



The Royal College of Pathologists

Part 1 examination

Veterinary Clinical Pathology: First paper

Tuesday 27 March 2007

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. Discuss the pathophysiological changes that lead to reduced hepatic functional capacity and the basis of the tests used to diagnose this condition.
2. In relation to the laboratory evaluation of neoplasia write short notes on **THREE** of the following:
 - a) thymidine kinase assay
 - b) c-kit staining of mast cell tumours
 - c) silver staining of nucleolar organizer regions (AgNORs)
 - d) PCR tests for antigen rearrangements
3. Discuss the rationale for and the relative advantages and disadvantages of tests that may be used to monitor renal function.
4. A biotech company has approached you, claiming that a new ELISA assay for pro - ANP (Atrial natriuretic peptide) that they are marketing to human diagnostic laboratories will work equally well for the diagnosis of heart disease in horses. Describe the laboratory and clinical validation exercises you would have to perform before you could accept their claims and introduce the test into your laboratory.

Please turn over for Questions 5 and 6

5. Write short notes on the uses and limitations of laboratory examination of the following fluids:
- a) Cerebrospinal fluid
 - b) Synovial fluid
 - c) Rumen fluid
6. Write short notes on:
- a) external quality control systems for veterinary laboratories
 - b) measurement of serum immunoglobins
 - c) Levey- Jennings control charts



The Royal College of Pathologists

Part 1 examination

Veterinary Clinical Pathology: Second paper

Tuesday 27 March 2007

Candidates must answer FOUR questions ONLY

Time allowed: 3 hours

1. List the sub-types of lymphoma (lymphosarcoma / malignant lymphoma) in the dog. Discuss the cytological, immunological and molecular biology techniques that are available for classification and monitoring of this disease.
2. Write an essay on lower respiratory tract cytology in the cat, dog and horse, discussing cell collection, examination and abnormalities.
3. Describe how the equine haemogram responds to physiological and pathological events in ways that resemble the responses of other species and ways which are quite different.
4. Describe the laboratory tests that may be used to aid the diagnosis and prevention of metabolic and deficiency diseases in cattle, providing a critical evaluation of the usefulness of each test.
5. With reference to clinical pathology, write short notes on **THREE** of the following:
 - a. Biochemical profiles for avian species
 - b. the advantages /disadvantages of SDH (sorbitol dehydrogenase) and GLDH (glutamate dehydrogenase) measurement in horses
 - c. the use of serum aldosterone measurement in dogs
 - d. the value of bicarbonate (tCO₂) and anion gap inclusion in routine biochemistry profiles in all species



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

Tuesday 14 March 2006

VETERINARY CLINICAL PATHOLOGY

First Paper

Answer FOUR questions ONLY

Time allowed – THREE HOURS

2. Discuss the cytological criteria for distinguishing between benign and malignant tumours of epithelium, stroma and round cells.
3. Write an essay on blood coagulation, including discussion of common disorders of coagulation and tests used to monitor changes.
4. Discuss the pathogenesis of proteinuria. Describe how proteinuria can be investigated and give guidelines for interpreting the findings.
5. The direct antiglobin (Coomb's) test was first described in the 1940's. What is the basis for this test, how is it used in the diagnosis of immune-mediated haemolytic anaemia and discuss any alternative tests that are available today.

Please turn over for Questions 5 and 6

6. Discuss the biochemical or chemical reactions that are used in assays for the following analytes and briefly, their use in clinical biochemistry:
- a) Alanine transaminase
 - b) Glucose
 - c) Haptoglobin
 - d) Creatinine
 - e) Bilirubin

(Note: if more than one reaction has been used in assays for a particular analyte, describe only one of the possible options).

7. Describe the quality management systems, including quality control procedures, you would run in your laboratory.



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Part 1 Examination

Tuesday 14 March 2006

VETERINARY CLINICAL PATHOLOGY

Second Paper

Answer FOUR questions ONLY

Time allowed – THREE HOURS

1. Ultrasound guided fine needle aspiration (FNA) biopsy is a technique increasingly used in the diagnosis of liver disease in dogs and cats. Illustrate the value of this technique in conjunction with biochemistry tests in the diagnosis of liver diseases.
2. Write short notes on three of the following:
 - a) Toxic neutrophils
 - b) Pelger-Huet anomaly
 - c) Microfilariae in a blood sample from a dog, and possible additional laboratory findings
 - d) White blood cell inclusion bodies.

