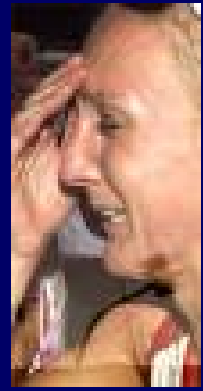
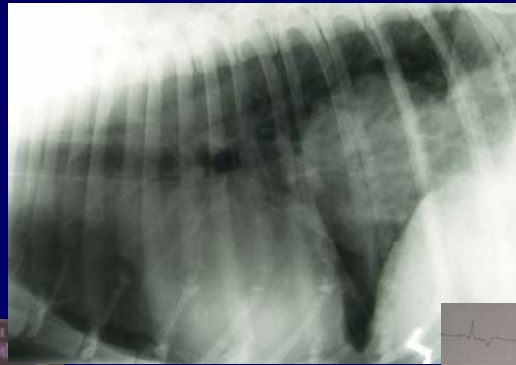


# Need a wee lie down?



**Syncope/presyncope/seizure at exercise**  
*When/how to investigate??*



Cedarmount Veterinary Clinic

Craig Reilly, BVM&S CertSAM MRCVS

# He "had a fit" when we were in the park!

**History** to indicate severity of problem and to differentiate:

- Syncope ( $O_2$ /BP)
- Seizures (brain function)
- Episodic Weakness (incl. Presyncope)

**Initial signs vital:**

- Loss of consciousness?
- Did collapse start as flaccid +/- pale MM? (appropriate physiological response to low BP)
- Any sign lateralisation?
- Pre/post-ictal signs?
- Relation to feeding? (blood glucose/ammonia)



# Syncope



## Cardiac

- tachy/brady
- outflow obstruction
- pump failure
- cardiac tamponade

## Non-cardiac

- vaso-vagal (tachy and hypertensive, followed by brady and hypotensive)
- (carotid sinus)
- (tussive/postural)

**50% in man never diagnosed  
- these don't usually die!**



# Case Presentation: Gordon



- 6 year old male Bulldog
- One syncopal episode three weeks previously
- Intermittent low volume diarrhoea
- Distended abdomen





		<b>Clinical Sign</b>
Weight		28.0 kg
Demeanour		Bright, alert.
Mucous membranes		Colour difficult to assess (heavy pigmentation), tongue salmon pink, normal CRT (<2 seconds)
Heart		Rate normal (140 bpm), no abnormal sounds or rhythm, easily audible both sides
Pulses		<b>Femoral pulses weak, difficult to count. No pulse deficit or digital pulses detected.</b>
Neck		<b>Jugular distension visible</b> (if head held up high to stretch neck skin).
Respiration		<b>Rate elevated (25/minute).</b> Significant URT noise referred to chest.
Peripheral lymph nodes		All palpable, not enlarged or painful.
Abdomen		<b>"Drum-tight", non-painful, no fluid thrill, auscultation – excessive borborygmi. Rectal examination – normal faeces present, prostate normal size, no pain.</b>
Eyes		Normal, pupils equal and reacting to light
Rectal Temperature		Normal (38.0 C)



# Problem List

- Abdominal distension
- Bilateral jugular distension
- Syncope (at exercise)
- Tachypnoea
- Intermittent diarrhoea
- Inappetance



# Differential Diagnoses

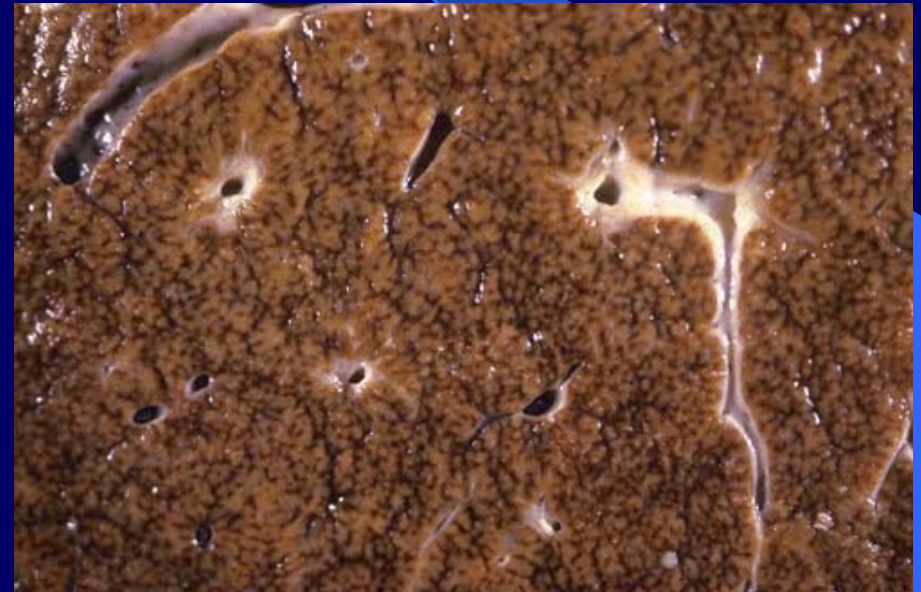
## Abdominal distension and bilaterally distended jugulars

• **Right heart failure** - therefore distension most likely due to modified transudate +/- hepatomegaly due to passive venous congestion if acute or subacute, or to "nutmeg" liver if chronic.

Other causes of abdominal distension

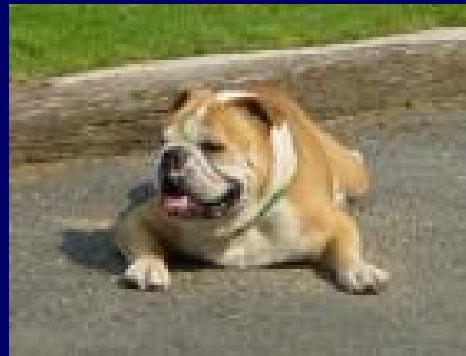
to be considered if CHF not present include:

- other effusions (pure transudate, exudate (non-septic and septic))
- other fluids (blood, urine, bile, (chyle))
- fat
- faeces
- organomegaly (aerophagia -breed)



## Differentials for Gordon`s Syncope

- Cardiac tamponade (pericardial effusion) (*??Pulsus paradoxicus absent*)
- Lung expansion restriction - due to severe abdominal distension/ pleural effusion
- Dysrhythmias esp. bradydysrhythmias (breed), SVT, VTach
- Vasovagal – (breed)
- Upper respiratory obstruction (breed)
  
- (Pulmonary hypertension) Rare
- (Pulmonic/aortic stenosis) No murmur
- (HCM (obstructive))
- (Hypoglycaemia)





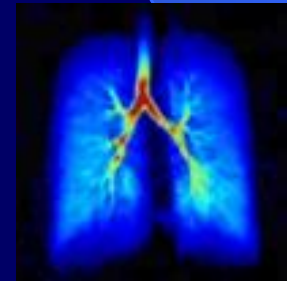
## Intermittent diarrhoea

- Presence of abdominal effusion (with intestinal mural oedema)
- (Primary liver/gastrointestinal disease)
- (Dietary indiscretion)

