Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2014

Veterinary Pathology

Paper 1

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

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

Answer **ALL <u>FOUR (4)</u>** questions

Answer **<u>FOUR</u>** questions each worth 30 marks .....total 120 marks

Paper 1: Veterinary Pathology

Answer all four (4) questions

1. Answer **one (1)** of the following:

   a) List and define the categories of disorders of cell growth. For **four (4)** of those categories provide an example using the integumentary system and outline the gross and histological appearance of **each** example. *(30 marks)*

   b) List the types of genetic and epigenetic alterations that may result in neoplasia. Provide a brief description of the mechanism(s) by which **each** type of alteration occurs. *(30 marks)*

2. Answer **two (2)** of the following:

   a) Define hypersensitivity reactions. Discuss type I and type IV hypersensitivity reactions in terms of both cellular and molecular mediators. Provide **one (1)** example of a type I and **one (1)** example of a type IV hypersensitivity reaction and outline the gross and histological appearance of **each** example. *(15 marks)*

   b) Inhalation is a potential portal of entry for microbial infection. List the physical barriers and immunological defences against inhaled microorganisms. *(15 marks)*

   c) List the categories of tissue necrosis (oncotic necrosis). Provide **one (1)** example of **each** and outline the histological appearance of **each** example. *(15 marks)*

Continued over page

3. Answer **three (3)** of the following:

a) Describe the mechanisms and mediators involved in the development of disseminated intravascular coagulation (DIC). *(10 marks)*

b) Describe the roles of neutrophils in acute inflammation. Include in your answer the mechanisms used by neutrophils in these roles. *(10 marks)*

c) List the cells (including subtypes) and chemical mediators involved in:

– nodular (tuberculoid) granulomas *(5 marks)*

– diffuse (lepromatous) granulomas *(5 marks)*

d) Briefly describe the fate of senescent erythrocytes and their contents in mammals. *(10 marks)*

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4. Answer **five (5)** of the following:

a) List the gross and microscopic features of oedema. *(6 marks)*

b) List common artefacts on histologic sections. *(6 marks)*

c) Outline the steps of second intention wound healing. *(6 marks)*

d) Outline the functions of **three (3)** chemokines from the list below: *(6 marks)*

- IL8 (CXCL8)
- RANTES (CCL5)
- Eotaxin-1 (CCL11)
- MIP-1α (CCL3)
- Lymphotactin (XCL1)
- Fractalkine (CX3CL1)

e) Outline the role and regulation of telomerase. *(6 marks)*

f) List the components of a laboratory quality management system. *(6 marks)*

End of paper

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Paper 2

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

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

Answer **ALL <u>FOUR (4)</u>** questions

Answer **<u>FOUR</u>** questions each worth 30 marks .....total 120 marks

Paper 2: Veterinary Pathology

Answer all four (4) questions

1. Answer **two (2)** of the following:

a) Below are the complete blood count and biochemistry results from a 13-year-old desexed female Maltese dog that presented with a history of increasing weakness over the last two weeks. *(15 marks)*

i. Interpret these results

ii. Outline the most likely cause/s of these changes

iii. Briefly describe your recommendations for further investigations.

Analyte	Case	Reference Intervals
Red Blood Cell Count	**4.0**	5.5–8.5 $x10^{12}$/L
Haemoglobin	**68**	120–180 g/L
Haematocrit	**0.21**	0.37–0.55
MCV	**53**	60.0–77.0 fL
MCH	**17**	19–24 pg
MCHC	324	320–360 g/L
Reticulocytes	55	< 60.0$x10^{9}$/L
Platelets	**980**	200–500 $x10^{9}$/L
White Blood Cell Count	**49.0**	6.0–17.0 $x10^{9}$/L
Neutrophils	**41.9**	3.0–11.5 $x10^{9}$/L
Band Neutrophils	**0.5**	0.0–0.4 $x10^{9}$/L
Lymphocytes	4.6	1.0–4.8 $x10^{9}$/L
Monocytes	**1.5**	0.1–1.3 $x10^{9}$/L
Eosinophils	0.5	0.1–1.3 $x10^{9}$/L

Red Blood Cell Morphology - 1 nRBC/100 WBC

Question 1 a) continued over page

Analyte	Case	Reference Intervals
Total Protein	68	54–78 g/L
Albumin	**21**	24–38 g/L
Globulins	**47**	24–42 g/L
A:G Ratio	**0.5**	0.8–1.9
Creatinine	59	44–150 µmol/L
Urea	7.1	2.5–9.5 mmol/L
CK	321	50–400 U/L
AST	63	10–80 U/L
ALP	**157**	10–120 U/L
ALT	**107**	5–80 U/L
Glucose	3.7	3.3–6.7 mmol/L
Bilirubin	3	2–15 µmol/L
GGT	**12**	1–10 U/L
Cholesterol	5.7	3.9–7.8 mmol/L
Potassium	5.4	3.9–5.7 mmol/L
Sodium	144	138–153 mmol/L
Na:K Ratio	27	> 22
Bicarbonate	20	15–24 mmol/L
Anion Gap	18	10–20 mmol/L
Calcium	2.32	1.90–2.90 mmol/L
Phosphate	1.91	0.87–2.10 mmol/L
Chloride	111	101–114 mmol/L
Amylase	993	226–1063 U/L
Lipase	72	< 100 U/L

b) Compare and contrast the gross and histological features of pulmonary infection in pigs with *Actinobacillus pleuropneumoniae* and *Mycoplasma hyopneumoniae*.
(15 marks)

Question 1 continued over page

c) Below are the complete blood count and biochemistry results from an eight-year-old Thoroughbred gelding that presented with a 12 hour history of watery diarrhoea and fever. *(15 marks)*

i. Interpret these results

ii. Outline the most likely cause/s of these changes

iii. Briefly describe your recommendations for further investigations.

