

Module 2

Endocrine System

Student Name: _____

	Total Possible Marks	Your Mark
Lesson 1	10	
Lesson 2	8	
Lesson 3	14	
Lesson 4	21	
Lesson 5	16	
Total Marks	69	

Teacher Comments:

(10 marks) Lesson 1: Structure and Organization of the Endocrine System

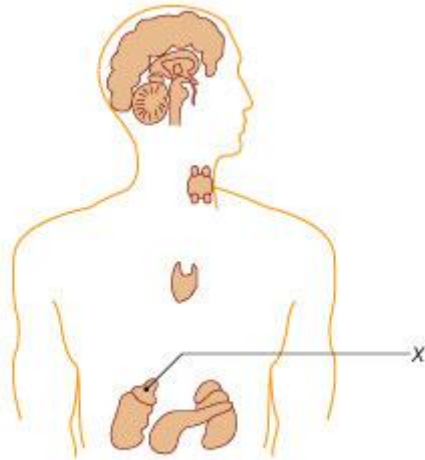
This Module 2: Lesson 1 Assignment is worth 10 marks. The value of each question is one mark.

For each question below, choose the **best** answer and record it on the line to the left of the question.

_____ 1. Damage to which of the following endocrine glands would most affect the reaction of the body to an emergency that stimulates the sympathetic nervous system?

- A. Thyroid gland
- B. Adrenal gland
- C. Anterior pituitary gland
- D. Posterior pituitary gland

_____ 2. Which of the following hormones is secreted by the gland indicated by X in the diagram below?



- A. Cortisol
- B. Glucagon
- C. Calcitonin
- D. ADH

_____ 3. Growth of the long bones and the skeleton is promoted by a hormone secreted by the

- A. adrenal cortex
- B. adrenal medulla
- C. anterior pituitary gland
- D. posterior pituitary gland

_____ 4. Increasing the levels of aldosterone in blood would result in

- A. increased blood volume
- B. decreased blood pressure
- C. increased urine production
- D. decreased reabsorption of water

- _____ 5. Which of the following rows correctly matches the endocrine gland to the hormone it secretes and the effect of the hormone?

Row	Endocrine Gland	Hormone Secreted	Effect
A.	Posterior Pituitary	ADH	Increases water absorption
B.	Adrenal Cortex	Epinephrine	Fight or flight
C.	Pancreas	Insulin	Raises blood glucose
D.	Anterior Pituitary	Oxytocin	Initiates childbirth

- _____ 6. Which of the following is an example of a tropic hormone?

- A. Cortisol
- B. Insulin
- C. Thyroid stimulating hormone
- D. Antidiuretic hormone

- _____ 7. Which pair consists of antagonistic hormones?

- A. TSH and thyroxine
- B. Cortisol and epinephrine
- C. Calcitonin and parathyroid hormone
- D. ACTH and cortisol

- _____ 8. Which of the following statements is true?

- A. Exocrine glands secrete chemical messengers called hormones directly into the blood stream which transports the hormones throughout the body.
- B. Compared to the actions of the nervous system, the hormones of the endocrine system have faster and longer-acting effects on a broader range of cell types.
- C. The concentration of hormones in the blood remains constant to maintain homeostasis.
- D. When a hormone binds to its receptor, it triggers other reactions in the target cell.

- _____ 9. Parathyroid hormone acts to ensure that

- A. calcium levels in the blood never drop too low
- B. sodium levels in urine are constant
- C. potassium levels in the blood don't drop too low
- D. the concentration of water in the blood is sufficient

- _____ 10. Which hormone stimulates the adrenal cortex to produce several of its hormones?

- A. TSH
- B. Releasing hormone from the hypothalamus
- C. Adrenocorticotropic hormone
- D. ADH

(8 Marks) **Lesson 2: Thought Lab—Evaluating Potential Uses for Human Growth Hormone**

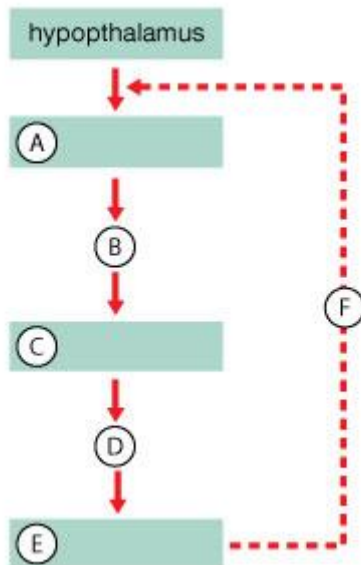
This Module 2: Lesson 2 Assignment is worth 8 marks. The value of each question is stated in the left margin.