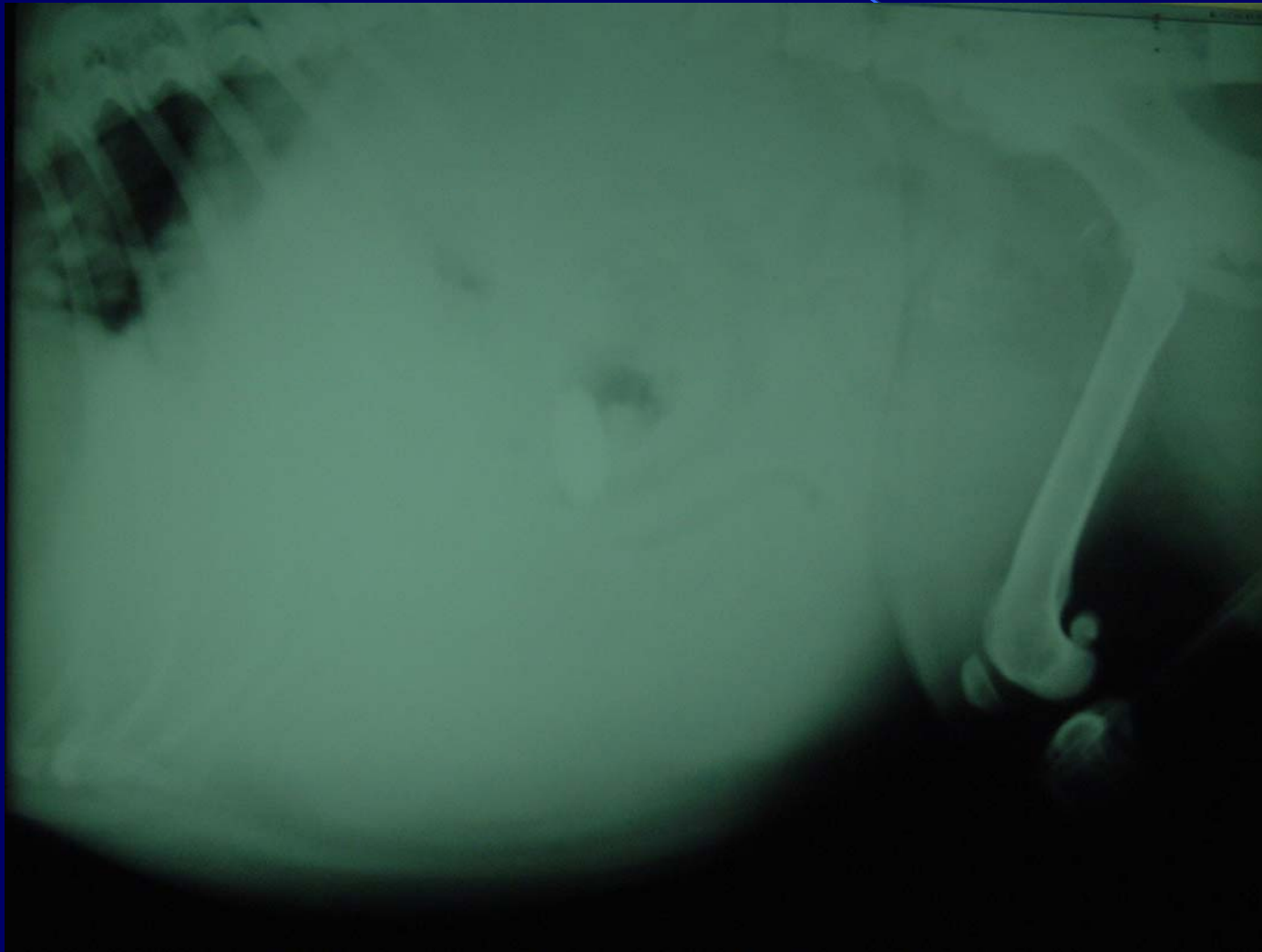


## Tachypnoea

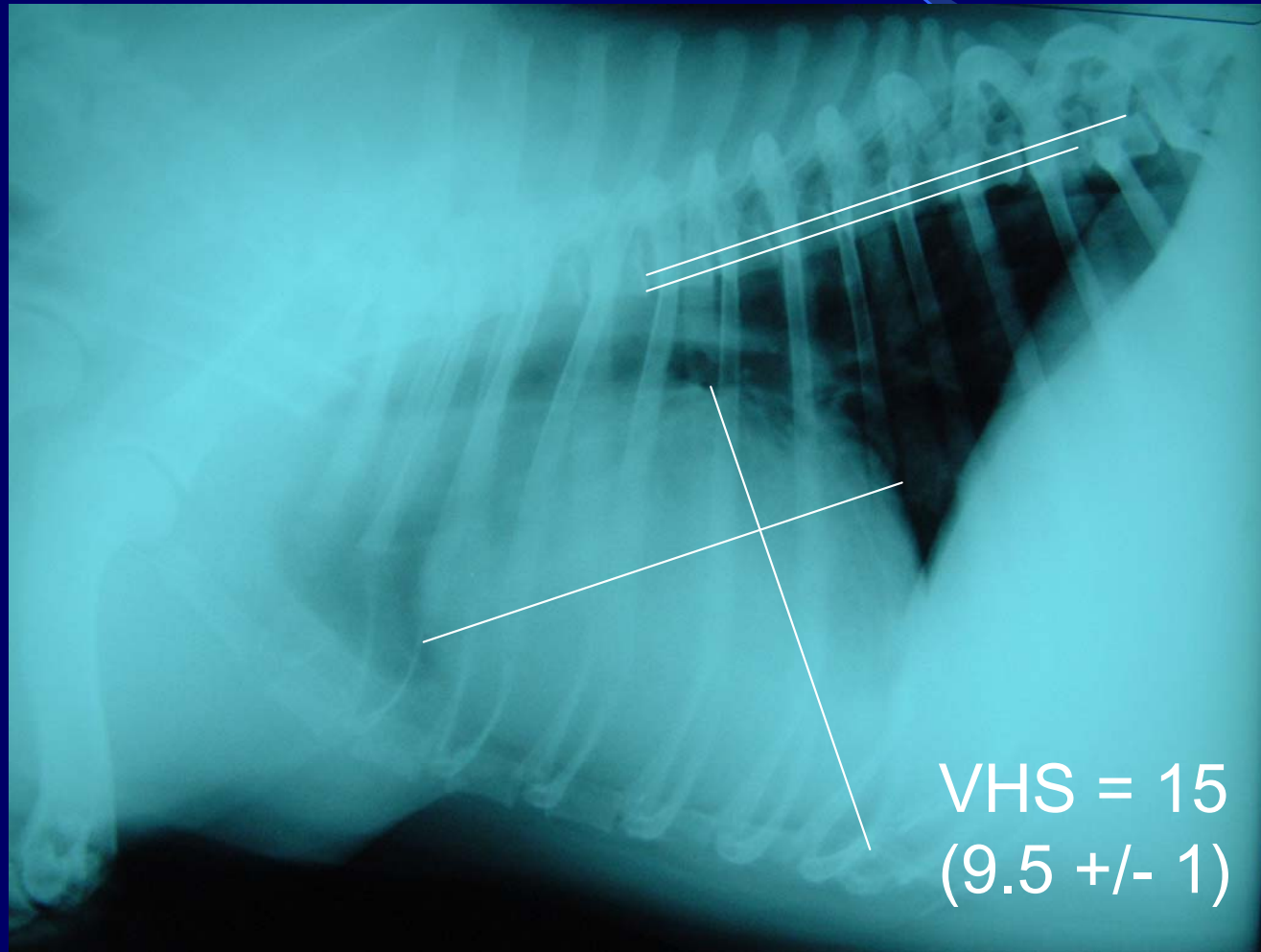
- Lung expansion restriction
- Reduced alveolar ventilation  
eg. pulmonary oedema, alveolar exudates
- Stress induced (in consultation)
- (reduced lung compliance)

