



## Picture-Perfect Thoracic Radiographs

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Thoracic radiographs are vital when thoracic cavity abnormalities are suspected. They also are recommended when looking for lung diseases (eg, pneumonia, fungal disease, primary lung tumors, metastatic diseases, pneumothorax) as well as some other conditions (eg, cardiac disease, tumors, heartworms). Perfectly positioned thoracic radiographs are essential to help the veterinary team diagnose these conditions.

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eterinary nurses taking thoracic radiographs must remember that radiation safety comes first. Appropriate personal protective equipment should be used. Hands in the primary beam are unacceptable and dangerous. (See **Figures 1 & 2.**)

Before taking the radiographs, the veterinary nurse should determine whether the patient is stable or if sedation or manual restraint is necessary. The veterinarian should determine the type and amount of sedation. Cotton ropes, tape, sandbags, and V-troughs can be used for manual restraint.

## TAKE ACTION

**1** High-quality images are essential to accurately diagnose thoracic cavity and lung diseases, so training veterinary nurses to properly take thoracic radiographs is key.

**2** Safety is paramount when taking radiographs, and the veterinary nurse must never place his or her hands in the primary beam.

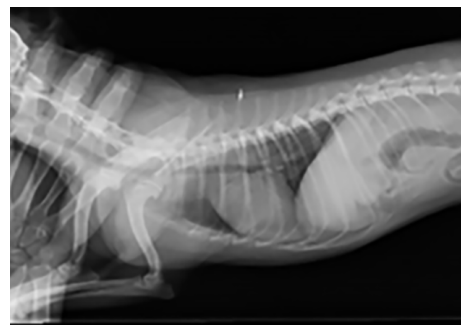
### Taking the Radiographs

- Thoracic radiographs usually are taken within the following parameters:
  - At a higher kVp and a lower mAs than abdominal films
  - On peak inspiration
  - With the entire thoracic cavity included (ie, the sternum ventrally, the spine dorsally, with the entire diaphragm visible)
- Take note of the following items to ensure high-quality radiographs:
  - If the entire thoracic cavity cannot be imaged, ensure the sternum is visualized so vital anatomy is not excluded.
  - Three views (ie, right and left



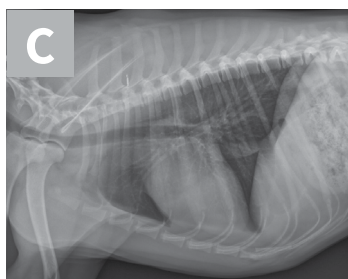
▲ **FIGURE 1** Ventrodorsal view obtained while holding the patient's thoracic limbs with the hands

*Images courtesy of Janet Paquette, AS, LVMT*



▲ **FIGURE 2** Right lateral view obtained while holding the patient's neck with the hands

# Veterinary nurses taking thoracic radiographs must remember that radiation safety comes first.



▲ **FIGURE 3** Patient in lateral positioning secured with ropes, a sandbag, and a wedge-shaped sponge (A). Note that the rib heads in the section of the left lateral view (B) are not superimposed as they are in right lateral view (C).



▲ **FIGURE 4** Ventrodorsal positioning

## Collimation for Thoracic Films

### FOLLOW THESE GUIDELINES:

- Landmarks are from the thoracic inlet cranially to halfway between the xyphoid and the last rib caudally.
- In small- to medium-breed patients, include the sternum ventrally and the spinous processes dorsally. (See **Large-Breed Dogs**, page 30.)
- Palpate the caudal edge of the scapula, and place the vertical line of the collimator light at or just caudal to this point to ensure the heart is centered in the radiograph.
- The horizontal line of the collimator light needs to be halfway between the sternum and the spine.
- Expose the radiograph on peak inspiration.
- Collimation landmarks are the same in the lateral and ventrodorsal views.
- If the patient is panting, take the image at a faster speed (ie, decrease the time, increase the mAs) to decrease motion.

See **Resources**, page 32.

