Parallax

Your Guide to

CT PROTOCOLS

POSITIONING. ACQUISITION. RECONSTRUCTION. SUBMISSION.

Disclaimer

The protocols and parameters contained in this document are intended to serve as general guidelines only and do not constitute a standard of care or definitive clinical recommendation. All protocols should be reviewed, verified, and adapted by a qualified veterinary professional before use, taking into account the individual patient, clinical circumstances, available equipment, and institutional requirements.

CT acquisition parameters — including but not limited to kVp, mAs, slice thickness, reconstruction kernel, and contrast dosing — vary depending on scanner manufacturer, model, and software version. Users are responsible for verifying that all parameters are appropriate for their specific equipment and patient population before implementation.

This document reflects information available at the time of publication and may not account for subsequent advances in imaging technology, contrast media, or clinical evidence. It is the sole responsibility of the clinician to ensure protocols are current, appropriate, and compliant with applicable professional and regulatory standards.

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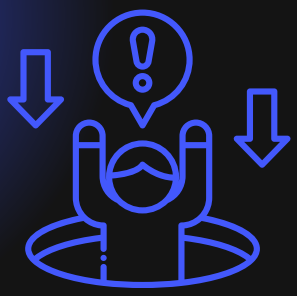


Common Pitfalls

1. Wide Field of View

- A display field of view that is wider than the anatomy of interest. This causes pixels to spread across a larger area, and resolution drops across the image.

2. Incorrect Anatomy

- A scan including a large portion of anatomy that does not match the protocol. A common example is a thoracic study that captures the full forelimbs along with the chest, when the protocol calls for the thorax only.

3. Poor Patient Positioning

- A patient who sits crooked, rotated, or off-center on the table. The symmetry is lost, anatomy falls off the isocenter, and the resulting images are harder to interpret side-to-side.

4. Sending Extra Series

- Studies are sent with more algorithms and reconstructions than the protocol calls for, such as pre-contrast sagittal and dorsal series sent alongside post-contrast, or a lung series in an abdomen study. The extra series adds interpretation time without adding diagnostic information.

Site Classification & Billing

Site classification affects scan coverage, radiation dose, and billing. Get it right before you start the scan.

When a request comes in, identify which anatomic regions need to be included and whether that's one site or multiple. Correct classification ensures appropriate coverage, limits unnecessary radiation, and prevents billing errors.

One Site Studies

- Head
- Head & Neck (captured together)
- Thorax
- Abdomen
- Cervical Spine
- Thoracolumbar Spine
- Thoracic Limbs (head/neck collimated out)
- Pelvic Limbs

Two Site Studies

- Thoracic Limbs + Head & Neck
- Head & Neck + Thorax
- Thorax + Abdomen
- Abdomen + Pelvic Limbs
- Cervical + Thoracolumbar Spine

Three Site Studies

- Thoracic Limbs + Head & Neck + Thorax
- Head & Neck + Thorax + Abdomen
- Thorax + Abdomen + Pelvic Limbs

Four Site Study

- Head & Neck + Thorax + Abdomen + Pelvic Limbs

Five Site Study

- Almost the entire patient from the carpi to the tarsi, excluding the feet

Six Site Study

- The entire patient from the tip of the thoracic limb toes to the pelvic limb toes

CT Protocol Quick Reference Guide

CT TYPE	POSITIONING	SLICE THICKNESS	SERIES TO SUBMIT	TOTAL	PAGE
HEAD & NECK					
Head (1 site)	Sternal; mouth open 1–2 in.; pull tongue away from oral masses	0.625 mm or lower (sub-millimeter)	**Pre:** Transverse Bone, Transverse Soft Tissue **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	5	18
Head & Neck (1 site)	Sternal; mouth open 1–2 in.; scan range: nose to T1	0.625 mm or lower	**Pre:** Transverse Soft Tissue, Transverse Bone **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	5	20
BODY					
Thorax (1 site)	Sternal; thoracic limbs cranial, tight to head; induce apnea	≤30 lbs: 1.5 mm or lower >30 lbs: 2.5–1.5 mm	**Pre:** Transverse Soft Tissue, Transverse Lung **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	5	22
Abdomen (1 site)	Sternal preferred (dorsal OK); extend pelvic limbs; tail-first	≤30 lbs: 1.25 mm 31–70+ lbs: 1.5 mm	**Pre:** Transverse Soft Tissue **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	4	24
SPINE					
Cervical Spine (1 site)	Dorsal; thoracic limbs caudal, tight to chest; tympanic bulla to T3	0.625 mm or lower	**Pre:** Transverse Soft Tissue, Transverse Bone **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	5	26
T/L Spine (1 site)	Dorsal; collimate to vertebrae + paraspinal; tail-first	≤30 lbs: 0.625 mm or lower 31–70+ lbs: 1.5 mm or lower IVDD/Trauma: <1 mm	**Pre:** Transverse Bone, Transverse Soft Tissue **Post:** Transverse Soft Tissue **Recon:** Dorsal Post Soft Tissue, Sagittal Post Soft Tissue	5	28
MULTI-REGION					
Cervical & T/L Spine (2 sites)	Dorsal **C-Spine:** Tympanic bulla to T3 **T/L Spine:** C5 to sacrum	≤30 lbs: 0.625 mm or lower 31–70+ lbs: 1.5 mm or lower	**C-Spine Pre:** Transverse Soft Tissue, Transverse Bone **T/L Spine Pre:** Transverse Soft Tissue, Transverse Bone **Post (each):** Transverse Soft Tissue **Recon (each):** Dorsal Post ST, Sagittal Post ST	10	38
Head & Neck + Thorax (2 sites)	Sternal; thoracic limbs cranial, lower than head; apnea **H&N:** Caudal skull to T1 **Thorax:** T1 to visible liver (T13)	≤30 lbs: 1.5 mm or lower 31–70+ lbs: 2.5–1.5 mm	**H&N Pre:** Transverse Soft Tissue, Transverse Bone **Thorax Pre:** Transverse Soft Tissue, Transverse Lung **Post (each):** Transverse Soft Tissue **Recon (each):** Dorsal Post ST, Sagittal Post ST	10	34
Thorax & Abdomen (2 sites)	Sternal; thoracic limbs cranial, pelvic limbs caudal; apnea; tail-first **Thorax:** T1 to visible liver (T13) **Abdomen:** Heart apex to past hip joints	**Thorax** ≤30 lbs: 1.5 mm or lower 31–70+ lbs: 2.5–1.5 mm **Abdomen** ≤30 lbs: 1.25 mm 31–70+ lbs: 1.5 mm	**Thorax Pre:** Transverse Soft Tissue, Transverse Lung **Abdomen Pre:** Transverse Soft Tissue **Post (each):** Transverse Soft Tissue **Recon (each):** Dorsal Post ST, Sagittal Post ST	9	36
ORTHOPEDIC					
Thoracic Limbs	Sternal preferably (or Dorsal); limbs cranially, parallel, straight; head-first **1 site:** Entire thoracic limbs (scapula to toes) **2 sites:** Entire thoracic limbs + Head & Neck	0.625 mm or lower	**Pre:** Transverse Soft Tissue, Transverse Bone **Post:** Transverse Soft Tissue **Recon:** Dorsal Post ST, Sagittal Post ST, Dorsal Pre Bone, Sagittal Pre Bone	7	30
Pelvic Limbs	Sternal (or Dorsal); limbs caudally, parallel, straight; tail-first **1 site:** Entire pelvic limbs (L5–L6 to toes) **2 sites:** Entire pelvic limbs + Abdomen	0.625 mm or lower	**Pre:** Transverse Soft Tissue, Transverse Bone **Post:** Transverse Soft Tissue **Recon:** Dorsal Post ST, Sagittal Post ST, Dorsal Pre Bone, Sagittal Pre Bone	7	32
ADVANCED PROTOCOLS					
CT Angiography (Portosystemic Shunts)	Sternal; thoracic limbs cranial, pelvic limbs caudal; cephalic vein for contrast	1.25 mm	**Pre:** Transverse Soft Tissue **Post (Arterial):** Transverse Soft Tissue **Post (Venous):** Transverse Soft Tissue **Recon:** Venous Phase Dorsal ST, Venous Phase Sagittal ST	5	40
IV Urography (IVU)	Sternal; pelvis elevated 5–10°; fast 12–18 hrs; clean colon	1.25 mm	**Pre:** Transverse Soft Tissue **Post (Excretory):** Transverse Soft Tissue **Recon:** Excretory Phase Dorsal ST, Excretory Phase Sagittal ST	4+	42

Start Here

Made For You

You're the first step in image quality. How you position, scan, and reconstruct determines what the radiologist can actually see. Better positioning and clean images mean radiologists can read studies faster and more accurately.

This guide covers patient positioning, reconstruction, and what to submit. You'll learn proper algorithms, slice thickness, field of view, and submission standards. This helps you produce diagnostic-quality studies, whether you're working solo, training someone new, or stepping into a new workflow.

Acquisition parameters like kVp, mAs, and pitch are set by your site's protocols and aren't covered here.

Use It Your Way

Read straight through or jump to the section you need. It's built to work at the scanner, during training, or when troubleshooting.

Core principles come first and apply throughout. Regional protocols build on them and are organized so you can jump to the section you need.

Example: Boxes like this appear throughout to highlight essential information for quick reference.

We're Here For You

Every patient is different, and protocols can't anticipate everything. When something doesn't fit the situation in front of you, don't guess. Talk to your team or the clinician if you need an answer right away. For questions that can wait, reach out to us.

We'd rather answer a question than have you guess.

info@parallax.vet

Core CT Standards

What makes CT images diagnostic

CT collects data as the scanner rotates around the patient, reconstructing images from that data. Your positioning, motion control, and scan time directly determine what the radiologist can see. Done well, you give them the information they need for accurate interpretations and the best possible guidance for patient care.

This is why planning matters. Your job is to collect the right information, with the right positioning and timing, for the specific question being asked.

Video: How Does a CT Scan Work?

Image Quality Fundamentals

Every CT scan you run is a tradeoff between speed and image quality, and both affect radiation dose. Improving one typically comes at the expense of another.

- **Scan fast**: You're collecting fewer photons per slice. That means more noise (looks grainy) and a harder time seeing low-contrast structures.
- **Scan slow**: Lower noise and better detail, but motion has more time to degrade the image, and longer exposure times usually mean higher dose.

Here's what matters: don't scan excessive anatomy just in case. A wider scan takes longer, gives motion more time to degrade the study, and adds heat load on the tube and radiation without improving diagnostic value. Scouts are the exception; they can show extra anatomy for planning purposes.

This is why protocols are tailored to specific studies.

- A **thoracic scan for pulmonary metastasis** prioritizes speed (fast). Respiratory and cardiac motion blur small nodules, and you want the whole thorax captured in as tight a window as possible.
- A **head scan** prioritizes resolution over speed (slow). Patients are anesthetized so the skull holds still, and small structural details matter more than acquisition time.

The clinical question drives the protocol. Know what you're looking for before you pick your parameters.

Patient Positioning

Proper positioning and motion control directly determine image quality. Start by getting the patient's body level, straight, and centered on the table. Then use the scanner's laser lights:

- **Vertical light**: Splits the patient down the midline, centering them left to right in the gantry
- **Horizontal light**: Marks the isocenter height, centering it top to bottom in the gantry

Patient centered and symmetric using laser lights for a CT of Thorax (Superman position)

Adjust the table height so the area you're scanning sits at **the isocenter**, the center of the gantry. For body scans, this usually means centering on the middle of the torso, from top to bottom. Off-center positioning degrades image quality and dose efficiency.

Keep the spine straight and centered. Don't let the patient rotate or twist. This matters for every scan, but it's especially critical for head and spine studies where even slight rotation degrades what you can see.

Recumbency by body region:

Most studies run in sternal recumbency. What changes by region is thoracic limb position. Keep the limbs out of the scan field so dense bone does not cast **beam-hardening or streak artifact** across the region of interest.

- **Skull**: Sternal, thoracic limbs caudal, close to the chest (Ironman position)
- **Thorax**: Sternal, thoracic limbs cranial, close to the head (Superman position)
- **Abdomen**: Sternal, thoracic limbs cranial and close to the head, pelvic limbs caudal (Superman position)
- **Spine**: Dorsal required (keeps the spine straight and aligned with the scan axis for clean reformats)
- **Extremities**: Varies by area of interest; position for stability and symmetry, limbs parallel to each other

Gantry entry (head-first vs tail-first): Anesthesia machines are mobile and follow the patient's head. Patient length drives the choice. Orient so that tubing takes the shortest path out of the bore; tubing in the scan field can create artifacts from metal fittings or condensation and make positioning harder.

- **Head-first**: Default when the patient fits; works for head, neck, thorax, and most abdomens
- **Tail-first**: Use when the patient is too long to reach caudal anatomy using head-first (large-breed abdomens, pelvis, hind limbs)

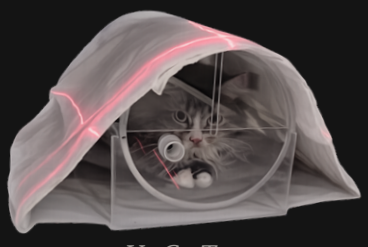
Tail-first: Sternal recumbency for CT of abdomen (Superman position)

Head-first: Sternal recumbency for CT of head (Ironman position)

Positioning aids: Use radiolucent materials that hold the body part securely while allowing adjustments.

- **Devices**: Troughs, Velcro bands, foam wedges, VetCatTrap, HawkSpine, Pawsitioner (EICKEMEYER), Flexi-Wedge Positioning Supports (Big Dog Bed Company), Ultrasound Positioning Pillow (EICKEMEYER)
- **Padding**: Foam blocks/wedges, towels, pool noodles, radiolucent gel bags, vacuum cushions
- **Tape**: Porous, masking, or painter's tape

Avoid positioning aids with metal components (buckles, wires, snaps), as they create streak artifacts in the scan field.



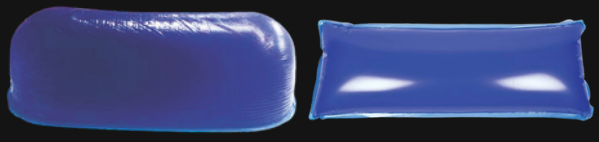
VetCatTrap

Flexi-Wedge Positioning Supports

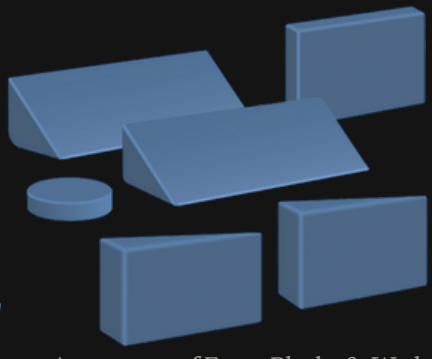
Vacuum Cushion

HawkSpine

Pawpositioner



Radiolucent Gel Bags



Assortment of Foam Blocks & Wedges

Porous / Masking / Painter's Tape

Motion Control

A slightly imperfect but motionless patient produces better images than a perfectly positioned moving patient. Motion control starts with positioning and ends with coordinated apnea during the scan.

Motion stability:

- Stabilize the anatomy of interest against the table surface
  - For spine studies, dorsal recumbency puts the vertebral column directly on the table
  - For thorax and abdomen scans, sternal recumbency puts the sternum and ventral body wall against the table

Apnea for thoracic and cranial abdominal scans:

Respiratory motion blurs lung detail and degrades cranial abdominal structures (liver, diaphragm, cranial kidneys). Apnea eliminates it, and there are two methods.

- **Hyperventilation-induced apnea** (standard method)
  - Hyperventilate the patient to lower CO2 and induce temporary apnea, stabilizing the chest wall and keeping the diaphragm stationary
  - The anesthetist exits the room before the scan begins
- **Manual breath-hold** (used when protective shielding is available)
  - The anesthetist remains in the scan room with full shielding (lead apron, thyroid shield, goggles, dosimeter badge, and mobile lead barrier) and follows your site's radiation safety protocols
  - Ventilation is paused at end-expiration, when the diaphragm is in its most relaxed and reproducible position, then scan on their signal

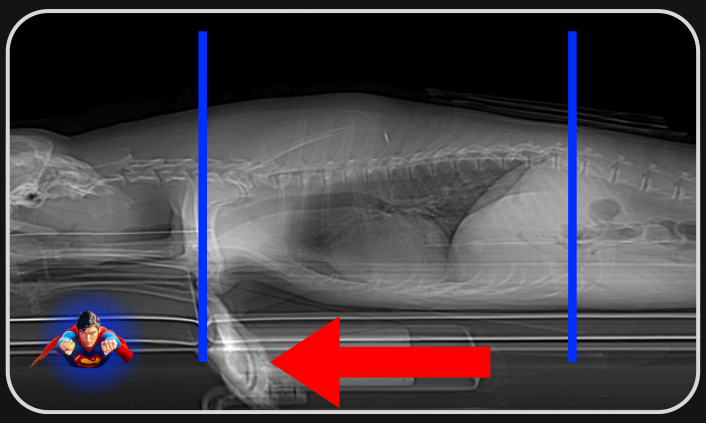
Radiation Shielding

Coordinate with the anesthetist:

- Confirm the apnea method (hyperventilation or manual breath-hold) before the patient is on the table
- Agree on a clear signal for apnea onset and scan completion
- Have the scan planned and loaded before inducing apnea so there's no delay between apnea onset and acquisition

Motion control best practice for CT of thorax:

Start just caudal to the diaphragm and scan cranially to the thoracic inlet. The caudal thorax is most prone to respiratory motion, so scanning it first captures those slices while the patient is still in apnea.



