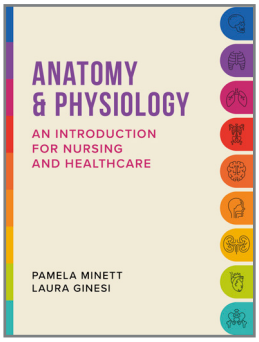
Lantern



Questions to accompany *Anatomy and Physiology*

CHAPTER 11 THE ENDOCRINE SYSTEM

Multiple Choice Questions (MCQs)

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

1. Most hormones travel from the gland where they were produced to the tissues and cells which they act upon:

A. along nerve fibres
B. via synapses
C. in the bloodstream
D. in ducts
E. by diffusion

2. What type of signalling occurs when neurons release chemical signal molecules which influence the activity and behaviour of neighbouring neurons?

A. autocrine
B. synaptic
C. paracrine
D. endocrine
E. neurocrine

3. G-proteins (guanine nucleotide-binding proteins) are molecules involved in the transmission of hormonal signals from outside a cell to the interior by means of a process called:

A. signal transduction
B. signal conduction
C. signal targeting
D. local signalling
E. long-distance signalling

4. The family of steroid hormones are chemically derived from cholesterol and include:

A. gonadotrophin-releasing hormone (GnRH), growth hormone-releasing hormone (GHRH) and thyrotropin-releasing hormone (TRH)
B. growth hormone (GH) and adrenocorticotrophic hormone (ACTH)
C. T4 (thyroxine) and T3 (triiodothyronine)
D. corticosteroids, sex hormones and vitamin D
E. antidiuretic hormone (ADH) and oxytocin

5. The gland that secretes the hormone that determines the basal rate of metabolism and normal growth is located:

A. in the brain
B. in bones
C. in front of the trachea
D. in the pelvis
E. on top of the kidneys

6. The posterior pituitary gland is sometimes called the neurohypophysis and it secretes which neurohormones?

A. calcitonin and parathyroid hormone (PTH)
B. insulin and glucagon
C. adrenaline and cortisol
D. antidiuretic hormone (ADH) and oxytocin
E. testosterone and oestrogen

7. Which hormone is produced in the hours of darkness and encourages sleep?

A. insulin
B. renin
C. angiotensin
D. leptin
E. melatonin

8. The exocrine cells of the pancreas produce:

A. adrenaline
B. insulin
C. cortisol
D. digestive juices
E. oestrogen

9. Which hormone is primarily responsible for uptake of glucose from blood by cells?

A. insulin
B. renin
C. angiotensin
D. leptin
E. melatonin

10. Which of the following cell types is NOT found in the pancreas?

A. acinar cells
B. alpha cells
C. beta cells
D. kappa cells
E. delta cells

11. Which of the following hormones are produced and secreted by the adrenal medulla?

A. T4 (thyroxine) and T3 (triiodothyronine)
B. adrenaline and noradrenaline
C. insulin and glucagon
D. calcitonin and parathyroid hormone (PTH)
E. aldosterone and cortisol

12. Which hormone from the anterior pituitary gland regulates the release of corticosteroid hormones from the adrenal cortex?

A. TSH
B. ACTH
C. FSH
D. LH
E. ADH

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 13

A = the Assertion	R = the Reason
The hypothalamus determines the secretion of hormones from the anterior lobe of the pituitary gland by means of releasing hormones	Thyroxine plays a key role in maintenance of body temperature and is secreted from the thyroid gland, which is located close to the larynx
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 14

A = the Assertion	R = the Reason
Parathyroid hormone (PTH) contributes to the process of bone remodelling and helps to maintain homeostasis of blood calcium	In the presence of parathyroid hormone (PTH), osteoclasts can break down bone and release calcium into the bloodstream
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 15

A = the Assertion	R = the Reason
The secretion of aldosterone follows a circadian rhythm and helps to regulate the way glucose is used by the body	The effects of adrenaline include increased respiration rate, increased heart rate and dilation of pupils
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
The hypothalamic–pituitary–adrenal axis plays an essential role in the regulation of the human body's stress response, which is a physiological reaction to a perceived harmful event	When the stress response is triggered, the hypothalamus regulates the level of activity of the pituitary gland, the sympathetic nervous system and the adrenal gland to stimulate release of hormones including adrenaline and cortisol
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

Label parts A to H on the diagram of the endocrine system below, and state which hormone(s) each of the glands produces.

