

Name: _____

Personal ID number: _____

School of Health sciences

WRITTEN EXAMINATION

Course: Pathophysiology and pharmacology

Examination: Written exam 2

Course code: BM544G

Credits for written examination: 3.5

Date: 2025-01-17

Examination time: 8:15-12:30

Examination responsible: Anna Benrick

Teachers concerned: Cathal O'Hare and Katarina Skogfält

Aid at the exam/appendices: No aids allowed

Other

Instructions

- ☐ Take a new sheet of paper for each teacher.
- ☐ Take a new sheet of paper when starting a new question.
- ☐ Write only on one side of the paper.
- ☒ Write your name and personal ID No. on all pages you hand in.
- ☒ Use page numbering.
- ☒ Don't use a red pen.
- ☒ Mark answered questions with a cross on the cover sheet.

Grade points E \geq 60%, D \geq 68%, C \geq 76%, B \geq 84%, A \geq 92%

Examination results should be made public within 18 working days

Good luck!

Total number of pages



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Pathophysiology

1. Describe the pathophysiology of type 2 diabetes mellitus. The answer should include underlying cause(s), beta cell function, insulin production, insulin receptor and insulin sensitivity. (5p)

2. Name three clinical symptoms that can be seen at diabetes diagnosis. (1.5)

3. Which of the following is a common diagnostic test for diabetes? (0.5p)

1. Complete blood count (CBC)
2. Hemoglobin A1c test
3. Thyroid function test
4. Continuous glucose monitoring (CGM)



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4. Which of the following is a risk factor for developing type 2 diabetes? (0.5p)

1. Entering puberty early
2. Family history of diabetes, obesity, and older age
3. Childhood viral infections
4. Vitamin B12 deficiency

5. Which of the following is an acute clinical manifestation of diabetic ketoacidosis at type 1 diabetes diagnosis? (0.5)

1. Increased thirst, fruity-smelling breath, and rapid breathing
2. Gradual vision loss, tingling in the feet, and fatigue
3. High blood pressure, joint pain, and constipation
4. Frequent infections, slow wound healing, and dry skin

6. What is the mechanism behind the development of diabetic ketoacidosis (DKA) in type 1 diabetes? (0.5p)

1. Increased glucagon secretion stimulates hepatic ketone production in the absence of insulin, leading to acidosis.
2. Insulin resistance causes inadequate glucose uptake, triggering fat breakdown and subsequent ketone formation.
3. Elevated cortisol levels during stress reduce insulin sensitivity, causing a shift to ketone production.
4. Lactic acidosis is triggered by the accumulation of pyruvate due to insufficient insulin-mediated glycolysis.

7. True or False: Hyperglycemia (high blood glucose) is the primary cause of the long-term complications seen in diabetes. (0.25p)

8. True or False: People with diabetes are at an increased risk of developing infections due to impaired immune function. (0.25p)



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9. Explain the pathophysiology of Hashimoto's thyroiditis, specifying whether it results in hypothyroidism or hyperthyroidism, and identify which biomarker you would assess for diagnosis, including the expected levels. (6p)

10. Which of the following is a common symptom of hypothyroidism? (0.5p)

- a) Weight loss
- b) Cold intolerance
- c) Tachycardia
- d) Sweating

11. Which symptom is most commonly associated with hyperthyroidism? (0.5p)

- a) Increased heart rate (tachycardia)
- b) Cold intolerance
- c) Weight gain
- d) Dry skin



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12. Which of the following symptoms is commonly associated with hypothyroidism? (0.5p)

- a) Increased sweating
- b) Depression
- c) Diarrhea
- d) Tremors

13. Which of the following symptoms is most often seen in hyperthyroidism? (0.5p)

- a) Tremors
- b) Weight gain
- c) Cold intolerance
- d) Dry skin

True or False: Hyperthyroidism can cause excessive sweating and heat intolerance. (0.25p)

True or False: In hypothyroidism, dry skin and hair loss are frequent symptoms. (0.25p)

True or False: Increased appetite is a common symptom of hyperthyroidism due to an increased metabolic rate. (0.25p)

True or False: Cold intolerance and weight gain are classic symptoms of hyperthyroidism. (0.25p)



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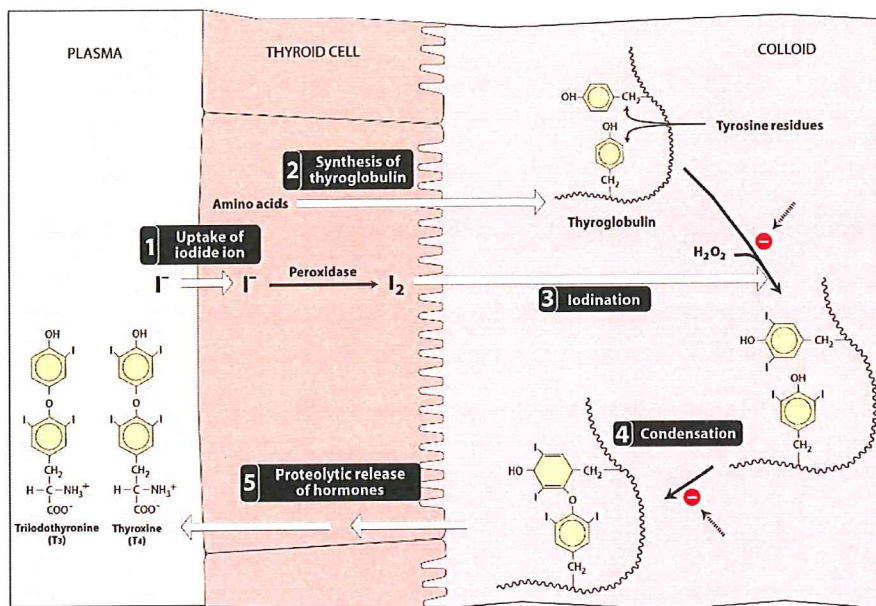
Pharmacology

1. Why can insulin not be administered orally? Give two reasons why this route of administration does not work. 2p
2. How is insulin modified to produce analogues with varying durations of action? 1p
3. Describe the mechanism of action of metformin. 3p
4. Explain how sodium–glucose cotransporter 2 inhibitors (SGLT2) can lower blood pressure? 2p
5. What type of infections are a common side effect of sodium–glucose cotransporter 2 inhibitors (SGLT2) due to their mechanism of action? 1p
6. State two reasons for why levothyroxine (T₄) is preferred over liothyronine (T₃) in clinical practice. 2p

7. Describe the mechanism of action of DPP-4 inhibitors. 2p

8. Why should both levothyroxine (T₄) and liothyronine (T₃) be taken on an empty stomach? 1p

9. The sites of action of which group of drugs are shown in the diagram below. 1p





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10. Which of the following is not a common side effect of levothyroxine? Put a cross in the box beside the correct answer. 1p

Nervousness	
Tachycardia	
Cardiac arrhythmias	
Cold intolerance	
Unexplained weight loss	

11. Which group of drugs act as agonists for the peroxisome proliferator-activated receptor- γ (PPAR γ)? 1p

12. Which group of drugs act by inhibiting enzymes located in the intestinal brush border, which break down carbohydrates into glucose and other simple sugars? 1p