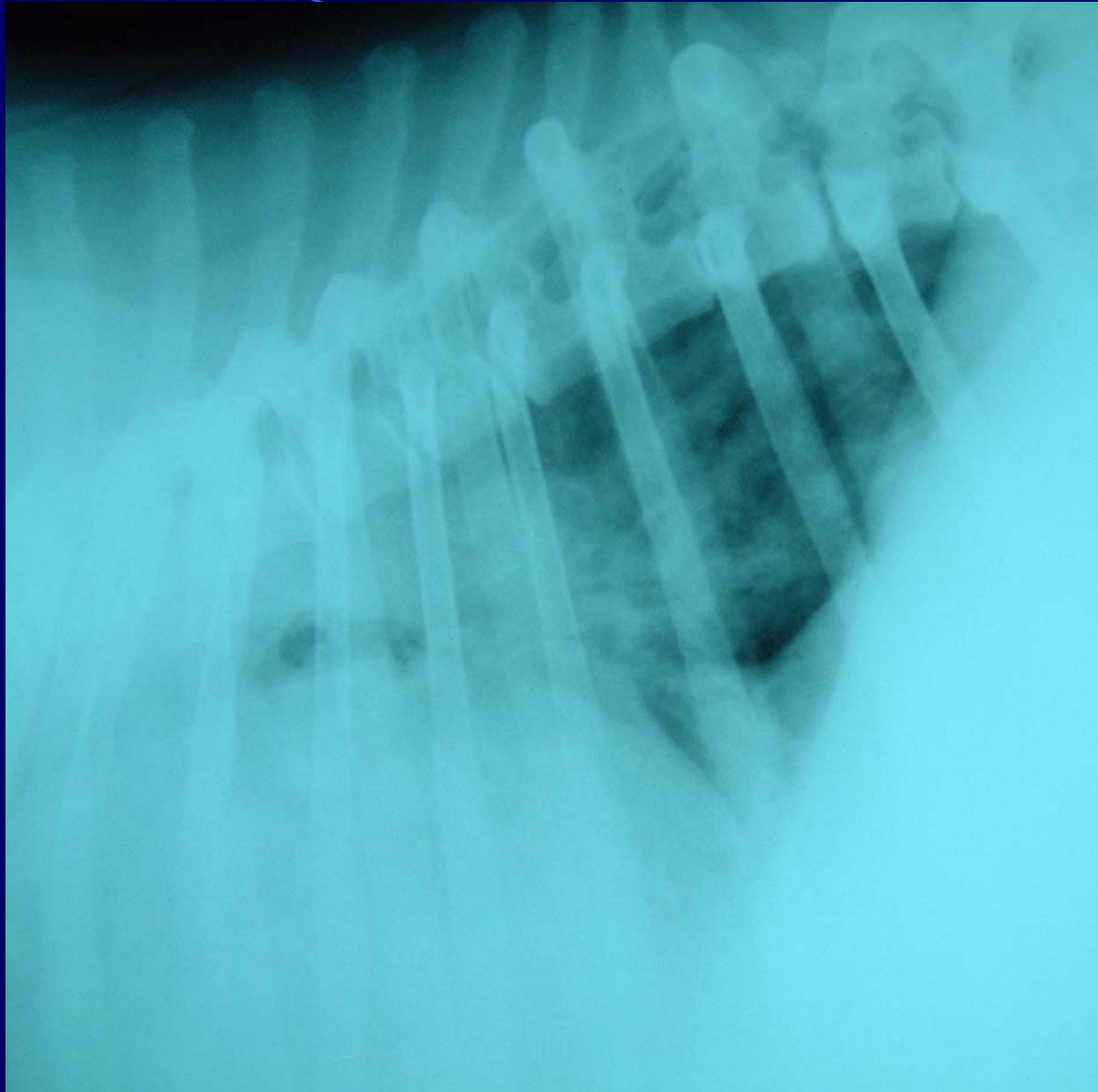


# Gordon – right lateral abdomen

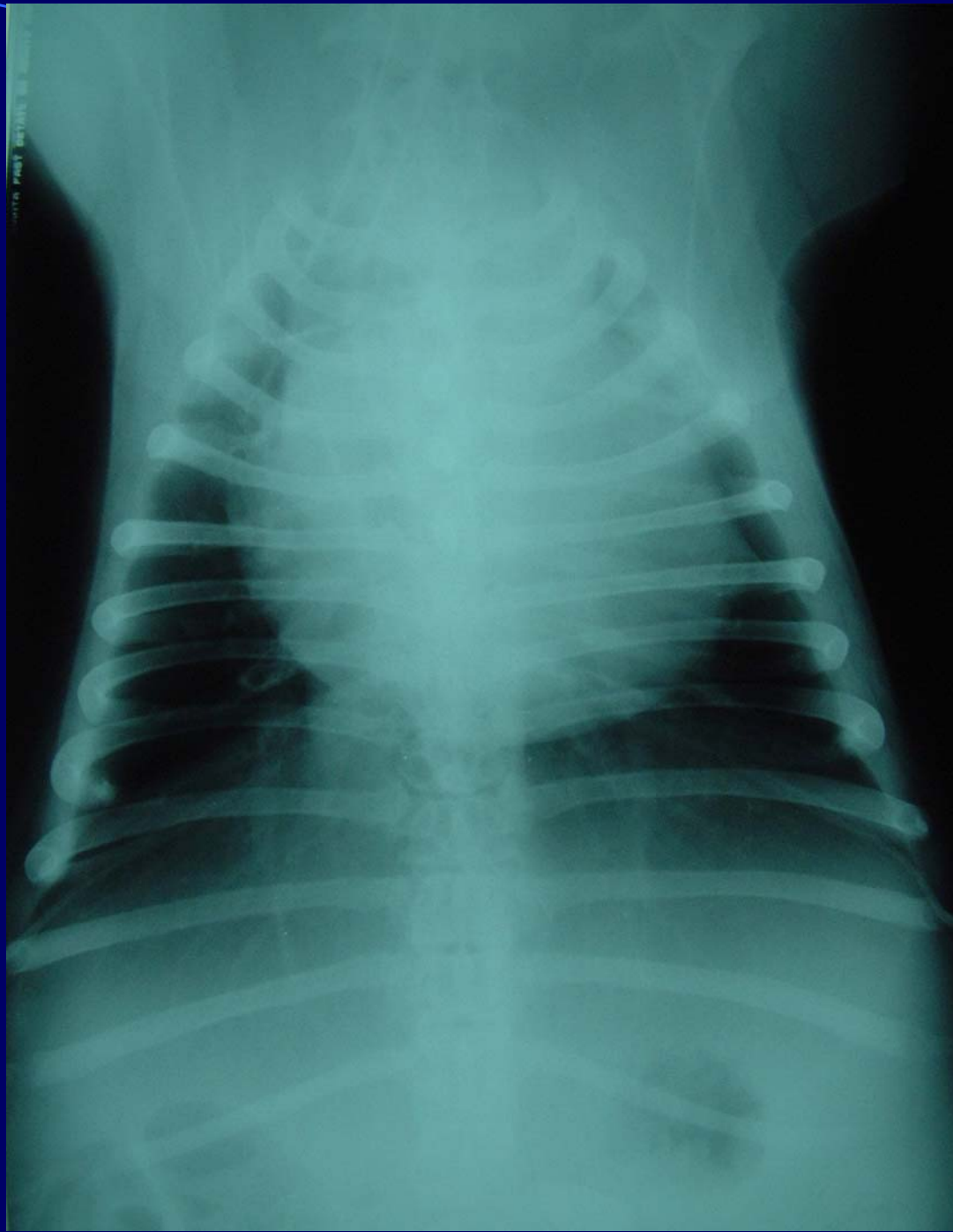


# Gordon – right lateral thorax (inflated)





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# Gordon – ECG in right lateral recumbency, no sedation

Parameter	Result	Reference Range
Heart Rate	140-160	70-160
Rhythm	sinus	
P	<del>0.04</del> <b>0.06</b> sec* <b>0.15 mV</b>	0.04 sec 0.4 mV
P-R	0.08 sec	0.06-0.13 sec
qRs	0.04 sec <b>0.4 mV</b>	<0.05 sec <2.0 mV
Q-T	0.2 sec	0.15-0.25 sec
MEA	+50°	+40° to +100°
Comment	Muscle tremor artefact	

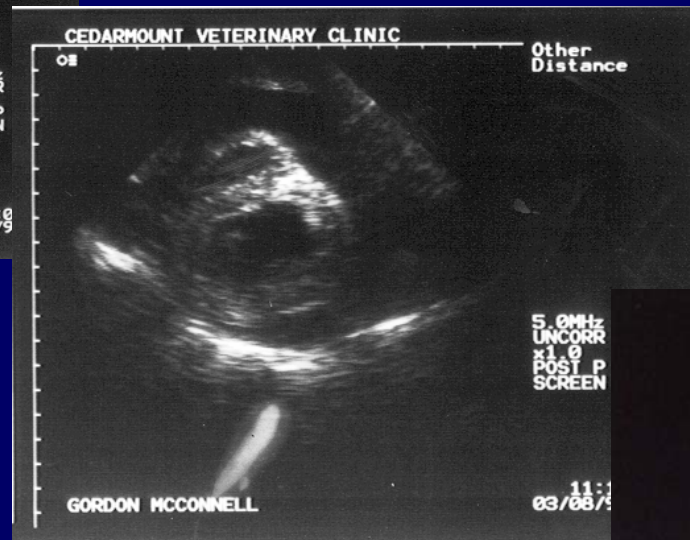


# Abdominocentesis

- serosanguinous modified transudate
- SG 1.023, Blood + + +, pH 8.0, protein ++ (Combur8Test) which clotted within a few minutes



# B-mode, right parasternal short and long axis views



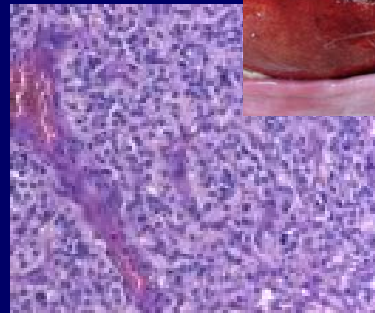


# Differentials for Pericardial effusion

- Tumour (HSA right atrium, mesothelioma, chemodectoma, ectopic thyroid carcinoma, lymphoma, metastases)
- Idiopathic pericardial effusion (IPE)
- Haemorrhage secondary to ruptured atrium
- Septic pericarditis

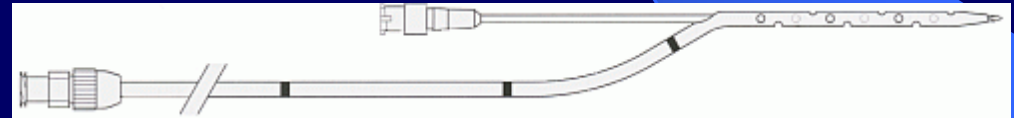
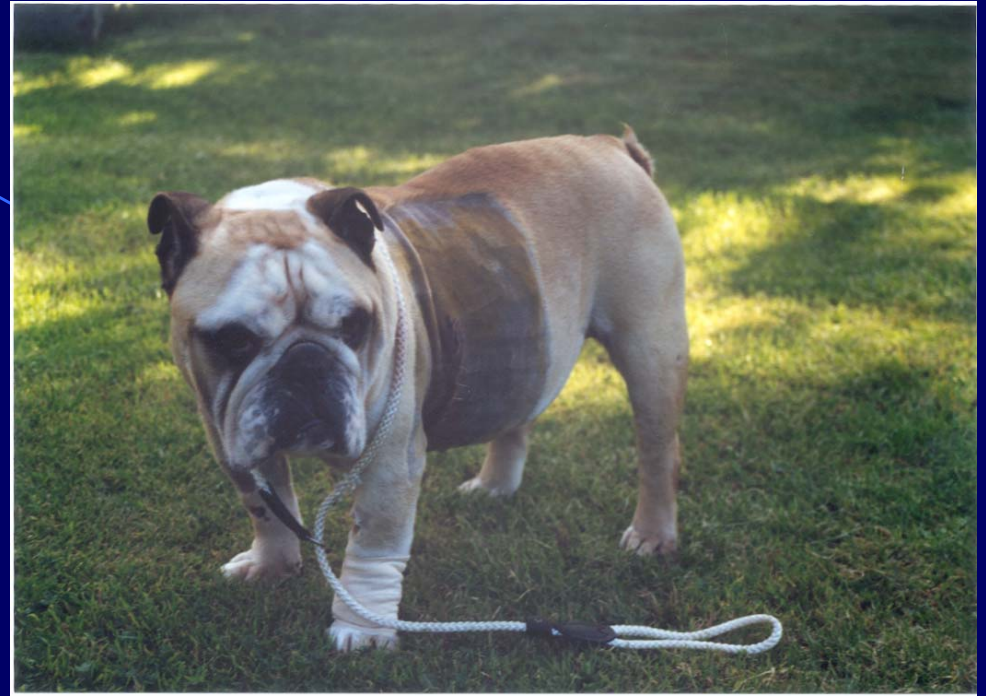
# Investigation

- Ultrasound
- Cytology of effusion (buffy coat 30%)
- Hypoglobulinaemia
- At pericardiectomy
- Post mortem



# Treatment options

- Diuretics contraindicated
- Pericardiocentesis
  - (Martin Direct Puncture Pericardiocentesis Set)
- Repeat pericardiocentesis or pericardiectomy (thoracotomy or thorascopic pericardiectomy)



# Ben Graham



- 8 year old MN black labrador
- 32 kg
- mild exercise intolerance 1 week
- equivocal weight loss
- Tonic clonic seizure at exercise (duration less than 30 secs)
- Bright and alert
- Good appetite





# Clinical findings

- bright and alert
- good colour
- no lymphadenomegaly
- HR 120/min, pulse strong and regular
- no pulse deficit
- CRT 1 second
- Rectal temp 38.3 °C
- RR 25/min
- slight hyperpnoea
- cranial nerve reflexes normal
- normal proprioception all four legs



# Problem List

- Tonic clonic seizure at exercise
- Exercise Intolerance (mild)
- Weight loss (??)