A _____

• _____

B _____

• _____

• _____

C _____

• _____

D _____

• _____

E _____

• _____

F _____

• _____

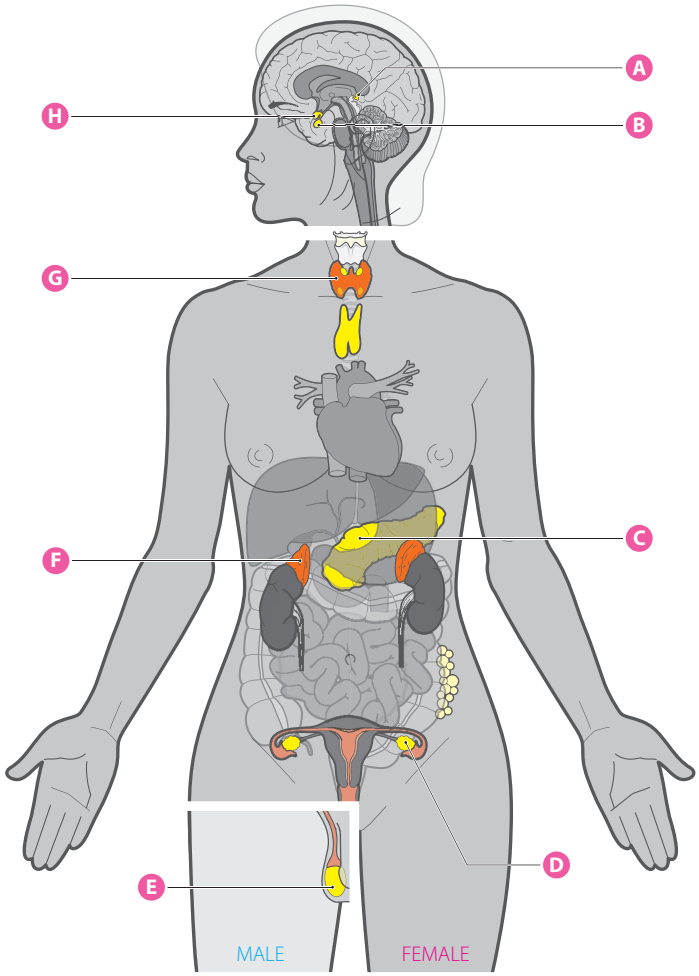
G _____

• _____

H _____

• _____

• _____



Question 18

Select the appropriate hormone from the table to complete the statements below.

Prolactin	Cortisol	Growth hormone (GH)	Adrenaline	Leptin	Gonadotrophin-releasing hormone (GnRH)
Parathyroid hormone (PTH)	Antidiuretic hormone (ADH)	Aldosterone	Thyroxine	Oxytocin	Glucagon

a) The anterior pituitary gland hormone ACTH regulates the production and secretion of the glucocorticoid hormone _____ from the adrenal cortex.

b) _____ – which tells the kidneys how much water to conserve – is called a neurohormone because it is made by neurons in the hypothalamus and stored in the posterior pituitary gland before it is released.

c) There are four parathyroid glands, each about the size of a grain of rice, embedded in the thyroid gland and they make and secrete _____ , which plays a part in calcium homeostasis.

d) _____ and _____ are essential for normal growth and development.

e) Dopamine inhibits the release of _____ , which is the hormone responsible for stimulating breast development and milk production.

f) Alpha cells in the pancreas secrete _____ to protect the body from hypoglycaemia.

g) A key hormone from the hypothalamus called _____ stimulates the onset of puberty and sexual development in adolescent boys and girls.

h) _____ stimulates the uterus to contract at the end of pregnancy and is essential for the let-down reflex in breastfeeding mothers.

i) When a person is frightened or anxious, the sympathetic nervous system stimulates the adrenal medulla to secrete _____ .

j) Adipocytes (fat cells) produce the hormone _____ which is sometimes known as the "satiety hormone".

k) The adrenal gland makes the hormone _____ , whose function is stimulating sodium and water reabsorption in the distal tubules of nephrons in the kidney.

Question 19

The acute stress response is important for survival because it is an immediate physiological reaction to something that the individual perceives as harmful, e.g. students feeling fearful about examinations.

Explain the role of the hypothalamus in regulating the ways in which the body adapts to a challenge or stressor.

Question 20

Explain, in your own words, why the hypothalamus is sometimes called "the master of the endocrine system".

