



Australian and New Zealand College of  
Veterinary Scientists

**Membership Examination**

June 2022

**Small Animal Medicine**

**Paper 1**

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL FOUR (4)** questions

Answer **FOUR (4)** questions, each worth 30 marks.....total: 120 marks

1. Answer **all** parts of this question

- a) Briefly outline **five (5)** reported risk factors for canine pancreatitis. (8 marks)
- b) Discuss the pathogenesis of canine pancreatitis. Include in your answer an explanation of how the normal pancreas is protected from autodigestion and how acute and chronic pancreatitis differ. (17 marks)
- c) Discuss the use of ultrasound in the diagnosis of canine pancreatitis. (5 marks)

2. Answer **all** parts of this question

- a) List the **three (3)** physiological features that make the kidneys particularly vulnerable to ischaemic and nephrotoxic insult. (3 marks)
- b) Briefly describe the **three (3)** primary classifications of azotaemia in dogs and cats **and** outline **two (2)** specific aetiologies of acute kidney injury (AKI) for each category. (12 marks)
- c) Define the terms **oliguria** and **anuria**. (2 marks)
- d) Describe the pathophysiologic mechanisms by which acute kidney injury causes **bradycardia, vomiting** and **dehydration** in dogs and cats. Each problem may be discussed separately. (13 marks)

3. Answer **all** parts of this question

- a) Outline the aetiopathogenesis for the most common causes of left ventricular hypertrophy in cats older than **eight (8)** years of age. (6 marks)
- b) Discuss the pathogenesis of the clinical disease caused by feline (primary) hypertrophic cardiomyopathy. (18 marks)
- c) Discuss the application(s) and limitation(s) of the SNAP NT-proBNP test cats presenting with suspected congestive heart failure. (6 marks)

4. Answer **all** parts of this question
- a) Micturition involves a storage and a voiding phase. Discuss the neurological control of the **storage** phase. *(12 marks)*
  
  - b) Urethral sphincter mechanism incompetence (USMI) is the most common cause of acquired urinary incontinence in female neutered dogs. Outline the role of ovariohysterectomy in the pathogenesis of USMI in female dogs. *(10 marks)*
  
  - c) **Phenylpropanolamine** and **oestriol** are used for the management of urinary incontinence in dogs. Outline the mechanism of action for **each** of these drugs. *8 marks)*

**End of paper**



Australian and New Zealand College of  
Veterinary Scientists

**Membership Examination**

June 2022

**Small Animal Medicine**

**Paper 2**

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL FOUR (4)** questions

Answer **FOUR (4)** questions, each worth 30 marks.....total: 120 marks

1. Answer **all** parts of this question

A six-month-old, male entire, Maltese terrier presents for vomiting, diarrhoea and reduced appetite over the last 48 hours. He has noticeable polyuria and polydipsia compared to the other dogs in the household. His owner reports minimal weight gain since acquisition **3 (three)** months ago, and at times appears dull.

On physical examination the patient is dull and has pale pink mucous membranes. All other physical examination findings are within normal limits.

A complete blood count and serum biochemistry are performed. The results of these are presented below:

Parameter	Abbreviation	Units	Result	Reference range
Alkaline phosphatase	ALP	U/L	42	5-50
Alanine transaminase	ALT	U/L	<b>143</b>	19-100
Gamma-glutamyl transferase	GGT	U/L	3	0-5
Aspartate aminotransferase	AST	U/L	<b>66</b>	2-62
Total bilirubin	TBIL	µmol/L	4	0-7
Cholesterol	CHOL	mmol/L	<b>1.4</b>	2.2-5.5
Urea	UREA	mmol/L	<b>3.6</b>	5.0-15.0
Creatinine	CREA	µmol/L	<b>68</b>	80-160
Calcium	CA	mmol/L	2.3	2.1-2.8
Phosphorus	PHOS	mmol/L	2.1	1.0-2.3
Total protein	TP	g/L	<b>55</b>	57-89
Albumin	ALB	g/L	<b>15</b>	22-40
Globulin	GLOB	g/L	40	31-52
Glucose	GLU	mmol/L	<b>2.9</b>	3.2-7.5
Creatine kinase	CK	U/L	230	64-400
Sodium	Na	mmol/L	144	144-158
Potassium	K	mmol/L	4.3	3.7-5.4
Chloride	Cl	mmol/L	109	106-123
Bicarbonate	HCO <sub>3</sub>	mmol/L	18	12-24
Total T4	TT4	nmol/L	12	10-60
Haematocrit	HCT	L/L	<b>34.3</b>	37.3-61.7
Red blood cells	RBC	x 10 <sup>12</sup> /L	7.08	5.65-8.87
Reticulocyte %	Retic %	%	0.7	
Reticulocytes Abs	Retic	x 10 <sup>9</sup> /L	51.0	10.0-110.0

