Respiratory Cases: Diagnosing with Confidence

Stephanie Seller, DVM, DACVR

NYC Veterinary Medical Association, May 2021

Who am I?

- Cornell College of Veterinary Medicine
  - Class of 2016
- Residency in Diagnostic Imaging at The Animal Medical Center from 2017-2020
- American College of Veterinary Radiology Diplomate, 2020
- Cornell University Veterinary Specialists
  - Stamford, CT
- VetImaging of New York (VINY)
- Huge fan of scruffy terriers, Pommies, and getting follow-up!

Indications for Thoracic Radiographs…

- Dyspnea
- Cyanosis
- Tachypnea
- Coughing
- Fever
- Known or suspected neoplasia
- Abnormal cardiopulmonary auscultation
- Trauma
- Upcoming anesthesia
- Neurologic abnormalities (Horner’s Syndrome, etc.)
- Geriatric screening
- Regurgitation/vomiting
- Tube placement checks – catheters, NG tubes, E tubes…
- And others!!

Blanket Advice for CXR

- Three views ideal in every situation (both laterals and either a VD or DV)… but orthogonal views are required!
  - Respiratory distress or turning blue? Abort! Come back later.
- Which lung are you most interested in (if only doing 1 lateral)?
  - Make sure that lung is UP (away from the table) in the lateral you choose
- Collimate to the actual thorax… chabdomens often hard to interpret especially for metastasis checks
- Have a technique chart available –need to increase technique for VD/DV to avoid underexposure
  - Underexposure will look like a lung pattern

More Advice

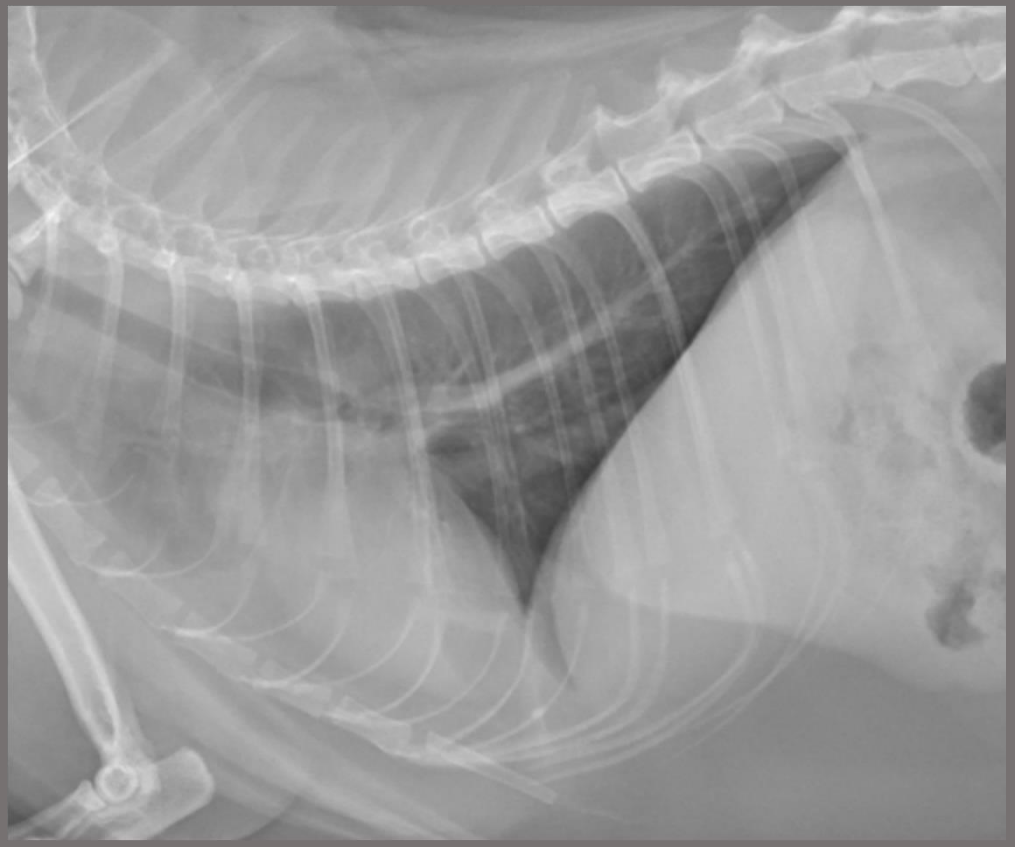
- Get in the habit of describing what you are seeing instead of just jumping to what pathology you think the pattern represents
- Use **Roentgen signs** to describe abnormalities
  - Size, shape, margin, number, location, opacity
  - Objective way to categorize abnormalities you see
- Turn the brightness up on your screens
  - For radiographic viewing in the clinic
  - And for this lecture!

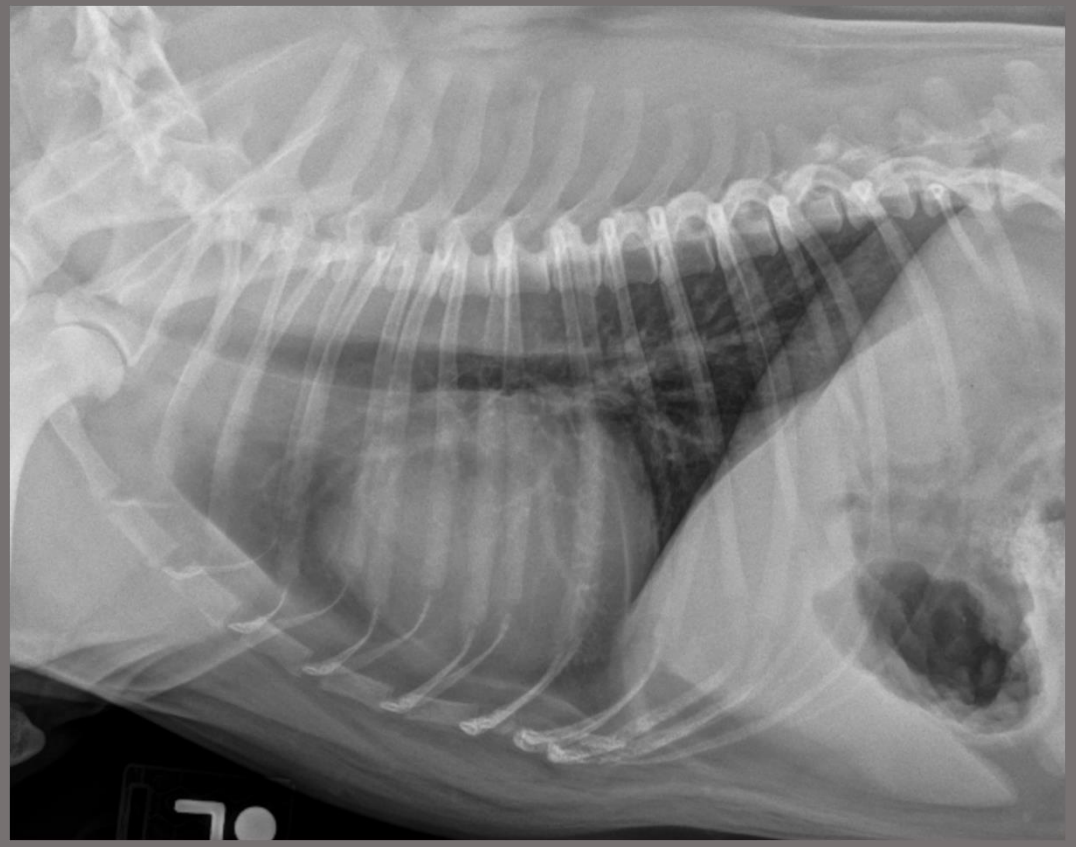
There are only FIVE opacities on radiographs….

1. Gas
2. Fat
3. Soft tissue
   - Fluid
4. Mineral/bone
5. Metal/contrast

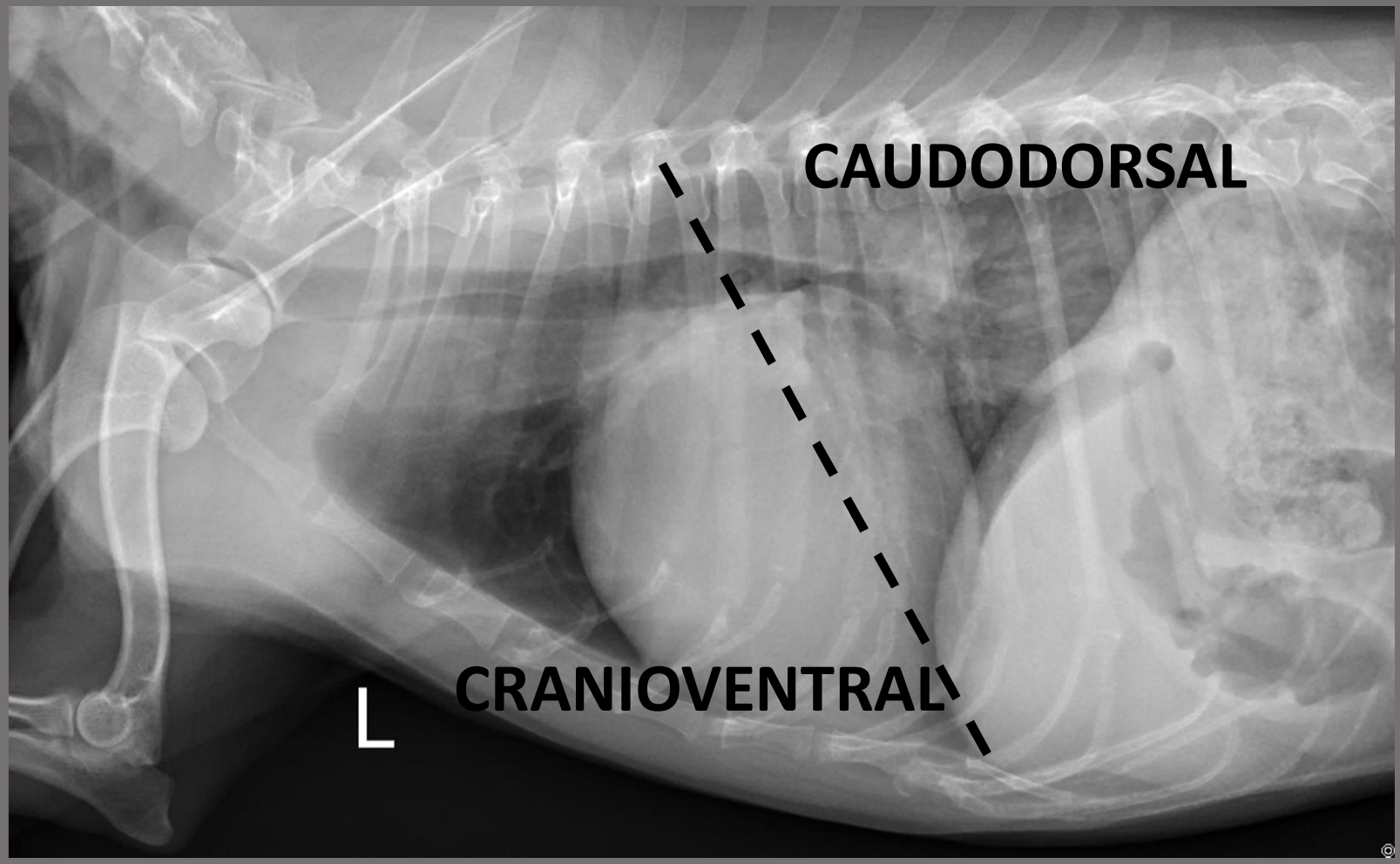
- **Everything you are looking at on a thoracic radiograph *must* be one of these five opacities**

