

# Systemic Anatomy and Physiology – Case Study (30%)

**Due:** Thursday 22<sup>nd</sup> October at 11:59 pm

This case study is designed to help you link the concepts we are learning in lectures with a “real-life” scenario. You will need to use the lecture material as well as other resources to help you answer the questions.

You will be expected to:

- Use lecture material and other reputable resources to answer the questions.
- Incorporate references into your responses using Vancouver referencing style. You need to reference lecture material.
- Proofread your writing, making sure you check for sentence structure, spelling, and grammar.
- Follow the page layout requirements.
- You are required to demonstrate your understanding of the content, by paraphrasing the information. Quoting does not demonstrate a sufficient level.

Please be guided by the marks allocated on each question for the level of detail required. There are 20 marks allocated to the questions, and 5 for referencing, spelling, and grammar (25 marks in total). Please refer to the marking rubric for the full marking criteria.

## Page Layout Requirements

- Do not exceed the 2-page limit (this does NOT include your reference lists)
- Do not include the question text in your document.
- Margins: all 2.54cm (standard).
- Font: Calibri (body), size 11.
- Line spacing: 1.15 lines.

## Referencing

Vancouver referencing style is to be used. Guidelines for this referencing style can be found on the [UC Library website](#)

## QUESTIONS

Candice is a 33-year-old woman with a history of excessive drinking, but after meeting her new partner Rob had become sober and began mountain climbing. She and Rob were planning on climbing Mount Everest as soon as they had sufficient funds. She worked in an outdoor supply store and had nearly acquired all the equipment they'd need to climb Everest. However, tragedy struck, and Rob was killed in a freak kite-surfing accident. Candice was devastated by the tragedy and after his death, she lost control. She spent more time drinking than sober and while her friends and family tried to help their pleas fell on deaf ears. Several months had passed since Rob's untimely death and Candice's drinking worsened and she lost significant amounts of weight. One night she wakes up sweating and feeling nauseous with incredible pain in her abdomen.

At the hospital Candice undergoes a CT scan, blood tests and an ECG. The CT scan shows inflammation of her pancreas. The blood test shows that she has an increased level of blood glucose and she has issues with her digestive enzymes. Her ECG was normal. Dr Bennett told Candice that she had acute pancreatitis caused by her excessive drinking. She was sent home with a prescription for oral pancreatic digestive enzymes and instructions to eat a well-balanced diet with no alcohol. Candice was instructed to call back if the discomfort returned at all.

1. The pancreas is an exocrine gland and endocrine gland. What does that mean? Name the exocrine and endocrine secretions of the pancreas. (2 points)
2. Candice was given pancreatic digestive enzymes. One digestive enzyme is also released in the stomach. What is this enzyme, what is its precursor, how is it activated, and what cells are involved? (1.5 marks)
3. Using your knowledge of how a negative feedback loop works to explain why Candice has elevated blood glucose levels (1.5 marks)
4. Candice's ECG results were normal. How does the P wave, QRS complex and T wave relate to the conduction system of the heart, and the contraction (systole) and relaxation (diastole) of the atria and ventricles? (2 marks)

Candice recovered well from her pancreatitis. She gave up drinking and generally began to lead a healthy life. She started training again to climb Mt. Everest. Candice went in for a physical exam just before she was to start her climb. Dr Bennett diagnosed her with hypertension and prescribed an Angiotensin-2-Receptor-Antagonist (A2RA)

5. List the cardiovascular factors that affect blood pressure (1.5 marks)
6. Describe how angiotensin II controls blood pressure, and why an A2RA would reduce Candice's blood pressure. (3 points)

7. Hypertension has been associated with reduced glomerular filtration rate. Define glomerular filtration rate (GFR) and describe the pressures within the glomerular capsule that affect GFR. (2 marks)

Candice also asked if she could go on the contraceptive pill so that she could ensure she did not menstruate on the climb. Dr Bennett prescribes a combined pill for Candice.

8. There are four main hormones in the uterine and ovarian cycle – what are they and what is their role? Which of these are found in the combined pill (as prescribed to Candice) and how can she use the combined contraceptive pill to prevent menstruation on her climb? (3 marks)

Candice arrives with great excitement in Kathmandu (elevation 1,400m) in mid-April. She slowly begins her 2-week overland trek to Everest base camp (elevation 5400m). At 5400 meters the atmospheric pressure is approximately 40% of that found at sea level.

9. How does this difference in atmospheric pressure affect Candice's ability for oxygen to diffuse across into the pulmonary capillary blood from the air she breathes? (2 marks)

Over the next few weeks Candice climbs and makes it to camp 4 (South Col - 7906 m) in the death zone. The night before summiting Mount Everest the temperature drops to  $-19^{\circ}\text{C}$  and Candice unwittingly leaves her propane cooker on. Unfortunately, this leads to high levels of carbon monoxide in her tent. She subsequently passes away in her sleep.

10. Why did the increase in carbon monoxide lead to her death? (1.5 marks)
11. **\*\*Bonus brownie point question (NO MARKS – but we are interested)\*\*** Tell us one interesting fact you discovered while researching this case study? Answer to be written at the bottom of the reference list.