

# Abdominal ultrasound study guidelines

This guide describes our protocol for a routine abdominal ultrasound study for dogs and cats, and provides a detailed checklist of exactly what views to include. It was developed in alignment with the American College of Veterinary Radiology (ACVR) and the European College of Veterinary Diagnostic Imaging (ECVDI) “Consensus Statement for the Standardization of the Abdominal Ultrasound Examination”<sup>1</sup> and the technology requirements of IDEXX Telemedicine Consultants.

## Technical requirements and recommendations

### Requirements:

- + **Still image and cine loop count:** A routine abdominal ultrasound study will consist of a maximum of **85** images and **25** cine loops and will include the recommended views as outlined below. Larger and more complex studies will incur additional charges. Not all studies will need to include all the recommended views. See [VetMedStat.com](https://vetmedstat.com) for details.
- + **File size:** If a study is manually uploaded through VetMedStat\*, each file must be smaller than 55 MB.

### Recommendations:

1. **File format:** Use DICOM\* format to maximize image quality.
2. **Compression settings:** Use lossless compression (or 70% quality) for images and cine loops to optimize data transfer without losing image quality. Ideal settings may vary between systems.
3. **Cine loop frame rate and length:** Use a cine loop frame rate of 30 and a length of 3–5 seconds. Prolonged cine loops do not improve the diagnostic value of the study and may cause technical problems.

Contact your ultrasound vendor support for assistance with system settings.

A routine study is composed of an appropriate patient history, sonographer impressions, and specific views, as outlined below in the “Checklist of recommended views.”

The sonographer is responsible for scanning and evaluating every organ and visible structure in the abdomen, using static images and cine loops judiciously to capture representative segments of organs and areas of interest.<sup>2</sup> The sonographer is responsible for labelling all images and cine loops, including key anatomic landmarks, as needed, summarizing their impressions, measuring structures when pathology is evident or when measurements of normal structures are indicated, and selecting only the most representative views to submit with each study.

Submitting the optimal number of ultrasound images, with the quality and format described in these guidelines, maximizes the diagnostic value of your submission, improves the efficiency with which our radiologists can provide a report, and ultimately enhances your ability to provide prompt and effective care to your patients.

## Checklist of recommended views

The views listed below are recommended for a routine abdominal ultrasound study. Not all views may be necessary, and additional views may be indicated, depending on the main clinical concern or abnormalities identified during the exam. Furthermore, our specialists may suggest repeating images or acquiring additional images, depending on abnormalities noted. (Additional diagnostics and interpretations may incur additional charges. Refer to the [IDEXX Telemedicine Service Guide](#) and/or [VetMedStat.com](#) for services and pricing).

### Note:

Typically, cine loops are reserved to capture areas of concern or suspected pathology. Start and end each video clip with normal anatomy, if possible, and keep the probe moving slowly through the sweep.

Application of color Doppler on statics and cine loops is recommended in specific circumstances, such as to evaluate blood flow on clinically relevant vasculature and areas of suspected pathology. It can also be used to help distinguish normal from abnormal structures and to provide landmarks for identifying the location of organs and lesions.

## Liver

Up to 10 statics and 3 cine loops

- ☐ Right liver in sagittal
- ☐ Gallbladder (GB) wall and contents with wall-thickness measurement if abnormal
- ☐ Biliary ducts (BD) if visible
- ☐ Right caudal liver and caudate lobe in sagittal (with right kidney [RK] in view)
- ☐ Mid-liver (midline) in sagittal. Include major hepatic vasculature: portal vein (PV), hepatic artery (HA), caudal vena cava (CVC), and aorta (AO). Apply color Doppler to demonstrate blood flow.
- ☐ Left liver in sagittal
- ☐ Left liver in transverse (optional)
- ☐ Mid-liver in transverse (with GB to establish right and left)
- ☐ Right liver in transverse (optional)
- ☐ Parenchymal comparison—liver/spleen. Ideally, the liver and spleen are visible in the same still-frame image. If using a split-screen option, make sure that the ultrasound machine settings are the same for both the liver and spleen images for an accurate comparison between organ parenchyma.

**Cine loops:** Include up to 3 video clips sweeping through representative segments of the liver, including biliary system, porta hepatis, and pathology.

## Spleen

Up to 7 statics and 2 cine loops

- ☐ Splenic head in sagittal
- ☐ Splenic head in transverse
- ☐ Mid-body spleen in sagittal (can include splenic vein with or without color Doppler, or both)
- ☐ Mid-body spleen in transverse
- ☐ Splenic tail in sagittal
- ☐ Splenic tail in transverse
- ☐ Splenic hilus with color Doppler +/- measurements in a sagittal plane.

**Tip:** The splenic portal veins can be seen originating from the splenic hilum and can be traced between the stomach and colon to a common confluence that then enters the portal vein. The splenic arteries are not distinguishable without color Doppler.

**Cine loops:** Include up to 2 video clips, sweeping through the spleen in sagittal and transverse, including splenic hilus and pathology.

## Adrenal glands [view reference images on pages 6–7](#)

Up to 4 statics and 2 cine loops

- ☐ Left adrenal in sagittal (with maximal thickness measurement +/- any pathology)
- ☐ Right adrenal in sagittal (with maximal thickness measurement +/- any pathology)

**Cine loops:** Include up to 2 video clips, sweeping through each adrenal gland in sagittal from medial to lateral, and displaying vasculature and regional anatomy so location can be definitively determined and organ can be evaluated for abnormalities.

**Tip:** If pathology is suspected, apply color Doppler to organ and surrounding vasculature (including vena cava) to look for vascular invasion and/or thrombus.

## Kidneys [view reference images on pages 8–11](#)

Up to 8 statics and 4 cine loops

- ☐ Midline of left kidney in sagittal (with and without measurements)
- ☐ Midline of left kidney in transverse, including renal pelvis and renal papilla +/- measurement of renal pelvis if distended
- ☐ Left ureter if visible (apply color Doppler if pathology suspected or as needed to identify)
- ☐ Midline of right kidney in sagittal (with and without measurements)
- ☐ Midline of right kidney in transverse, including renal pelvis and renal papilla +/- measurement of renal pelvis if distended
- ☐ Right ureter if visible (apply color Doppler if pathology suspected or as needed to identify)

**Cine loops:** Include up to 4 video clips, sweeping through each kidney in sagittal and transverse, including areas of suspected pathology.

