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Australasian Board Of Cardiovascular Perfusion

Australasian Diploma of Perfusion

February 2011

Final Examinations

Part 1 – Written Exam

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N.B. Write your answers on the enclosed answer paper.

**Please write on one side only.**

Place the question number at the top of each page in the space allocated and your candidate number

All questions have equal marks.

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Question 1 (a) Describe the mechanism of transport of O<sub>2</sub> and CO<sub>2</sub> in the blood. Make specific reference to variations in temperature, acid base status and 2,3 DPG.

(b) Define alpha-stat and pH-stat acid base management during hypothermia cardiopulmonary bypass, with reference to "temperature compensation" of blood-gas values.

(10 marks)

Question 2 (a) Discuss the differences between two vasodilating agents which may be used in patients undergoing coronary artery bypass grafting.

(6 marks)

(b) Lasix is a loop diuretic and mannitol is an osmotic diuretic.

Briefly explain the difference in the actions of these two drugs.

(4 marks)

Question 3 (a) Describe the conduction pathways of the myocardium.

(3 marks)

(b) What are the common patterns of arterial supply to the sinus node and the atrioventricular node?

(2 marks)

(c) Name and describe the coronary arteries and their major branches which supply the **left** ventricle.

(2 marks)

(d) Compare and contrast the venous drainage of the left and right ventricles.

(3 marks)

Question 4

What are the issues for cardiopulmonary bypass with pregnant patients?

(10 Marks)

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**Question 5**

- (i) Discuss the impact of the intra aortic balloon pump to the myocardial physiology and performance in the failing left ventricle (5 marks)
- (ii) Discuss the indications, contraindications and complications of IABP therapy (3 marks)
- (iii) Sketch the arterial trace showing an IABP with correct timing at a rate of 1:2. Label the relevant parts of the diagram (2 mark)

**Question 6**

After the repair of an acute dissection of the ascending aorta, cardiopulmonary bypass is terminated successfully. Despite the administration of protamine, bleeding continues without surgical cause.

- (a) What are the possible causes of the bleeding? (4 marks)
- (b) What tests are available to confirm the diagnosis? (3 marks)
- (c) What agents are available to treat the bleeding? (3 marks)

**Question 7** With regard to ultrafiltration:

- (i) List patient parameters that may influence you to use ultrafiltration. (3 marks)
- (ii) Describe factors that may influence the rate of ultrafiltrate production. (3 marks)
- (iii) It is now common to perform ultrafiltration at varying stages of bypass and off bypass. Discuss the claimed advantages of performing ultrafiltration at these stages. (4 marks)

**Question 8**

You are required to perform a perfusion for a bypass case requiring deep hypothermic circulatory arrest. Discuss the protocol you would adopt including your cooling/rewarming strategies, the period of time circulatory arrest would be safe, drugs, monitoring and circuits you would use.

(10 marks)

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**Question 9** Outline the advantages and disadvantages of;

- (i) Antegrade
- (ii) Retrograde and
- (iii) Coronary Ostial cardioplegia delivery techniques.

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**Question 10** Patient is 53 years old female.  
Weight 50 kg, Height 142 cm,  
B.S.A. is 1.38 m<sup>2</sup>, Haematocrit is 35%. K<sup>+</sup> is 3.0 mmol/L.

Her mitral valve and aortic valve will need to be replaced as both are stenotic. Her ECG shows she is in atrial fibrillation. Present medications include Lasix, Potassium and Warfarin. The total circuit requires 2000 ml of priming volume. Any clear fluid replacement will be lactated ringers. Any blood replacement will be using packed cells which have a volume of 250 cc per unit and a haematocrit of 60.

- (i) Calculate patient's total blood volume. **(Show all calculations)**  
(3 marks)

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(ii) Calculate patient's estimated HCT on pump.  
**(Show all calculations)** (3 Marks)

- (iii) We would like a haematocrit of 25% when we go on bypass. To keep the total prime at 2000ccs and achieve the desired haematocrit, how must we alter the prime.  
**(Show all calculations)** (4 marks)

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