



# Australian College of Veterinary Scientists

## Fellowship Examination

June 2011

### Veterinary Emergency Medicine and Critical Care

#### Paper 1

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

Time allowed: **Four (4)** hours after perusal

Answer **ALL** three sections

In **Section A**, answer your choice of **ONE (1)** question from the two questions **ONLY**

In **Sections B and C**, answer **ALL** questions

The examination has a total of 100 marks. The mark value of each section is indicated.

# Paper 1: Veterinary Emergency Medicine and Critical Care

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## SECTION A

Answer your choice of **ONE (1)** question from the two questions **ONLY.** (25 marks)

1. A ten-year-old, female-spayed shih tzu presents with a three-day history of lethargy, poor appetite, polydipsia, and a progressively distending abdomen. The dog has a history of tricuspid regurgitation and you diagnose her at this visit with right-sided congestive heart failure.

She has moderate, anechoic ascites on ultrasound examination. Peritoneal fluid evaluation reveals a relatively acellular fluid with a total protein concentration of 3.2 g/dL.

An initial serum electrolyte panel reveals a serum sodium concentration of 128 mEq/L.

Answer **all** subparts of this question:

- a) Indicate whether this dog's total body sodium content is decreased, normal or increased. (1½ marks)
- b) Describe in detail the physiological mechanisms that resulted in the ascites, polydipsia, and hyponatremia in this patient. (2½ marks)

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

- a) Discuss the role of platelets in the healthy dog. Your answer should include **both** the following points:
  - i. the current understanding of the role of platelets in normal coagulation (12½ marks)
  - ii. any other effects of platelets in normal physiology. (5 marks)
- b) With regard to their effect on platelet function, discuss the mechanisms of action of **each** of the following drugs: (7½ marks)
  - i. aspirin
  - ii. clopidogrel
  - iii. abciximab.

**Section B on next page**

## **SECTION B**

**Answer ALL five short answer questions. (10 marks each)**

3. Answer **all** subparts of this question:

- a) Compensatory and non-compensatory pauses may be seen on an ECG during an arrhythmia. Answer **both** the following regarding compensatory and non-compensatory pauses:
  - i) Describe the electrocardiographic appearance of compensatory and non-compensatory pauses. *(1½ marks)*
  - ii) Describe the mechanism that causes a compensatory pause, **and** describe the mechanism that causes a non-compensatory pause. *(1½ marks)*
- b) Answer **all** subparts of this question regarding pre-excitation syndrome:
  - i) Explain the cause of pre-excitation syndrome. *(1½ marks)*
  - ii) Describe the electrocardiographic changes commonly seen with pre-excitation syndrome. *(1½ marks)*
  - iii) Describe the arrhythmia that commonly results from pre-excitation syndrome. In your answer, explain how this arrhythmia arises. *(2½ marks)*
  - iv) Indicate which pharmacologic treatment you would choose first for a patient with the arrhythmia described in b iii above? Explain why you would choose this drug. *(2½ marks)*

4. With regard to cerebral blood flow. Answer **all** subparts of this question:

- a) Define ‘autoregulation.’ *(2 marks)*
- b) Describe how and why local phenomena alter cerebral blood flow. *(5 marks)*
- c) Discuss how these mechanisms are affected by intracranial disease. *(3 marks)*

**Section B continued on next page**

5. Regarding central venous pressure:

**Part 1** Answer **all** subparts of this question:

- a) List the determinants of central venous pressure. (1 mark)
- b) State why some clinicians measure central venous pressure. (1 mark)
- c) Indicate what literature finding(s) support clinicians who elect not to measure central venous pressure. (1 mark)

**Part 2**

Answer **all** subparts of this question on the separate answer sheet provided; and ensure the separate answer sheet remains attached to the answer booklet which is handed to the invigilator at the conclusion of the examination.