## Urinary bladder

Up to 4 statics and 2 cine loops

- ☐ Midline of urinary bladder body in sagittal
- ☐ Midline of trigone in sagittal
- ☐ Proximal urethra in sagittal
- ☐ Midline of urinary bladder body in transverse

**Cine loops:** Include up to 2 video clips, sweeping through the urinary bladder in sagittal and transverse, including areas of suspected pathology.

## Pancreas [view reference images on pages 12–13](#)

Up to 4 statics and 2 cine loops

- ☐ Right limb if visible (with and without measurements)
- ☐ Left limb and body of pancreas if visible (with and without measurements)

**Cine loops:** Include up to 2 video clips, sweeping through the pancreas and areas of suspected pathology.

## Gastrointestinal

Up to 17 statics and 4 cine loops of representative segments

- |   |   |
|---|---|
| <input type="checkbox"/> Gastric fundus in sagittal (with wall thickness measurement)       | <input type="checkbox"/> Descending duodenum in transverse  |
| <input type="checkbox"/> Gastric fundus in transverse                                       | <input type="checkbox"/> Jejunal segment in sagittal (multiple, if not uniform in appearance) and including wall-thickness measurement  |
| <input type="checkbox"/> Gastric body in sagittal (with wall thickness measurement)         | <input type="checkbox"/> Jejunal segment in transverse (multiple, if not uniform in appearance)   |
| <input type="checkbox"/> Gastric body in transverse   | <input type="checkbox"/> Ileocecolic junction (ICCJ) in sagittal cats and, if visible, in dogs  |
| <input type="checkbox"/> Pyloric antrum in sagittal (with wall thickness measurement)       | <input type="checkbox"/> Ileocecolic junction (ICCJ) in transverse cats and, if visible, in dogs  |
| <input type="checkbox"/> Pyloric antrum in transverse (with wall thickness measurement)     | <input type="checkbox"/> Large intestinal segment (multiple, if not uniform in appearance) in sagittal, with wall-thickness measurement |
| <input type="checkbox"/> Pyloroduodenal junction in sagittal                                | <input type="checkbox"/> Large intestinal segment (multiple, if not uniform in appearance) in transverse                                |
| <input type="checkbox"/> Pyloroduodenal junction in transverse                              |   |
| <input type="checkbox"/> Duodenal papilla (one plane with or without measurements)          |   |
| <input type="checkbox"/> Descending duodenum in sagittal (with wall thickness measurements) |   |

**Cine loops:** Include up to 4 video clips, sweeping through the representative areas of the gastrointestinal tract and areas of suspected pathology.

## Lymph nodes/vasculature

Up to 6 statics and 2 cine loops

- ☐ Jejunal lymph nodes (also known as mesenteric lymph nodes) with thickness measurement or the region of these nodes if nodes not readily visible
- ☐ Medial iliac lymph nodes with thickness measurement or the region of these nodes if nodes not readily visible
- ☐ Termination of the aorta with its branches and caudal vena cava

**Cine loops:** Submit up to 2 video clips to capture the area of the lymph nodes, if not readily visible. Views of additional lymph nodes or regions are indicated if pathology is evident (e.g., enlarged or irregular lymph nodes, colic lymph nodes, if visible, or hepatic lymph nodes, if hepatic disease is present, etc.).

**Tip:** Apply color Doppler to help differentiate lymph nodes and vasculature and to show blood flow as indicated.

## Genital

### Female

Up to 10 statics and 4 cine loops

- ☐ Left ovary
- ☐ Right ovary
- ☐ Left uterine horn in sagittal if visible
- ☐ Right uterine horn in sagittal if visible
- ☐ Left uterine horn in transverse if visible
- ☐ Right uterine horn in transverse if visible
- ☐ Uterine body +/- cervix in sagittal
- ☐ Uterine body +/- cervix in transverse

### Male

Up to 7 statics and 4 cine loops

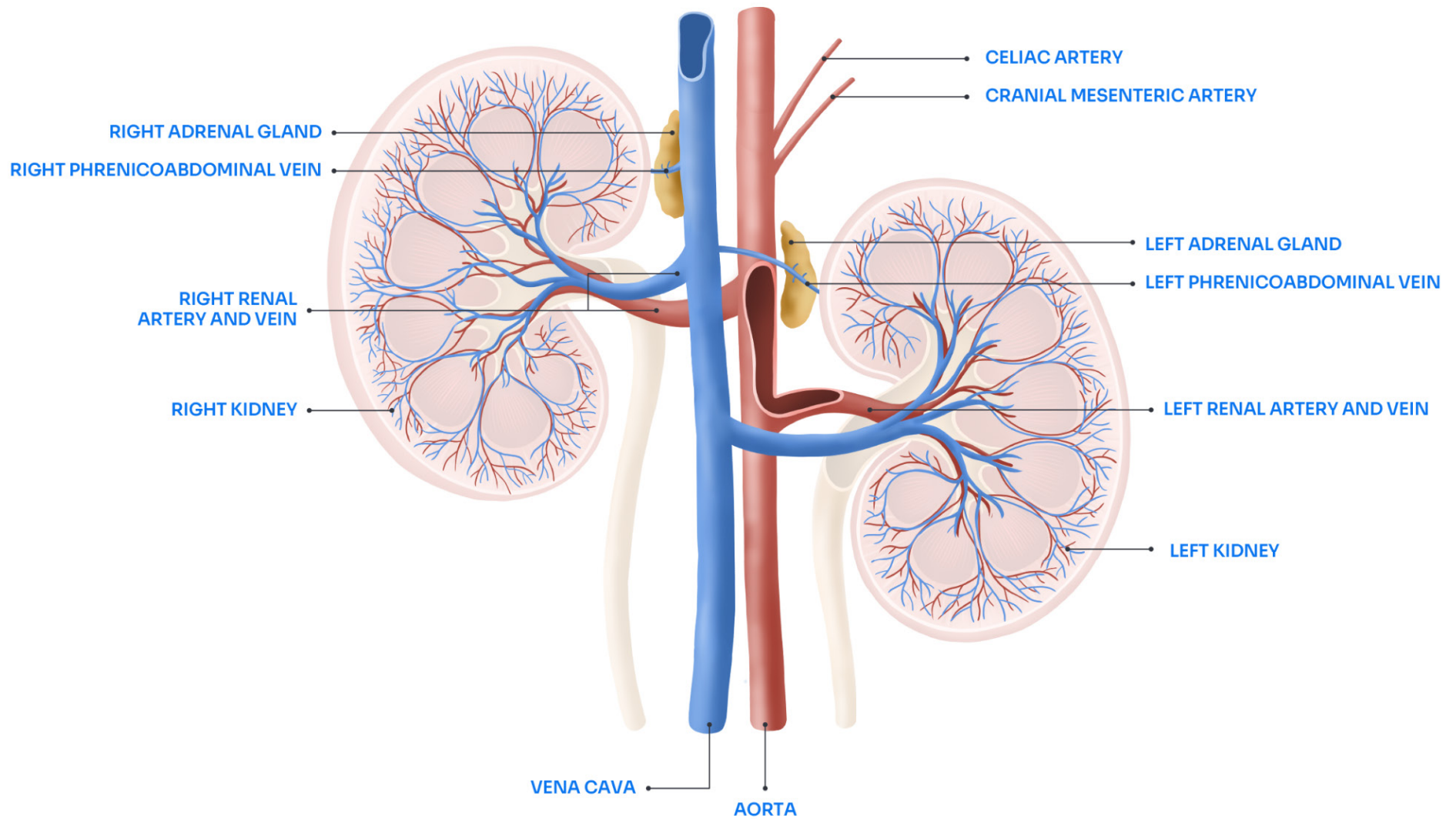
- ☐ Prostate in transverse (with and without measurements)
- ☐ Prostate in sagittal (including proximal urethra)
- ☐ Left testicle in sagittal
- ☐ Right testicle in sagittal
- ☐ Left testicle in transverse
- ☐ Right testicle in transverse

