

THE ROYAL COLLEGE OF VETERINARY SURGEONS

DIPLOMA IN VETERINARY CARDIOLOGY

WEDNESDAY 8 AUGUST 2001

PAPER I

(3 hours)

Candidates are required to answer **FOUR** out of the following **five** questions on this paper.

Illegible handwriting or failure to answer the question in the form requested may result in examiners being unable to award marks for information which candidates intended to convey.

If insufficient time is available to answer a question fully, it will be acceptable to complete in note form.

1. Murmurs are more commonly found in athletes than in non-athletes. What physiological adaptations occur in the cardiovascular system during exercise training? How might these explain the generation of cardiac murmurs in athletes?
 2. **Discuss** the anatomical and haemodynamic basis of right to left cardiovascular shunts. What physiological adaptations might occur with these lesions?
 3. **Describe** the potential mechanisms of arrhythmogenesis leading to atrial fibrillation in different domestic species.
 4. **Discuss** the pathophysiology of the formation of pleural and abdominal effusions resulting from cardiac disease
 5. **Discuss** the role of aldosterone in the pathophysiology of congestive heart failure. What is the rationale for the use and selection of aldosterone antagonists in patients with heart disease?
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PAPER II

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1. **Discuss** the reasons for and against the use of the drug pimobendan in the treatment of chronic degenerative mitral valve disease.
 2. **Discuss** how Doppler echocardiography can be used to provide information about diastolic function.
 3. You are approached by a breed society who are worried about the high frequency of sudden death in their large breed dogs. They suspect that this is due to cardiac disease, probably cardiomyopathy. How would you advise them to proceed in establishing a programme to help identify the cause of the sudden death and to reduce the frequency of the problem?
 4. With reference to the recent human literature, discuss the indications for beta-blockade in canine dilated cardiomyopathy. In what circumstances would you consider using these drugs in treating dilated cardiomyopathy in the dog? What complications may be expected and how would you try and reduce the risk of these occurring?
 5. You have been sent an ECG from a 12 year old Thoroughbred X hunter showing occasional ventricular premature complexes:
 - a) What advice would you give the referring veterinary surgeon?
 - b) The horse is referred to you for further evaluation. **Discuss** how you would investigate the case. How do the results of investigations influence your advice to the owner about use of this animal?

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DIPLOMA IN VETERINARY CARDIOLOGY

TUESDAY 30 JULY 2002

PAPER I

(3 hours)

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1. Give an account of the mechanism of action of the Class I antidysrhythmic drugs. Why are the Class Ib drugs thought to be the safest sub-group of these drugs to use clinically?
 2. Describe the short and long term cardiac adaptations to exercise in animals.
 3. With the aid of an **annotated diagram**, describe the relationship between the electrical, mechanical and acoustic events in a normal cardiac cycle in a horse.
 4. Explain what the systolic time intervals are and how these are related to the electromechanical function of the heart. With the **aid of diagrams** explain how these are measured with echocardiography? Discuss how the following will affect these intervals:
 - i. subaortic stenosis
 - ii. dilated cardiomyopathy
 - iii. a ventricular septal defect.
 5. Describe the anatomy and haemodynamics of the coronary circulation. What coronary abnormalities and conditions that affect coronary blood flow are encountered in veterinary practice?
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TUESDAY 30 JULY 2002

PAPER II

(3 hours)

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1. **Explain** how you would assess the pulmonary artery pressure in a dog with suspected pulmonary hypertension using Doppler echocardiography (with the *modified* Bernoulli equation). The modifications to the original Bernoulli equation make certain assumptions - discuss what these are and, with the aid of examples, what the limitations of the modified Bernoulli equation are in echocardiography.
 2. *"Systemic hypertension in the cat is increasingly recognised as an important problem"*.
Discuss:
 - i. The diagnosis of hypertension in the cat.
 - ii. The goals in management of feline hypertension critically appraising the current knowledge of how these can be best achieved.
 3. *"Congestive heart failure is a neuroendocrine disorder."* **Discuss** this statement, describing the action of the neurohormones activated in heart failure, and what current and/or novel therapies could inhibit these processes.
 4. **Compare and contrast** atrial fibrillation in small and large animal species.
 5. You are presented with a 13 year-old endurance horse with a grade 3 holodiastolic heart murmur. **Describe** how you would approach and manage this case.
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DIPLOMA IN VETERINARY CARDIOLOGY

THURSDAY 17 JULY 2003

PAPER I

(3 hours)

