

CTA Upper Extremity

Reviewed By: Drs. Daniel Verdini & Jamie All
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Contact: (866) 761-4200, Option 1

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
- **kVp**
 - 100 @ <140lbs
 - 120 @ >140lbs
- **mAs**
 - Prefer: Quality reference mAs for specific exam, scanner and patient size
 - Auto mAs, as necessary

CTA Upper Extremity

Indication: Trauma, vascular compromise, vascular planning, etc

**This protocol is NOT for thoracic outlet syndrome, please see separate protocol for that exam

Patient Position: Supine, please make sure correct extremity being imaged, patient's arm preferably above patient's head with palm up and fingers extended, but if not possible, can be down at patient's side. Consider use of pillows / wedge to stabilize arm as much as possible. Arm should be isocentered. The opposite arm should be down if imaged arm is up and if the imaged arm has to be down, then opposite arm should be up if possible.

Scan Range (CC z-axis): Aortic arch through hand for each acquisition (can be tailored to area of interest, contact Rad if in doubt)

If objective is arterial evaluation of hand, keep hand warm by wrapping in heated blankets

IV Contrast Dose, Flush, Rate, and Delay:

- Access: Should be 18 or 20g in arm **opposite** of arm being evaluated
- Dose: (modify volume if using something other than Isovue 370)
 - < 200 lbs 60 mL Isovue 370
 - > 200 lbs 80 mL Isovue 370
- Flush: 50 mL saline
- Rate: 3-4 cc/sec (18 or 20g IV ideally)
- Delay:
 - Arterial: Trigger off of Aorta (threshold 100 HU)
 - Delayed acquisition: 75 sec after contrast administration

Acquisitions: 2 (arterial, delay)

- **Arterial phase**
 - Trigger off **Aortic Arch** (Threshold 100HU)
 - Acquisition helical thickness (slice) 0.6 - 1 mm
- **Delay phase**
 - Delay of 75 sec after contrast starts
 - Acquisition helical thickness (slice) 1.0 - 1.25mm

Series + Reformats:

- **Arterial**
 - Axial (thin) 0.6- 1mm soft tissue kernel
 - Axial (not thin) 2-2.5 mm soft tissue kernel
 - Coronal 2 x 2 mm soft tissue kernel
 - Sagittal 2 x 2 mm soft tissue kernel
 - Coronal MIP 5 x 2 mm soft tissue kernel

- **Venous**
 - Axial 1.0 – 1.25 mm soft tissue kernel

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

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

- GE = 0.625 mm
- Siemens = 0.6-0.8 mm
- Toshiba = 1 mm

*NOT THIN AXIAL ARTERIAL PHASE - 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):

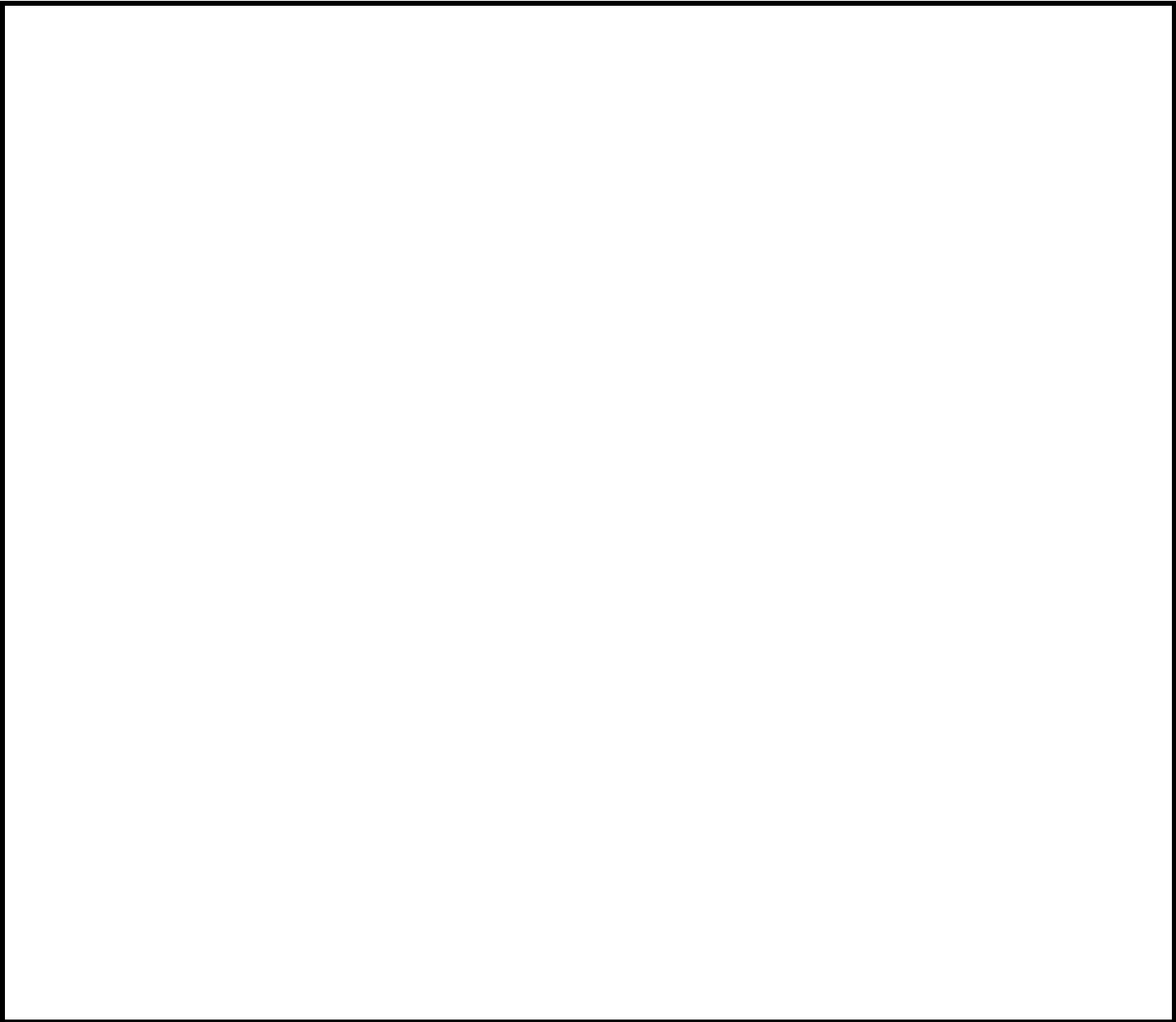
- GE = 1.25 mm
- Siemens = 1-1.25 mm
- Toshiba = 1 mm



 253-761-4200

 PO Box 1535
Tacoma WA 98401

 tranow.com



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