

# CTA Coronary with Calcium Score / CTA Angiography Heart

**Reviewed By:** Daniel Verdini, MD; Rachael Edwards, MD

**Last Reviewed:** October 2019

**Contact:** (866) 761-4200

*In accordance with the ALARA principle, TRA policies and protocols promote the utilization of radiation dose reduction techniques for all CT examinations. For scanner/protocol combinations that allow for the use of automated exposure control and/or iterative reconstruction algorithms while maintaining diagnostic image quality, those techniques can be employed when appropriate. For examinations that require manual or fixed mA/kV settings as a result of individual patient or scanner/protocol specific factors, technologists are empowered and encouraged to adjust mA, kV or other scan parameters based on patient size (including such variables as height, weight, body mass index and/or lateral width) with the goals of reducing radiation dose and maintaining diagnostic image quality.*

**If any patient at a TRA outpatient facility requires CT re-imaging, obtain radiologist advice prior to proceeding with the exam.**

---

**Indication:** Chest pain, concern for coronary artery disease in low and intermediate risk patients, anomalous coronary artery, equivocal stress test, etc.

**Prep:**

\*\*A negative troponin is required for ED patients prior to scanning, unless exam has been ordered by Cardiologist; if result is not available, call radiologist\*\*

\*\* Pre-Medication: The CCTA radiologist should ALWAYS be called prior to ANY medication administration (this includes metoprolol, nitro, and IV fluids).

Beta blockers = Metoprolol

\*\*GE Scanner (FHS) and Non-FLASH Siemens (MHS)\*\*

RADIOLOGIST MUST BE NOTIFIED PRIOR TO MEDICATION ADMINISTRATION

- If heartrate is > 75 bpm and systolic blood pressure > 95mmHg, 100mg of Metoprolol by mouth
  - Scan 45-60 minutes after dose administered
- If heartrate is > 75 bpm and systolic blood pressure < 95mmHg, call Radiologist due to risk of hypotension
- If heartrate < 75 bpm, no Metoprolol is needed

**\*\*Siemens Scanner, FLASH (MHS)\*\***

- If heartrate is > 90 bpm and systolic blood pressure > 95mmHg, 100mg of Metoprolol by mouth
  - Scan 45-60 minutes after dose administered
- If heartrate is > 90 bpm and systolic blood pressure < 95mmHg, call Radiologist due to risk of hypotension
- If heartrate < 90 bpm, no Metoprolol is needed

**Sublingual Nitroglycerin**

- **Contraindications** (do not give nitro and call radiologist)
  - Ingestion of erectile dysfunction medication (Viagra, Cialis, etc.) in last 24 hours
  - History of severe aortic stenosis or hypertrophic cardiomyopathy
  - Currently taking medications for glaucoma
- **Administration**
  - Sublingual tablets: confirm with patient tablets have dissolved prior to scanning
  - Sublingual spray: Ensure spray tube is primed by spraying away from patient prior to administering SL spray
- If without contraindications, then:
  - If systolic blood pressure is >95mmHg, give sublingual nitroglycerin two tablets or sprays (0.8 mg total dose)
  - If systolic blood pressure is <95mmHg, call Radiologist due to risk of hypotension
  - **CTA should be done 4-7 minutes after NTG is given.**

**Patient Position:**

1. Supine: Cardiac breathing (Hyperventilation), Feet down with arms above head
2. Female patients: Attempt breast displacement by moving breasts laterally and superiorly which may be secured in some cases with the CT binder strap.

**Scan Range (CC Z-AXIS):** Carina through base of heart, center on both frontal (for superior border) and lateral (for inferior border) scouts/topograms

- If patient has had bypass (CABG) or aortic evaluation also needed, call CCTA radiologist and plan to extend coverage to top of lungs (*and scan caudocranial*)

**IV Contrast:**

- Exam requires IV to be antecubital or more central in location (no forearm, wrist, hand IVs)
- Ideally, IV should be in right antecubital (AC) fossa; left AC is 2<sup>nd</sup> choice
- IV **must** be rated for 5cc/sec or higher; default rate is 6cc/sec

**Acquisitions:**

**TWO** acquisitions total typically = Non-contrast and IV contrast enhanced CTA

NOTES:

- If pt is < 40 yo and **not** from ER, call Radiologist to see if non-contrast necessary
- Rarely, delayed phase may be necessary in cases of aneurysm, cardiac mass, etc and will be decided on by CCTA radiologist.
- If Calcium score > 800, please call Radiologist to check to see if arterial scan will be performed

