



Cardiology made easy

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questions

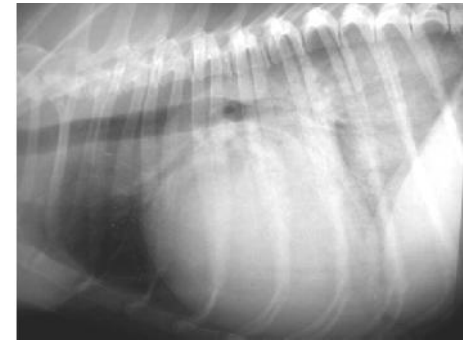
- Does a patient have heart disease?
- What kind of heart disease does it have?
- What is the severity?





definitions

- Heart disease
 - Every cardiac abnormality
- Heart failure
 - Result of heart disease
 - Symptomatic syndrom
 - Can be asymptomatic with treatment
 - „congestive heart failure“
 - Edema or effusion





How to diagnose heart disease?

- Depends on the disease 😊
- But in general:

Auscultation is a very good screening
tool



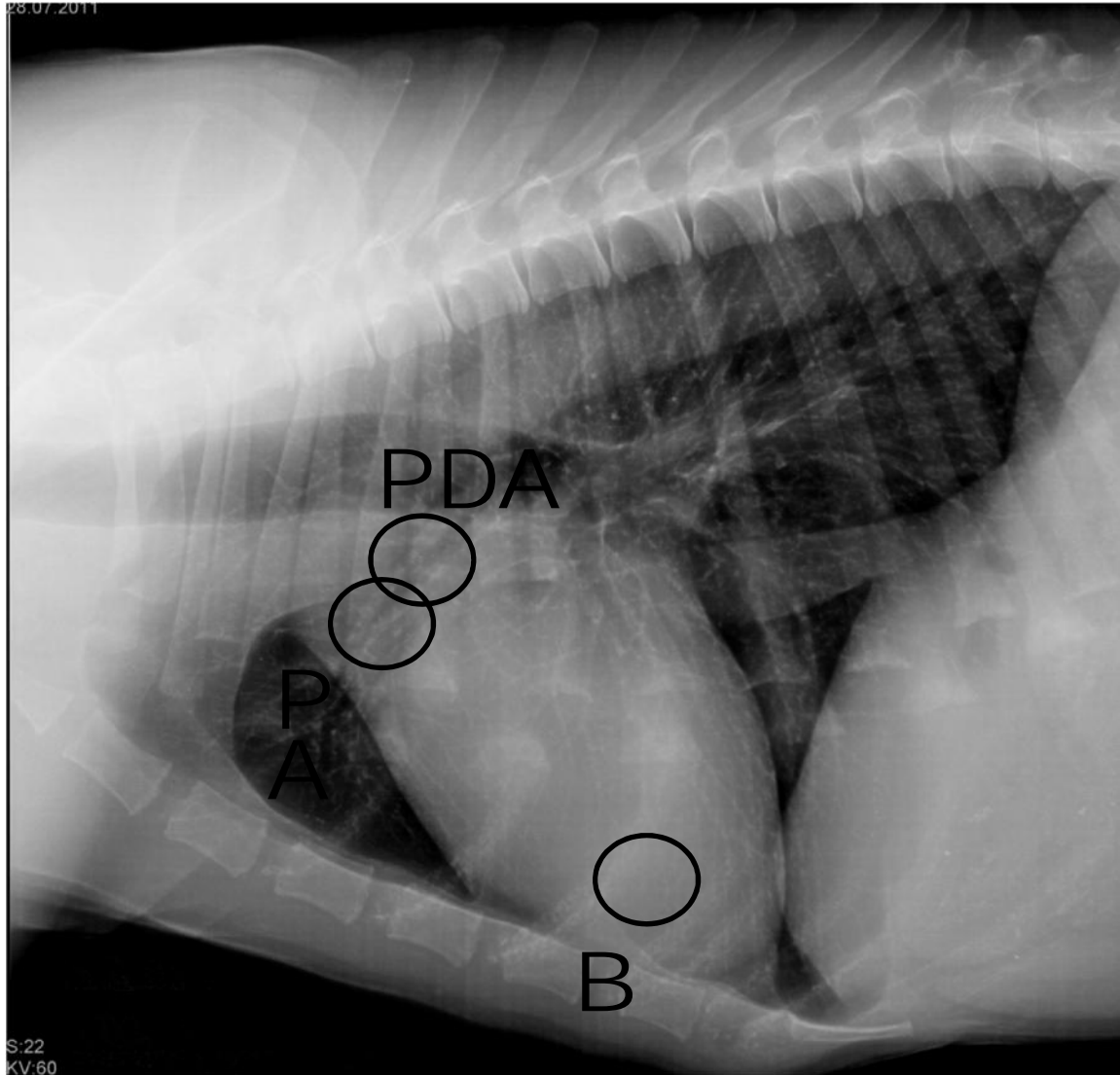
How to diagnose heart disease?

	MVD	DCM	HCM	PDA/SAS/ PS	ASD
Echo	+++	+++	+++	+++	+++
Auscultation	+++	+	+	+++	-
X-rays	++	+	+	+	-
ECG	-	+	-	-	-



Heart murmur

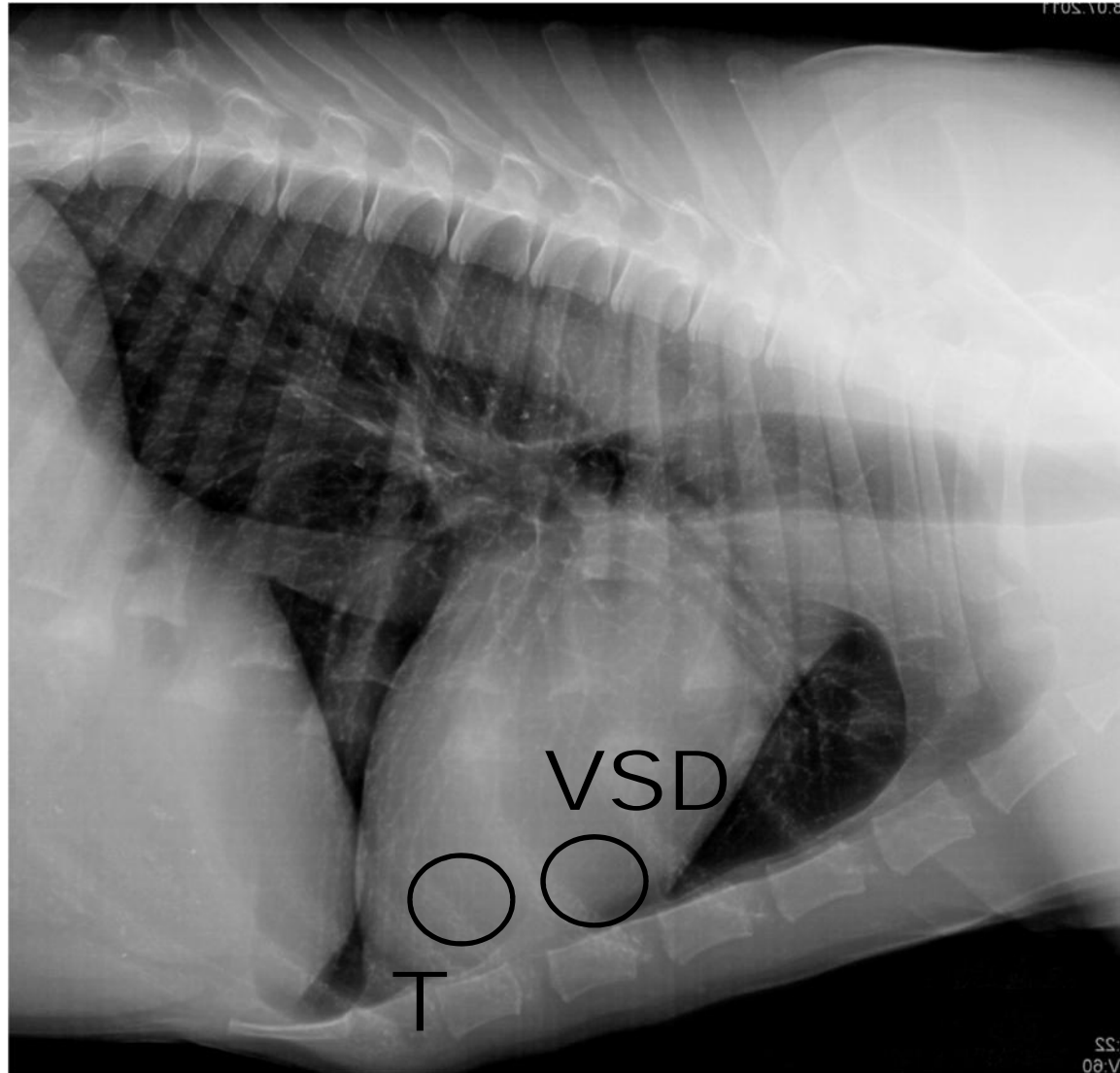
Localisation left side





Heart murmur

Localisation right side



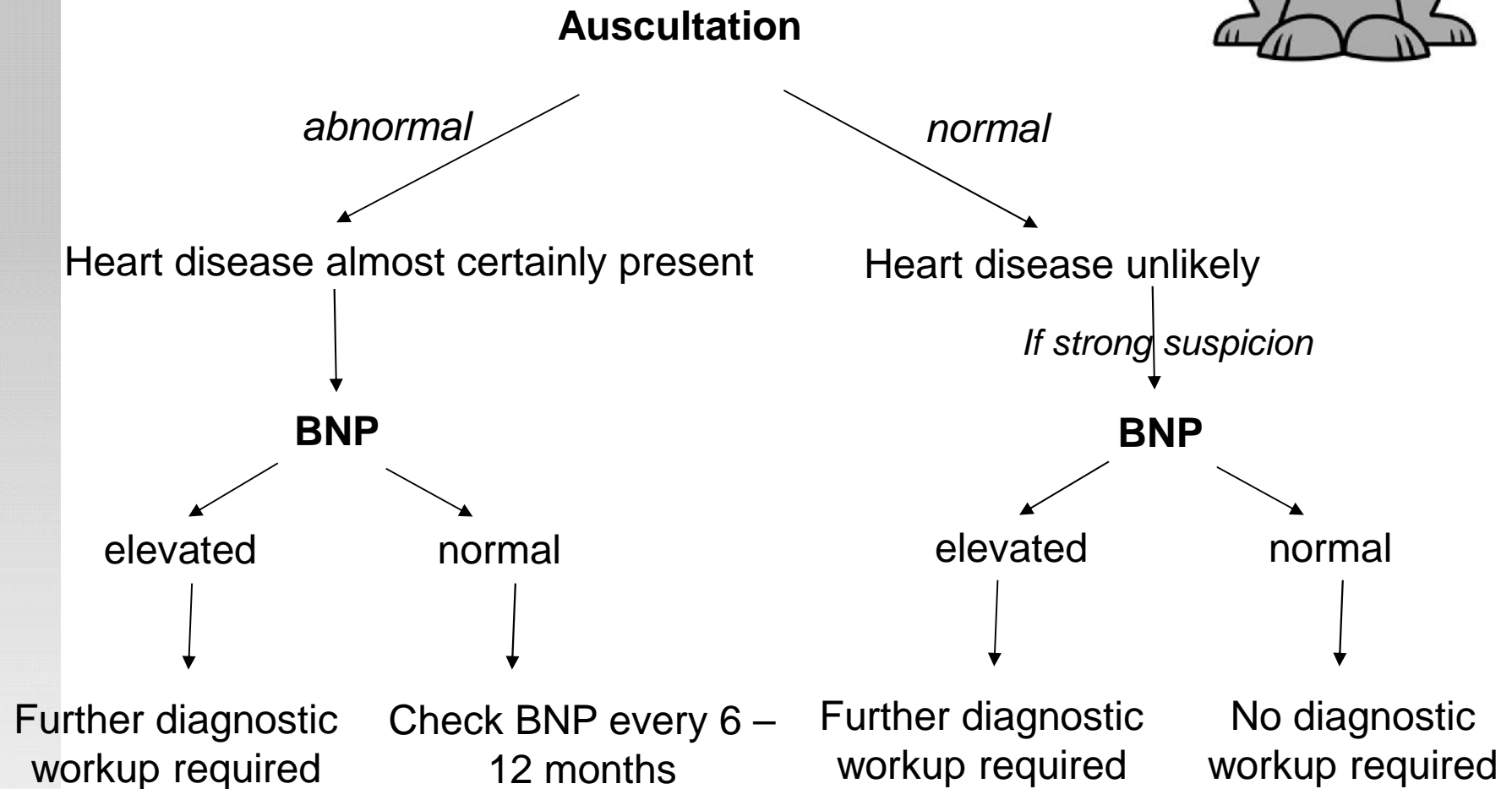


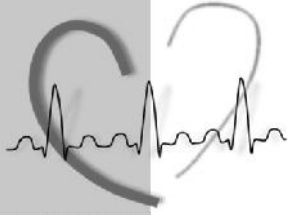
Auscultation

- Does correlate with the amount of shunting blood
- Does not really correlate with disease severity
=> X-Rays or Echo