Lateral scout for a thoracic CT, with scan direction (red arrow) and start/end points (blue lines).

Common Artifacts

Artifact Type	What You See	What to Do
Motion	Blur, smearing, double edges	Induce breath hold, stabilize anatomy; use fastest rotation time and appropriate pitch
Metal / Streak	Bright and dark lines from metal	Remove external metal and increase mAs; if your scanner supports it, enable Metal Artifact Reduction (MARS)
Noise	Grainy, speckled texture	Increase mAs first; kVp can help, but reduces contrast; if your scanner supports it, enable Iterative Reconstruction (e.g., ASiR on GE)
Beam Hardening	Dark bands between dense structures	Increase kVp; center patient; verify beam hardening correction is enabled in reconstruction
Ring	Circular bands centered on rotation axis	Run air calibration; if rings persist, report to the service engineer

Click an artifact type to see examples.

Contrast Protocol

Pre-contrast (first, always):

Before you give any contrast, run the pre-contrast series. This is your **baseline**. Once contrast is in, **you can't go back**. Hemorrhage (bleeding) and mineralization (calcium deposits) will look like contrast, and fat-containing lesions are harder to identify once contrast obscures their low density. Always run pre-contrast before injecting, no exceptions.

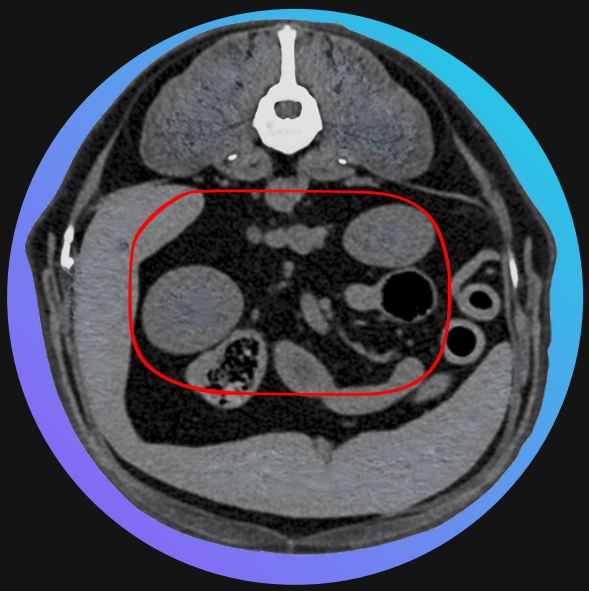
Post-contrast:

These series show how tissues take up contrast, helping distinguish **vascular lesions** (tumors, inflammation) from **non-vascular** ones (cysts, necrosis, fibrosis). Timing determines what you see: the arterial phase highlights vascular structures, venous phase shows tissue enhancement. See Contrast Administration for phase timing.

Skip contrast when it won't help:

Orthopedic studies where the question is bony anatomy don't need contrast: elbow dysplasia, fracture assessment, and foreign body localization. If the situation doesn't call for it, don't give it.

Pre Contrast



Pre-contrast: kidneys and vessels (boxed), no enhancement

Post Contrast

Post-contrast: same kidneys and vessels showing contrast uptake

Contrast Administration

What to use:

Give non-ionic iodinated contrast. Iohexol or iopamidol are the standard choices.

How much:

- 1 mL per pound of lean body weight (2.2 mL/kg) using Iohexol 350 mgI/mL
  - Contrast bottles are labeled by mg of iodine, not drug concentration (350 mg of iodine per mL).
  - Use actual body weight minus excess fat (if quantifiable).
  - **Maximum dose**: 880 mgI/kg

Example: 50 lb dog | Iohexol 350 mgI/mL
- **Give:** 50 mL (1 mL/lb)
- **Total iodine:** 50 × 350 = 17,500 mgI
- **Weight in kg:** 50 ÷ 2.2 = 22.7 kg
- **Result:** 17,500 ÷ 22.7 = 770 mgI/kg ✓

Where to inject:

Warm contrast before injection. Room temperature or body temperature contrast is easier to inject, better tolerated, and improves image quality.

- **Cephalic vein for most studies,** into a **large-bore IV catheter (20g or 18g)** with a macro extension set. A standard T-port works for manual push. For power injection, use a **Macrobore T-port**, which handles higher flow rates.
  - For abdominal scans, this matters most. Saphenous injection **causes streak artifacts** (dark lines that obscure the image) from concentrated contrast in the caudal vena cava, which can hide what you're trying to see.

How to give it:

- Manual IV Push and power injection are both valid delivery methods. Use whichever your hospital has available. Please note that power injection produces more consistent results.
- Bolus tracking, when available, is the standard for vascular studies. Place your ROI in the target vessel and trigger at a threshold for consistent phase capture across patients.

Phase targets:

- Arterial Phase: Peak vascular enhancement during the first pass.
- Venous Phase: parenchymal enhancement after the first pass has cleared.

Phase timing without bolus tracking depends on your scanner's acquisition speed, scan coverage length, and the patient's cardiac output. Your CT applications specialist or scanner manufacturer can help you build phase-specific presets calibrated to your machine.

Flush and hydrate:

- Flush the line with saline after injection, or keep IV fluids running through and after.

Monitor during injection:

Contrast can act as a mild stimulant, even in anesthetized patients.

Watch for reactions during injection:

- Increased respiratory rate
- Movement or muscle tension
- Swallowing

If you see these, check the anesthetic depth. These reactions can happen at an appropriate depth but are usually controlled by deepening anesthesia.

☢️ For **severe reactions** (bradycardia, hypotension, hives), stop the injection and alert the clinician immediately.

Iohexol (Omnipaque) in 240, 300, and 350 mgI/mL

Power injectorMEDRAD® Stellant FLEX CT Injection System

Contrast Safety

Dehydration is a **contraindication** for IV contrast. Check with your attending clinician prior to administering contrast in any patient.

Iodinated contrast is nephrotoxic, and reduced renal perfusion from dehydration amplifies that risk.

Reconstruction & Submission

Turning raw data into diagnostic images

When you scan, the scanner collects raw data once. Your protocol then reconstructs that data into multiple series with different **algorithms** (also called kernels), slice thicknesses, field of view settings, and sometimes additional planes (dorsal, sagittal).

Your protocols should handle most of this automatically, but check before you submit. Protocols get tweaked, settings change, and scanners don't always cooperate.

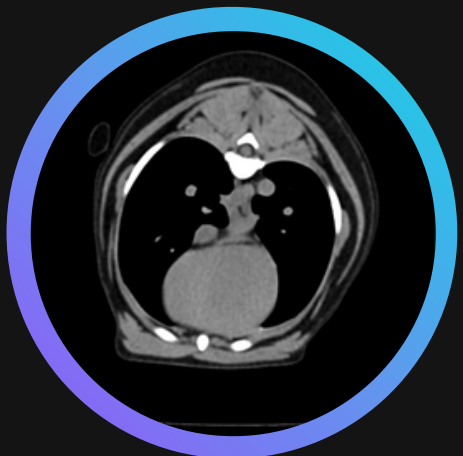
What Your Scanner Creates

Your protocol can produce multiple series because the scanner processes the same raw data with different settings:

- **Soft Tissue**: Smooth edges, low noise. Used for organs, masses, and vessels.
  - Labeled as "Transverse Soft Tissue" or similar.
- **Bone**: Sharp edges, higher noise. Used for skeleton, fractures, and joints.
  - Labeled as "Transverse Bone" or similar.
- **Lung**: Very sharp edges, higher noise. Used for lung parenchyma and airways.
  - Labeled as "Transverse Lung" or similar.

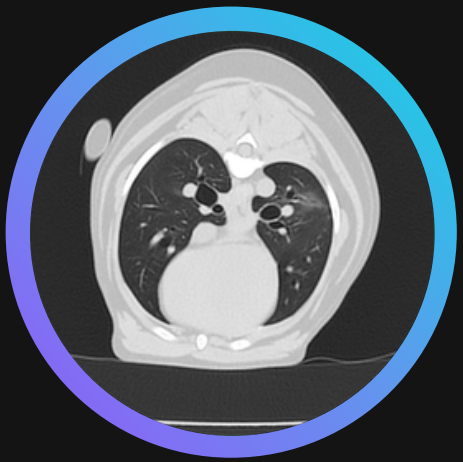
This is why protocols list multiple series for one acquisition; they're all coming from the same scan, just processed differently.

Soft Tissue



Bone

Lung

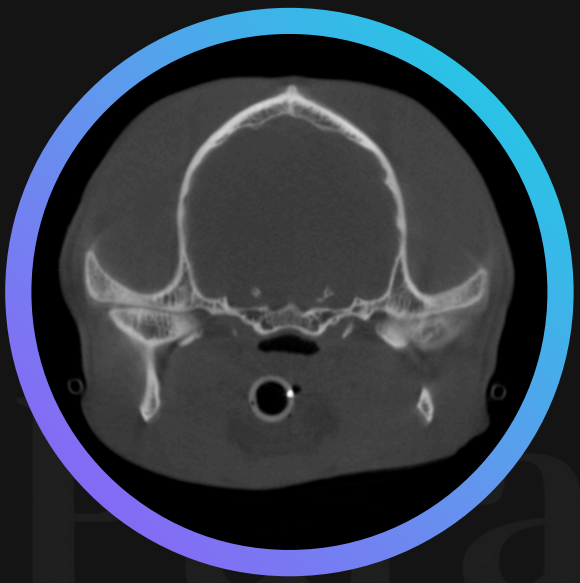


Display Field of View (DFOV)

DFOV controls the zoom level of your images:

- Smaller DFOV = tighter crop = **higher pixel density and more visible detail**
- Should be set to the region of interest, not the whole scan area
- A wide DFOV dilutes pixel density and makes small findings harder to spot

Good Display Field of View



Poor Display Field of View

Slice Thickness

Slice thickness balances detail against noise:

- Thinner (0.5-0.625 mm) = more detail, more noise; Head, lungs, spine, small patients
- Thicker (1.5-2.5 mm) = less noise, less detail; Large patients and soft tissue overview

Thorax Soft Tissue Post-Contrast Dorsal

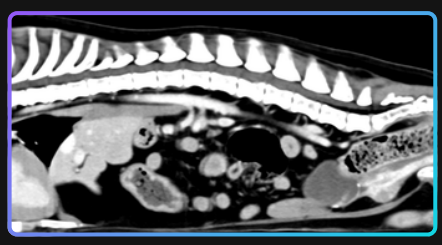
Multiplanar Reconstructions

These show different viewing angles of the same data:

- Dorsal - View from above or below, showing the patient in a top-down plane
- Sagittal - Side profile view, dividing left and right halves

Most protocols call for multiplanar reconstructions on post-contrast series, either auto-generated or created manually. Check your protocol and confirm the expected MPRs are present before submitting. Pre-contrast planes are included only if your protocol specifies.

Thorax Soft Tissue Post-Contrast Sagittal



Pre-Submission Checklist

Run through each item below before submitting. If anything looks off, check the Reconstruction & Submission page for a refresher on the concepts.

1

Match the Protocol Count

Look at "Total Series Submissions" and confirm the number matches your protocol. For example, if your protocol calls for 5 series, you should see exactly 5 ready to send. If you see 3 or 7, something's off - investigate before submitting.

2

Verify the Algorithms

Scroll through each series and confirm it's using the correct reconstruction algorithm. You should be able to tell at a glance: soft tissue looks smooth, bone looks sharp/noisy, lung looks very sharp. If a series looks wrong for its label, don't submit it.

(See the algorithm comparison images on the Reconstruction & Submissions page if you're unsure what each should look like.)

3

Confirm the Field of View Is Collimated

Images should be zoomed to the region of interest, not showing extra anatomy around the edges. If the field of view is too wide, the resolution suffers, and pathology may be harder to read.

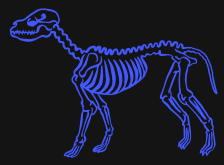
4

Check Multiplanar Reconstructions

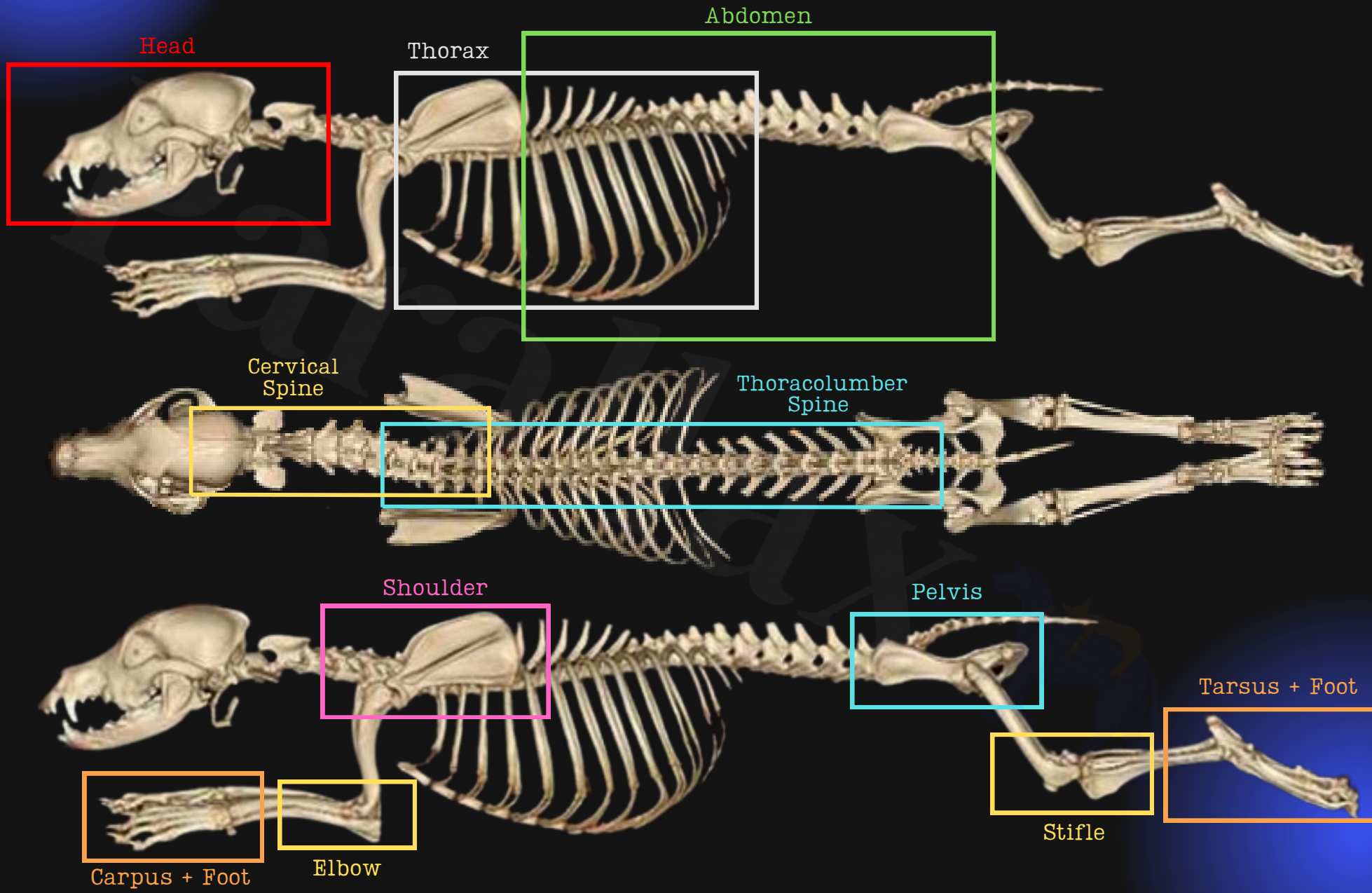
Create dorsal and sagittal reconstructions for the series your protocol specifies. Confirm they're present and labeled correctly before submitting.

⚠

If anything looks off at any step, stop and investigate before submitting.



