



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

PRIMARY EXAMINATION IN
CELL BIOLOGY AND BIOCHEMISTRY

Monday 26th November 2007

Time allowed: **Two hours**

INSTRUCTIONS TO CANDIDATES

- There are Six (6) sections to this paper. Each section is worth 24 marks.
- Candidates are required to complete the compulsory Section 1.
- Answer FOUR (4) of the other FIVE sections. Each section must be answered in a **separate booklet.**

SECTION 1 (24 minutes)

This section is compulsory and must be completed by all candidates.

Miss Jan Drew, aged 25, comes to your surgery. She is generally fit and well. You accidentally inject a small amount of anaesthetic containing adrenaline into a blood vessel. Her heart begins to race and she begins to sweat.

Q1 What are the second messenger mechanisms that occur when adrenaline binds to its receptors?

12 marks

Q2 What metabolic changes occur in adipose tissue, liver and muscle as a result of adrenaline receptor activation?

12 marks

Total for Section 1 = 24 marks



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SECTION 2 (24 minutes)

Jennifer Jamieson, aged 16 years, decided to go onto a vegan diet. Unfortunately she was not given appropriate advice and her diet was deficient in protein.

Q3 Describe in detail the normal mechanisms for protein digestion, absorption, transport, metabolism, function and output.

10 marks

Q4 What effect could a deficiency in protein have on Jennifer's general and dental health?

5 marks

Q5 What other macro and micro nutrients could Jennifer become deficient in on such a diet? For one of these nutrients explain how the deficiency could lead to a change in Jennifer's dental health.

9 marks

Total for Section 2 = 24 marks

SECTION 3 (24 minutes)

Peter Fredrik attends your surgery as a new patient. He is very overweight. You are concerned about the effects his obesity, food and liquor consumption may have on his metabolism.

Q6 What is the major hormone that is active in the fed state? What is the mechanism of action of this hormone?

5 marks

Q7 Discuss in detail how this hormone facilitates the deposition of fat in the fed state.

14 marks

Q8 What effect would excessive alcohol intake have on these mechanisms?

5 marks

Total for Section 3 = 24 marks



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SECTION 4 (24 minutes)

Mrs Gordon comes to you to have some teeth removed and to have a denture fitted. She is 62 and has had diabetes for 20 years.

Q10 Outline the possible long term effects of high blood glucose on Mrs Gordon in respect to:

- a. The formation of advanced glycation end products and their consequences 8 marks
- b. The formation of sorbitol and its consequences 8 marks
- c. Her capacity to heal after her teeth have been removed 8 marks

Total for Section 4 = 24 marks

SECTION 5 (24 minutes)

The cell cycle is very important in the normal maintenance of the oral cavity.

Q11 Outline the major steps in the cell cycle? 5 marks

Q12 Explain in detail how the cell cycle is controlled? 10 marks

Q13 What mechanisms, other than cancer, lead to disruption of the cell cycle and what effects do these disruptions have on the oral cavity? 9 marks

Total for Section 5 = 24 marks



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SECTION 6 (24 minutes)

You are about to treat a patient when you see an abnormality on her lip. You suspect that this could be a cancer.

Q14 Discuss the formation of cancer cells and the role of:

- | | |
|------------------------|---------|
| a. Growth factors | 8 marks |
| b. Oncogenes | 8 marks |
| c. Signalling pathways | 8 marks |

Total for Section 4 = 24 marks

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