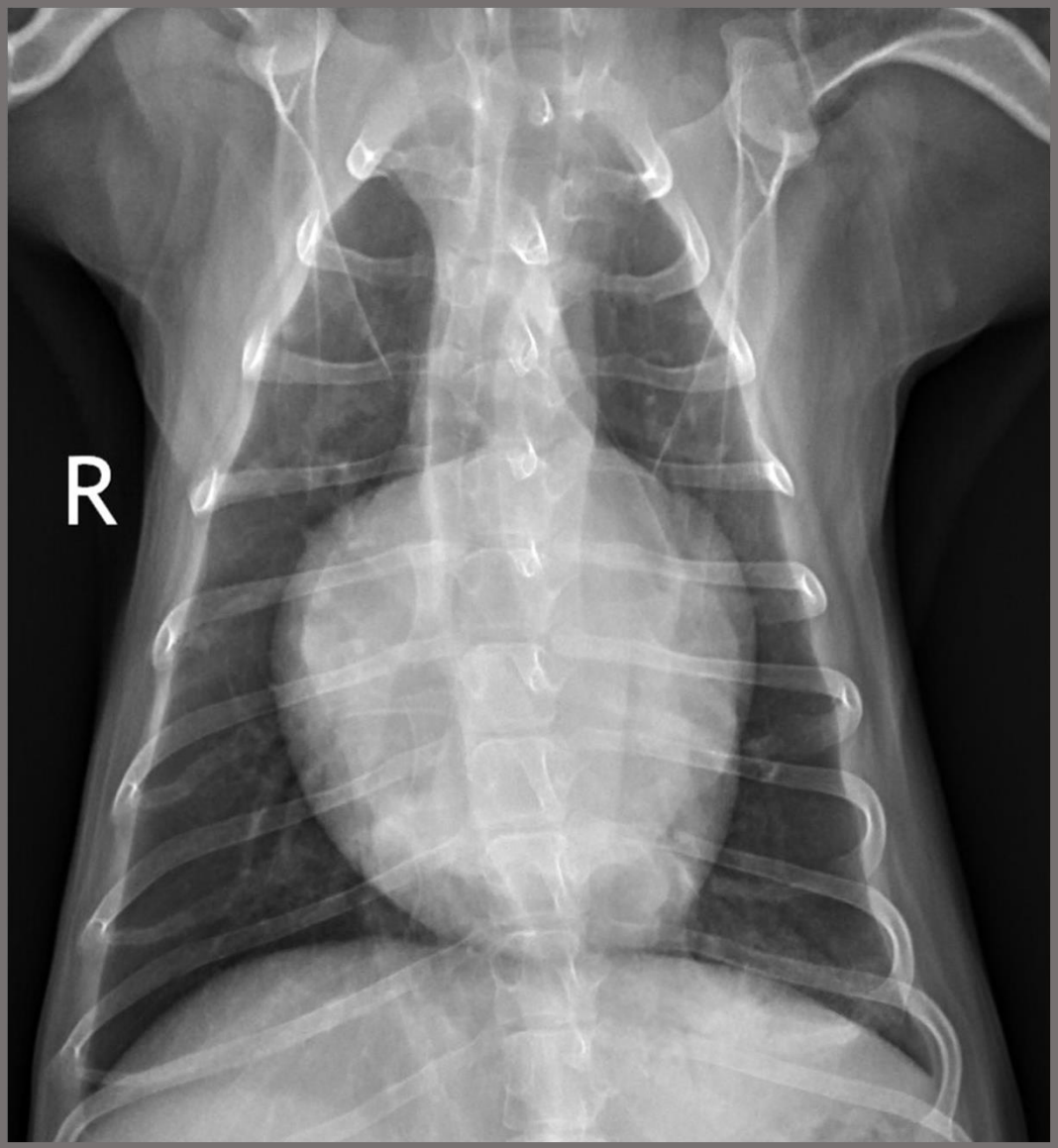
Step 1: IS there a lung pattern…?

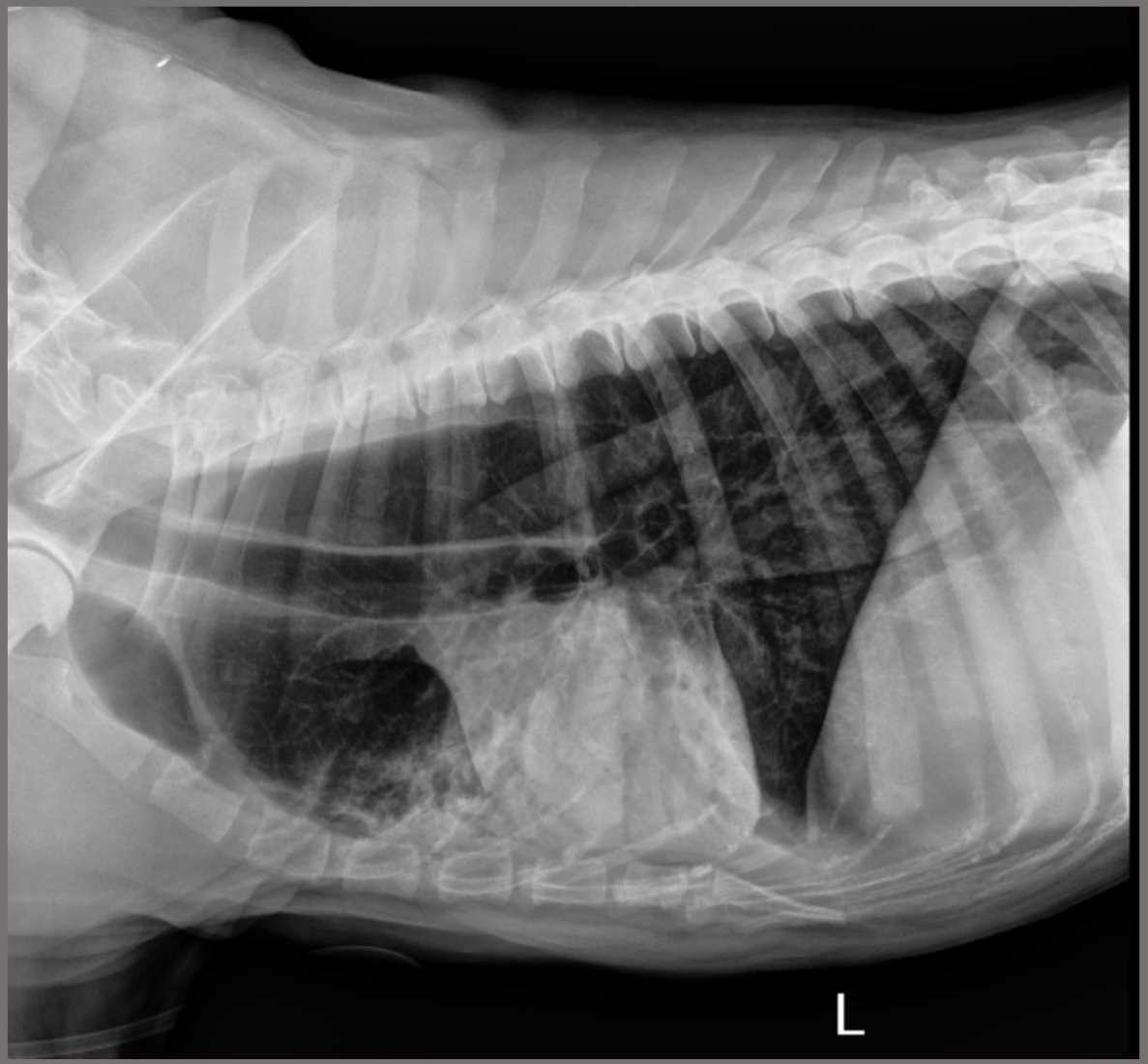


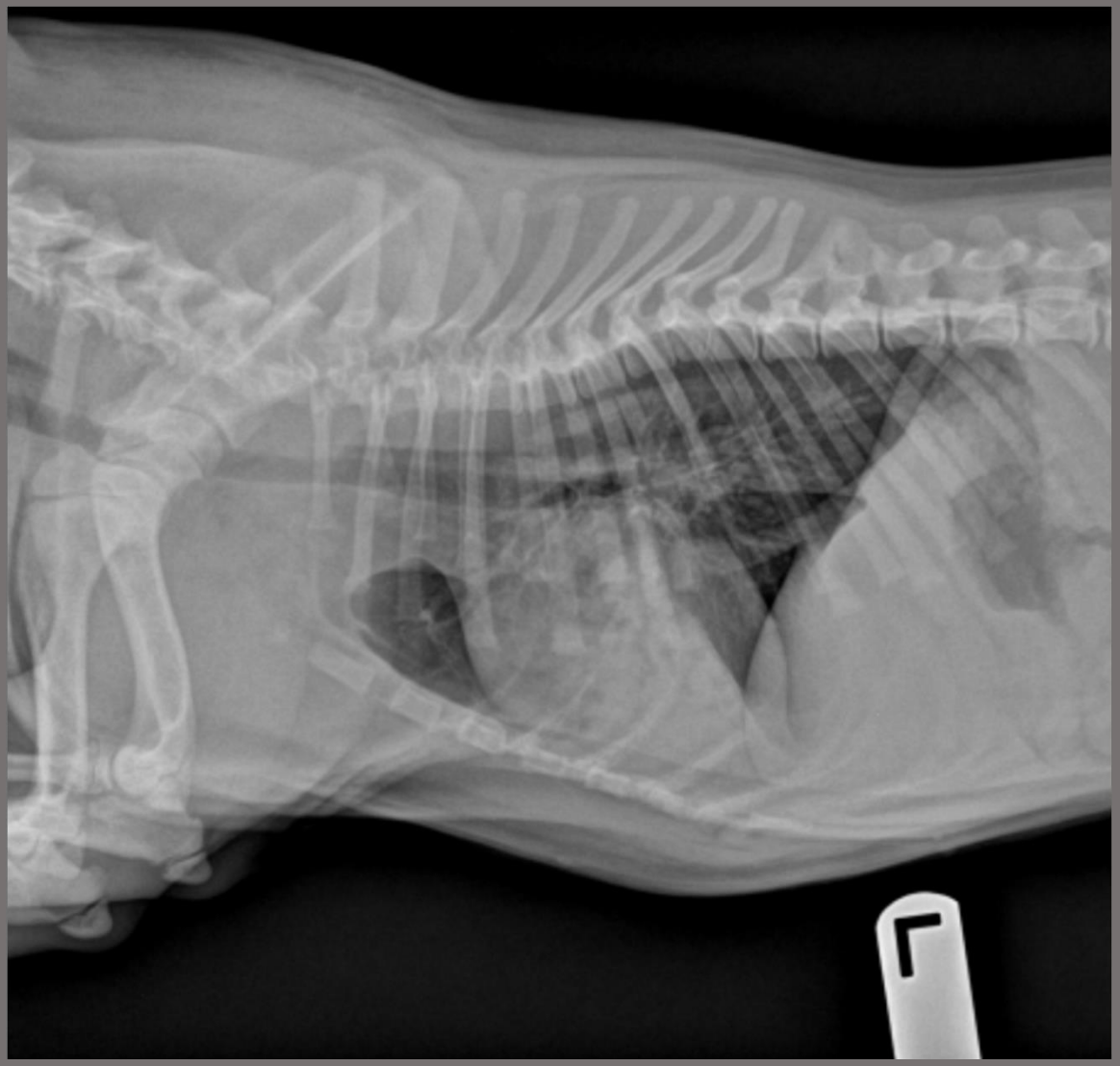


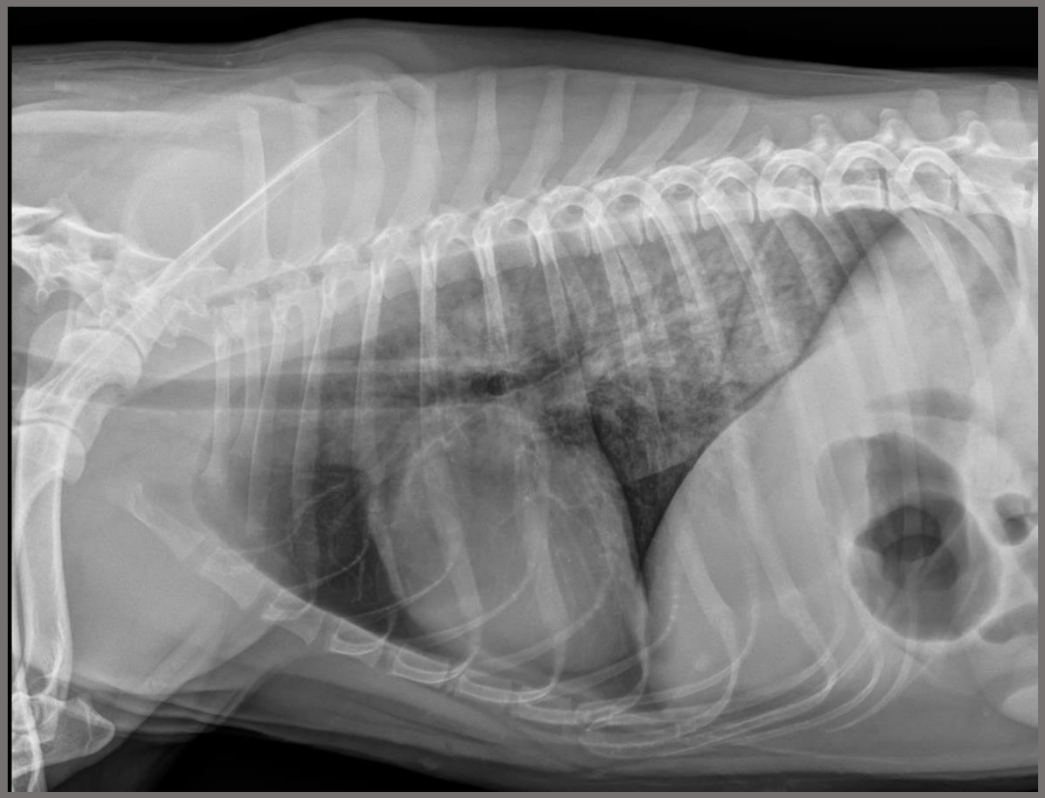
Step 2: WHERE is the lung pattern?

