	If calcified plaque is present, then use 120 kVp.	
AEC Type	Cardiac CTA Standard	Cardiac CTA Standard
mA	AEC	AEC
Start-End Phase	30–80%	30–80%
Cardiac Gating	Yes	Yes
Slice Thickness (mm)	0.5	0.5

Reconstruction

Multiphase	
A minimum of 5 unique axial series are requested	
Acquisition window of 70–80%	Every 2% and 75%
Acquisition window of 60–80%	Every 5%
Acquisition window of 30–80%	Every 10% and 35% and 75%
DFOV (mm)	180
Recon Type/Kernel	Standard (FC03)
Iterative Reconstruction	AICE*/PIQE*
Iterative Reconstruction Level	Standard
Slice Thickness (mm)	0.5
Interval (mm)	0.5

Cardiac PhaseXact	
DFOV (mm)	180
Recon Type/Kernel	Sharp (FC05)
Iterative Reconstruction	AICE*/PIQE*
Iterative Reconstruction Level	Standard
Slice Thickness (mm)	0.5
Interval (mm)	0.5

******Note: Please disable the Enhanced CT (multi-frame DICOM) option per manufacturer instructions. Contact your Canon Service Representative for guidance on this option. Cleerly software is currently unable to analyze any CCTA with this function enabled.***

- ▲ ***Reconstruct all cardiac series from the Multi View tab and create axial thin datasets into ≤ 0.5 mm x 0.5 mm increment or less. Reconstructions created on the volume dataset are currently unable to be analyzed by Cleerly software.***

Contrast Protocol

kVp	Iodine Concentration (mg/mL)	Volume (mL) @ Standard Injection Rate (mL/s)	Large Habitus Volume (mL) @ Standard Injection Rate (mL/s)	Saline Chaser
100	320	**65–70 mL** @ 5.0–5.5 mL/s		40 mL
	350	**55–60 mL** @ 4.0–4.5 mL/s		40 mL
	370	**55–60 mL** @ 4.0–4.5 mL/s		40 mL
120	320	**78–85 mL** @ 6.0–6.5 mL/s	**90–97 mL** @ 7.0–7.5 mL/s	40 mL
	350	**65–70 mL** @ 5.0–5.5 mL/s	**78–85 mL** @ 6.0–6.5 mL/s	40 mL
	370	**65–70 mL** @ 5.0–5.5 mL/s	**78–85 mL** @ 6.0–6.5 mL/s	40 mL

Formula: (scan delay time + acquisition time) x flow rate = contrast volume[1]

[1]Abbara S, Blanke P, Maroules CD, et al. SCCT guidelines for the performance and acquisition of coronary computed tomographic angiography: A report of the society of Cardiovascular Computed Tomography Guidelines Committee: Endorsed by the North American Society for Cardiovascular Imaging (NASCI). *J Cardiovasc Comput Tomogr*. 2016 Nov-Dec;10(6):435-449.

Canon: 16 cm Systems

Aquilion ONE, Aquilion ONE Genesis, Aquilion ONE Insight, Aquilion ONE Prism, Aquilion ONE Vision

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Patient Preparation

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Rotation Time	Target Heart Rate
0.35 seconds	≤ 60 bpm
< 0.30 seconds	≤ 65 bpm

Acquisition

Scanogram	BMI ≤ 30	BMI > 30
AP kV	120	120
AP mA	30	30
Lateral kV	120	120
Lateral mA	100	100

Bolus Tracking	BMI ≤ 30	BMI > 30
mA	50	50
Monitoring Delay(s)	7.0	7.0
Monitoring Inter-Scan Delay (ISD)	2.0	2.0
Enhancement Threshold (HU)	220–300	220–300
Diagnostic Delay	0	0
ROI Placement	Descending Aorta	Descending Aorta

Prospective

	BMI ≤ 30	BMI > 30
Scan Type	Volume	Volume
Cardiac Mode	Prospective	Prospective
Scan FOV	220 (L)	220 (L)
Rotation Time(s)	0.35, 0.275*, 0.24	0.35, 0.275*, 0.24
kV	100	120
	If calcified plaque is present, then use 120 kVp.	
AEC Type	Cardiac CTA Standard	Cardiac CTA Standard
mA	AEC	AEC
Start-End Phase	60–80%	60–80%
Cardiac Gating	Yes	Yes
Slice Thickness (mm)	0.5	0.5

Reconstruction

Multiphase	
A minimum of 5 unique axial series are requested	
Acquisition window of 70–80%	Every 2% and 75%
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Iterative Reconstruction	AICE*/PIQE*
Iterative Reconstruction Level	Standard
Slice Thickness (mm)	0.5
Interval (mm)	0.5

Cardiac PhaseXact	
DFOV (mm)	180
Recon Type/Kernel	Sharp (FC05)
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