

THE ENDOCRINE SYSTEM

Topic: The function of the endocrine system: glands and hormones.

WHAT YOU NEED TO KNOW

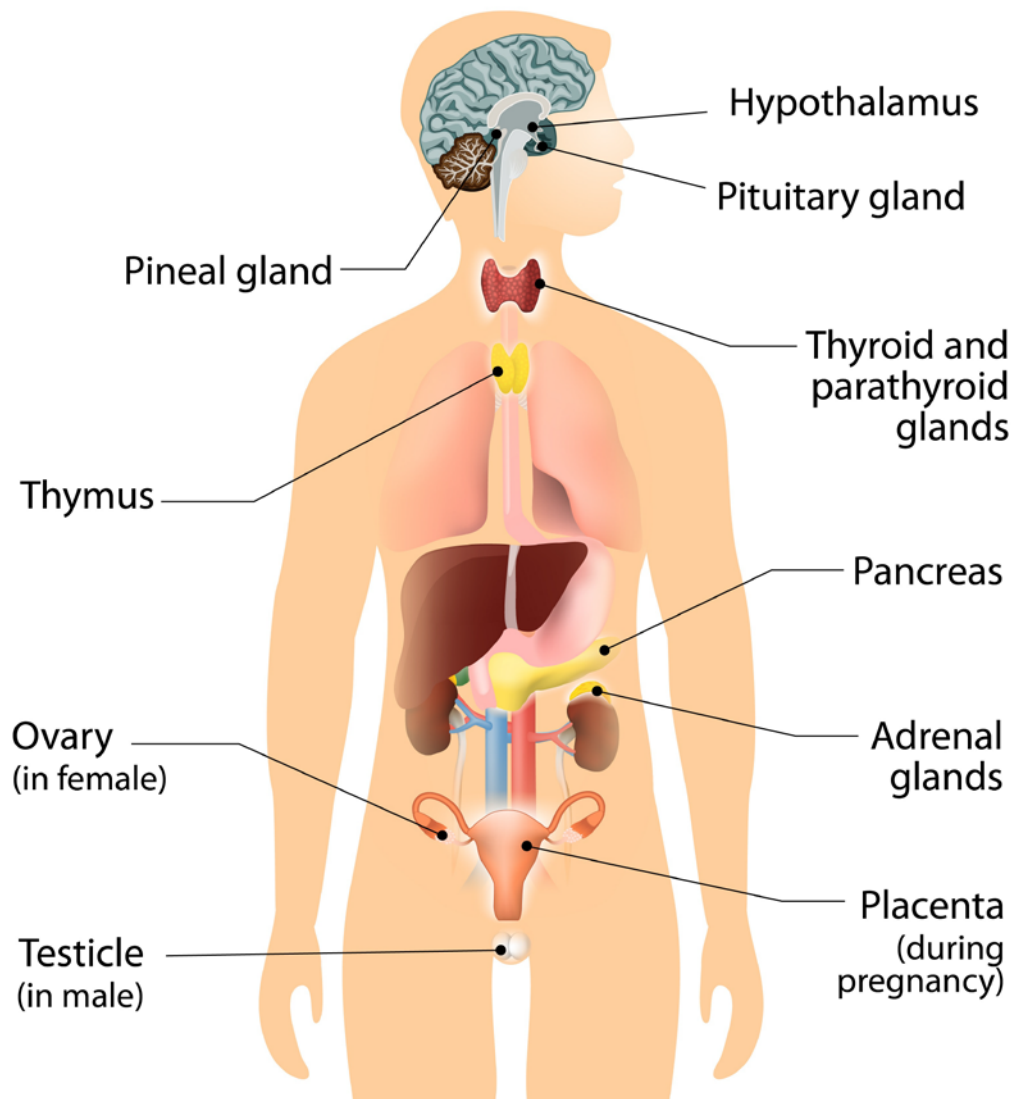
1. Outline the function of the endocrine system, including:
 - a. Glands
 - b. Hormones

Exam Hint: For this part of the course it is important to know what hormones are released by the different glands in the body and what effect these hormones have.

1. The Endocrine System - Glands

The endocrine system works alongside the nervous system. It is a network of **glands** across the body that secrete chemical messages called **hormones**. Instead of using nerves (sensory and motor neurons) to transmit information, this system uses blood vessels. Different hormones produce different effects (behaviours).

The glands which make up the endocrine system can be found in the diagram below.