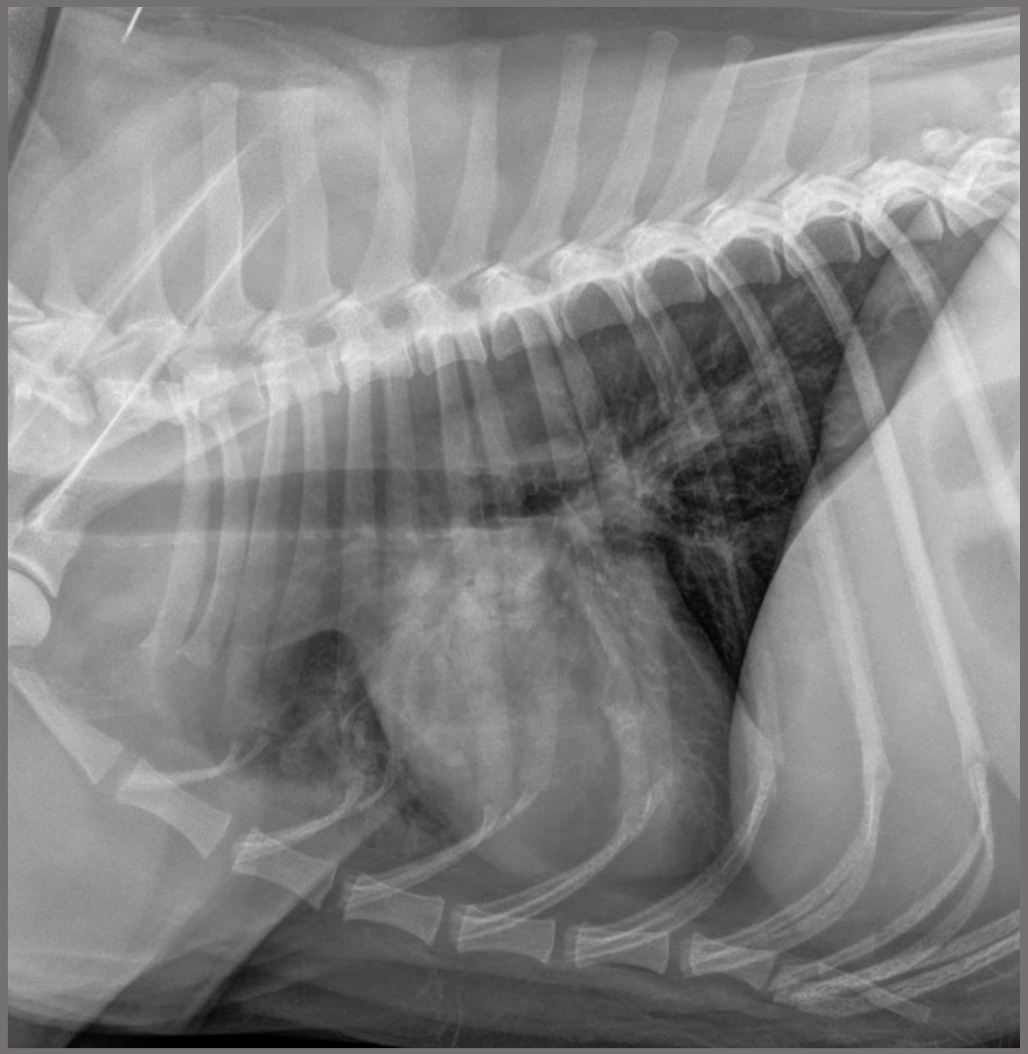



R


L








R


L

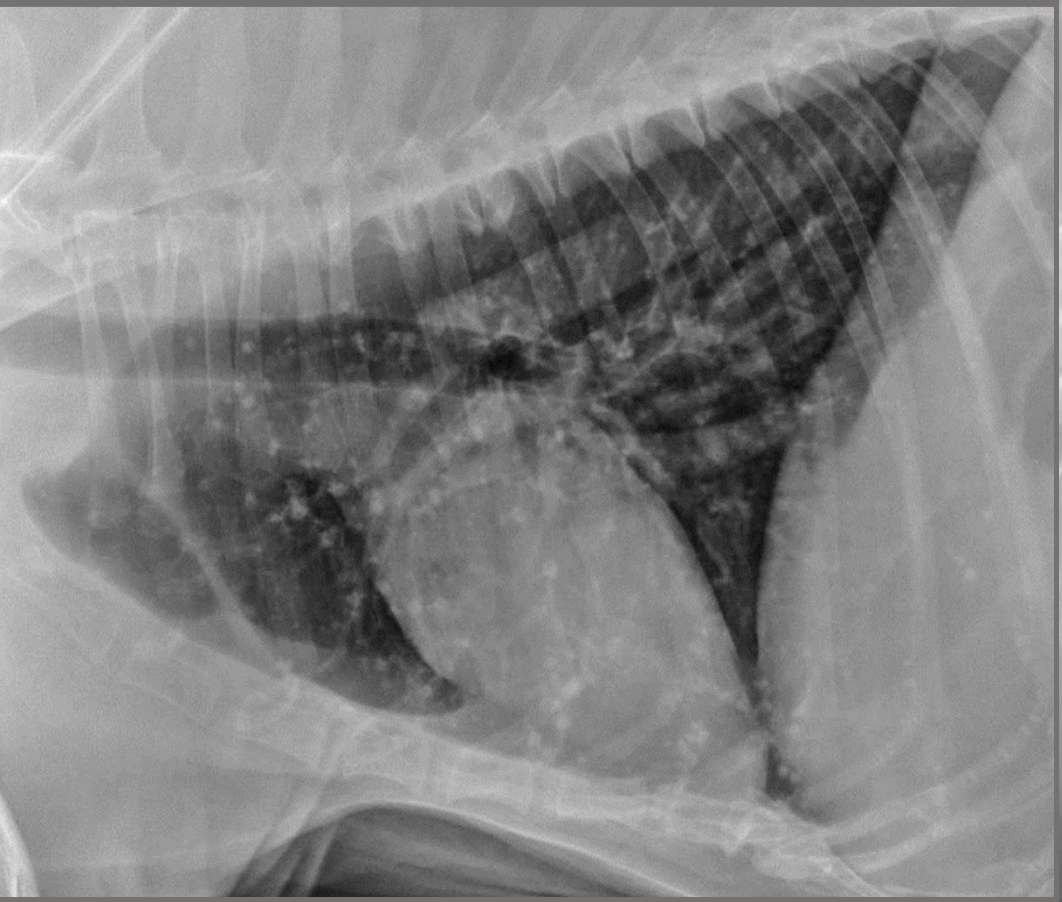
Lung Pattern Distribution

- Cranial and ventral?
- Think about…
  - Pneumonia
  - Hemorrhage/contusions

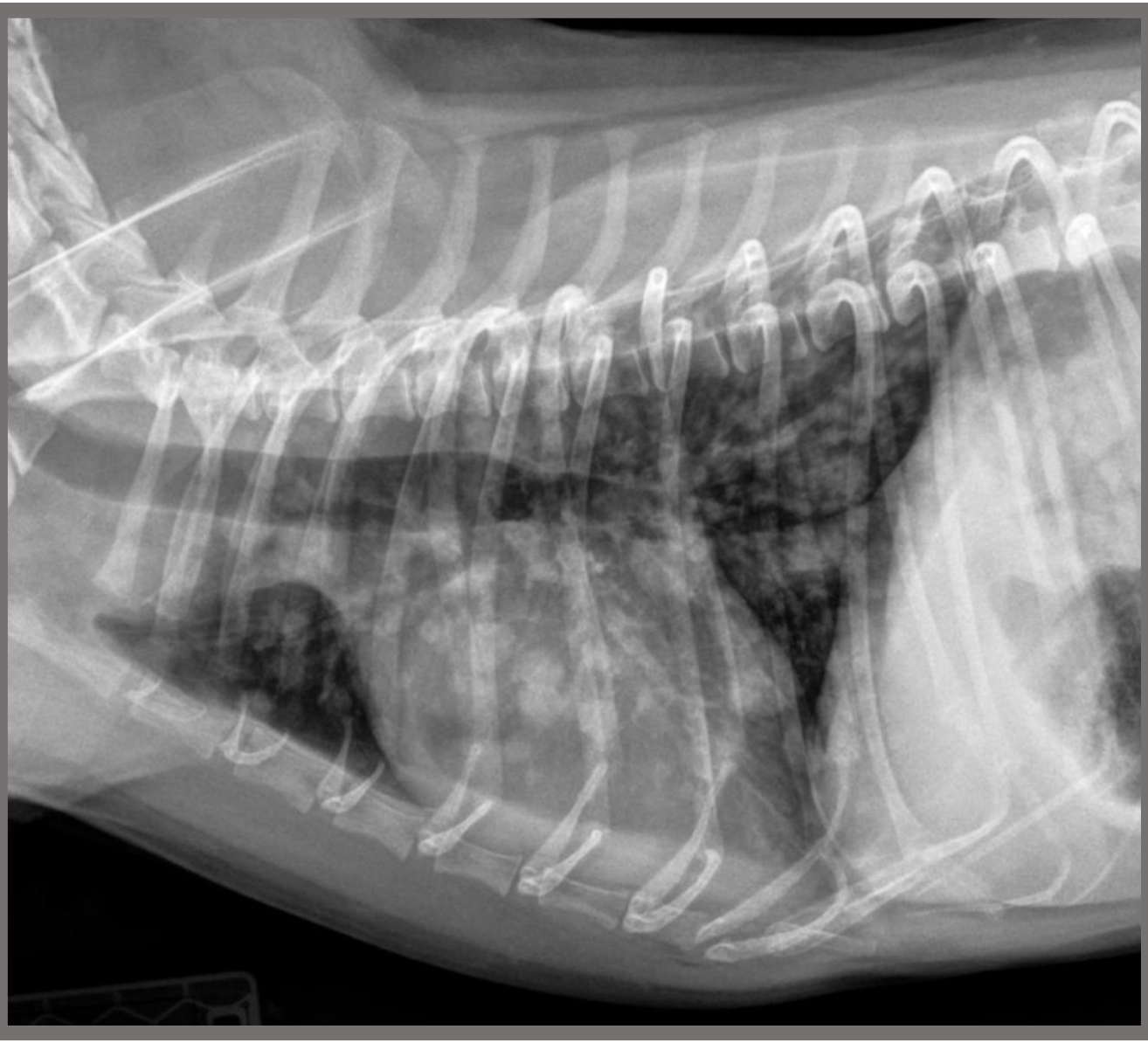
- Caudal and dorsal?
- Think about…
  - Cardiogenic pulmonary edema
  - Non-cardiogenic pulmonary edema
  - ALI/ARDS

Step 3: Does the lung pattern have a shape?

- Round
- Triangular/wedge-shaped
- Tubular
- Unstructured/no real shape

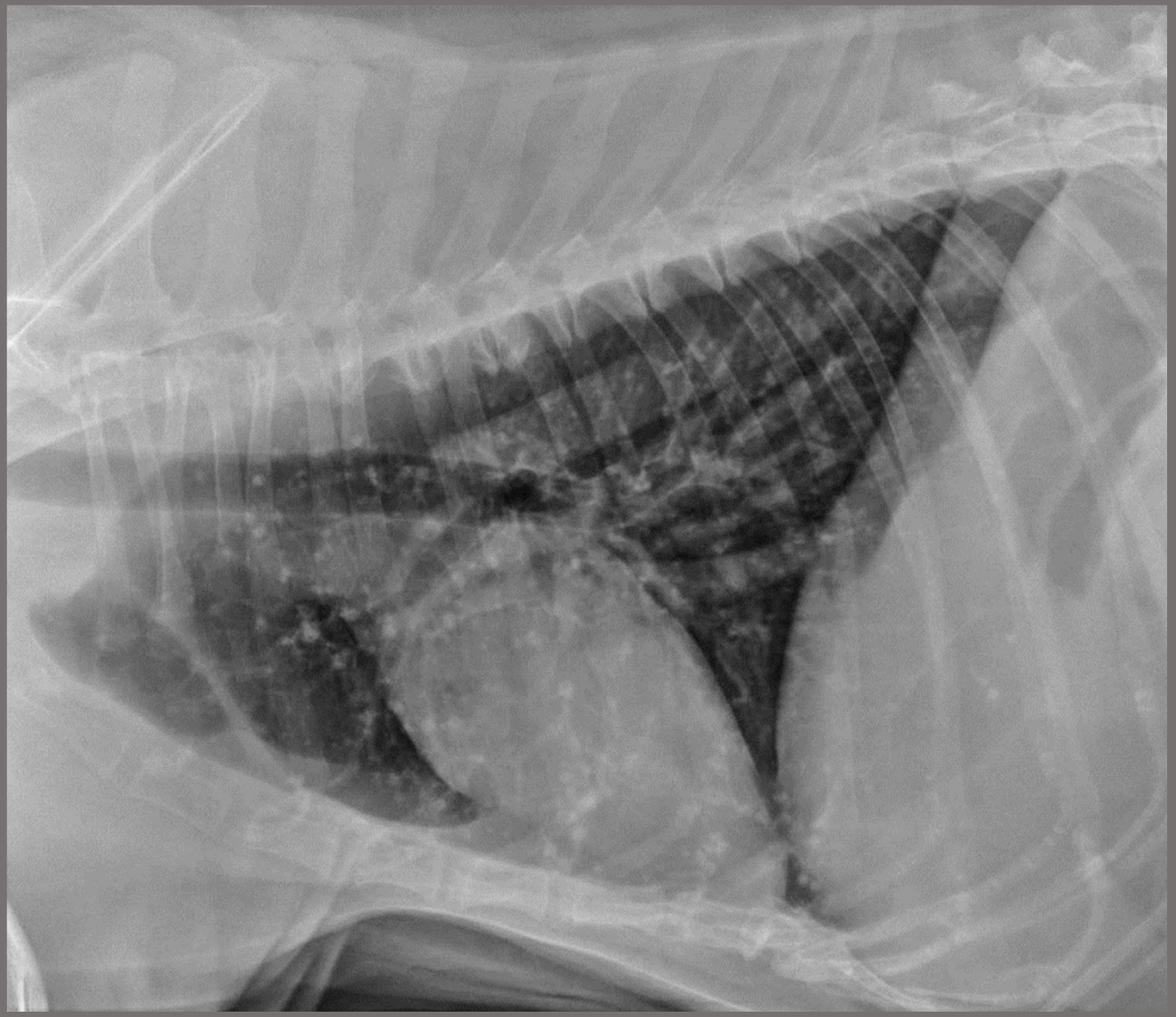


Nodules



When are nodules not mets?

