Miniboard Exam 2009
Clinical Pathology

1. Blood gas sample from a 10-year-old pony:

pH	7.25	(Ref. Int. 7.32-7.44)
HCO_3	40 mEq/L	(Ref. Int. 24-30)
PCO_2	55 mmHg	(Ref. Int. 36-46)
PO_2	88 mmHg	(Ref. Int. 94)
TCO_2	38 mEq/L	(Ref. Int. 22-33)

The most likely acid-base abnormality is:
A. Metabolic acidosis uncompensated
B. Metabolic acidosis with partial compensation
C. Respiratory acidosis with partial compensation
D. Respiratory acidosis uncompensated
E. Respiratory alkalosis uncompensated

2. All of the following concerning creatine kinase are true except:
A. CK is artificially increased with hemolysis
B. Persistent high serum CK activity indicates continuing muscle damage.
C. Persistent high serum CK activity indicates continuing CNS damage.
D. CK activity is highest in skeletal muscle, cardiac muscle, and brain.
E. If CK analysis must be delayed beyond 12 hours, the serum should be frozen.

3. The following values are given from a dog:
Na^+ - 145
Cl^- - 115
K^+ - 5.0
Ca^+ - 10.0
Mg^+ - 2.0
TCO_2 - 20
Phosphorous - 4.0

What is the calculated anion gap (AG):
A. 15
B. 14
C. 12
D. 10
E. 4

4. Coagulation panel from a 1-year-old Doberman Pinscher:

Platelet count	500 x10^3/µl	(Ref. Int. 211-621)
BMBT	2 minutes	(Ref. Int. 1-5)
APTT	25 sec	(Ref. Int. 13.1-17.4)
OSPT	12.5 sec	(Ref. Int. 5.8-7.9)
TT	6.1 sec	(Ref. Int. 4.2-7.0)
FDP	20.1 µg/ml	(Ref. Int. 0-32)

The most likely hemostasis disorder is:
A. von Willebrand's disease
B. Coumarin toxicosis
C. Disseminated intravascular coagulation
D. Factor VII deficiency
E. Glanzmann's thrombasthenia

5. The test of choice to diagnose iatrogenic hyperadrenocorticism is:
A. ACTH stimulation test
B. Low-dose dexamethasone suppression test
C. High-dose dexamethasone suppression test
D. Plasma cortisol measurement
E. Urine cortisol/creatinine ratio

6. Blood gas sample from a 5-year-old Greyhound:

pH	7.50	(Ref. Int. 7.31-7.42)
HCO_3	30 mEq/L	(Ref. Int. 17-24)
PCO_2	35 mmHg	(Ref. Int. 29-42)
PO_2	94 mmHg	(Ref. Int. 85-95)

The most likely acid-base abnormality is:
A. Metabolic alkalosis uncompensated
B. Metabolic alkalosis with partial compensation
C. Respiratory alkalosis with partial compensation
D. Mixed metabolic acidosis and alkalosis
E. Respiratory alkalosis uncompensated

7. A male poodle with non-pruritic alopecia of 18 months duration and recent development of PU/PD, and mild loss of muscle mass.
Hematology = normal
Serum Chemistry:

Test	Result	Reference Interval	
Sodium (mmol/l)	144	135-155	
Potassium (mmol/l)		4.0	3.5-5.8
Chloride (mmol/l)		109	95-115
Glucose (mmol/l)	6.1	3.3 – 5.5	
Urea (mmol/l)		3.3	2.5 – 8.5
ALT (IU/l)		128	0 - 90
ALP (IU/l)		278	0 – 230
GGT (IU/l)		10	0 – 20
Cholesterol (mmol/l)		11.7	2.0-7.0
Endocrinology			
Total T4 (mmol/l)	12	15-45	
TSH (ng/ml)		0.44	0 – 0.69
Cortisol pre-ACTH (nmol/l)		146	50 – 250
Cortisol post ACTH (nmol/l)		610	<400
Endogenous ACTH (pg/ml)		<5	20 – 80
Cortisol basal (nmol/l)		147	50-250
Cortisol 4 hours post dex (nmol)		135	< 40
Cortisol 8 hours post dex (nmol)		117	< 40