**Breathing Instructions:** *MUST be followed to decrease motion artifact.*

- Perform a practice run with the patient to ensure understanding
  - To be done while patient is lying on the CT table after hooking up EKG leads PRIOR to acquiring images
  - Choose cardiac package breathing instructions

**1. Non-contrast**

- GE:
  - No ASIR
  - DFOV: 25 cm
  - kV: 120
  - mA settings:
    - BMI table
- Siemens:
  - care kV OFF
  - kV: 120
  - mA settings:
    - Care dose
- Toshiba:
  - No AIDR
  - DFOV: 25 cm
  - kV: 120
  - mA settings:
    - small patient (<120 lbs): 300 mA
    - average patient: 340 mA
    - large patient (BMI > 40): 450 mA

**2. CTA Coronary with IV contrast**

- **kV and mA:**
  - Siemens: Care kV and Care dose
  - GE scanner – BMI table
  - Contrast bolus:
    - Trigger delay with HU threshold of 100HU in the ascending aorta
    - Test Bolus: 15 cc contrast w/ 15cc flush; ROI in ascending aorta + 5 sec to peak
- ECG Gating:
  - **Siemens 128 (Flash) ONLY:**
    - Heartrate <75 bpm: prospective ECG gating
    - Heartrate >75 retrospective ECG gating
  - **All other scanners:** Retrospective (dose-modulated)
    - 0-90% R-R interval with pulse modulation

- Tube on full dose for 65-85% and low dose (20% dose) remaining time

**Series and Reformats:**

**\*\*If your scanner cannot reconstruct the exact axial thickness specified, reconstruct the closest axial thickness but not thicker than requested dimensions below\*\***

**-example: Axial 2mm requested and scanner can only recon 2.5mm or 1.25mm → choose the 1.25mm thickness**

**1. Non-contrast: (same for all scanners and sites)**

- Axial 2.5 – 3mm mm ST kernel (22-25 cm FOV around heart)
- *NOTE: Please calculate calcium scores on every **coronary** CTA, EXCEPT if there has been prior coronary artery bypass grafting and/or stents*

**2. CTA Coronary with IV contrast: (differs by scanner, see below)**

• **Siemens:**

- CTA: Axial 0.6 mm slice thickness “Best systole” (I31 or I41 kernel; FOV around heart)
- Multiphase: Axial 0.6 mm slice thickness multiphase coronary CTA; (FOV around heart) 200 - 440ms increments of 20ms for FLASH, 65 – 85% in increments of 5% for Definition
- Function: Axial 2mm slice thickness (FOV around heart) – 0- 90% in Increments of 10%
- Chest / Full FOV (soft tissue/standard kernel, full FOV)
  1. Axial 2 mm slice thickness (I30 kernel)
  2. Coronal: 2x2mm slice thickness
  3. Sagittal: 2x2mm slice thickness
  4. Axial 10 x 2 MIPS (soft tissue/standard kernel, full FOV)

• **GE:**

- CTA: Axial 0.625 mm slice thickness @ 75% (soft tissue/standard kernel, 25 cm FOV around heart)
- Multiphase: Axial 0.625 mm slice thickness multiphase coronary CTA 65-85% in 5% increments (soft tissue/standard kernel, 25 cm FOV around heart)
- Function: Axial 2mm slice thickness (soft tissue/standard kernel, 25 cm FOV around heart) 0-90% with increment of 10%
- Chest / Full FOV: (soft tissue/standard kernel, full FOV)
  1. Axial 2 mm slice thickness
  2. Coronal: 2x2mm slice thickness
  3. Sagittal: 2x2mm slice thickness

4. *Axial* 10 x 2 MIPS (soft tissue/standard kernel, full FOV)

- **Toshiba:**

- CTA: *Axial* 0.625 mm slice thickness @ 75% (soft tissue/standard kernel, 25 cm FOV around heart)
- Multiphase: *Axial* 0.625 mm slice thickness multiphase coronary CTA 65-85% in 5% increments (soft tissue/standard kernel, 25 cm FOV around heart)
- Function: *Axial* 2mm slice thickness (soft tissue/standard kernel, 25 cm FOV around heart) 0-90% with increment of 10%
- Chest / Full FOV: (soft tissue/standard kernel, full FOV)
  1. *Axial* 2 mm slice thickness (130 kernel)
  2. *Coronal*: 2x2mm slice thickness
  3. *Sagittal*: 2x2mm slice thickness
  4. *Axial* 10 x 2 MIPS (soft tissue/standard kernel, full FOV)