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. **Most hormones travel from the gland where they were produced to the tissues and cells which they act upon:**
   C. in the bloodstream

2. **What type of signalling occurs when neurons release chemical signal molecules which influence the activity and behaviour of neighbouring neurons?**
   B. synaptic

3. **G-proteins (guanine nucleotide-binding proteins) are molecules involved in the transmission of hormonal signals from outside a cell to the interior by means of a process called:**
   A. signal transduction

4. **The family of steroid hormones are chemically derived from cholesterol and include:**
   D. corticosteroids, sex hormones and vitamin D

5. **The gland that secretes the hormone that determines the basal rate of metabolism and normal growth is located:**
   C. in front of the trachea

6. **The posterior pituitary gland is sometimes called the neurohypophysis and it secretes which neurohormones?**
   D. antidiuretic hormone (ADH) and oxytocin

7. **Which hormone is produced in the hours of darkness and encourages sleep?**
   E. melatonin

8. **The exocrine cells of the pancreas produce:**
   D. digestive juices

9. **Which hormone is primarily responsible for uptake of glucose from blood by cells?**
   A. insulin

10. **Which of the following cell types is NOT found in the pancreas?**
    D. kappa cells

11. **Which of the following hormones are produced and secreted by the adrenal medulla?**
    B. adrenaline and noradrenaline

12. **Which hormone from the anterior pituitary gland regulates the release of corticosteroid hormones from the adrenal cortex?**
    B. ACTH

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 13

A = the Assertion	R = the Reason
The hypothalamus determines the secretion of hormones from the anterior lobe of the pituitary gland by means of releasing hormones	Thyroxine plays a key role in maintenance of body temperature and is secreted from the thyroid gland, which is located close to the larynx
2. Both A and R are true but R is NOT the explanation of A	
Explanation The Assertion (A) is *TRUE* because the hypothalamus produces several releasing hormones that regulate the production of the various anterior pituitary hormones. The Reason (R) is also *TRUE*. The function of thyroxine is to determine the rate at which metabolism takes place and it is one of several hormones that regulate the rate of growth and development. Both statements are true but they refer to different aspects of function of the hypothalamic–pituitary axis. The Reason statement (R) does not provide an explanation for the Assertion (A), therefore **option 2 is correct**.	

Question 14

A = the Assertion	R = the Reason
Parathyroid hormone (PTH) contributes to the process of bone remodelling and helps to maintain homeostasis of blood calcium	In the presence of parathyroid hormone (PTH), osteoclasts can break down bone and release calcium into the bloodstream
1. Both A and R are true and R is the correct explanation of A	
Explanation The Assertion (A) is *TRUE* because the process of bone remodelling involves cells called osteoclasts which secrete enzymes and acid to dissolve bone (see *Chapter 4*). The Reason (R) is *TRUE*. Parathyroid hormone (PTH) regulates the activity of osteoclasts and hence its effect is to raise blood levels of calcium. Both statements are true and the Reason statement (R) provides an explanation for the Assertion (A). **Thus option 1 is the correct answer.**	

Question 15

A = the Assertion	R = the Reason
The secretion of aldosterone follows a circadian rhythm and helps to regulate the way glucose is used by the body	The effects of adrenaline include increased respiration rate, increased heart rate and dilation of pupils

4. A is false but R is true

Explanation

The Assertion (A) is *FALSE*. Aldosterone is a steroid hormone from the adrenal cortex, but its primary role is to promote sodium and water reabsorption by the distal tubule of the kidney.

The Reason (R) is *TRUE*. Adrenaline is released from the adrenal medulla when a person is frightened, alarmed or excited. It prepares the person for action and the effects described in the Reason (R) statement are part of the "fight, flight or freeze" response.

For this reason, option 4 is the correct answer to choose.

Question 16

A = the Assertion	R = the Reason
The hypothalamic–pituitary–adrenal axis plays an essential role in the regulation of the human body's stress response, which is a physiological reaction to a perceived harmful event	When the stress response is triggered, the hypothalamus regulates the level of activity of the pituitary gland, the sympathetic nervous system and the adrenal gland to stimulate release of hormones including adrenaline and cortisol

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

Explanation

The Assertion (A) is *TRUE* because the inter-relationship between the hypothalamus, the pituitary gland and the adrenal glands is known as an "axis". Fear, excitement or anxiety about events that are taking place can trigger the axis, leading to release of the hormones adrenaline and cortisol that promote survival.