What is the most likely diagnosis:
A. Hypothyroidism
B. Iatrogenic hyperadrenocorticism
C. Pituitary dependent hyperadrenocorticism
D. Adrenal dependent hyperadrenocorticism
E. Hypothyroidism and pituitary dependent hyperadrenocorticism

8. The following vaginal cytology findings are noted in a dog:
- Predominance of intermediate cells and nucleated and anuclear superficial cells
-Few neutrophils

- Mixed bacteria adhered to epithelial cells

What is the most likely stage of the estrus cycle:
A. Early proestrus
B. Late proestrus
C. Estrus
D. Diestrus
E. Anestrus

9. The following tracheo-bronchiolar cytology findings are noted in a dog:
- Numerous squamous epithelial cells with adherent mixed bacteria
- Presence of many large, striated rodlike organisms (consistent with *Simonsiella* sp.)

What is the most likely diagnosis:
A. Vitamin A deficiency
B. Distemper infection with bronchointerstitial pneumonia and secondary bacterial infection
C. Squamous cell carcinoma of the large bronchioles
D. Nondiagnostic specimen consistent with oropharyngeal contamination
E. Chronic bronchitis

10. Xylitol ingestion in dogs causes:
A. Acute respiratory distress with histologic findings similar to atypical interstitial pneumonia in cows
B. Severe intravascular hemolysis
C. Severe hypoglycemia with acute hepatic failure
D. Severe tachycardia with myocardial necrosis
E. Renal failure with acute tubular necrosis

11. The following laboratory data is from a 4-year-old female Standard Poodle with a history of lethargy and decreased appetite. Clinical examination revealed a dog with weakness and no other abnormalities.

Hematology: Within normal limits

White Blood Cell Differential	Result	Reference Interval
WBC (x 1,000)	15.8	6 – 17
Neutrophils (segmented)	5.85	3 – 11.5
Neutrophils (bands)	0	0 – 0.3
Lymphocytes (x 10^9/l)	7.43	1.0 – 4.8
Monocytes (x 10^9/l)	0.63	0.2 – 1.5
Eosinophils (x 10^9/l)	1.9	0.1 – 1.3

Some of the lymphocytes appear reactive.

Biochemistry	Result	Reference Interval
Sodium (mmol/l)	143	135-155
Potassium (mmol/l)	6.5	3.5-5.8
Chloride (mmol/l)	117	95-115
Glucose (mmol/l)	4.2	3.3 – 5.5
Urea (mmol/l)	20.7	2.5 – 8.5
Creatinine (umol/l)	184	45 – 155
Calcium (mmol/l)	2.7	2.3 – 3.0
Inorganic phosphate (mmol/l)	2.11	1.3 – 1.9

Albumin (g/l)	23	25 – 30
TP (g/l)	62	50 – 78
Globulin (g/l)	39	25 - 40
ALT (IU/l)	67	0 - 90
ALP (IU/l)	45	0 – 230
Cholesterol (mmol/l)	2.8	2.0-7.0

Urinalysis

Specific gravity	1.024
Dipstick analysis	No protein, blood, glucose or ketones pH = 6.5

What is the most probable diagnosis:

A. Protein-loosing enteritis
B. Marked renal insufficiency
C. Cushing's disease
D. Gastrointestinal hemorrhage
E. Hypoadrenocorticism

12. Blood chemistry and gas analysis from a 2-year-old Belgian Malinois

Sodium	125 mEq/L	(ref. int. 142-152)
Potassium	2.5 mEq/L	(ref. int. 3.9-5.1)
Chloride	75 mEq/L	(ref. int. 110-124)
TCO_2	29 mEq/L	(ref. int. 14-26)
Anion gap	26 mEqL	(ref. int. 5-17)
pH	7.50	(ref. int. 7.31-7.42)
HCO_3	27 mEq/L	(ref. int. 17-24)
pCO_2	32.6 mmHg	(ref. int. 29-42)
pO_2	90 mmHg	(ref. int. 85-95)

The most likely acid-base abnormality is:
A. Metabolic alkalosis uncompensated
B. Metabolic alkalosis with partial compensation
C. Mixed metabolic acidosis and metabolic alkalosis
D. Respiratory acidosis with partial compensation
E. Metabolic acidosis with partial compensation

13. An eight-month-old male Siamese kitten presents with anorexia, emaciation, lethargy, and abdominal enlargement or 2 week duration.