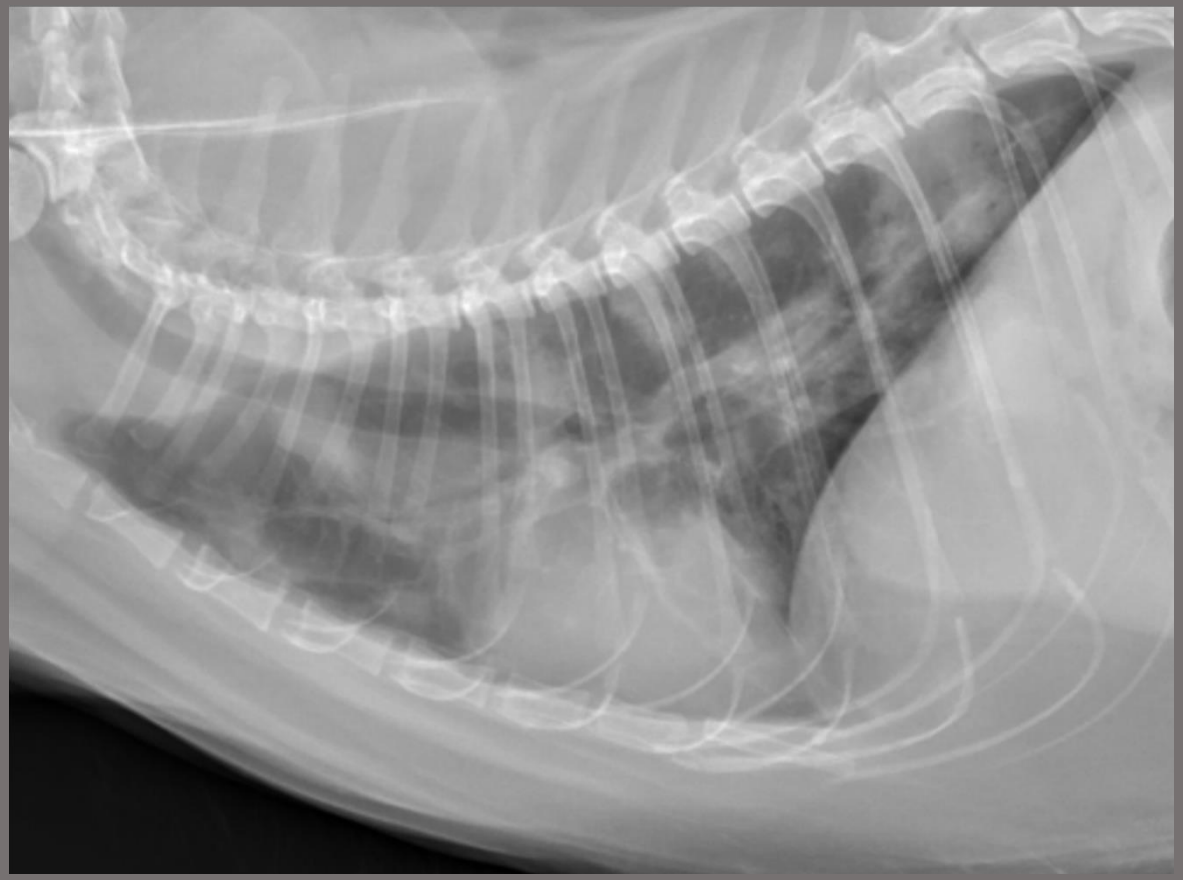
When are nodules not mets?

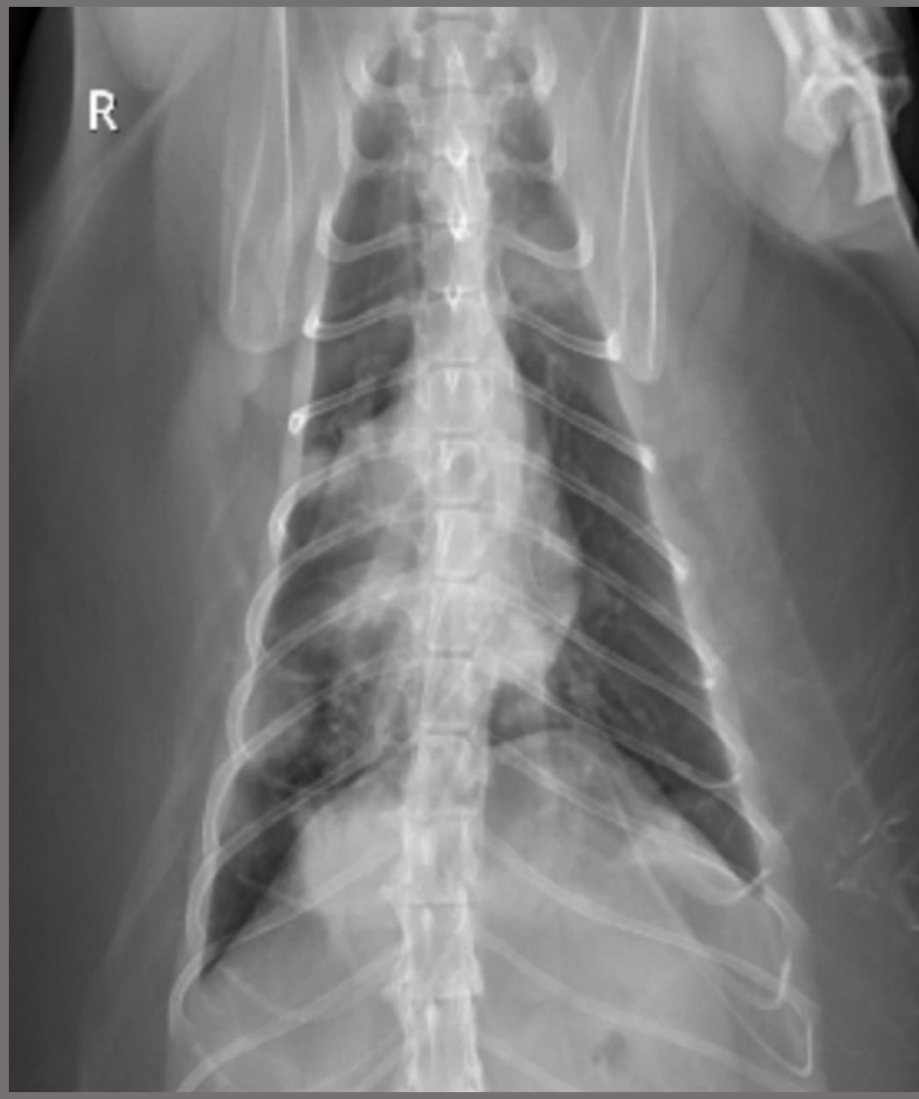


When are nodules not mets?

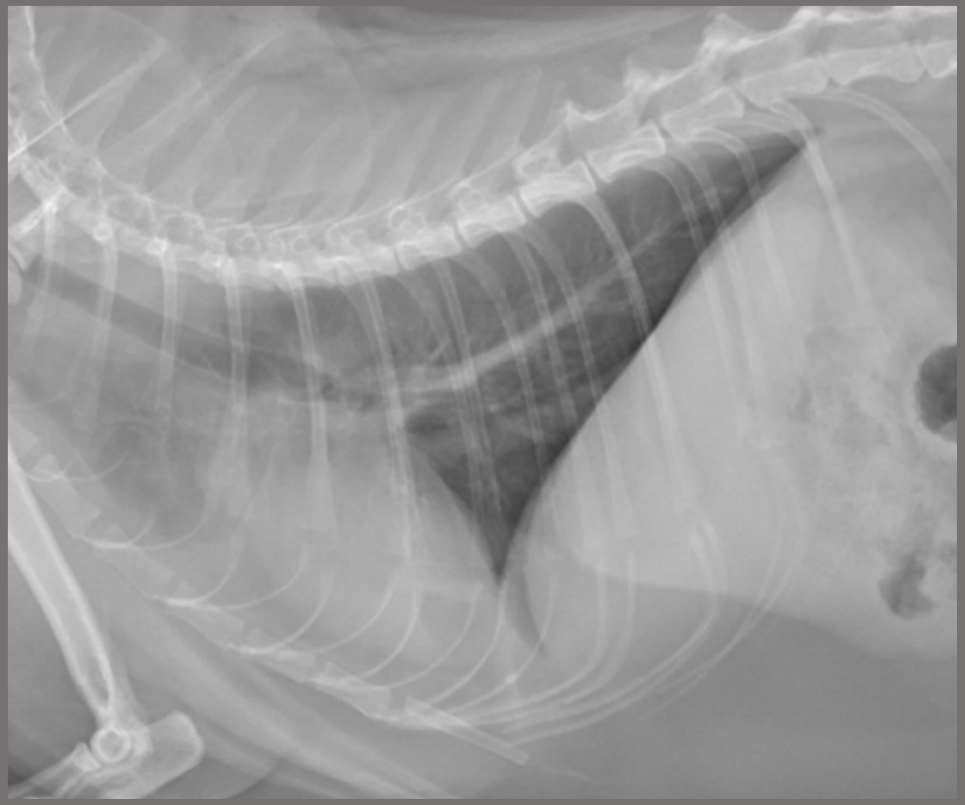
Embolic disease

- Peripheral, wedge-shaped
- Can be interstitial or alveolar
- Thromboembolism
- Pneumonia (cats especially)
- Cancer




R

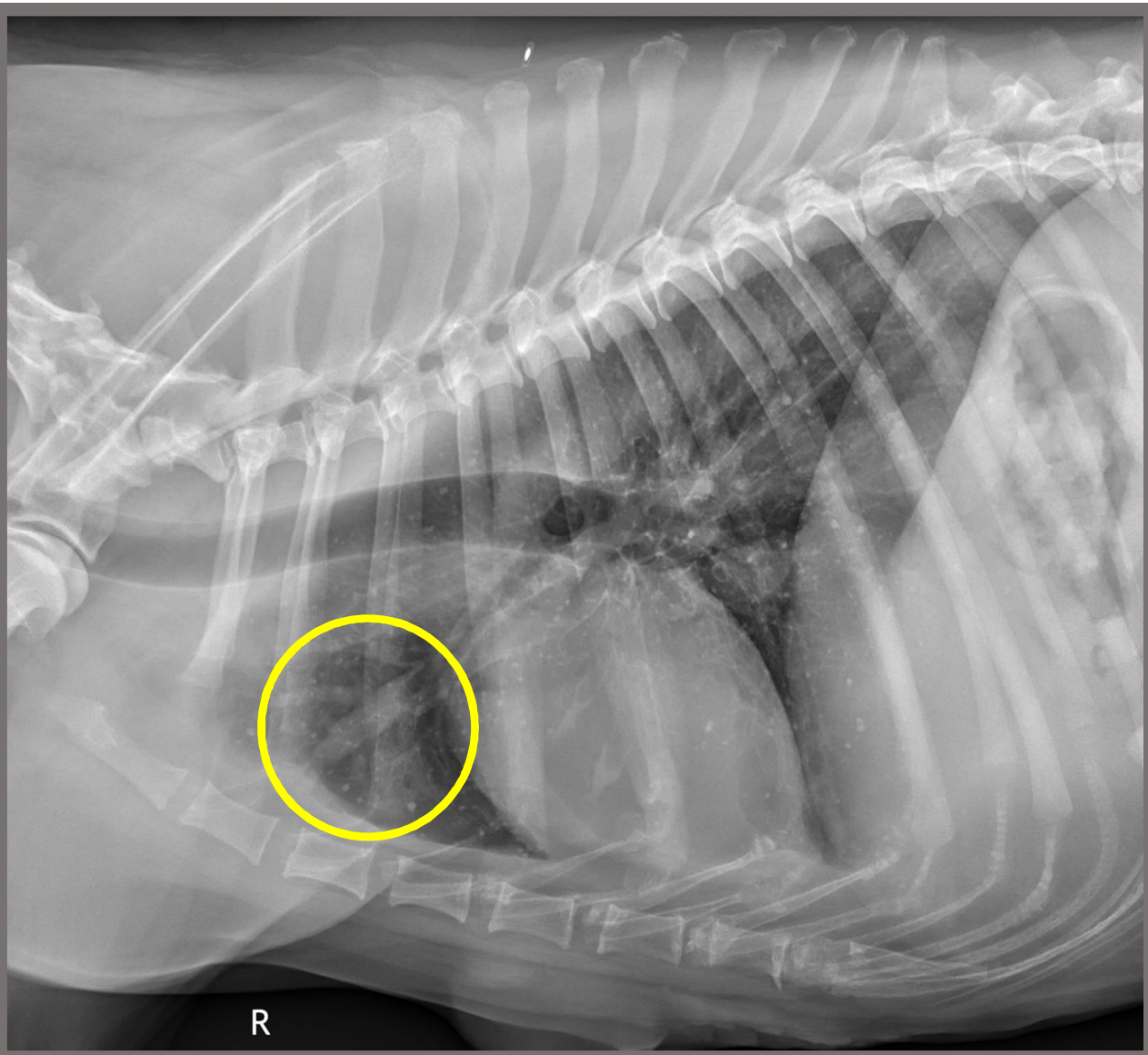
5 months later… after
Clavamox for 14 days