Body Sites & Joints



Head

Positioning

Hold the mouth open 1 to 2 inches with a syringe or roll of gauze

Recumbency: Sternal

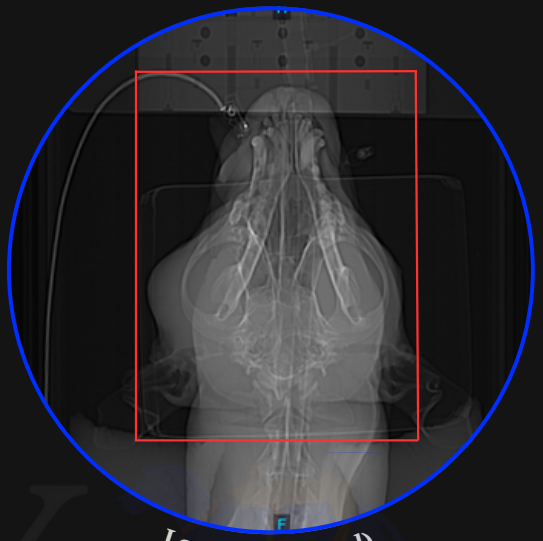
Gantry Entry: Head-first (if unable, tail-first)

Body Alignment: Head straight and symmetric to the table, center laser light through the middle of the body

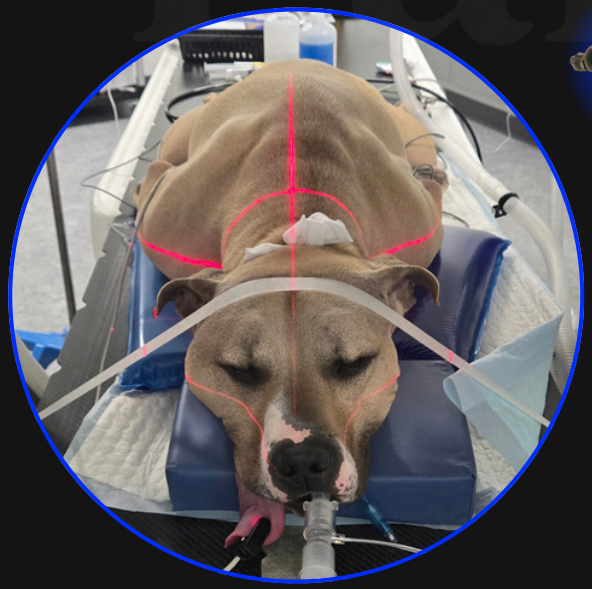
Limb Placement: Thoracic limbs caudal, tight to chest (ironman position)

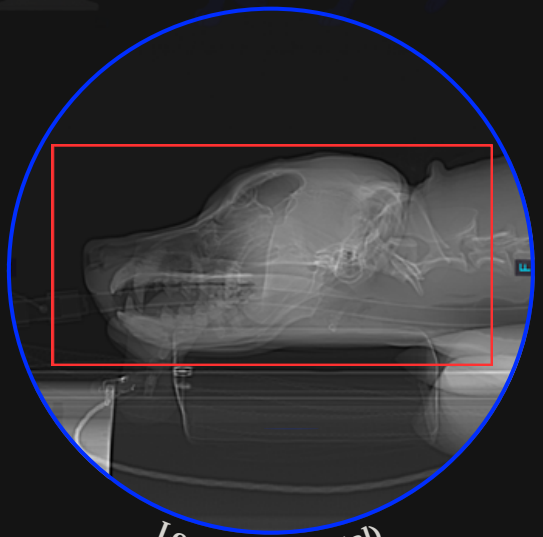
Scan Range: Tip of nose to middle of C3

Note: Clear all metal, including monitoring equipment, from the nose to the shoulders for the diagnostic series



Localizer (Dorsal)





Localizer (Sagittal)

Head

Acquisition

Slice Thickness: 0.625mm or lower

Pre-contrast: Transverse Soft Tissue + Transverse Bone

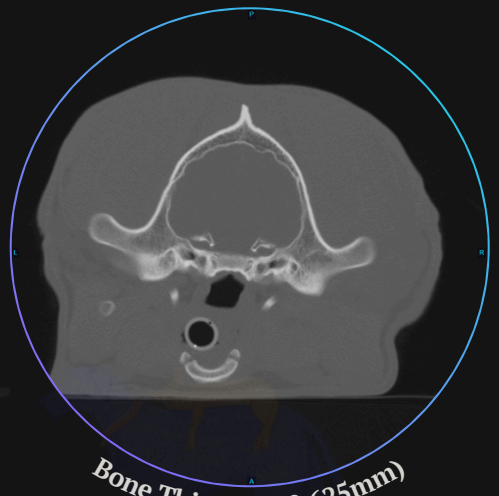
Post-contrast: Transverse Soft Tissue

Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

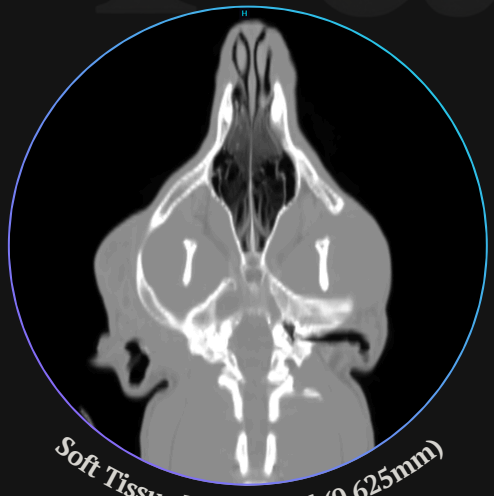
Site Count: One

Total Series Submissions: Five

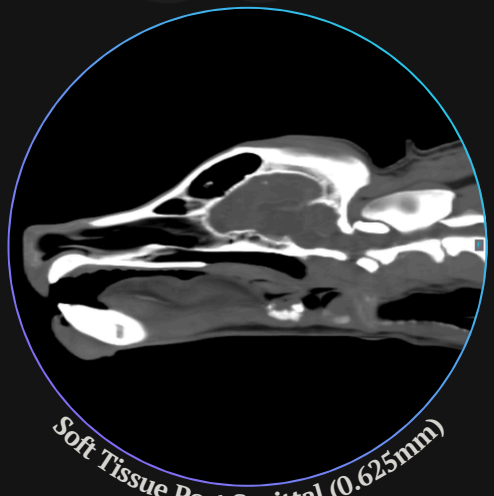
Soft Tissue Pre (0.625mm)



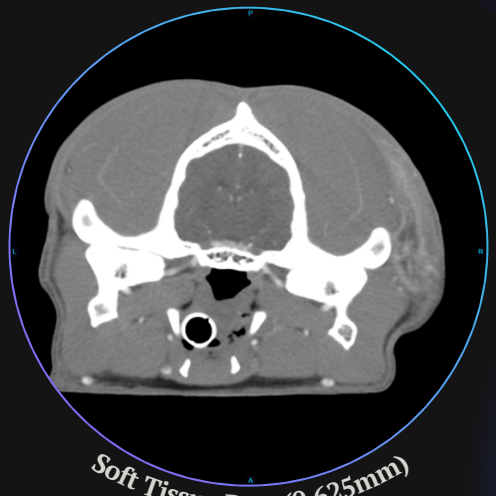
Bone Thins Pre (0.625mm)



Soft Tissue Post Dorsal (0.625mm)



Soft Tissue Post Sagittal (0.625mm)



Soft Tissue Post (0.625mm)

Head & Neck

Positioning

Recumbency: Sternal

Gantry Entry: Head-first (if unable, tail-first)

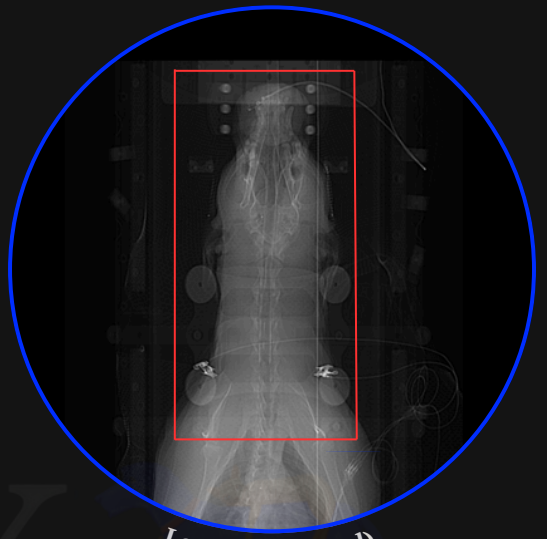
Body Alignment: Head straight and symmetric to the table, center laser light through the middle of the body

Limb Placement: Thoracic limbs caudal, tight to chest (ironman position)

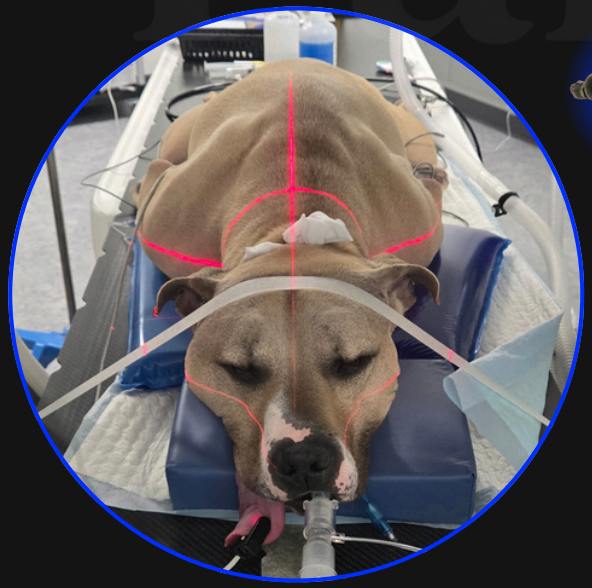
Scan Range: Tip of nose to middle of T1

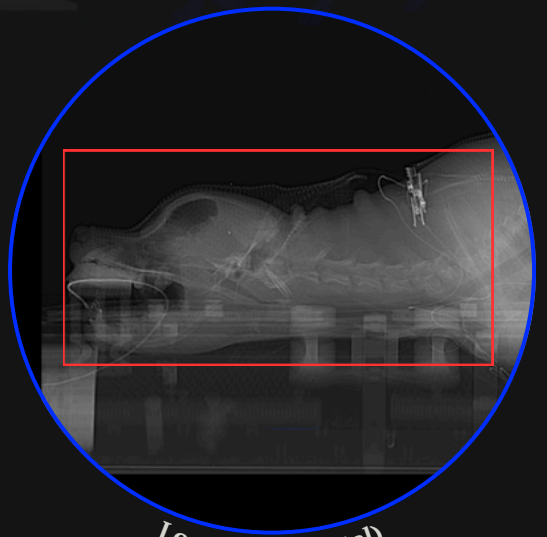
Note: Clear all metal, including monitoring equipment, from the nose to the shoulders for the diagnostic series

Hold the mouth open 1 to 2 inches with a syringe or roll of gauze



Localizer (Dorsal)





Localizer (Sagittal)

Head & Neck

Acquisition

Slice Thickness: 0.625mm or lower

Pre-contrast: Transverse Soft Tissue + Transverse Bone

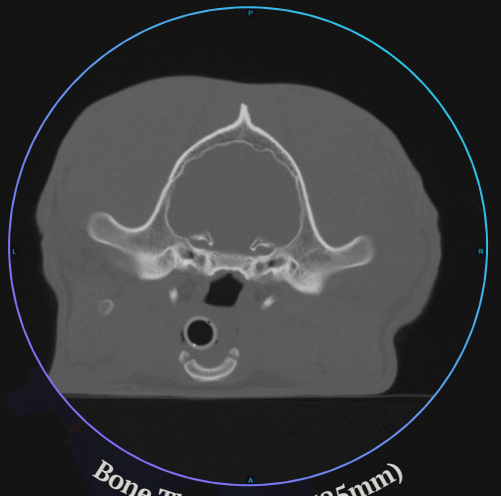
Post-contrast: Transverse Soft Tissue

Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

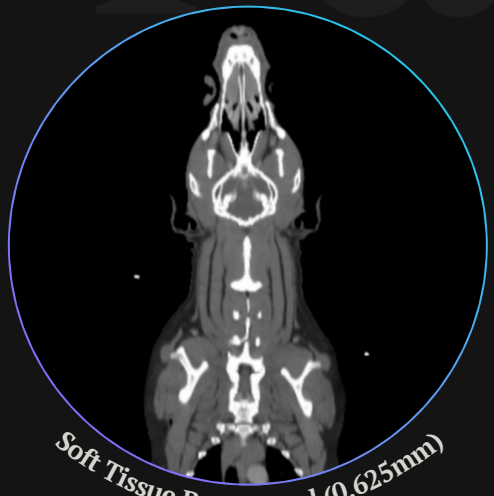
Site Count: One

Total Series Submissions: Five

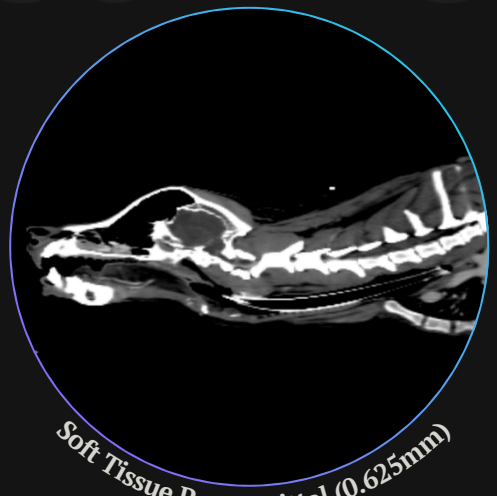
Soft Tissue Pre (0.625mm)



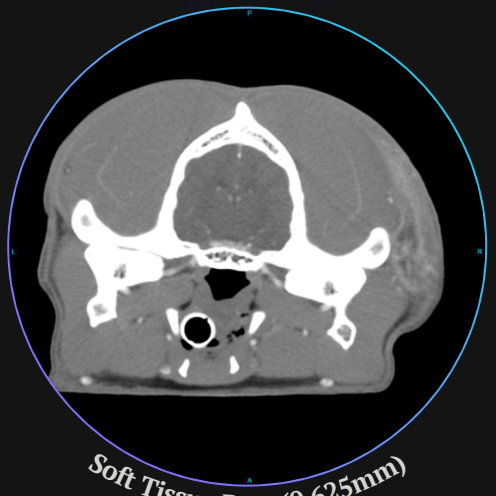
Bone Thins Pre (0.625mm)



Soft Tissue Post Dorsal (0.625mm)



Soft Tissue Post Sagittal (0.625mm)



Soft Tissue Post (0.625mm)

Thorax

Positioning

Induce apnea to minimize motion

Recumbency: Sternal

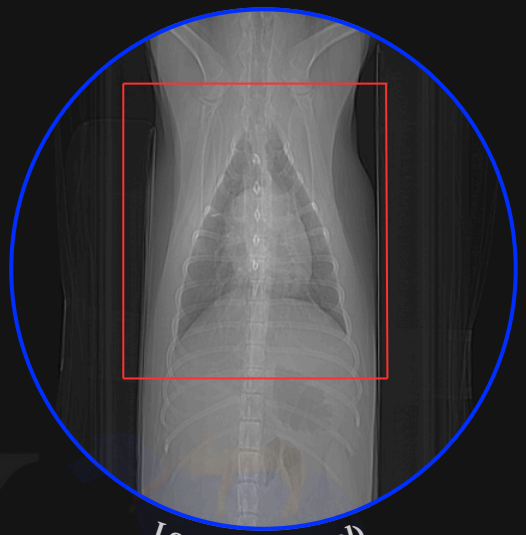
Gantry Entry: Head-first (if unable, tail-first)

Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

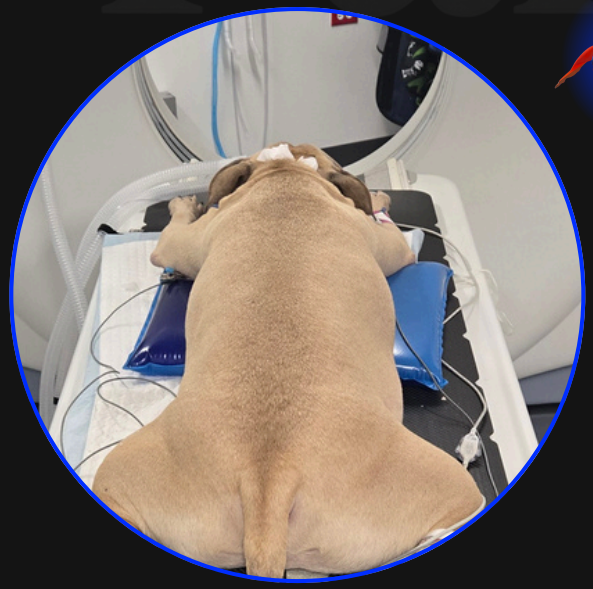
Limb Placement: Thoracic limbs cranial, tight to the head (superman position)

