6.5 The Fight or Flight Response and the Role of Adrenaline

AQA 7182 · about 55 minutes · Write-in edition

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 Define the sympathomedullary pathway as it is used to describe the acute fight or flight response in humans.

(Total for Question 1 is 2 marks)

2 Name the gland that contains the adrenal medulla which releases adrenaline during the fight or flight response.

(Total for Question 2 is 1 mark)

3 State the role of the hypothalamus in initiating the acute fight or flight response in the sympathomedullary pathway.

(Total for Question 3 is 2 marks)

4 State one immediate effect of adrenaline on digestion in the acute fight or flight response.

(Total for Question 4 is 1 mark)

---

5 Explain one negative consequence of repeatedly triggering the acute fight or flight response for an otherwise healthy adult, limited to physiological or behavioural outcomes directly linked to repeated adrenaline surges.

(Total for Question 5 is 4 marks)

---

6 Explain how the adrenal medulla releases adrenaline into the bloodstream and why this step is important for the fight or flight response.

(Total for Question 6 is 3 marks)

7 Outline four physiological changes produced by adrenaline during the acute fight or flight response and name the likely benefit of each change in a threatening situation.

(Total for Question 7 is 4 marks)

8 Explain why blood is diverted to skeletal muscles during the acute fight or flight response and how adrenaline contributes to this change.

(Total for Question 8 is 3 marks)

9 Identify the role of the parasympathetic nervous system after an acute fight or flight episode, naming one physiological change it produces to return the body to baseline.

(Total for Question 9 is 2 marks)

10 Explain how pupil dilation during the fight or flight response improves an individual's ability to respond to an acute threat, using physiological detail.

(Total for Question 10 is 2 marks)

11 Outline one gender difference claim about responses to acute stress, for example the tend and befriend account, and explain one implication this has for understanding fight or flight as a universal response.

(Total for Question 11 is 4 marks)

12 Discuss the fight or flight response as an explanation for acute stress reactions. In your answer include factual description of the sympathomedullary pathway and the role of adrenaline, and evaluate the explanation with reference to at least one strength and one limitation. Use evidence or theoretical arguments where appropriate.

(Total for Question 12 is 8 marks)

13 Application: In a park a jogger, Erin, is startled when a large dog suddenly barks and runs towards her. Describe the sequence of events in the sympathomedullary pathway for Erin, from hypothalamic activation to at least three physiological outcomes caused by adrenaline. Apply the sequence directly to Erin's situation.

(Total for Question 13 is 6 marks)

Mark scheme · 6.5 The Fight or Flight Response and the Role of Adrenaline

Question 1

states that the sympathomedullary pathway involves activation of the sympathetic branch of the autonomic nervous system by the hypothalamus oe — **B1**

states that the adrenal medulla is stimulated to release adrenaline into the bloodstream as part of this pathway oe — **B1**

Answer: The sympathomedullary pathway is when the hypothalamus activates the sympathetic autonomic system and the adrenal medulla releases adrenaline into the bloodstream.

Question 2

adrenal gland or adrenal glands cao — **B1**

Answer: The adrenal gland.

Question 3

identifies that the hypothalamus detects a threat or stressor and activates the sympathetic branch of the autonomic nervous system oe — **B1**

states that this activation leads to signals sent to the adrenal medulla to release adrenaline oe — **B1**

Answer: The hypothalamus detects a threat and activates the sympathetic nervous system, triggering the adrenal medulla to release adrenaline.

Question 4

digestion is suppressed or reduced oe — **B1**

Answer: Digestion is suppressed or slowed.

Question 5

identifies a plausible negative consequence directly linked to repeated adrenaline surges, e.g. persistently raised blood pressure or increased risk of cardiovascular strain oe — **M1**

explains the mechanism, e.g. repeated vasoconstriction and elevated heart rate increase wear on blood vessels and the heart, making hypertension more likely oe — **A1**

relates a behavioural outcome if present, e.g. ongoing vigilance or anxiety-related behaviours that disrupt sleep or daily functioning oe — **M1**

explains why this matters, e.g. reduced quality of life and increased healthcare needs if the acute response is triggered too often oe — **A1**

Answer: Repeated adrenaline surges can lead to persistently raised blood pressure and cardiovascular strain because repeated vasoconstriction and elevated heart rate place extra wear on the heart and vessels. Behaviourally, chronic triggering can produce ongoing hypervigilance and sleep disruption, reducing quality of life and increasing health risks.

Question 6

states that sympathetic nerve impulses from the hypothalamus stimulate the adrenal medulla to secrete adrenaline (epinephrine) into the blood oe — **M1**

explains that circulating adrenaline reaches target organs rapidly, producing widespread physiological changes oe — **A1**

explains that this rapid hormonal release enables a coordinated, bodywide response to an acute threat oe — **A1**

Answer: Sympathetic impulses stimulate the adrenal medulla to secrete adrenaline into the bloodstream; adrenaline circulates to organs quickly, producing coordinated physiological changes needed for immediate action.

Question 7

increased heart rate, benefit: faster delivery of oxygen and glucose to muscles and brain oe — **B1**

increased blood pressure, benefit: improves blood flow to essential organs and muscles oe — **B1**

pupil dilation, benefit: allows more light into the eye to improve visual detection of threats oe — **B1**

blood diverted to skeletal muscles and away from digestion, benefit: more energy and oxygen available for rapid movement or fighting oe — **B1**

Answer: Examples: increased heart rate (faster oxygen and glucose delivery), raised blood pressure (better blood flow to muscles and brain), pupil dilation (improved visual acuity), and diversion of blood to skeletal muscles with digestion suppressed (more energy for immediate action).