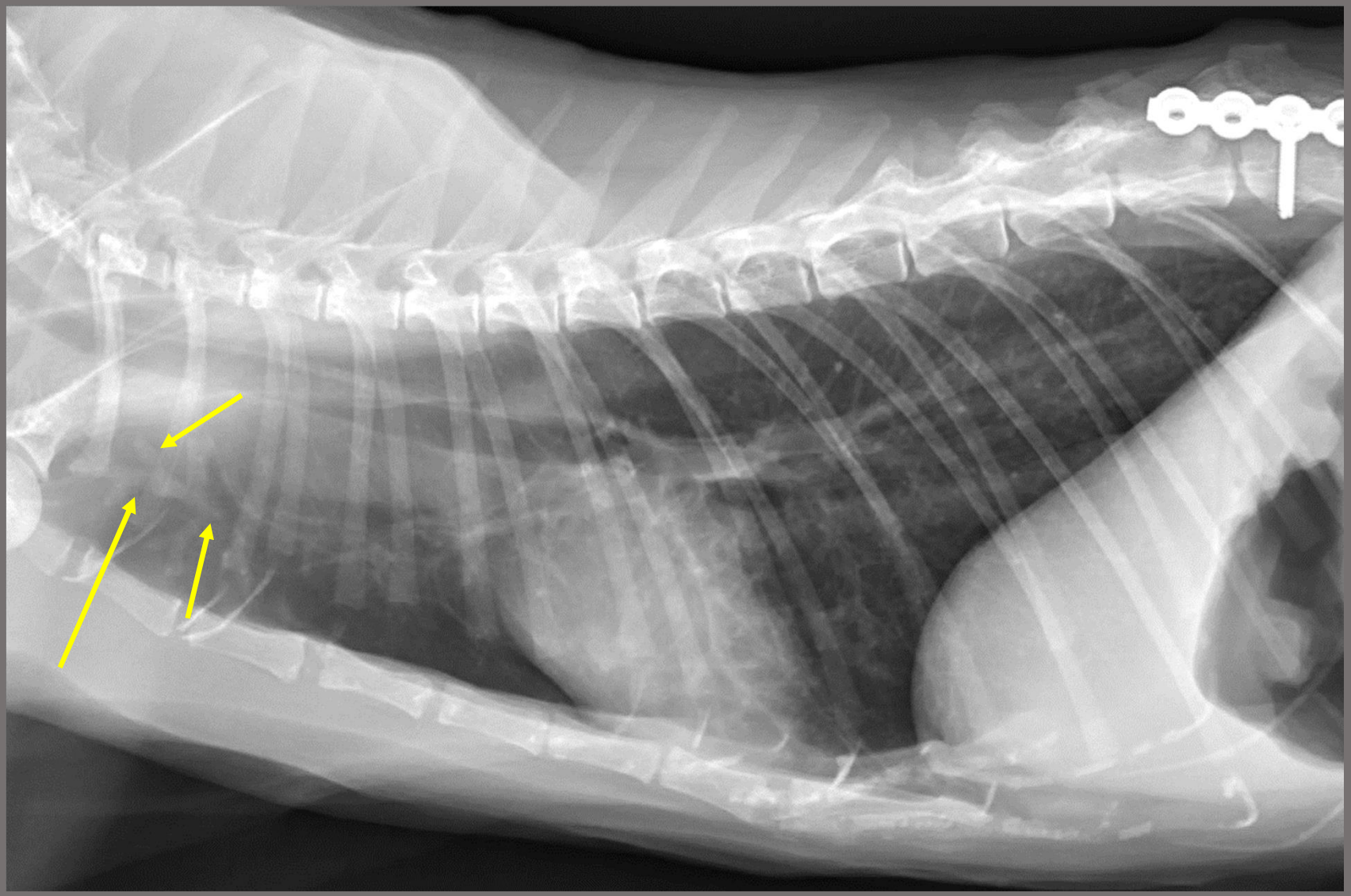


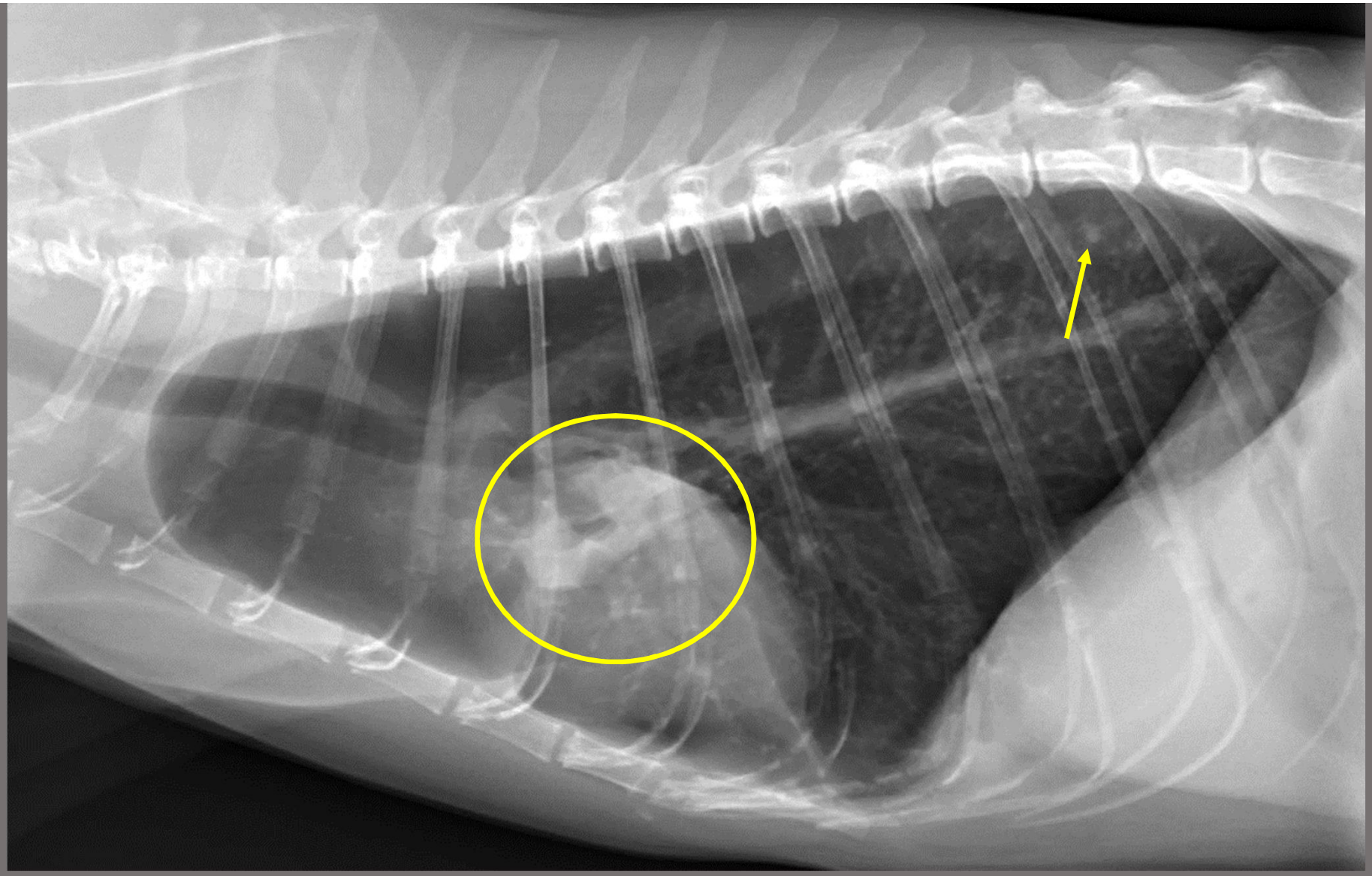
Tubular Lung Patterns

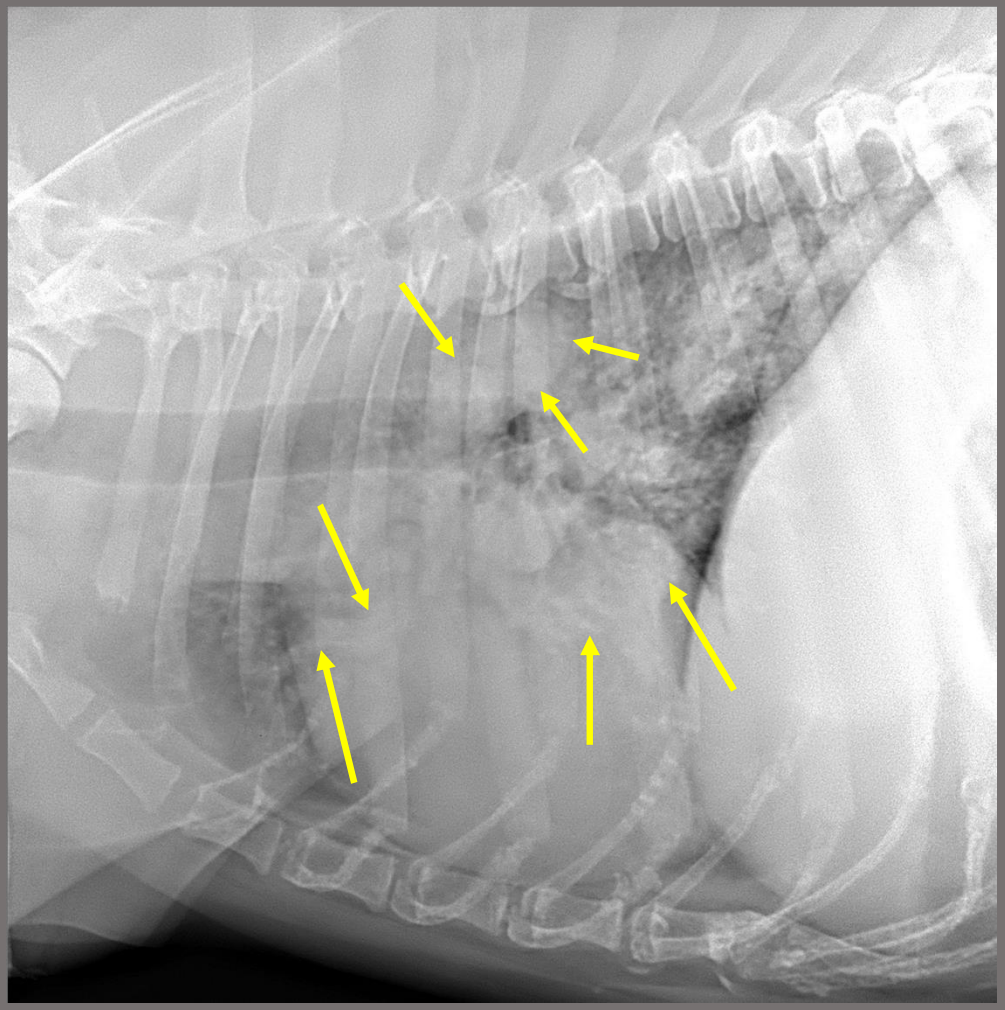
- Is the pattern actually blood vessels?
  - “Vascular” pattern
  - Heartworm
  - Pulmonary hypertension
  - Congenital heart disease with pulmonary overcirculation
    - Patent ductus arteriosus (PDA)
- Tree-in-bud/mucus plugs
  - Occasionally aspiration pneumonia