Workup dog





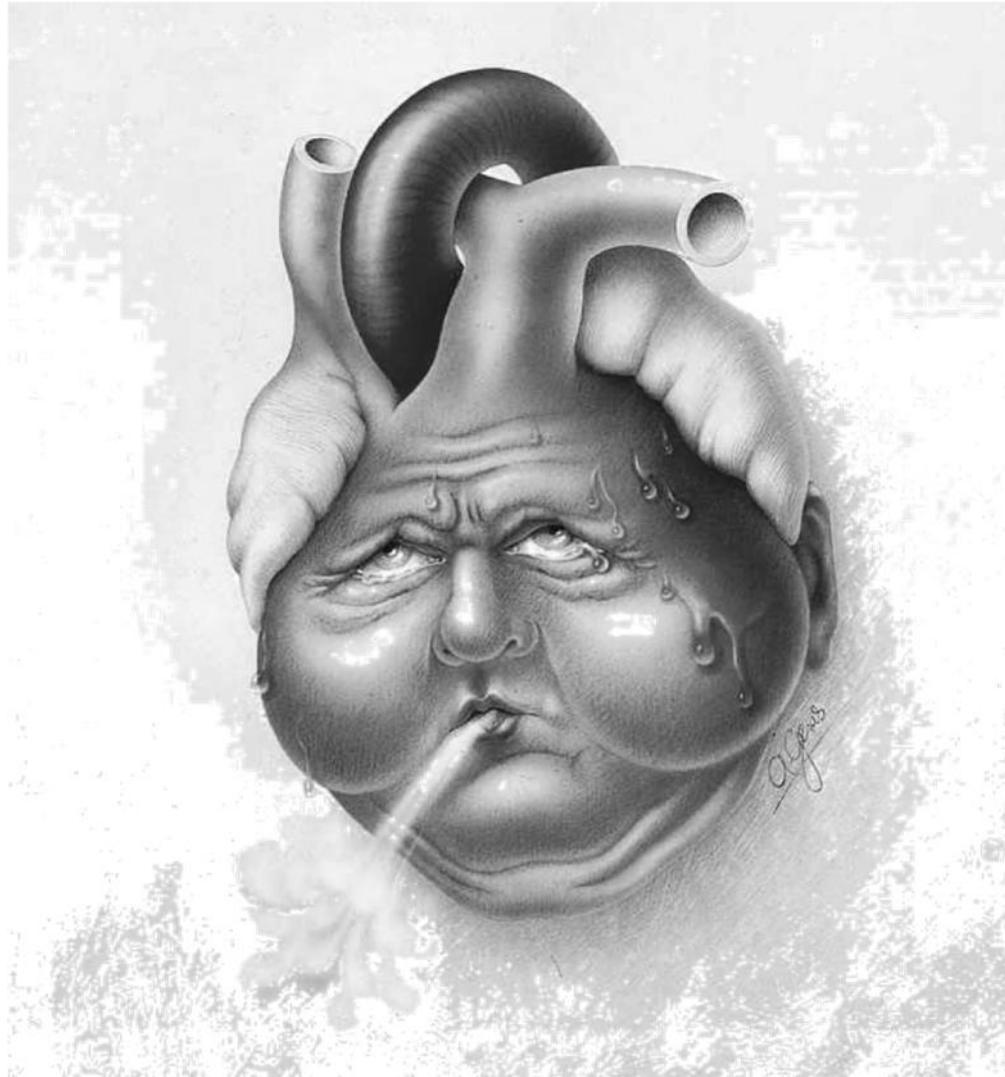
Workup cat



- A heart murmur does not tell you the cat has heart disease
- BNP
- Echocardiography



How to diagnose heart failure?



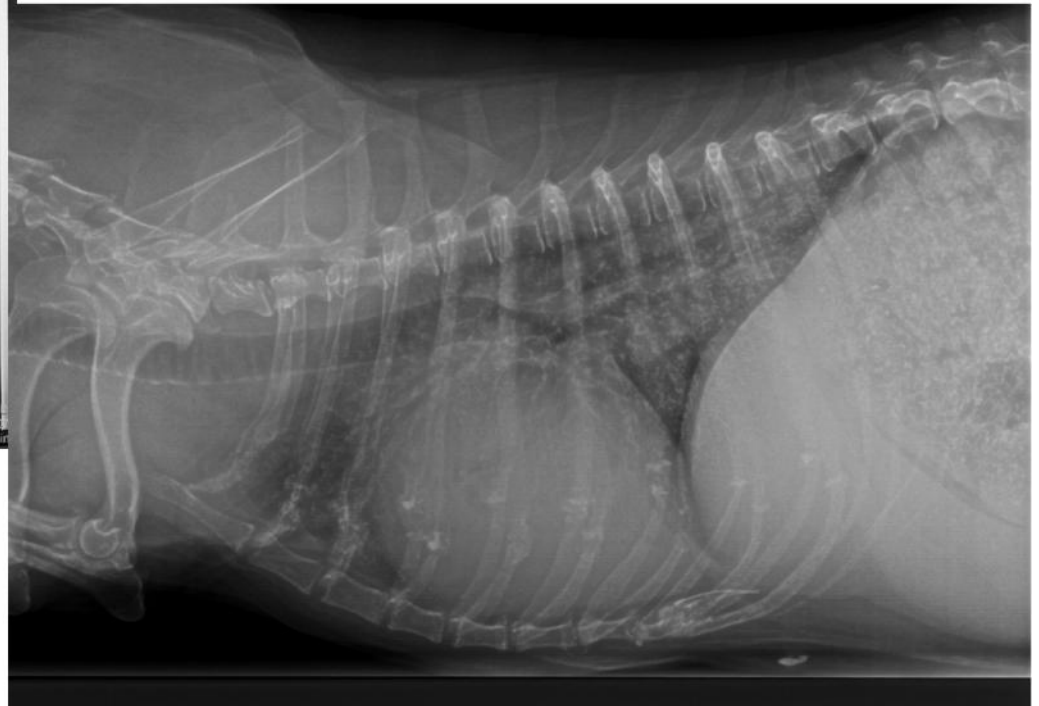
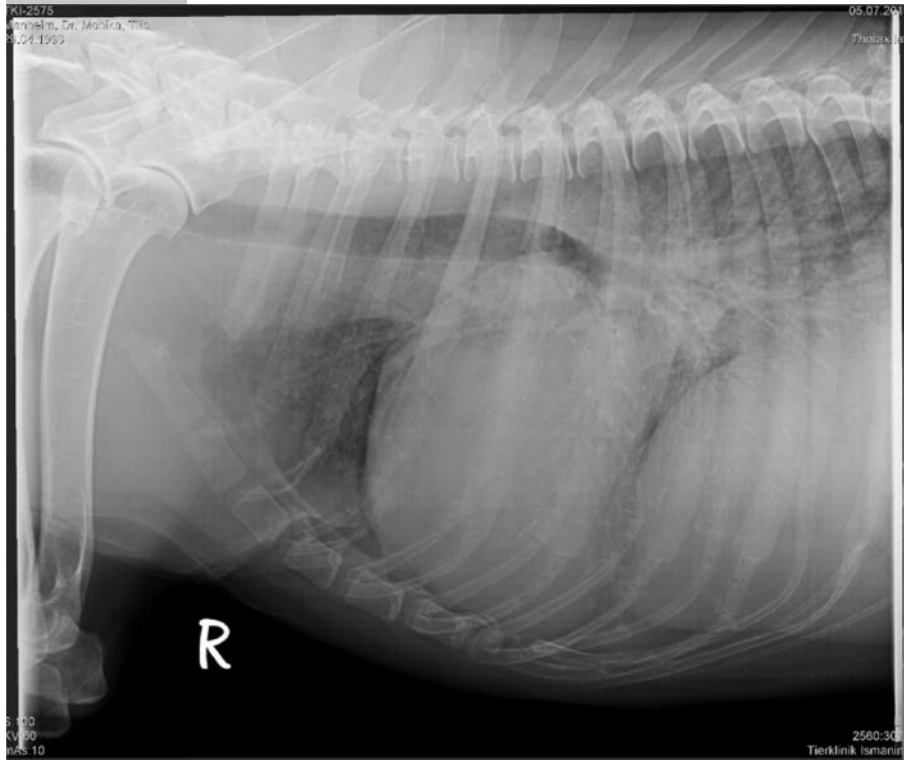


Heart disease or not?



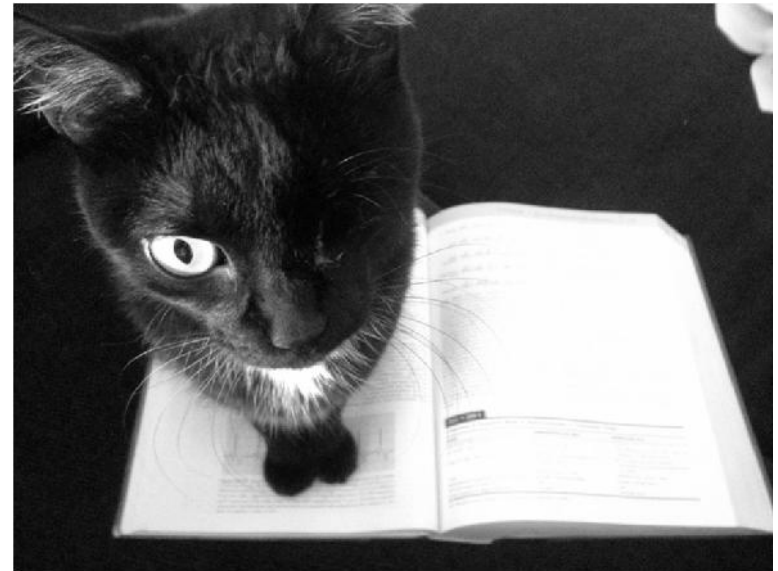


Heart disease or not?





„Radiography can be a liar“





**X-rays prove the existence of
pulmonary edema
but be careful not to overinterpret!**



How to diagnose heart failure

By means of:

Clinical symptoms

Clinical examination

Imaging

Xrays

Echo

Biomarkers



Heart disease

Clinical course:

Insult



Preclinical or occult Phase



Symptomatic or overt heart failure



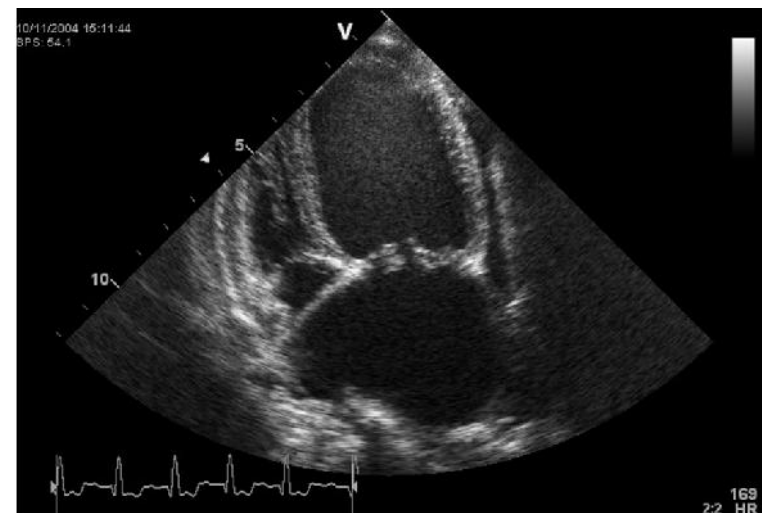
Which symptoms do typically occur in heart failure?