Please turn over for Questions 3, 4 and 5

3. Answer all parts of this question:
 - a) Describe how ketoacidosis develops in Diabetes mellitus in the dog and the consequences for an animal with this disease [65% of marks].
 - b) Explain how ketoacidosis develops in bovine ketosis and in ovine pregnancy toxaemia and the consequences in these species [20% of marks]
 - c) Describe the metabolic changes that lead to the development of hyperlipidaemia in ponies [15% of marks].
4. "Dyshaemopoiesis" is a cause of anaemia in domesticated animals". Illustrate this statement by providing a variety of causes, involving both small and large animals, and describe tests you would employ to ascertain the cause.
5. Describe the pathogenesis and laboratory diagnosis of drug-induced hepatotoxicity in the rat.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

Tuesday 15 March 2005

Veterinary Clinical Pathology

First Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. Evaluate the methods that are available to measure sodium and potassium in a clinical pathology laboratory. Discuss how the condition of the sample can affect the measurements.
2. The concentrations of the hormones cortisol and progesterone in serum are measured by immunoassay. Discuss and contrast the methodology of an enzyme linked immuno-absorbent immunoassay for progesterone and a chemi-luminescent immunoassay for cortisol and highlight the advantages or disadvantages of each immunoassay system.
3. Write short notes on how the following aspects of quality control in the laboratory can be assessed and quantified:
 - (a) assay specificity
 - (b) limits of detection
 - (c) accuracy
 - (d) precision
 - (e) clinical specificity
 - (f) clinical sensitivity

Please turn over for questions 4, 5 and 6

4. Bone metabolism is a dynamic process: discuss the basis of this statement and the limitations of biochemical tests available for monitoring changes in bone disease.
5. Write short notes on THREE of the following
 - (a) cytology of corneal and conjunctival swabs and scrapes
 - (b) cytology of cutaneous round cell tumours
 - (c) classification of pleural and peritoneal effusions
 - (d) the relative merits of the following stains for lymph node cytology: Wright's Giemsa, Diff Quick, May Grunwald, Papanicolaou's (PAP).
6. A pharmaceutical company has engaged you as a consultant to assist with the interpretation of haematology and biochemistry data from rats used in drug trials. Specifically, they requested guidance on the establishment of reference intervals for these animals. Outline the advice you would provide.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

Tuesday 15 March 2005

Veterinary Clinical Pathology

Second Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. With reference to clinical pathology, write short notes on THREE of the following:
 - (a) faecal cortisol levels
 - (b) hepatic encephalopathy
 - (c) Von Willebrand's disease in dogs
 - (d) Hyperglycaemia in rabbits

2. With reference to clinical pathology, write short notes on THREE of the following:
 - (a) abdominal fluid analysis in horses with colic
 - (b) CSF analysis in horses with neurological disease
 - (c) the clinico-pathological features of SLE (systemic lupus erythematosus)
 - (d) nucleated red blood cells in the peripheral blood of mammals

Please turn over for questions 3, 4 and 5

3. A parrot breeder has several sick birds that his veterinarian suspects have psittacosis. Outline your approach to the problem from the perspective of laboratory testing for diagnosis and monitoring to help this breeder eliminate the problem from his flock
4. Changes in glucose metabolism in late pregnancy and early lactation in dairy cows can cause severe clinical signs. Discuss the underlying cause of these and the laboratory tests that can aid in a diagnosis.
5. Discuss your clinical laboratory approach to icterus in the cat. Relate the tests you would perform and the expected results to the underlying causative disease processes.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

VETERINARY CLINICAL PATHOLOGY

Tuesday 16 March 2004

First Paper

Candidates must answer FOUR questions ONLY

Time allowed – THREE HOURS

1. Describe the aetiology of pancreatitis and the biochemical rationale of the laboratory tests available to diagnose and monitor this disease.
2. Provide a definition of the term biomarker in the context of veterinary clinical pathology and indicate the desirable characteristics of an ideal biomarker.
3. Write an essay on urinalysis and include a discussion of the core tests that would be used diagnostically. Discuss how the quality of results from random urine samples is ensured.
4. Describe what steps you would take when replacing your current method for measuring creatinine with a newer method to ensure continuity of results reporting and interpretation for clinicians.

