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|  <p>Skagit RADIOLOGY <small>INCORPORATED PROFESSIONAL SERVICES</small></p> | <p>Body: CT Protocols</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Reviewed:</td><td style="width: 33%;">Date: 1/28/2024</td><td style="width: 33%;">G. Cooper</td></tr> <tr> <td>Revised:</td><td>Date: 1/28/2024</td><td>Dr. Call</td></tr> </table> | Reviewed: | Date: 1/28/2024 | G. Cooper | Revised: | Date: 1/28/2024 | Dr. Call |
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GU 4: Pelvis CT with contrast (CT cystogram)

GU 5: Pre- and post-contrast abdomen CT (renal protocol)

Combo 1: Chest, abdomen, and pelvis CT with contrast

Combo 2: Chest and abdomen CT with contrast

Combo 3: Chest, abdomen Pelvis with contrast Trauma (significant trauma protocol)

C 1: Chest CT with contrast

Indications: mediastinal and pleural pathology.

| | |
|----------------------|---|
| Contrast parameters | IV: 125ml @ 2.5ml/sec, OR 100ml @ 2.5ml/sec, with 30ml saline flush <i>Venogram option:</i> 140 ml at 4ml/sec, 10% contrast solution (100ml total) at 3ml/sec. |
| Region of scan | Lung apex to posterior costophrenic angles |
| Scan delay | 50 seconds <i>Venogram option:</i> 60-90 seconds |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | Axial 1mm lung kernel Axial 5mm soft tissue kernel Axial 8 x 2 mm MIPs Coronal and sagittal 5 mm reformats with soft tissue kernel 10.2019 REV |
| Filming | B30f kernel (axials) B70f kernel (axials, axial MIP) |

Comments:

- Optional CT venogram protocol for SVC syndrome or thrombus; best used with double-barreled power injector.
- Pediatric patients under 10 years of age: reconstructions at 3 mm axials instead; keep 8 x 2 mm axial MIP.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

C 2: Chest CT without contrast

Indications: pulmonary nodules, airspace disease.

| | |
|----------------------|--|
| Contrast parameters | NA |
| Region of scan | Lung apex to posterior costophrenic angles |
| Scan delay | NA |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | Axial 1mm lung kernel Axial 5mm soft tissue kernel Axial 8 x 2 mm MIPs Coronal and sagittal 5 mm reformats with soft tissue kernel 10.2019 REV |
| Filming | B30f kernel (axials) B70f kernel (axials, axial MIP) |

Comments:

- Pulmonary nodule workup: optional 1.5 mm thick sections through nodules of interest at radiologist's discretion.
- Pediatric patients under 10 years of age: reconstructions at 3 mm axials instead; keep 8 x 2 mm axial MIP.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

C 3: Chest CT angiogram (pulmonary embolism protocol)

Indications: suspected pulmonary embolism.

| | |
|----------------------|---|
| Contrast parameters | IV: 125 ml @ 4 ml/sec, OR 100 ml @ 4 mL/sec, with 30 ml saline flush |
| Region of scan | 1) Lung apex to adrenal glands a) Scan caudo-cranial (re-orient images to scroll from top to bottom) 2) Iliac crests to popliteal fossae (optional) |
| Scan delay | 1) CARE bolus: ROI on main pulmonary artery. Delay of peak + 4 sec. 2) 4 minutes (optional) |
| Detector collimation | 1) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 2) Non-helical 5 mm at 4 cm intervals (optional) |
| Slice thickness | 1) 2 mm axials and 5 mm axials. 7 mm straight coronal & sagittal reformats through entire thorax. 3 mm oblique coronal MIPS reformats through right and left pulmonary arteries. 8 x 2 mm axial MIPS 2) 5 mm axials at 4 cm intervals (optional) |
| Filming | B31fkernell (2 mm axials and all coronal MIP's) B70f kernel (5 mm axials) |

Comments:

- Siemens Embolism042s settings.
- CT venography is optional and is done only when specifically requested by the referring clinician.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.
- Scan caudo-cranial – reduces streak artifact

C 4: Chest CT without contrast (lung nodule follow-up, lung CA screening)

Indications: pulmonary nodule follow-up, minimizing radiation exposure.

| | |
|----------------------|---|
| Contrast parameters | NA |
| Region of scan | Lung apex to posterior costophrenic angles |
| Scan delay | NA |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 1.0 or 1.25 mm axial (lung), 5 mm axial (soft tissue), 8 mm coronal & sagittal MIP reformats. |
| Filming | B30f kernel (axials) B70f kernel (axials, coronal MIP) |

