

## ABDOMEN AND PELVIS

| Abdomen without and with IV Contrast                          |                                      |                                                                    |                                                                      |                                                                                                                             |
|---------------------------------------------------------------|--------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Exam                                                          | Scan Range                           | Enteric Contrast                                                   | Pre/Post IV Contrast                                                 | Images Saved to PACS                                                                                                        |
| <b>Adrenal</b>                                                | Through adrenals only                | None                                                               | Unenhanced, check with rad                                           | Soft tissue axial                                                                                                           |
|                                                               |                                      |                                                                    | Portal venous (if necessary)                                         | Soft tissue axial, sagittal and coronal                                                                                     |
|                                                               |                                      |                                                                    | 10 minute delay (if necessary)                                       | Soft tissue axial                                                                                                           |
| Abdomen with IV Contrast                                      |                                      |                                                                    |                                                                      |                                                                                                                             |
| <b>Hepatic</b>                                                | Lung base through pelvic inlet       | None                                                               | Arterial phase                                                       | Soft tissue axial                                                                                                           |
|                                                               |                                      |                                                                    | Portal venous phase                                                  | Soft tissue axial, sagittal and coronal                                                                                     |
|                                                               |                                      |                                                                    | 5 minute delay                                                       | Soft tissue axial                                                                                                           |
| <b>Pancreatic Mass (for pancreatitis use routine abdomen)</b> | Lung base through pelvic inlet       | No positive contrast. 250 mL water 15 min and just before scanning | Late arterial phase <sup>1</sup><br>Portal venous phase <sup>2</sup> | Soft tissue axial, sagittal, and coronal. MIP reconstruction. Curved multiplanar reconstruction per request of radiologist. |
| Abdomen and Pelvis without IV Contrast                        |                                      |                                                                    |                                                                      |                                                                                                                             |
| <b>CT Colonography (no known cancer)</b>                      | Lung base to ischial tuberosity      | Colon cleansing; oral stool tagging; rectal air <sup>3</sup>       | Unenhanced supine                                                    | Soft tissue axial, sagittal and coronal                                                                                     |
|                                                               |                                      |                                                                    | Unenhanced prone                                                     | Soft tissue axial, sagittal and coronal                                                                                     |
| <b>Renal Stone</b>                                            | Top of kidneys to ischial tuberosity | None                                                               | Unenhanced                                                           | Soft tissue axial, sagittal and coronal                                                                                     |
| <b>Routine</b>                                                | Lung base to ischial tuberosity      | None                                                               | Unenhanced                                                           | Soft tissue axial, sagittal and coronal                                                                                     |

<sup>1</sup> Late arterial phase (pancreatic phase) contrast injection rate 4 cc/s. Ideally bolus tracking 30 sec after lower thoracic/upper abdominal aortic enhancement is above 150 HU. Alternatively, timed 35 seconds after the start of contrast injection. Through pancreas & obtain slices as thin as possible. Send 2 mm with thinner slices available per request.

<sup>2</sup> Portal venous phase (fixed time of 70 seconds after the start of contrast injection) of the entire abdomen.

<sup>3</sup> Add rectal air until the abdomen is tympanic or the patient is uncomfortable.