**Cine loops:** Include up to 4 video clips if pathology is evident, sweeping through ovaries, uterus, cervix or prostate, and testicles.

## Additional recommendations and notes

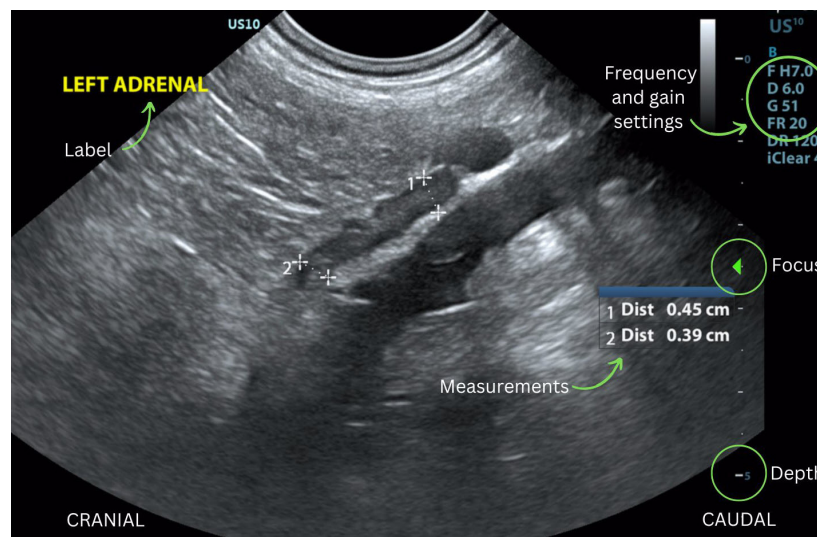
If a board-certified veterinary radiologist is not available to perform the ultrasound examination, the ACVR and ECVDI "Consensus Statement for the Standardization of the Abdominal Ultrasound Exam" recommends that the images be acquired by a sonographer (R.D.M.S.) or veterinary technician (R.V.T.) trained by a veterinary radiologist, or a veterinarian who has completed a training program approved by the ACVR or ECVDI, or who was trained by a board-certified veterinary radiologist.<sup>3</sup>

## Adrenal glands reference images

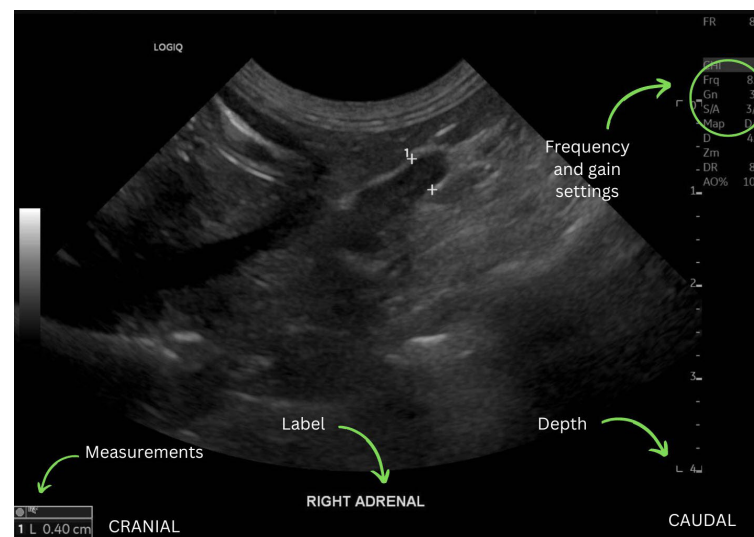




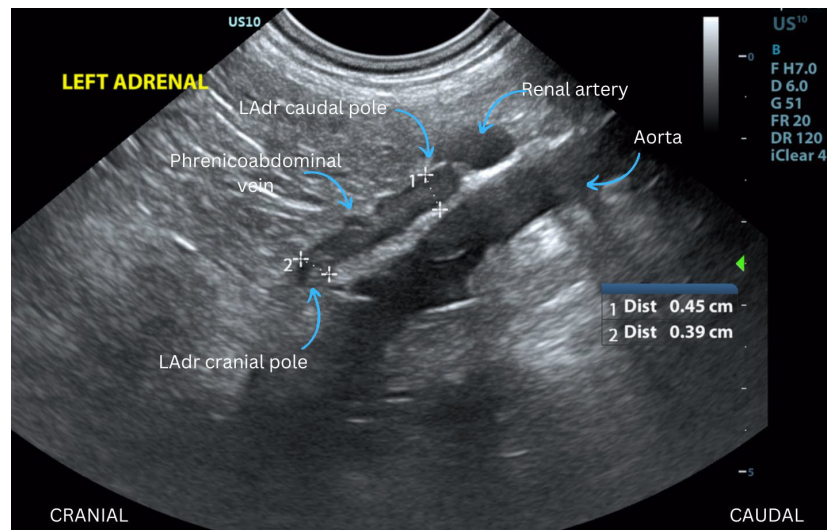
Left adrenal gland (settings and labels†)