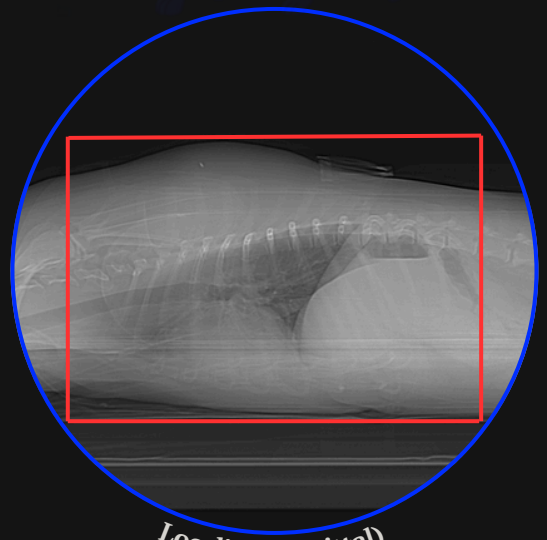
Scan Range: Cranially from the visible liver (T13) to the thoracic inlet (T1)

Note: Clear all metal, including monitoring equipment, from the neck to the abdomen for the diagnostic series



Localizer (Dorsal)





Localizer (Sagittal)

Thorax

Acquisition

Slice Thickness:
- 0–30 lbs: 1.5mm or lower
- 31–70+ lbs: 2.5mm to 1.5mm

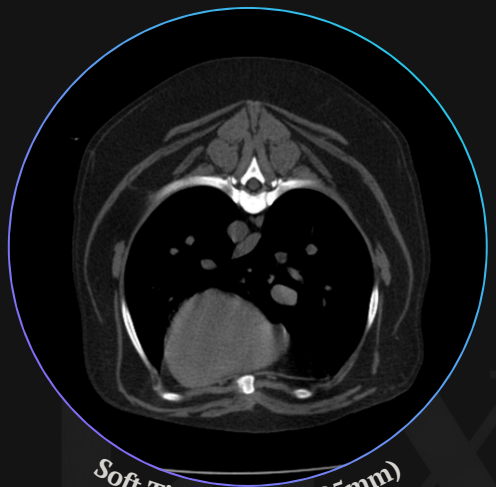
Pre-contrast: Transverse Soft Tissue + Transverse Lung

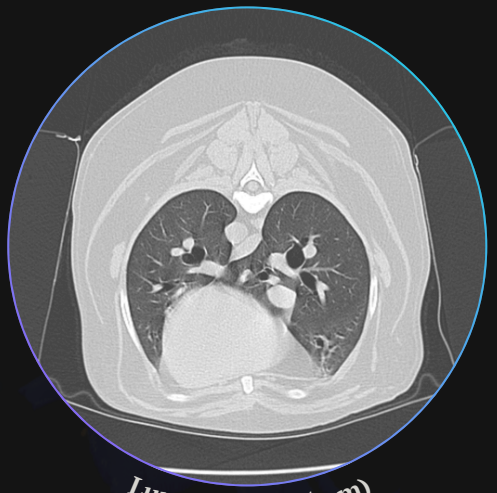
Post-contrast: Transverse Soft Tissue

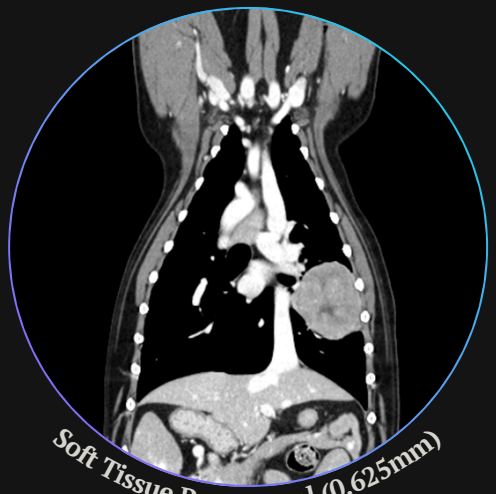
Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

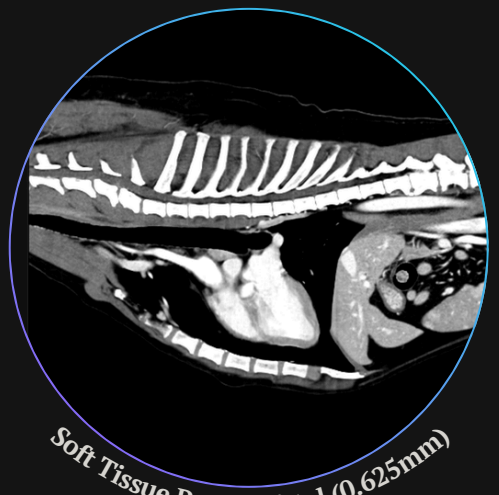
Site Count: One

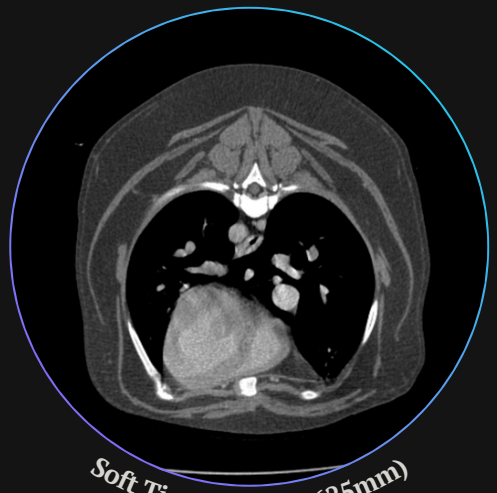
Total Series Submissions: Five


Soft Tissue Pre (0.625mm)


Lung Pre (0.625mm)


Soft Tissue Post Dorsal (0.625mm)


Soft Tissue Post Sagittal (0.625mm)


Soft Tissue Post (0.625mm)

Abdomen

Positioning

Recumbency: Sternal

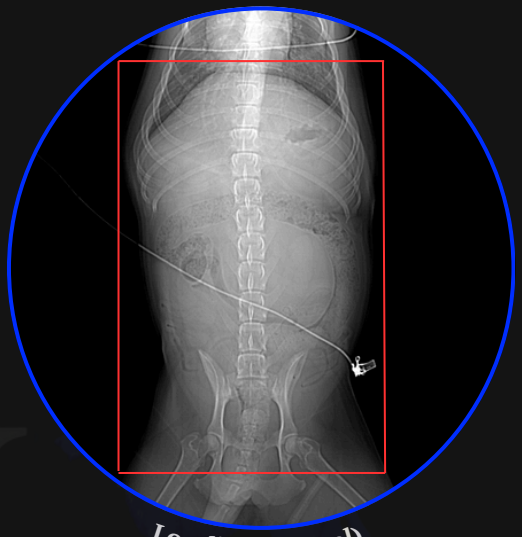
Gantry Entry: Tail-first (if unable, head-first)

Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

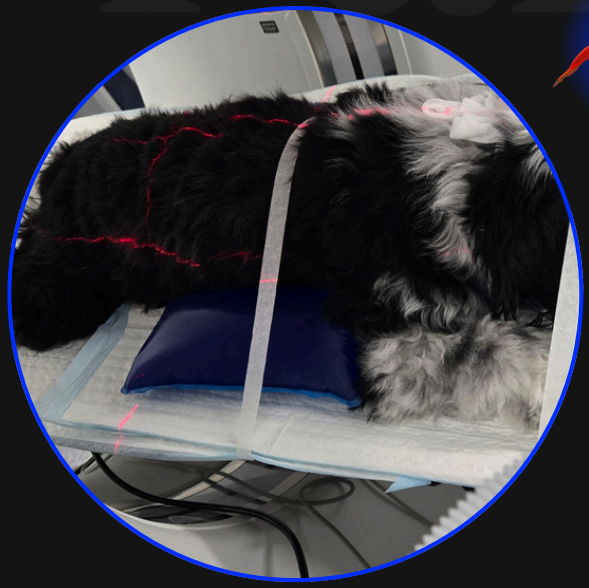
Limb Placement: Thoracic limbs cranial, tight to the head, and pelvic limbs caudal and straight (superman position)

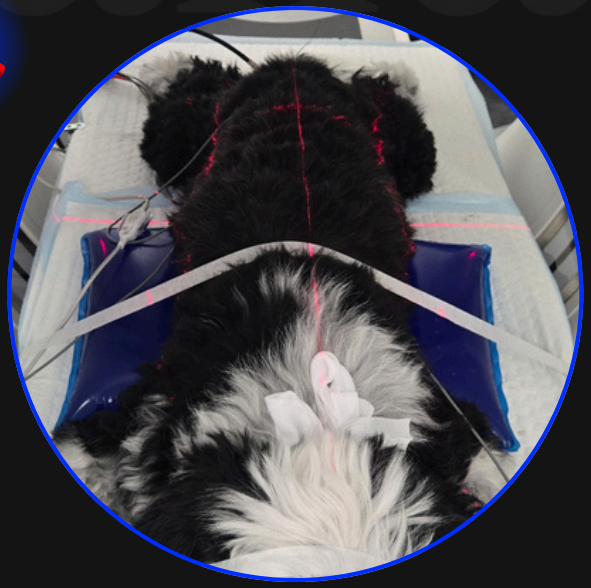
Scan Range: Extends caudally from the tip of the heart (apex) to just past the hip joints

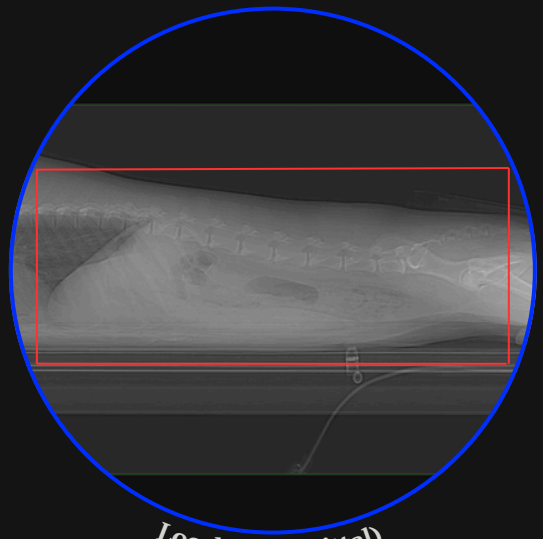
Note: Clear all metal, including monitoring equipment, from the armpits to the stifles for the diagnostic series



Localizer (Dorsal)







Localizer (Sagittal)

Abdomen

Acquisition

Slice Thickness:
- 0–30 lbs: 1.25 mm
- 31–70+ lbs: 1.5 mm

Pre-contrast: Transverse Soft Tissue

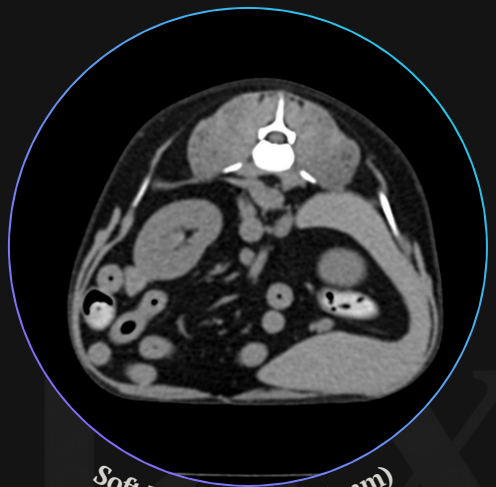
Post-contrast: Transverse Soft Tissue

Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

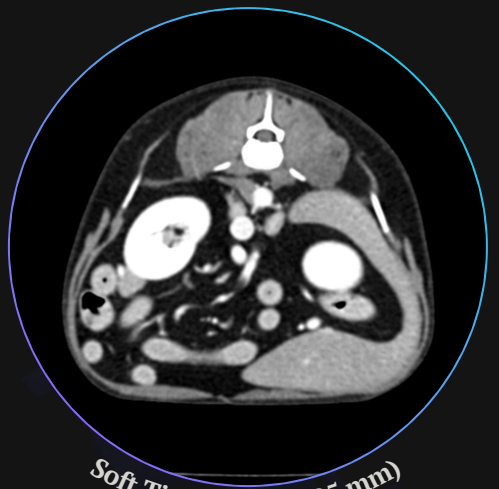
Site Count: One

Total Series Submissions: Four

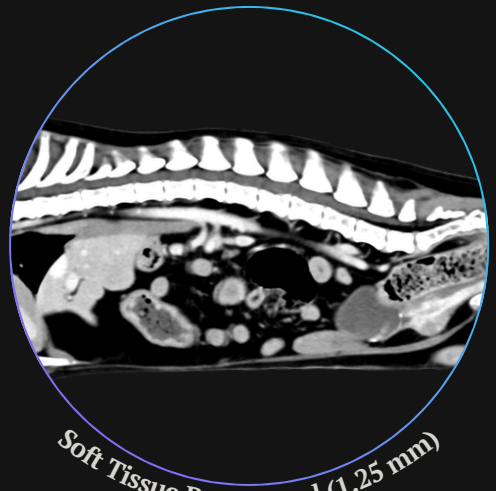
Use a cephalic vein for contrast to prevent artifacts



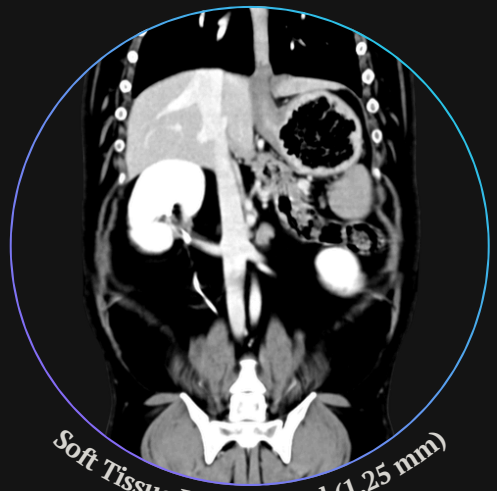
Soft Tissue Pre (1.25 mm)



Soft Tissue Post (1.25 mm)



Soft Tissue Post Dorsal (1.25 mm)



Soft Tissue Post Sagittal (1.25 mm)

Cervical Spine

Positioning

Recumbency: Dorsal

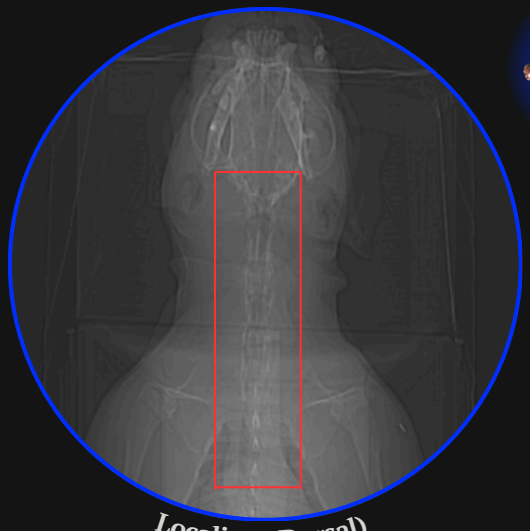
Gantry Entry: Head-first (if unable, tail-first)

Body Alignment: Spine straight and as symmetric as possible to the table, center laser light through the middle of the body.

