

## **Problem Orientated Medicine**

### **Endocrine Disease – Cases**

#### **Case 1 Dennis**



#### **Signalment**

- > Boxer
- > 6
- > M(e)
- > No travel history
- > Vaccinated and wormed

#### **History at referral**

- > Chronic poor ambulation and pacing on solid floors
- > Low positioned hocks.
- > Slower than normal
- > Interrupted urine stream

- > Otherwise normal, including appetite thirst

### **Examination**

- > BAR
- > T38, P60, R20
- > MM and LN nad
- > Chest clear
- > Abdomen uncomfortable caudally, large moderately painful prostate on rectal
- > Bilateral symmetrical flank alopecia, and poor hair growth
- > Testicular atrophy - bilateral

### **Neurological Examination**

- > Low posture of the hocks, no proprioceptive deficits, normal bilateral patellar and tibialis reflexes, normal forelimb reflexes, no neck pain, no thoracolumbar pain

### **Problems**

**What are Denis' problems?**

**Can you draw up a problem list and neurolocalise any of the clinical signs?**

**Draw up an action plan?**

**Blood work –**

**Biochemistry**

**BIOCHEMISTRY**

Test	Result	Alert	Units	Reference Range
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**Biochemistry**

*Total Protein	61.7		g/L	54.9 - 75.3
*Albumin	26.2	Low	g/L	26.3 - 38.2
*Globulin	35.5		g/L	23.4 - 42.2
*AG Ratio	0.74			0.70 - 1.40
*Urea	4.2		mmol/L	3.1 - 10.1
*Creatinine	87.0		umol/L	20.0 - 144.5
*ALT (SGPT) 37 C	213.0	High	U/L	19.8 - 124.0
*Alk. Phosphatase 37 C	392.0	High	U/L	<= 130.0
*Gamma GT 37 C	13.8	High	U/L	2.5 - 10.6
*Total Bilirubin	0.8		umol/L	0.1 - 4.2
*CK (CPK) 37 C	502.0	High	U/L	20.0 - 225.0
*Bile Acids (fasting)	3.5		umol/L	0.1 - 5.0
*Cholesterol	15.96	High	mmol/L	3.20 - 6.20
*Triglycerides	1.13		mmol/L	0.30 - 1.20
*Amylase. 37 C	1749.0	High	U/L	100.0 - 1200.0
*Lipase 37 C	2141.1	High	U/L	0.1 - 200.0
*Sodium	146.0		mmol/L	135.0 - 155.0
*Potassium	5.49		mmol/L	3.60 - 5.60