Please turn over for Questions 5 and 6

5. Discuss how you would prepare your laboratory for inspection by a laboratory accrediting agency (ISO 2002, GLP accreditation).

6. With reference to clinical pathology, write short notes on THREE of the following:
- a) biochemical profiles for avian species
 - b) establishing a laboratory safety programme conforming to current regulations
 - c) synovial fluid evaluation
 - d) ROC (receiver operating characteristic) curves and their use in laboratory test validation.



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Part 1 Examination

VETERINARY CLINICAL PATHOLOGY

Tuesday 16 March 2004

Second Paper

Candidates must answer FOUR questions ONLY

Time allowed – THREE HOURS

1. In the context of clinical pathology, discuss the pathogenesis and diagnosis of feline infectious peritonitis in the cat.
2. Review the differential diagnosis of polyuria and polydipsia in the dog with particular reference to the clinical pathology.
3. Discuss the clinical and haematological indications for bone marrow analysis and describe the cytological changes that you would expect in these condition
4. Discuss the clinical pathology investigations you would perform on cats, dogs and cattle with enlarged lymph nodes in order to obtain a diagnosis.

Please turn over for Question 5

5. With reference to clinical pathology, write short notes on **THREE** of the following:
- a) hypocalcaemia in cattle
 - b) melanotic tumours in the horse
 - c) metabolic bone disease in reptiles
 - d) hypoglycaemia in the dog.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

Tuesday 18 March 2003

VETERINARY CLINICAL PATHOLOGY

First Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. Giving examples, discuss the methodological and technological basis of assays of the coagulation system as they are applied in veterinary clinical pathology.
2. Describe how you would undertake the evaluation and validation of a new assay for cardiac troponin 1 for use in dogs.
3. Quality assurance (QA) and quality control (QC) are major responsibilities of laboratory management. Describe how you, as a director of a veterinary clinical pathology laboratory, would select and maintain programmes for achieving high standards of QA/QC. Make special reference to short and long term programmes.
4. Discuss how you would validate a new replacement chemistry analyser in your laboratory.
5. Giving examples, discuss the use of cytological, cytochemical and immunocytochemical methods in diagnosis and classification of leukaemias.
6. Write short notes on THREE of the following:
 - (a) Clinical biochemical tests for renal disease,
 - (b) Blood cell inclusion bodies,
 - (c) Bone marrow evaluation,
 - (d) Cytology of urogenital neoplasms.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

Tuesday 18 March 2003

VETERINARY CLINICAL PATHOLOGY

Second Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. Discuss the differential diagnosis of hypercalcaemia in cats and dogs. Describe what further diagnostic tests may be undertaken in order to reach a diagnosis.
2. Vaginal cytology is frequently used to assess the stage of the oestrous cycle in bitches. Describe the cytological changes that occur during the different stages of the oestrous cycle and discuss how these changes correlate with alterations in circulating sex hormones. What criteria provide the best assessment for optimal time of mating?
3. Describe the clinical and clinicopathological features of hyperadrenocorticism in the horse. Prioritise the tests which, in your opinion, are the most reliable to diagnose this condition.
4. Describe the clinical and laboratory abnormalities you might expect to see in a dog with immune-mediated haemolytic anaemia. Discuss briefly the possible causes.
5. Write short notes on THREE of the following:
 - (a) The clinical and pathological consequences of ragwort ingestion in the equine.
 - (b) Monitoring of drugs used for the control of epilepsy in dogs.
 - (c) The relevance of metabolite measurements in blood of ruminants prior to parturition.
 - (d) Common causes of anaemia in the large domestic animals.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