| Abdomen and Pelvis with IV Contrast             |                                      |                                                              |                                                                   |                                          |
|-------------------------------------------------|--------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------|
| <b>CT Colonography (known cancer)</b>           | Lung base through ischial tuberosity | Colon cleansing; oral stool tagging; rectal air <sup>1</sup> | Portal venous phase supine                                        | Soft tissue axial, sagittal and coronal  |
|                                                 |                                      |                                                              | Portal venous phase prone                                         | Soft tissue axial, sagittal and coronal  |
| <b>Oncology patient</b>                         | Lung base through ischial tuberosity | Oral contrast                                                | Hepatic arterial phase <sup>4</sup>                               | Soft tissue axial                        |
|                                                 |                                      |                                                              | Portal venous phase                                               | Soft tissue axial, sagittal and coronal  |
|                                                 |                                      |                                                              | 10 minute delayed                                                 | Soft tissue axial                        |
| <b>Pediatric patient</b>                        | Lung base to ischial tuberosity      | Oral contrast <sup>5</sup>                                   | Portal venous phase                                               | Soft tissue axial, sagittal and coronal  |
| <b>CT-enterography</b>                          | Lung base through ischial tuberosity | Oral contrast <sup>6</sup>                                   | Arterial phase                                                    | Soft tissue axial, sagittal, and coronal |
|                                                 |                                      |                                                              | Portal venous phase                                               | Soft tissue axial, sagittal, and coronal |
| <b>Routine</b>                                  | Lung base through ischial tuberosity | Oral contrast <sup>7</sup>                                   | Portal venous phase                                               | Soft tissue axial, sagittal, and coronal |
|                                                 |                                      |                                                              | 5 min delayed ONLY if done for trauma or suspected pyelonephritis | Soft tissue axial                        |
| Abdomen and Pelvis without and with IV Contrast |                                      |                                                              |                                                                   |                                          |
| <b>Renal lesion (RFA candidates)</b>            | Lung base through ischial tuberosity | None                                                         | Unenhanced supine                                                 | Soft tissue axial                        |
|                                                 |                                      |                                                              | Portal venous phase supine                                        | Soft tissue axial, sagittal, and coronal |
|                                                 |                                      |                                                              | 10 minute delayed prone                                           | Soft tissue axial                        |
| <b>CT Urogram</b>                               | Lung base through ischial tuberosity | None                                                         | Unenhanced                                                        | Soft tissue axial                        |
|                                                 |                                      |                                                              | Combo portal venous/delayed <sup>8</sup>                          | Soft tissue axial, sagittal, and coronal |
|                                                 |                                      |                                                              |                                                                   | Soft tissue coronal MIPS through ureters |
| Pelvis without IV Contrast                      |                                      |                                                              |                                                                   |                                          |
| <b>CT Cystogram</b>                             | Above iliac crest through ischial    | None                                                         | Unenhanced                                                        | Soft tissue axial                        |

<sup>4</sup> Add for hypervascular tumors: thyroid, choriocarcinoma, breast, melanoma, pancreatic islet cell, and carcinoid

<sup>5</sup> Oral contrast for pediatric patient: Use adult contrast diluted in half. For routine prep divide contrast into 3 cups and give one 2 hours before, another 1 hr before exam and the third immediately before exam. For more urgent prep give 2 cups contrast 1-2 hours before exam. Dose: 1-6 mo: 60-120 mL; 6 – 12 mo: 120-180 mL; 1 – 4 yr: 1880-270 mL; 4 – 8 yr: 270-360 mL; 8 – 12 yr: 360 – 480 mL; 12 – 16 yr: 480-600 mL

<sup>6</sup> Oral contrast for enterography: 900 – 1400 mL Volumen or whole milk 20-30 min pre scan

<sup>7</sup> Routine: 900 mL Redicat for 2 hrs or dilute iodinated contrast for 1 hr pre scan

<sup>8</sup> Combined portal venous/delayed: first contrast bolus 80 mL @ 2.5 ml/sec + saline flush; second contrast bolus at 6 minutes after first bolus: 40 mL @ 2.5 ml/sec; scan at 8 minutes after the first bolus.

|                                |                                              |               |                                            |                                      |
|--------------------------------|----------------------------------------------|---------------|--------------------------------------------|--------------------------------------|
|                                | tuberosity                                   |               | bladder contrast instillation <sup>9</sup> | Soft tissue axial, sagittal, coronal |
| <b>Pelvis with IV Contrast</b> |                                              |               |                                            |                                      |
| <b>Pelvis Soft Tissue</b>      | Above iliac crest through ischial tuberosity | Oral contrast | Portal venous phase                        | Soft tissue axial, sagittal, coronal |
|                                |                                              |               | 5 minute delay                             | Soft tissue axial                    |

## CHEST

| Chest without IV Contrast                     |                                |                                                                   |                                                                        |
|-----------------------------------------------|--------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------|
| Exam                                          | Scan Range                     | Pre/Post IV Contrast                                              | Images Saved to PACS                                                   |
| <b>Routine</b>                                | Lung apices through adrenals   | Unenhanced inspiration                                            | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows |
| <b>High Resolution</b>                        | Lung apices through adrenals   | Unenhanced inspiration supine                                     | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows |
|                                               | Lung apices through lung bases | 1 mm q 20 mm inspiration supine<br>1 mm q 20 mm expiration supine | High resolution pulmonary axial<br>High resolution pulmonary axial     |
|                                               | Carina to lung bases           | 1 mm q 20 mm prone                                                | High resolution pulmonary axial                                        |
| <b>Follow-up High Resolution<sup>10</sup></b> | Lung apices through lung bases | 1 mm q 20 mm inspiration supine                                   | High resolution pulmonary axial                                        |
|                                               | Lung apices through lung bases | 1 mm q 20 mm expiration supine                                    | High resolution pulmonary axial                                        |
|                                               | Carina to lung bases           | 1 mm q 20 mm prone                                                | High resolution pulmonary axial                                        |
| <b>Pediatric</b>                              | Lung apices through adrenals   | Unenhanced inspiration                                            | Soft tissue axial, sagittal, coronal                                   |
| Chest with IV Contrast                        |                                |                                                                   |                                                                        |
| <b>Routine</b>                                | Lung apices through adrenals   | Enhanced inspiration – time contrast for descending aorta         | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows |
| <b>PE Study</b>                               | Lung apices through adrenals   | Enhanced inspiration – time                                       | Soft tissue axial, sagittal, coronal                                   |