Following is an idealised schematic of a normal pressure waveform obtained from a central venous catheter, under an idealised, simultaneous ECG:

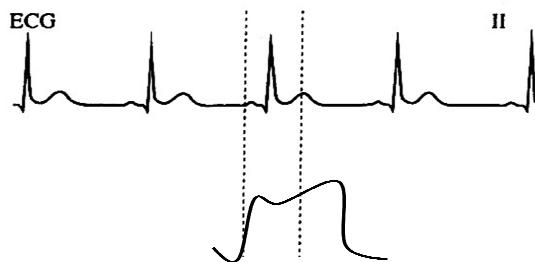
- d) Using their standard names, name the deflections on both the ECG and CVP waveforms. (2 marks)
- e) Describe what causes each of these deflections. (2 marks)



**Examination question continued on next page**

**Part 3** Answer **all** subparts of this question:

- f) Describe the abnormality in the following CVP tracing, paired with its normal, simultaneous ECG tracing. *(1 mark)*
- g) Name the patient condition that causes this abnormality. *(1 mark)*
- h) Explain why the condition causes the CVP waveform abnormality. *(1 mark)*



6. Discuss the role of the major histocompatibility complex (MHC) in acquired and innate immunity in dogs and cats. *(10 marks)*

7. Answer **all** subparts of this question:

- a) Define an adjunctive analgesic agent. *(1 mark)*
- b) For **three (3)** adjunctive analgesics used in veterinary medicine, discuss their mechanism of action, potential indications and adverse effects when used in critically ill dogs. *(9 marks)*

**Section C on next page**

## **SECTION C**

**Answer ALL TEN (10) short answer questions: (2½ marks each)**

8. Adrenaline is commonly used in cardiopulmonary-cerebral resuscitation in humans and animals. Answer **all** subparts of this question:
  - a) At which adrenergic receptors does adrenaline act? (½ mark)
  - b) Describe the clinical effects that stimulation of these receptors has on the patient. (2½ marks)
9. List the mechanism of action, indications for use, antibiotic class and spectrum of activity, and potential adverse effects in cats and dogs for **both** of the following antibiotics:
  - a) imipenem (1¼ marks)
  - b) amikacin. (1¼ marks)
10. Answer **all** subparts of this question:
  - a) Describe the clinical signs of beta blocker toxicity in the dog. (1¼ marks)
  - b) List the treatment(s) you could use to treat this toxicity and explain why they would be useful. (1¼ marks)
11. Answer **all** subparts of this question:
  - a) Define physiological dead space. (½ mark)
  - b) Describe how to calculate physiological dead space for a patient. (1 mark)
  - c) List clinical conditions that could increase physiological dead space. (1 mark)
12. Glutamine is regarded as a conditionally essential nutrient in critical illness. Answer **all** subparts of this question.
  - a) Describe what is meant by the term ‘conditionally essential.’ (½ mark)
  - b) List the proposed mechanisms by which glutamine may improve patient outcome in critical illness. (1 mark)
  - c) Describe the methods you would recommend for glutamine supplementation in a clinical setting. (1 mark)

**Section C continued on next page**

13. Answer **all** subparts of this question:
- Define the ‘Bohr effect’ and describe how it is of benefit to the animal.  
*(1¼ marks)*
  - Define the ‘Haldane effect’ and describe how it is of benefit to the animal.  
*(1¼ marks)*
14. Answer **all** subparts of this question:
- Name the mechanisms of heat transfer between the body and the environment.  
*(1 mark)*
  - Heat stroke is heat-induced injury severe enough to adversely affect which organ?  
*(¼ marks)*
  - Briefly describe the physiologic roles of heat shock proteins and indicate when they are produced.  
*(1¼ marks)*
15. With respect to *in vivo* antibiotic efficacy, what is the clinical significance of **each** of the following terms:
- minimum inhibitory concentration  
*(1¼ marks)*
  - breakpoint.  
*(1¼ marks)*
16. Parameters have been described in the literature for the diagnosis of sepsis in the dog. Without using specific numbers, state the diagnostic criteria that must be met to diagnose sepsis in the dog.  
*(2½ marks)*
17. With regard to renal physiology, answer **all** subparts of this question:
- define ‘tubuloglomerular feedback’ and explain the role of this response.  
*(1¼ marks)*
  - define ‘glomerulotubular balance’ and explain the role of this response.  
*(1¼ marks)*

**End of paper**

## **Answer Sheet for Paper 1 Question 5 – Part 2**

**Candidate:** \_\_\_\_\_

### **Part 2**

**Answer all** subparts of this question **on the separate answer sheet provided; and ensure the separate answer sheet remains attached to the answer booklet which is handed to the invigilator at the conclusion of the examination.**

Following is an idealised schematic of a normal pressure waveform obtained from a central venous catheter, under an idealised, simultaneous ECG:

- a) Using their standard names, name the deflections on both the ECG and CVP waveforms. *(2 marks)*



- b) Describe what causes each of these deflections. *(2 marks)*