*Compile differential list, or opt for screening tests?*

*Investigate/not??*



# Screening tests

## Seizures

- rule out cardiac (ECG)
- rule out metabolic
  - low glucose
  - low calcium
  - hepatic/renal
  - (low magnesium)
- *then* - investigate CNS

## Episodic weakness

- ACTH stim
- Edrophonium response test +/- ACh rec Ab
- EMG and nerve conduction velocities
- muscle biopsies
- (thyroid)

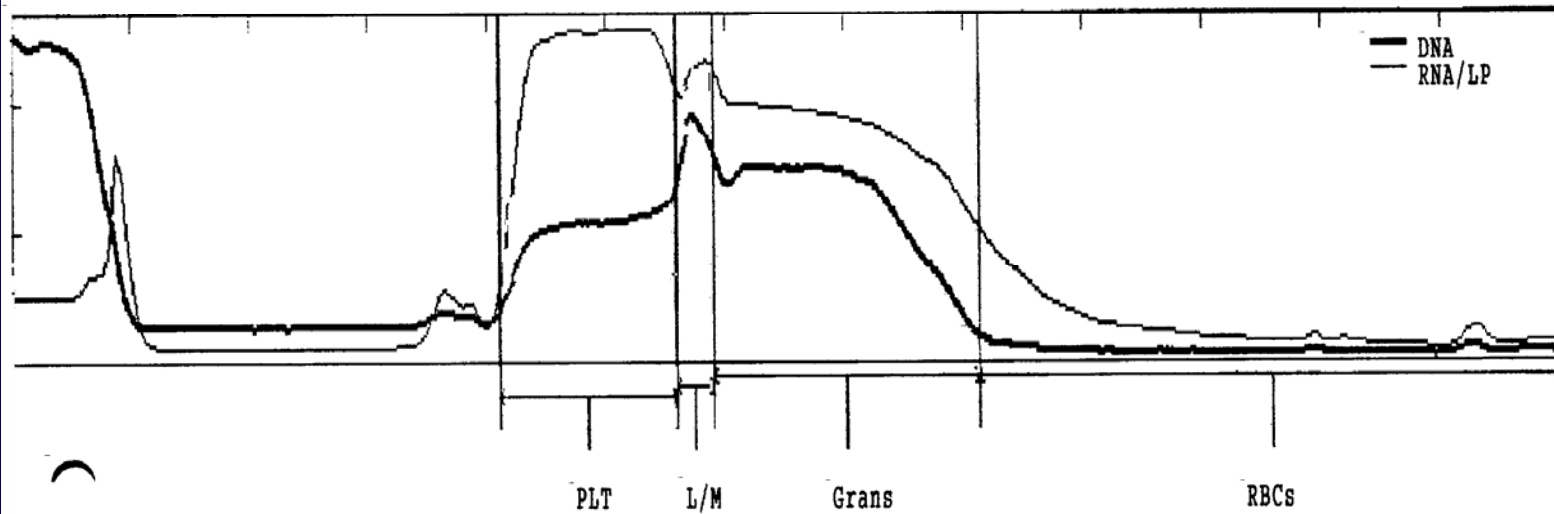


Species : Adult Canine  
 Patient : BEN  
 Client : GRAHAM

Ver: 6.7A  
 Date : 21-Nov-2002 12:49PM

Test	Results	Reference Range	Indicator		
			LOW	NORMAL	HIGH
HCT	= 51.2 %	37.0 - 55.0	[Progressive bar chart showing value in normal range]		
HGB	= 17.4 g/dl	12.0 - 18.0	[Progressive bar chart showing value in normal range]		
MCHC	= 34.0 g/dl	30.0 - 36.9	[Progressive bar chart showing value in normal range]		
WBC	= 19.4 x10 <sup>9</sup> /L	6.0 - 16.9	[Progressive bar chart showing value above normal range]		
GRANS	= 15.7 x10 <sup>9</sup> /L	3.3 - 12.0	[Progressive bar chart showing value above normal range]		
%GRANS	= 81 %		[Progressive bar chart showing value in normal range]		
L/M	= 3.7 x10 <sup>9</sup> /L	1.1 - 6.3	[Progressive bar chart showing value in normal range]		
%M	= 19 %		[Progressive bar chart showing value in normal range]		
PL <sub>1</sub>	> 245 x10 <sup>9</sup> /L	175 - 500	[Progressive bar chart showing value above normal range]		
Retics	~ 0.9 %		[Progressive bar chart showing value in normal range]		

Buffy Coat Profile



Cedarmount Veterinary Clinic  
 67 Bryansburn Road, Bangor,  
 Co Down, BT20 3SD.  
 028 91 271364

Species : Adult Canine  
 Patient : BEN  
 Client : GRAHAM

Ver: 6.7A  
 Date : 21-Nov-2002 12:49PM

	Results	Reference Range	Indicator		
			LOW	NORMAL	HIGH
ALB	= 33 g/l	27 - 38			
ALKP	= 57 U/L	23 - 212			
ALT	= 20 U/L	10 - 100			
AMYL	= 1041 U/L	500 - 1500			
UREA	= 2.32 mmol/l	2.50 - 9.64			
Ca	= 2.52 mmol/l	1.98 - 3.00			
CHOL	= 3.19 mmol/l	2.84 - 8.27			
CREA	= 118 umol/l	44 - 159			
GLU	= 5.87 mmol/l	4.28 - 6.94			
PHOS	= 0.95 mmol/l	0.81 - 2.19			
TBIL	= 3 umol/l	0 - 15			
TP	= 62 g/l	52 - 82			
GLOB	= 30 g/l	25 - 45			

Na, K, Cl, and blood pH - all within reference range (Istat)