<sup>9</sup> Mix 25 mL contrast in 1,000 mL saline; unclamp and drain bladder through Foley; administer mix through Foley until pt feels full (usually around 500 mL)

<sup>10</sup> To be used only when doing serial follow-up of a patient who has had a recent complete CT chest (within the past year) who does not have any known nodules undergoing follow-up.

|  |  |                                 |                                                                        |
|--|--|---------------------------------|------------------------------------------------------------------------|
|  |  | contrast for pulmonary arteries | Axial thick MIP @ lung windows<br>Oblique thick MIP pulmonary arteries |
|--|--|---------------------------------|------------------------------------------------------------------------|

## CHEST, ABDOMEN, AND PELVIS

|                          |                                      |               |                                                                   |                                                                        |
|--------------------------|--------------------------------------|---------------|-------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>Routine</b>           | Lung apices through diaphragm        | Oral contrast | Enhanced chest – time for descending aorta                        | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows |
|                          | Lung base through ischial tuberosity |               | Portal venous phase A&P                                           | Soft tissue axial, sagittal, coronal                                   |
|                          | Lung base through ischial tuberosity |               | 5 min delayed ONLY if done for trauma or suspected pyelonephritis | Soft tissue axial                                                      |
| <b>Oncology Patients</b> | Lung apices through diaphragm        | Oral contrast | Enhanced chest – time for descending aorta                        | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows |
|                          | Lung base through ischial tuberosity |               | Portal venous phase A&P                                           | Soft tissue axial, sagittal, coronal                                   |
|                          | Lung base through ischial tuberosity |               | 10 minute delay A&P                                               | Soft tissue axial                                                      |

### CTA

| <b>Exam</b>                                                                  | <b>Scan Range</b>                                           | <b>Pre/Post IV Contrast</b>                                                        | <b>Images Saved to PACS</b>                                                                                       |
|------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>CTA Abdomen (Aorta or Renal)</b>                                          | Lung bases through iliac crest                              | Enhanced – time for abdominal aorta                                                | Soft tissue axial, sagittal, coronal<br>3D surface rendered aorta                                                 |
| <b>CTA Abdomen and Pelvis (Dissection or Graft)</b>                          | Lung bases through iliac crest                              | Unenhanced                                                                         | Soft tissue axial                                                                                                 |
|                                                                              |                                                             | Enhanced – time for abdominal aorta                                                | Soft tissue axial, sagittal, coronal<br>3D surface rendered aorta                                                 |
|                                                                              |                                                             | 3 minute delay (for graft)                                                         | Soft tissue axial                                                                                                 |
| <b>CTA Abdomen and Pelvis (Lower GI Bleeding)</b>                            | Lung bases through ischial tuberosity                       | Unenhanced                                                                         | Soft tissue axial                                                                                                 |
|                                                                              |                                                             | Arterial phase                                                                     | Soft tissue axial                                                                                                 |
|                                                                              |                                                             | Portal venous phase                                                                | Soft tissue axial, sagittal, coronal                                                                              |
|                                                                              |                                                             | 5 minute delay (check with radiologist)                                            | Soft tissue axial                                                                                                 |
| <b>CTA Abdomen – Lower Extremity Runoff</b>                                  | Above kidneys through toes                                  | Enhanced – time for common femoral arteries<br>Rescan from knee to toes (no delay) | Soft tissue axial, sagittal, coronal<br>Axial 3D surface rendered aorta                                           |
| <b>CTA Chest</b>                                                             | Lung apices through renal arteries                          | Unenhanced (for dissection or graft)                                               | Soft tissue axial                                                                                                 |
|                                                                              |                                                             | Enhanced – time for descending aorta                                               | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows<br>3D surface rendered aorta               |
|                                                                              |                                                             | 3 minute delay (for graft)                                                         | Soft tissue axial                                                                                                 |
| <b>CTA Chest, Abdomen, and Pelvis (Entire Aorta for Aneurysm/Dissection)</b> | Lung apices through ischial tuberosity                      | Unenhanced (if done for dissection)                                                | Soft tissue axial                                                                                                 |
|                                                                              |                                                             | Enhanced – time for descending aorta (add 2 min delay for graft)                   | Soft tissue axial, sagittal, coronal<br>Axial thick MIP @ lung windows<br>3D surface rendered aorta               |
| <b>CTA Head</b>                                                              | C1 to vertex (12 cm FOV)                                    | Enhanced – time for common carotid                                                 | Soft tissue axial (1 x 0.5 mm)<br>Axial, sagittal, coronal radial MIPs                                            |
| <b>CTA Neck (with or without Circle of Willis)</b>                           | Top of aortic arch to 3 <sup>rd</sup> ventricle (12 cm FOV) | Enhanced – time for common carotid                                                 | Soft tissue axial (1 x 0.5 mm)<br>Axial, sagittal, and coronal radial MIPs<br>(Reformat head and neck separately) |

