![The Royal College of Pathologists — Pathology: the science behind the cure]

Draft Structured Short Answer Question Examples for Veterinary Clinical Pathology

All questions are worth 20 points with breakdown of the points for each sub-question indicated in [x marks].

Question 1 - Haematology core area.

A 10 year old female spayed Beagle cross is presented for lethargy and decreased appetite. A comprehensive biochemistry profile was unremarkable. Routine haematology identified increased haemoglobin and erythrocyte count with an haematocrit of 0.78 l/l (78%).

a)　At what level of increased haematocrit is further investigation indicated and why is consideration of breed important? [4 marks]

Usually haematocrit should be > 65% before further investigation is indicated. Breed consideration is important because some breeds will normally have higher haematocrits, but usually not exceeding 65%.

b)　List two underlying pathophysiologic causes for increase in haematocrit. [4 marks]

Accept any two of the following:

1.　Haemoconcentration (dehydration or endotoxic shock also acceptable)
2.　Increased total erythrocyte mass
3.　Physiologic erythrocytosis (splenic contraction also acceptable)

c)　If secondary erythrocytosis resulting in an increase in the erythron is suspected, what are the two categories of erythrocyosis that should be investigated? [4 marks]

1.　Secondary appropriate erythrocytosis
2.　Secondary inappropriate erythrocytosis

d)　List two underlying conditions that can result in secondary appropriate erythrocytosis [4 marks]

Accept any two of the following:
1.　Chronic pulmonary disease resulting in poor blood oxygenation/hypoxia
2.　Right to left cardiac shunt resulting in hypoxia
3.　Hyperthyroidism

e)　Why is increased erythropoietin production associated with erythroid neoplasia considered to be an INAPPROPRIATE response? [2 marks]

Because increased erythropoietin is autonomously produced rather than produced in response to hypoxia

f)   Explain the difference between primary erythrocytosis and polycythemia vera..[2 marks]

Polycythaemia vera is a myeloproliferative disorder resulting in neoplastic proliferation all marrow cell precursors and results in erythrocytosis, leukocytosis and thrombocytosis. Primary erythrocytosis is an increase in erythrocytes without an increase in other haematopoietic cell lines.

Question 2 - Pathophysiology core area.

Answer the following questions regarding dysproteinaemias:

a)   What category/designation is given to a condition when all protrein concentrations are increased (panhyperproteinaemia)? [2 marks]

Nonselective hyperproteinaemia

b)   If hypoalbuminaemia and hypoglobulinaemia are identified and serum protein electrophoresis indicates that all protein fractions are decreased proportionately, what category/designation is given to this condition? [2 marks]

Nonselective hypoproteinaemia

c)   What are positive acute phase proteins? [4 marks]

Positive acute phase proteins are those that increase because of an inflammatory process.

d)   What is the main purpose of an acute phase protein response? [4 marks]

To restore homeostasis by isolating and destroying the harmful agent initiating the response and to activate the repair process.

e)   Describe the findings with laboratory findings with SELECTIVE HYPOPROTEINAEMIA. [4 marks]

Total protein is decreased, but some protein concentrations on electrophoresis are decreased more than

f)   What are the bases for categorization of acute phase proteins as major, moderate or minor acute phase reactants? [4 marks]

Major acute phase proteins - concentrations increase 10 -100x over baseline and peak within 24-48 hours following a pathological stimulus and decline rapidly due to a short half-life.

Moderate acute phase proteins – concentrations increase 5-10 x over baseline and peak by 2-3 days following a pathological stimulus and decline more slowly than major acute phase proteins.

Minor acute phase proteins – concentrations increase between 50-100% of their baseline level, with variable peak and duration.

Question 3 - Other Testing core area.

Answer the following questions regarding anion gap:

a)   What are the parameters need to calculate an anion gap and what is the formula for calculating the anion gap? [4 marks]

Parameters: Na, Cl, K, HCO_3
Formula: Anion gap = $([Na^+] + [K^+]) – ([Cl^-] + [HCO_3^-])$

b)   What are the 4 sources for unmeasured anion charges that normally occur in serum? [4 marks]

1.PO_4^-,
2.albumin
3. anions of organic acids
4. SO_4^-

c)   In hypochloaemic metabolic alkalosis, would you expect the anion gap to be increased or not? Why? [2 marks]

No increase in anion gap
Why – because the decrease in [Cl^-] is balanced by an increase in [HCO_3^-]. Na and K do not change.

d)   List 4 diseases/conditions that can result in an increased anion gap acidosis. [4 marks]

Accept any four of the following:
1. Lactic acidosis
2. Ketoacidosis
3. Renal failure - increased PO_4. Osulfate or citrate
4. Massive rhabdomylolysis
5. Toxic agents {accept ethylene glycol toxicity or methanol poisoning – both in antifreeze, Paraldehyde toxicity (sedative or anaesthetic)
Metadehyde toxicity (snail bait, high doses of Penicillin)}
6. Hyperalbuminaemia

e)   Is decreased anion gap likely to be of clinical significance? What is the most common underlying cause? [2 marks]

Clinical significance – unlikely to be of significance
Common underlying cause – accept either hypoalbuminaemia or laboratory error in electrolyte measurements

f)   Name 4 common causes of increased anion gap acidosis in horses with hyperlactataemia. [4 marks]

Accept any 4 of the following:

1.   Strenuous exercise/exhaustion
2.   Severe rhabdomyolysis
3.   Sepsis
4.   Grain overload
5.   Liver disease
6.   Shock
7.   Colic

Question 4 - Urinalysis core area.

