



# Australian and New Zealand College of Veterinary Scientists

## Fellowship Examination

June 2015

# Veterinary Anaesthesia and Critical Care Paper 1

Perusal time: **Twenty (20)** minutes

Time allowed: **Three (3)** hours after perusal

Answer **ALL SIX (6)** questions

All six questions are of equal value.

Answer **SIX** questions each worth 30 marks .....total 180 marks

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# Paper 1: Veterinary Anaesthesia and Critical Care

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Answer all six (6) questions

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

a) Define the following statistical concepts:

- i. confidence interval (2 marks)
- ii. p value (2 marks)
- iii. precision and accuracy (2 marks)
- iv. sensitivity and specificity (2 marks)
- v. statistical power. (2 marks)

b) Define and briefly list **one (1)** application in anaesthesia of **each** of the following:

- i. The Flick principle (2 marks)
- ii. Beer Lambert Law (2 marks)
- iii. Hagen Poiseuille equation (2 marks)
- iv. Universal gas law (2 marks)
- v. Ohm's Law (Darcy's Law). (2 marks)

c) Define **each** of the following pharmacokinetic terms:

- i. volume of distribution (2 marks)
- ii. clearance (2 marks)
- iii. elimination half life (2 marks)
- iv. context-sensitive half life (2 marks)
- v. bioavailability. (2 marks)

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

a) Define **each** of the following intrinsic cardiovascular reflexes. Include receptors and location, stimulus and response:

- i. Baroreflex (2 marks)
- ii. Bainbridge reflex (2 marks)
- iii. Bezold-Jarisch reflex (2 marks)
- iv. Cushing reflex (2 marks)
- v. Branham reflex. (2 marks)

b) Draw and label the action potential for the sinoatrial node. For **each** phase, outline the changes in ion concentration that occur. (10 marks)

c) Describe the fetal circulation and outline how this is altered following birth. (10 marks)

3. Answer **both** parts of this question:

a) Briefly describe the mechanism and site of action of the following drugs when administered into the epidural space. For **each**, outline onset and duration of action:

- i. bupivacaine (2.5 marks)
- ii. morphine (2.5 marks)
- iii. ketamine (2.5 marks)
- iv. medetomidine. (2.5 marks)

b) Describe the pharmacology of the following drugs used in anaesthetised animals. Your description should include receptor type, location, secondary messengers and effect:

- i. ephedrine (5 marks)
- ii. vasopressin (5 marks)
- iii. nitroprusside (5 marks)
- iv. phentolamine. (5 marks)

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

- a) Define hypoxia and outline **four (4)** causes. (4.5 marks)
- b) Define and outline **five (5)** causes of hypoxaemia. (5.5 marks)
- c) List and briefly describe the **five (5)** most important physiological consequences of hypothermia in an anaesthetised animal. (10 marks)
- d) Using a diagram, describe the coagulation cascade. (10 marks)

5. Answer **all** parts of this question:

- a) Outline the direct and indirect hormone responses mediated by the kidney in response to hypotension. Briefly describe how **each** of the hormones released act to restore blood pressure. (10 marks)
- b) Briefly describe the changes in hormone levels and nervous system activity associated with the stress response and outline the beneficial role of **each** change. (16 marks)
- c) Outline the detrimental effects of the stress response. (2 marks)
- d) List factors that increase or decrease the stress response in an anaesthetised animal. (2 marks)

6. Answer **all** parts of this question:

- a) Invasive blood pressure measurement is considered the gold standard for measuring a patient's blood pressure. Outline the factors that alter the accuracy of this measurement technique. (10 marks)
- b) Describe **two (2)** methods of vaporization used in precision out of circuit vaporisers. (10 marks)
- c) Outline **ten (10)** methods of reducing exposure of personnel to anaesthetic gases in the perioperative period. (10 marks)

**End of paper**



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## Veterinary Anaesthesia and Critical Care Paper 2

Perusal time: **Twenty (20)** minutes

Time allowed: **Three (3)** hours after perusal

Answer **ALL SIX (6)** questions

All six questions are of equal value.

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# Paper 2: Veterinary Anaesthesia and Critical Care

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## Answer all six (6) questions

1. An eight-year-old male neutered Boxer (30 kg) is presented with seizures, ataxia, and behavioural changes. Magnetic resonance imaging revealed a meningioma in the right frontal lobe. It is decided to perform a craniectomy to excise the mass. Treatment with phenobarbitone and prednisolone is commenced two weeks prior to day of surgery to help stabilise the dog's condition. Haematology and biochemistry on the day of surgery was within normal limits.

Answer **both** parts of this question:

- a) Discuss the major considerations regarding anaesthetising this patient. *(15 marks)*
- b) Outline and justify a suitable protocol for anaesthesia of this animal based on the considerations identified above. *(15 marks)*

2. A black swan presents as an emergency following an unknown trauma. The patient has a broken leg and has to be anaesthetised for radiography and possible fracture repair.

Answer **both** parts of this question:

- a) Discuss important considerations when anaesthetising birds, with reference to anatomy and function of the pulmonary and cardiovascular systems. *(18 marks)*
- b) Describe an anaesthetic protocol that accommodates these considerations. *(12 marks)*

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3. A six-year-old, male castrated Border collie was scheduled for exploratory thoracoscopy to investigate spontaneous pneumothorax that had not resolved with repeated suction. Based on computed tomography an abscess secondary to foreign body was believed to be present in the right middle lung lobe. Specific requirements for the thoracoscopy were alternating one-lung ventilation to allow the surgical access to the right middle lobe and its removal, and the examination of the left hemithorax to rule out the presence of other lesions.

Answer **all** parts of this question:

- a) Discuss the effects of one-lung ventilation on pulmonary function and gas exchange in an anaesthetised animal. (5 marks)
- b) Describe **three (3)** methods used for lung isolation in one-lung ventilation (6 marks). For **each** method include **two (2)** advantages and **one (1)** disadvantage (9 marks).
- c) Describe a suitable anaesthetic technique for use in this animal. Justify the methods and/or techniques selected. (10 marks)
4. A two-year-old Thoroughbred stallion has developed a cataract after a traumatic injury. The owner has requested that the cataract be removed.
- Discuss an appropriate anaesthetic protocol for use in this stallion. The protocol should include methods for providing the best surgical conditions for the performance of phacoemulsification and any specialised monitoring requirements. Justify your choices. (30 marks)
5. Describe the clinical use of xylazine in ruminant species. Include in your answer a description of the pharmacokinetics and pharmacodynamics of this drug. (30 marks)
6. Cardiopulmonary arrest is observed in a four-year-old domestic shorthair cat immediately following induction of anaesthesia and prior to orotracheal intubation. The cat was premedicated with medetomidine and butorphanol, and anaesthesia was induced with diazepam and ketamine.
- Discuss the approach to cardiopulmonary cerebral resuscitation in this patient. Justify **each** part of the plan. (30 marks)

**End of paper**