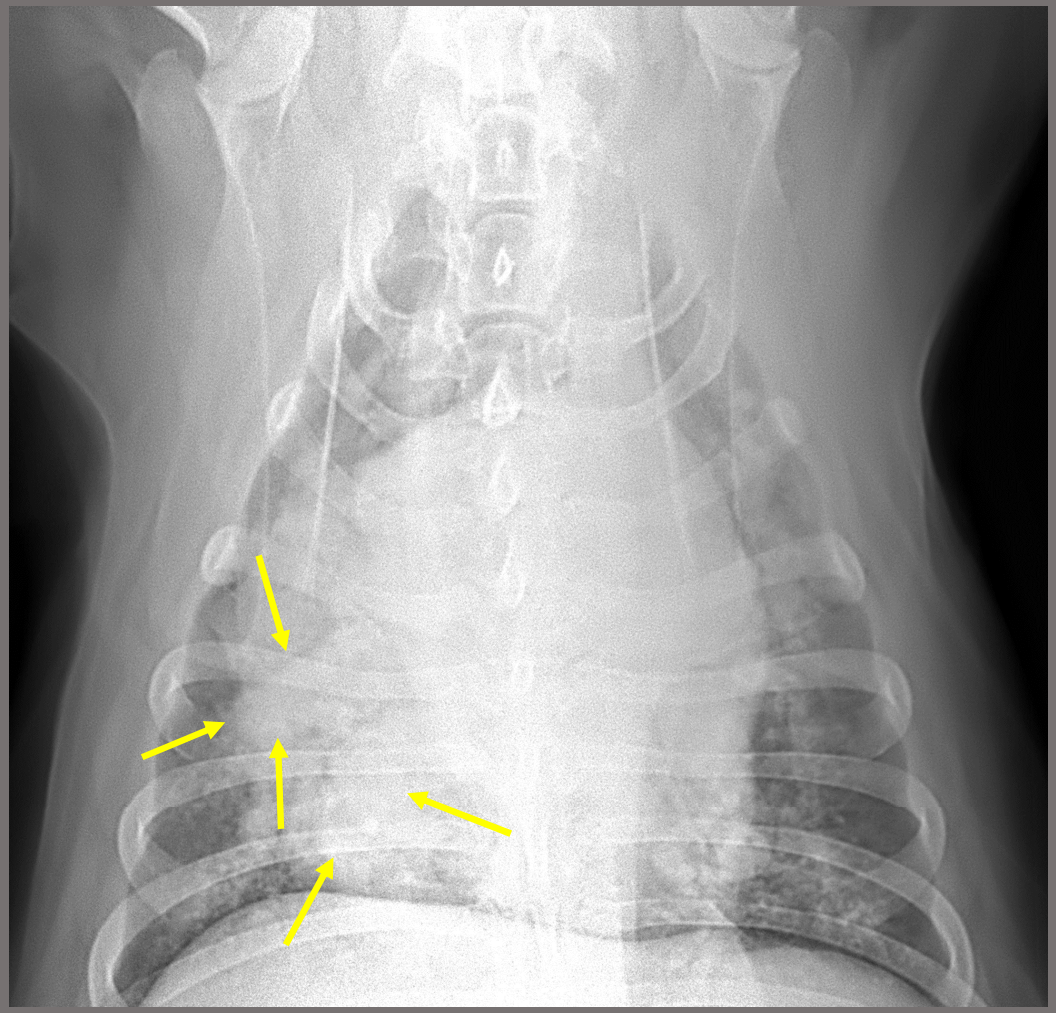
Tubular Lung Patterns









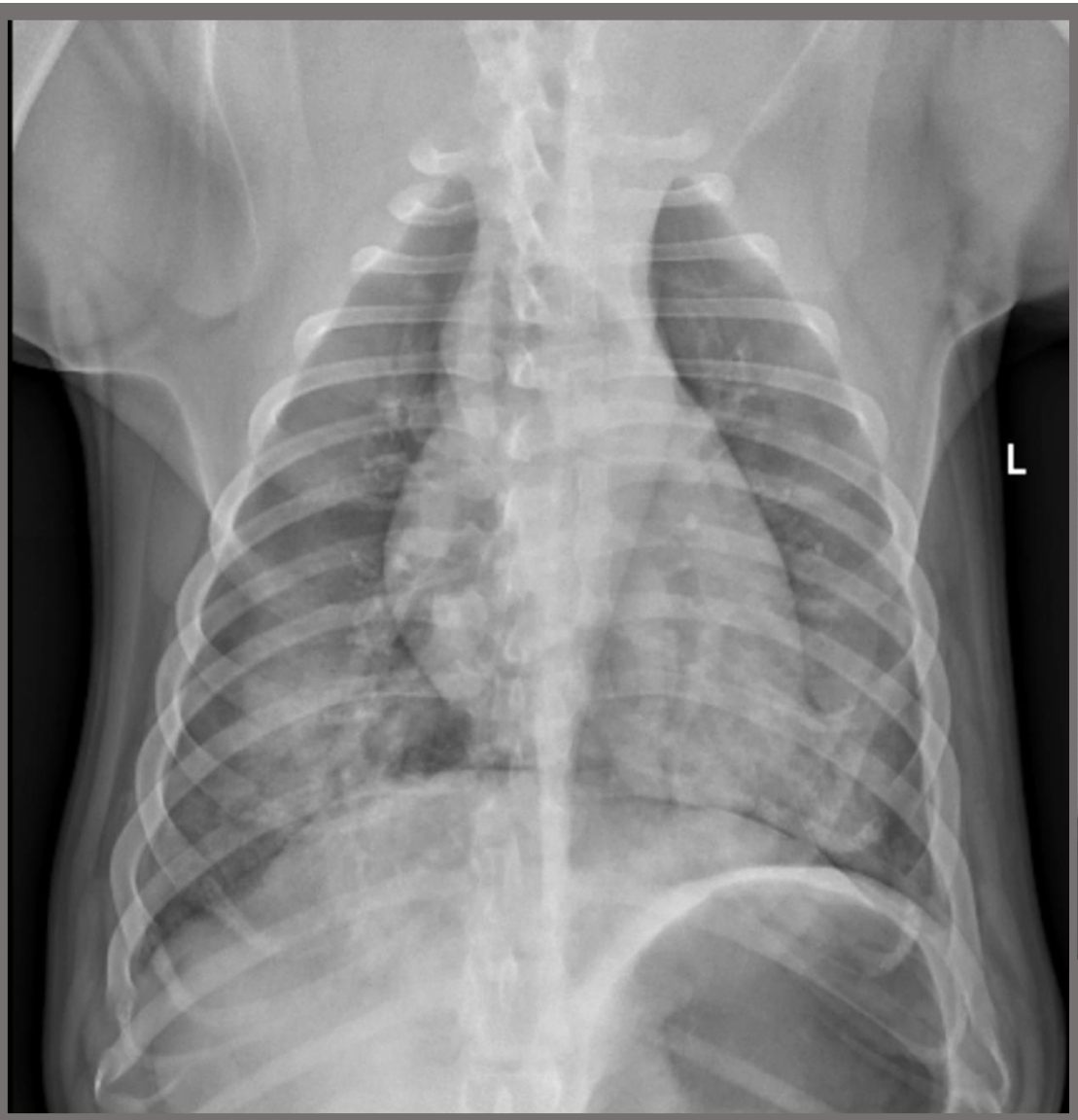


Step 4: What type of lung pattern is it?

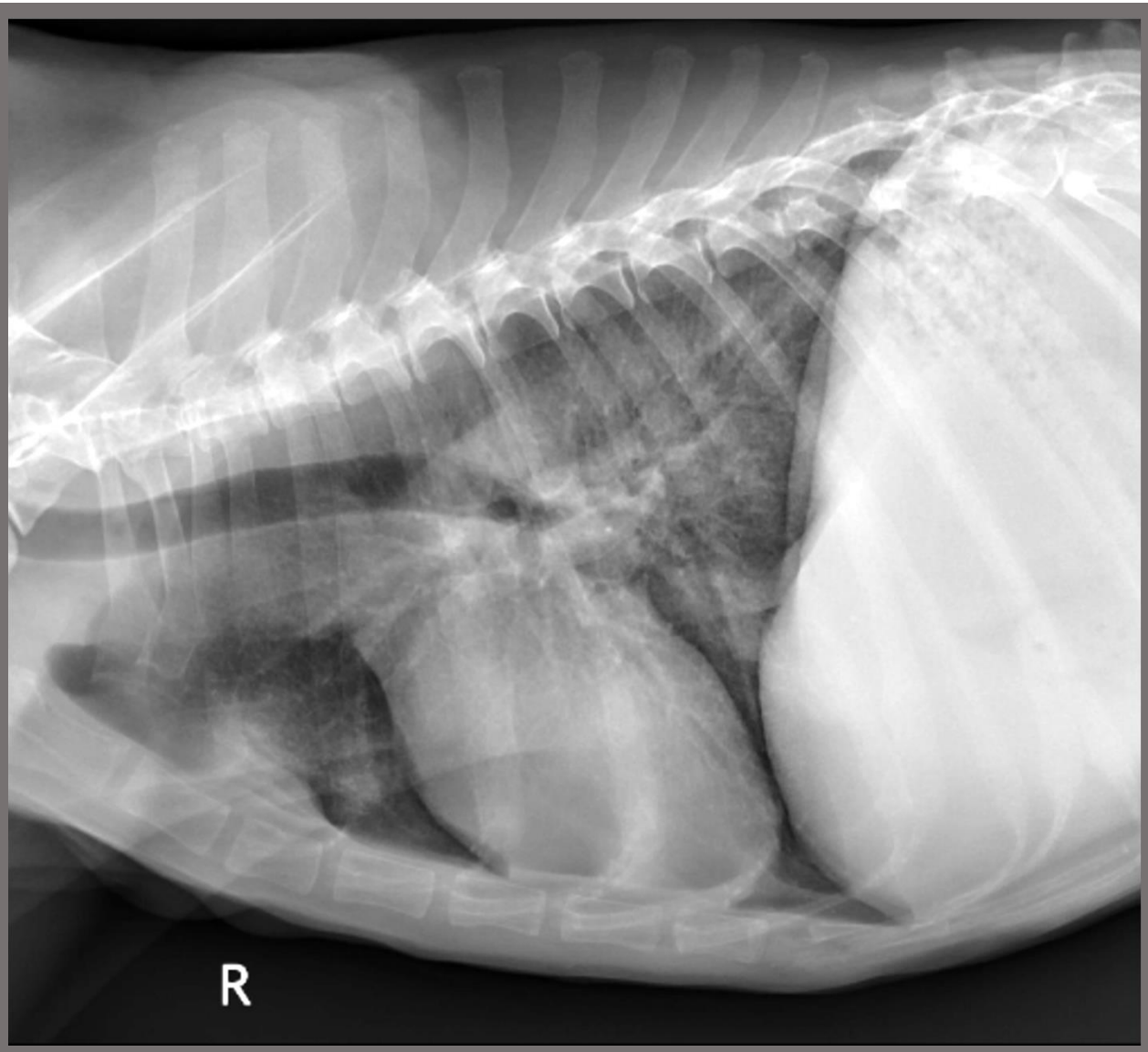
- What is the difference between an interstitial and an alveolar pattern????
- Ability to see pulmonary vasculature markings
  - Kind of visible? = Interstitial
  - Not even a little visible = alveolar
- Air bronchograms? = ALVEOLAR
- Nodules are technically alveolar
- Lines and rings? Donuts? = BRONCHIAL

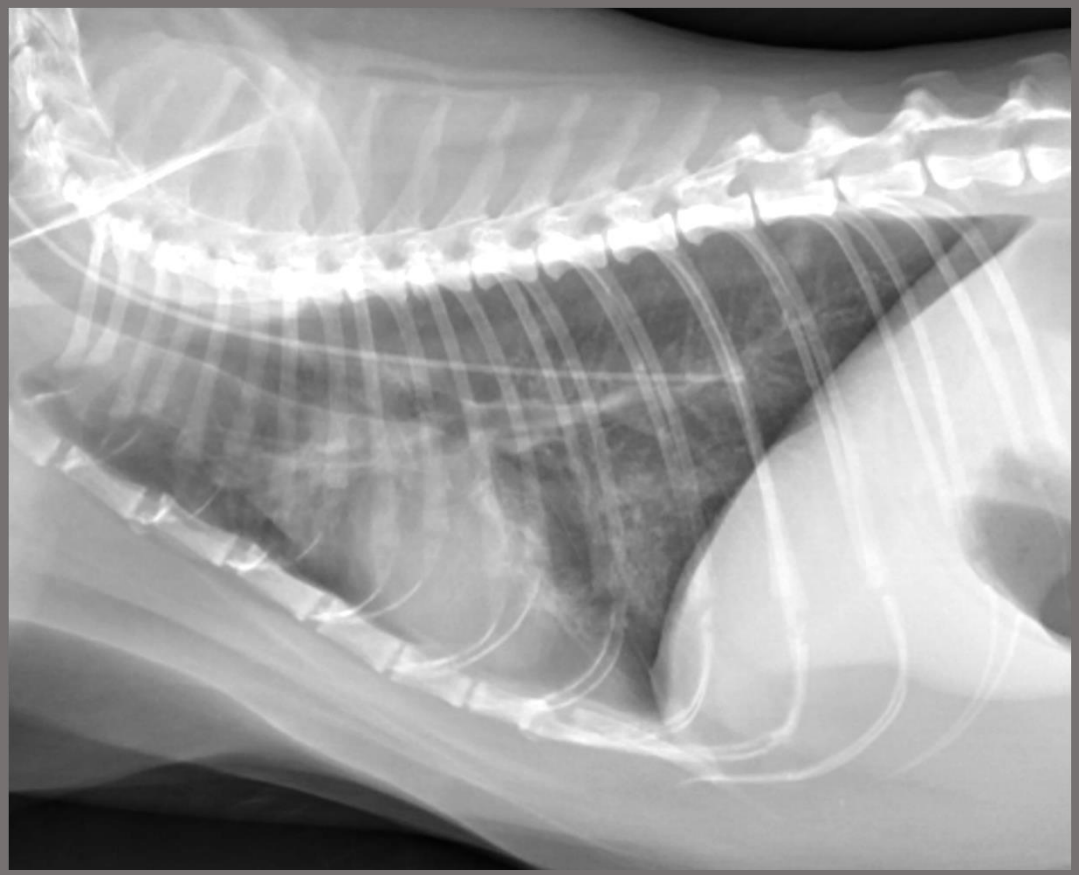
Interstitial to alveolar patterns…

- Think edemas
  - Cardiogenic
    - Ruptured chordae tendinae
  - Non-cardiogenic
    - Sildenafil-responsive
- Interstitial lung diseases
  - Pulmonary fibrosis in Westies
  - Tanovea-related fibrosis
- Every once and a while…
  - Lymphoma
- Unusual pneumonias
  - *Mycoplasma*
  - *Toxoplasma*
  - *Pneumocystis*
  - Lungworms
  - Is the patient immunocompromised?