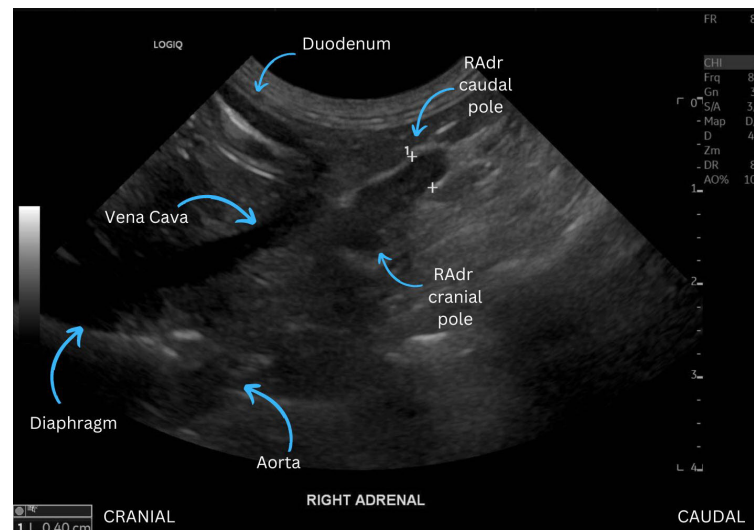
Right adrenal gland (settings and labels†)



Left adrenal gland (anatomy)

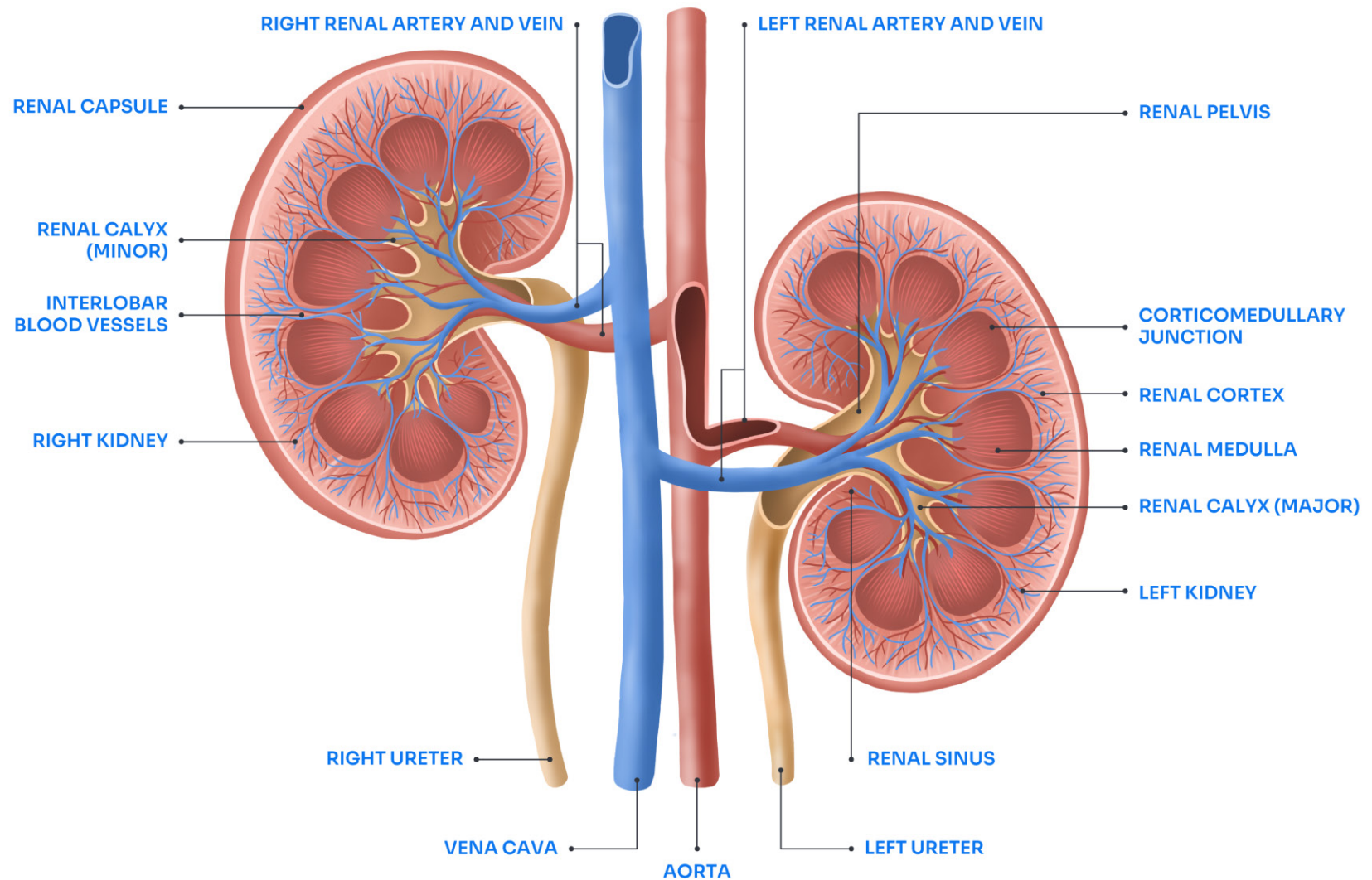


Right adrenal gland (anatomy)



†Set the frequency, gain, depth, and focus appropriate for the area of interest, and include relevant labels and measurements.