Comments:

- Siemens Lung Low Dose settings.
- Utilize when confirming stability of indeterminate nodules over a 2-year period.
- For lung screening CT: patients would need initial requisition from referring provider.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window

C 5: High-resolution chest CT

Indications: diffuse lung pathology, inhalational exposure, asbestosis.

| | |
|----------------------|---|
| Contrast parameters | NA |
| Region of scan | 1) Supine inspiration <i>contiguous</i> scan (apex to posterior costophrenic angles) 2) Supine expiration <i>contiguous</i> scan (apex to posterior costophrenic angles). MinIP3) Prone inspiration <i>contiguous</i> scan (apex to posterior costophrenic angles) |
| Scan delay | NA |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 1) 1.0 mm and 5 mm axials; 5 mm coronal & sagittal reformats. 2) 1.0 mm axials. 8 mm MinIP axial on Supine Expiration images 3) 1.0 mm axials. |
| Filming | B70f kernel (1.0 mm axials and 5 mm coronals) B30f kernel (5 mm axials). |

Comments:

- Supine expiration images will detect air trapping.
- Prone inspiration series will differentiate early fibrosis from posterior dependent atelectasis.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

C 6: Chest CT angiogram (pulmonary vein ablation protocol)

Indications: pre-procedural mapping for pulmonary vein ablation treatment of atrial fibrillation.

| | |
|----------------------|--|
| Contrast parameters | IV: 125 ml @ 4 mL/sec, OR 100 ml @ 4 mL/sec, with 30 ml saline flush |
| Region of scan | Lung apex to posterior costophrenic angles (scan from bottom to top) |
| Scan delay | 30 sec |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 3 mm axial; 3 mm MIP oblique coronal reformats parallel to right and left pulmonary veins; 7 mm MIP straight coronal & sagittal reformats. |
| Filming | B31f kernel (axials, oblique coronal reformats) B70f kernel (axials, 7 mm MIP reformats). |

Comments:

- Siemens Embolism042s settings.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

C 7: Post Procedural Pneumo Scan

Indications: Dr. Desai protocol: post lung bx scan

| | |
|----------------------|---|
| Contrast parameters | none |
| Region of scan | Lung apex to posterior costophrenic angle. FOV affected lung only |
| Scan delay | none |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 1.0 mm axial Coronal and sagittal 5 mm reformats with soft tissue kernel |
| Filming | B70f kernel – very sharp (1 mm axial - lung) |

Comments:

C 8: Veran Chest Without (inspiration, expiration)

Indications: Navigational Bronchoscopy

| | |
|----------------------|--|
| Contrast parameters | none |
| Region of scan | Hyoid bone to costophrenic angles. FOV: Need lateral skin margins |
| Scan delay | none |
| Detector collimation | 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 0.75 mm x 0.5 mm axial, 5 mm axial; 7 mm coronal and sagittal MIP reformat |
| Filming | B35f kernel – Heart View Medium – mediastinum (0.75 x 0.5 & 5 mm axial – soft tissue) B70f kernel – very sharp (5mm axial & 8 x 2 mm coronal & sagittal MIP – lung) |

Comments:

CTDI for Medium 7.6 mGy

CTDI for Large 11.4 mGy

Breathing Instructions:

1. Inspiration: Have patient take a breath in and blow it out. Take another breath in and blow it out. Take another breath in and hold it.
2. Expiration: Have patient take a breath in and blow it out and hold it.

C 9: CT Coronary Artery Calcium Scoring

Indications: Coronary artery calcium scoring.

| | |
|----------------------|---|
| Contrast parameters | IV: None |
| Region of scan | Heart |
| Scan delay | N/A |
| Detector collimation | 128 x 0.6 mm |
| Slice thickness | Axial 1mm lung kernel Axial 3 mm soft tissue kernel with 1.5 mm increments Axial 8 x 2 mm MIPS Coronal and sagittal 5 mm reformats with soft tissue kernel |
| Filming | B35f kernel heart view (axials) B70f kernel (axials, axial MIP) |

Comments:

- Spiral protocol for patients with heart rate greater than 60 bpm.
- Sequential scan for patient with heart rate less than 60 bpm.

