



ROYAL AUSTRALASIAN COLLEGE  
OF  
DENTAL SURGEONS  
INCORPORATED  
ABN 97 343 369 579

PRIMARY EXAMINATION IN  
PHYSIOLOGY

Wednesday 26 November 2008

Time allowed: **Two hours**

**INSTRUCTIONS TO CANDIDATES:**

- Answer FOUR of the following six questions.
- Each question is of equal value, namely, 25% of the total for the written paper.
- If you answer more than four questions, marks will be given to only four.
- Write each answer in a **separate booklet**.
- Ample time is allowed for your answers so you should strive to present them concisely and in a well-organised manner.
- Diagrams may be used to illustrate your answers where appropriate.
- Allow time at the end of the examination to read your answers *carefully*.

**Question 1**

**(30 minutes: 25 marks)**

You have provided a patient with a new set of partial dentures and she has returned for the first post-insertion check one week later. The patient reports that she is managing quite well, but complains that the dentures are irritating her gum in one spot. It was initially just a feeling of pressure, but it is now very painful when she bites. You remove the dentures and ask her to point to the spot on her gum which is bothering her. Without looking, she immediately points accurately to a small, ulcerated spot on the alveolar ridge in the lower premolar region on the left side.

- a) Describe the neural mechanisms responsible for the patient's ability to distinguish the type of sensation the dentures have produced (i.e. pressure vs. pain). [6 marks]
- b) The mechanical stimulation of the mucosa by the denture was initially perceived as pressure, but after a period of time the same stimulus produced a painful sensation. Describe the physiological mechanisms responsible for the change in sensation from pressure to pain. [10 marks]
- c) What neural mechanisms are responsible for her ability to accurately localise the site of irritation in her mouth? Why is a stimulus much better localised in the mouth than a comparable stimulus applied to the skin of the back? [9 marks]



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written paper continued

**Question 2**

**(30 minutes: 25 marks)**

What is a stretch reflex? Your explanation should describe the essential components and functional properties of a stretch reflex.

[9 marks]

List two *different* routine activities or body functions where stretch reflexes play a central role, and explain – with appropriate physiological detail and with reference to anatomical structures, including nerve pathways – how stretch reflexes are involved in these activities or functions.

[8 marks for each]

**Question 3**

**(30 minutes: 25 marks)**

There is a considerable risk that dental procedures may cause foreign objects such as aerosols and particulate matter to enter the airways.

- a) List five reflexes that normally protect the airways against the entry of foreign objects.

[5 marks]

- b) For two of the reflexes mentioned in part a), provide a detailed description of the operation of the reflex.

[7 marks for each]

- c) Describe the mechanisms that normally assist with the clearance of foreign objects from the airways.

[6 marks]

**Question 4**

**(30 minutes: 25 marks)**

- a) If heart rate increases then cardiac output must increase. Is this statement true or false? Explain your choice giving appropriate physiological detail.

[8 marks]

- b) After their secretion fat soluble hormones usually have a prolonged period of biological activity, whereas water soluble hormones usually have only a brief period of biological activity. Is this statement true or false? Explain your choice giving appropriate physiological detail. Your answer must include an example of a fat-soluble and a water-soluble hormone together with a statement of what action each exemplar triggers.

[9 marks]

- c) The partial pressure of oxygen in the arterial blood of a patient suffering severe iron deficiency anaemia will be lower than that in an individual with a normal haematocrit. Is this statement true or false? Explain your choice giving appropriate physiological detail.

[8 marks]



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**Question 5**

**(30 minutes: 25 marks)**

- Name three different classes of analgesic agents that could be used to alleviate pain of dental origin, and briefly describe how each works. [9 marks]
- Xerostomia is dryness of the mouth caused by an abnormal reduction in the amount of salivary secretion. Describe the possible consequences to oral health of the loss of saliva in a patient with this condition. [8 marks]
- Describe the role of platelets in haemostasis. [8 marks]

**Question 6**

**(30 minutes: 25 marks)**

An anxious 22 year old patient enters your consulting room for a dental examination and treatment. Her face is pale, there are beads of sweat on her forehead and upper lip and she has cold clammy hands. You attempt to calm her when she is seated in the dental chair, but she continues to show symptoms of anxiety and is now hyperventilating. Subsequently her breathing slows and becomes shallow; her lips turn blue.

- What is the explanation for the pallor, the sweating and the cold clammy hands? Your explanation should contain appropriate detail of the physiological mechanisms involved. [10 marks]
- What is the explanation for the respiratory changes subsequent to hyperventilation, and why are her lips blue? Your explanation should contain appropriate detail of the physiological mechanisms involved. [10 marks]
- How would you manage her condition before proceeding with her dental examination? [5 marks]

**This is the last page of this examination paper**