Abdominal fluid analysis:
Yellow-green, cloudy, viscid
Nucleate cell count = 5,008 cells/ul
Nondegenerate neutrophils, macrophages on a granular proteinaceous background

Protein	6.0 g/dl	H
Albumin	1.5 g/dl	L
α-globulin	0.3 g/dl	
β-globulin	0.3 g/dl	
γ-globulin	4.0 g/dl	H
A/G ratio	0.33	

Effusion creatinine= 0.5 mg/dl; Serum creatinine = 1.2 mg/dl
Effusion BUN = 20 mmol/l; Serum creatinine = 20 mmol/l

Abdominal ultrasound: Large amount of abdominal fluid. No other organ defects identified.
FCoV titer: negative

What is the most likely diagnosis:
A. Septic peritonitis
B. Liver disease
C. Uroperitoneum
D. Feline infectious peritonitis
E. Heart failure

14. What is the sensitivity of the following test with the results listed below:
True positive (TP)= 2 True negative (TN)= 182 False positive (FP)= 18 False negative (FN)= 1
A. 99.5%
B. 91.0%
C. 66.7%
D. 10.0%
E. None of the above

15. A 4-year-old male Labrador with a white milky pleural fluid with the following laboratory data:

Fluid analysis	Results
TP (g/l)	32
RBC ($x10^{12}$/l)	0.05
Total nucleated cell count ($x10^{9}$/l) 12.3	
Cholesterol	3.2 mmol/l
Triglycerides	24.4 mmol/l

Serum analysis	
Cholesterol	3.5 mmol/l
Triglycerides	1.77 mmol/l

Cytologic appearance:
Mixed population of cells including moderate numbers of small and medium lymphocytes with few macrophages. No bacteria are seen.

What is the most likely diagnosis:
A. Right-sided heart failure
B. Left-sided heart failure
C. Lymphoma
D. Chyle
E. Septic exudates

16. The most likely diagnosis in a dog with increased serum iron (SI) and increased serum ferritin:
A. Acute or chronic inflammation
B. Hypothyroidism
C. Hemolytic anemia
D. Renal disease
E. Glucocorticoid excess

17. The following findings are noted in a 5 year old Holstein cow:
HCT- 18% (24-46) TP- 4.2 mg/dl (6.7-7.5)

MCV- 37 fl (40-60)
MCHC- 27 pg (30-36)
M:E- 3 (.3-1.8)
Neutrophils - 2,000/L (600 - 4,000)
Monocytes - 500/L (0 - 900)
Platlets - 250,000/L (100,000 - 800,000)

Serum ferritin concentration- decreased

What is the most likely cause?
A. Bracken fern toxicity
B. Pyridoxine deficiency
C. Vitamin B12 deficiency
D. Cobalt deficiency
E. *Haemonchus placei* infection

18. The following findings are noted in a 6 year old German Shepherd Dog:
HCT- 27% (35-57)
MCV- 70 (66-77)
MCHC- 34 (32.0-36.3)
Reticulocytes (absolute count)- 10 (>80 is a regenerative response)
TP- 6.8 mg/dL (6.0-7.5)
Ca^{++}- 12.4 (9.1-11.7)
Platlets - 70,000 (211,000-621,000)
WBCs- 1,500 (5,000-14,000)
M:E- 1.5 (.75-2.5)

What is the most likely diagnosis:
A. Chronic renal disease
B. Metastatic apocrine carcinoma of the anal sac to the bone marrow
C. Hypoadrenocorticism
D. Chronic hookworm infection
E. Acquired Portosystemic shunt

19. The following changes are noted in a cat:
HCT- 33% (30 - 45)
Platlets- 80,000/uL (300,000 - 800,000)
MPV (Mean platlet volume) - 19.2 fl (12 - 18)
Cytology - Giant platelets, numerous platlet fragments
Flow cytometric analysis - many reticulated platelets
Calcium (serum ionized) - 8.9 mg/dL (8.7- 11.7)
Phosphorous - 5.0 mg/dL (3.0-6.1)