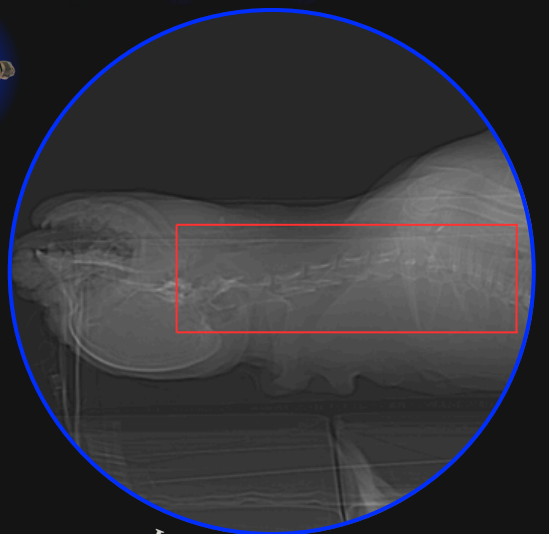
Limb Placement: Thoracic limbs caudal, tight to the chest (ironman position, upside down)

Scan Range: Tympanic Bulla (ear canals) to T3

Note: Clear all metal, including monitoring equipment, from the head to the abdomen for the diagnostic series



Localizer (Dorsal)



Localizer (Sagittal)

Cervical Spine

Acquisition

Slice Thickness: 0.625 mm or lower

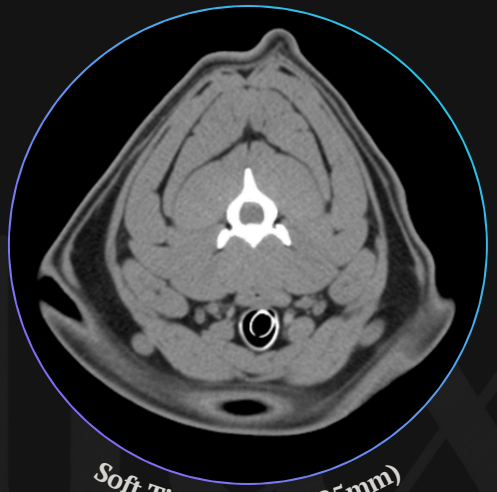
Pre-contrast: Transverse Soft Tissue + Transverse Bone

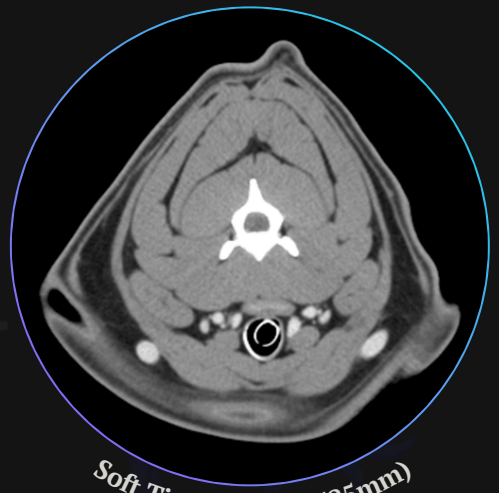
Post-contrast: Transverse Soft Tissue

Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

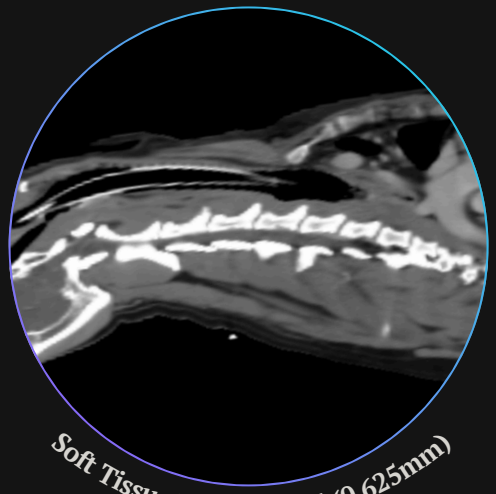
Site Count: One

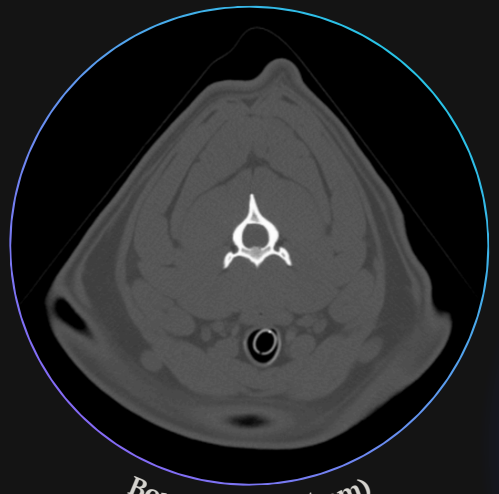
Total Series Submissions: Five


Soft Tissue Pre (0.625mm)


Soft Tissue Post (0.625mm)


Soft Tissue Post Dorsal (0.625mm)


Soft Tissue Post Sagittal (0.625mm)


Bone Pre (0.625mm)

Thoracolumbar Spine

Positioning

Recumbency: Dorsal (minimizes motion)

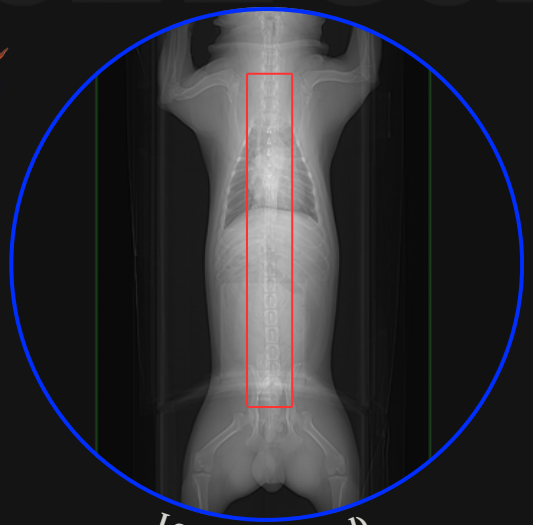
Gantry Entry: Tail-first (if unable, head first)

Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

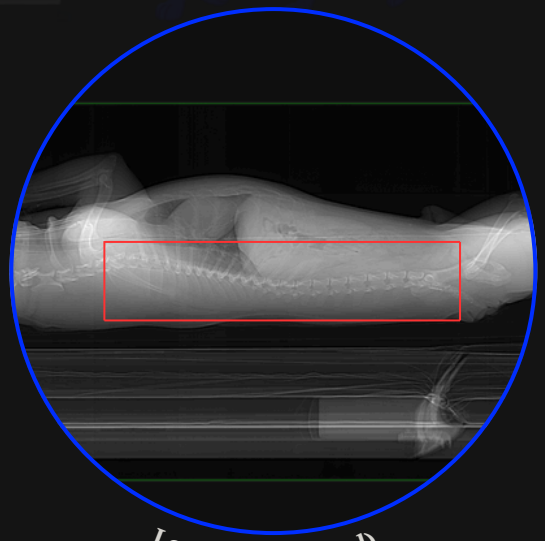
Limb Placement: Pelvic limbs caudal, straight (superman position, upside down; thoracic limbs can be slightly relaxed)

Scan Range: Middle of C5 to Middle of Sacrum

Note: Clear all metal, including monitoring equipment, from the neck to the stifles for the diagnostic series



Localizer (Dorsal)



Localizer (Sagittal)

Thoracolumbar Spine

Acquisition

Slice Thickness:

- 0–30 lbs: 0.625 mm or lower
- 31–70+ lbs): 1.5 mm or lower
- **IVDD or Trauma**: Use the smallest slice thickness possible (<1 mm) for optimal diagnostic quality

Note: A myelogram may be beneficial to assess compressive myelopathy and is performed at the supervising clinician's discretion.

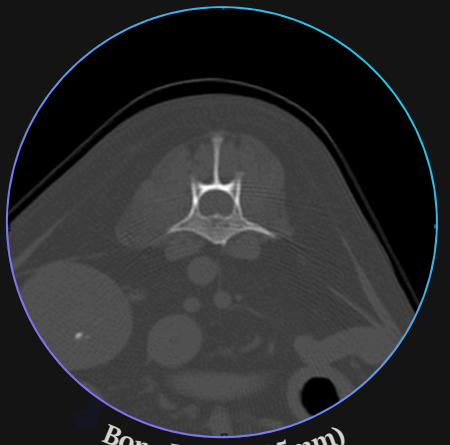
Pre-contrast: Transverse Bone + Transverse Soft Tissue

Post-contrast: Transverse Soft Tissue

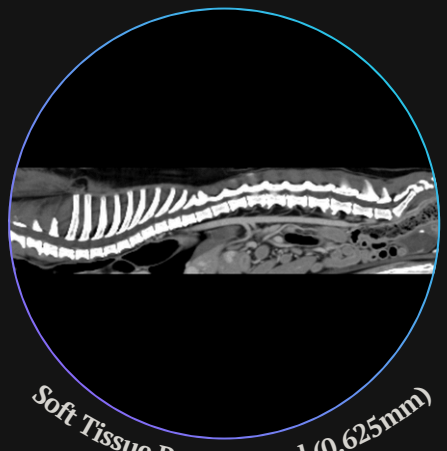
Reconstructions: Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

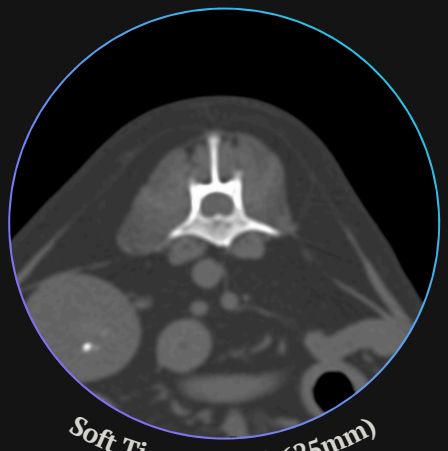
Site Count: One

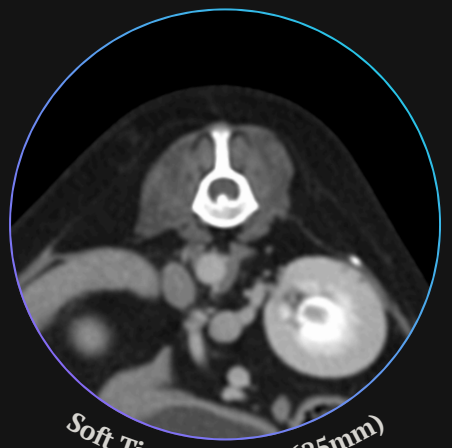
Total Series Submissions: Five


Bone Pre (0.625mm)


Soft Tissue Post Dorsal (0.625mm)

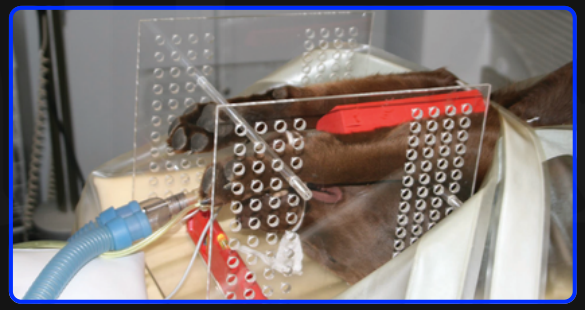

Soft Tissue Post Sagittal (0.625mm)

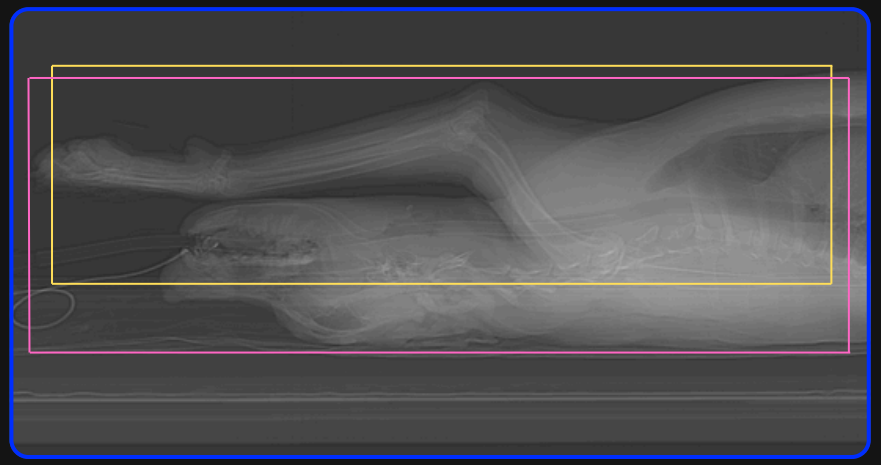

Soft Tissue Pre (0.625mm)


Soft Tissue Post (0.625mm)

Thoracic Limbs

Positioning





Recumbency: Sternal preferably (or Dorsal)

Gantry Entry: Head-first

Body Alignment:

- The spine should be as straight as possible and stable
- Use a radiolucent trough, padding (foam wedges), and/or straps to keep the patient upright and straight
- Position the head and neck as far from the thoracic limbs as possible and collimate them out of the display field of view for the diagnostic scans

Limb Placement:

- Thoracic limbs extended cranially, parallel, straight
  - Limbs positioned **neutral and parallel** to the CT table to reduce beam hardening and artifact from long bones
  - Align limbs **symmetrically** to improve diagnostic consistency and image quality, and away from the head

Scan Range: Caudal scapula through the toes

Scan Extents:

- **Entire Thoracic Limbs** (**1 site**)
  - Entire Thoracic Limbs + Head & Neck (**2 sites**)

Note: Thoracic limb scans may partially include the skull and cervical spine (see yellow box); please note if pathology is suspected in those regions.

Thoracic Limbs

Acquisition

Slice Thickness: 0.625 mm or lower

Pre-contrast: Transverse Soft Tissue + Transverse Bone

Post-contrast: Transverse Soft Tissue

Reconstructions:

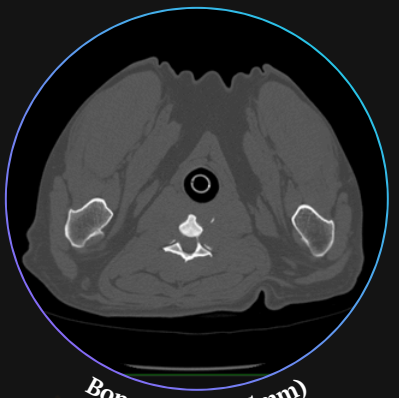
- Post Soft Tissue Sagittal + Post Soft Tissue Dorsal
- Pre Bone Sagittal + Pre Bone Dorsal

Note: Use the thinnest slice thickness available (0.5 to 0.625 mm) for all orthopedic studies, especially elbows and tarsi, to optimize detection of subtle fractures, medial coronoid disease, OCD lesions, and other fine osseous detail.

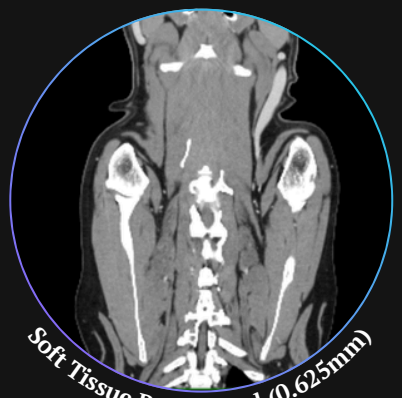
Site Count: One

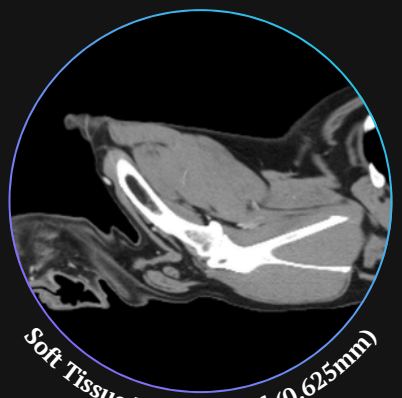
Total Series Submissions: Seven

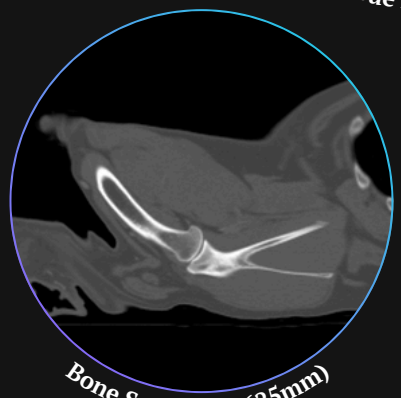

Soft Tissue Pre (0.625mm)

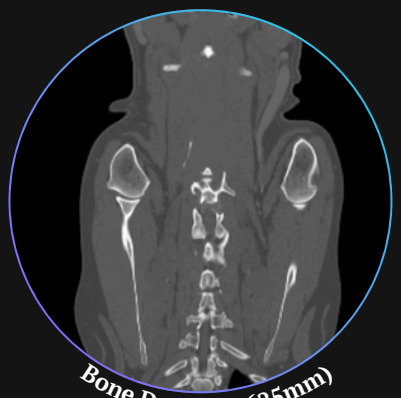

Bone Pre (0.625mm)


Soft Tissue Post (0.625mm)


Soft Tissue Post Dorsal (0.625mm)


Soft Tissue Post Sagittal (0.625mm)


Bone Sagittal (0.625mm)


Bone Dorsal (0.625mm)

Pelvic Limbs

Positioning

Recumbency: Sternal (or Dorsal)

Gantry Entry: Tail-first

Body Alignment:

- The pelvis should be as straight as possible and stable
- Use a radiolucent trough, padding (foam wedges), and/or straps to keep the patient upright and straight

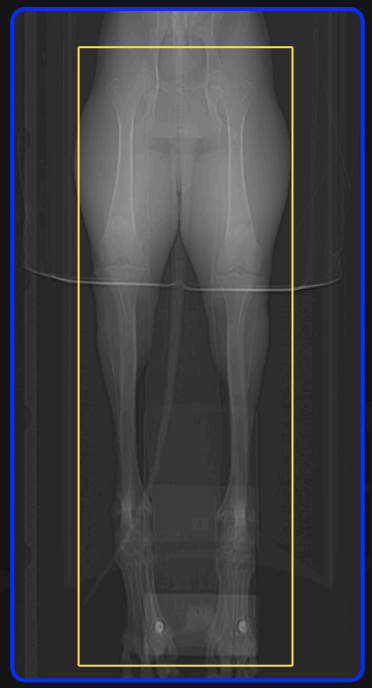
Limb Placement:

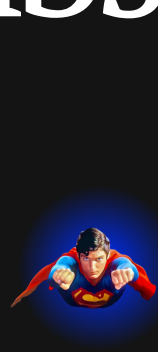
- Pelvic limbs extended caudally, parallel, straight
  - Limbs positioned **neutral and parallel** to the CT table to reduce beam hardening and artifact from long bones
  - Align limbs **symmetrically** to improve diagnostic consistency and image quality, and level with the table

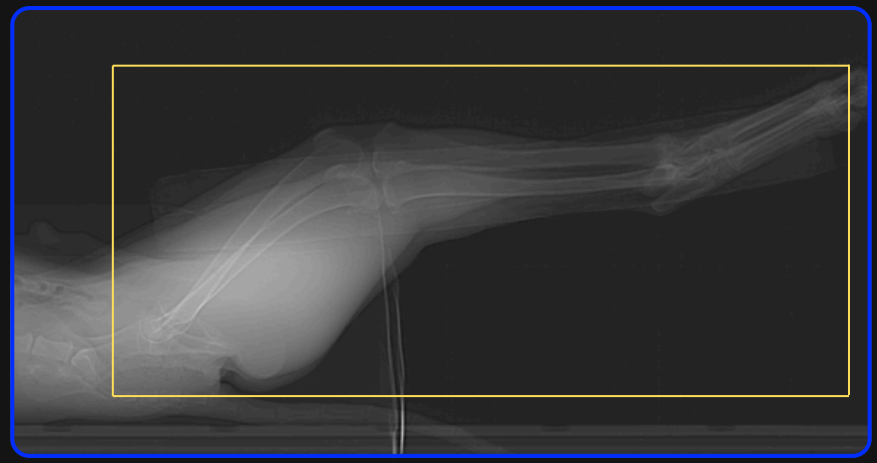
Scan Range: Hip joints through the tips of the toes

Scan Extents:

- **Entire Pelvic Limbs** (**1 site**)
  - Entire Pelvic Limbs + Abdomen (**2 sites**)







Pelvic Limbs

Acquisition

Slice Thickness: 0.625 mm or lower

Pre-contrast: Transverse Soft Tissue + Transverse Bone

Post-contrast: Transverse Soft Tissue

Reconstructions:

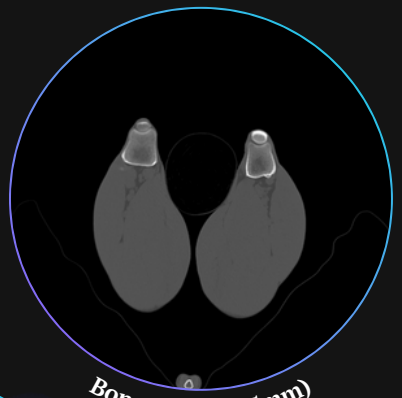
- Post Soft Tissue Sagittal + Post Soft Tissue Dorsal
- Pre Bone Sagittal + Pre Bone Dorsal

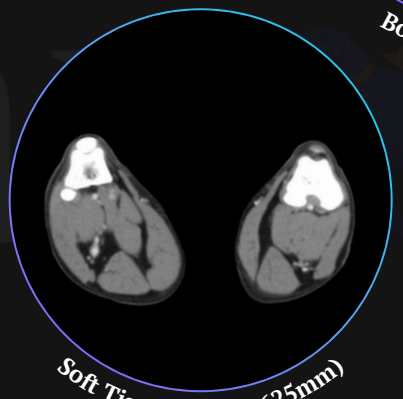
Note: Use the thinnest slice thickness available (0.5 to 0.625 mm) for all orthopedic studies, especially elbows and tarsi, to optimize detection of subtle fractures, medial coronoid disease, OCD lesions, and other fine osseous detail.

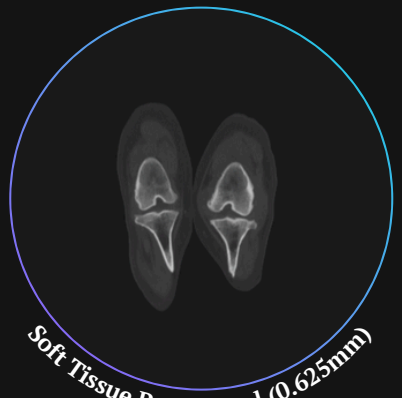
Site Count: One

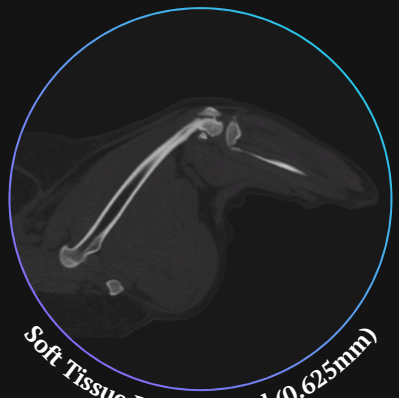
Total Series Submissions: Seven

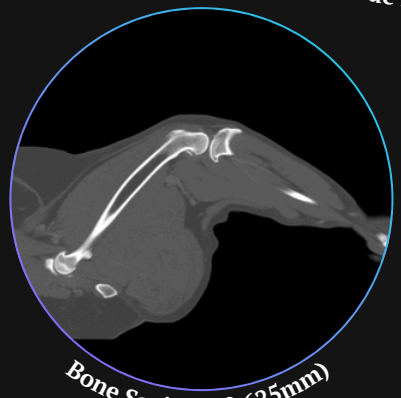

Soft Tissue Pre (0.625mm)

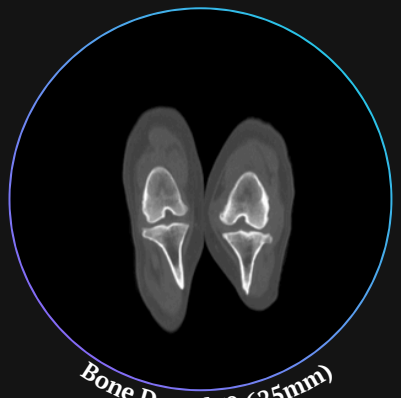

Bone Pre (0.625mm)


Soft Tissue Post (0.625mm)


Soft Tissue Post Dorsal (0.625mm)


Soft Tissue Post Sagittal (0.625mm)


Bone Sagittal (0.625mm)


Bone Dorsal (0.625mm)

Head & Neck + Thorax

Positioning

Induce apnea to minimize motion

Recumbency: Sternal

Gantry Entry: Head-first (if unable, tail-first)

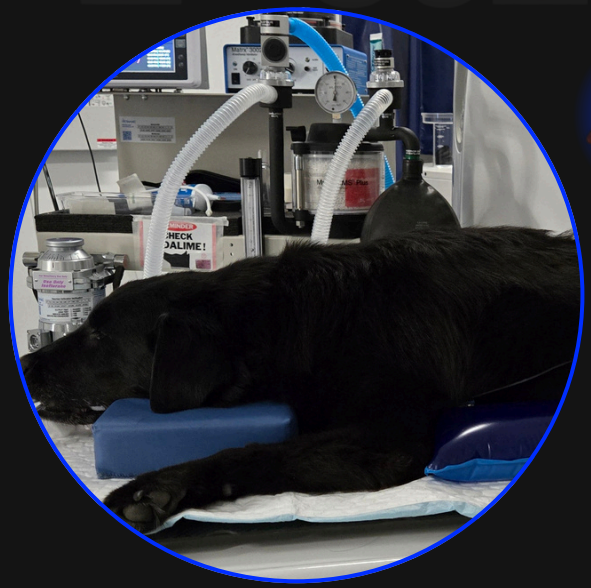
Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

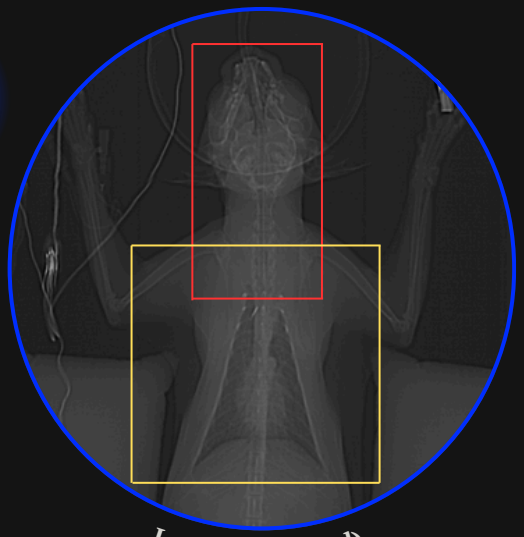
Limb Placement: Thoracic limbs cranial, on a lower level than the head, and far from the head towards the sides

Scan Range:

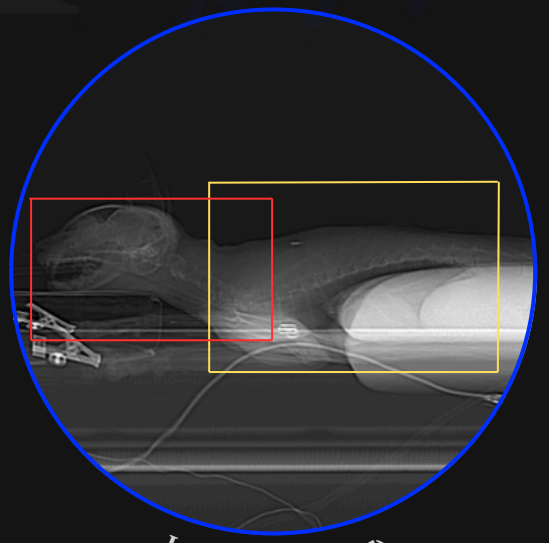
- Head & Neck Series: Caudal Skull (behind the ear canals) to T1
- Thorax Series: Thoracic inlet (T1) to the visible liver (T13)

Note: Clear all metal, including monitoring equipment, from the head to the abdomen for the diagnostic series





Localizer (Dorsal)



Localizer (Sagittal)

Head & Neck + Thorax

Acquisition

Slice Thickness:
- 0–30 lbs: 1.5mm or lower
- 31–70+ lbs: 2.5mm to 1.5mm

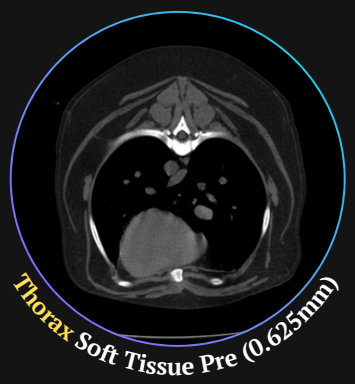
Pre-contrast:
- Head & Neck
  - Transverse Soft Tissue + Transverse Bone
- Thorax:
  - Transverse Soft Tissue + Transverse Lung

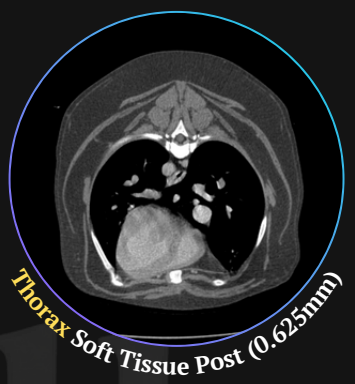
Post-contrast:
- Head & Neck
  - Transverse Soft Tissue
- Thorax
  - Transverse Soft Tissue

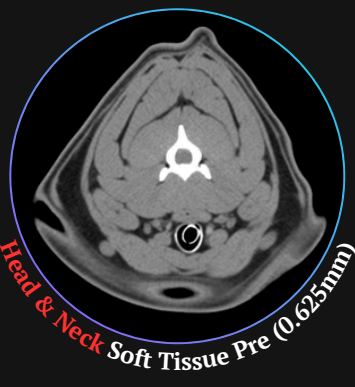
Reconstructions:
- Head & Neck
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal
- Thorax
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

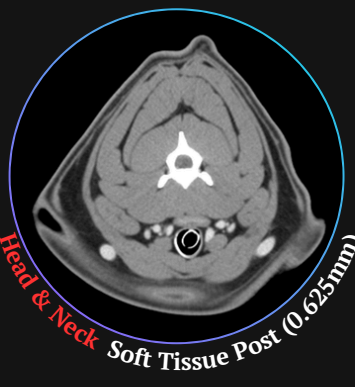
Site Count: Two

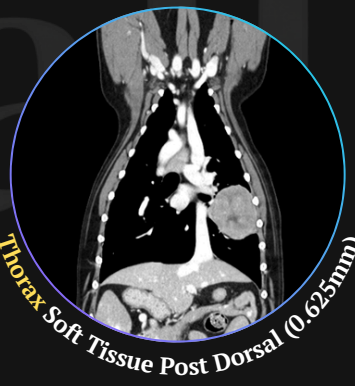
Total Series Submissions: Ten

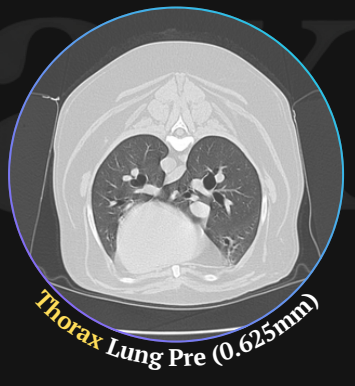

Thorax Soft Tissue Pre (0.625mm)

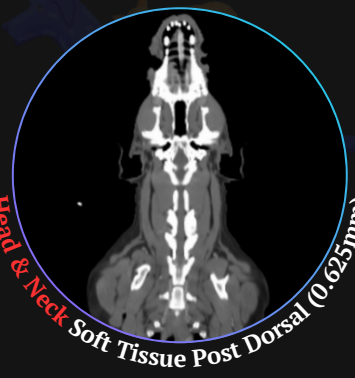

Thorax Soft Tissue Post (0.625mm)

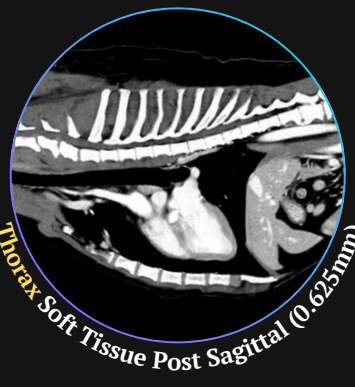

Head & Neck Soft Tissue Pre (0.625mm)

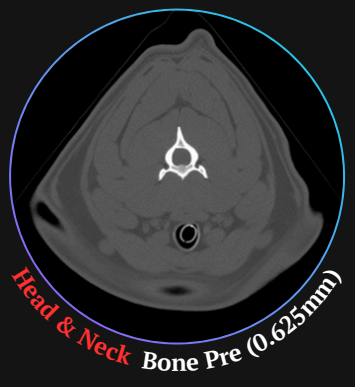

Head & Neck Soft Tissue Post (0.625mm)

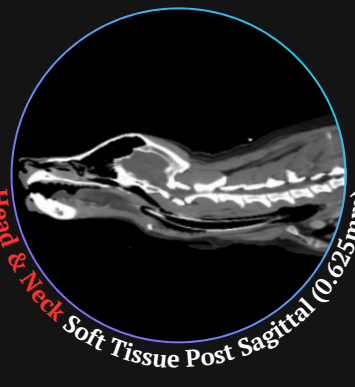

Thorax Soft Tissue Post Dorsal (0.625mm)


Thorax Lung Pre (0.625mm)


Head & Neck Soft Tissue Post Dorsal (0.625mm)


Thorax Soft Tissue Post Sagittal (0.625mm)


Head & Neck Bone Pre (0.625mm)


Head & Neck Soft Tissue Post Sagittal (0.625mm)

Thorax & Abdomen

Positioning

Induce apnea to minimize motion.