Haemoglobin	Hb	g/L	<b>12.2</b>	13.1-20.5
Mean corpuscular volume	MCV	fL	<b>48.4</b>	61.6-73.5
Mean corpuscular haemoglobin	MCH	pg	22.3	21.2-25.9
Mean corpuscular haemoglobin concentration	MCHC	g/L	35.6	32.0-37.9
White blood cells	WBC	x 10 <sup>9</sup> /L	<b>24.35</b>	5.05-16.76
Neutrophils		x 10 <sup>9</sup> /L	<b>19.53</b>	2.95-11.64
Lymphocytes		x 10 <sup>9</sup> /L	3.52	1.05-5.10
Monocytes		x 10 <sup>9</sup> /L	0.82	0.16-1.12
Eosinophils		x 10 <sup>9</sup> /L	0.41	0.06-1.23
Basophils		x 10 <sup>9</sup> /L	0.04	0.00-0.10
Platelet Count	PLT	x 10 <sup>9</sup> /L	182	148-484

- a) Provide a prioritised list of **three (3)** differential diagnoses for this dog. Justify **each** differential with an evaluation of the supporting signalment, history, clinical examination and clinicopathological findings. (12 marks)

A bile acid stimulation was performed as a part of your diagnostic investigations and the results are provided in the following table.

<b>Parameter</b>	<b>Units</b>	<b>Result</b>	<b>Reference range</b>
Bile acids (pre-prandial)	µmol/L	15	<25
Bile acids (post-prandial)	µmol/L	<b>140</b>	<25

- b) Provide an interpretation of the bile acid stimulation results in the context of this case. (3 marks)

An abdominal ultrasound is performed and demonstrates a portocaval extrahepatic shunt.

- c) Outline the principles of medical management for this patient. Include in your answer treatment recommendations and the rationale behind these therapies. (15 marks)

2. Answer **all** parts of this question

An 11-year-old male neutered Golden retriever presents with a **four (4)** week history of lethargy, weakness, polyuria, and polydipsia. Acute vomiting and inappetence have developed over the last 48 hours.

On physical exam there are mild-to-moderate muscle fasciculations in the hindquarters. The heart rate is 125 bpm and regular with no murmur auscultated. The respiratory rate and effort are normal. The remainder of the physical exam is unremarkable. Body condition score is 5/9.

The results of a complete blood count were within reference limits. Serum biochemistry and in-house urinalysis results for the dog are as follows:

Parameter	Abbreviation	Units	Result	Reference range
Glucose (fluoride oxalate)	GLU	mmol/L	6.1	4.11-7.95
Symmetric dimethylarginine	SDMA	µg/dl	6	0-14
Creatinine	CREA	µmol/L	142	44-159
Urea	UREA	mmol/L	<b>10.8</b>	2.5-9.6
Phosphorus	PHOS	mmol/L	0.95	0.81-2.20
Calcium	Ca	mmol/L	<b>4.25</b>	1.98-3.0
Calcium: Phosphorus Ratio	Ca:P Ratio		<b>4.47</b>	1.1-2.3
Sodium	Na	mmol/L	155	144-160
Potassium	K	mmol/L	4.1	3.5-5.8
Sodium:Potassium Ratio	Na:K Ratio		37.8	29.0-40.0
Chloride	Cl	mmol/L	113	109-120
Total protein	TP	g/L	<b>86</b>	52-82
Albumin	ALB	g/L	38	23-40
Globulin	GLOB	g/L	<b>48</b>	25-45
Albumin: globulin ratio	A:G Ratio		0.79	0.5-1.1
Alanine transaminase	ALT	U/L	115	10-125
Aspartate aminotransferase	AST	U/L	23	10-50
Alkaline phosphatase	ALP	U/L	52	23-212
Gamma-glutamyltransferase	GGT	U/L	1	0-11
Total bilirubin	TBIL	µmol/L	3	0-15
Cholesterol	CHOL	mmol/L	5	2.84-8.26
Lipase	LIPA	U/L	1021	200-1800

Amylase	AMYL	U/L	625	500-1500
Creatine kinase	CK	U/L	<b>322</b>	64-400
Collection Method	Free catch			
USG	1.006			
Glucose	Negative			
Ketones	Negative			
Protein	Negative			
Bilirubin	Negative			
Blood	+			
Leukocytes	++			

- Outline and justify your diagnostic approach to this patient. Assume that all diagnostic tests and modalities are available. *(14 marks)*
- Assuming the hypercalcaemia in this patient is pathological, provide the **three (3)** most likely differential diagnoses for this patient. *(3 marks)*
- Discuss your initial stabilisation and management for the hypercalcaemia in this patient. *(8 marks)*

Additional diagnostic test results become available and are as follows:

Parameter	Abbreviation	Units	Result	Reference range
Ionised calcium	iCa	mmol/L	<b>2.21</b>	1.25-1.45
Parathyroid hormone	PTH	pmol/L	12	2-13

Thereafter, a 5 mm regular, round mass is detected in the left parathyroid gland.