## MUSCULOSKELETAL

See also University of Wisconsin musculoskeletal imaging protocols available at [www.radiology.wisc.edu/sections/msk/protocols.php](http://www.radiology.wisc.edu/sections/msk/protocols.php).

| <b>Exam</b>                                 | <b>Scan Range</b>                                                                                                        | <b>Images Saved to PACS<br/>(do 3D surface if requested)</b>                                               |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>Arm</b>                                  | Entire arm or as requested                                                                                               | Bone axial, sagittal, and coronal to humerus                                                               |
| <b>Ankle</b>                                | At least 4 cm above ankle through bottom of calcaneus<br>Scan axial to ankle joint                                       | Bone axial, sagittal, and coronal to mortise                                                               |
| <b>Elbow</b>                                | At least 6 cm above to 6 cm below joint                                                                                  | Bone axial to forearm and humerus<br>Bone coronal to radius, ulna, and humerus<br>Bone sagittal to humerus |
| <b>Foot</b>                                 | At least 1 cm above ankle through entire foot                                                                            | Bone axial, sagittal, and coronal to metatarsals                                                           |
| <b>Forearm</b>                              | Entire arm or as requested                                                                                               | Bone axial, sagittal, and coronal to radius                                                                |
| <b>Hand</b>                                 | Entire hand or as requested<br>Position prone with arm above head ("Superman") if tolerated.<br>Center anatomy in gantry | Bone axial, sagittal, and coronal to radius                                                                |
| <b>Knee</b>                                 | At least 6 cm above to 6 cm below knee                                                                                   | Bone axial, sagittal, and coronal to radius                                                                |
| <b>Leg</b>                                  | Entire leg or as requested                                                                                               | Bone axial, sagittal, and coronal to femur                                                                 |
| <b>Pelvis</b>                               | Above iliac crest to below ischial tuberosity                                                                            | Bone axial, sagittal, and coronal                                                                          |
| <b>Shoulder</b>                             | Above AC joint to below tip of scapula                                                                                   | Bone axial, sagittal, and coronal                                                                          |
| <b>Spine – Cervical, including CT-myelo</b> | Skull base to T1. If pathology near border, scan additional levels                                                       | Bone axial, sagittal, and coronal 0.5 x 0.5 mm<br>Soft tissue axial, sagittal, and coronal 2 x 2 mm        |
| <b>Spine – Lumbar, including CT-myelo</b>   | T12 – S1 or as requested. If pathology near border, scan additional levels                                               | Bone axial, sagittal, and coronal<br>Soft tissue axial, sagittal, and coronal                              |
| <b>Spine – Thoracic, including CT-myelo</b> | C7 – L1 or as requested. If pathology near border, scan additional levels                                                | Bone axial, sagittal, and coronal<br>Soft tissue axial, sagittal, and coronal                              |
| <b>Thigh</b>                                | Entire thigh or as requested                                                                                             | Bone axial, sagittal, and coronal to femur                                                                 |
| <b>Wrist</b>                                | At least 4 cm proximal to radiocarpal joint through MCP joints                                                           | Bone axial, sagittal, and coronal to radius                                                                |

