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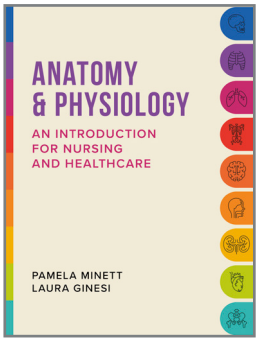

Questions to accompany *Anatomy and Physiology*

CHAPTER 16 MULTISYSTEM DISORDERS

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options.
You must pick the one correct answer.

1. What causes type 1 diabetes?

A. the body creates too many ketones
B. the body is unable to produce glucose
C. the body gets fatigued too quickly
D. the body cannot produce any insulin
E. the body produces too much insulin

2. Which two hormones are essential for keeping blood glucose concentration within the normal range?

A. oestrogen and progesterone
B. testosterone and inhibin
C. cortisol and adrenaline
D. insulin and glucagon
E. renin and angiotensin II

3. Which of the following physiological signs is NOT usually characteristic of diabetes mellitus?

A. increased white cell count
B. glucose in urine
C. large volumes of urine
D. fatigue
E. excessive thirst

4. The risk factors for type 2 diabetes include all of the following except:

A. diet
B. obesity
C. smoking
D. lack of physical activity
E. advancing age

5. Which cells are destroyed in the pancreas of people who have type 1 diabetes?

A. alpha (α) cells
B. beta (β) cells
C. kappa (ϰ) cells
D. delta (Δ) cells
E. omega (Ω) cells

6. in the UK, what is the recommended daily amount of physical activity for children?

A. 10 minutes
B. 20 minutes
C. 60 minutes
D. 2 hours
E. 3 hours

7. Hypoglycaemia occurs when blood glucose levels fall below _____ mol/L.

A. 2
B. 4
C. 6
D. 8
E. 10

8. Most cases of diabetic ketoacidosis (DKA), in which ketones are detected in urine, occur in people who have:

A. gestational diabetes
B. diabetes insipidus
C. type 1 diabetes
D. type 2 diabetes
E. cystic-fibrosis related diabetes

9. Diabetic nephropathy is a complication of diabetes that is caused by:

A. severe lack of insulin
B. alterations to the structure of glomeruli of the kidney
C. damage to the autonomic nervous system
D. long-term damage to neurons
E. tiny haemorrhages (bleeds) into the retina

10. Diabetes insipidus causes the body to lose too much fluid in urine because of alterations in the body's response to:

A. thyroxine
B. melatonin
C. oxytocin
D. antidiuretic hormone
E. cortisol

11. Stress is defined as:

A. psychological ill health
B. a bad day with lots of pressure
C. anxiety about the pressures in life
D. inability to cope with life
E. an adverse reaction to perceived pressure

12. Levels of which hormone rise in a person's response to long-term stress?

A. adrenaline
B. cortisol
C. renin
D. leptin
E. thyroxine

13. Circulatory shock is a condition that is associated with:

A. hyperperfusion and hypoxia
B. hyperperfusion and adequate oxygenation
C. hypoperfusion and adequate oxygenation
D. hypoperfusion and hypoxia
E. an acute stress reaction

14. Which of the following factors is associated with reduced risk of developing metabolic syndrome in men?

A. waist circumference greater than 94cm
B. high levels of low-density lipoprotein (LDL) in blood
C. blood pressure consistently higher than 140/90mmHg
D. high level of daily physical activity
E. insulin resistance

Critical thinking: ARQs (assertion reasoning questions)

These questions consist of two statements:

- an assertion, and
- a reason.

You must first determine whether each statement is *TRUE* or *FALSE*.

- If both statements are true, you must next determine whether the reason correctly explains the assertion. The answer will be option 1 or option 2.
- If one statement is true and the other is false then the answer is option 3 or option 4, depending on which of the statements is correct.
- If both statements are false, then the answer is option 5.

There is one option for each possible outcome.

Question 15

A = the Assertion	R = the Reason
Cardiogenic shock occurs when the heart muscle is no longer able to function effectively as a pump	Cardiogenic shock is most likely to arise in a person who has had a heart attack or who is in left ventricular failure
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 16

A = the Assertion	R = the Reason
Marfan syndrome is an inherited condition that is caused by a recessive gene for the protein fibrillation	The protein fibrillation is essential for the formation of elastic fibres in connective tissue
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Putting it all together

Question 17

Use the following words and terms to complete the table that compares and contrasts type 1 diabetes with type 2. Some of the cells may contain more than one item.

Sudden and severe – a matter of weeks	Mostly young but any age	80–90%	Thin or losing weight
Mostly in adults over 40	10–20%	Autoantibodies	Gradual – may not be noticed for years
Ketoacidosis may occur	Ketoacidosis is rare	Often overweight or obese	Decreased or absence of insulin
Normal or increased insulin	Hyperosmolar hyperglycaemic state is more common	Immune system destroys beta cells of the islets of Langerhans	No autoantibodies
Insulin resistance is a common feature			Hyperosmolar hyperglycaemic state is rarer

Feature or characteristic	Type 1 diabetes	Type 2 diabetes
Prevalence (frequency)		
Age of onset		
Type of onset		
Body mass (weight)		
Antibodies to own pancreas (autoantibodies)		
Pathophysiology		
Blood levels of insulin		
Complications		

Question 18

Uncontrolled or poorly controlled diabetes mellitus increases the risk of many different complications. In your own words, explain why regular monitoring of blood glucose levels and attendance at screening checks are important for those who are affected by the disease.