Urinalysis is done in a cat for investigation of possible renal disease. Serum urea and creatinine are both moderately elevated.

a) What urine specific gravity would provide support the presence of renal disease and why? [4 marks]

Urine specific gravity < 1.035, although somewhat higher USG does not rule out decreased renal concentrating ability since cats are capable of producing very highly concentrated urine. There is some imprecision with refractometers, so results at or near 1.035 may or may not indicate reduced renal concentrating ability and multiple evaluations are recommended to determine if a USG < 1.035 is persistent.

b) The urine dipstick analysis shows a positive leukocyte test, but no leukocytes are observed in the urine sediment. Give two reasons why this may occur? [2 marks]

Accept any two of the following:

1.   Feline esterases of non-leukocyte origin (nonspecific esterases) may cause false positive reaction
2.   Lysis of leukocytes in urine during cytologic processing or prolonged nonrefrigerated interval between urine collection and sediment evaluation
3.   Poor mixing of urine sediment prior to sediment evaluation
4.   Failure to correctly identify leukocytes on urine sediment evaluation

c) A 3+(on a scale of 1+ to 4+) glucosuria is observed on the dipstick analysis. Indicate 4 possible diseases/conditions that may result in hyperglycaemic glucosuria. [4 marks]

Accept any 4 of the following diseases conditions:

1.   Diabetes mellitus
2.   Acute pancreatitis
3.   Acromegaly or progesterone administration
4.   Sepsis
5.   Glucagonoma
6.   Chronic liver disease (failure to clear glucagon)
7.   Severe 'stress'

d) The International Renal Interest Society has a staging system that is recommended once a diagnosis of chronic renal disease has been made.

List 2 parameters used for staging of chronic renal disease. When might SDMA may helpful for more accurate staging of chronic renal disease? [4 marks]

Parameters used – Accept any two of the following:
1.   Creatinine concentration,
2.   urine protein concentration
3.   blood pressure

SDMA may be useful for identifying animals in Stage 1 CKD when creatinine may be within reference interval and in staging of animals with low body condition score that may result in lower creatinine concentrations

e)   Bacteriuria is suspected based on the routine urinalysis sediment examination. What nonmicrobiologic method is recommended to confirm the presence of bacteria in urine? [2 marks]

Cytologic evaluation of a stained smear of urine sediment.

f)   List 4 possible reasons for negative bacterial urine cultures when bacteriuria is observed in the urine sediment or on a cytologic smear of urine sediment. [4 marks]

Accept any 4 of the following:

1.   Nonviable microbes (host defenses or antimicrobial drugs)
2.   Urine sample for routine urinalysis or cytologic preparaations contaminated and/or improperly preserved following collection
3.   Death of fastidous patogens in the interval between time of sample collection and culture
4.   Improper culture technique
5.   Misidentification of bacteria in routine urinalysis or cytologic preparations

Question 5 - Laboratory Quality Management core area.

A new biochemistry analyzer is being installed in your laboratory. You are now undertaking validation of the new instrument and methods used for this analyzer.

a)   What is the underlying purpose of method validation? [2 marks]

The purpose of method validation is to assess error. The error should be assessed relative to a quality requirement expressed as allowable total error.

b)   Indicate 4 of the possible studies ('experiments') that should be done in order to validate the new instrument and methods being used? [4 marks]

Accept any four of the following:

1.   Determination of reportable range (linearity study)
2.   Within-run replication study
3.   Interference study
4.   Recovery study
5.   Total replication (between-run repeatability) study
6.   Comparison of methods study
7.   Establishment of reference intervals or reference interval transference validation
8.   QC validation

c)   Indicate two means by which quality requirements can be determined for each of the laboratory requirements can be determined for the tests run on this analyzer? [2 marks]

Accept any two of the following:

1.   ASVCP recommendations
2.   Recommendations based on biologic variation
3.   Recommendations based on expert opinions or from the literature
4.   Recommendations based on state of the art instrument performance

d) Explain how a linearity graph is used for evaluation of the reportable range for a test? [6 marks]

The standard values are reported on the x-axis with the observed values reported on the y-axis. The points at which the data begins to deviate significantly from the 45 degree line indicating direct correspondence of the standard and observed values are compared to the quality specification. The numerical difference between the observed and expected (standard) values is compared to the numerical value of the quality specification and when the calculated difference exceeds that of the quality specification, this indicates the limit of the reportable range.

e) The regression equation for a test on this analyzer is y = 0.586 + 1.25x.

If the comparative instrument method has a result of 86 units/L what is result is expected for the candidate instrument method? What does this indicate about the bias of the candidate instrument method compared to the comparative instrument method at a clinical decision level of 86 units/L? [6 marks]

Y = 0.586 + 1.25(86) = 108 units /L.

This indicates a positive bias for the candidate instrument method compared to the comparative instrument method of 22 units/L at the clinical decision level of 86 units/L.