Question 8

states that vasodilation occurs in blood vessels supplying skeletal muscles while vasoconstriction occurs in less essential areas such as the gut oe — **M1**

explains that adrenaline binds to receptors causing these vascular changes, redirecting oxygen and glucose to muscles oe — **A1**

explains that this supports rapid movement and strength needed to fight or flee from a threat oe — **A1**

Answer: Adrenaline causes vasodilation of vessels to skeletal muscles and vasoconstriction to nonessential areas, redirecting oxygen and glucose so muscles have more energy for rapid movement during a threat.

Question 9

identifies the parasympathetic system as restoring the body to baseline, the 'rest and digest' function oe — **B1**

gives an example physiological change, e.g. decreased heart rate or increased digestion oe — **B1**

Answer: The parasympathetic system restores the body to baseline, producing changes such as a decreased heart rate and increased digestive activity.

Question 10

states that adrenaline causes the radial muscles of the iris to contract, producing pupil dilation oe — **M1**

explains that dilation allows more light into the eye, improving visual acuity and peripheral awareness so the person can detect threats or escape routes more easily oe — **A1**

Answer: Adrenaline causes contraction of the iris radial muscles, dilating pupils; larger pupils let more light in and improve visual sensitivity and peripheral awareness, helping detect threats and escape routes quickly.

Question 11

outlines the tend and befriend account: some research suggests females may respond to stress by protecting offspring and seeking social support rather than fighting or fleeing oe — **M1**

links this to hormones such as oxytocin interacting with adrenaline, supporting tending and affiliative behaviours in many females oe — **A1**

explains an implication: suggests fight or flight may not be the only common acute response and that gender or social factors can change typical reactions oe — **M1**

adds that this challenges a simple universal model and means researchers must consider sex differences and context when generalising the fight or flight explanation oe — **A1**

Answer: The tend and befriend account suggests females may be more likely to protect offspring and seek social support under acute stress, partly due to oxytocin interacting with adrenaline. This implies fight or flight is not the only acute response and that sex and social context influence which reactions occur, challenging a simple universal model.

Question 12

Level 4 Detailed and accurate knowledge of the sympathomedullary pathway and adrenaline's role is clearly presented. Evaluation offers well developed strengths and limitations, with relevant evidence or theoretical argument. The response is well organised and applies points clearly to the explanation, showing insight. — **7-8**

Level 3 Knowledge of the pathway and adrenaline's role is accurate but may lack some detail. Evaluation includes valid strengths and limitations with some supporting evidence or reasoning. The answer is generally clear and organised. — **5-6**

Level 2 Basic knowledge of the pathway and adrenaline is present but incomplete. Evaluation is limited or superficial, with little evidence or weak reasoning. The answer may be fragmentary or only loosely organised. — **3-4**

Level 1 Minimal relevant knowledge or understanding. Evaluation is missing or very weak. Response lacks structure and detail. — **1-2**

Level 0 No creditworthy content. — **0**

Indicative content:

- AO1 content: The sympathomedullary pathway begins when the hypothalamus detects a threat and activates the sympathetic branch of the autonomic nervous system, sending signals to the adrenal medulla.
- AO1 content: The adrenal medulla secretes adrenaline into the bloodstream where it acts rapidly on target organs, increasing heart rate and blood pressure, dilating pupils, diverting blood to skeletal muscles and suppressing digestion.
- AO1 content: The parasympathetic nervous system later restores baseline, reducing heart rate and reactivating digestion.
- AO3 strength: Explanatory power, adrenaline explains rapid, coordinated, bodywide changes that prepare an organism for immediate action; supported by physiological measurement studies showing rapid adrenaline increases after acute stressors.
- AO3 strength: Clear mechanism, testable predictions and observable physiological outcomes such as raised heart rate and pupil dilation that are straightforward to measure in lab settings.
- AO3 limitation: Not the only acute stress response, evidence for gender differences such as the tend and befriend account suggests social affiliative responses may occur especially in females, challenging a unitary fight or flight model.
- AO3 limitation: Repeated activation has negative consequences, for example ongoing cardiovascular strain from frequent adrenaline surges, showing the model does not address long term health impacts and so must be integrated with other systems for a fuller account.
- AO3 evaluation point: Consideration of context and individual differences is needed, for example previous experience, fitness, or appraisal of threat can alter whether fight or flight occurs, reducing the universality of the model.

Question 13

states that Erin's hypothalamus detects the threat and activates the sympathetic branch of the autonomic nervous system oe	**M1**
states that sympathetic activation sends signals to the adrenal medulla which releases adrenaline into Erin's bloodstream oe	**M1**
applies a physiological outcome: increased heart rate in Erin, enabling faster circulation of oxygen and glucose to muscles oe	**A1**
applies a physiological outcome: blood diverted to skeletal muscles, preparing Erin to run or kick the dog oe	**A1**
applies a physiological outcome: pupil dilation in Erin to improve visual detection of the dog or escape path oe	**A1**
application ties the sequence together, e.g. explaining that these changes enable Erin to sprint away or defend herself quickly oe	**A1**

Answer: Erin's hypothalamus detects the sudden threat and activates the sympathetic nervous system. Sympathetic signals stimulate the adrenal medulla to release adrenaline into her blood. Adrenaline increases her heart rate so oxygen and glucose reach muscles faster, diverts blood to her skeletal muscles so she can sprint or defend herself, and dilates her pupils so she can see the dog and escape route more clearly, all helping her react immediately.