

## **EKG Gated CTA Thoracic Aorta = CTA Chest (Inpatient / ED)**

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*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 re-imaging, please obtain radiologist advice prior to proceeding with exam.**

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The following document is an updated CT protocol for all of the sites at which TRA is responsible for the administration, quality, and interpretation of CT examinations.

### **Include for ALL exams**

- **Scout:** Send all scouts for all cases
- **Reformats:** Made from *thinnest source* acquisition
  - Scroll Display
    - Axial recons - Cranial to caudal
    - Coronal recons - Anterior to posterior
    - Sagittal recons - Right to left
  - Chest reformats should be in separate series from Abdomen/Pelvis reformats, where applicable
- **mAs**
  - Prefer: Quality reference mAs for specific exam, scanner and patient size
  - Auto mAs, as necessary

## **EKG Gated CTA Thoracic Aorta; Inpatient / ED**

**Indication:** Thoracic aortic aneurysm, aortic dilation, aortic dissection, Thoracic EndoVascular Aortic Repair (TEVAR), etc

**The Gated CTA Thoracic Aorta protocol should be performed as the default CTA thoracic aorta protocol for scanners capable of EKG gating, 7 days / week, 7:30am – 5pm.**

**\*NOTES\*:**

- **Non-contrast:** may not be necessary in patients < 40 years old and not having acute chest pain, please contact Rad if questions
- **Delayed phase** is needed if there is history of vascular stent (TEVAR) or for requested venous evaluation

**Patient Position:** Supine, feet down with arms above head

**Scan Range (CC z-axis):** Lung apices to bottom of heart / aortic hiatus (where aorta crosses the diaphragm (smaller field than routine Chest CT))

**IV Contrast Dose, Flush, Rate and Delay:**

- Dose: (modify volume if using something other than Isovue 370)
  - < 200 lbs            80 mL Isovue 370
  - > 200 lbs            100 mL Isovue 370
- Flush: 50 mL saline
- Rate: 4 mL/sec (20g or larger IV, at least 4 inches above wrist, or pressure injectable line)
- Arterial delay: Bolus trigger off of Ascending Aorta (threshold 125HU)

**Acquisitions:** typically 2 (non contrast and arterial; if pt < 40yo, call Rad to see if Noncon needed)

**NOTES:**

- Breathing (all phases): End inspiration
- kV (all phases): Scanner specified (Care kV for Siemens, BMI table for GE) or 80kV for < 150lbs, 100kV for 150 – 250 lbs, 120kV for > 250 lbs
- Coverage (all phases): lung apices to diaphragm hiatus / bottom of heart

- **Non contrast phase**
  - Use this exam to ensure proper coverage for arterial scan
  - Helical acquisition (non-EKG gated), thickness (slice) 1.0 – 1.25 mm
- **Arterial phase**
  - Trigger bolus off ascending aorta, threshold 125 HU
  - NOTE: Use care in setting of dissection due to false lumen, may require manual trigger
  - Acquisition helical thickness (slice) 0.6-0.75 mm
  - EKG gating: Helical, dose-modulated Retrospective with 70-80% window; MinDose on Siemens
- **Delay phase (if done - patients with stent/graft, s/p TEVAR, venous evaluation)**
  - Delay of 60 seconds (or 20 seconds after arterial finishes)
  - Acquisition helical thickness (slice) 1.0-1.25 mm
  - EKG gating: Helical, dose-modulated Retrospective with 70-80% window; MinDose on Siemens

**Series + Reformats:**

- **Non-contrast**
  - Axial 1.0-1.25 mm, FFOV, soft tissue kernel, **TERA / VIA**
- **Arterial**
  - Thin Axial 0.6-0.75 mm, **coned down to aorta**, soft tissue or Vascular kernel (**TERA / VIA**); Siemens: Best Diastolic, GE: 75%
  - Axial 2-2.5 mm, FFOV, soft tissue kernel (**TERA / VIA**) Siemens: Best Diastolic, GE: 75%
  - Axial 10 x 2 mm MIP, FFOV, soft tissue kernel
  - Coronal 2 x 2 mm, FFOV, soft tissue kernel
  - Sagittal 2 x 2 mm, FFOV, soft tissue kernel
  - Sagittal MIP 5 x 2 aorta, FFOV
- **Delay (if performed)**
  - Axial 1.0 – 1.25 mm, FFOV, soft tissue kernel (**TERA / VIA**) Siemens: Best Diastolic, GE: 75%