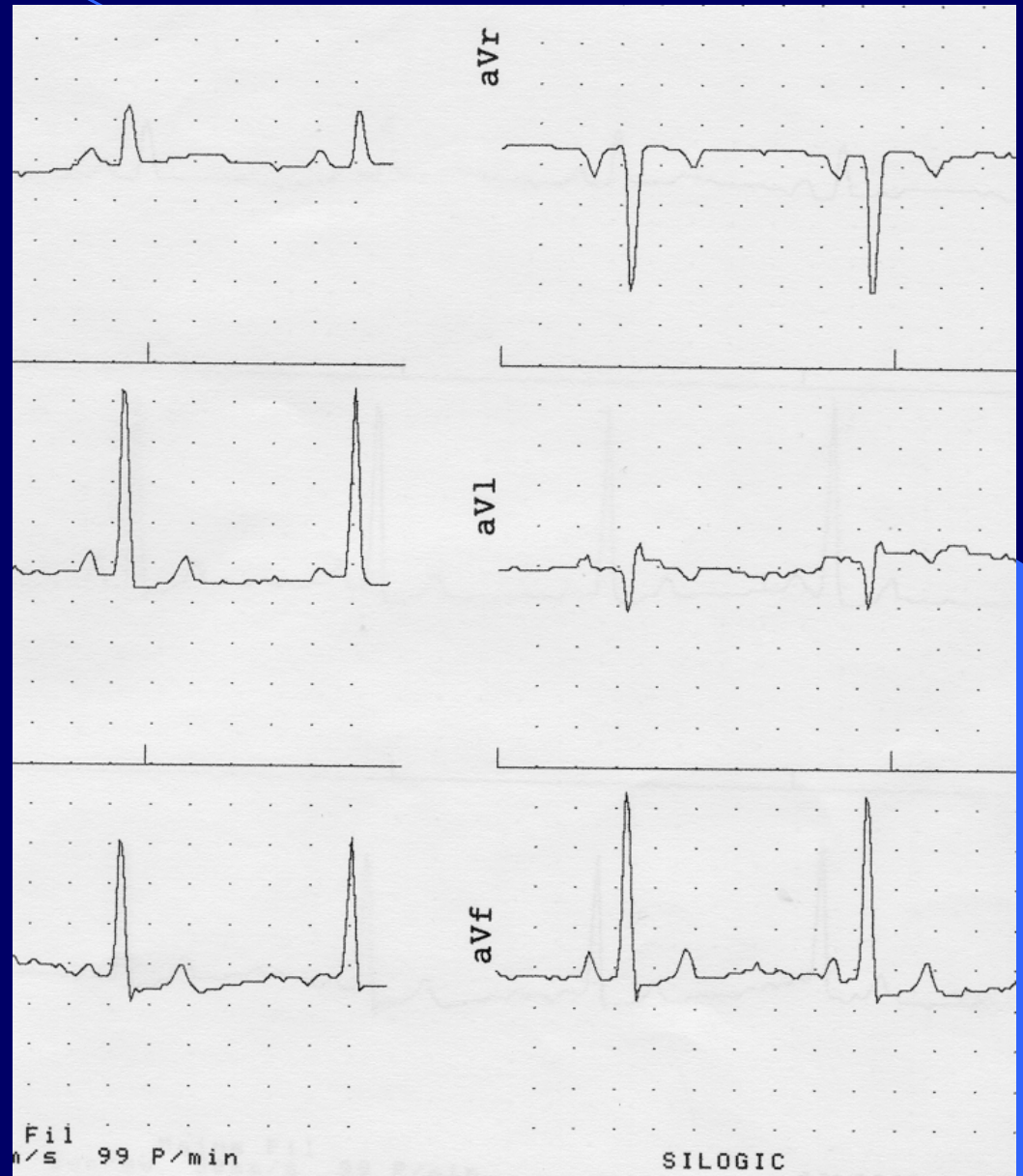


# Ben

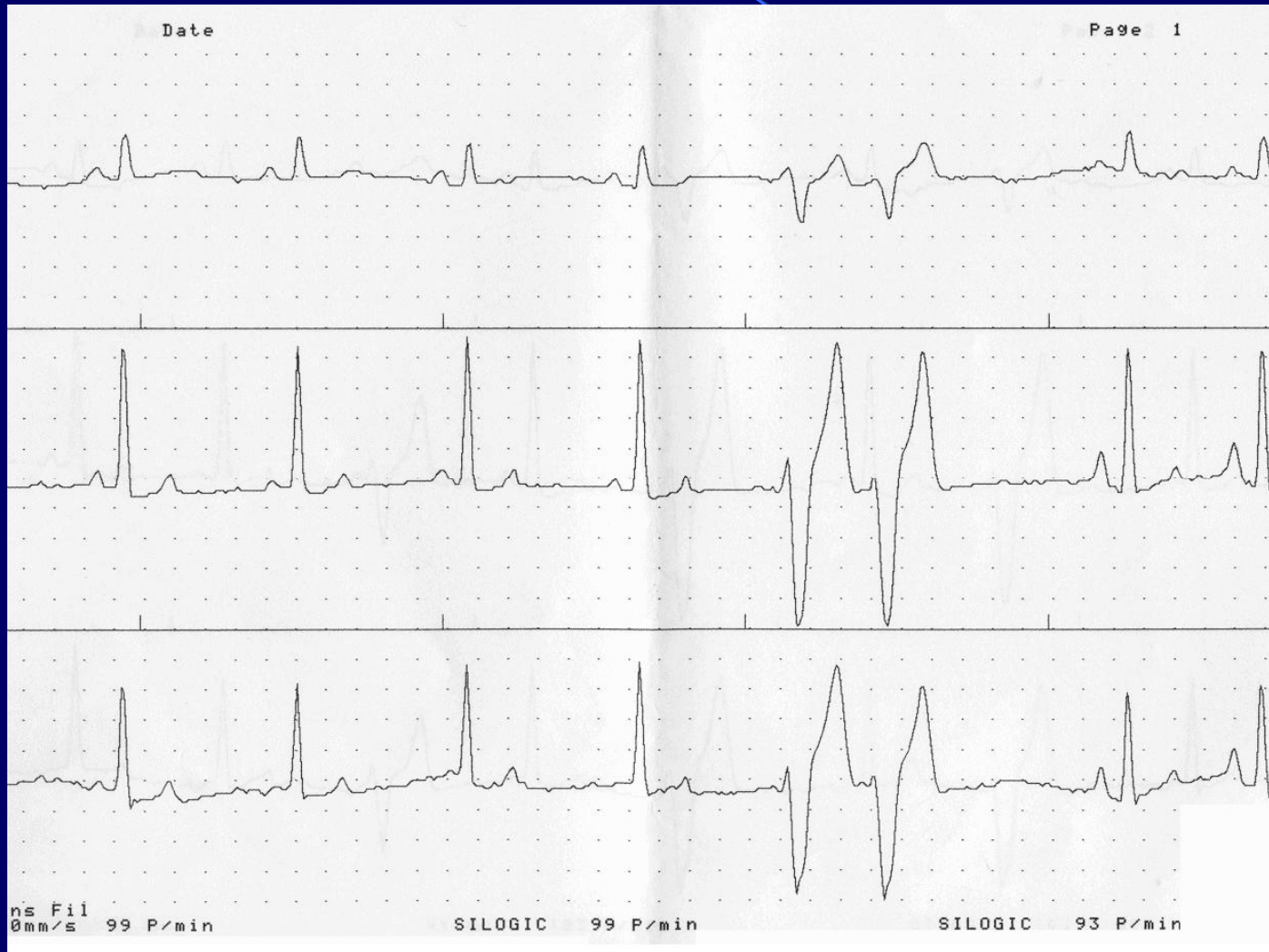
## 6 lead trace

2 cm/mV  
50 mm/s

I  
II  
III



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I

II

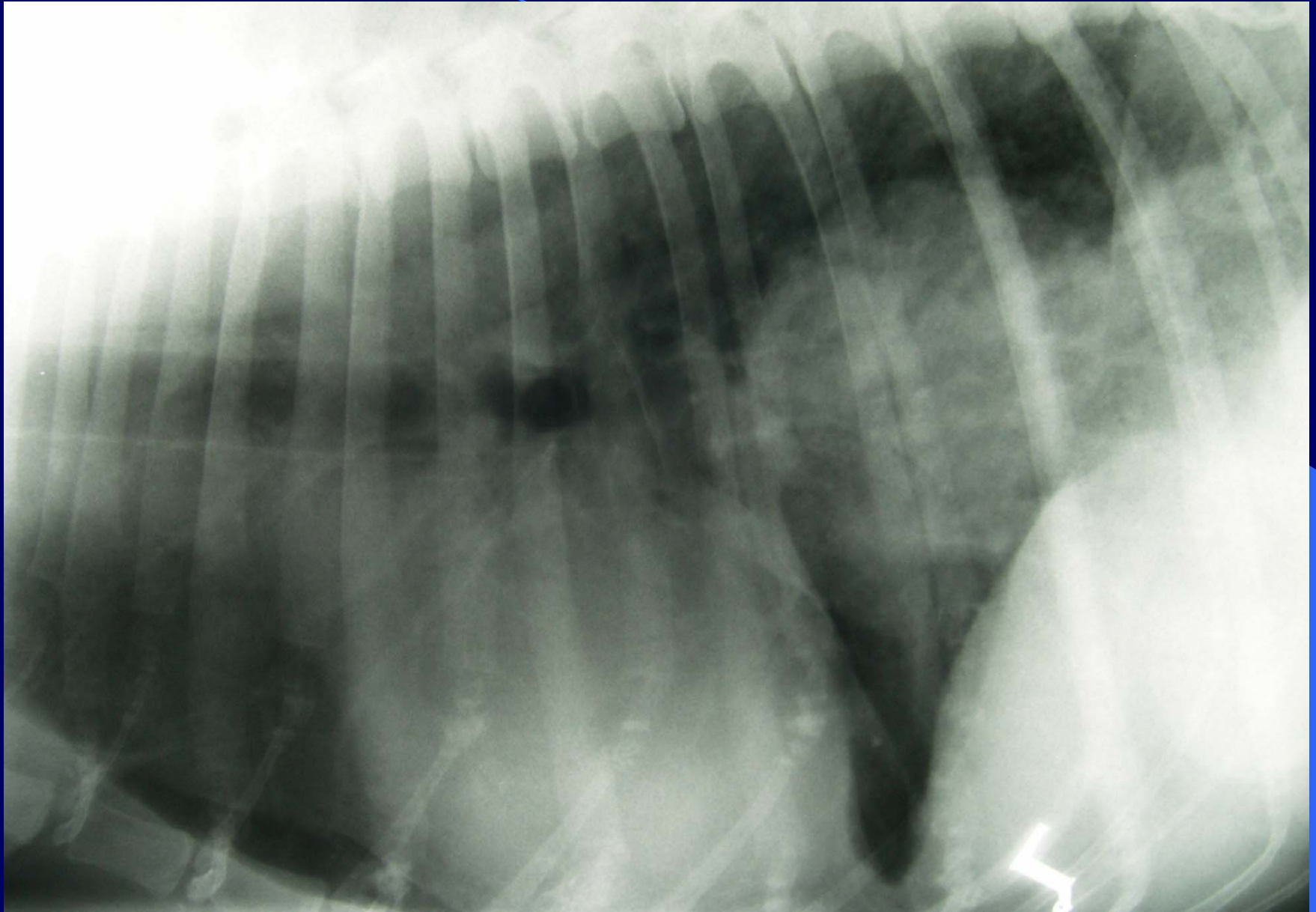
III



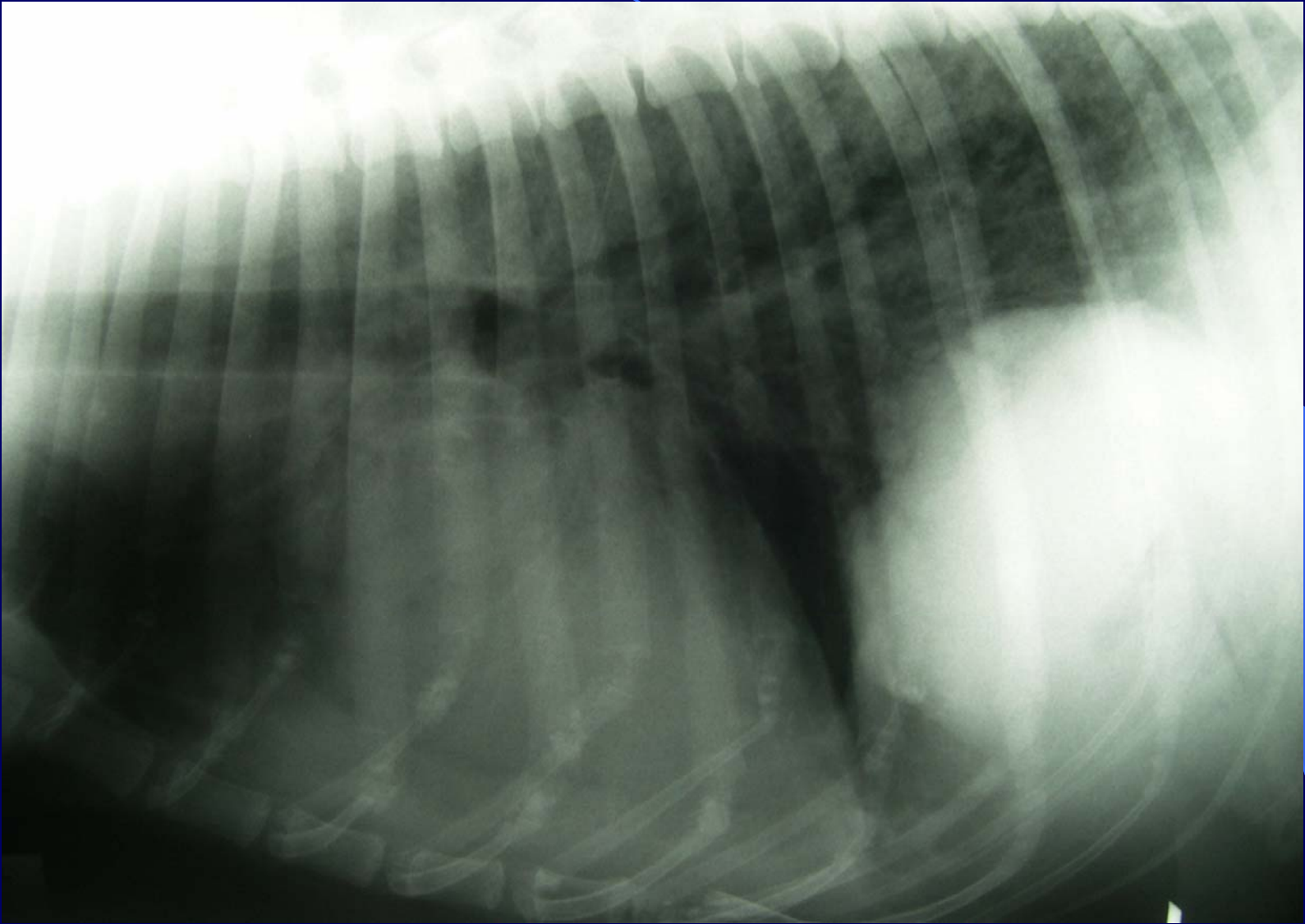
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# Ben - Lead II