A 1: Abdomen and pelvis CT with contrast

Indications: abdominal pain, tumor staging, acute abdomen, penetrating abdomen trauma.

| | |
|----------------------|--|
| Contrast parameters | Oral: 900 ml (approx. 100 ml just before scan) IV: 125 ml at 2.5 ml/sec, OR 100 ml at 2.5 ml/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to symphysis |
| Scan delay | Oral: 45-90 minutes from initial ingestion; 120 min for patients 10 years and younger IV: 60 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats. |
| Filming | B30f kernel B70f kernel for lung bases. |

Comments:

- Siemens Abdomen Vol settings.
- Use 5% Gastrograffin solution when there is possible bowel perforation, impending surgery, or suspected bowel obstruction.
- Oral contrast delay can be shortened to 45-60 minutes if using Omnipaque.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.
- Inguinal/ventral hernia evaluation: patients should perform Valsalva maneuver at end-inspiration to accentuate any hernias.

A 1A: Abdomen CT with contrast

Indications: upper abdominal pain, tumor staging.

| | |
|----------------------|--|
| Contrast parameters | Oral: 450ml (approx. 100 ml just before scan) IV: 125 ml @ 2.5 ml/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to iliac crests |
| Scan delay | Oral: 45-60 minutes from initial ingestion IV: 60 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases. |

Comments:

- Siemens Abdomen Vol settings.
- Use 5% Gastrograffin solution when there is possible bowel perforation, impending surgery, or suspected bowel obstruction.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 1P: Pelvis CT with contrast

Indications: lower abdominal pain, inguinal hernias.

| | |
|----------------------|--|
| Contrast parameters | Oral: 900 ml IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 ml/sec, with 30 ml saline flush |
| Region of scan | Iliac crests to symphysis |
| Scan delay | Oral: 45-90 minutes from initial ingestion; 120 minutes for patients 10 years and younger IV: 60 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel |

Comments:

- Siemens Abdomen Vol settings.
- Use 5% Gastrograffin solution when there is possible bowel perforation, impending surgery, or suspected bowel obstruction.
- Oral contrast delay can be shortened to 45-60 minutes if using Omnipaque.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 2: Abdomen and pelvis CT with contrast (trauma protocol)

Indications: blunt abdomen injury.

| | |
|----------------------|---|
| Contrast parameters | Oral: none IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | 1) Diaphragm to symphysis 2) Optional: kidneys to symphysis after 10-minute delay |
| Scan delay | Oral: NA IV: 60 seconds, optional 10-minute delay |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats. |
| Filming | B30f kernel B70f kernel for lung bases and sagittal reformats. |

Comments:

- Siemens Abdomen Vol settings.
- Perform optional 10-minute delayed imaging through the GU system if gross hematuria or if renal trauma is seen.
- For *stable* patients with penetrating abdomen injuries, protocol A1 is preferred. Unstable patients should not be imaged.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 3: Abdomen and pelvis CT without intravenous contrast

Indications: abdominal pain; estimated GFR too low for IV contrast.

| | |
|----------------------|---|
| Contrast parameters | Oral: 900 ml (approx. 100 ml just before scan) IV: none |
| Region of scan | Diaphragm to symphysis |
| Scan delay | Oral: 45-90 minutes; 120 minutes for patients 10 years old or younger |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abdomen Vol settings.
- Oral contrast delay can be shortened to 45-60 minutes if using Omnipaque.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 3A: Abdomen CT without intravenous contrast

Indications: upper abdomen pain; estimated GFR too low for IV contrast.

| | |
|----------------------|--|
| Contrast parameters | Oral: 450 ml (approx. 100 ml just before scan) IV: none |
| Region of scan | Diaphragm to iliac crests |
| Scan delay | Oral: 45-60 minutes |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abdomen Vol settings.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 3P: Pelvis CT without intravenous contrast

Indications: lower abdomen pain; estimated GFR too low for IV contrast.

| | |
|----------------------|---|
| Contrast parameters | Oral: 900 ml (approx. 100 ml just before scan) IV: none |
| Region of scan | Iliac crests to symphysis |
| Scan delay | Oral: 45-90 minutes; 120 minutes for patients 10 years old or younger |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel |

Comments:

- Siemens Abdomen Vol settings.
- Oral contrast delay can be shortened to 45-60 minutes if using Omnipaque.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 4: Abdomen and pelvis CT without contrast (hematoma protocol)

Indications: ruptured AAA, post-catheterization groin hematomas.

| | |
|----------------------|---|
| Contrast parameters | Oral: none IV: none |
| Region of scan | Diaphragm to symphysis |
| Scan delay | NA |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abdomen Vol settings.
- Pediatric patients under 10 years of age: 3 mm axials and 3 mm coronals instead.