**\*\*\*Machine specific protocols are included below for reference\*\***

Machine specific recons (axial ranges given above for machine variability):

**\*NON-CONTRAST PHASE - Soft tissue (ST) Kernel, machine-specific thickness (axial):**

- GE = 1.25 mm
- Siemens = 1.2 mm (or 1.5 mm on older generation)
- Toshiba = 1.5 mm

**\*THIN, AXIAL ARTERIAL PHASE - Soft tissue (ST) Kernel, machine-specific thickness (axial):**

- GE = 0.625 mm
- Siemens = 0.6 mm
- Toshiba = 0.625 mm

**\*AXIAL ARTERIAL PHASE (not thin) - Soft tissue (ST) Kernel, machine-specific thickness (axial):**

- GE = 2.5 mm
- Siemens = 2 mm
- Toshiba = 2 mm

**\*AXIAL DELAYED PHASE - Soft tissue (ST) Kernel, machine-specific thickness (axial):**

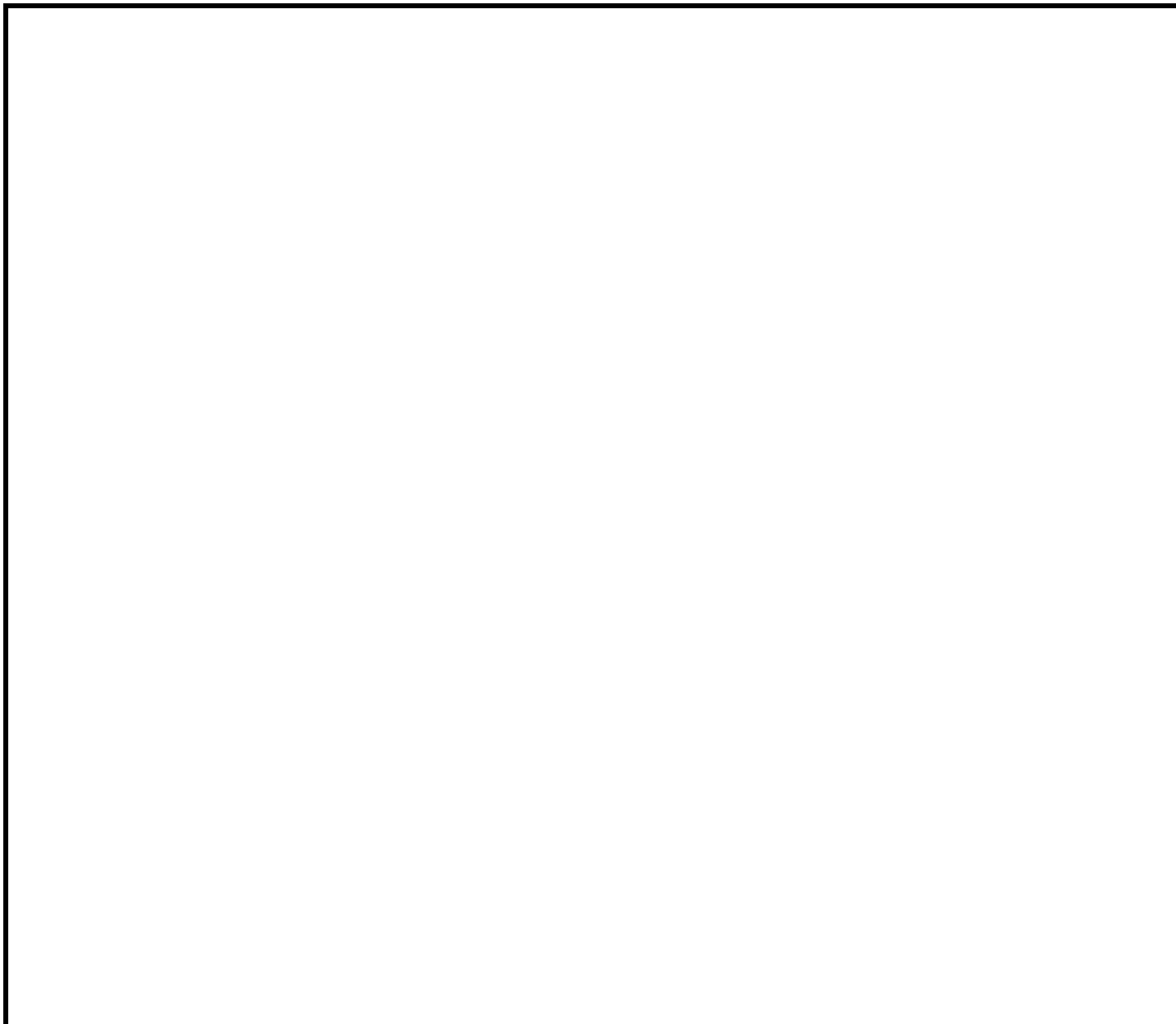
- GE = 1.25 mm
- Siemens = 1.2 mm (or 1.5 mm on older generation)
- Toshiba = 1.5 mm

