

TAVR CT

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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 CT re-imaging, obtain radiologist advice prior to proceeding with the exam.

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

TAVR CT

Indication: Aortic stenosis, aortic insufficiency

***NOTES*:**

- **Tera Recon:** All arterial axial (EKG gated and non-gated) recons go to Tera Recon
- **NO** medications should be given to TAVR patients

Patient Position: Supine, feet down with arms above head

Scan Range (CC z-axis): Thoracic Inlet to Ischial tuberosities

IV Contrast Dose, Flush, Rate, and Delay:

- Dose: (modify volume if using something other than Isovue 370)
 - < 150 lbs 80 mL Isovue 370
 - 150-300 lbs 100 mL Isovue 370
 - >300 lbs 120 mL Isovue 370
- Flush: 50 mL saline
- Rate: 3-4 mL/sec

Acquisitions: 2 (Non contrast and arterial)

NOTES:

- Breathing (all phases): End inspiration / TAVR (may need to manually instruct patient to breath at end of C/A/P acquisition)
- kV (all phases): Scanner specified (Care kV for Siemens, BMI table for GE) or 100kV for < 150lbs, 120kV for > 150 lbs

- **Non contrast phase**
 - Coverage: Immediately above aortic arch to diaphragm
 - Acquisition helical thickness (slice) 1.2-1.5 mm
 - EKG gating
 - Systolic based prospective (Siemens Flash) or retrospective (GE scanners) EKG gating with dose modulation

- **Arterial phase (2 linked acquisitions to decrease delay between scans, gated heart and C/A/P)**
 1. Gated Heart
 - Coverage: just below carina to bottom of heart
 - Scan direction: Caudocranial
 - Trigger bolus off ascending aorta, threshold 50 – 100 HU
 - EKG Gating:
 - Systolic based retrospective EKG gating with dose modulation
 - Acquisition helical thickness (slice) 0.6-0.625 mm

 2. Chest / Abdomen / Pelvis
 - Coverage: thoracic inlet to ischial tuberosities
 - Scan direction: Craniocaudal
 - Linked to gated CTA heart (no breathing instructions between)

- Acquisition helical thickness (slice) 1.2-1.5 mm
- Where capable: FLASH acquisition

Series + Reformats:

- **Non-contrast**
 - Axial 1.2-1.5 mm soft tissue kernel
- **Arterial**
 1. HEART
 - Thin Axial heart 0.6-0.625 mm (thinnest axial recon possible) ST or Vascular kernel (***TERA RECON***)
 - Thin Axial Multiphase heart 0.6–0.625mm (200-440ms in increments of 20ms) (***TERA RECON***)
 2. CHEST / ABD / PEL
 - Axial (not thin) Chest-Abdomen-Pelvis 2-2.5 mm soft tissue kernel (***TERA RECON***)
 - Coronal Chest 2 mm soft tissue kernel
 - Sagittal Chest 2 mm soft tissue kernel
 - Axial Chest 10 x 2 mm MIPS soft tissue kernel
 - Coronal Abdomen / Pelvis 2 mm soft tissue kernel
 - Sagittal Abdomen / Pelvis 2 mm soft tissue kernel

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

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

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

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

- GE = 2.5 mm
- Siemens = 2 mm
- Toshiba = 2 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 m²) **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 m²: 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