## Kidneys reference images

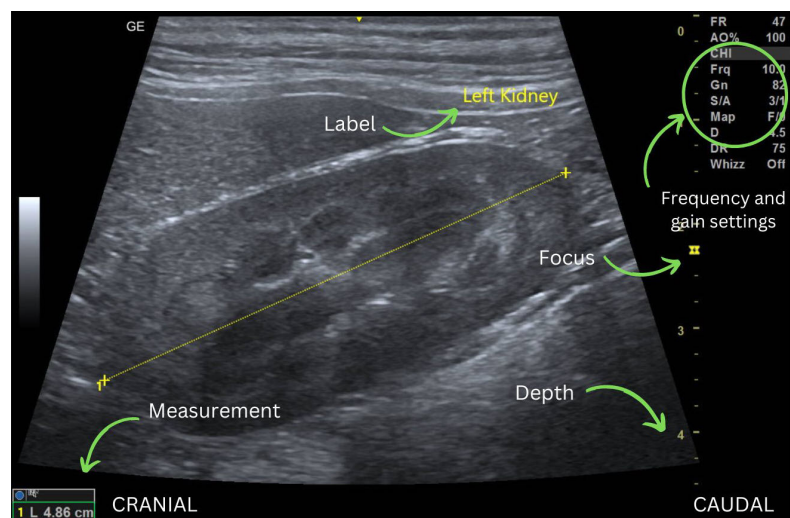




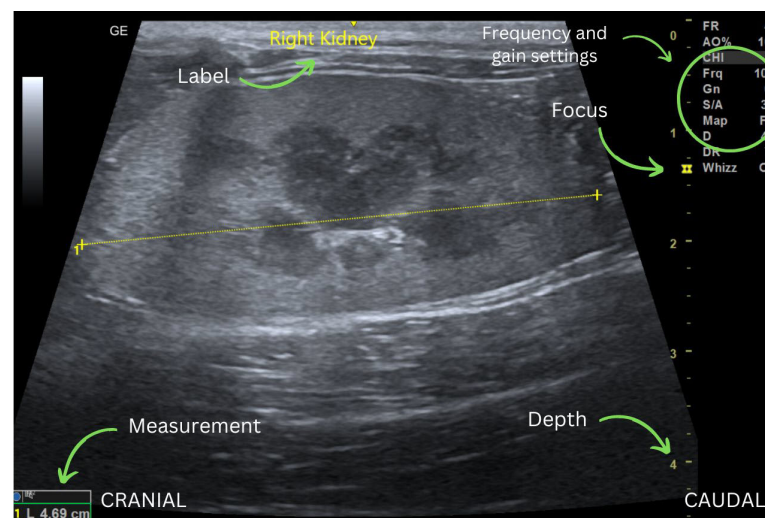
**Note:** It is not necessary to submit images with both the linear and curvilinear probes.

## Linear probe

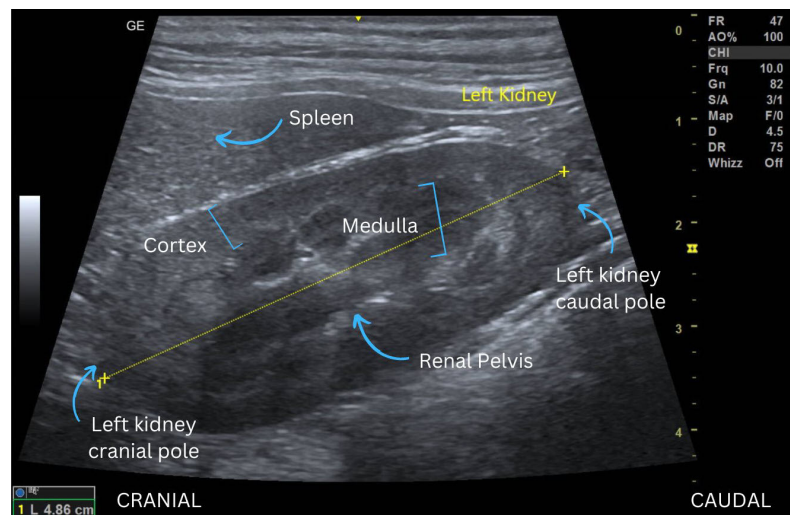
**Left kidney, sagittal (settings and labels<sup>†</sup>)**



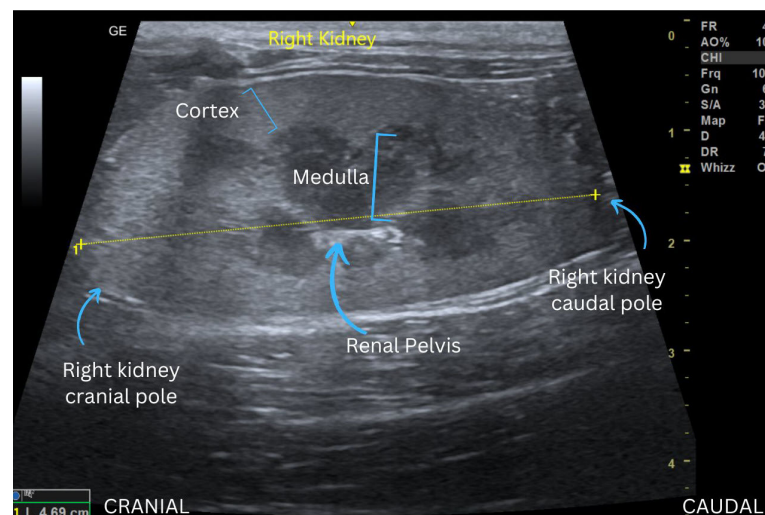
**Right kidney, sagittal (settings and labels<sup>†</sup>)**



**Left kidney, sagittal (anatomy)**



**Right kidney, sagittal (anatomy)**

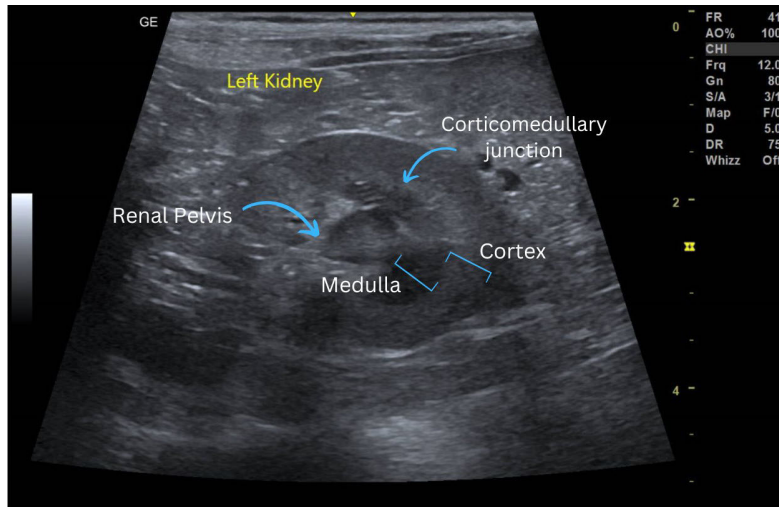


<sup>†</sup>Set the frequency, gain, depth, and focus appropriate for the area of interest, and include relevant labels and measurements.

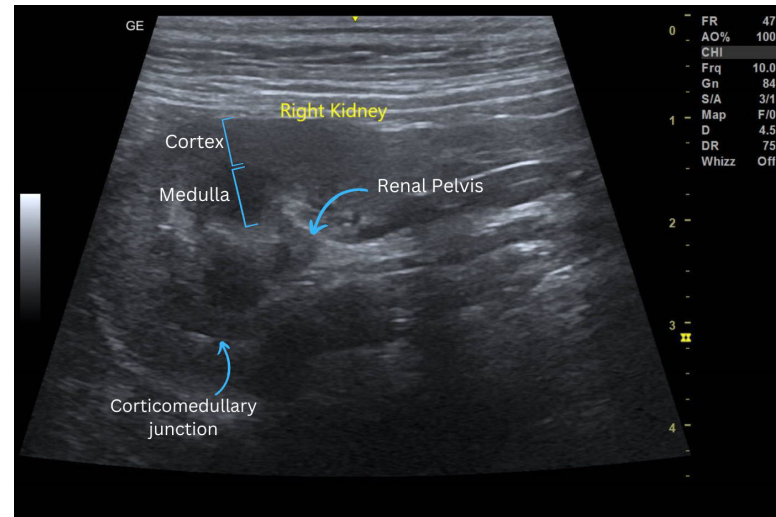
**Note:** It is not necessary to submit images with both the linear and curvilinear probes.