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1. **Describe** the location of pacemaker tissue in domestic animals and the variations in the cardiac conduction system between carnivores and herbivores, and the effect that this may have on the ECG pattern. Discuss the differences in the ECG lead systems used in the domestic species, and the potential diagnostic value of variations in ECG waveform.
 2. **Describe** the embryological formation of the interatrial and intraventricular septa (with diagrams), and discuss the different forms of septal defects found in domestic species.
 3. **Discuss** the concept of 'ventricular remodelling' and its therapeutic implications.
 4. **Describe**, with the aid of diagrams, the main pacemaker currents that may be involved in spontaneous depolarization of the sinoatrial node.
 5. **Discuss** the classification of feline myocardial disease. How has the demarcation between categories become blurred in recent years?
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THURSDAY 17 JULY 2003

PAPER II

(3 hours)

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1. **Discuss** the pathophysiology of episodic collapse. Describe your approach to evaluation of recurrent collapse in a mature boxer.
 2. **Discuss** the conditions that may result in mitral regurgitation in horses. What factors would influence your advice to the owner of a horse with mitral regurgitation?
 3. **Discuss** the current role of cardiac surgery in small animals.
 4. **Discuss** the aetiological factors resulting in thrombogenesis in feline myocardial disease. What are the advantages and disadvantages of the different available therapeutic strategies for managing an asymptomatic cat with hypertrophic cardiomyopathy and a left atrial thrombus?
 5. There are fewer veterinary indications for cardiac catheterisation since the advent of echocardiography. What are the current remaining veterinary indications for cardiac catheterisation? When is cardiac catheterization more reliable than echocardiography?
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WEDNESDAY 14 JULY 2004

PAPER I

(3 hours)

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1. **List** the causes of 'high-output' heart failure in small animals. What are the mechanisms involved in the development of congestive heart failure in these conditions, and how would you manage such patients?
 2. Discuss the causes of pulmonary hypertension, with reference to the pathophysiological mechanisms in **each** category.
 3. Write **short notes** on the following:
 - a. Double-chambered right ventricle.
 - b. Cor triatriatum sinister.
 - c. Persistent left cranial vena cava.
 - d. Atrio-ventricular septal defects (endocardial cushion defects).
 4. Describe the main signalling pathways for control of vascular smooth muscle. Indicate the site of action for the vasodilators most commonly used in veterinary medicine.
 5. **Draw a diagram** describing the relationship of the **FOUR** transient heart sounds to left atrial and left ventricular pressure. What causes gallop sounds in small animals?
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WEDNESDAY 14 JULY 2004

PAPER II

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1. **Discuss** the indications for cardiac pacing in dogs. What are the potential complications and problems in veterinary patients?
 2. What cardiovascular findings might lead you to advise a client against the purchase of a hunter, and what findings may be considered acceptable?
 3. **Discuss** the generation of supraventricular tachydysrhythmias (including atrial fibrillation), and how the mechanism influences their management.
 4. Is there a potential role in veterinary medicine for ANP, BNP, troponin-I and other related plasma markers of cardiac disease?
 5. **Discuss** the generation of left ventricular outflow tract obstruction in cats. What is its clinical impact?
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DIPLOMA IN VETERINARY CARDIOLOGY

WEDNESDAY 13 JULY 2005

PAPER I

(3 hours)

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1. Blood pressure varies: **discuss** the short and long-term regulation of *arterial* blood pressure.
 2. Is heart failure a dysautonomia? **Discuss.**
 3. **Describe** what happens to the left ventricle during the progression of systolic dysfunction.
 4. **Describe** what happens to intracellular calcium following depolarization of cardiac myocytes.
 5. **Describe** the embryonic development of the branchial arches and how they lead to the final arrangement of thoracic arteries. What types of vascular ring anomalies may result from derangement of this embryological development?
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THE ROYAL COLLEGE OF VETERINARY SURGEONS

DIPLOMA IN VETERINARY CARDIOLOGY

WEDNESDAY 13 JULY 2005

PAPER II

(3 hours)

Candidates are required to answer **FOUR** out of the following **five** questions on this paper.

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1. Write **short notes** on the following:
 - Orthodromic atrioventricular reciprocating tachycardia
 - Torsades de pointes
 - Atrial standstill
 - Left anterior fascicular block
 2. **Describe** the physical findings and your approach to the investigation and management of a cow with right sided cardiac failure.
 3. **Discuss** the measurement of cardiac chamber size.
 4. What are the factors that influence your choice of furosemide dose in a dog with mitral regurgitation?
 5. A cat is presented to you with sudden onset respiratory distress; thoracocentesis yields an opaque, milky-white fluid. Discuss your approach to this case.

THE ROYAL COLLEGE OF VETERINARY SURGEONS

DIPLOMA IN VETERINARY CARDIOLOGY

TUESDAY 8 JULY 2008

PAPER I

(3 hours)

Candidates are required to answer **FOUR** out of the following **five** questions on this paper.

Allow 45 minutes per question.

