FBMB 4F52

FIRST EXAMINATION FOR THE DEGREE OF B.M.

Part II

SUBJECT 5: SYSTEMS OF THE BODY: INTEGRATIVE ASPECTS

PART B

HILARY TERM 2009

Tuesday 17th March

9.30 a.m. - 11.30 a.m.

Answer three questions. Use a separate book for each question. Please write your **CANDIDATE NUMBER** and not your name on each answer book.

Your answers should be in essay form, but they may be illustrated with diagrams or tables. Answers should be direct and clear, and they should refer to evidence and/or clinical relevance as appropriate. You should take care not to use exactly the same material in two separate essays.

Do **not** turn over until told that you may do so.

1. Explain what is meant by the term 'metabolic rate' and suggest appropriate units for its measurement. Describe in detail an experiment in which metabolic rate is measured at rest and during exercise, paying attention to the ways in which errors may easily arise in such an experiment. Outline how mechanical efficiency could be determined in the experiment you describe, and what information it gives about metabolism.

2. Compare and contrast the extent to which the hypothalamus conducts widespread regulation of growth, homeostasis and behaviour via *neural* efferents and via *hormonal* communication.

3. Compare and contrast the mode of action of substances that target α-adrenergic receptors as anti-hypertensive therapy.

4. Write an essay about the role of Vitamin D in the body and the consequences of deficiency of this vitamin in childhood and adult life.

5. What is a normal value of central venous pressure and what determines how it changes in **BOTH** normal healthy activities and during disease?

6. Give **THREE** different causes for the finding of arterial acidaemia ($pH_a < 7.2$) in a human. For each of these describe the underlying mechanism resulting in the acidaemia and discuss how pharmacological or other interventions could be used to manage the disturbance, if it is necessary to intervene.

7. From your knowledge of the complex apparatus regulating breathing, speculate on several mechanisms that might account for the huge changes in breathing that occur during exercise. Have any of the possible mechanisms been excluded by experiment?

8. In Cerro de Pasco at 4,300 m in Peru several residents were observed to have a systolic pulmonary arterial pressure above 70 mmHg and/or a hematocrit above 70%. Explain how these measurements can be made. Comment on these figures and explain their relation to disease in both short-term visitors and long-term residents.

9. Evaluate the physiological importance of nitric oxide to vascular function, and give an account of drugs that exploit the nitric oxide system.

10. Explain how it is possible to compare the potencies of different inhalational anaesthetic agents with regard to their use for surgical anaesthesia. Outline the wider effects of anaesthetic agents on all systems of the body, and generate a hypothesis of what mechanism, or mechanisms, might underlie such widespread effects.

END OF PAPER

Last page