## Linear probe

**Left kidney, transverse (anatomy)**

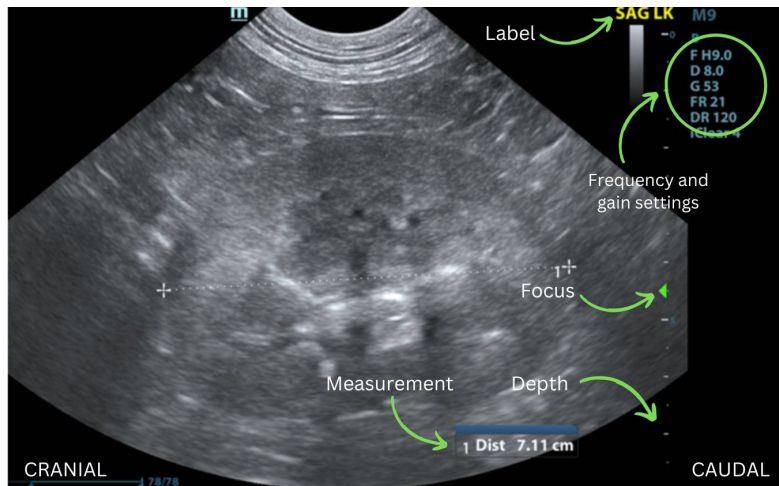


**Right kidney, transverse (anatomy)**

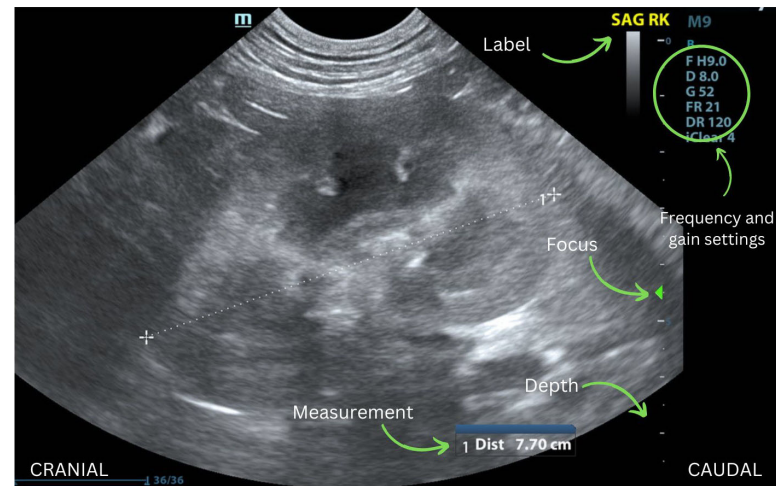


## Curvilinear probe

**Left kidney, sagittal (settings and labels<sup>†</sup>)**



**Right kidney, sagittal (settings and labels<sup>†</sup>)**



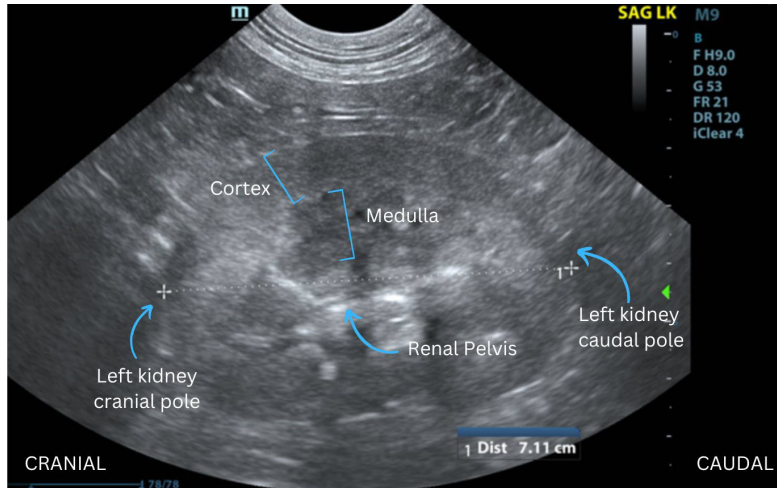
<sup>†</sup>Set the frequency, gain, depth, and focus appropriate for the area of interest, and include relevant labels and measurements.



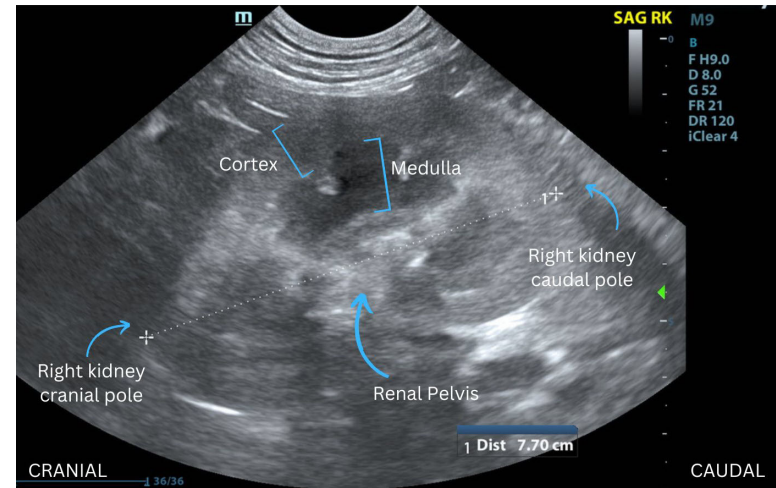
**Note:** It is not necessary to submit images with both the linear and curvilinear probes.