## Large-Breed Dogs

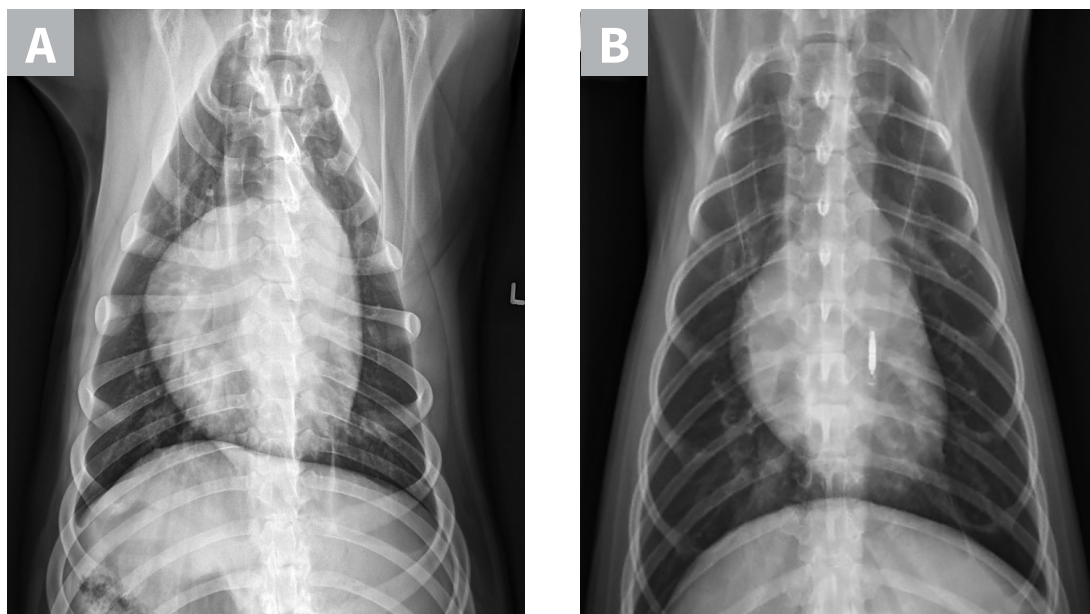
The following tips may be useful when taking thoracic radiographs in large-breed or deep-chested dogs.

- Excluding the spinous processes to ensure the entire sternum will be in the view may be necessary.
- Turning the cassette or plate vertically so the entire thoracic cavity is present in the dorsal and ventral plane may also be necessary.
- Cranial and caudal radiographs that include the entire thorax will be needed.

- lateral, ventrodorsal) are recommended.
  - A dorsoventral view is acceptable if the patient cannot be positioned dorsally.
  - A horizontal beam or humanoid view may sometimes be required.
- Position the patient in lateral recumbency with the dependent side down to obtain right or left lateral views. Tie the thoracic limbs with the cotton rope or tape, and pull them cranially so the elbow and tricep muscles are not superimposed over the cranial chest cavity.
- Secure the pelvic limbs caudally in the same manner as the thoracic limbs, and place a sandbag across the neck to help with restraint. Ensure the patient is aligned laterally by putting one finger on the sternum and one on

the dorsal spinous process and confirming they are equidistant to the table. If not, place a foam wedge under the patient's lower side to acquire laterality, being sure to include a right or left marker. (See **Figure 3**, page 29.) Also, when critiquing the radiograph for laterality, make sure to check the rib heads for superimposition. (See **Figure 3A**, page 29.)

- Place the patient in dorsal recumbency for the ventrodorsal view. For ease in positioning, a V-trough helps keep the spine and sternum aligned and is more comfortable for the patient. With the head straight, tie the thoracic limbs cranially and the pelvic limbs caudally. Place a thin sandbag across the neck or on either side of the head if help is needed with restraint and positioning. The head and



▲ **FIGURE 5** Ventrodorsal views. Spinous processes superimposed over the sternum (A). Spinous processes pointing to the left (B). Moving the dog's sternum to the left will make the image straight.



## High-quality, correctly positioned thoracic radiographs are crucial to help the veterinarian diagnose thoracic cavity abnormalities

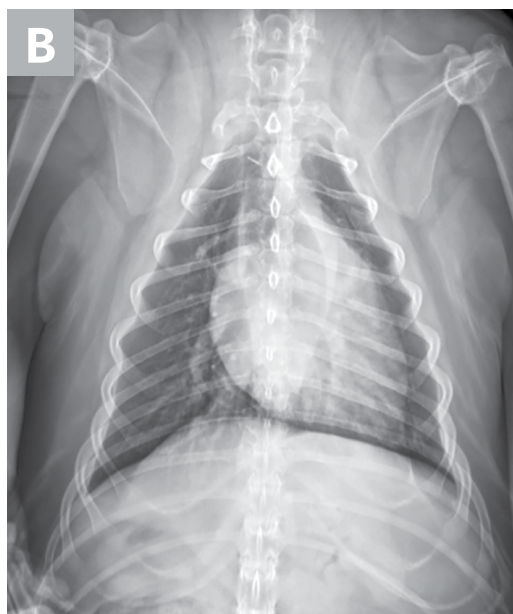
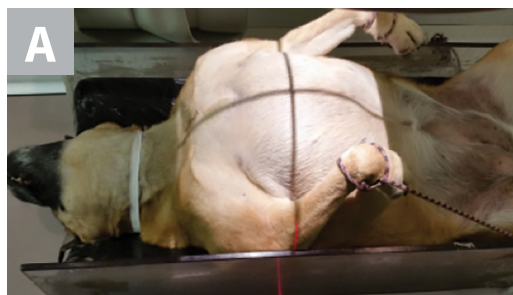
neck need to be straight, not turned to the side. (See **Figure 4**, page 29.)