**\*Sodium/Potassium ratio**

26.59 Low 28.80 - 40.00

**\*Chloride** 106.0 mmol/L 100.0 - 116.0

**\*Inorganic phosphorus** 1.65 High mmol/L 0.80 - 1.60

**\*Calcium** 2.35 Low mmol/L 2.36 - 2.84

**\*Glucose** 6.2 mmol/L 3.6 - 7.0

**Haematology**

## Full Blood Count

**\*Red cells** 6.42  $10^{12}/L$  5.50 - 8.50

**\*Haemoglobin** 15.4 g/dL 12.0 - 18.0

**\*Hct** 0.442 l/L 0.380 - 0.570

**\*MCV** 68.8 fL 61.0 - 80.0

**\*MCH** 24.0 pg 20.0 - 26.0

**\*MCHC** 34.8 g/dL 30.0 - 36.0

**\*Absolute retic. count** 64.2  $10^9/L$   $\leq$  110.0

**\*White Cells** 12.9  $10^9/L$  6.0 - 15.0

**\*Neutrophils (Absolute)** 11.09  $10^9/L$  2.50 - 12.50

**\*Neutrophils** 86 %

**\*Lymphocytes (Absolute)** 1.29 Low  $10^9/L$  1.40 - 4.90

**\*Lymphocytes** 10 %

**\*Monocytes (Absolute)** 0.52  $10^9/L$   $\leq$  0.80

**\*Monocytes** 4 %

**\*Eosinophils (Absolute)** 0.00  $10^9/L$  0.00 - 1.60

**\*Eosinophils** 0 %

**\*Platelet count** 570 High  $10^9/L$  150 - 450

**Urine - Normal SG 1.040**

**Can any new problems be added to the list?**

**What would you do next?**

**How far have we got?**

**What would you test next?**

## **Case 2 Fenrir**

### **Signalment**

- > 2 year old M(n) Siberian Husky
- > Vaccinated and wormed
- > No travel history
- > Presented to the orthopaedic department for investigation of insidious onset exercise intolerance

### **Orthopaedic Assessment**

- > Shortened pelvic limb gait most pronounced at a medium pace or above
- > Subtle thoracic limb gait abnormality
- > Mild resentment of full extension of both coxofemoral joints
- > No joint effusion, muscle asymmetry
- > Neurological exam normal –proprioception/myotactic reflexes

### **What would you do next?**

#### **History at medical appointment?**

- > Fenrir is an active racing Husky, he regularly runs 10K a day
- > Recent decrease in exercise tolerance tiring at 1-2K and having to have a period of rest before returning to exercise
- > Otherwise well, no PU/PD, change in appetite, change in weight

#### **Clinical examination**

- > BAR
- > T37C, (it was a very hot day), P56, R20
- > MM and peripheral LN nad
- > Chest HR 56 no murmur, marked sinus arrhythmia
- > Abdomen NAD
- > Hair coat slightly dull

**Can you generate a problem list?**

**Make an action plan?**

## BIOCHEMISTRY

### Extended Profile

Total protein	67	g/L	(54.0 -77.0 )
Albumin	34	g/L	(25.0 -40.0 )
Globulin	33	g/L	(20.0 -47.0 )
Albumin Globulin ratio	1.0		(0.6 - 1.5 )
Sodium	144	mmol/L	(142 -157 )
Potassium	6.1	mmol/L	(3.6 -6.6 )
Na:K ratio	* 24	Low	(25.0 -35.0 )
Chloride	110	mmol/L	(99 -119 )
Total calcium	2.56	mmol/L	(2.0 -3.0 )
Phosphate	1.3	mmol/L	(0.8 -1.6 )
Urea	7.8	mmol/L	(3.0 -9.0 )
Creatinine	141	umol/L	(40 - 150)
Alk Phos	19	U/L	(0.1 -150.0 )
ALT	37	U/L	(5.0 -66.0 )
AST	45	U/L	(0.0 -49.0 )
GLDH	1	U/L	(0.1 -10.0 )
Gamma GT	3	U/L	(0.1 -12.0 )
Total bilirubin	1.7	umol/L	(0.1 - 9.0 )
Bile acids	1.5	umol/L	(0.1 - 5.0 )
Glucose	4.6	mmol/L	(3.5 - 6.5)
CK	* 390	U/L	High (0.0 -190.0)
Cholesterol	* 15.2	mmol/L	High (3.8 -7.0 )
Triglycerides	1.3	mmol/L	(0.45 -1.9 )
Amylase	351	U/L	( 0 - 1800)
Lipase	23	U/L	(0.0 -250.0)