## Curvilinear probe

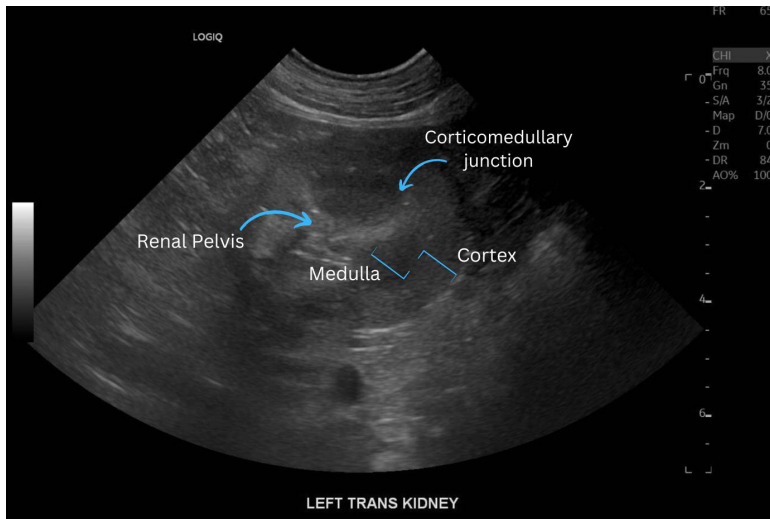
**Left kidney, sagittal (anatomy)**



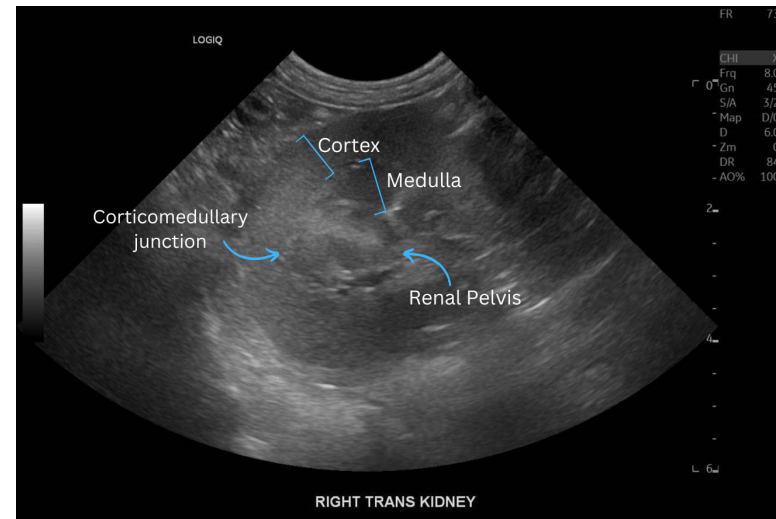
**Right kidney, sagittal (anatomy)**



**Left kidney, transverse (anatomy)**

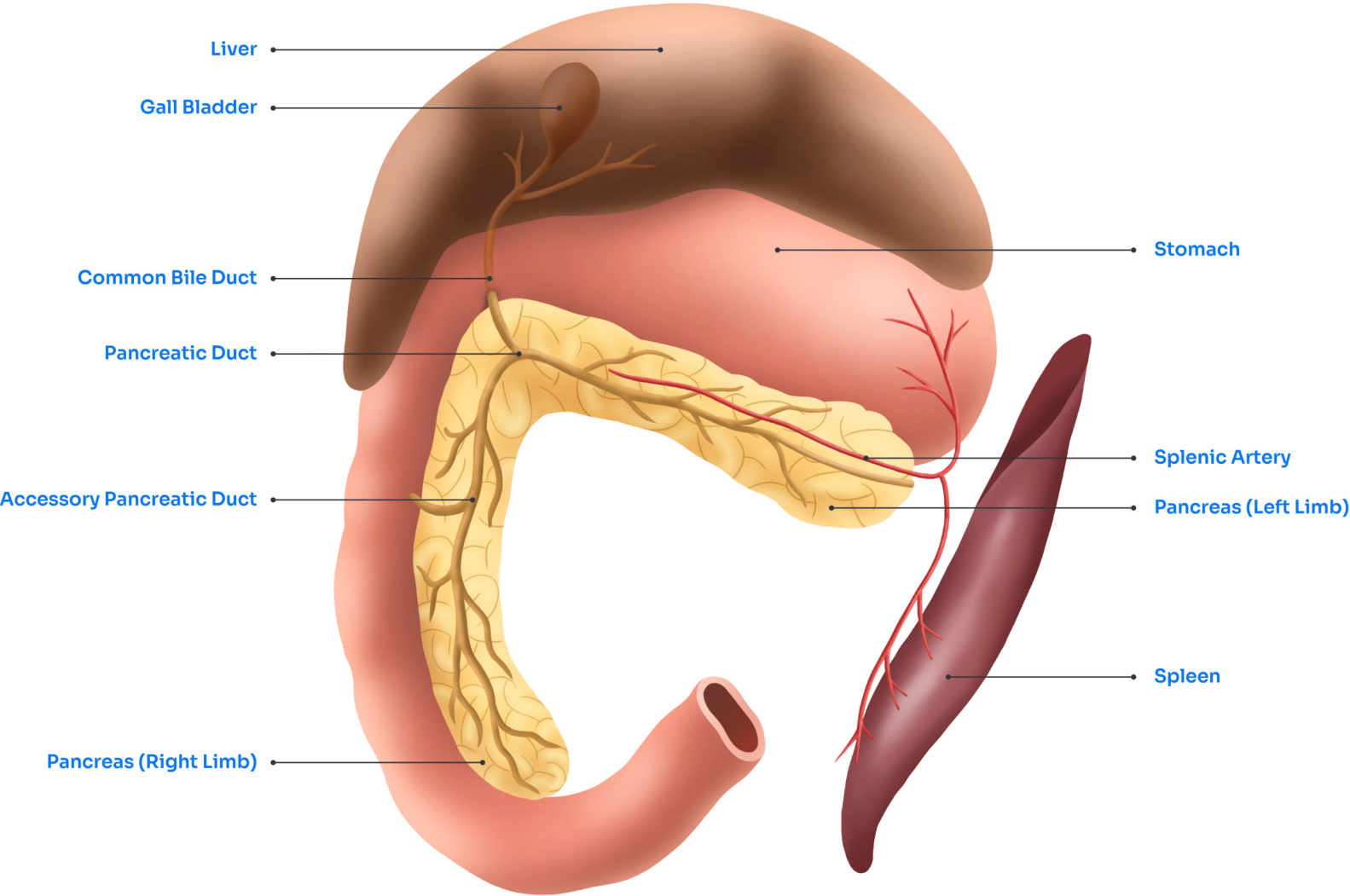


**Right kidney, transverse (anatomy)**



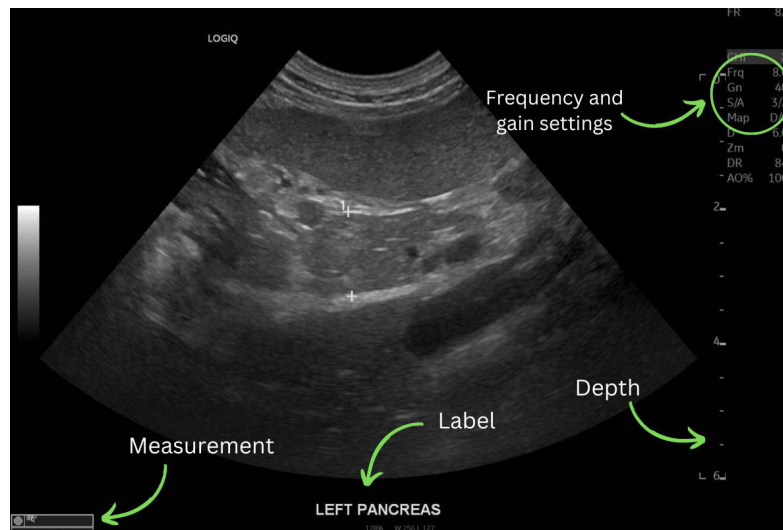
\*Set the frequency, gain, depth, and focus appropriate for the area of interest, and include relevant labels and measurements.

Pancreas reference images

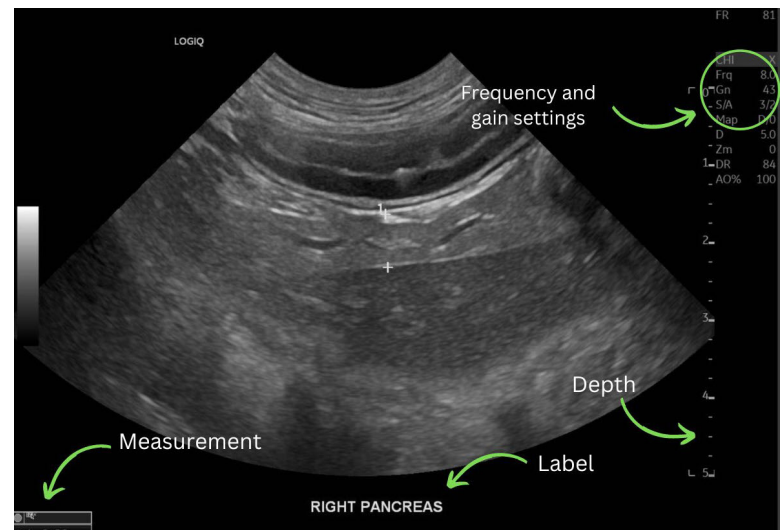


**Note:** In dogs, the right limb is more easily identified. In cats, the left limb is more easily identified.

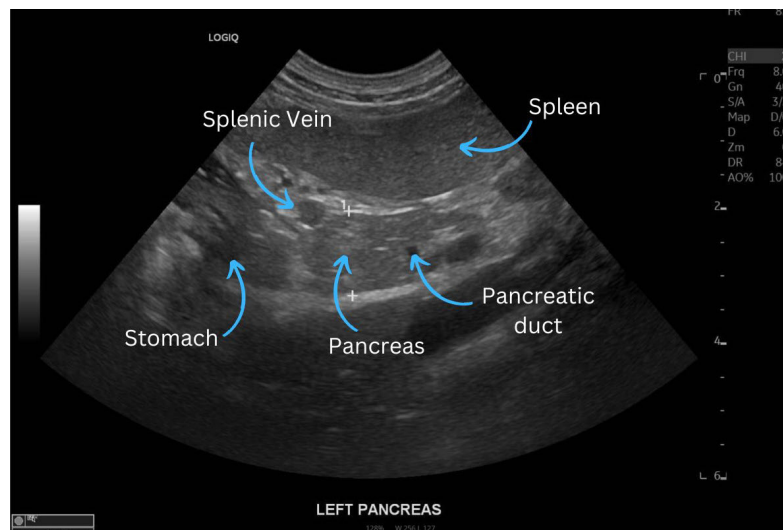
**Canine pancreas left limb (settings and labels†)**



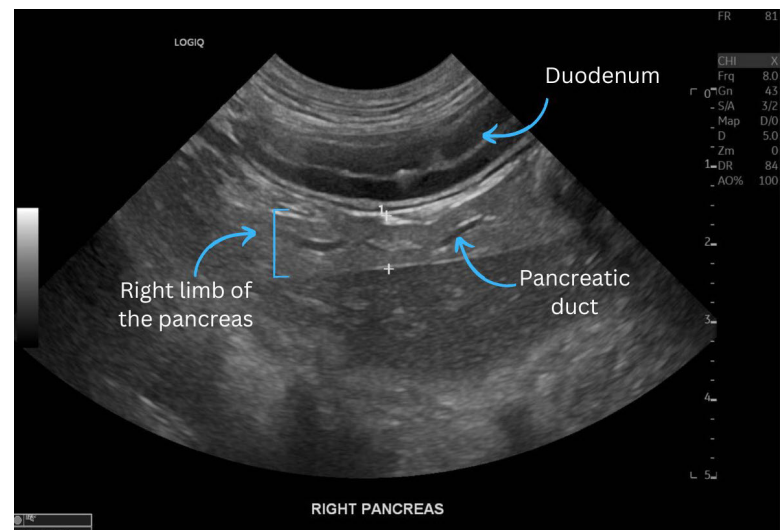
**Canine pancreas right limb (settings and labels†)**



**Canine pancreas left limb (anatomy)**



**Canine pancreas right limb (anatomy)**



†Set the frequency, gain, depth, and focus appropriate for the area of interest, and include relevant labels and measurements.



For more information on our submission requirements, contact our Telemedicine Support Team at **1-800-726-1212** or email **[TelemedicineSupport@idexx.com](mailto:TelemedicineSupport@idexx.com)**.

#### References

1. Seiler GS, Cohen EG, d'Anjou MA, et al. ACVR and ECVI consensus statement for the standardization of the abdominal ultrasound examination. *Vet Radiol Ultrasound*. 2022 Nov;63(6):661-674. doi: 10.1111/vru.13151. Epub 2022 Oct 3. <https://pubmed.ncbi.nlm.nih.gov/36189784/>.
2. American College of Veterinary Radiology. Types of imaging and therapy. Ultrasound. <https://acvr.org/how-we-do-it/types-of-imaging-therapy/ultrasound/>.
3. American College of Veterinary Radiology. Position statement on ultrasound. <https://acvr.org/dashboard/resources/position-statement-on-ultrasound/>.



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