## NEURO

| <b>Exam</b>                                                     | <b>Scan Range &amp; Patient Position</b>                               | <b>Pre/Post IV Contrast</b>                      | <b>Images Saved to PACS</b>                                                                                                              |
|-----------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Head without IV Contrast (routine)</b>                       | Skull base to vertex<br>Angle gantry to orbitomeatal line              | Unenhanced                                       | Soft tissue and bone axial 3 x 3 mm<br>Bone and soft tissue sag and cor 2 x 2 mm                                                         |
| <b>Head without IV Contrast (Code Stroke without Perfusion)</b> | Skull base to vertex<br>Angle gantry to orbitomeatal line              | Unenhanced                                       | Soft tissue and bone axial, sagittal, and coronal 2 x 2 mm                                                                               |
| <b>Head without IV Contrast (Craniosynostosis)</b>              | Foramen magnum to above skull vertex (20 cm FOV)<br>No gantry angle    | Unenhanced                                       | Bone axial 0.5 x 0.5 mm<br>Soft tissue axial 3 mm<br>3D surface rendered                                                                 |
| <b>Head without IV Contrast (Pediatric Head)</b>                | Skull base to vertex (17 cm FOV)<br>Angle gantry with petrous pyramids | Unenhanced                                       | Soft tissue and bone axial, sagittal, and coronal 3 x 3 mm                                                                               |
| <b>Head with IV Contrast (CT Head Venogram)</b>                 | Skull base to vertex<br>Angle gantry to orbitomeatal line              | Enhanced; 2 ml/sec, scan following 120 sec delay | Soft tissue and bone axial 3 mm<br>Soft tissue and bone sagittal and coronal 2 x 2 mm                                                    |
| <b>Head without and with IV Contrast (Routine)</b>              | Skull base to vertex<br>Angle gantry to orbitomeatal line              | Unenhanced                                       | Soft tissue and bone axial 3 mm                                                                                                          |
|                                                                 |                                                                        | Enhanced; 2 ml/sec, scan following 120 sec delay | Soft tissue and bone axial 3 mm<br>Soft tissue and bone sag and cor 2 x 2 mm                                                             |
| <b>Head without IV Contrast (Code Stroke with Perfusion)</b>    | Skull base to vertex<br>Angle gantry to orbitomeatal line              | Unenhanced                                       | Soft tissue and bone axial 3 mm                                                                                                          |
|                                                                 |                                                                        | Enhanced – evaluate midbrain perfusion           | Soft tissue and bone axial 1 x 0.5 mm<br>CBV, MTT, CBF maps<br>Reformat head and neck separately<br>Radial MIPs axial, sagittal, coronal |
| <b>Maxillofacial (Face)</b>                                     | Chin through skull<br>No gantry angle                                  | Unenhanced                                       | Soft tissue and bone axial 0.5 x 0.5 mm<br>Bone sagittal and coronal 0.5 x 0.5 mm                                                        |



|                                            |                                                                                                                                                               |                                               |                                                                                                        |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Maxillofacial (Sinus Supine)</b>        | Inferior aspect of maxillary sinus through frontal sinus (FOV 15 cm)<br>No gantry angle                                                                       | Unenhanced supine                             | Bone axial, sagittal, and coronal<br>0.5 x 0.5 mm                                                      |
| <b>Maxillofacial (Sinus Coronal Prone)</b> | Posterior to sphenoid sinus through nose (FOV 15 cm)<br>Angle gantry to face                                                                                  | Unenhanced prone, face perpendicular to floor | Bone axial, sagittal, and coronal<br>0.5 x 0.5 mm                                                      |
| <b>Neck Soft Tissue</b>                    | Aortic arch to skull base axial scans; BB marker at site of lump; do a second angled scan to evaluate any area obscured by dental artifact on the axial study | Enhanced; 90 sec delay                        | Soft tissue axial, sagittal, and coronal<br>2 x 2 mm                                                   |
| <b>Temporal Bone</b>                       | Mastoid tips through top of ears<br>No gantry angle                                                                                                           | Unenhanced                                    | Bone axial 0.5 x 0.5 mm<br>Recon right and left to a 9.6 cm FOV and reformat into coronal 0.5 x 0.5 mm |
| <b>Parathyroid</b>                         | Carina to the inferior aspect of the maxillary teeth                                                                                                          | Arterial                                      | Soft tissue ax, sag, and cor 2 x 2 mm                                                                  |
|                                            |                                                                                                                                                               | 60 sec delay                                  | Soft tissue axial                                                                                      |