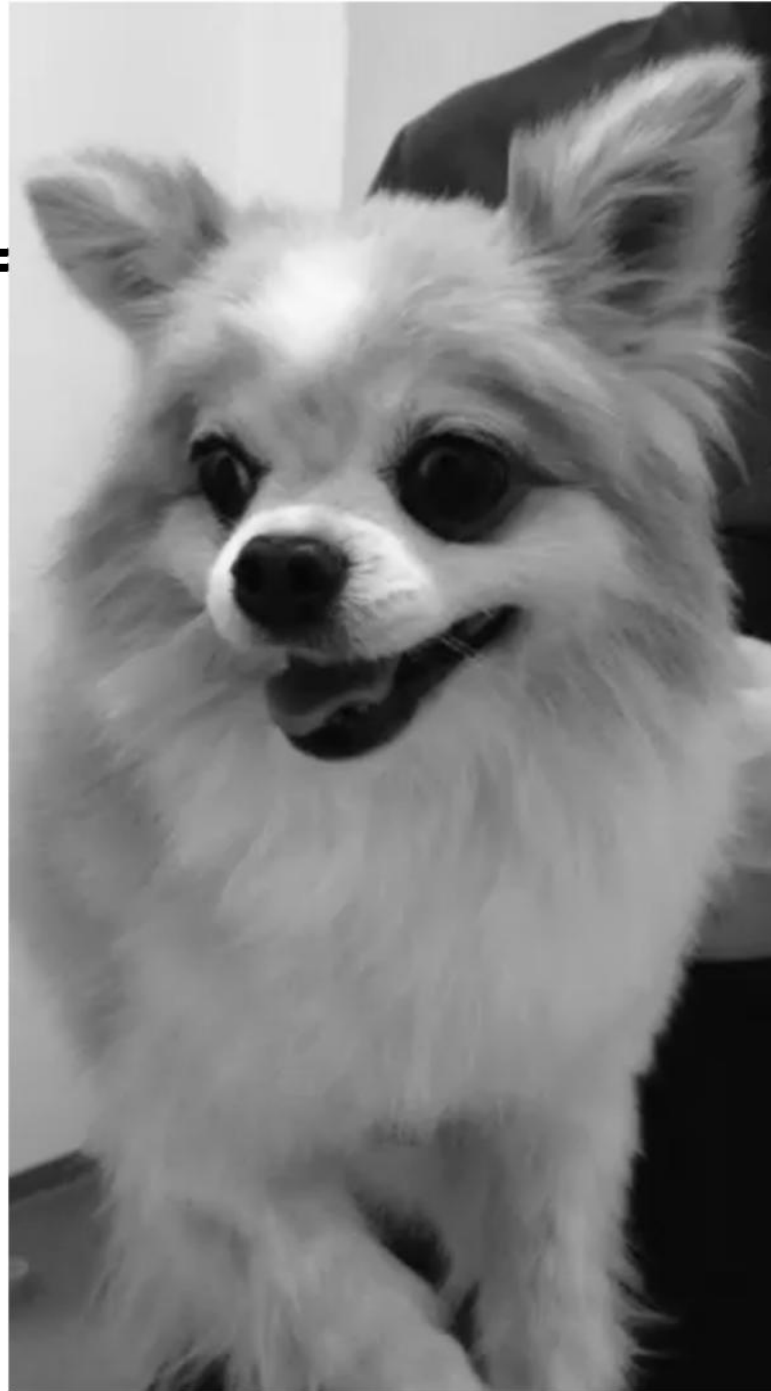
How to diagnose heart failure?

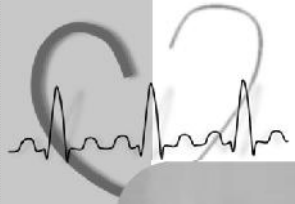


Clinical signs

- **Respiratory signs**
 - Cough (not in cats). Polypnea/Dyspnea
- Exercise intolerance ← *Late stage*
- ~~Blue tongue~~ →
- Syncope
- With right heart failure
 - Ascites
 - Thoracic effusion
- Cachexia/anorexia (esp. cats)







Expiratory vs inspiratory





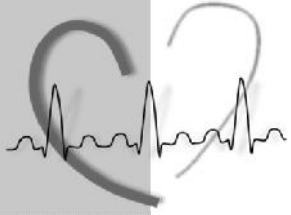
Anamnesis

- Paroxysmal respiratory symptoms
 - Come and go without treatment
 - Not cardio-related
- Dyspnea due to heart failure:
 - Expiratory
 - Sometimes mixed
 - Inspiratory dyspnea => upper airway



Anamnesis

- The longer the symptoms exist the less likely it is the heart
- Coughing for more than a couple of months excludes heart disease



Clinical Examination

Auscultation: heart

- Abnormality present: yes/no
- Heart frequency:
 - Dog: normal HF excludes heart failure
 - Sinusarrhythmie: positive sign!

Dogs are very rarely in heart failure without an auscultatory abnormality!



Clinical Examination

Auscultation: lungs

- Abnormalities can be present but don't have to
- Crackles: much more common in pulmonary parenchymal disease

Never diagnose pulmonary edema based only on auscultation!

You need X-rays.



Clinical examination

- Thoracic effusion
 - Dog: right heart failure
 - modified transsudat
 - Cat: left and/or right heart failure
 - modified transsudat
 - Chylus

Dogs with thoracic effusion but without ascites don't have reason for the effusion!

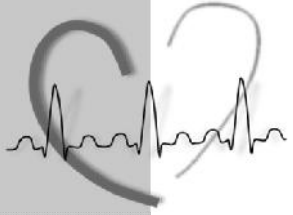


Clinical examination

Clinical examination

- Prominent jugular veins
 - Suggestive of right heart failure

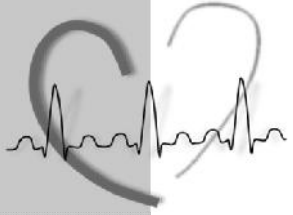




Clinical examination

Clinical examination

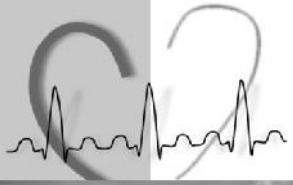
- Body temperature
 - Hyperthermia
 - Virtually excludes heart failure
 - Hypothermia
 - Might be due to underperfusion



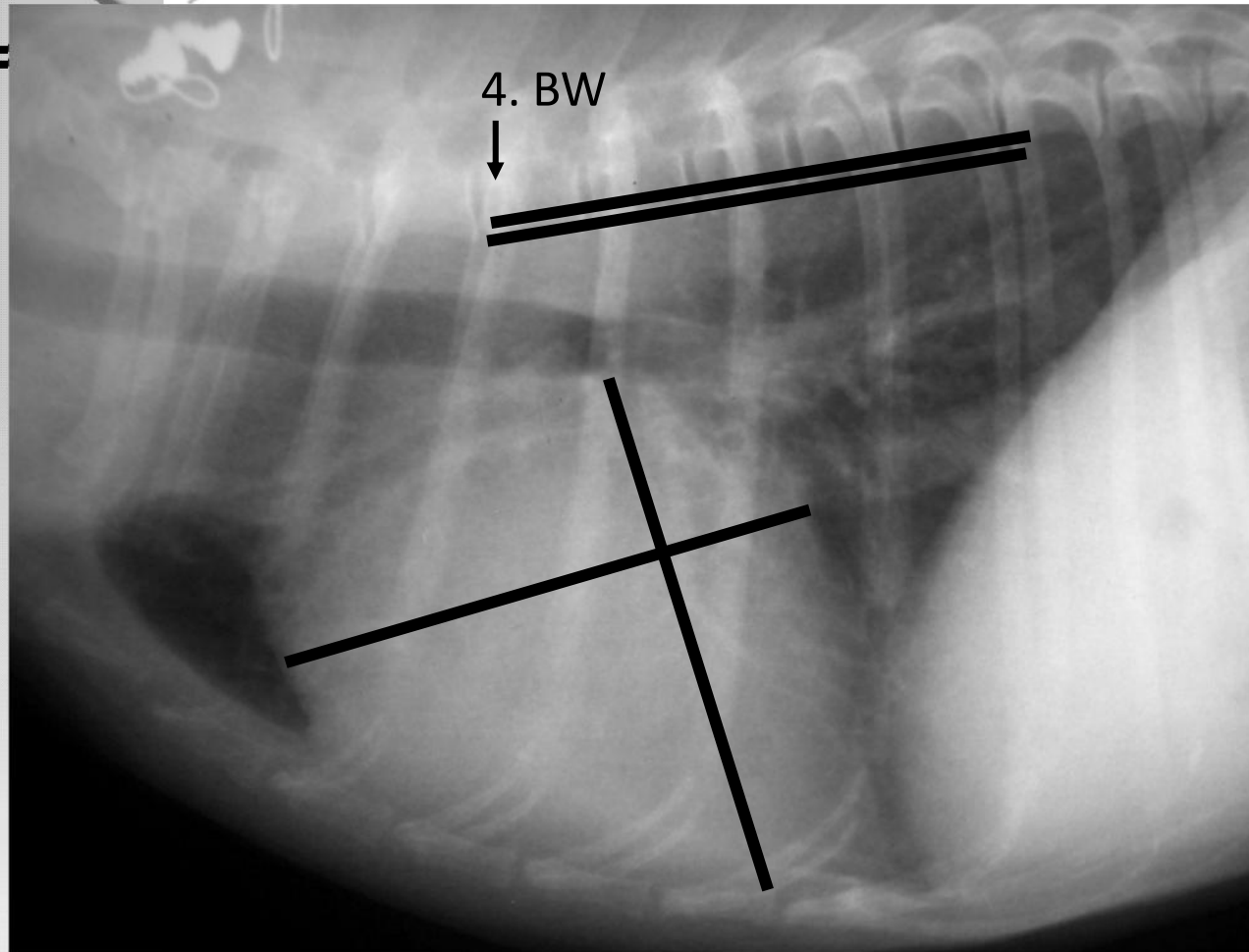
VHS

Radiography

Pulmonary edema



Vertebral Heart Score



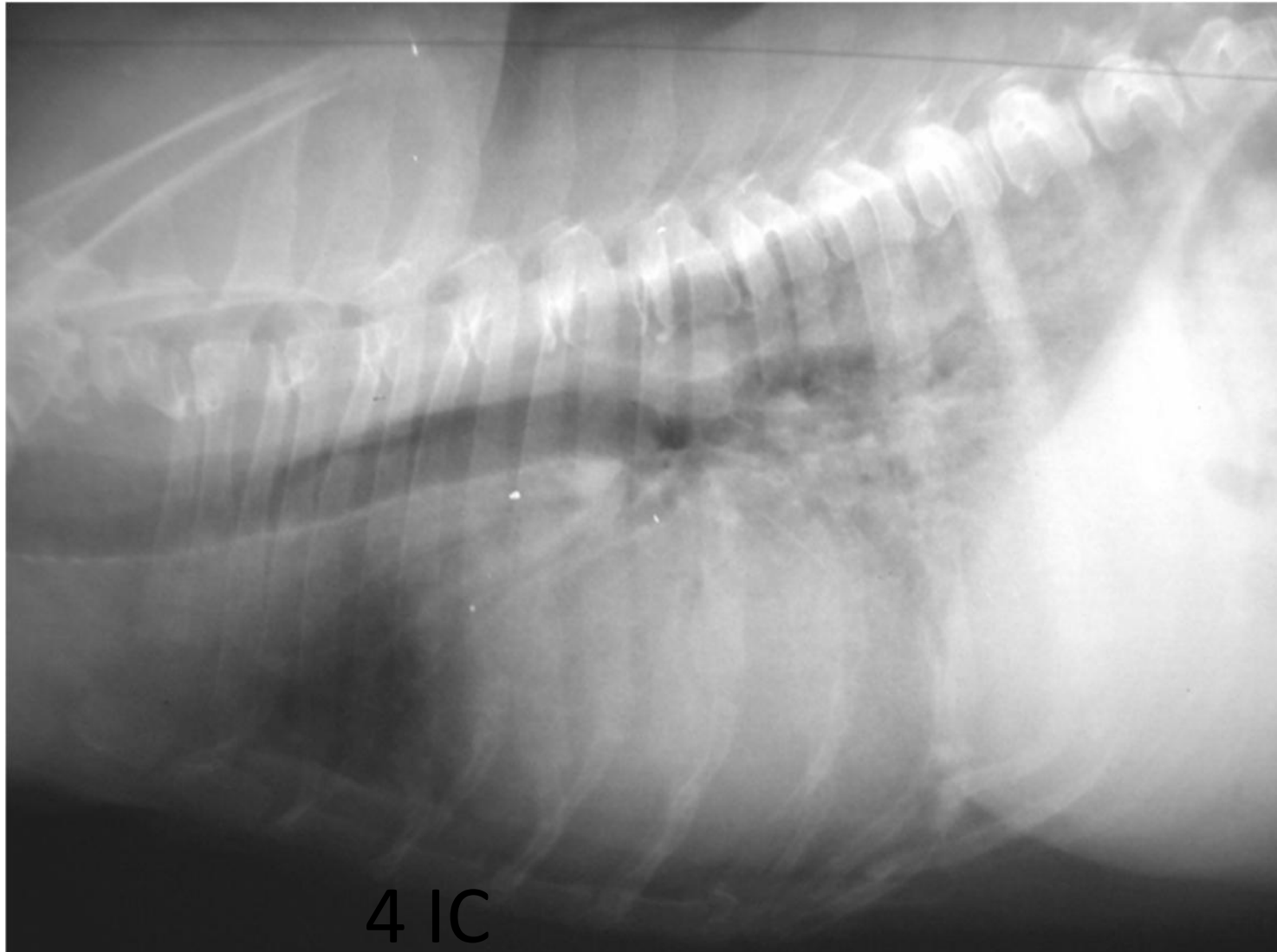
Norm:

- dog ≤ 11.0 (grey zone 10.5 – 11.0)
- cat ≤ 8.2

$$\text{VHS} = 5.1 + 5.2 = 10.3$$



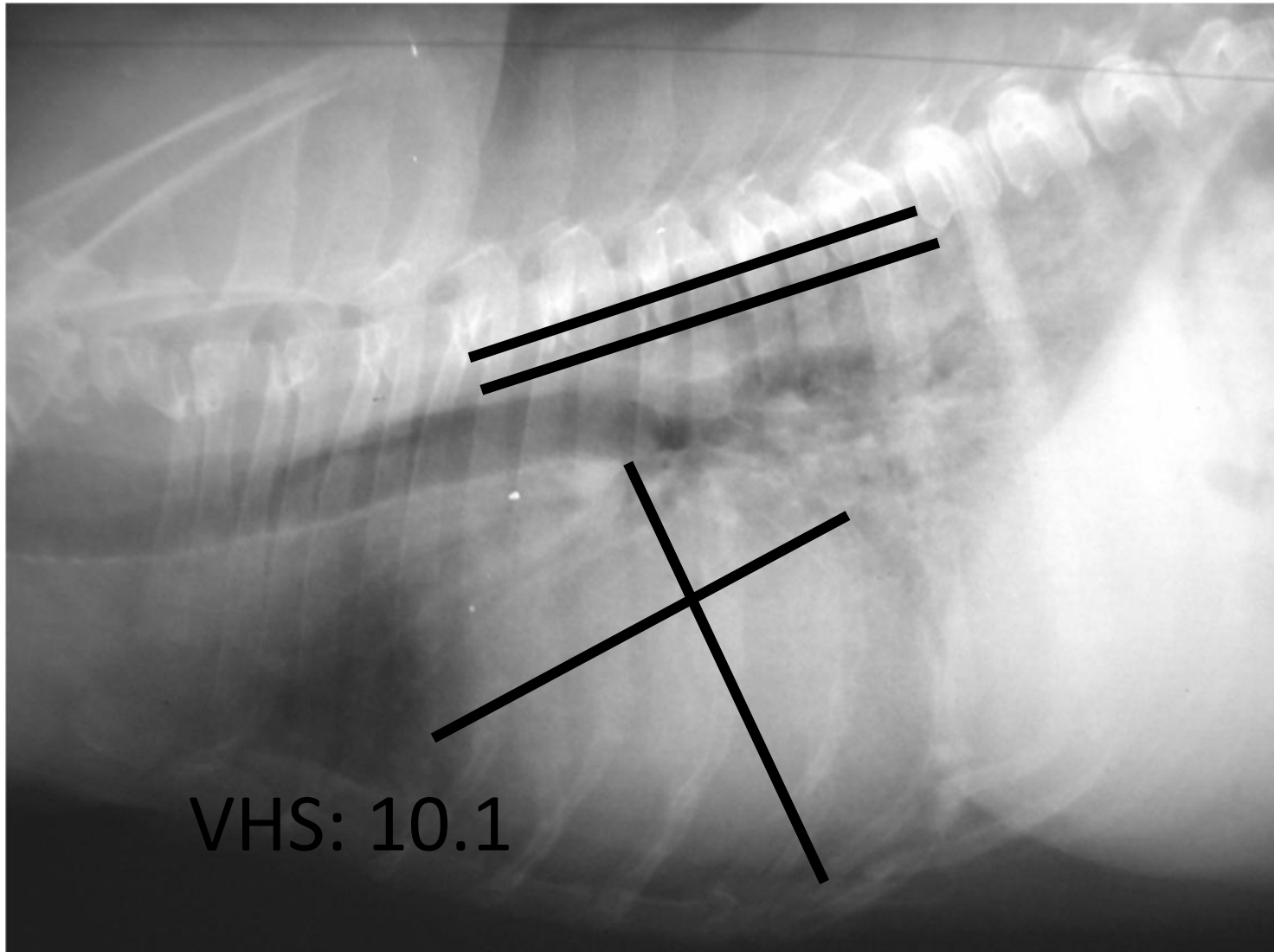
VHS vs. Intercostals



4 IC



VHS vs. Intercostals

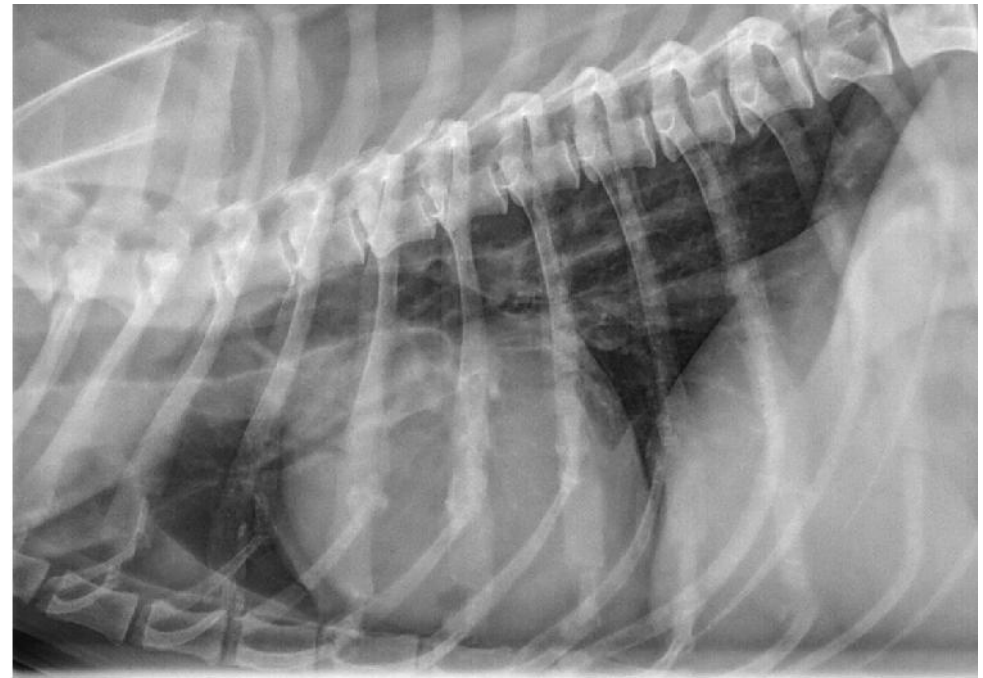
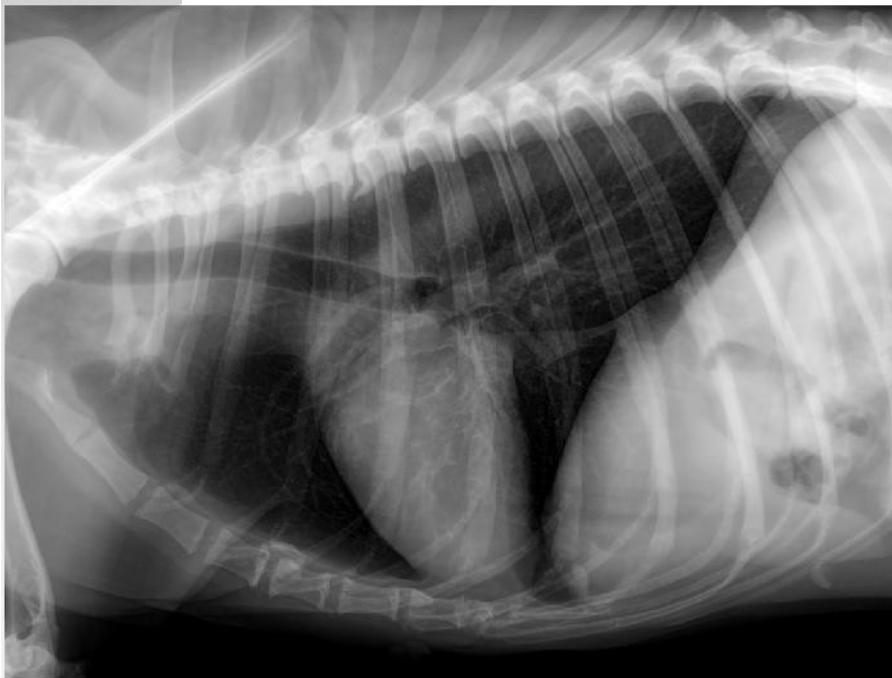


VHS: 10.1



Left atrial size

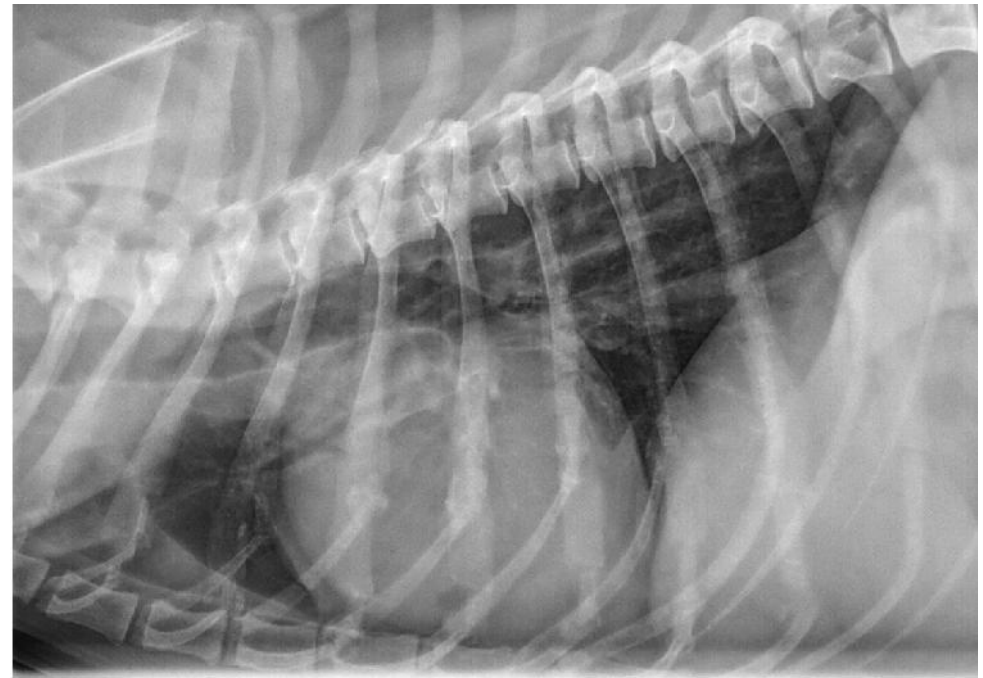
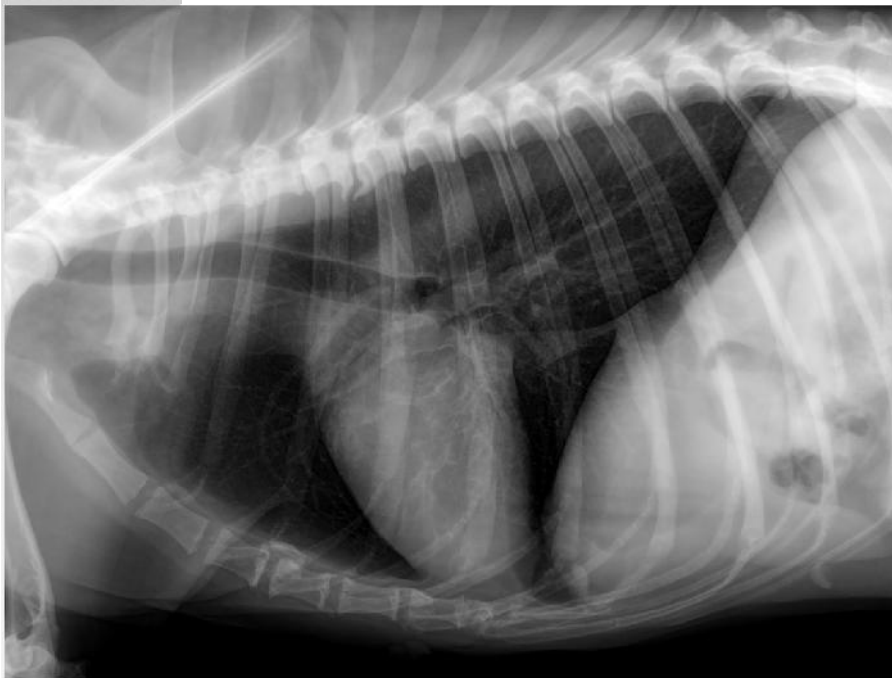
- Course of the trachea
 - Can run almost parallel to the vertebral column
 - Depends on chest configuration