- d) List the definitive treatment options available for the management of the most likely diagnosis in this case **and** outline your consideration for immediate post-treatment management. (5 marks)

3. Answer **all** parts of this question

A 16-month-old male neutered Ragdoll presents with a two-week history of lethargy and a decreased appetite.

On physical examination the patient is alert and responsive. The patient is dehydrated and weighs 4.4 kg, a decrease from his previous weight of 4.7kg at 14 months of age. His rectal temperature is 39.7°C and there is a palpable fluid wave on abdominal palpation.

The patient's PCV/TPP is 25/90.

- a) With reference to the cat's problem list and likely differential diagnoses, outline an appropriate diagnostic investigation **and** justify your approach. (16 marks)
- b) Describe the procedure to perform a diagnostic abdominocentesis in this patient. (8 marks)
- c) Outline the diagnostic tests that can be performed on the peritoneal effusion **and** the results that would support a diagnosis of your **two (2)** most likely differentials (6 marks)

4. Answer **all** parts of this question

A six-year-old female neutered standard Poodle presents for acute collapse following a week duration of lethargy, anorexia, and occasional vomiting. On examination the dog has pale mucous membranes, a heart rate of 160 beats per minute, a respiratory rate of 40 breaths per minute, and a rectal temperature of 39.2°C.

The results of the patient's haematology and serum biochemistry follow.

## Haematology

Parameter	Abbreviation	Units	Result	Reference range
Red Blood Cells	RBC	x 10 <sup>12</sup> /L	<b>1.14</b>	5.65 – 8.87
Haematocrit	HCT	%	<b>12.6</b>	37.3 – 61.7
Haemoglobin	HGB	g/dL	<b>3.3</b>	13.1 – 20.5
Mean Corpuscular Volume	MCV	fL	<b>81.5</b>	61.6 – 73.5
Mean Corpuscular Haemoglobin	MCH	pg	<b>28.9</b>	21.2 – 25.9
Mean Corpuscular Haemoglobin Concentration	MCHC	g/dL	<b>26.2</b>	32 – 37.9
Red Blood Cell Distribution Width	RDW	%	20.1	13.6 – 21.7
	%RETIC	%	21.5	
Reticulocytes	RETIC	K/ $\mu$ L	<b>245.4</b>	10 - 110
Reticulocyte Haemoglobin	RETIC-HGB	pg	29.0	22.3 – 29.6
White Blood Cells	WBC	x 10 <sup>9</sup> /L	<b>28.0</b>	6.0 – 17.0
Neutrophils		x 10 <sup>9</sup> /L	<b>24.36</b>	3 – 11.5
Lymphocytes		x 10 <sup>9</sup> /L	<b>0.28</b>	1.0 – 4.8
Monocytes		x 10 <sup>9</sup> /L	<b>3.26</b>	0.2 – 1.4
Eosinophils		x 10 <sup>9</sup> /L	0.1	0.1 – 1.3
Basophils		x 10 <sup>9</sup> /L	0	0 – 0.1
Platelet Count		K/ $\mu$ L	<b>62</b>	148 - 484

### Comments:

Red cells show: Polychromasia ++ Hypochromia + Spherocytes ++ Agglutination +++

White cells show: Neutrophils show mild toxic changes

Platelets clumped but overall reduced

Saline Test for agglutination: Markedly positive

## Biochemistry

Parameter	Abbreviation	Units	Result	Reference range
Glucose			4.68	4.11 - 7.95
Creatinine			91	44 - 159
Urea			4	2.5 - 9.6
BUN/Crea			11	
Phosphate			1.73	0.81 - 2.2
Calcium			2.56	1.98 - 3
Total Protein			<b>84</b>	52 - 82
Albumin			28	23 - 40
Globulin			<b>56</b>	25 - 45
ALT			<b>134</b>	10 - 125
ALKP			<b>351</b>	23 - 212
GGT			0	0 - 11
TBIL			<b>40</b>	0 - 15
Cholesterol			4.22	2.84 - 8.26
Amylase			871	500 - 1500
Lipase			731	200 - 1800
Sodium			159	144 - 160
Potassium			4.1	3.5 - 5.8
Na/K			39	
Cl			120	109 - 122

### Comments:

Haemolysed serum

- a) Provide a problem-list and assessment of this patient considering the history, clinical examination and clinicopathological findings. Include in your answer a brief assessment of each problem, an overall assessment **and** the most likely diagnosis. (18 marks)

A complete urinalysis, three-view thoracic radiographs and abdominal ultrasound found no further abnormalities in this patient.

- b) Outline and justify the immediate management of this patient for the first **seven (7)** days. (12 marks)

**End of paper**