- Make sure the sternum and dorsum are superimposed on the radiograph. If the spinous processes are visible pointing to one side, move the sternum in the direction they are pointing to straighten the spine and sternum. (See **Figure 5**.)
- If a dorsoventral view is required, place the patient in sternal recumbency with the thoracic limbs pulled forward and out of the chest. The pelvic limbs can be in a frog-legged position. Place a sandbag across the neck to help stabilize the patient. The collimation landmarks are the same as the ventrodorsal view. (See **Figure 6 & Collimation for Thoracic Films**, page 29.)



▲ **FIGURE 6** Dorsoventral positioning

- Use the humanoid projection to visualize the cranial lung field and remove any superimposition of the caudal scapula. Place the patient in dorsal recumbency with the thoracic limbs pulled caudally along his or her side. The landmarks are the same as other views. (See **Figures 7A & 7B**.)



▲ **FIGURE 7** Humanoid positioning with legs pulled caudally alongside the patient (**A**). Resulting humanoid view (**B**). Note the scapula are not superimposed over the chest.

## Chewable Tablets

**Brief Summary:** Please consult full package insert for more information.

**INDICATIONS:** Tri-Heart® Plus chewable tablets are indicated for use in prevention of canine heartworm caused by *Dirofilaria immitis* and for the treatment and control of ascarids (*Toxocara canis*, *Toxascaris leonina*) and hookworms (*Ancylostoma caninum*, *Uncinaria stenocephala*, *Ancylostoma braziliense*) in dogs and in puppies 6 weeks of age and older.

**PRECAUTIONS:** All dogs should be tested for existing heartworm infection before starting treatment with Tri-Heart® Plus chewable tablets. A mild hypersensitivity-type reaction, presumably due to dead or dying microfilariae and particularly involving a transient diarrhea has been observed in clinical trials with ivermectin alone after treatment of some dogs that have circulating microfilariae.

**Keep this and all drugs out of the reach of children.** In case of ingestion by humans, clients should be advised to contact a physician immediately. Physicians may contact a Poison Control Center for advice concerning cases of ingestion by humans.

**ADVERSE REACTIONS:** The following adverse reactions have been reported following the use of ivermectin at the recommended dose: depression/lethargy, vomiting, anorexia, diarrhea, mydriasis, ataxia, staggering, convulsions and hypersalivation.

**Caution:** Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.

**HOW SUPPLIED:** Tri-Heart® Plus chewable tablets are available in three dosage strengths for dogs of different weights. Each strength comes in convenient packs of 6 chewable tablets.

Store at controlled room temperature of 59-86° F (15-30° C). Protect product from light.

**For Technical Assistance, call Merck Animal Health: 1-800-224-5318**

Manufactured for: Intervet Inc. a subsidiary of Merck & Co. Inc., Summit, NJ 07901  
Manufactured by: Diamond Animal Health, Inc., a wholly owned subsidiary of Heska Corporation, Des Moines, IA 50327

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## Conclusion

High-quality, correctly positioned thoracic radiographs are crucial to help the veterinarian diagnose thoracic cavity abnormalities, so the veterinary nurse must make sure the radiographs are the best they can be. ■



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Technicians Association for the last 3 years. She currently serves on the committee working toward VTS certification in diagnostic imaging, which she hopes will be approved by NAVTA within the year.

**FUN FACT:** In her spare time, Janet likes to hike in the Smoky Mountains, walk for exercise, read, and play with her adorable dog, Emma. She is looking forward to retirement in a few years, moving back to Michigan, and enjoying water sports at her son's lake house.

## Resources

- *Handbook of Radiographic Positioning for the Veterinary Technician.* Sirois M, Anthony E, Mauragis D. Delmar Cengage Learning; 2010.
- *Lavin's Radiography for Veterinary Technicians.* 5th ed. Brown M, Brown L. Saunders Elsevier; 2014.
- *Practical Diagnostic Imaging for the Veterinary Technician.* 3rd ed. Han CM, Hurd CD. Elsevier-Mosby; 2005.
- Small animal thoracic radiography. Mauragis D, Berry CR. *Today's Veterinary Practice.* 2011:45-50.
- *Textbook of Veterinary Radiology.* 6th ed. Thrall DE, ed. Saunders Elsevier; 2013.