Serum quality      Good



## HAEMATOLOGY

RBC	* 5.19	x10 <sup>12</sup> /L	Low (5.9 -8.4 )
Hb	* 11.7	g/dl	Low (14.2 -20.0 )
HCT	* 33.4	%	Low (43.0 -60.0 )
MCV	64.4	fl	(60.0 -80.0 )
MCH	22.5	pg	(22.0 -25.9 )
MCHC	35.0	g/dl	(30.8 -35.5 )
RBC distribution	15.2	%	(12.9 - 17.8)
Reticulocytes	54	X10 <sup>9</sup> /L	( 20 - 151 )
Platelets	281	x10 <sup>9</sup> /L	(108 -562 )
WBC	6.21	x10 <sup>9</sup> /L	(5.9 -14.5 )
Neutrophils	55.2%	3.43 x10 <sup>9</sup> /L	(3.1 - 9.4 )
Bands	0.0%	0.00 x10 <sup>9</sup> /L	(0.0 -0.3 )
Lymphocytes	35.7%	2.22 x10 <sup>9</sup> /L	(0.8 - 4.7 )
Monocytes	2.3%	0.14 x10 <sup>9</sup> /L	(0.0 - 1.6 )
Eosinophils	6.6%	0.41 x10 <sup>9</sup> /L	(0.1 - 1.4 )
Basophils	0.2%	0.01 x10 <sup>9</sup> /L	(0.0 -0.2 )

**Blood Film Examination** A smear from the submitted EDTA and a fresh blood

film were examined. Red cells appear normocytic and normochromic.

A single Mast cell seen after the differential was performed.

Other white cells appear of normal morphology.

Platelet morphology and numbers appear normal with no evidence of platelet clumps or clots.

**New problems?**

**What would you do next?**

### Case 3 James



#### Signalment

- > 2 year 8 month M(e)
- > Labrador retriever
- > BIOP from a puppy
- > Vaccinated and wormed

#### History at referral

- > Six day history of progressive weakness and unwillingness to stand
- > Started as sitting down frequently at play to requiring help standing on the day of referral

#### Clinical Examination

- > Recumbent, poorly responsive to voice and handling. Peripheral reflexes sluggish intact
- > T36.5C, P32-56, R12
- > MM cool, crt 2secs
- > Thorax HR 32-56, chest clear
- > Abdomen comfortable, dry faeces in rectum

- > Weak peripheral pulses, BP 110 mmHg each beat

**Can you generate a problem list?**

**Use the problem list to generate differential diagnosis?**

**Action plan?**

Client: cartledge (cartledge)  
Patient Name: jet  
Species: Canine  
Breed:

Gender: Male  
Weight: 0.0 lbs  
Age: 2 Years  
Doctor:

Armac Veterinary Clinic  
147, The Rock,  
Bury.

Test	Results	Reference Interval	LOW	NORMAL	HIGH
<b>LaserCyte (22 March 2011 16:59)</b>					
WBC	5.09 x10 <sup>9</sup> /L	5.50 - 16.90	LOW		
LYM	1.72 x10 <sup>9</sup> /L	0.50 - 4.90			
MONO	0.61 x10 <sup>9</sup> /L	0.30 - 2.00			
NEU	2.32 x10 <sup>9</sup> /L	2.00 - 12.00			
EOS	0.41 x10 <sup>9</sup> /L	0.10 - 1.49			
BASO	0.02 x10 <sup>9</sup> /L	0.00 - 0.10			
%LYM	33.9 %				
%MONO	12.0 %				
%NEU	45.6 %				
%EOS	8.1 %				
%BASO	0.5 %				
HCT	44.1 %	37.0 - 55.0			
RBC	6.18 x10 <sup>12</sup> /L	5.50 - 8.50			
HGB	12.5 g/dL	12.0 - 18.0			
RETIC	19.8 K/ $\mu$ L				
%RETIC	0.3 %				
MCV	71.5 fL	60.0 - 77.0			
RDW	17.2 %	14.7 - 17.9			
MCH	20.3 pg	18.5 - 30.0			
PLT	341 K/ $\mu$ L	175 - 500			
MPV	9.2 fL				
PCT	0.3 %				
PDW	17.4 %				