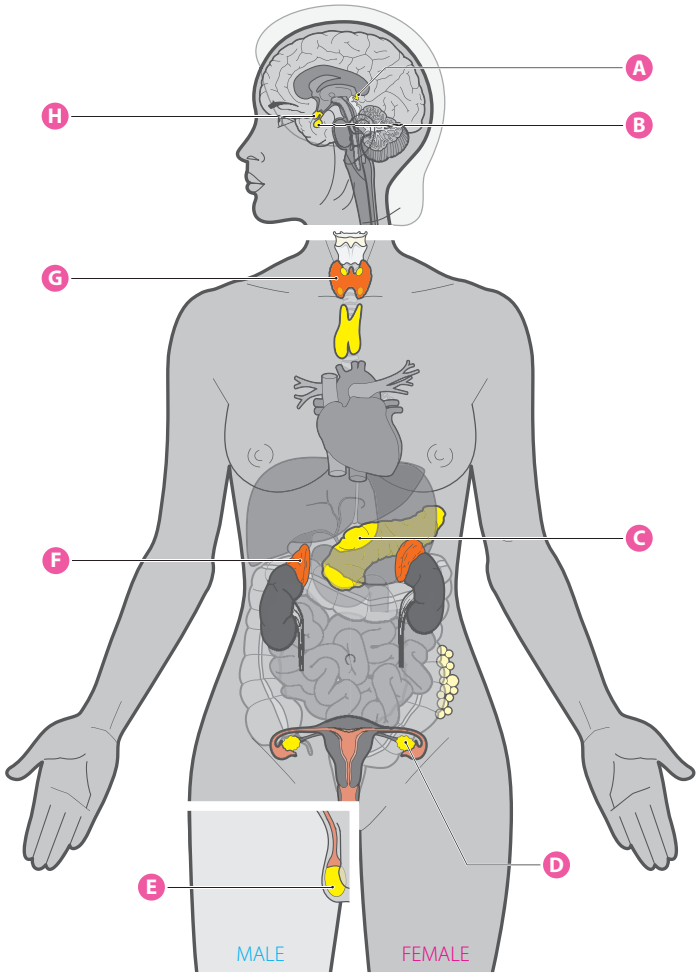
The Reason (R) is also *TRUE*. Through activity of the sympathetic division of the autonomic nervous system, the hypothalamus can rapidly stimulate the adrenal medulla to secrete adrenaline as part of the "fight, flight or freeze" response. If the stressor does not go away, the hypothalamus stimulates the pituitary gland to secrete ACTH, which travels to the adrenal gland and, in turn, stimulates secretion of cortisol. This hormone mobilises body fat stores, which raises blood glucose levels and promotes the breakdown of nutrients for energy.

Both statements are true. The Reason statement (R) provides an explanation for the Assertion (A), so **option 1 is the correct answer.**

Putting it all together

Question 17

Label parts A to H on this diagram of the endocrine system, and state which hormone(s) each of the glands produces.



A Pineal gland
- melatonin

B Pituitary gland
- posterior – neurohormones
- anterior – growth hormone, TSH, ACTH, FSH, LH, prolactin

C Pancreas
- glucagon, insulin, somatostatin

D Ovary
- oestrogens, progesterone

E Testis
- androgens

F Adrenal gland
- adrenaline (and noradrenaline), cortisol, aldosterone

G Thyroid
- T3 (triiodothyronine), T4 (thyroxine)

H Hypothalamus
- releasing hormones – TRH, GnRH, CRH, GHRH, dopamine
- neurohormones – ADH, oxytocin

Question 18

Select the appropriate hormone from the table below to complete the statements.

Prolactin	Cortisol	Growth hormone (GH)	Adrenaline	Leptin	Gonadotrophin-releasing hormone (GnRH)
Parathyroid hormone (PTH)	Antidiuretic hormone (ADH)	Aldosterone	Thyroxine	Oxytocin	Glucagon

a) The anterior pituitary gland hormone ACTH regulates the production and secretion of the glucocorticoid hormone **cortisol** from the adrenal cortex.

b) **Antidiuretic hormone (ADH)** – which tells the kidneys how much water to conserve – is called a neurohormone because it is made by neurons in the hypothalamus and stored in the posterior pituitary gland before it is released.

c) There are four parathyroid glands, each about the size of a grain of rice, embedded in the thyroid gland and they make and secrete **parathyroid hormone (PTH)**, which plays a part in calcium homeostasis.

d) **Growth hormone (GH)** and **thyroxine** are essential for normal growth and development.

e) Dopamine inhibits the release of **prolactin**, which is the hormone responsible for stimulating breast development and milk production.

f) Alpha cells in the pancreas secrete **glucagon** to protect the body from hypoglycaemia.

g) A key hormone from the hypothalamus called **gonadotrophin-releasing hormone (GnRH)** stimulates the onset of puberty and sexual development in adolescent boys and girls.

h) **Oxytocin** stimulates the uterus to contract at the end of pregnancy and is essential for the let-down reflex in breastfeeding mothers.

i) When a person is frightened or anxious, the sympathetic nervous system stimulates the adrenal medulla to secrete **adrenaline**.
j) Adipocytes (fat cells) produce the hormone **leptin** which is sometimes known as the "satiety hormone".
k) The adrenal gland makes the hormone **aldosterone** whose function is stimulating sodium and water reabsorption in the distal tubules of nephrons in the kidney.