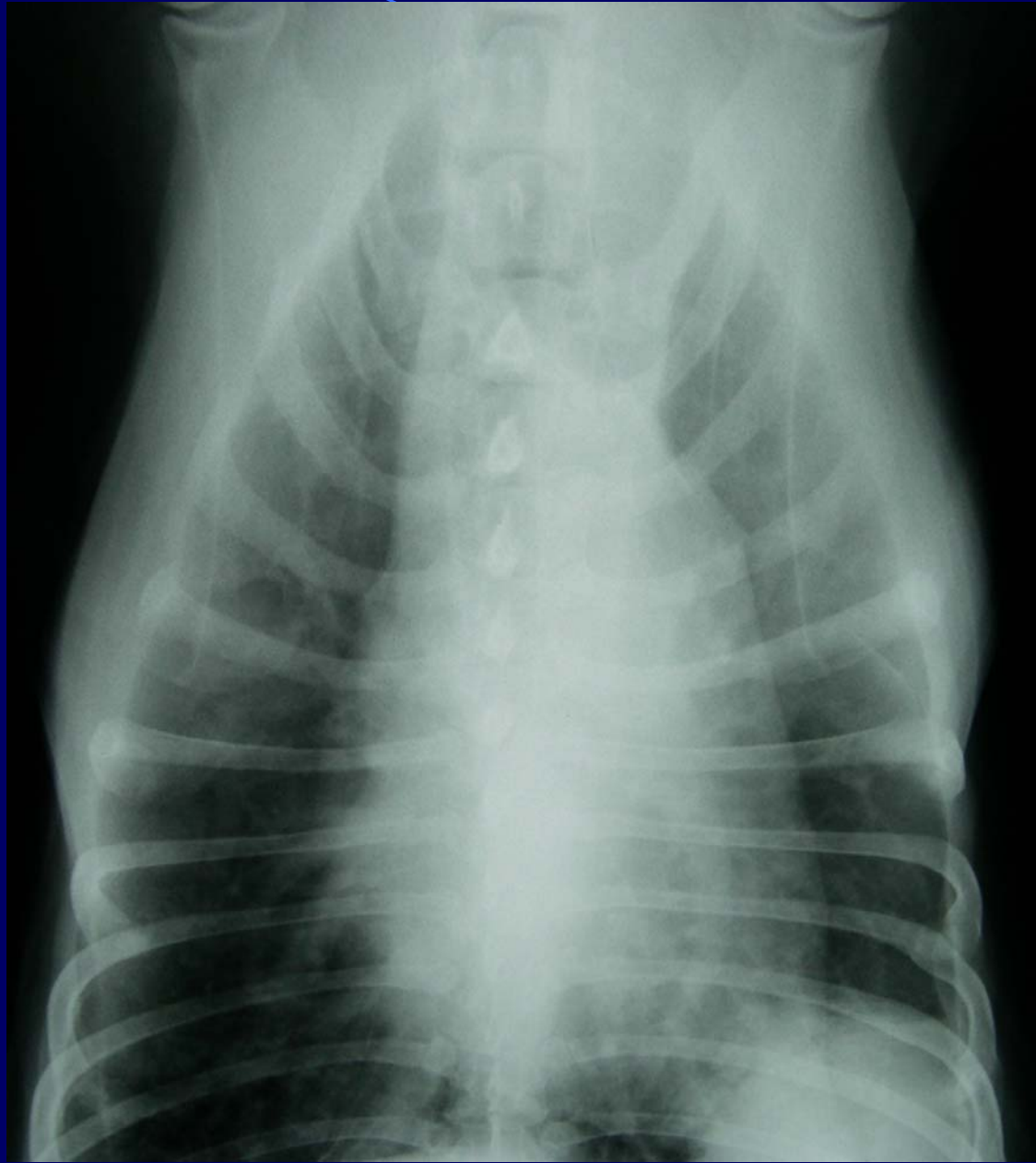




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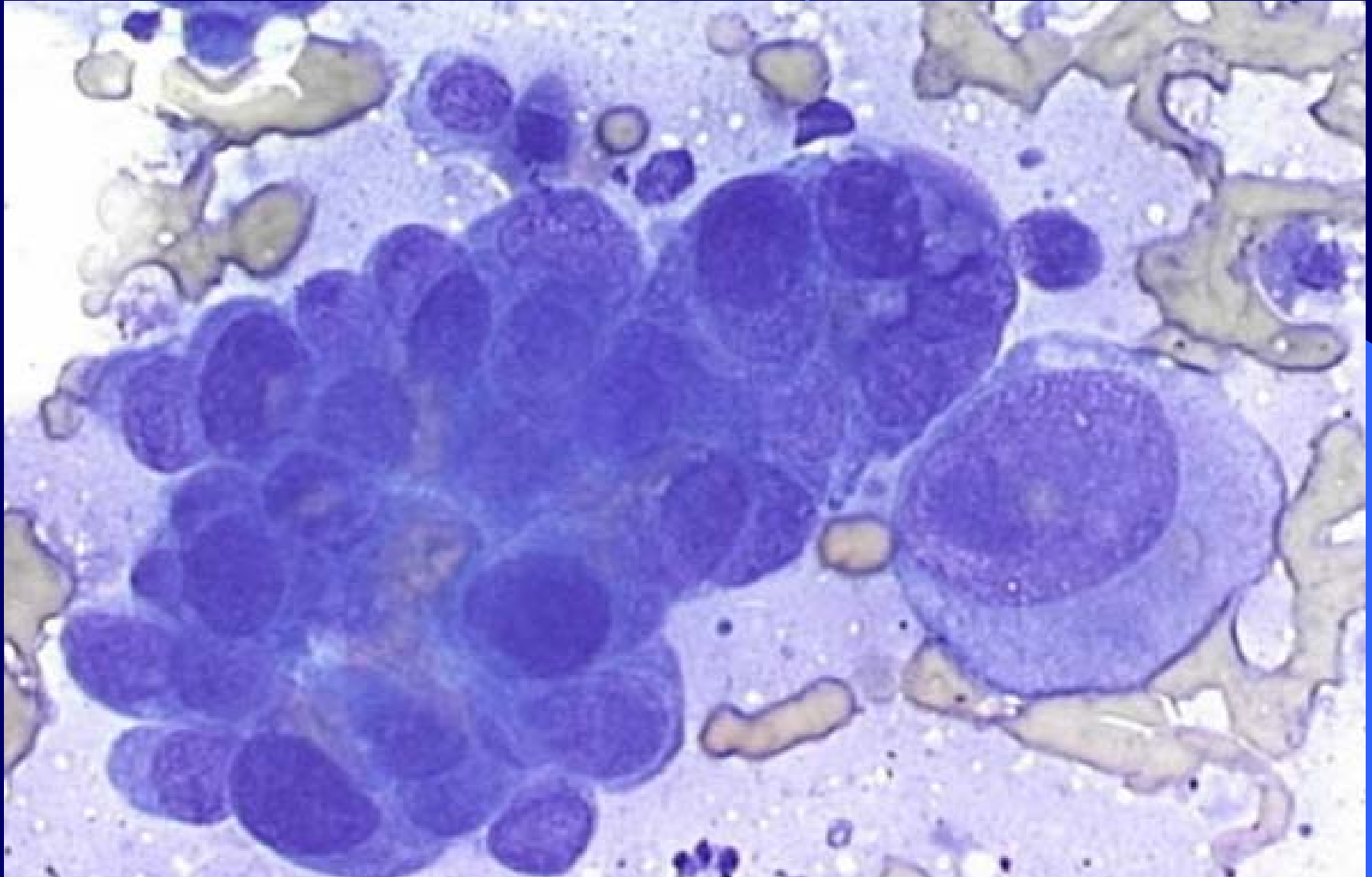


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# FNA mass



# Case Presentation: Mack

- 9 year old MN WHWT,
- historical grade II/VI, mid-systolic, soft murmur, loudest at the apex of the heart on the left-hand side
- three short pre-syncopal episodes at exercise





# Presyncope

- he staggered to one side
- sternal recumbency for a few seconds
- hind legs straight out behind
- *No loss of consciousness*, urination, defaecation or salivation
- No confusion
- Recovery in a few seconds
  
- His appetite and thirst were normal.