A 5: Pre- and post-contrast abdomen CT (liver protocol)

Indications: liver lesion characterization; HCC screening in cirrhosis.

| | |
|----------------------|--|
| Contrast parameters | Oral: none IV: 125 ml at 4cc/sec, OR 100 mL @ 4 mL/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to iliac crests |
| Scan delay | 1) Non-contrast 2) Arterial phase: 25 sec after IV contrast 3) Portal venous phase: 70 sec after IV contrast 4) Delayed phase: 5 min after IV contrast |
| Detector collimation | 1) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 2) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 3) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 4) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats (portal venous phase only) |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abd Multi Phase settings.

A 6: Pre- and post-contrast abdomen CT (pancreas protocol)

Indications: pancreatic mass; NOT for initial pancreatitis workup.

| | |
|----------------------|---|
| Contrast parameters | Oral: Neutral contrast or water IV: 125 ml at 4cc/sec, OR 100 mL @ 4 mL/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to iliac crests |
| Scan delay | 1) Non-contrast 2) Pancreatic Parenchymal phase at 40-50 sec 3) Portal Venous phase at 65-70 sec |
| Detector collimation | 1) 16 x 1. mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 2) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 3) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 3 mm axials; 3 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases |

Reference: Society of Abdominal Radiology and American Pancreatic Association Gastroenterology [January 2014](#) Volume 146, Issue 1, Pages 291–304.e1 ([https://www.gastrojournal.org/article/S0016-5085\(13\)01588-6/fulltext#sec3.1](https://www.gastrojournal.org/article/S0016-5085(13)01588-6/fulltext#sec3.1))

Comments:

- Siemens Abd Multi Phase settings.
- For pancreatitis, perform protocol A1 instead.

A 7: Abdomen and pelvis CT with contrast (enterography protocol)

Indications: Crohn's disease, ischemic bowel, small bowel tumors.

| | |
|----------------------|---|
| Contrast parameters | Oral: 1350 mL Volumen (see comments) IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to symphysis |
| Scan delay | Oral: 60 minutes from contrast ingestion IV: 45 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 3 mm axial; 3 mm coronal & sagittal reformats (at 2 mm intervals) |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abdomen Vol settings.
- Volumen timing: drink 450 mL 60 minutes before scan, another 450 mL 40 minutes before scan, 225 mL at 20 minutes before scan, and last 225 mL at 10 minutes before scan.
- Warn patients about watery bowel movements (but not diarrhea) afterwards; Volumen is not absorbed by the intestinal lining.

A 8: Renal Ablation CT

Pre ablation: Angio abdomen-regular-angio only

Post ablation as follows:

- 1) Diaphragm to iliac crests (non con 5mm axial)
- 2) Diaphragm to iliac crests (angio 2mm axial, coronal, sagittal)
- 3) Diaphragm to iliac crests (Urographic phase 10 min 5mm axial, 2mm cor, sag)

A 9: Abdomen and pelvis CT angiogram (GI bleed protocol)

Indications: Gastrointestinal bleeding- Looking for active extravasation

| | |
|----------------------|--|
| Contrast parameters | Oral: None. IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | Diaphragm to symphysis |
| Scan delay | IV: Arterial phase: 25 sec after IV contrast or care bolus at mid aorta; peak + 0 sec Optional: Portal venous phase: 70 sec after IV contrast (look for delayed pooling of blood) |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axial; 2 mm coronal & sagittal reformats 1 mm 3-D coronal and sagittal MIP |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens BodyAngioRoutine package
- A kernel of BR59 or lower must be selected when using iMAR metal reduction software

GU 1: Abdomen and pelvis CT without contrast (CT-KUB)

Indications: flank pain and hematuria; suspected renal colic.

| | |
|----------------------|---|
| Contrast parameters | Oral: none IV: none |
| Region of scan | Diaphragm to symphysis |
| Scan delay | NA |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abdomen Vol settings
- Obtain plain film KUB either before or after CT scan.
- Pediatric patients under 10 years of age: 3 mm axials and coronals instead.
- **Ultra-Low-dose CT-KUB option:** 120 kV and 30 mAs.
 - **To be used only:** in the setting of known kidney stones detected on a prior study (CT or US), must be ordered specifically as a low-dose study
 - NOT recommended for patients with BMI >25.