L


R

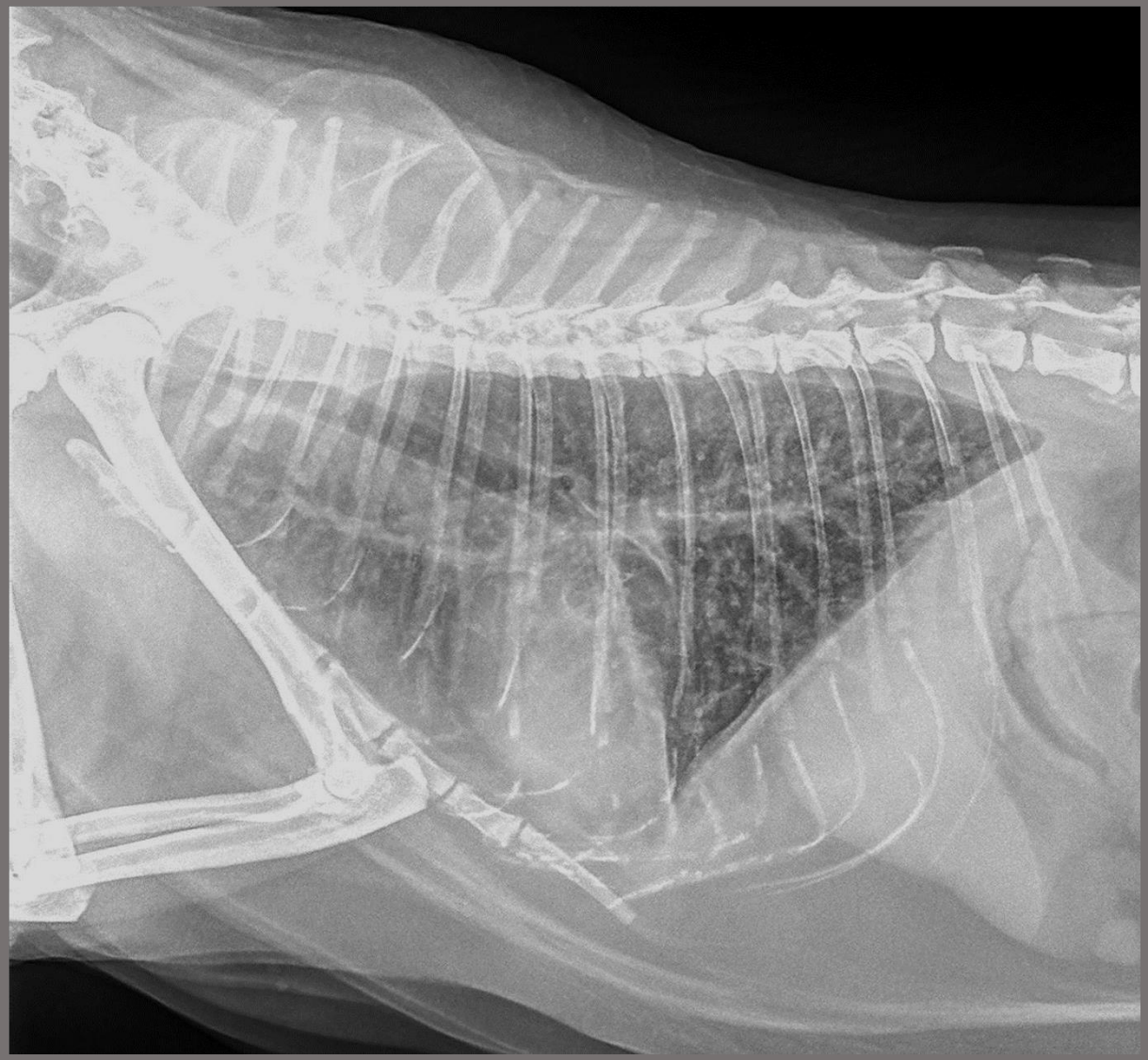

R

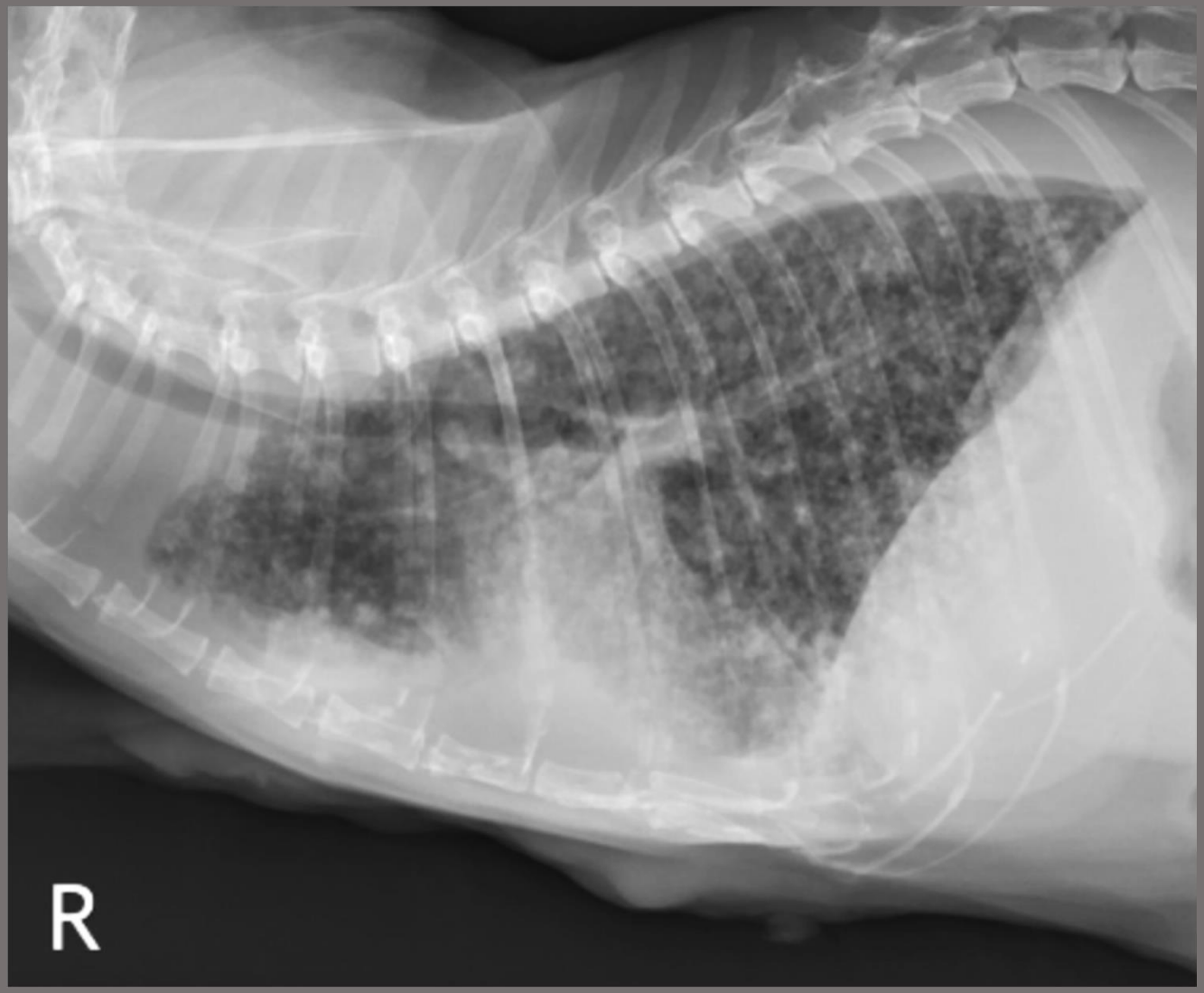


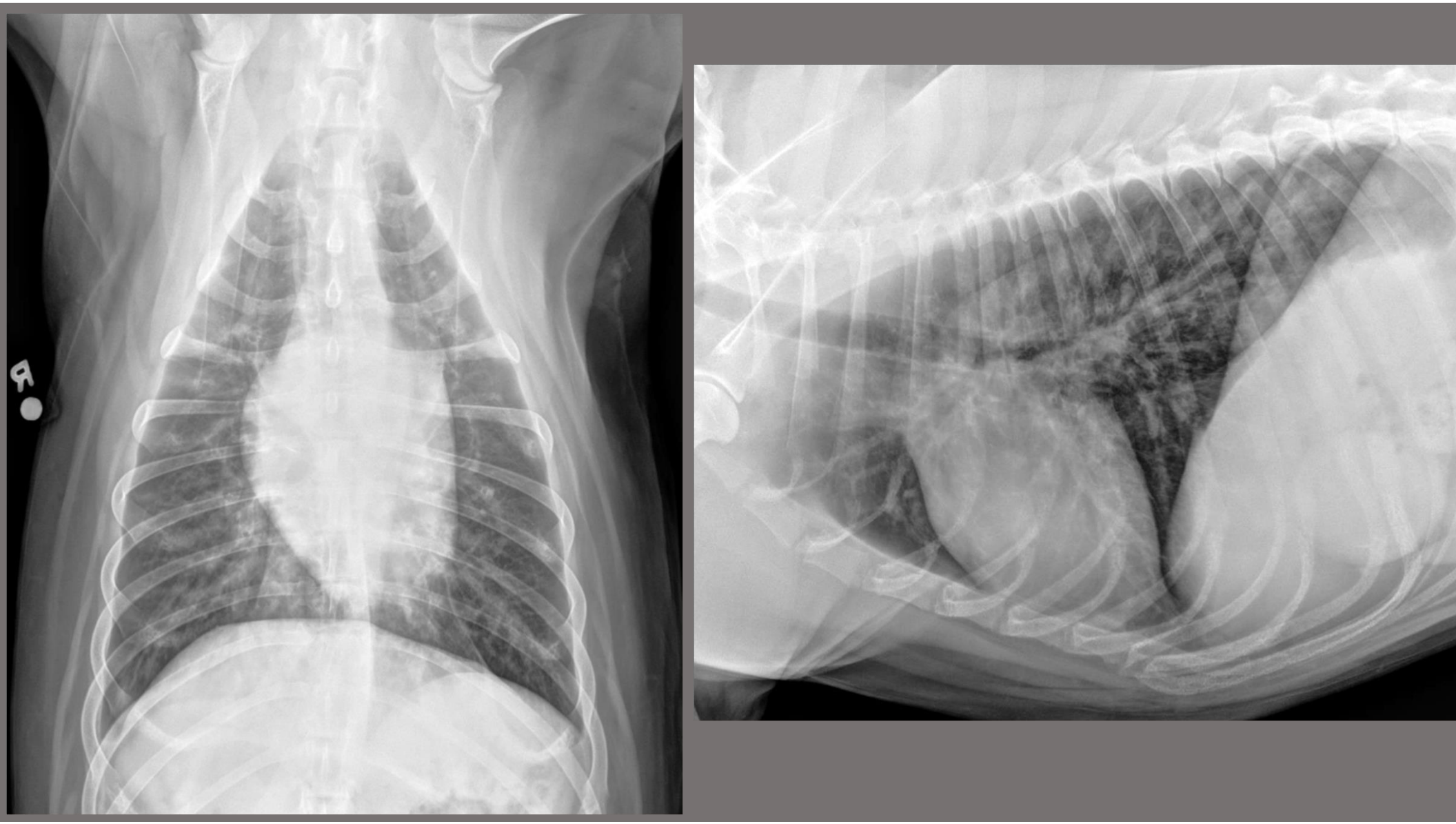

R

Bronchial patterns

- Normal
  - Chondrodystrophic/Bulldogs
  - Geriatric
  - Large/giant breed dog
  - NYC dogs?
- Chronic bronchitis (dog)
- Feline asthma (cat)
- Eosinophilic bronchopneumopathy
- Infectious bronchitis
  - Lungworms
  - Bacterial bronchitis
  - Viral bronchitis
- Bronchogenic spread of carcinomas
  - Primary pulmonary
  - Mammary (cats)




R


R

Practice narrowing down your differentials…

- History is SO IMPORTANT
  - Duration and onset of signs
  - Severity of signs
  - Other comorbidities
  - Travel history
- Signalment is IMPORTANT
  - Bronchial patterns in young vs. older cats
  - Breed predispositions
- Have you tried any therapy yet?
  - Is it on any other medications?
- Species is important!
  - Cats… do they really get aspiration pneumonia?
  - Differences in congestive heart failure

All of this is information appreciated by your in-house or teleradiologist!!