Recumbency: Sternal

Gantry Entry: Tail-first (if unable, Head first)

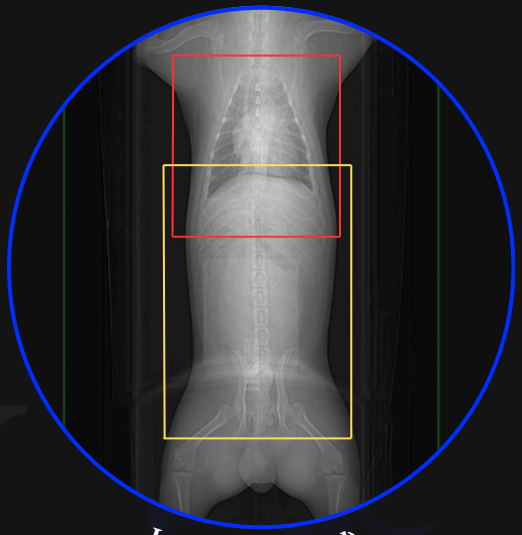
Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

Limb Placement: Thoracic limbs cranial, tight to the head, and pelvic limbs caudal and straight (superman position)

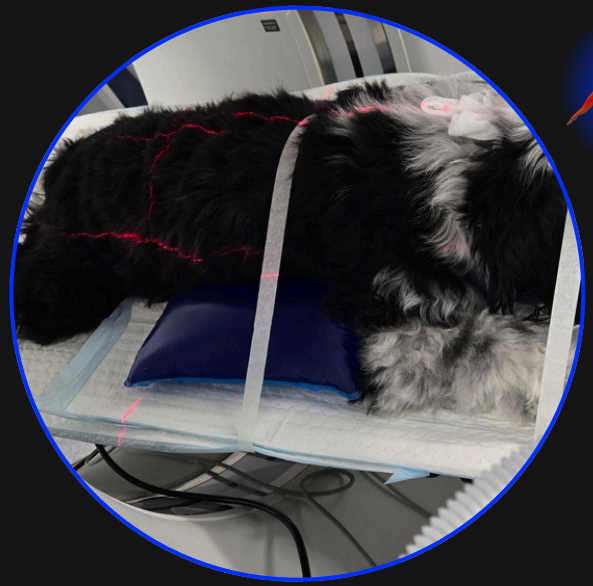
Scan Range:

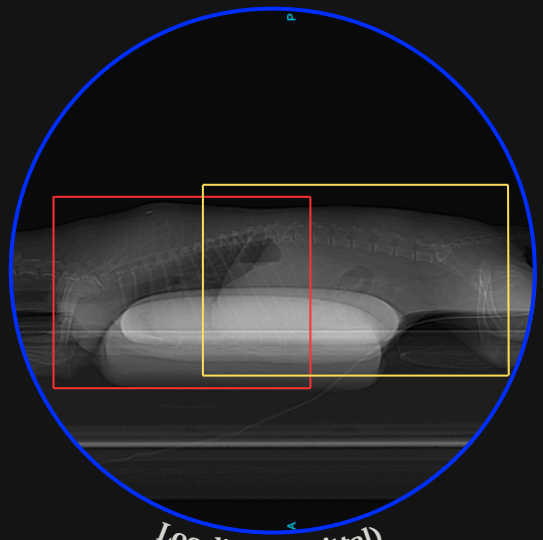
- Thorax Series: Thoracic inlet (T1) to visible liver (T13)
- Abdomen Series: Extends caudally from the heart tip (apex) to just past the hip joints

Note: Clear all metal, including monitoring equipment, from the neck to the pelvic limbs for the diagnostic series



Localizer (Dorsal)





Localizer (Sagittal)

Thorax & Abdomen

Acquisition

Slice Thickness:
- Thorax
  - 0–30 lbs: 1.5 mm or lower
  - 31–70+ lbs: 2.5 mm to 1.5 mm
- Abdomen
  - 0–30 lbs: 1.25mm
  - 31–70+ lbs: 1.5 mm

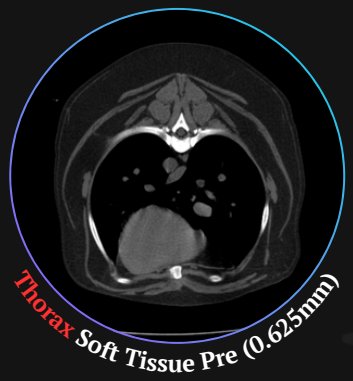
Pre-contrast:
- Thorax
  - Transverse Soft Tissue + Transverse Lung
- Abdomen
  - Transverse Soft Tissue

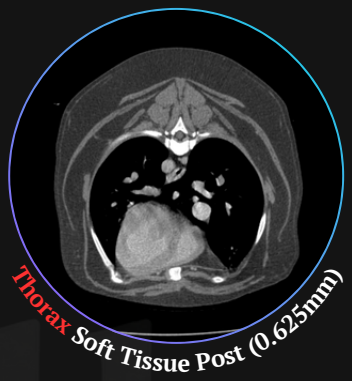
Post-contrast:
- Thorax
  - Transverse Soft Tissue
- Abdomen
  - Transverse Soft Tissue

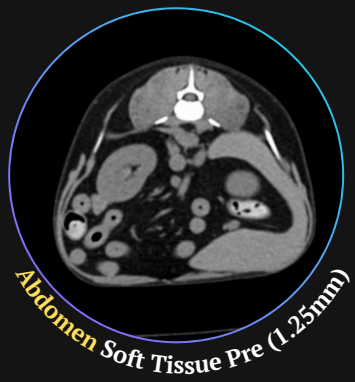
Reconstructions:
- Thorax
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal
- Abdomen
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

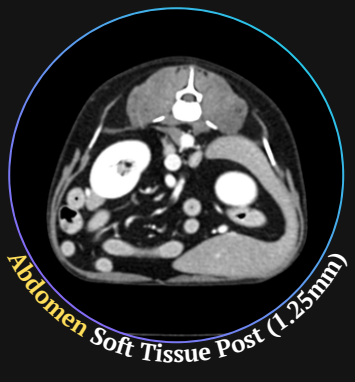
Site Count: Two

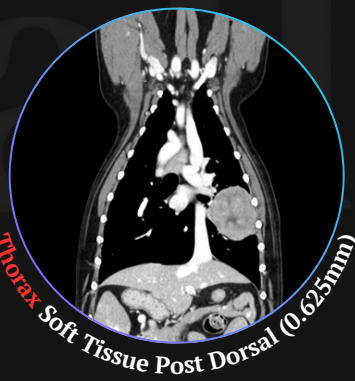
Total Series Submissions: Nine

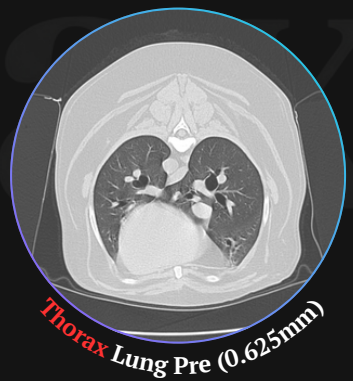

Thorax Soft Tissue Pre (0.625mm)

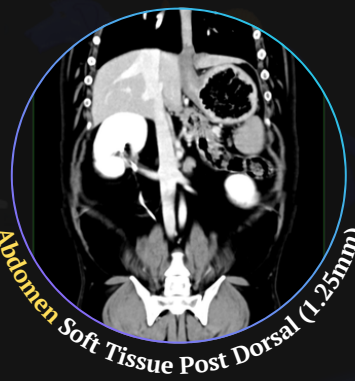

Thorax Soft Tissue Post (0.625mm)

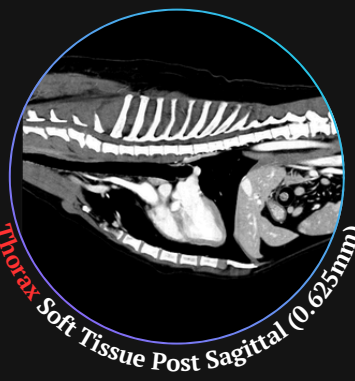

Abdomen Soft Tissue Pre (1.25mm)


Abdomen Soft Tissue Post (1.25mm)


Thorax Soft Tissue Post Dorsal (0.625mm)


Thorax Lung Pre (0.625mm)


Abdomen Soft Tissue Post Dorsal (1.25mm)


Thorax Soft Tissue Post Sagittal (0.625mm)


Abdomen Soft Tissue Post Sagittal (1.25mm)

Cervical & Thoracolumbar Spine

Positioning

Recumbency: Dorsal (minimizes motion)

Gantry Entry: Tail-first (if unable, head first)

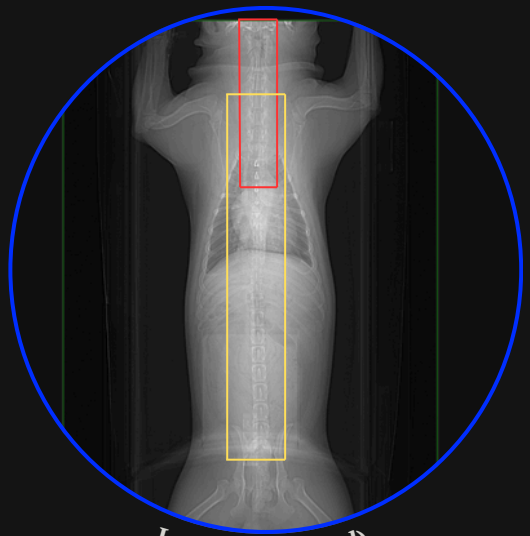
Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

Limb Placement: Thoracic limbs either caudal (preferred) or cranial, and **out of the lateral view of the spine**; pelvic limbs straight, caudal

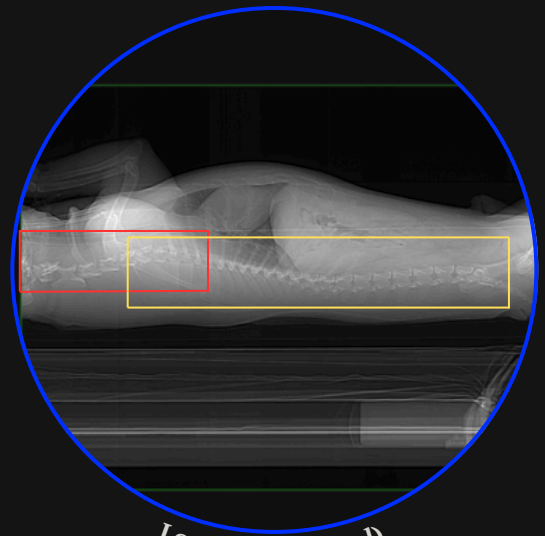
Scan Range:

- Cervical Spine: Tympanic Bulla (ear canals) to T3
- Thoracolumbar Spine: Middle of C5 to Middle of Sacrum

Note: Clear all metal, including monitoring equipment, from the head to the stifles for the diagnostic series



Localizer (Dorsal)



Localizer (Sagittal)

Cervical & Thoracolumbar Spine

Acquisition

Slice Thickness:
- Cervical Spine
  - 0–30 lbs: 0.625 mm or lower
  - 31–70+ lbs: 1.5 mm or lower

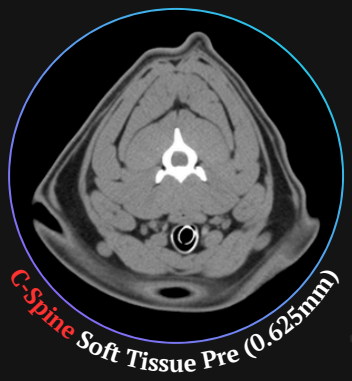
Pre-contrast:
- Cervical Spine
  - Transverse Soft Tissue + Transverse Bone
- Thoracolumbar Spine
  - Transverse Soft Tissue + Transverse Bone

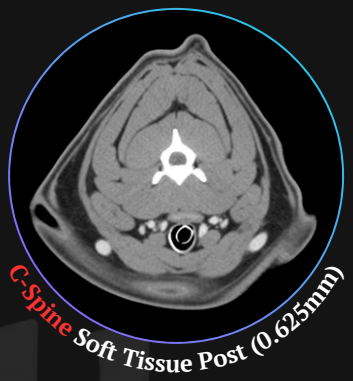
Post-contrast:
- Cervical Spine
  - Transverse Soft Tissue
- Thoracolumbar Spine
  - Transverse Soft Tissue

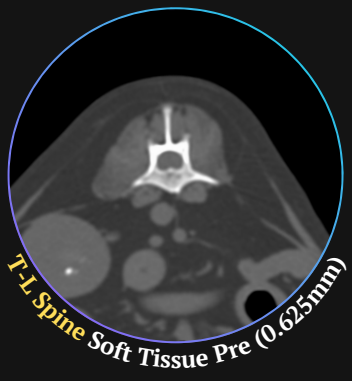
Reconstructions:
- Cervical Spine
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal
- Thoracolumbar Spine
  - Post Soft Tissue Sagittal + Post Soft Tissue Dorsal

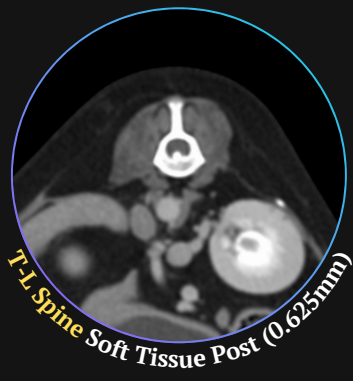
Site Count: Two

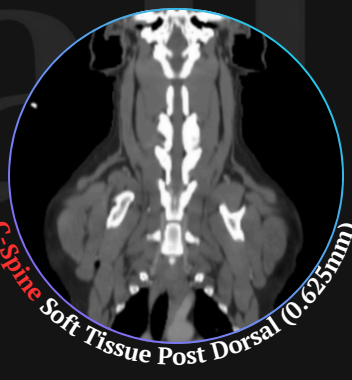
Total Series Submissions: Ten

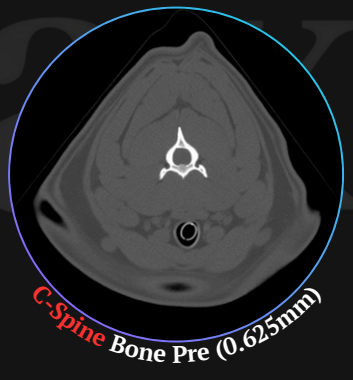

C-Spine Soft Tissue Pre (0.625mm)

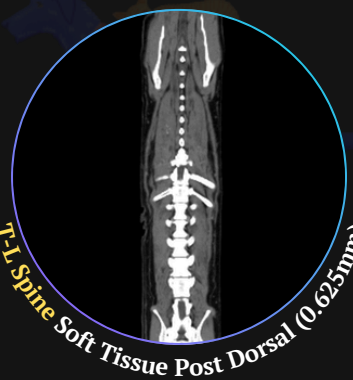

C-Spine Soft Tissue Post (0.625mm)

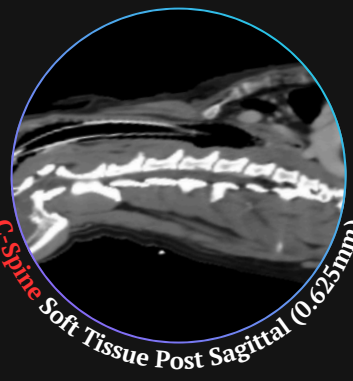

T-L Spine Soft Tissue Pre (0.625mm)

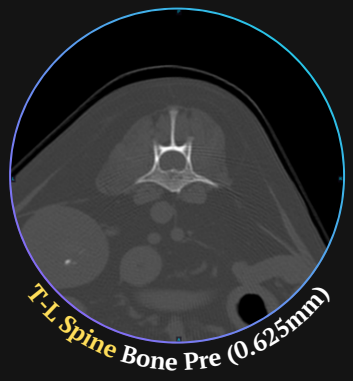

T-L Spine Soft Tissue Post (0.625mm)


C-Spine Soft Tissue Post Dorsal (0.625mm)


C-Spine Bone Pre (0.625mm)


T-L Spine Soft Tissue Post Dorsal (0.625mm)


C-Spine Soft Tissue Post Sagittal (0.625mm)


T-L Spine Bone Pre (0.625mm)


T-L Spine Soft Tissue Post Sagittal (0.625mm)

CT Angiography (CTA)

Positioning

Recumbency: Sternal (if unable, Dorsal)

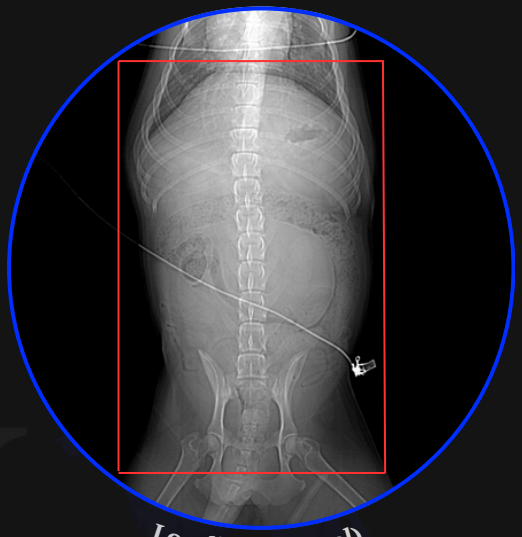
Gantry Entry: Head-first (if unable, tail-first)

Body Alignment: Spine straight and symmetric to the table, center laser light through the middle of the body