GU 2: Pre- and post-contrast abdomen and pelvis CT (CT-IVP)

Indications: painless hematuria, renal mass or transitional cell CA evaluation

| | |
|----------------------|--|
| Contrast parameters | Oral: 1000 mL water for hydration 15-20 min before. IV: 80 ml at 2.5 ml/sec, wait 8 minutes. 60 ml at 2.5 ml/sec, wait 2 minutes. |
| Region of scan | 1) Diaphragm to symphysis pubis (optional) 2) Diaphragm to symphysis pubis |
| Scan delay | 1) Non-contrast (CT-KUB): (optional) 2) Nephrographic/urographic phase: 10 min after IV contrast |
| Detector collimation | 1) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 2) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 1) 5 mm axial, Coronal non-contrast reformat (bone kernel) 2) 5 mm axial, 2 mm thick coronal MPR, 5 mm thick sagittal reformats. |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abd Multi Phase settings.
- Low-dose CT-KUB option: 120 kV and 30 mAs. Use if pt has already had CT-KUB in last 2 months (but not recommended if patient BMI >25).

GU 3: Pre- and post-contrast abdomen CT (adrenal protocol)

Indications: distinguish between adenoma and metastasis.

| | |
|----------------------|--|
| Contrast parameters | Oral: none IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | 1) Diaphragm to iliac crests 2) Diaphragm to iliac crests 3) Adrenals and kidneys |
| Scan delay | 1) Non-contrast: NA 2) Venous phase: 75 sec after IV contrast 3) Delayed phase: 15 min after IV contrast |
| Detector collimation | 1) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 2) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 3) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 1) 3 mm axial 2) 3 mm axial; 5 mm coronals and sagittal reformats. 3) 3 mm axial |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abd Multi Phase settings.
- Pre-contrast attenuation < 0 HU supersedes the washout profile in adenoma characterization. Non-hemorrhagic, non-calcified masses > 43 HU are suspicious for malignancy. Absolute percentage washout of 52% distinguishes benign from malignant lesions. Radiology 2006; 238: 578-585.

GU 4: Pelvis CT with contrast (CT cystogram)

Indications: assess for intra- or extraperitoneal bladder rupture.

| | |
|----------------------|---|
| Contrast parameters | 300 ml diluted contrast instilled by gravity through existing Foley catheter (or as much as patient can tolerate) |
| Region of scan | 1) Iliac crests or bladder dome to symphysis 2) Iliac crests or bladder dome to symphysis |
| Scan delay | 1) Non-contrast 2) No delay after instillation of contrast |
| Detector collimation | 1) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) 2) 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 1) 5 mm axials 2) 5 mm axials; 5 mm coronal & sagittal reformats |
| Filming | B30f kernel |

Comments:

- Siemens Abd Vol settings.
- Foley catheter should be inserted by Emergency Dept or Urology prior to arriving in CT.
- Dilute 50 ml contrast in 500 mL normal saline before instilling.
- Pediatric patients under 10 years of age: 3 mm axials and coronals instead.

GU 5: Pre- and post-contrast abdomen CT (renal protocol)

Indications: renal mass evaluation or follow up.

| | |
|----------------------|--|
| Contrast parameters | Oral: 1000 ml water for hydration 15-20 min before. IV: 80 ml at 2.5 ml/sec, wait 8 minutes. 60 ml at 2.5 ml/sec, wait 2 minutes. |
| Region of scan | 1) Diaphragm to iliac crests (optional) 2) Diaphragm to iliac crests 3) Diaphragm to iliac crests |
| Scan delay | 1) Non-contrast (may omit for follow-up scans) 2) Arterial phase: 30 seconds 2) Nephrographic/urographic phase: 10 minutes |
| Detector collimation | 1) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 2) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm 3) 16 x 0.75 mm, 64 x 0.6 mm, 128 x 0.6 mm |
| Slice thickness | 1) 5 mm axial 2) 5 mm axial; 5 mm thick coronal reformats 3) 2 mm coronal & sagittal reformats. |
| Filming | B30f kernel B70f kernel for lung bases |

Comments:

- Siemens Abd Multi Phase settings.
- Pre-contrast component is optional; omit if scan is done for follow-up of known lesion, OR if urology deems it not necessary.