**\*AXIAL ARTERIAL, Lung Kernel, machine-specific thickness**

- GE = 1.25 mm
- Siemens = 1.2 mm (or 1.5 mm on older generation)
- Toshiba = 1.5 mm

**\*DELAY Soft tissue (ST) Kernel, machine-specific thickness (axial):**

- GE = 1.25 mm
- Siemens = 1.2 mm (or 1.5 mm on older generation)
- Toshiba = 1.5 mm



## General Comments

### NOTE:

Use of IV contrast is preferred for most indications *aside from*: pulmonary nodule follow-up, HRCT, lung cancer screening, and in patients with a contraindication to iodinated contrast (see below).

### Contrast Relative Contraindications

- **Severe contrast allergy:** anaphylaxis, laryngospasm, severe bronchospasm
  - If there is history of severe contrast allergy to IV contrast, avoid administration of oral contrast
- **Acute kidney injury (AKI):** Creatinine increase of greater than 30% over baseline
  - Reference hospital protocol (creatinine cut-off may vary)
- **Chronic kidney disease (CKD) stage 4 or 5** (eGFR < 30 mL/min per 1.73 m<sup>2</sup>) **NOT** on dialysis
  - Reference hospital protocol

### Contrast Allergy Protocol

- Per hospital protocol
- Discuss with radiologist as necessary

### Hydration Protocol

- For eGFR **30-45 mL/min** per 1.73 m<sup>2</sup>: Follow approved hydration protocol

### IV Contrast (where indicated)

- Isovue 370 is the default intravenous contrast agent
  - See specific protocols for contrast volume and injection rate
- If Isovue 370 is unavailable:
  - Osmolality 350-370 (i.e., Omnipaque 250): Use same volume as Isovue 370
  - Osmolality 380-320 (i.e., Isovue 300, Visipaque): Use indicated volume + **25 mL** (*not to exceed 125 mL total contrast*)

### Oral Contrast

- Dilutions to be performed per site/hospital policy (unless otherwise listed)
- Volumes to be given per site/hospital policy (unless otherwise listed)
- TRA-MINW document is available for reference if necessary (see website)

### Brief Summary

- Chest only
  - ✓ Chest W, Chest WO
  - ✓ CTPE
  - ✓ HRCT
  - ✓ Low Dose Screening/Nodule

- None
- Pelvis only
  - ✓ Pelvis W, Pelvis WO
    - Water, full instructions as indicated
- Routine, excluding chest only and pelvis only
  - ✓ Abd W, Abd WO
  - ✓ Abd/Pel W, Abd/Pel WO
  - ✓ Chest/Abd W, Chest/Abd WO
  - ✓ Chest/Abd/Pel W, Chest/Abd/Pel WO
  - ✓ Neck/Chest/Abd/Pel W, Neck/Chest Abd Pel WO
  - ✓ CTPE + Abd/Pel W
  - TRA-MINW offices: Dilute Isovue-370
  - Hospital sites:
    - ED: Water, if possible
    - Inpatient: prefer Dilute Isovue 370
      - Gastrografin OK if Isovue unavailable
      - Avoid Barium (Readi-Cat)
    - FHS/MHS Outpatient: Gastrografin and/or Barium (Readi-Cat)
- Multiphase abdomen/pelvis
  - ✓ Liver, pancreas
    - Water, full instructions as indicated
  - ✓ Renal, adrenal
    - None
- CTA abdomen/pelvis
  - ✓ Mesenteric ischemia, acute GI bleed, endograft
    - Water, full instructions as indicated
- Enterography
  - Breeza, full instructions as indicated
- Esophogram
  - Dilute Isovue 370, full instructions as indicated
- Cystogram, Urogram
  - None

- Venogram
  - Water, full instructions as indicated