What is the most likely cause?
A. Responsive thrombopoiesis secondary to Hyperthyroidism
B. Responsive thrombopoiesis secondary to immune mediated thrombocytopenia
C. Insufficient thrombopoiesis secondary to Feline Panleukopenia virus
D. Insufficient thrombopoiesis secondary to iron deficiency
E. Insufficient thrombopoiesis secondary to plasma cell myeloma

20. Which of the following neoplasms often results in a persistent hyperglycemia:
A. Pheochromoctyoma
B. Hemangiosarcoma
C. Hepatocellular carcinoma
D. Melanoma
E. Renal carcinoma

21. The following changes are noted in a 4 year old Jersey cow:

Hematology:
gas:
HCT- 40% (24-46)
WBC- 17,000 (4-12,000)
Fibrinogen- 700 (100-600)

Blood

pH- 7.57 (7.35-7.5)
PCO_2 - 52.7 (35-44)
HCO_3 - 38.4 (20-30)

Chemistry:
Glucose- 231 (40-100)
Sodium- 136 (136-144)
Potassium- 3.0 (3.6 -4.9)
Chloride- 84 (99-107)
Calcium- 8.6 (8.0-11.4)
Anion gap- 13.1 (6-14)
Creatinine- 2.1 (.5-2.2)

Urinalysis:
Sp. gravity - 1.012
pH - 5.0
Protein - negative
Glucose - 2+
Ketone- negative
Blood- negative
Sediment - none

What is the most likely diagnosis:
A. Diabetes Mellitus
B. Pregnancy toxemia
C. Fatty liver disease
D. Renal Failure
E. Right Abomasal Displacement

22. Laboratory data from a 5 year old Quarterhorse mare:

Hematology

		(normal range)
Plasma color: light yellow		
Hct	37	(27-43)
Hb	13	(10.1-16.1)
RBC morph:	normal	
Platelets:	adequate	
WBC	16.1	(5.6-12.1)
Seg	11.916	(2.9-8.5)
Bands	0.483	(0.0-0.1)
Lymphs	2.415	(1.16-5.1)
Monos	1.288	(0.0-0.7)
Eos	0	(0.0-0.78)
Baso	0	(0.0-0.3)
WBC morph:	normal	
Fibrinogen	850	(100-400)

Serum Chemistry

BUN	70	(11-27)
Creatinine	4.7	(0.4-2.2)
Tot. protein	6.6	(5.6-7.6)
Albumin	2.9	(2.6-4.1)
AST	960	(160-412)
CK	640	(60-330)
Glucose	90	(62-134)
Calcium	11.2	(10.2-13.4)

Urinalysis (catheterized)

color	brown
turbidity	cloudy
Sp gr	1.020
pH	7.5
protein	2+
glucose	neg
ketones	neg
bilirubin	neg
occult blood	4+

Sediment

0-1 RBC/HPF
4-5 WBC/HPF
2-3 gran. Casts/HPF

Phosphorus 5.4 (1.5-4.7) CaCo3 crystals

The most likely diagnosis is:
A. Exertional rhabdomyolysis with secondary myoglobinuric nephrosis
B. Bracken fern (Pteridium aquilinum) toxicity
C. Red maple (Acer rubrum) toxicity
D. Chronic copper toxicity
E. Septic shock

23. In the rat, the enzyme with the most specificity and sensitivity in detection of hepatocellular injury is:
A. Alkaline phosphatase
B. Sorbitol dehydrogenase
C. Alanine aminotransferase
D. Aspartate aminotransferase
E. Gamma glutamyltransferase

24. The following values are from an adult dog:
Folate – 17.0 (4.8 – 13.0)
Cobolamin – 57 (200 – 400)
TLI (Trypsin-like immunoreactivity) – 17 (5.2 – 35)

What is the most likely diagnosis:
A. Exocrine pancreatic insufficiency
B. Bacterial overgrowth
C. Proximal small intestine disease
D. Distal small intestinal disease
E. Diffuse small intestinal disease

25. What red blood cell morphology is most often associated with oxidative damage:
A. Keratocytes (helmet cells)
B. Schistocytes
C. Acanthocytes
D. Spherocytes
E. Codocytes (target cells)