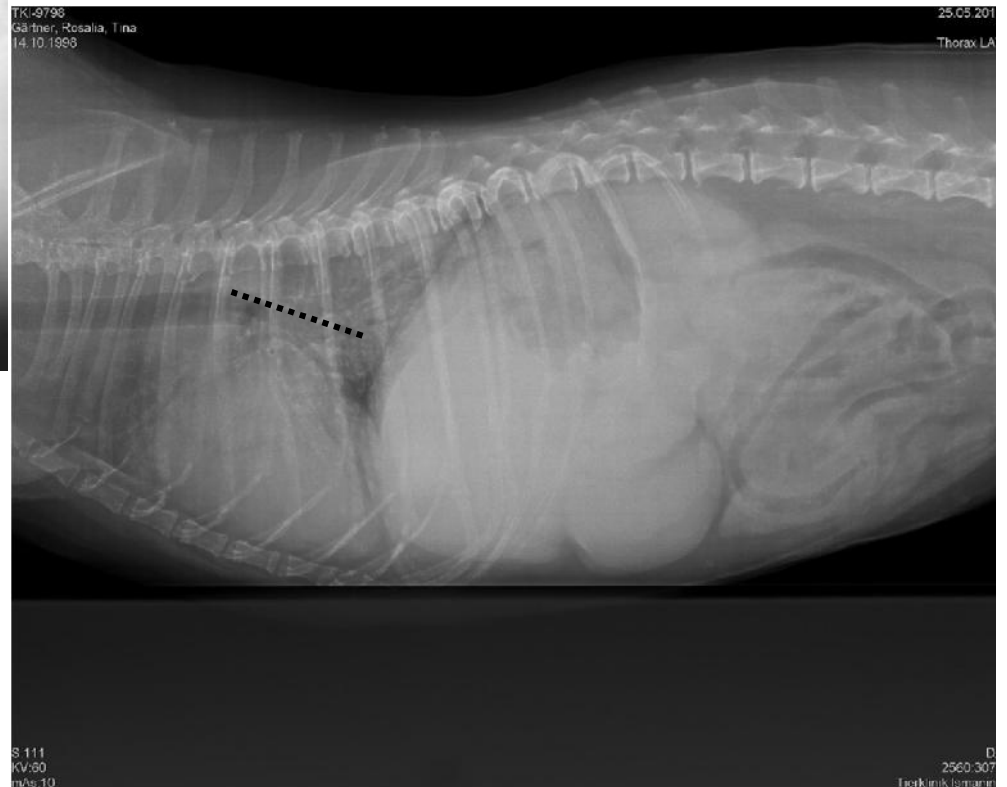
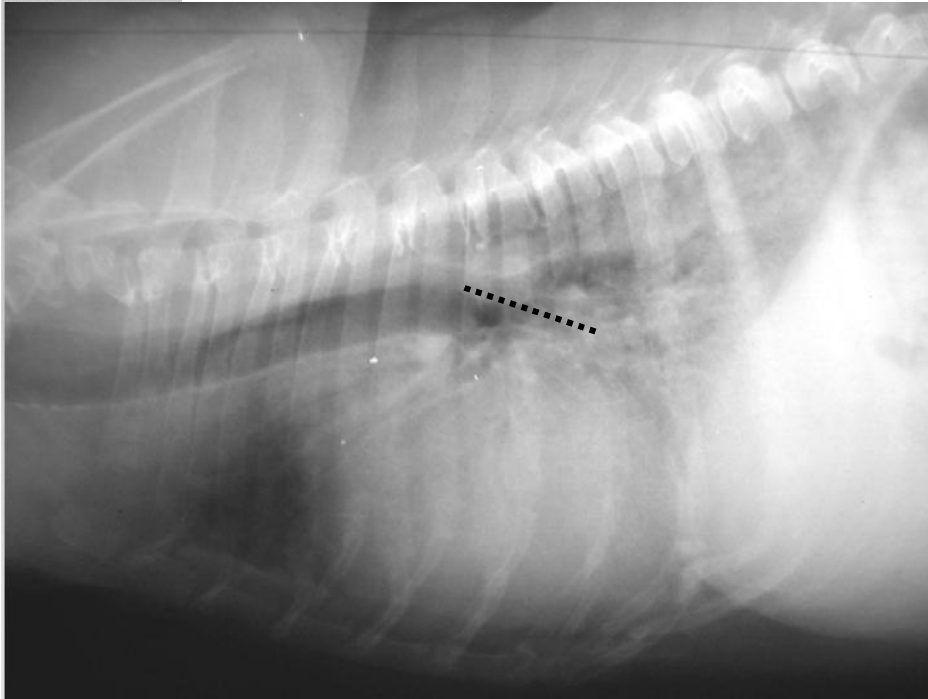
Left atrial size

- Course of the main bronchi
 - Ventrally oriented



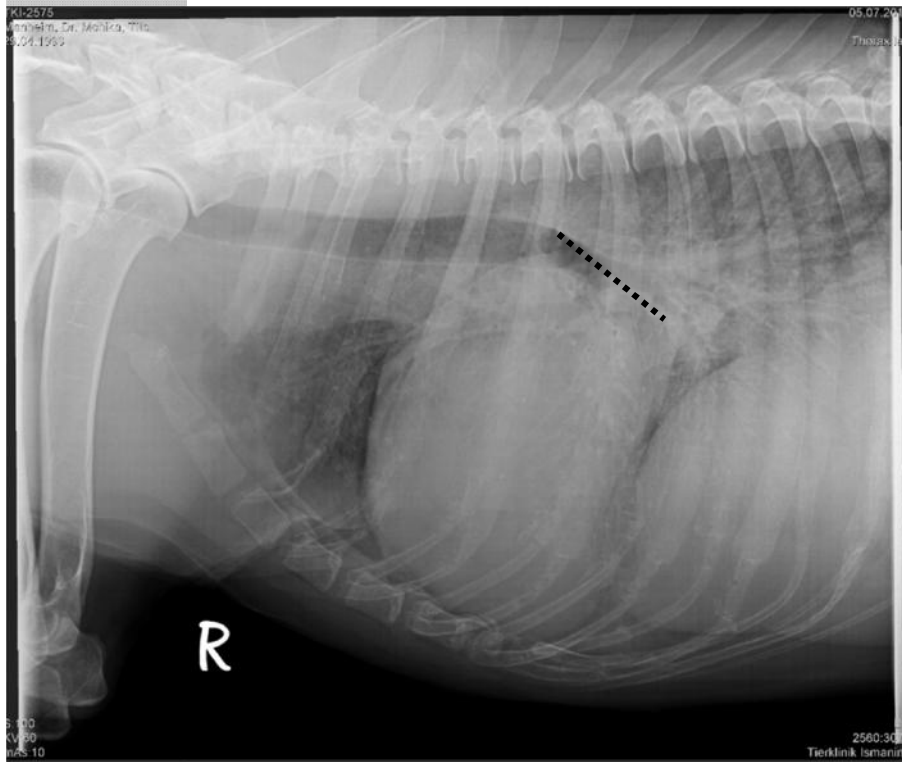


Heart disease or not?

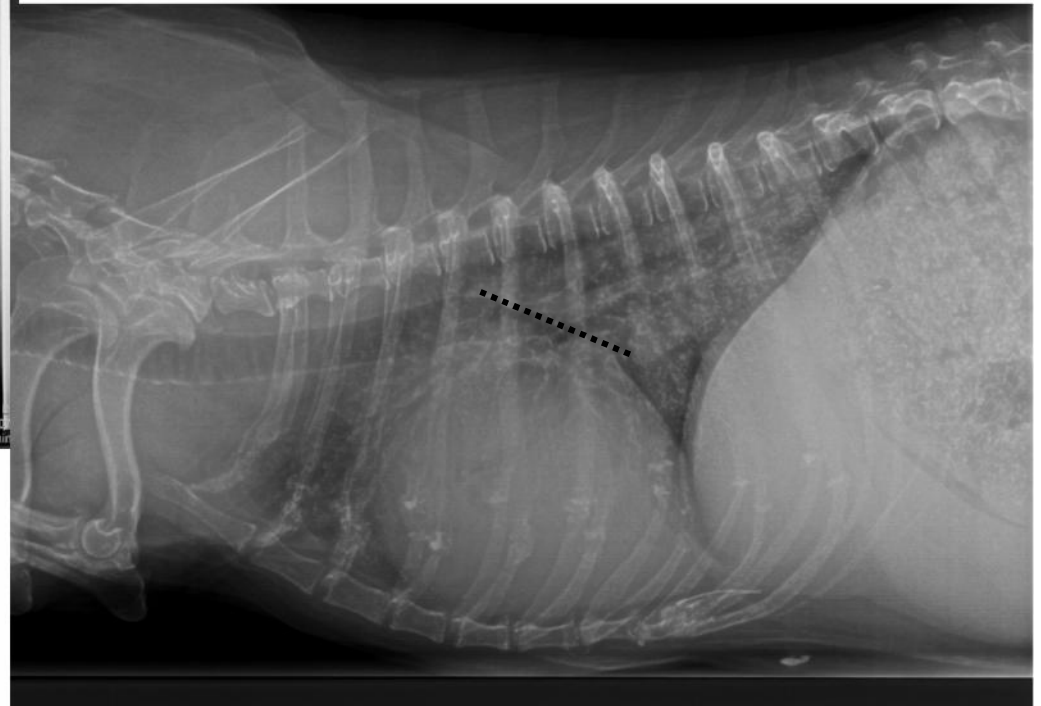




Heart disease or not?