**VetTest (22 March 2011 17:16)**

ALB	29 g/L	23 - 40			
ALKP	48 U/L	23 - 212			
ALT	36 U/L	10 - 100			
AMYL	4.44 U/L	500 - 1500	LOW		
BUN	7.1 mmol/L	2.5 - 9.6			
CA	2.58 mmol/L	1.98 - 3.00			
CHOL	8.08 mmol/L	2.84 - 8.26			
CREA	133 $\mu$ mol/L	44 - 159			
GLOB	31 g/L	25 - 45			
GLU	5.00 mmol/L	4.11 - 7.95			
PHOS	1.49 mmol/L	0.81 - 2.20			
TBIL	< 2 $\mu$ mol/L	0 - 15			
TP	61 g/L	52 - 82			

**VetStat (22 March 2011 16:59)**

pH(ven)	7.43	7.31 - 7.42	HIGH		
HCO3(ven)	28.3 mmol/L	20.0 - 29.0			
PCO2(ven)	46.0 mmHg	32.0 - 49.0			
AnGap	19.0 mmol/L				
tCO2(ven)	29.7 mmol/L	21.0 - 31.0			
Na	160.0 mmol/L	144.0 - 160.0			
K	4.8 mmol/L	3.5 - 5.8			
Cl	117.0 mmol/L	109.0 - 122.0			

Specimen Type = Blood  
Specimen Source = Venous  
SamType = Ven

**New Problems?**

**Endocrine Results**

**Can you make a diagnosis?**

## Case 4 Eadie McCreadie



### Signalment

- > 12 year old F(n) cross bred
- > 1 month history of PU/PD
- > Intermittently responsive to antibiotics
- > Owner perceives abdominal pain when petting and grooming
- > Bloods ALP 440U/L, ALT 161U/l GGT12U/l
- > ACTH, LDDS do not suggest Cushings

### Problem List and what would you do next?

## BIOCHEMISTRY

### Extended Profile

Total protein	71	g/L	(54.0 -77.0 )
Albumin	38	g/L	(25.0 -40.0 )
Globulin	33	g/L	(20.0 -47.0 )
Albumin Globulin ratio	1.2		(0.6 - 1.5 )
Sodium	152	mmol/L	(142 -157 )
Potassium	4.8	mmol/L	(3.6 -6.6 )
Na:K ratio	32		(25.0 -35.0 )
Chloride	106	mmol/L	(99 -119 )
Total calcium	2.54	mmol/L	(2.0 -3.0 )
Phosphate	1.4	mmol/L	(0.8 -1.6 )
Urea	* 2.8	mmol/L	Low (3.0 -9.0 )
Creatinine	67	umol/L	(40 - 150)
Alk Phos	889	U/L	High (0.1 -150.0 )
ALT	374	U/L	High (5.0 -66.0 )
AST	40	U/L	(0.0 -49.0 )
GLDH	* 49	U/L	High (0.1 -10.0 )
Gamma GT	* 48	U/L	High (0.1 -12.0 )
Total bilirubin	2.1	umol/L	(0.1 - 9.0 )
Bile acids	3.5	umol/L	(0.1 - 5.0 )
Glucose	4.7	mmol/L	(3.5 - 6.5)
CK	* 350	U/L	High (0.0 -190.0)
Cholesterol	* 8.6	mmol/L	High (3.8 -7.0 )
Triglycerides	1.3	mmol/L	(0.45 -1.9 )
Amylase	572	U/L	( 0 - 1800)
Lipase	134	U/L	(0.0 -250.0)