Analyte	**Case**	**Reference Intervals**
Red Blood Cell Count	9.1	6.5–12.5 $x10^{12}$/L
Haemoglobin	129	110–190 g/L
Haematocrit	0.35	0.32–0.52
MCV	39	34–58 fL
MCH	14	12–18 pg
MCHC	365	310–370 g/L
Platelets	**70**	100–500 $x10^{9}$/L
White Blood Cell Count	7.0	5.5–12.5 $x10^{9}$/L
Neutrophils	**1.3**	2.5–8.0 $x10^{9}$/L
Band Neutrophils	**1.5**	0.0–0.2 $x10^{9}$/L
Lymphocytes	4.2	1.5–5.5 $x10^{9}$/L
Monocytes	0.0	0.0–0.9 $x10^{9}$/L
Eosinophils	0.0	0.0–0.8 $x10^{9}$/L
Fibrinogen	**5.0**	1.0–4.0 g/L
Serum Amyloid A	**1181.10**	Less than 7 mg/L

WBC Morphology – marked toxic changes to neutrophils

Platelets- occasional small clump; manual count averages 5/HPF

Question 1 c) continued over page

Analyte	Case	Reference Intervals
Total Protein	**32**	58–76 g/L
Albumin	**14**	28–38 g/L
Globulins	**18**	26–40 g/L
A:G Ratio	0.8	0.8–1.9
Creatinine	**181**	81–164 µmol/L
Urea	**17.3**	3.6–8.9 mmol/L
CK	**2549**	50–400 U/L
AST	**601**	150–400 U/L
GLDH	2	0–20 U/L
Glucose (unpreserved)	5.6	3.5–6.5 mmol/L
Bilirubin	16	4–100 µmol/L
GGT	**5**	20–38 U/L
Cholesterol	**0.94**	1.80–3.60 mmol/L
Triglycerides	0.87	0.00–1.32 mmol/L
Potassium	3.5	2.8–5.0 mmol/L
Sodium	**114**	132–152 mmol/L
Na:K Ratio	33	Greater than 29
Anion Gap	20	8–20 mmol/L
Calcium	**2.14**	2.50–3.60 mmol/L
Phosphate	1.35	0.80–1.70 mmol/L
Ca:PO4 ratio	**1.6**	1.8–3.8
Chloride	**83**	92–102 mmol/L
Bicarbonate	**14**	23–32 mmol/L

Urinary Specific gravity	1.021

Continued over page

2. Answer **three (3)** of the following:

a) Briefly describe the **three (3)** types of photosensitivity. Using an example of **each** from a species of your choice, outline the gross **and** histological appearance of affected tissue. *(10 marks)*

b) Describe the gross pathological **and** histopathologic changes in advanced ovine Johne's disease. *(10 marks)*

c) List the expected clinical pathology findings in **two (2)** of the following: *(10 marks)*

i. acute copper toxicity in sheep

ii. *E.coli* mastitis in a cow

iii. chronic pleuropneumonia in a horse

iv. theileriosis in cattle.

d) Detail the expected histological findings in a case of Paterson's curse/Salvation Jane (*Echium lycopsis*), intoxication in horses. *(10 marks)*

e) List the gross pathologic and histologic features of **two (2)** of the following: *(10 marks)*

i. morbillivirus infection in dolphins

ii. polyomavirus infection in psittacine species

iii. inclusion body disease in snakes.

Continued over page

3. Answer **three (3)** of the following:

a) List the expected clinical pathology findings in **two (2)** of the following: *(10 marks)*

i. ethylene glycol intoxication in cats

ii. nephrotic syndrome in dogs

iii. hyperthyroidism in cats

iv. Cushing's disease in dogs.

b) Outline the expected clinical pathology and histological findings in a cat with chronic renal failure. *(10 marks)*

c) Describe the gross and histological lesions seen with eimerial infection in poultry. *(10 marks)*

d) Compare and contrast the histological appearance of actinic keratosis and bowenoid carcinoma in cats. *(10 marks)*

e) Describe the immunohistochemistry markers used in the differentiation of round cell tumours in dogs. *(10 marks)*

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4. For **five (5)** of the following discuss the:

a) Cytological **or** histological findings in granulomatous meningoencephalitis (GME) in dogs. *(6 marks)*

b) Histological changes within the lymphoid system of pigs with circovirus infection. *(6 marks)*

c) Cytological findings in a bronchoalveolar lavage from a horse with exercise induced pulmonary haemorrhage. *(6 marks)*

d) Histological appearance of listerial infection of the CNS in sheep. *(6 marks)*

e) Cytological findings from a fine needle aspirate taken from a sialocoele in a dog. *(6 marks)*

f) The histological lesions in *Streptococcus iniae* infection in fish. *(6 marks)*

g) Cytological findings in a nasal wash from a cat with cryptococcal rhinitis. *(6 marks)*

End of paper