- (2 marks)** 1. What are the main questions that Health Canada should investigate before changing its regulations on the use of synthetic hGH?
- (2 marks)** 2. Why might parents want synthetic hGH for their children? What should parents be aware of before deciding to obtain hGH for their children?
- (2 marks)** 3. Should athletes be allowed to use synthetic hGH? Why or why not?
- (2 marks)** 4. Should health insurance cover the use of synthetic hGH, and if so, in which circumstances?

(14 marks) Lesson 3: Adrenal Gland and Homeostasis

This Module 2: Lesson 3 Assignment is worth 14 marks. The value of each assignment and each question is stated in the left margin.

1. Use this flow chart to answer the following questions about the adrenal glands:

**(1 mark)**

- a. Identify the letter on the flowchart that represents the pituitary gland.

(1 mark)

- b. Identify the name of the hormone that is released from the pituitary gland and the letter on the flowchart that represents it.

(1 mark)

- c. Identify the endocrine gland that is targeted by this pathway and identify which letter on the flowchart represents this gland.

(1 mark)

- d. As a result of this regulatory pathway, identify two hormones that are released from this endocrine gland.

(2 marks)

e. Describe the effects of these two hormones on the body systems and tissues.

(2 marks)

f. Explain how the production of these hormones is regulated.

(6 marks)

2. Distinguish between the structure and function of the adrenal medulla and the adrenal cortex by completing the table below

Characteristics	Adrenal Medulla	Adrenal Cortex
Location in Gland		
Composition of Cells in Gland		
Hormones Secreted		
Effects of Secreted Hormones		
Duration of Effect		
Stimulated By		

(21 marks) Lesson 4: George has a Thyroid Problem

This Module 2: Lesson 4 Assignment is worth 21 marks. The value of each question is stated in the left margin.

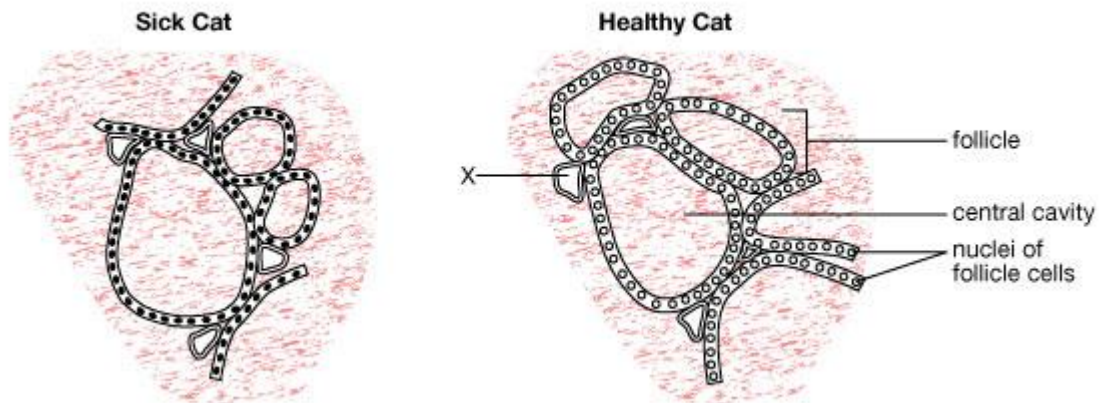
Use the information below to answer the following questions:

Jordan, a young Grade 12 student, loves his orange, fluffy cat George. Lately, George has not been his usual rambunctious self and just wants to sleep all the time. He is losing clumps of hair and Jordan has taken him in to see the veterinarian. The following questions are about the veterinary investigation of the sick cat, thought to be suffering from a malfunction of the thyroid gland.