Question 19

Compensation for poor perfusion and low oxygenation following circulatory shock describes the range of physiological responses that are activated with the aim of restoring homeostasis of blood volume and pressure.
Create a flow chart or diagram that relates signs of compensation to the ways that many body systems respond. Make sure that your figure:

- outlines the part played by baroreceptors
- describes the role of antidiuretic hormone (ADH)
- explains the activation of the renin–angiotensin–aldosterone cascade

Question 20

Sometimes, people say that the rising prevalence of obesity across the world is an epidemic.

a) Is obesity a disease? Justify your answer.
b) Write short notes that consider the causes of obesity and its impact on the individual's health.

Answers to questions

Answers are supplied to most, but not all questions. Some may require you to carry out further research using the book.

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options. You must pick the one correct answer.

1. **What causes type 1 diabetes?**
   D. the body cannot produce any insulin

2. **Which two hormones are essential for keeping blood glucose concentration within the normal range?**
   D. insulin and glucagon

3. **Which of the following physiological signs is NOT usually characteristic of diabetes mellitus?**
   A. increased white cell count

4. **The risk factors for type 2 diabetes include all of the following except:**
   C. smoking

5. **Which cells are destroyed in the pancreas of people who have type 1 diabetes?**
   B. beta (β) cells

6. **in the UK, what is the recommended daily amount of physical activity for children?**
   C. 60 minutes

7. **Hypoglycaemia occurs when blood glucose levels fall below _____ mol/L.**
   B. 4

8. **Most cases of diabetic ketoacidosis (DKA), in which ketones are detected in urine, occur in people who have:**
   C. type 1 diabetes

9. **Diabetic nephropathy is a complication of diabetes that is caused by:**
   B. alterations to the structure of glomeruli of the kidney

10. **Diabetes insipidus causes the body to lose too much fluid in urine because of alterations in the body's response to:**
    D. antidiuretic hormone

11. **Stress is defined as:**
    E. an adverse reaction to perceived pressure

12. **Levels of which hormone rise in a person's response to long-term stress?**
    B. cortisol

13. **Circulatory shock is a condition that is associated with:**
    D. hypoperfusion and hypoxia

14. **Which of the following factors is associated with reduced risk of developing metabolic syndrome in men?**
    D. high level of daily physical activity

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There is one option for each possible outcome.

Question 15

A = the Assertion	R = the Reason
Cardiogenic shock occurs when the heart muscle is no longer able to function effectively as a pump	Cardiogenic shock is most likely to arise in a person who has had a heart attack or who is in left ventricular failure

1. Both A and R are true and R is the correct explanation of A

Explanation

The Assertion (A) is *TRUE*. Cardiogenic shock arises when the heart is no longer able to pump blood effectively to the brain and other vital organs including lungs and kidneys. It is a medical emergency that most commonly arises suddenly and results in blood pressure drops, poor oxygenation (hypoxia), pallor, rapid breathing, sweatiness and confusion or loss of consciousness. The aim of treatment is to restore blood flow to vital organs and protect them from damage.

The Reason (R) is *TRUE* because cardiogenic shock most commonly arises when people have a myocardial infarction (a heart attack). However, a range of other conditions can prevent blood from flowing freely through the heart – heart failure, pulmonary embolism (blood clot in the lungs) or chest injury.

Since the Reason (R) is correct and provides an explanation for the assertion (A), **option 1 is the correct answer**.

Question 16

A = the Assertion	R = the Reason
Marfan syndrome is an inherited condition that is caused by a recessive gene for the protein fibrillation	The protein fibrillation is essential for the formation of elastic fibres in connective tissue

5. Both A and R are false

Explanation

The Assertion (A) is *FALSE*. The affected protein is called *fibrillin* – not fibrillation.

Marfan syndrome develops in people who have inherited a dominant allele for a defective form of fibrillin. The syndrome is inherited in an autosomal dominant manner, which means that there is a 50% chance that a person with Marfan syndrome will pass the genetic mutation to their children. However, the syndrome occasionally arises in people who do not have a parent with the syndrome.

The Reason (R) is *FALSE*. Fibrillin is a structural protein that is made by fibroblasts. It is transported into the extracellular matrix of connective tissue, where it forms a lattice that supports elastin and holds all of the body's cells, tissues and organs together. Marfan syndrome is the result of mutations in the gene for fibrillin and the features of the condition can be seen in many different parts of the body.

Option 5 is the correct solution to this problem.

NB the term *fibrillation* refers to heart arrhythmias that cause quivering or irregular heartbeat.

Putting it all together

Question 17

Use the following words and terms to complete the table that compares and contrasts type 1 diabetes with type 2. Some of the cells may contain more than one item.

Sudden and severe – a matter of weeks	Mostly young but any age	80–90%	Thin or losing weight
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Normal or increased insulin	Hyperosmolar hyperglycaemic state is more common	Immune system destroys beta cells of the islets of Langerhans	No autoantibodies
Insulin resistance is a common feature			Hyperosmolar hyperglycaemic state is rarer

Feature or characteristic	Type 1 diabetes	Type 2 diabetes
Prevalence (frequency)	10–20%	80–90%
Age of onset	Mostly young but any age	Mostly in adults over 40
Type of onset	Sudden and severe – a matter of weeks	Gradual – may not be noticed for years
Body mass (weight)	Thin or losing weight	Often overweight or obese
Antibodies to own pancreas (autoantibodies)	Autoantibodies present	No autoantibodies
Pathophysiology	Immune system destroys beta cells of the islets of Langerhans	Insulin resistance is a common feature
Blood levels of insulin	Decreased or absence of insulin	Normal or increased insulin
Complications	Ketoacidosis may occur Hyperosmolar hyperglycaemic state is rarer	Ketoacidosis is rare Hyperosmolar hyperglycaemic state is more common