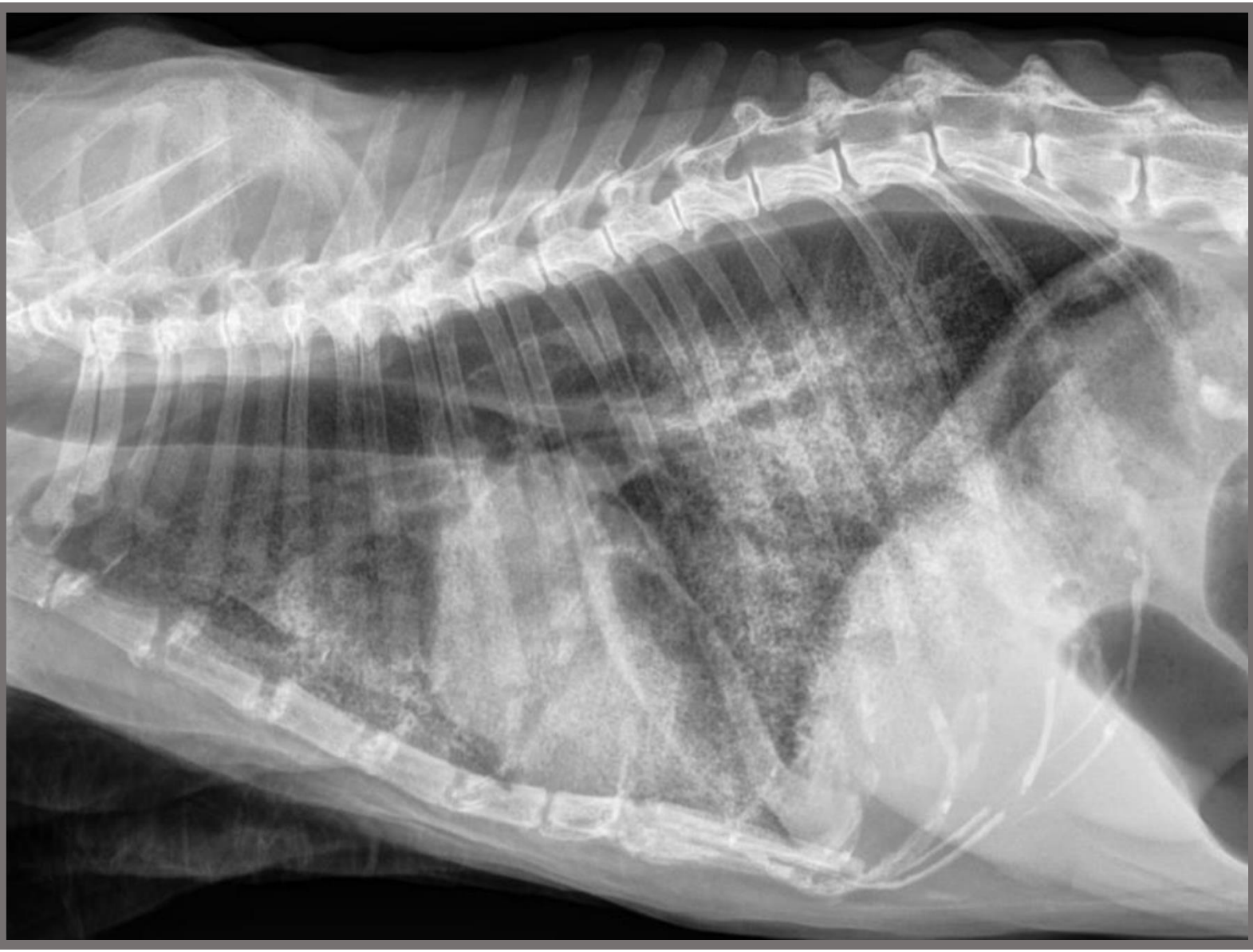
Is there a lung pattern AND pleural effusion?

Dogs

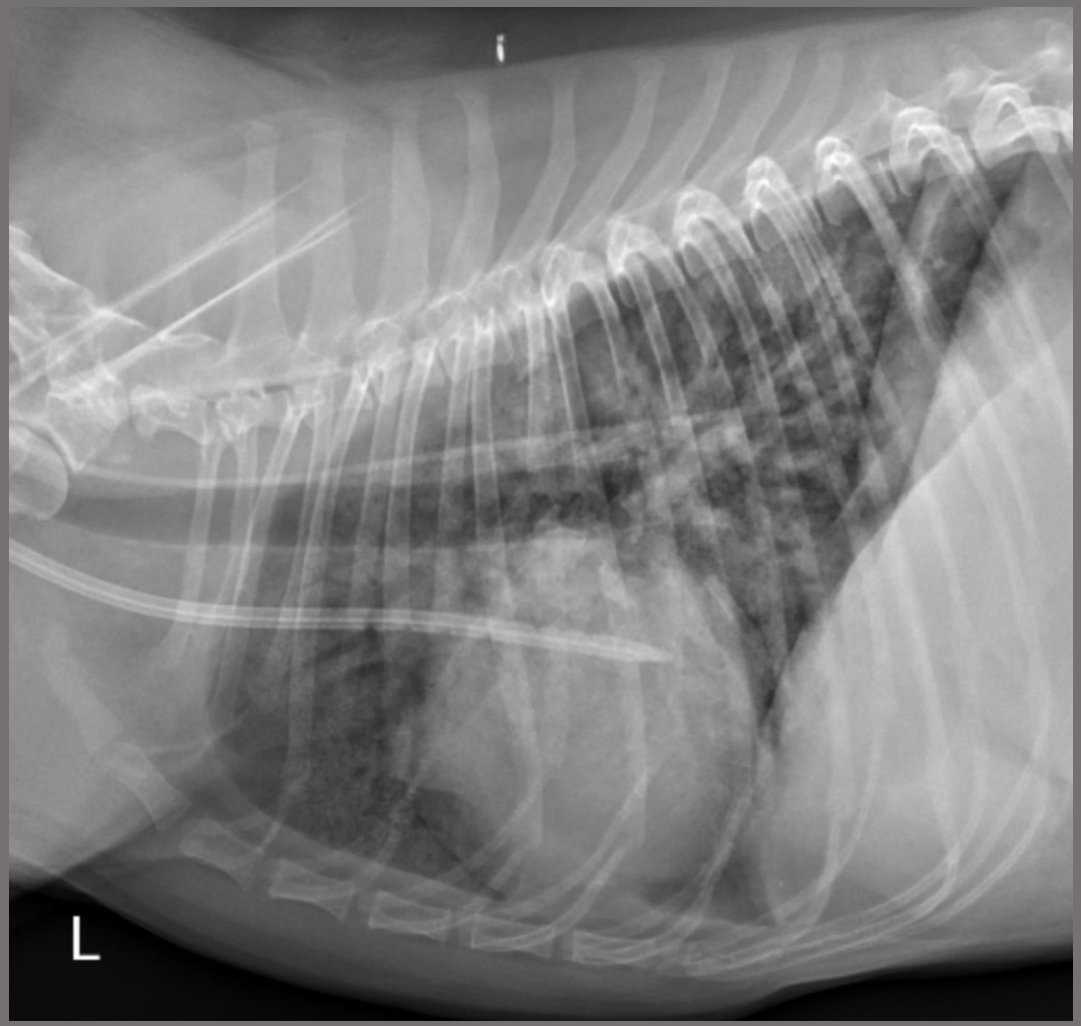
- **Lung lobe torsions**
  - Right middle
  - Left cranial
  - Breed predispositions
- Cancer
- **CHF (only biventricular)**
- Trauma
- Infections (heartworm)
- DIC, ARDS

Cats

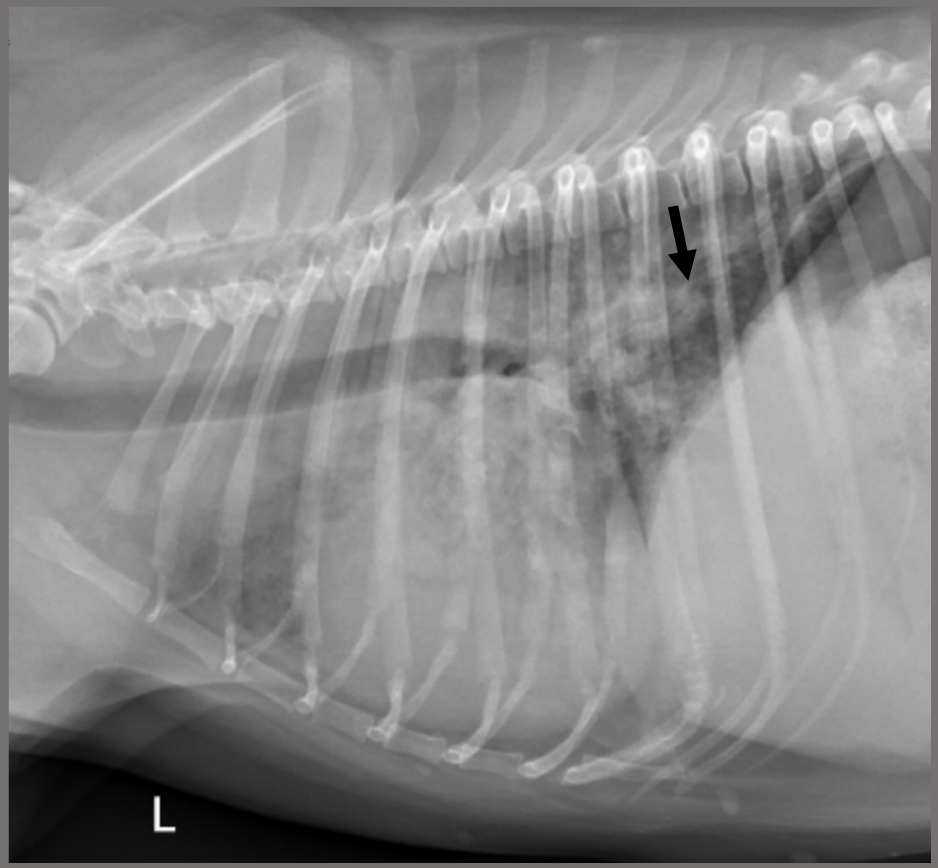
- **Left-sided CHF**
- Cancer
- **FIP**
- Trauma
- Weird infections
- ARDS

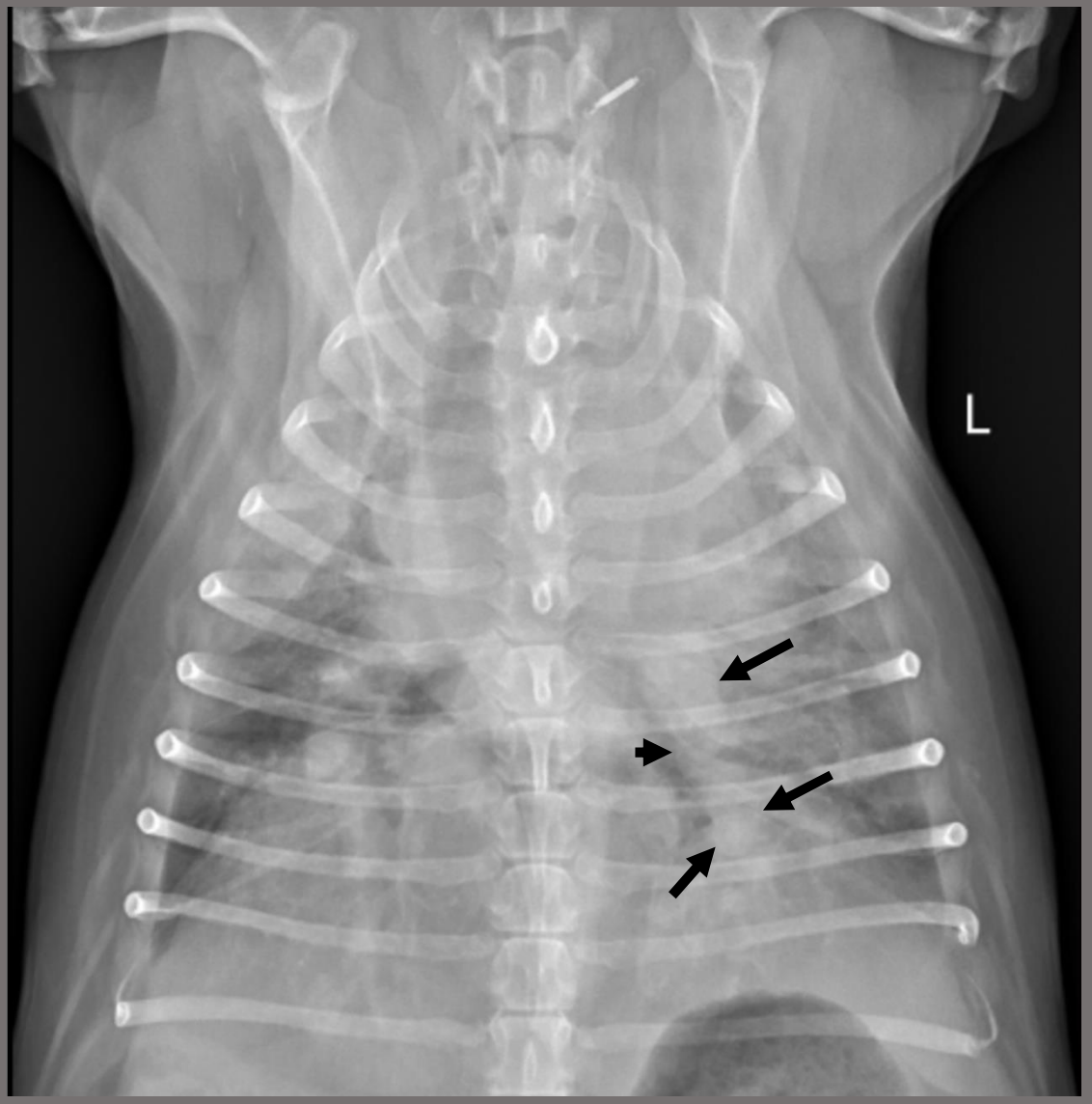



R


L


L


L


L

Questions?