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1. Explain the pressure and volume changes which occur in the left atrium, left ventricle and aorta through systole and diastole.

What are:

- a. Diastasis?
- b. Afterload?
- c. The Windkessel effect?

You may use diagrams in your answer.

2. What is respiratory sinus arrhythmia? **Describe** the physiological mechanisms behind it.
 3. **Discuss** the role of endothelial dysfunction in cardiac disease.
 4. **Compare and contrast** ventricular septal defects in domestic species.
 5. How can systolic function be measured?
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DIPLOMA IN VETERINARY CARDIOLOGY

TUESDAY 8 JULY 2008

PAPER II

(3 hours)

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Allow 45 minutes per question.

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1. **Write an essay** which explains clinically relevant features of feline hypertension.
 2. What are your views on the controversy regarding Pimobendan versus Angiotensin-converting-enzyme Inhibitor (ACEI) therapy for canine heart failure? Support your arguments with evidence.
 3. How can functional murmurs be distinguished from murmurs associated with structural heart disease in horses?
 4. A local branch of the British Small Animal Veterinary Association (BSAVA) has asked you to give a presentation about heart murmurs in cats for general practitioners. Give an **outline** of the issues which you will tackle under the following headings:
 - A. Murmurs in cats: general overview.
 - B. Murmurs in cats: What else can you do to investigate?
 - C. What else should we know about feline heart disease and failure?
 5. You are asked to design a clinical study to test the hypothesis that sotalol is of benefit in boxers with arrhythmogenic right ventricular cardiomyopathy. **Outline** the protocol for your study.
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DIPLOMA IN VETERINARY CARDIOLOGY

TUESDAY 7 JULY 2009

PAPER I
(3 hours)

Candidates are required to answer **FOUR** out of the following **five** questions on this paper.

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1. The endothelium is a key regulator of blood flow to tissues.
 - a. **Give an account** of the factors produced by the vascular endothelium which regulate smooth muscle tone.
 - b. What diseases have dysfunction of the endothelium been well characterized in human medicine and is there any evidence that endothelial cell dysfunction may be important in veterinary species?

 2. **Explain the pros and cons** of antagonist drugs which selectively and competitively target membrane receptors in the cardiovascular system.

How might the targeting of second messenger / effector systems (to produce non-competitive and/or physiological antagonism) overcome some of the potential disadvantages? Illustrate your answer **with examples**.

 3. How does knowledge of the pathogenesis and epidemiology of atrial fibrillation influence its treatment and management?

 4. **Describe** the changes in the foetal heart and circulation that occur on and just after birth.

P.T.O. for Question 5

5.

- a. **Briefly outline** the **FOUR** haemodynamic phases of diastole for the left ventricle.
- b. What factors contribute to the left ventricular passive diastolic properties?
- c. What does it indicate when the left ventricular diastolic pressure-volume relationship is shifted to the right and to the left?
- d. What shifts, if any, to the left ventricular diastolic pressure-volume relationship are seen with the following cardiac disease states?
 - a. Dilated cardiomyopathy.
 - b. Restrictive cardiomyopathy.
 - c. Constrictive pericarditis.
 - d. Isolated chronic mitral regurgitation with LV enlargement.

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DIPLOMA IN VETERINARY CARDIOLOGY

TUESDAY 7 JULY 2009

PAPER II

(3 hours)

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1. A five year-old pregnant, welsh cob mare is presented to you with pyrexia, severe ventral and brisket oedema and engorged jugular veins. The pony was reported to be lame some days earlier, but then became progressively more lethargic. On clinical examination, you detect a grade 5/6 systolic murmur with point of maximal intensity at the cranial left heart base. The murmur is also audible on the right, but at a lesser intensity. The pony has been reliably auscultated in the past and no murmur was noted. Her resting heart rate is 70 beats per minute. Respiratory rate is normal (10 breaths per minute). The mare is six weeks off her expected foaling date.
 - a. What is your most likely diagnosis and why?
 - b. How would you confirm your diagnosis and manage this case?
 - c. What advice would you give to her owners?

2. How can mitral regurgitation be **quantified** using echocardiography?
 - a. **Describe in detail** the available techniques and **discuss** any limitations.
 - b. In your opinion, should quantification of regurgitation be part of a routine echocardiographic examination?

P.T.O. for Questions 3 - 5

3. **Discuss** the electrocardiographic characteristics of supraventricular tachyarrhythmias and their therapies (including both acute and chronic management). Include all proposed SVT mechanisms in your answer, not just those described in dogs.

 4. **Discuss** the various aetiologies and therapy options for canine pulmonary hypertension.

 5. **Explain** the proposed role of the aldosterone antagonist spironolactone in the treatment of congestive heart failure. **Discuss** relevant human and veterinary clinical trial data.
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