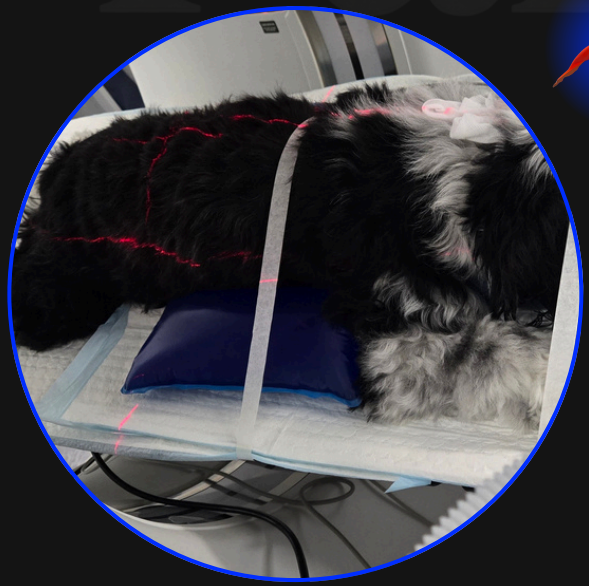
Limb Placement: Thoracic limbs cranial, tight to the head, and pelvic limbs caudal and straight (superman position)

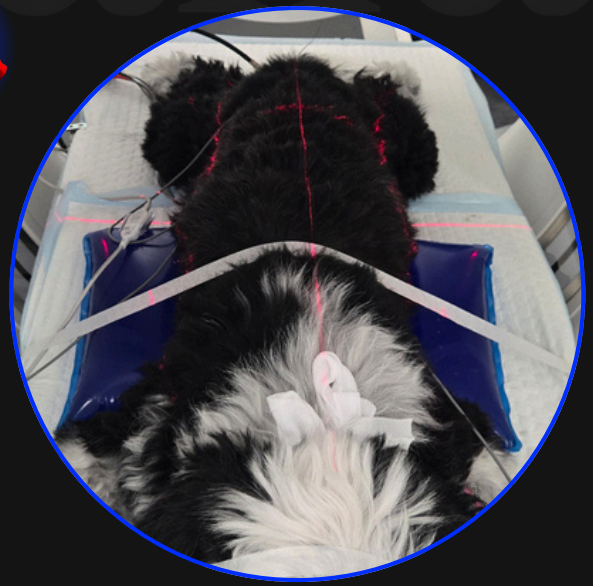
Scan Range: Extends caudally from the tip of the heart (apex) to just past the hip joints

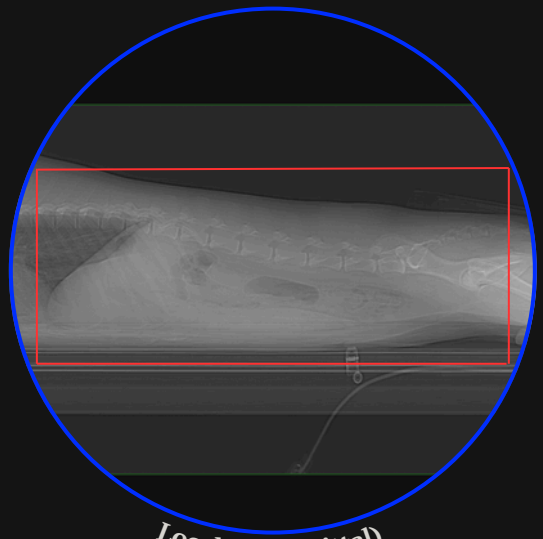
Note: Clear all metal, including monitoring equipment, from the armpits to the tail for the diagnostic series



Localizer (Dorsal)







Localizer (Sagittal)

CT Angiography (CTA)

Acquisition

Use a cephalic vein for contrast to prevent artifacts

Slice Thickness: 1.25mm

Pre-contrast: Transverse Soft Tissue

Phase Timing:

- Manual IV Push and power injection are both valid delivery methods. Use whichever your hospital has available. Please note that power injection produces more consistent results.
- With bolus tracking, place your ROI in the target vessel and trigger at threshold. This is the most consistent approach across patients.
- Without bolus tracking, use scanner-specific presets calibrated by your CT applications specialist or manufacturer. Phase timing varies with scanner speed, coverage length, and patient cardiac output.

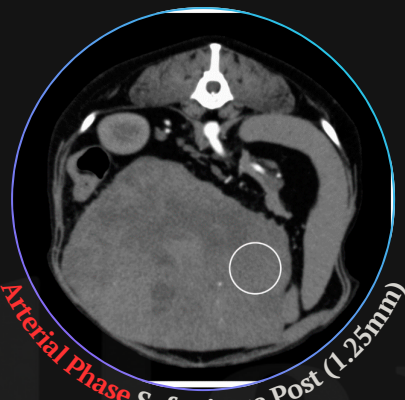
Reconstructions:

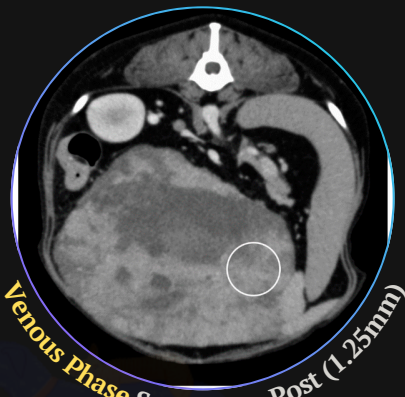
- Post-contrast Venous Phase Soft Tissue Sagittal
- Post-contrast Venous Phase Soft Tissue Dorsal

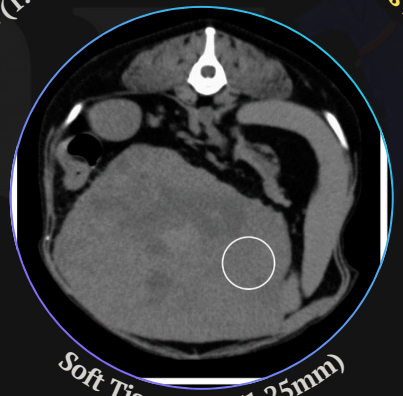
Note: The white circles are just for measurements.

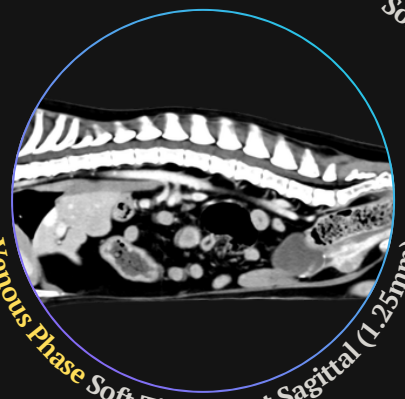
Site Count: One

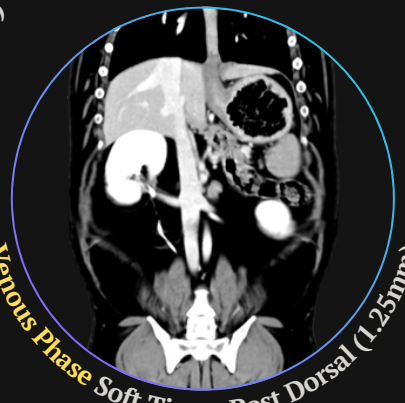
Total Series Submissions: Five











Intravenous Urography (IVU)

Patient Preparation

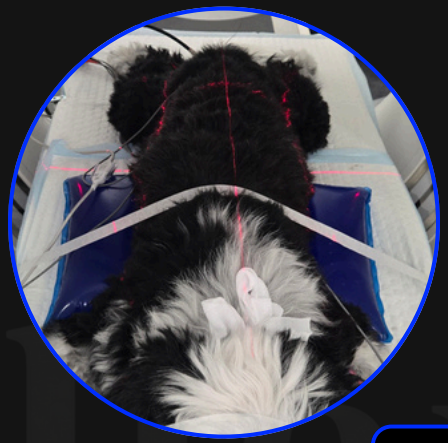
Fast your patient for 12 to 18 hours.

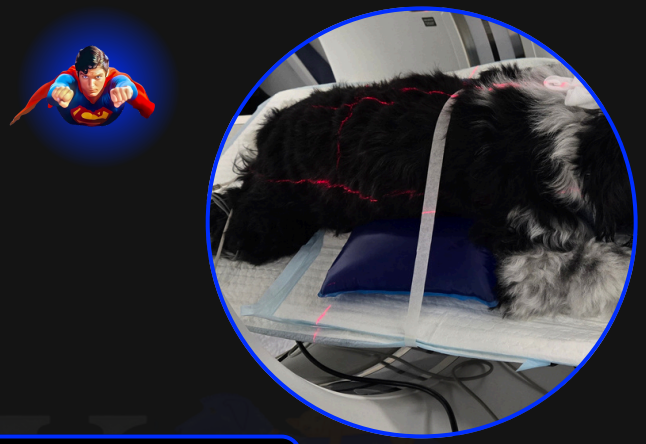
Take a lateral abdominal radiograph before anesthesia to check for fecal material.

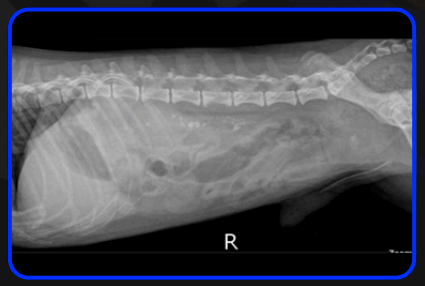
- If the colon isn't clean, perform a warm water enema and repeat the radiograph to confirm clearance.

The bladder needs to be normally distended.

- Not over-filled, not empty. Both extremes make it harder to assess the trigone and vesicoureteral junctions (VUJs).
- If a urinary catheter is in place, clamp it before scanning.







Right Lateral Radiograph

Positioning

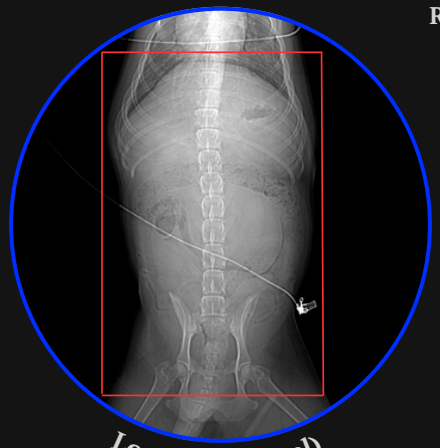
Recumbency: Sternal

- In dorsal, contrast pools at the trigone and obscures the VUJs, which is exactly what you're trying to evaluate.
- Position the pelvis on a 5–10° wedge to elevate it above kidney level.

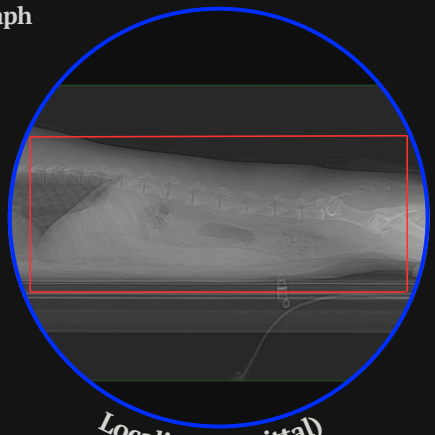
Limb Placement: Thoracic limbs cranial, tight to the head, and pelvic limbs caudal and straight (superman position)

Scan Range: Extends caudally from the heart tip (apex) to just past the hip joints

Note: Clear all metal, including monitoring equipment, from the armpits to the tail for the diagnostic series



Localizer (Dorsal)



Localizer (Sagittal)

Intravenous Urography (IVU)

Acquisition

Slice Thickness: 1.25mm

Pre-contrast: Transverse Soft Tissue

Post-contrast:

- **Excretory Phase**
  - Begin at approximately 3 minutes post-injection.
  - Repeat at 3–5-minute intervals if contrast has not reached the ureters.

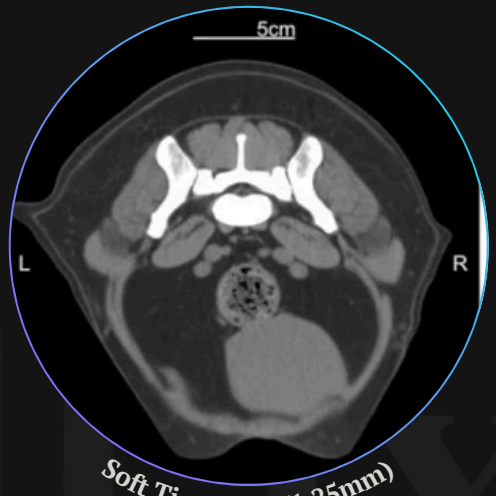
Reconstructions:

- Post-contrast Excretory Phase Soft Tissue Sagittal
- Post-contrast Excretory Phase Soft Tissue Dorsal

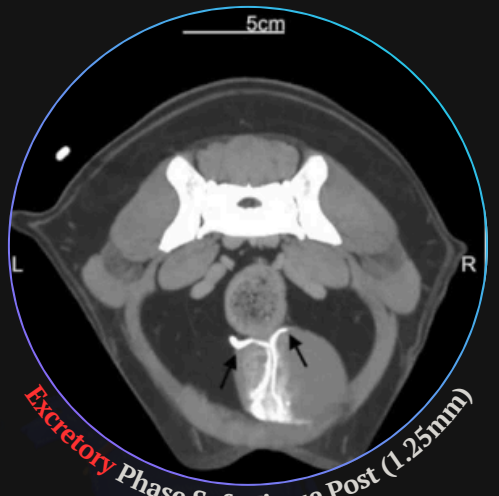
Note: If your CT tube overheats easily, after obtaining the pre-contrast and post-contrast scans, collimate subsequent acquisitions to the kidneys through the acetabulum (past the hip joints) to reduce tube load.

Site Count: One

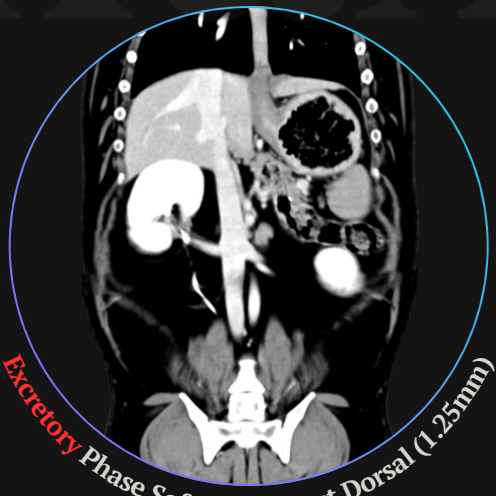
Total Series Submissions: Minimum four

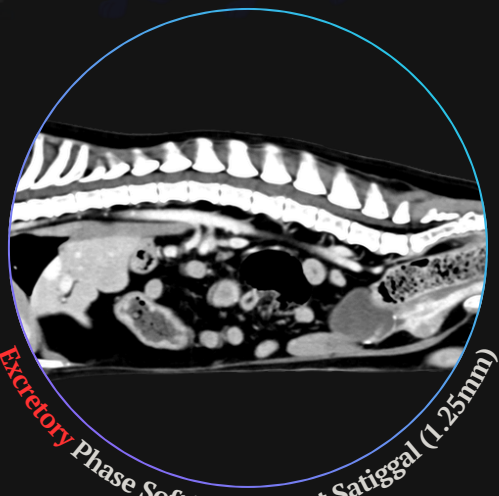


Soft Tissue Pre (1.25mm)



Excretory Phase Soft Tissue Post (1.25mm)


Excretory Phase Soft Tissue Post Dorsal (1.25mm)


Excretory Phase Soft Tissue Post Satiggal (1.25mm)

CT Resources

Veterinary Computed Tomography
Schwarz, T. & Saunders, J. (2011). Wiley-Blackwell.

- Primary CT textbook. Physics, acquisition, contrast, artifacts, and region-specific protocols across species.

Practical Computed Tomography (CT) Guide for the Small Animal Orthopaedic and Neurosurgeon
Ingrid Gielen & Henri van Bree. (2026). CRC Press.

- Practical protocols by body region with 200+ images. CT principles, positioning, equipment selection, and intraoperative/follow-up CT.

Atlas of Small Animal CT and MRI
Wisner, E.R. & Zwingenberger, A.L. (2015). Wiley-Blackwell.

- Cross-sectional anatomy reference. Side-by-side CT and MRI with anatomic correlation.

Body MDCT in Small Animals
Bertolini. (2017). Springer.

- Multidetector Computed Tomography (MDCT) specific. CT angiography, trauma, oncology, and organ-specific protocols with 2D/3D figures.

MAIOS (vet-Anatomy)
Imaios.com/en/vet-anatomy

- Labeled cross-sectional anatomy atlas. CT, MRI, and radiograph module for dogs, cats, and horses. Interactive scrolling.

Radiology Café (CT Imaging)
Radiologycafe.com/frcr-physics-notes/ct-imaging

- CT physics, equipment, and image formation overviews. Good starting point for understanding how your scanner works.

CTisUs.com
Ctisus.com

- Johns Hopkins CT education hub. 322,000+ case images, quizzes, weekly podcast. Includes a small veterinary case collection focused on exotic and zoo species.

Parallax