- (2 marks)** 1. a. Identify the hormones produced by the thyroid gland.
- (1 mark)** b. Just by looking at the cat, measuring its heart rate, and discussing why Jordan brought the cat in to the veterinary office, identify the hormone that the veterinarian thought was most likely responsible for its condition.
- (2 marks)** c. State two symptoms that may have led the veterinarian to suspect that George was suffering from a thyroid hormone deficiency.

Use this additional information to answer the following questions:

A sample of tissue was taken from the thyroid gland of the sick cat and a stained section was prepared for viewing under the microscope. This was compared with a similarly prepared section taken from a healthy cat. Drawings of parts of these sections are shown below.

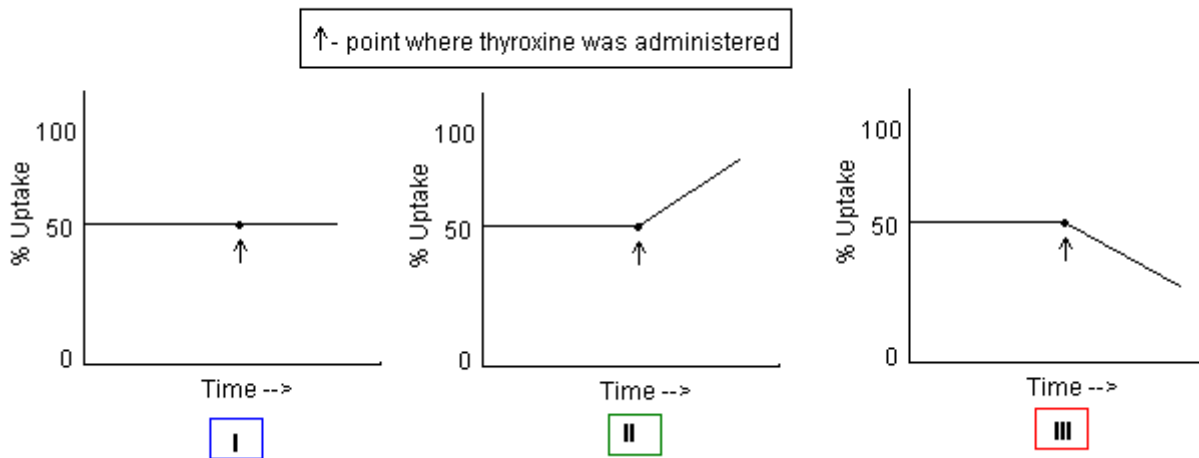


- (1 mark)** 2. a. Suggest a function for the central cavity of the follicle.
- (1 mark)** b. Identify the tubular structure on the diagram that is labelled X (It is not a C cell or storage cavity)
- (2 marks)** c. Explain why there should be many such tubular structures in thyroid tissue.
- (1 mark)** d. The veterinarian hypothesized that George may be suffering as a result of a lack of iodine in his diet. Why is this element required for healthy thyroid function?

Use the information and graphs to answer the following question.

- (3 marks)** 3. Radioactive iodine is injected into the blood as a way for doctors and researchers to track iodine levels in the blood. The levels can be measured and plotted on a graph. In this experiment researchers tested iodine uptake by the thyroid gland before and after administration of thyroxine.

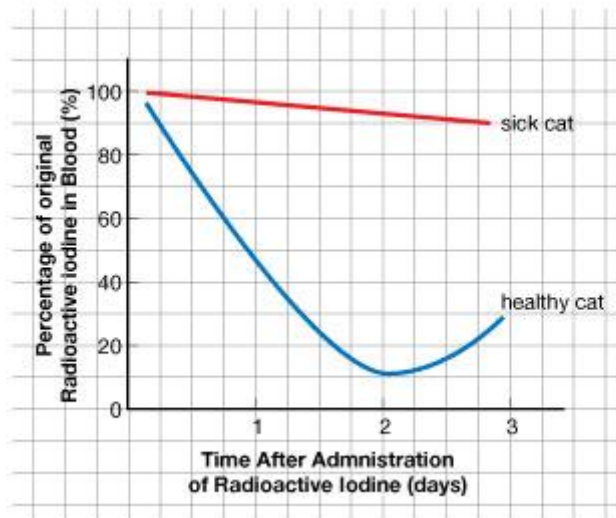
Figure 1: Radioactive iodine uptake after administration of thyroxine in three individuals



In which graph(s) is there evidence of thyroid malfunction? How do you know?