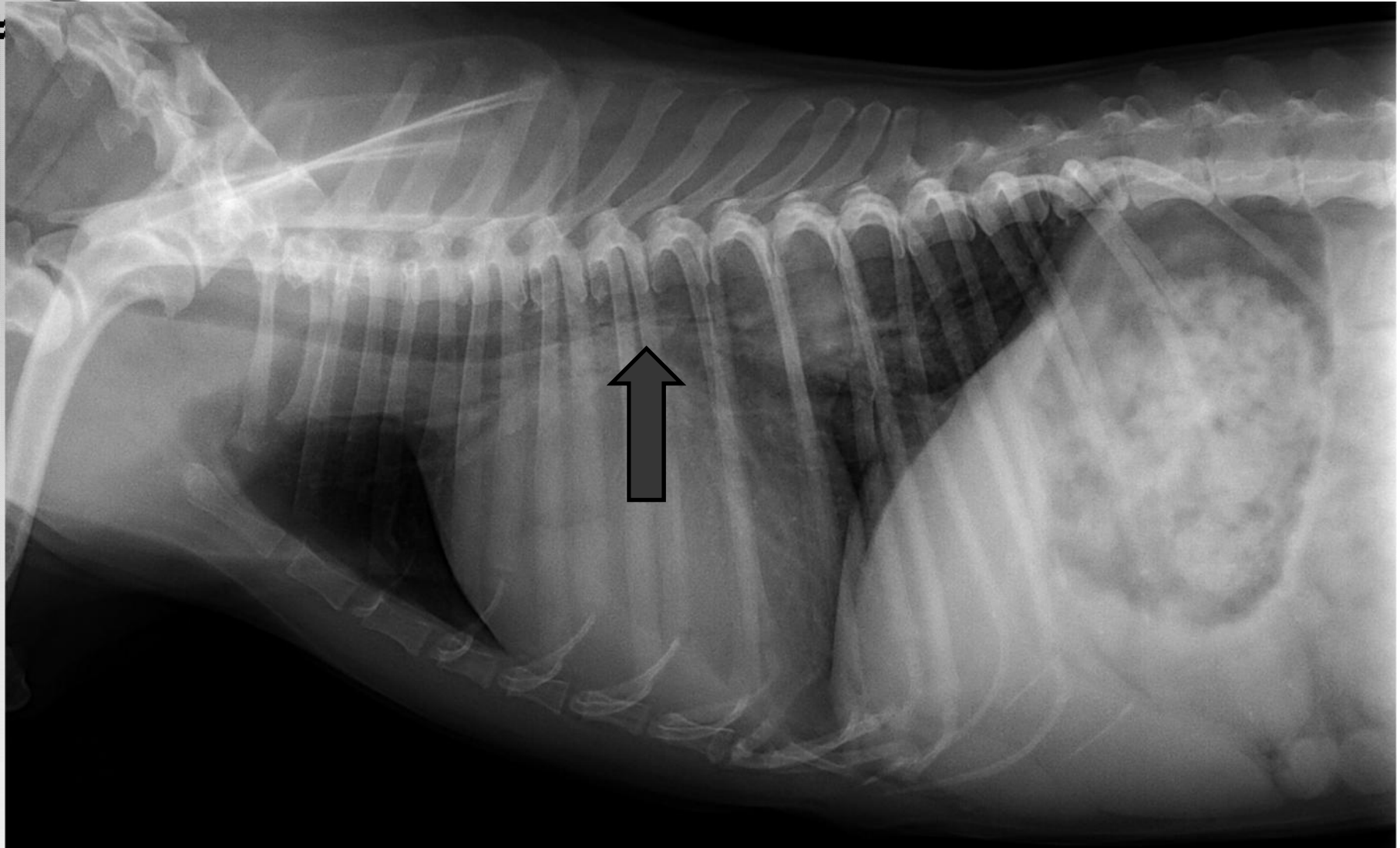


Cardiac enlargement: yes
Heart failure: no



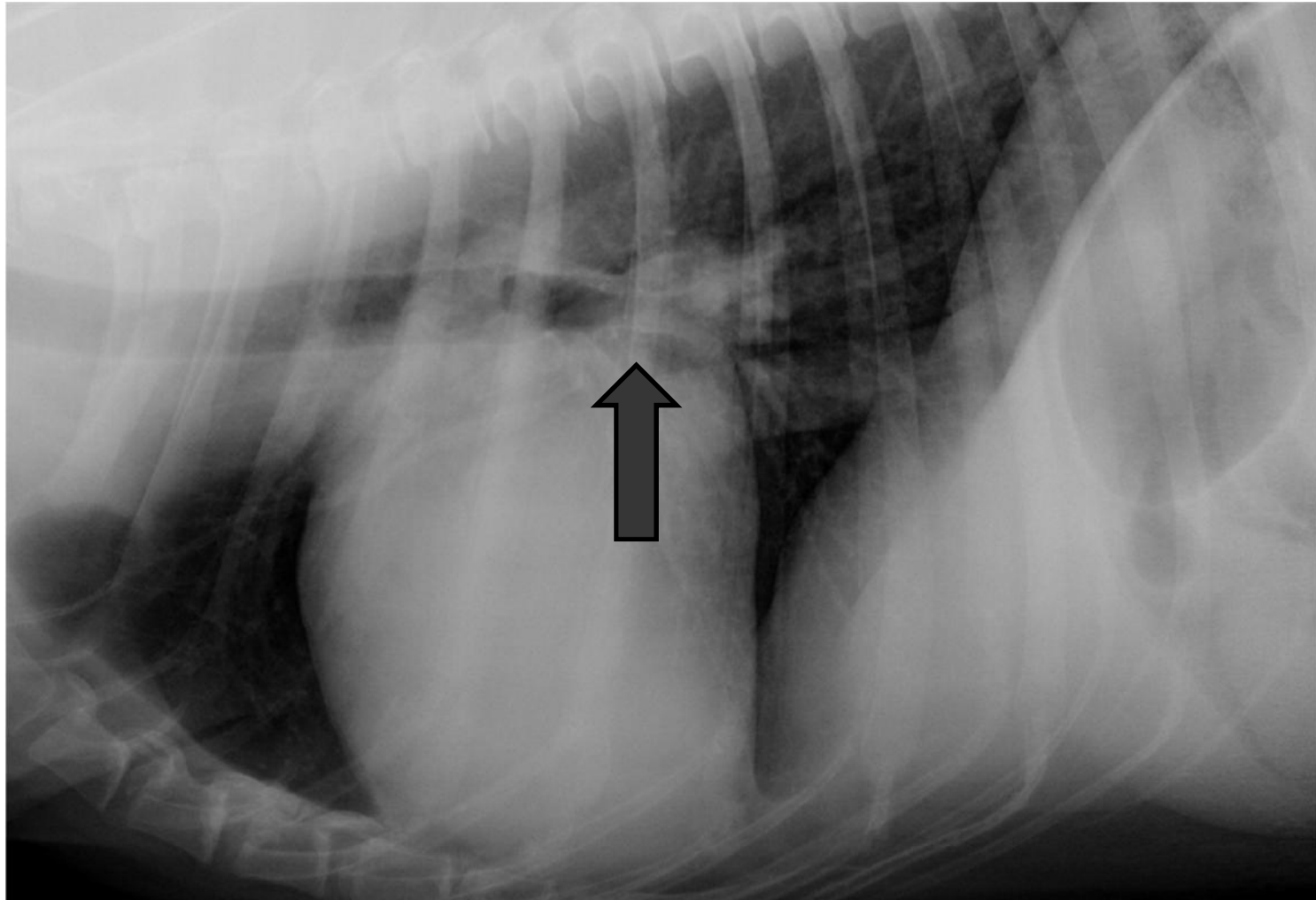


Dilated left atrium



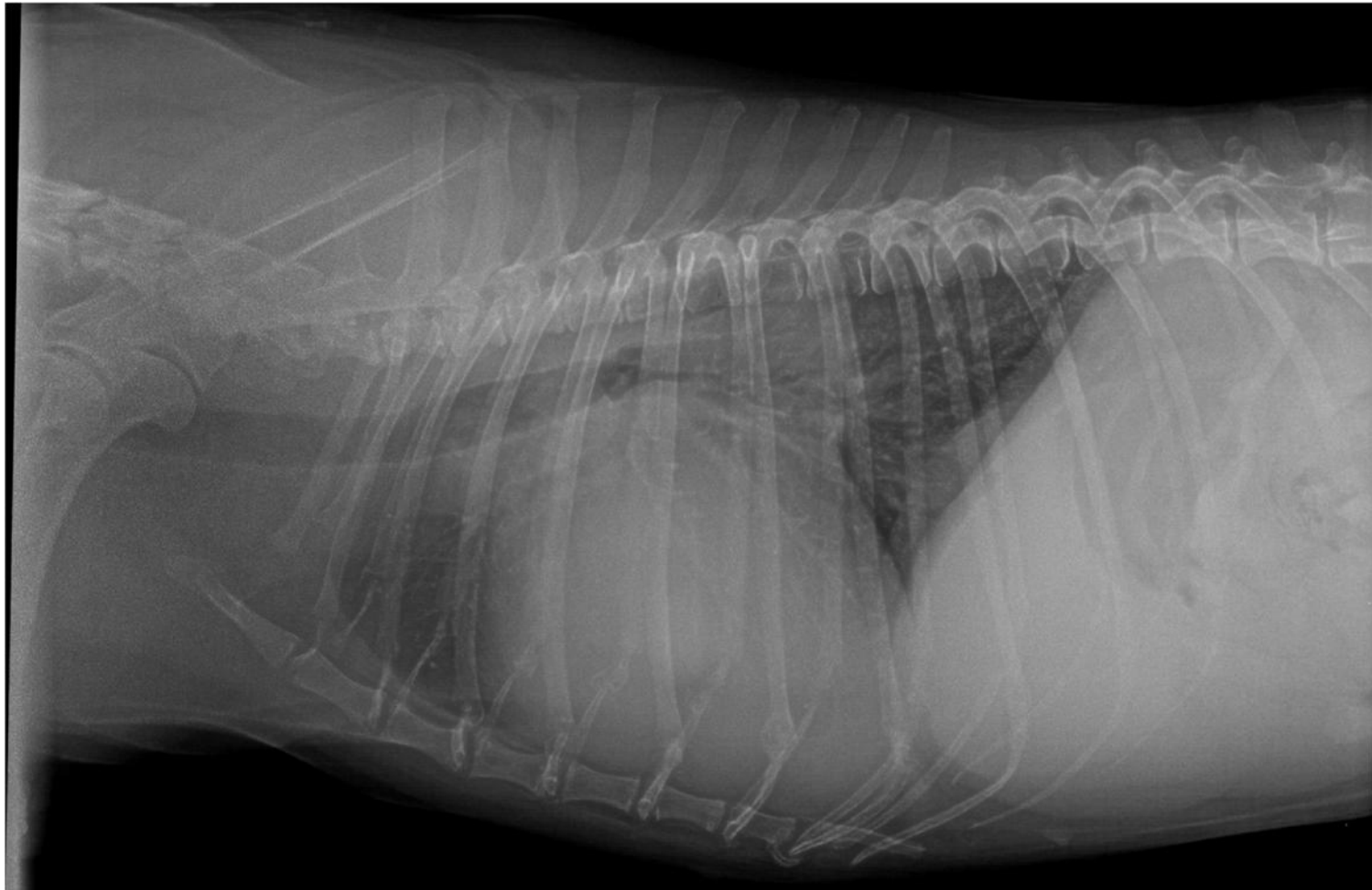


Dilated left atrium



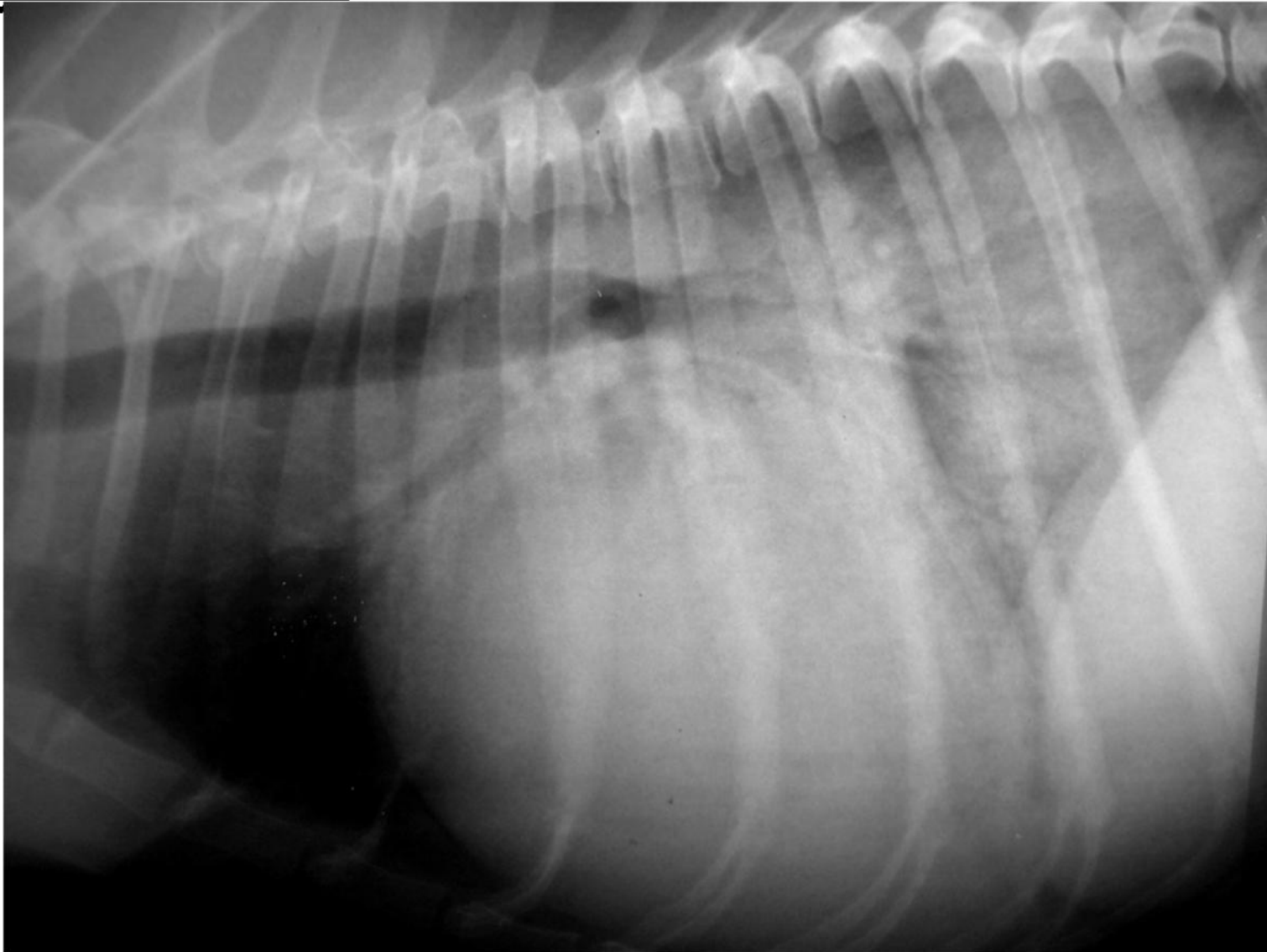


Interstitial pulmonary edema





Alveolar pulmonary edema





Tip

- Look at the severity of the pulmonary infiltrates
- Severe shadowing without life-threatening symptoms indicates a chronic process



Dog was only displaying mild to moderate respiratory signs despite the severe radiographic changes.