## HAEMATOLOGY

RBC	7.60	x10 <sup>12</sup> /L	(5.9 -8.4 )
Hb	17.9	g/dl	(14.2 -20.0 )
HCT	51.4	%	(43.0 -60.0 )
MCV	67.6	fl	(60.0 -80.0 )
MCH	23.6	pg	(22.0 -25.9 )
MCHC	34.8	g/dl	(30.8 -35.5 )
RBC distribution	17.3	%	(12.9 - 17.8)
Reticulocytes	52.4	X10 <sup>9</sup> /L	( 20 - 151 )
Platelets	287	x10 <sup>9</sup> /L	(108 -562 )
WBC	10.04	x10 <sup>9</sup> /L	(5.9 -14.5 )
Neutrophils	81.9% 8.22	x10 <sup>9</sup> /L	(3.1 - 9.4 )
Bands	0.0% 0.00	x10 <sup>9</sup> /L	(0.0 -0.3 )
Lymphocytes	10.5% 1.05	x10 <sup>9</sup> /L	(0.8 - 4.7 )
Monocytes	5.0% 0.50	x10 <sup>9</sup> /L	(0.0 - 1.6 )
Eosinophils	2.5% 0.25	x10 <sup>9</sup> /L	(0.1 - 1.4 )
Basophils	0.1% 0.01	x10 <sup>9</sup> /L	(0.0 -0.2 )

## ACTH Stimulation results

TEST	RESULT (Baseline)	Normal Range** Baseline	RESULT (Post ACTH)	Normal Range** Post-ACTH
Cortisol µg/dL	4.9	<1.0-5.9	17.0	6.5-17.5
Androstenedione ng/ml	1.48*	0.05-0.57	>10.0*	0.27-3.97
Estradiol pg/ml	82.4*	30.8-69.9	84.3*	27.9-69.2
Progesterone ng/ml	0.21	<0.20-0.49	2.52*	<0.2-1.50
17 OH Progesterone ng/ml	*<0.08	0.08-0.77	6.97*	0.40-1.62
Testosterone ng/dL	<15.0	<15.0-32.0	<15.0	<15.0-45.0

## Case 5 Douglas

### Signalment

- > 10 year old, M(n) WHWT
- > Vaccinated
- > Wormed
- > No travel history

### History

- > 3 month history of PU/PD
- > Investigations performed at referring practice
  - > Haematology
  - > Biochemistry
  - > Abdominal ultrasound by a peripatetic specialist

### Results

- > Biochemistry 1223u/l, chol 8u/l, bile acids 31mmol/l
- > Haematology unremarkable
- > Ultrasound 'The liver is mildly increased in size and echogenicity, its caudal margin extending beyond the costal arch and its parenchyma isoechoic to the spleen. There is also a subtle heterogeneity to the overall echogenicity of the liver parenchyma. There is no evidence of hepatic lymphadenopathy
- > Liver Biopsy - vacuolar hepatopathy

### Clinical Examination

- > BAR
- > TPR normal
- > Peripheral LN normal to palpation
- > Thorax nad

- > Abdomen some resentment to palpation over the left renal area

**What are Douglas problems?**

**Differential Diagnosis**

**What would you do next**

## Case 7 Toby

### ase 11 Toby

#### **Signalment**

- 4yo MN Dachs BIOP since 10 weeks old
- Vaccine history unknown
- No worming or flea treatment history
- Diet Hills Maintenance and treats
- Lives in a rural area
- No known access to poisons
- no travel abroad

#### **Previous medical history**

None

#### **History at the referring veterinary surgeons**

Toby was presented to the referring veterinary surgeon as an emergency on a Sunday evening. He was collapsed and unable to stand and non responsive to his owner. The owner had observed vomiting and diarrhoea on Sunday morning and described the diarrhoea as 'thick and black like tar'. Clinical examination revealed a temperature of 37, pulse 40 and respiratory rate 24. Heart rate was 40 and rhythm regular. Mucous membranes were dry and tacky and capillary refill time increased. Skin tenting was seen. Abdominal palpation was unremarkable. The referring vet performed the following basic investigations

1. Serum Electrolytes Na 127mmol/l, K 10.4mmol/l
2. Chest and abdominal x-rays, microcardia was observed
3. ECG a ventricular rhythm with no demonstrable P waves

#### **Problem list and major differentials**

What are the main problems for this dog?

**What are the differential diagnoses for these problems?**

**What is your major concern for this patient and how would you act?**

### **History on referral**

After overnight treatment with fluids (0.9% NaCl) at 10 times maintenance!) and an injection of dexamethasone Toby was referred, he was still collapsed and poorly responsive. Vomiting and diarrhoea had stopped but some melaena type faeces were still present.