March 2002

VETERINARY CLINICAL PATHOLOGY

First Paper

Candidates must answer FOUR questions ONLY

Time allowed – THREE HOURS

1. Giving examples, discuss the methodological and technological basis of immunoassays as they are applied in veterinary clinical pathology.
2. Describe how you would undertake the evaluation and validation of a new haematology analyser.
3. Health and safety are major responsibilities in laboratory management. Describe how you would deal with these issues as a Director of a Veterinary Clinical Pathology laboratory with especial emphasis on biological hazards, chemical hazards and radiation protection.
4. Write an essay on the aetiopathogenesis of haemolytic anaemias and their differential diagnosis using clinical pathological tests.
5. Giving examples, discuss the cytological criteria for distinguishing between epithelial, stromal and round cell tumours and between benign and malignant tumours.
6. Write short notes on THREE of the following:
 - (a) Clinical biochemical tests for hepatocellular and hepatobiliary disease.
 - (b) Phenotyping of myeloproliferative disease.
 - (c) Peritoneal cavity fluid evaluation.
 - (d) Quality control and assurance in clinical pathology laboratories.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

March 2002

VETERINARY CLINICAL PATHOLOGY

Second Paper

Candidates must answer FOUR questions ONLY

Time allowed – THREE HOURS

1.
 - (a) Describe the clinicopathological findings in adrenal diseases of dogs.
 - (b) Highlight the problems that may be encountered when interpreting the results of adrenal function tests, and how these problems may be resolved.
2.
 - (a) Discuss the collection and examination of tracheal and bronchoalveolar lavages in the dog, cat and horse.
 - (b) Describe the cytological abnormalities you would expect to see in one disorder of the respiratory tract in each species.
3. Write an essay on metabolic profiles in cattle.
4. Write an essay on the use of serum protein electrophoresis as a diagnostic tool in veterinary clinical pathology, including descriptions of common electrophoretic abnormalities.
5. Write short notes on clinicopathological aspects of THREE of the following:
 - (a) Chylous effusions
 - (b) Reticulocytes and reticulocyte counts
 - (c) Polycythaemia in the dog
 - (d) Exertional rhabdomyolysis (azoturia) in the horse.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

March 2001

VETERINARY CLINICAL PATHOLOGY

First Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. A research laboratory has developed a new immunoassay for canine liver glutathione S-transferase (GST) and claims that it is a useful diagnostic test in the diagnosis of liver disease in dogs. Describe the laboratory and clinical validation to be undertaken before this new assay could be used in routine investigations.
2. Describe the aetiology of diabetes mellitus and the biochemical rationale of the tests available to diagnose and monitor this disease.
3. What are the advantages and disadvantages of practice versus specialist veterinary clinical pathology laboratories.
4. Write an essay on blood coagulation and include a discussion of the tests used to monitor changes in this system.
5. Write an essay on fine needle aspiration of abdominal and thoracic masses in animals.
6. Discuss the mechanisms involved in the development and resolution of inflammation and how these can be monitored by a clinical pathology laboratory.



THE ROYAL COLLEGE OF PATHOLOGISTS

Part 1 Examination

March 2001

VETERINARY CLINICAL PATHOLOGY

Second Paper

Candidates must answer FOUR questions ONLY

Time allowed - THREE HOURS

1. What is meant by the term 'myelodysplasia'? Describe the haematological and clinical manifestations of myelodysplasia in dogs and cats.
2. Discuss the rationale and relative advantages/disadvantages of laboratory-based tests for the diagnosis of thyroid malfunction in the dog and cat.
3. Describe the use of laboratory tests to diagnose liver disease, including measurement of functional capacity, in domestic animals.
4. Describe the cytological features of malignant disease. Discuss in detail cytopathological methods which may be used to assess the malignancy of mast cell tumours more objectively.
5. Write short notes on THREE of the following:
 - (ii) the clinicopathological features of canine Leishmaniasis
 - (iii) Heinz bodies
 - (iv) the clinical and clinicopathological features of hyperlipidaemia in the horse
 - (v) collection, handling and examination of cerebrospinal fluid in the dog.