ECG



- Neither sensitive nor specific
- Does not answer whether to treat or not
- When to use it:
 - Arrhythmia
 - Suspected pericardial effusion (Hypovoltage/electrical alternans)
 - Syncope or exercise intolerance of unknown origin
 - (differentiation of congenital heart disease)



Biomarkers

- Major cardiac biomarkers
 - cTNI
 - Marker of myocardial damage
 - Useful only for certain indications:
 - Myokarditis
 - Cardiac hemangiosarkoma
 - NT-ProBNP
 - Marker of myocardial wall stress

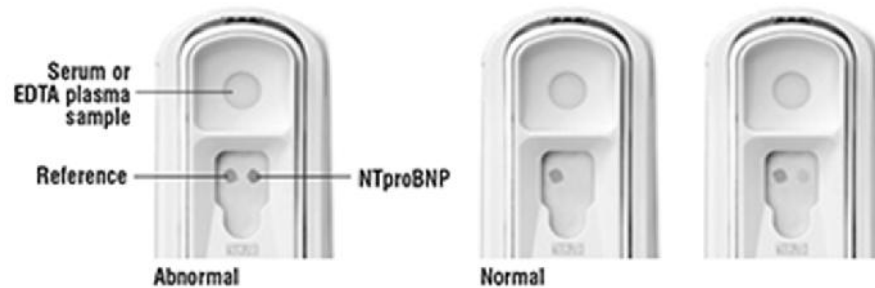
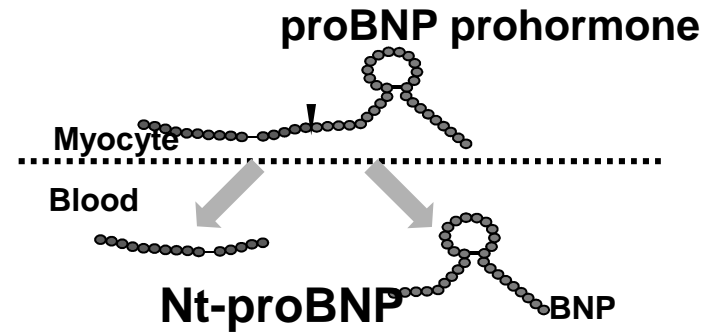


NT-ProBNP

Indication:

- Suspected Cardiomyopathy
 - HCM and DCM
- exclude heart diseases in unclear cases
- Differentiation between cardiac and non cardiac dyspnea

- Feline Snap-Test



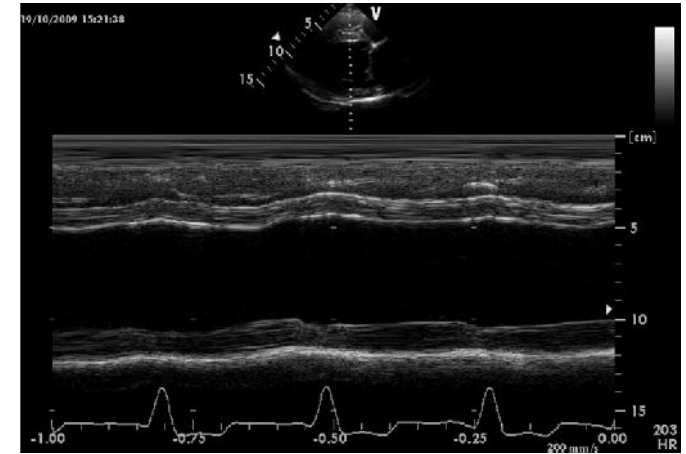
- Prognosis and clinical course



Therapy: Acute Heart Failure

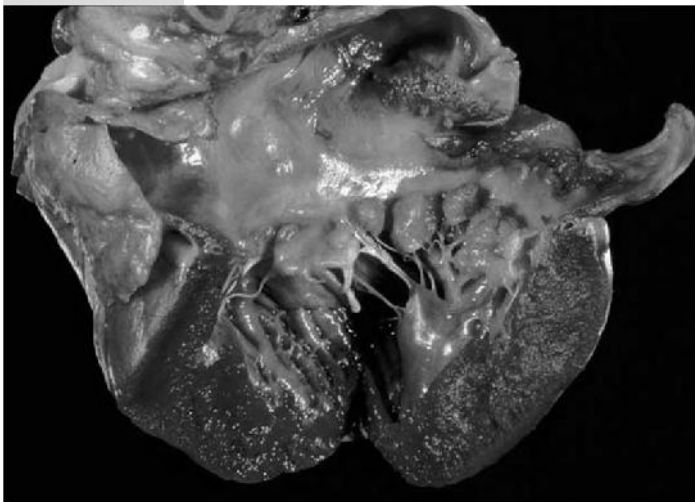
- Do not stress
- O₂
- Furosemide
- Consider positive inotropic support
 - Dobutamin iv
 - Cave: Rhythm disturbances
 - **Pimobendan po./iv.**
- Thoracocentesis or Abdominocentesis

ACE-I are not required in acute heart failure



Therapy

MVD, DCM





MVD

- Stages according *ACVIM consensus statement*
 - Stage **A**: high risk patient without heart disease

 - Stage **B1**: asymptomatic patient **without** cardiomegaly

 - Stage **B2**: asymptomatic patient **with** cardiomegaly

 - Stage **C 1/2/3**: heart failure
 - 1: chronic (almost asymptomatic)
 - 2: mild to moderate symptoms
 - 3: severe life threatening symptoms

 - Stage **D**: refractory heart failure



MVD

Triple therapy

	A	B1	B2	C
Furosemide	-	-	-	+
Pimobendan	-	-	+	+
ACE-Inhibitor	-	-	+/-	+
Spirolactone	-	-	-	+/-

+: generally advised but NO scientific proof

+/-: unclear



MVD



	A	B1	B2	C
Furosemide	-	-	-	+
Pimobendan	-	-	+	+
ACE-Inhibitor	-	-	+/-	+
Spirolactone	-	-	-	+/-

EPIC-Trial

+: generally advised but NO scientific proof
+/-: unclear



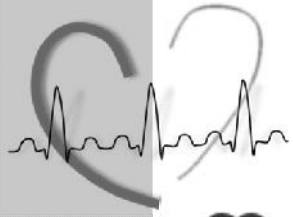
MVD

- Unanswered questions:
 - Role of ace-inhibitors in B2 and C
 - B2: trials with conflicting results
 - C: no trial that compares Triple Therapy vs. Dual Therapy
 - Role of spironolactone in B2 and C



Refractory Cases

- Pimobendan
 - *Increase dose to TID*
- Furosemide
 - Change route of administration to sq.
- Hydrochlorothiazide
- Spironolactone
- Digoxin
- Diet (adequate caloric intake)



Humane Guidelines



European Heart Journal (2012) 33, 2451–2496
doi:10.1093/eurheartj/ehs109

ESC/EACTS GUIDELINES 

Guidelines on the management of valvular heart disease (version 2012)

The Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

6.1.6 Medical therapy

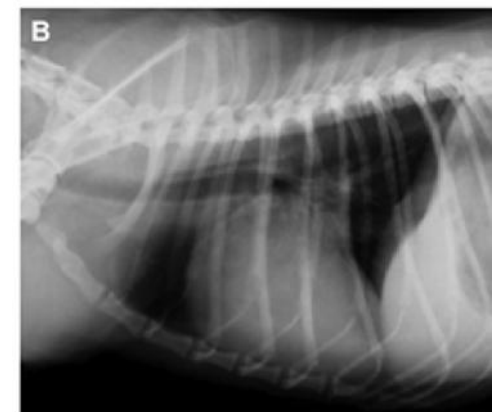
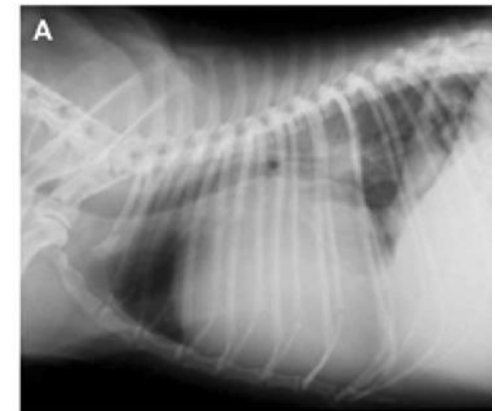
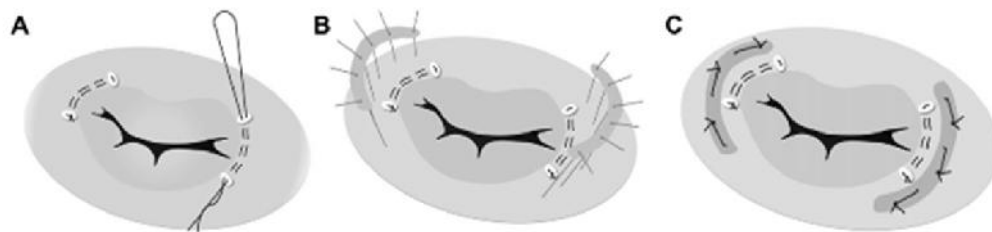
In acute MR, reduction of filling pressures can be obtained with nitrates and diuretics. Sodium nitroprusside reduces afterload and regurgitant fraction, as does an intra-aortic balloon pump. Inotropic agents and intra-aortic balloon pump should be added in case of hypotension.

There is no evidence to support the use of vasodilators, including ACE inhibitors, in chronic MR without HF and they are therefore not recommended in this group of patients. However, when HF has developed, ACE inhibitors are beneficial and should be considered in patients with advanced MR and severe symptoms, who are not suitable for surgery or when there are still residual symptoms following surgery. Beta-blockers and spironolactone should also be considered as appropriate.¹³



Mitral valve repair

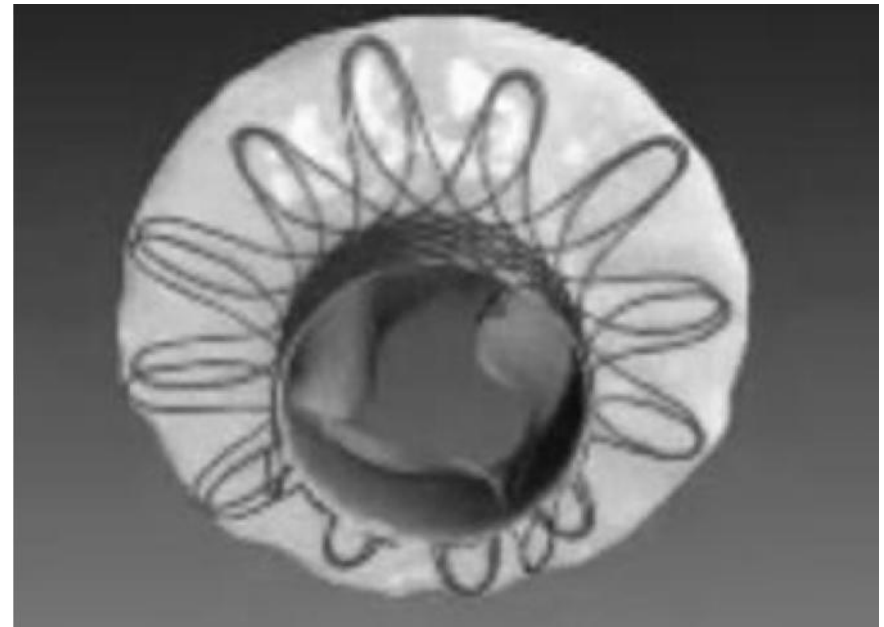
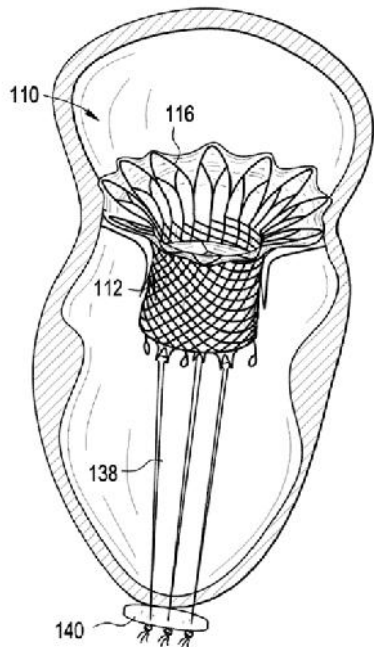
- YES. it is an option
- BUT: it is expensive and not widely available





Mitral valve replacement

- semi-invasiv
- Transthoracal placement
- To date: not an option





Clinical Impact

- Dog with heart murmur at left apex
 - Consider Imaging
 - Radiography or echocardiography
 - If not available:
 - Consider BNP
- Do not wait for clinical symptoms



DCM

occult	overt
Patient has heart disease but <u>no</u> clinical symptoms	Patient shows overt signs of heart failure



DCM

	occult	overt
Furosemide	-	+
Pimobendan	+	+
ACE-Inhibitor	+/-	+
Spirolactone	+/-	+/-

+/-: unclear



PROTECT Study



- prospective. placebo-controlled multicenter-study
- 67 Dobermans with occult DCM
- Pimobendan vs Placebo
- Question: Does Pimobendan delay the onset of CHF or sudden death (primary endpoints) and improve survival (secondary endpoint)?



