

## CT Urogram/IVP

### CT Abdomen + Pelvis WO W – Three Phase & NC.Split Delay

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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-MINW outpatient facility requires CT re-imaging, obtain radiologist advice prior to proceeding with the exam.**

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The following document is an updated CT protocol for all of the sites at which TRA-MINW 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

## CT Abdomen + Pelvis WO W – Three Phase

**Indication:** Age  $\geq$  50 years with hematuria (microscopic or macroscopic), evaluate or follow-up urothelial tumor (urology orders), evaluate for upper tract disease with known bladder cancer

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

**Scan Range (CC z-axis):** 1 cm above diaphragm through lesser trochanter

**Prep:** No solids (liquids OK) for 3 hours prior to examination

- Note: Okay to continue examination if prep is incomplete or not done

**Oral Contrast:** None

**IV Contrast:**

Please note patients less than 250 lbs receive a different IV contrast volume than patients who weight 250 lbs or more.

**Patients <250 lbs – 100 total contrast volume:**

**IV Contrast and Delay/Timing:**

1. 2-3 glasses of PO water prior to scan
2. Scan CT Abd Pel WO
3. 100 mL Isovue 370 @ 2 mL/sec
4. **Wait 90 seconds**
5. Scan CT Abd Pel W (nephrographic = 90 sec delay)
6. **Wait 7.5 minutes**
7. Scan CT Abd Pel W (delay = 9 min delay)

**Patients  $\geq$ 250 lbs - 150cc total contrast volume:**

**IV Contrast and Delay/Timing:**

1. 2-3 glasses of PO water prior to scan
2. Scan CT Abd Pel WO
3. 150 mL Isovue 370 @ 2 mL/sec
4. **Wait 90 seconds**
5. Scan CT Abd Pel W (nephrographic = 90 sec delay)
6. **Wait 7.5 minutes**
7. Scan CT Abd Pel W (delay = 9 min delay)

**Acquisitions:** 3 for most (1 non-contrast + 2 post-contrast), 4 if added additional delay

▪ **Non-contrast**

- **NOTE:** If CT Abd/Pel WO (CT KUB) has been performed *on the same scanner within 30 days*, check with the radiologist to see if it needs to be repeated; otherwise, should perform noncon

▪ **Nephrographic Phase:** 90 second delay

▪ **Delay Phase:** 9 minute delay

▪ **Optional added delay:** Technologists can decide to do an additional delayed acquisition if ureters are inadequately opacified on delayed phase, but must check with radiologist to ensure delay is necessary prior to acquisition

- Delay timing: approximately 5 minutes after acquisition of 9 minute delay phase
- Same reconstructions as Delay Phase (see below)

**Series + Reformats:**

1. **Non-contrast**

- a. Axial 2-2.5 mm ST kernel

2. **Nephrographic Phase (90 sec delay)**

- a. Axial 2-2.5 mm ST kernel
- b. Coronal 2 mm ST kernel
- c. Sagittal 2 mm ST kernel
- d. Send thinnest source axial recons ST kernel to PACS

3. **Delay Phase (9 min delay)**

- a. Axial 2-2.5 mm ST kernel
- b. Coronal 2 mm ST kernel
- c. Sagittal 2 mm ST kernel
- d. Coronal ST MIP 5 x 2 mm
- e. Send thinnest source axial recons ST kernel to PACS

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

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

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

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

Source(s): <https://www.acr.org/~media/E690CB12905B44788B9E4175D68B5C07.pdf>

## **CT Urogram/IVP** **CT Abdomen + Pelvis WO W – NC.Split Delay**

**Indication:** Age < 50 years with hematuria (microscopic or macroscopic)

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

**Scan Range (CC z-axis):** 1 cm above diaphragm through lesser trochanter

**Prep:** No solids (liquids OK) for 3 hours prior to examination

- Note: Okay to continue examination if prep is incomplete or not done

**Oral Contrast:** None

**IV Contrast:**

Please note patients less than 250 lbs receive a different IV contrast volume than patients who weight 250 lbs or more.

**Patients <250 lbs – 100 total contrast volume:**

**IV Contrast and Delay/Timing:**

1. 2-3 glasses of water prior to scan
2. Scan CT Abd Pel WO
3. 50 mL Isovue 370 @ 2 mL/sec
4. **Wait 7 minutes**
5. 50 mL Isovue 370 @ 2 mL/sec

**6. Wait 120 seconds**

7. Scan CT Abd Pel W (combined excretory/nephrographic scan at 2 min post second injection)

**Patients >=250 lbs - 150cc total contrast volume:**

**IV Contrast and Delay/Timing:**

1. 2-3 glasses of water prior to scan
2. Scan CT Abd Pel WO
3. 75 mL Isovue 370 @ 2 mL/sec
4. **Wait 7 minutes**
5. 75 mL Isovue 370 @ 2 mL/sec
6. **Wait 120 seconds**
7. Scan CT Abd Pel W (combined excretory/nephrographic scan at 2 min post second injection)

**Acquisitions:** 2 for most (1 non-contrast + 1 post-contrast); 3 if added delay (1 non-contrast + 2 post-contrast)

**8. Non-contrast**

- a. **NOTE:** If CT Abd/Pel WO (CT KUB) has been performed on the same scanner within 30 days, check with the radiologist to see if it needs to be repeated; otherwise, should perform noncon

**9. Split Delay Phase (nephrographic/excretory): 2 min post second injection**

- a. **Added delay:** Technologists can decide to do an additional delayed acquisition if ureters are inadequately opacified, but must check with radiologist to ensure delay is necessary prior to acquisition
- i. Delay timing: approximately 5 minutes after acquisition of split-delay phase
  - ii. Same reconstructions as Split Delay Phase (see below)

**Series + Reformats:**

**10. Non-contrast**

- a. Axial 2-2.5 mm ST kernel

**11. Split Delay Phase (Nephrographic/Excretory)**

- a. Axial 2-2.5 mm ST kernel
- b. Coronal 2 mm ST kernel
- c. Coronal ST MIP 5 x 2 mm
- d. Sagittal 2 mm ST kernel
- e. Send thinnest source axial recons ST kernel to PACS

**3. If additional delay acquired**

- a. Axial 0.625 mm or equivalent (0.5-1.5 mm, thinnest possible recon)

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

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

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

12. GE = 2.5 mm
13. Siemens = 2 mm
14. Toshiba = 2 mm

Source(s): <https://www.acr.org/~media/E690CB12905B44788B9E4175D68B5C07.pdf>

## 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