### **Examination**

On examination Toby was collapsed and poorly responsive. His temperature was normal, pulse 100/min and respiration 20/min. Skin turgor had improved. Thoracic examination was unremarkable

and abdominal palpation although uncomfortable was otherwise unremarkable. Peripheral lymph nodes were normal to palpation and mucous membranes tacky, capillary refill time was <2.5 seconds. He was still unable to stand and neurological examination indicated depression, a decreased bilateral menace response, decreased muzzle sensation, decreased palpebral reflex (left greater than right) with a normal PLR. He was non-ambulatory and had delayed placing reflexes on all four limbs.

### **Problem List-**

### **Differential Diagnosis**



## **Plan**

## **Treatment**

## **Investigations**

**Monitoring**

**Nutrition**

## Results

### Electrolytes and blood glucose

Na 145mmol/l

K 4.9mmol/l

Ca 2.3 mmol/l

Glucose 5.1 mmol/l

### **Biochemistry**

Total Protein	56	g/l	54-77.0
Albumin	24	g/l	26.0 – 40.0
Globulin	32.6	g/l	20.0 -47.0
Sodium	148	mmol/l	139-154
Potassium	3.84	mmol/l	3.5 – 6.0
Chloride	112	mmol/l	99-112
Total Calcium	4.15	mmol/l	2.0-3.0
Phosphate	0.9	mmol/l	0.8-1.6
Urea	15.0	Umol/l	2.0-9.0
Creatinine	204	U/L	40.0-106.0
ALKP	<b>27</b>	U/L	0.0 – 25.0
ALT	<b>58</b>	U/L	0.0-49.0
AST	7	U/L	0.0 – 49.0

GGT	8	U/L	0-27.0
Total Bilirubin	3	Umol/l	0- 9.0
Glucose	4.9	mmol/l	2.0-5.5
CK	153	U/L	0.0-190.0
Cholesterol	4.0	mmol/l	3.8- 7.0
Amylase	587	U/L	0.0 – 1800.0
Lipase	26	U/L	0.0 – 250.0
Magnesium	0.6	mmol/l	0.6-1.3

### Haematology

RBC	<b>4.6</b>	<b>x10<sup>12</sup>/l</b>	<b>5.0-8.5</b>
Hb	13.30	g/dl	12.0-18.0
HCT	<b>29</b>	<b>%</b>	<b>37.0-55.0</b>
MCV	72.8	fl	60-80
MCH	24.4	pg	19.0-26.0
MCHC	33.6	g/dl	31.5-37.0
Platelets	221	x10 <sup>9</sup> /l	160-500
WBC	14.2	x10 <sup>9</sup> /l	6.0-15.0
Neutrophils	11.93	x10 <sup>9</sup> /l	3.0-11.5
Lymphocytes	1.28	x10 <sup>9</sup> /l	1.0-4.8
Monocytes	0.85	x10 <sup>9</sup> /l	0-1.3
Eosinophils	<b>2.2</b>	<b>x10<sup>9</sup>/l</b>	<b>0-1.25</b>

RBC – normal morphology

Platelet count accurate

## Urine

Ph	6.4	
Blood	Negative	
Glucose	Negative	
Ketones	Negative	
Protein	Negative	
Sg	1.009	
Urine Deposits	Scant Epithelia cells	
Urine culture negative		

## ACTH stimulation test

Cortisol pre ACTH <20mmol/l

Cortisol post ACTH < 20mmol/l

ECG normal sinus rhythm

**Based on the information so far**

- 1- Review differential diagnosis
- 2- Do you have a definitive diagnosis and does this explain all the clinical findings so far

Points to Consider

**Revised DDX list**

**Action Plan**

**Results**

**Treatment**

**Point of discussion, how would you prevent this happening again?**