Use this additional information to answer the following questions:

The veterinarian set up an experiment, where he arranged a healthy cat and the sick cat to receive low dosage radioactive iodine compounds and then he measured the levels of radioactivity in their blood plasma. The results are shown in the graph below.



- (2 marks)** 4. a. Write the hypothesis that the veterinarian was investigating (use an “if-then” statement).
- (1 mark)** b. What was the purpose of giving a healthy cat radioactive iodine compounds in this experiment?
- (2 marks)** c. Do the results shown in the graph support the hypothesis? Explain your answer.
- (2 marks)** d. Suggest why the graph for the healthy cat rose after approximately 2 days.
- (1 mark)** e. Outline a treatment which might enable George to recover.

(16 Marks) Lesson 5: The Pancreas and Homeostasis

This Module 2: Lesson 5 Assignment is worth 16 marks. Multiple choice questions are worth one mark each. The value of each other question is stated in the left margin.

- _____ 1. Blood samples taken from an individual who had been fasting for 24 hours would have which of the following?
- A. High levels of insulin and low levels of glucagon
 - B. High levels of insulin and high levels of glucagon
 - C. Low levels of insulin and low levels of glucagon
 - D. Low levels of insulin and high levels of glucagon

- _____ 2. Use the information below to answer the next question.

Michael Simpson has just been brought into the emergency room of the Royal Alexandra Hospital. He is perspiring profusely and is breathing rapidly and irregularly. His breathe smells strongly like nail polish remover (acetone), and his blood sugar tests at 700 mg/100 mL of blood. Normal range for blood sugar is between 75 mg – 110 mg /100 mL of blood.

Which hormone drug should most likely be administered and why?

- A. Insulin because the patient is hyperglycemic
 - B. Insulin because the patient is hypoglycemic
 - C. Glucagon because the patient is hyperglycemic
 - D. Glucagon because the patient is hypoglycemic
- _____ 3. Which one of the following is a function of insulin?
- A. Stimulation of cell respiration
 - B. Decrease in sugar absorption by body cells
 - C. Decrease in conversion of glucose to fat
 - D. Increase in glycogen synthesis

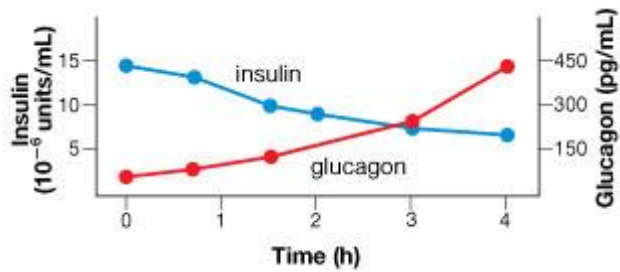
- _____ 4. Use the following list of hormones to answer the next question.

I insulin
II calcitonin
III glucagon
IV thyroxine
V parathyroid hormone

Which of the pairs of hormones function antagonistically?

- A. I and IV
- B. I and III
- C. II and IV
- D. IV and V

Use the following graph to answer question 5.



The graph shows an individual's insulin and glucagon levels during a four-hour hike with no break for food.

(2 marks)

5. a) At what point in time does the level of insulin drop? What is the effect on the body?

(2 marks)

- b) At what point in time does the level of glucagon rise? What is the effect on the body?

(2 marks)

- c) How would having a large meal at the 4 h time point affect the individual's levels of insulin and glucagon?

(2 marks)

- d) Hypothesize what this graph would look like if this individual had untreated Type 1 diabetes mellitus.

6. Explain the following aspects of diabetes mellitus and its treatment.

(1 mark)

- a) Glucose may be present in the urine of an untreated diabetic.

(1 mark)

- b) A diabetic cannot take insulin orally in pill form; it must be injected.

7. Research shows a strong correlation between people with Type 2 diabetes mellitus and obesity.

(1 mark)

a) What are some societal factors that may be contributing to the rise of Type 2 diabetics in Canada?

(1 mark)

b) Suggest how one of these factors may be addressed.

This is the end of the module. Please check your work, make sure your name is on the cover and submit the completed module to your instructor for marking.