PROTECT Study



Medium time to primary endpoint:

Pimobendan: 718 days

Placebo: 441 days

Median survival time:

Pimobendan: 623 days

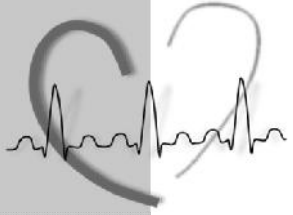
Placebo: 466 days



PROTECT Study



Pimobendan prolongs the time to the onset of clinical signs and extends survival in Dobermans with preclinical DCM.



Irish Wolfhound Study

- Prospective Study
- 66 IW with occult DCM and/or atrial fibrillation
- Pimobendan vs Benazepril vs Digoxin
- Primary endpoint: CHF or SD
- Medium time to primary endpoint:
 - Benazepril: 33.2 months
 - Digoxin: 42.1 months
 - Pimobendan: 66.4 months





DCM



- Unanswered questions:
 - Role of ACE-inhibitors
 - Probably more important than in MVD
 - Studies in Dobermans and Irish Wolfhounds
 - Other breeds?





Clinical Impact

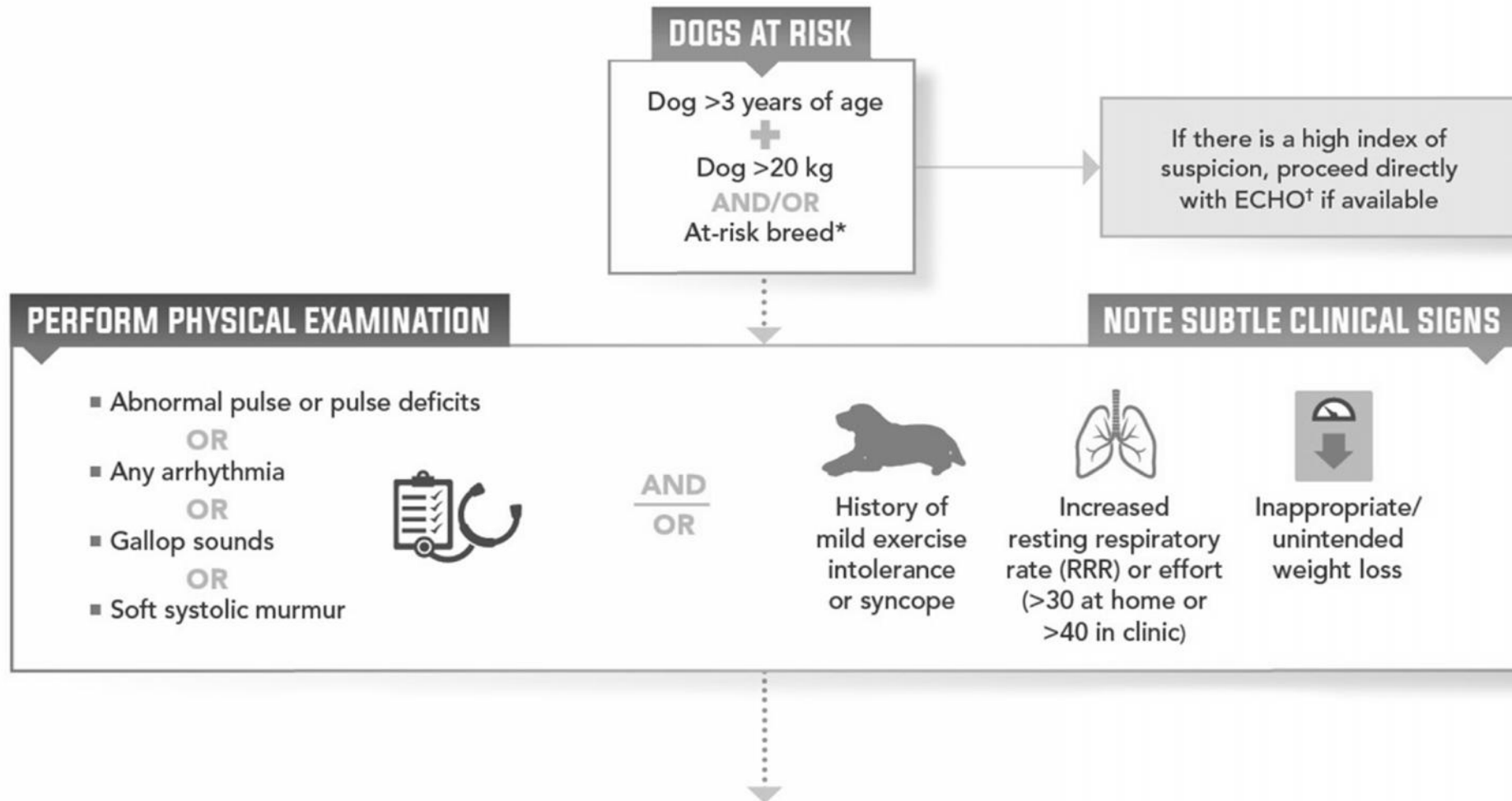
- Screening for DCM should be recommended in all dogs at high risk (Dobi. Great Dane. IWH)
 - Owner education!





Algorithm

Screening for occult DCM





Algorithm

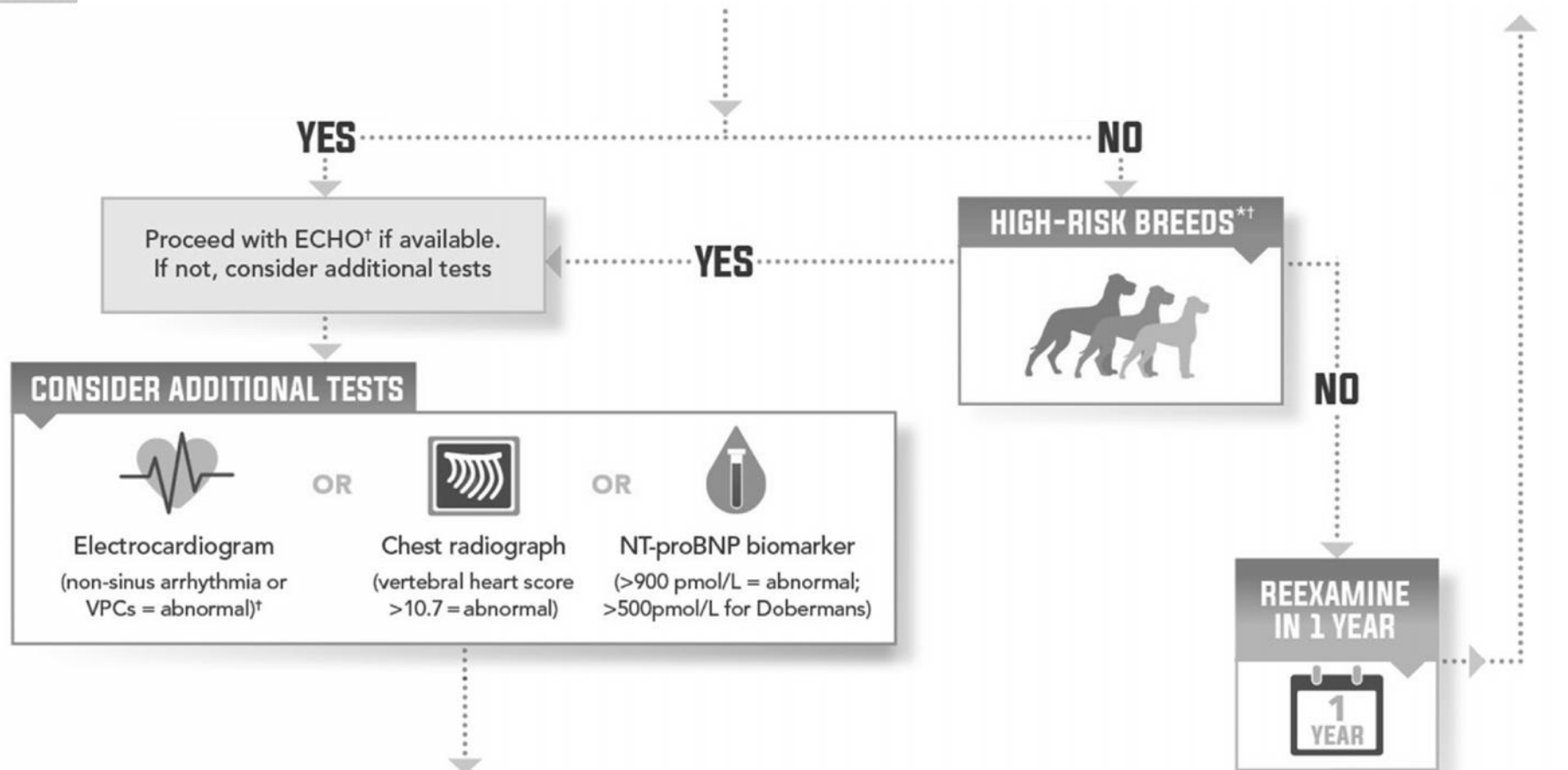
Screening for occult DCM

†A Holter is indicated in many dogs with preclinical DCM and as a screening test in some high-risk breeds. such as the Boxer and Doberman. regardless of echocardiographic findings.



Algorithm

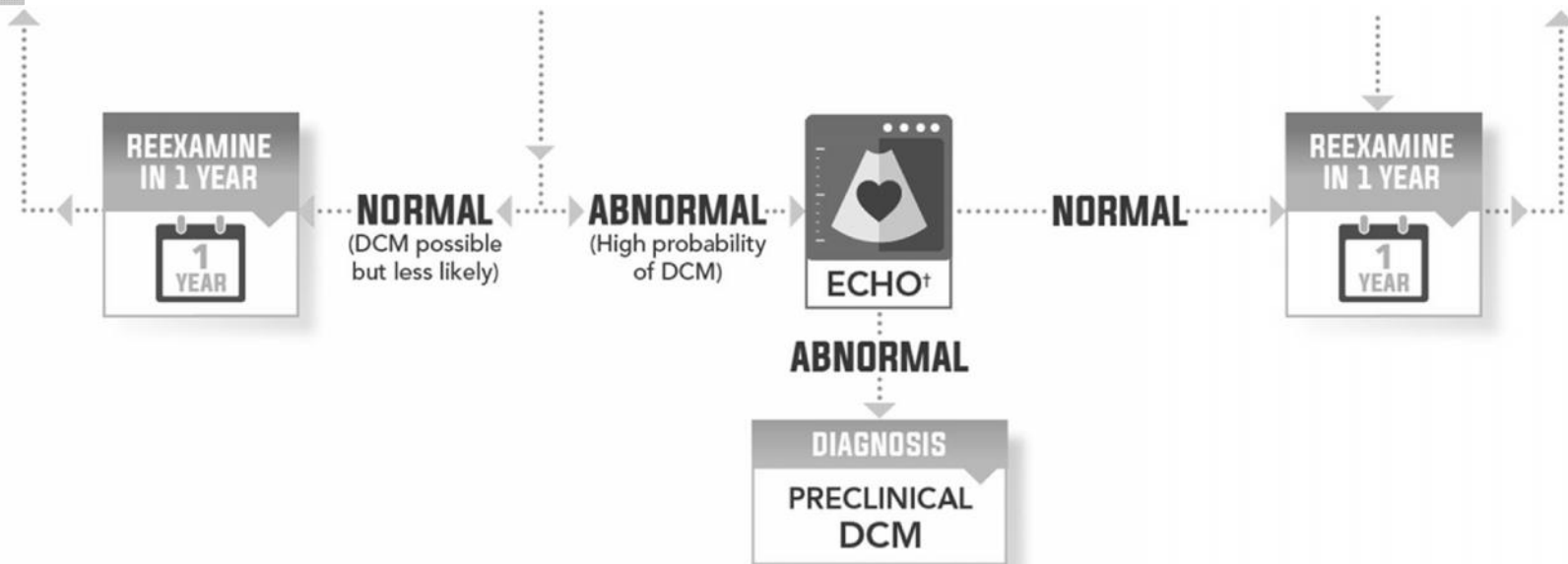
Screening for occult DCM





Algorithm

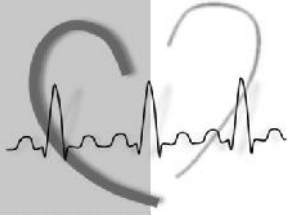
Screening for occult DCM





Clinical impact

- VETMEDIN[®] is now also licenced in Europe for **preclinical dilated cardiomyopathy (DCM)** in Doberman Pinschers.
- VETMEDIN[®] helps delay the onset of clinical signs of DCM and increase overall survival of DCM patients.
- VETMEDIN[®] is the first and **only** medication licenced for preclinical treatment in veterinary cardiology.



Take Home



- Diagnosis of heart failure is a combination of
 - Clinical signs, clinical exam, imaging and biomarkers
- MVD stage B2: start on Pimobendan
- Occult DCM: start on Pimobendan

NEW INDICATION

vet²edin[®]

More than medicine.



The End

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