Combo 1: Chest, abdomen, and pelvis CT with contrast

Indications: Tumor staging.

| | |
|----------------------|--|
| Contrast parameters | Oral: 900 ml (approx. 100 ml just before scan) IV: 125 ml at 2.5 mL/sec, OR 100 ml @ 2.5 ml/sec, with 30 ml saline flush |
| Region of scan | Lung apices to symphysis |
| Scan delay | Oral: 45-90 minutes from initial ingestion; 120 min for patients 10 years and younger IV: 60 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 5 mm axial; 5 mm coronal & sagittal reformats 8 x 2 mm axial MIPs through the lungs |
| Filming | B30f kernel B70f kernel for lungs (including MIP reformats). |

Comments:

- Siemens Abdomen Vol settings.
- For trauma scans: omit oral contrast. Perform sagittal reformats in B70f kernel, to include the anterior chest wall.
- Oral contrast delay can be shortened to 45-60 minutes if using Omnipaque.
- Pediatric patients under 10 years of age: 3 mm axial and coronals instead. Keep 8 x 2 mm axial MIP's.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

Combo 2: Chest and abdomen CT with contrast

Indications: Tumor staging.

| | |
|----------------------|--|
| Contrast parameters | Oral: 900 ml (approx. 100 ml just before scan) IV: 125 ml at 2.5 ml/sec, OR 100 ml @ 2.5 ml/sec, with 30 ml saline flush |
| Region of scan | Lung apices to iliac crests |
| Scan delay | Oral: 45-60 minutes from initial ingestion IV: 60 seconds |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | Axial 1 mm lung kernel Axial 5 mm soft tissue kernel Axial 8 x 2 mm MIPs Coronal and sagittal 5 mm soft tissue kernel |
| Filming | B30f kernel B70f kernel for lungs (including MIP reformats). |

Comments:

- Siemens Abdomen Vol settings.
- Pediatric patients under 10 years of age: 3 mm axials and coronals instead. Keep 8 x 2 mm axial MIP's.
- Optional CT navigational bronchoscopy images: 1 mm x 0.8 mm axial slices, B31F kernel, mediastinal window.

Combo 3: Chest abdomen and pelvis CT with contrast (significant trauma protocol)

Indications: High impact trauma or penetrating trauma

| | |
|----------------------|--|
| Contrast parameters | Oral: none IV: 125 ml @ 2.5 mL/sec, OR 100 ml @ 2.5 mL/sec, with 30 ml saline flush |
| Region of scan | 1) Clavicles to the end of the last rib in arteriogram phase (chest angiogram portion) 2) Top of diaphragm to femoral necks in portal venous phase (abdomen/pelvis portion) 3) *(Optional) Delayed phase: Top of diaphragm to femoral necks. -Perform automatically if fluid is seen in the abdomen and suspected renal injury. |
| Scan delay | Oral: none 1) IV: Arterial phase: 25 sec after IV contrast or care bolus at mid aorta; peak + 0 sec 2) Portal venous phase: 70 sec after IV contrast 3) (Optional) Delayed phase: anytime up to 5mins after contrast at technologist discretion, if previewed images seem abnormal (abdomen fluid, renal injury etc.) |
| Detector collimation | 16 x 1.5 mm, 64 x 1.2 mm, 32 x 1.2 mm (128 slice) |
| Slice thickness | 1) Chest angiogram CT <ul style="list-style-type: none">· Axial 1 mm lung kernel· Axial Lung MIPS 8 x 2 mm· Axial 5 mm; 5 mm coronal and sagittal soft tissue kernel· Sagittal 3 mm bone kernel 2) Abdomen/pelvis PV phase CT |

| | |
|---------|--|
| | <ul style="list-style-type: none"> · Axial 5 mm; 5 mm coronal and sagittal soft tissue kernel · Sagittal 3 mm bone kernel <p>3) Delayed phase</p> <ul style="list-style-type: none"> · Axial 5 mm; 5 mm coronal and sagittal soft tissue kernel |
| Filming | <p>B30f kernel</p> <p>B70f kernel for lungs and additional spine sagittal reformats.</p> |

Comments:

- Usually done with non-con CT head and CT C-spine before giving contrast.
- ***Optional) Delayed phase: If blood or fluid/urine seen in the abdomen, this series is required. When in doubt -> add it.**
- CTA head and Neck should also be considered in the setting of high impact trauma.
- Indications/High-risk mechanisms:
MVC with ejection, Death of occupant in the vehicle, Intrusion > 12 inches into patient compartment or >18 inches any compartment, Adult Falls >20ft, Auto vs pedestrian or bicycle with significant impact, MCC > 20 mph or with separation of rider from motorcycle, All-terrain vehicle collisions, Fall from a horse, Major crush injury to chest and/or head.