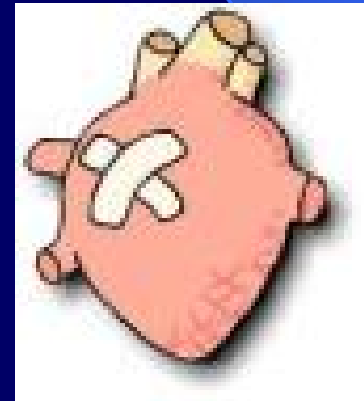


		<b>Clinical Sign</b>	
Weight		<b>10.0 kg</b>	
Demeanour		Nervous, bright, alert.	
Mucous membranes		Deep pink, moist, normal CRT (1.5 seconds)	
Heart		<b>Rate slow 55 /minute, normal: 70-160/minute and regular. On prolonged auscultation, occasional pauses of around two seconds were detected. Soft, grade II/VI, protosystolic murmur, loudest on the left, at the apex of the heart</b>	
Pulses		Femoral pulses strong. No pulse deficit.	
Neck		No jugular distension/pulses.	
Respiration		Rate normal (15/minute). No abnormal lung sounds were detected	
Peripheral lymph nodes		All palpable, not enlarged or painful.	
Abdomen		No pain or organomegaly on palpation.	
Eyes		Normal, pupils equal and reacting to light	
Ears		Waxy otitis externa (right). Not possible to visualise the tympanic membrane on right	
Rectal Temperature		Normal (38.1 C)	



## Problem List

- Pre-syncope, at exercise
- Bradycardia (regular, with intermittent pauses)
- Murmur
- (Otitis externa)
- (Obesity)



# Presyncope, at exercise

Cardiac cause suspected, since:

1. It occurred at exercise,
2. It lasted only a few seconds with a rapid recovery,
3. There was no loss of consciousness, muscle spasm, cyanosis or confusion,
4. There was a bradycardia.

ie. **arrythmia**, but also considering possible causes of forward failure (pulmonic/subaortic stenosis, pericardial tamponade (unlikely – no jugular distension or pulsus paradoxicus), heart failure) and vasovagal syncope.



## Bradycardia (regular, with intermittent pause in the rhythm)

- Sinus bradycardia
- Intermittent sinus arrest or sinoatrial standstill
- Sick-sinus syndrome
- Heart block (3<sup>rd</sup> or advanced 2<sup>nd</sup> degree)



Other disorders which might cause bradydysrhythmias.

- Respiratory disease (increased vagal tone -especially chronic pulmonary disease of WHWT (IPF))
- Hyperkalaemia (hypoadrenocorticism, acute renal failure (very unlikely))
- Hypocalcaemia (hypoparathyroidism)
- Hypoglycaemia (insulinoma)
- Hypothyroidism

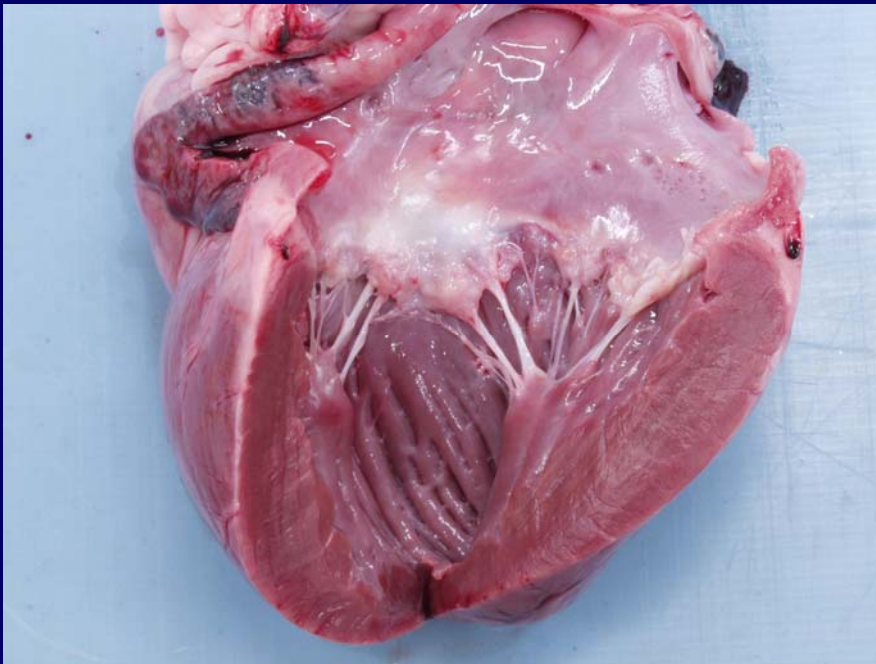
Miscellaneous:

Neurological and neuromuscular disorders, epilepsy, CNS tumour, myasthenia gravis, polymyopathy/polymyositis, vestibular disease (including extension from otitis externa (no other signs of this detected – no nystagmus or head tilt observed at any time)).



**Acquired murmur (soft, grade II/VI,  
protosystolic murmur, loudest on the left at the  
apex of the heart)**

- Degenerative mitral valve disease (or tricuspid)
- (Anaemia ??pale mucous membranes)



<i>Serum Chemistry</i>	<i>Result</i>	<i>Reference Range</i>
Albumin	30 g/l	21-36 g/l
Serum alkaline phosphatase	322 U/L	46-337 U/L
Serum alanine aminotransferase	60 U/L	8-75 U/L
Amylase	1200 U/L	300-1300 U/L
BUN	9.00 mmol/l	2.5-10.35 mmol/l
Cholesterol	4.00 mmol/l	2.58-10.34 mmol/l
Total Calcium (unionised)	2.80 mmol/l	1.95-3.15 mmol/l
Creatinine	96 umol/l	27-106 umol/l
<b>Glucose</b>	<b>8.14 mmol/l</b>	5.00-7.78 mmol/l
Phosphate	2.67 mmol/l	1.65-3.35 mmol/l
Total bilirubin	10 umol/l	0-14 umol/l
Total Protein	56 g/l	48-72 g/l
Total thyroxine	40 nmol/L	15-51 nmol/L
Globulin	26 g/l	23-38 g/l
PCV	48 L/L	37.0-55.0L/L
HGB	16.0 g/dl	12.0-18.0 g/dl
MCHC	36.5 g/dl	30.0-36.9 g/dl
WBC	10.0 x 10 <sup>9</sup> /L	6.0-16.9 x 10 <sup>9</sup> /L
GRANS	5.0 x 10 <sup>9</sup> /L	3.3-12.0 x 10 <sup>9</sup> /L
%GRANS	63%	
NEUTS	2.5 x 10 <sup>9</sup> /L	2.8-10.5 x 10 <sup>9</sup> /L
EOSINS	0.5 x 10 <sup>9</sup> /L	0.5-1.5 x 10 <sup>9</sup> /L
L/M	2.0 x 10 <sup>9</sup> /L	1.1-6.3 x 10 <sup>9</sup> /L
%L /M	37%	
PLT	350 x 10 <sup>9</sup> /L	175-500 x 10 <sup>9</sup> /L



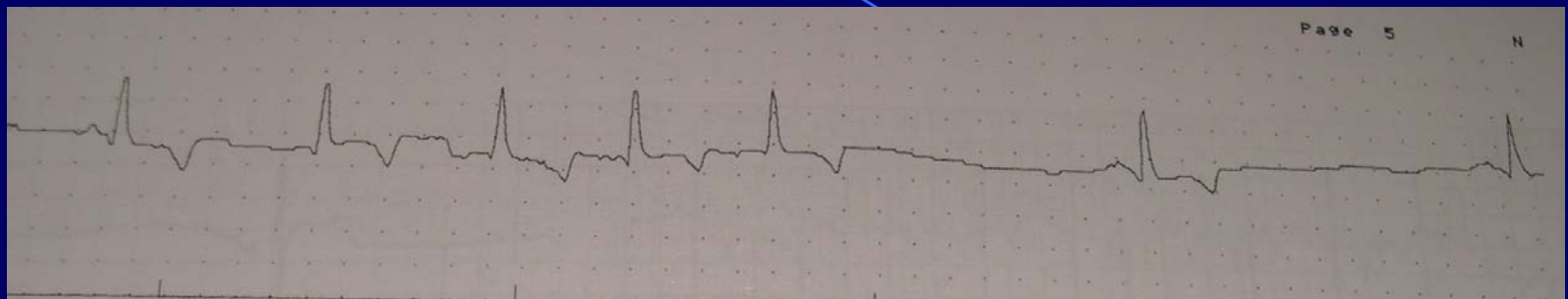


<i>Parameter</i>	<i>Result</i>	<i>Reference Range</i>
Glucose (mmol/L)	<b>7.2</b>	3.33-6.38
BUN (mmol/L)	9.0	3.57-9.28
Sodium (mmol/L)	145	142-155
Potassium (mmol/L)	4.5	3.4-4.9* (Serum 4.1-5.5)
Chloride (mmol/L)	111	106-127
PCV (L/L)	48	35-50
Haemoglobin (g/dl)	16	12-17
pH	7.42	7.35-7.45

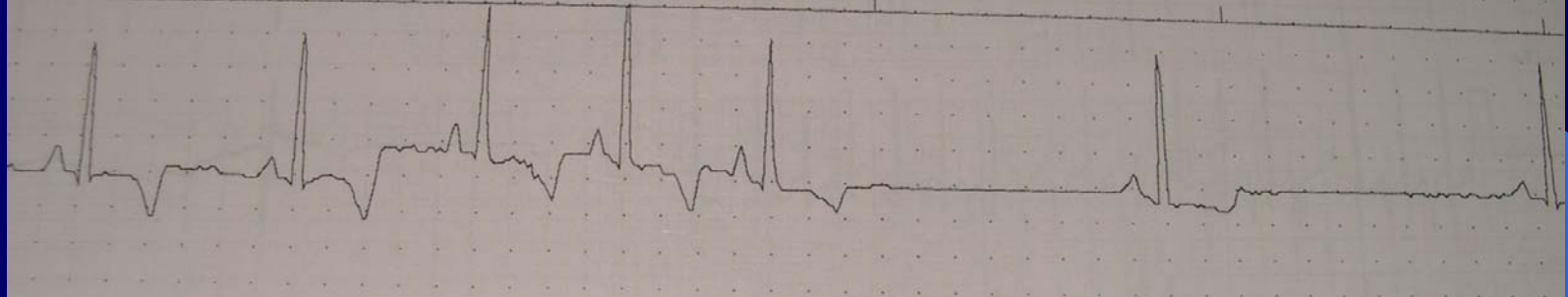
\*The methodology of the Istat necessitates an Istat-specific reference range