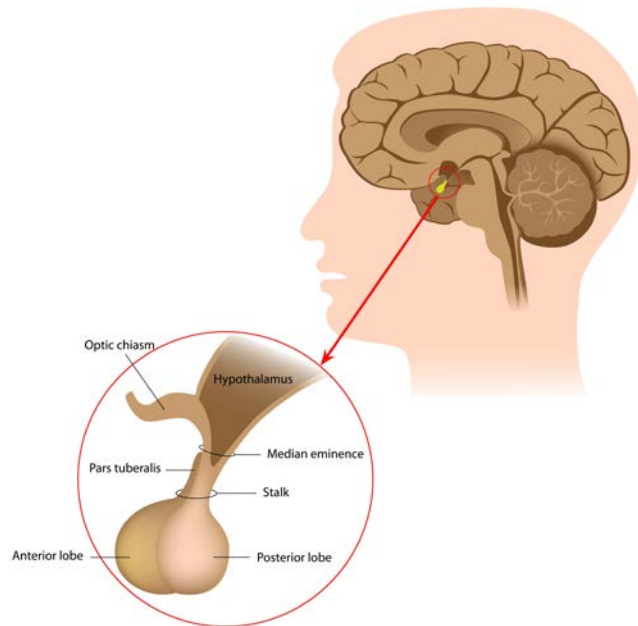


Each gland produces a different hormone. The word ‘hormone’ comes from the Greek work ‘hormao’ which means ‘excite’, as hormones excite (stimulate) a particular part of the body.

2. The Endocrine System - Hormones

The **hypothalamus** is connected to the **pituitary gland** and is responsible for stimulating or controlling the release of hormones from the pituitary gland. Therefore, the hypothalamus is the control system which regulates the endocrine system.

The **pituitary gland** is sometimes known as the **master gland** because the hormones released by the pituitary gland control and stimulate the release of hormones from other glands in the endocrine system. The pituitary gland is also divided into the anterior (front) and posterior (rear) lobes (see right), which release different hormones. A key hormone released from the posterior lobe is **oxytocin** (often referred to as the ‘love hormone’) which is responsible for uterus contractions during childbirth. A key hormone released from the anterior lobe is **adrenocortical trophic hormone (ACTH)** which stimulates the adrenal cortex and the release of cortisol, during the stress response.



The main hormone released from the **pineal gland** is **melatonin**, which is responsible for important biological rhythms, including the sleep-wake cycle.

The **thyroid gland** releases **thyroxine** which is responsible for regulating **metabolism**. People who have a fast metabolism typically struggle to put on weight, as metabolism is involved in the chemical process of converting food into energy.

The adrenal gland is divided into two parts, the **adrenal medulla** and the **adrenal cortex**. The adrenal medulla is responsible for releasing **adrenaline** and **noradrenaline**, which play a key role in the fight or flight response. The adrenal cortex releases **cortisol**, which stimulates the release of glucose to provide the body with energy while suppressing the immune system.

Males and females have different sex organs, and in males the **testes** release androgens, which include the main hormone **testosterone**. Testosterone is responsible for the development of male sex characteristics during puberty while also promoting muscle growth. In females, the **ovaries** release **oestrogen** which controls the regulation of the female reproductive system, including the menstrual cycle and pregnancy.

GLAND	MAIN HORMONE RELEASED	EFFECT
Hypothalamus		Stimulates and controls the release of hormones from the pituitary gland.
Pituitary Gland (Master Gland)	Anterior - adrenocortical trophic hormone (ACTH)	Stimulates the adrenal cortex and the release of cortisol during the stress response.
	Posterior – oxytocin	Responsible for uterus contractions during childbirth.
Pineal Gland	Melatonin	Responsible for important biological rhythms, including the sleep-wake cycle.
Thyroid Gland	Thyroxine	Responsible for regulating metabolism.
Adrenal Gland	Adrenal medulla – adrenaline & noradrenaline	The key hormones in the fight or flight response.
	Adrenal cortex - cortisol	Stimulates the release of glucose to provide the body with energy, while suppressing the immune system.
Ovaries (female)	Oestrogen	Controls the regulation of the female reproductive system, including the menstrual cycle and pregnancy
Testes (male)	Testosterone	Responsible for the development of male sex characteristics during puberty, while also promoting muscle growth.

Possible Exam Questions

- Which of the following glands is responsible for the release of hormones from all other glands within the endocrine system?
 - Thyroid
 - Adrenal
 - Hypothalamus
 - Pituitary
- Identify one gland that forms part of the endocrine system and outline its function. (2 marks)

3. Outline the relationship between glands and hormones. (4 marks)
4. Describe the functions of the endocrine system. (6 marks)