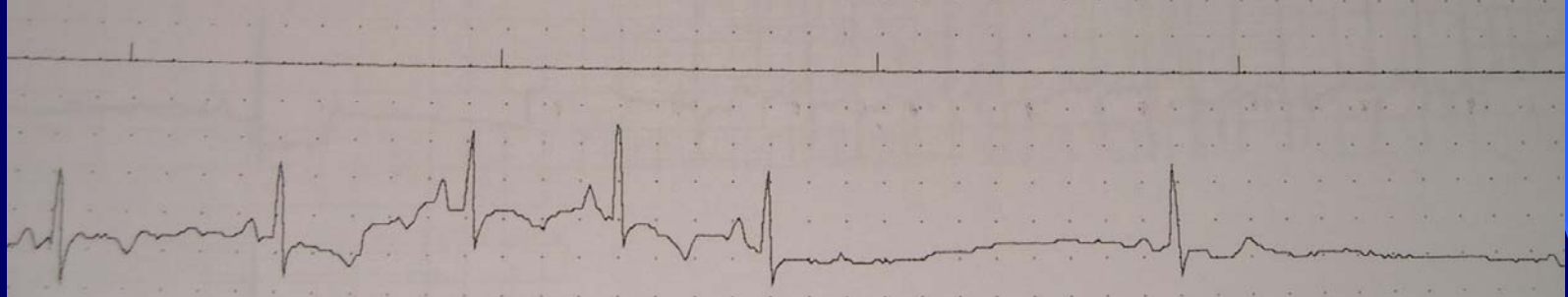
I



II



III



No Fil  
50mm/s 56 P/min

SILOGIC 60 P/min

SILOGIC 60 P/min



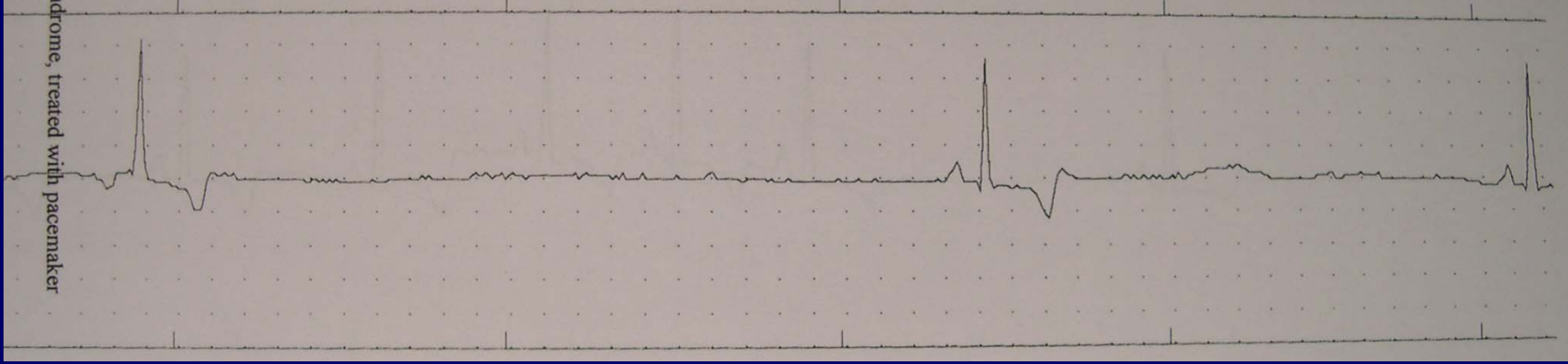
II



II



II

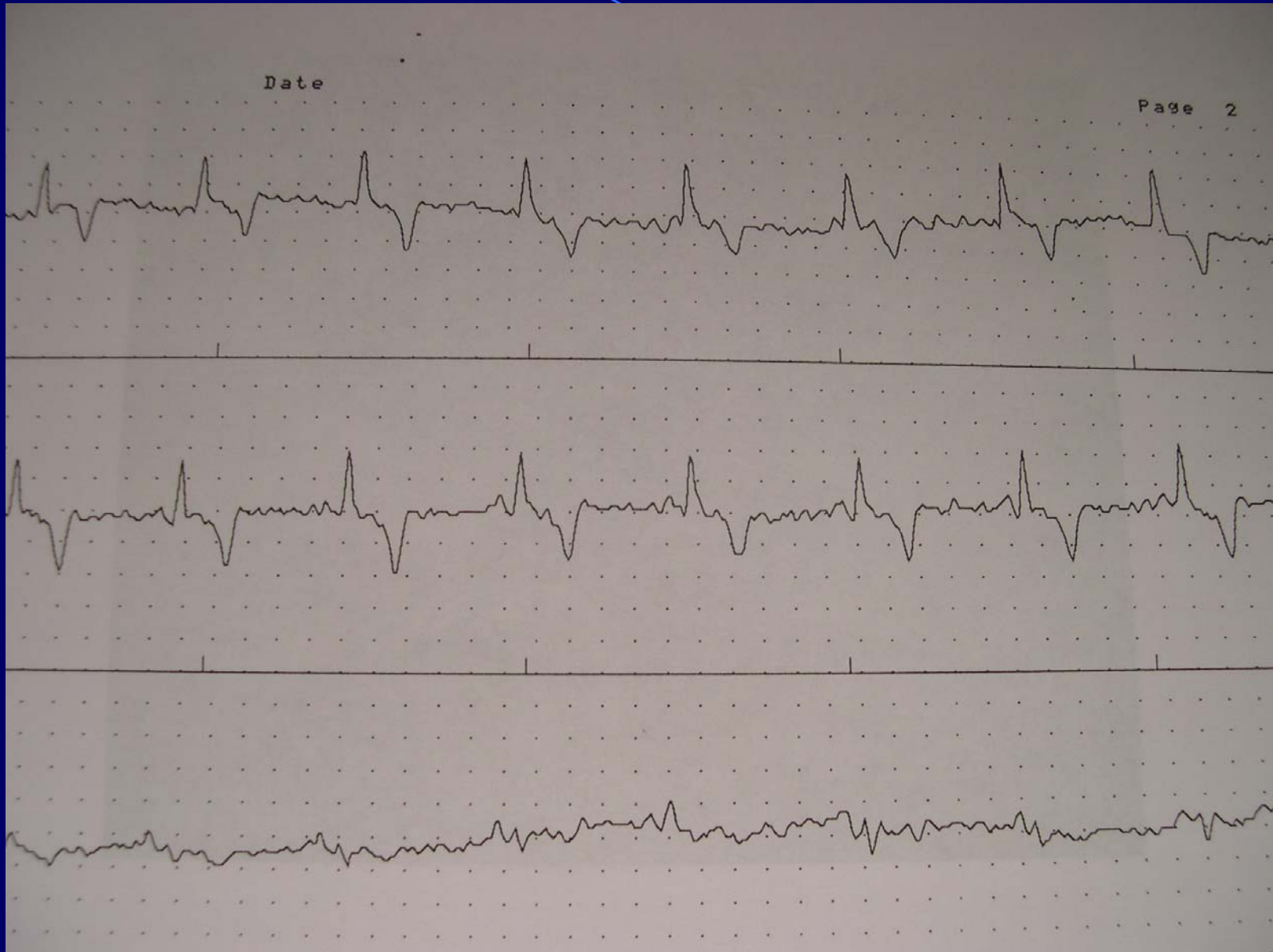


	<b>Result</b>	<b>Reference Range</b>
Heart Rate	<b>60 bpm</b>	<b>70-160 bpm</b>
Rhythm	<b>Sinus bradycardia</b>	
P	<b>0.04 sec 0.2 mV*</b>	<b>0.04 sec 0.4 mV</b>
P-R	<b>0.08 sec</b>	<b>0.06-0.13 sec</b>
qRs	<b>0.04 sec 1.1 mV*</b>	<b>&lt;0.05 sec &lt;2.0 mV</b>
Q-T interval	<b>0.2 sec</b>	<b>0.15-0.25 sec at normal heart rate</b>
MEA*	<b>+70°</b>	<b>+40° to +100°</b>
Comment	<b>Some movement artefacts</b>	

Footnote: the mains filter reduces the amplitude of all complexes slightly  
 \* MEA determined by analysis of Lead I (net amplitude +6) and lead III (net amplitude +8)  
 (Tilley, 1992)



# Atropine Response Test 30 mins post 0.04 mg/kg s/c



# Treatment and Follow up

- Propantheline bromide 3.75 mg/kg PO q8h
- Good response for 8 weeks (HR 110/min)
- Recurrence of daily presyncopal episodes failed to respond to 7.5 mg propantheline, even when supplemented with slow release theophylline (Corvental-D) at 20 mg/kg q24h
- Referred for pacemaker





Preoperative ECG : periods of SVT as well as predominant bradycardia



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# Sick Sinus Syndrome

(Brady-tachy-syndrome)

- Idiopathic
- Female miniature schnauzers
- Female WHWT + Mack (MN WHWT)!
- Paced at 90/min (single chamber VVI, Vitrion)
- Continuing SVT controlled with digoxin (0.0625 mg q12h)
- Died of IPF six years later





Remember to  
remove  
pacemaker  
before  
cremation!

