



YMCA Awards

Level 3 Applied anatomy and
physiology

2018

Level 3 Applied anatomy and physiology

The endocrine system

Learning outcomes

By the end of this session you will be able to:

- Describe the structure of the endocrine system
- Identify the major glands in the endocrine system
- Identify the function of key hormones in the body secreted by endocrine glands
- Describe hormonal responses to training and overtraining

The endocrine system

- Comprises a number of glands that produce and secrete hormones
- Hypothalamus (the 'master gland')
 - Controls most of the other endocrine glands in the body

The endocrine system

- Works in tandem with the nervous system to maintain homeostasis
 - If the CNS receives information from afferent nerves to show that the body is out of a homeostatic state, efferent nerves may send information to directly stimulate a response, or may send information to an endocrine gland to release a hormone

The endocrine system

Regulation of homeostasis is achieved through feedback loops

Feedback loops are either positive or negative

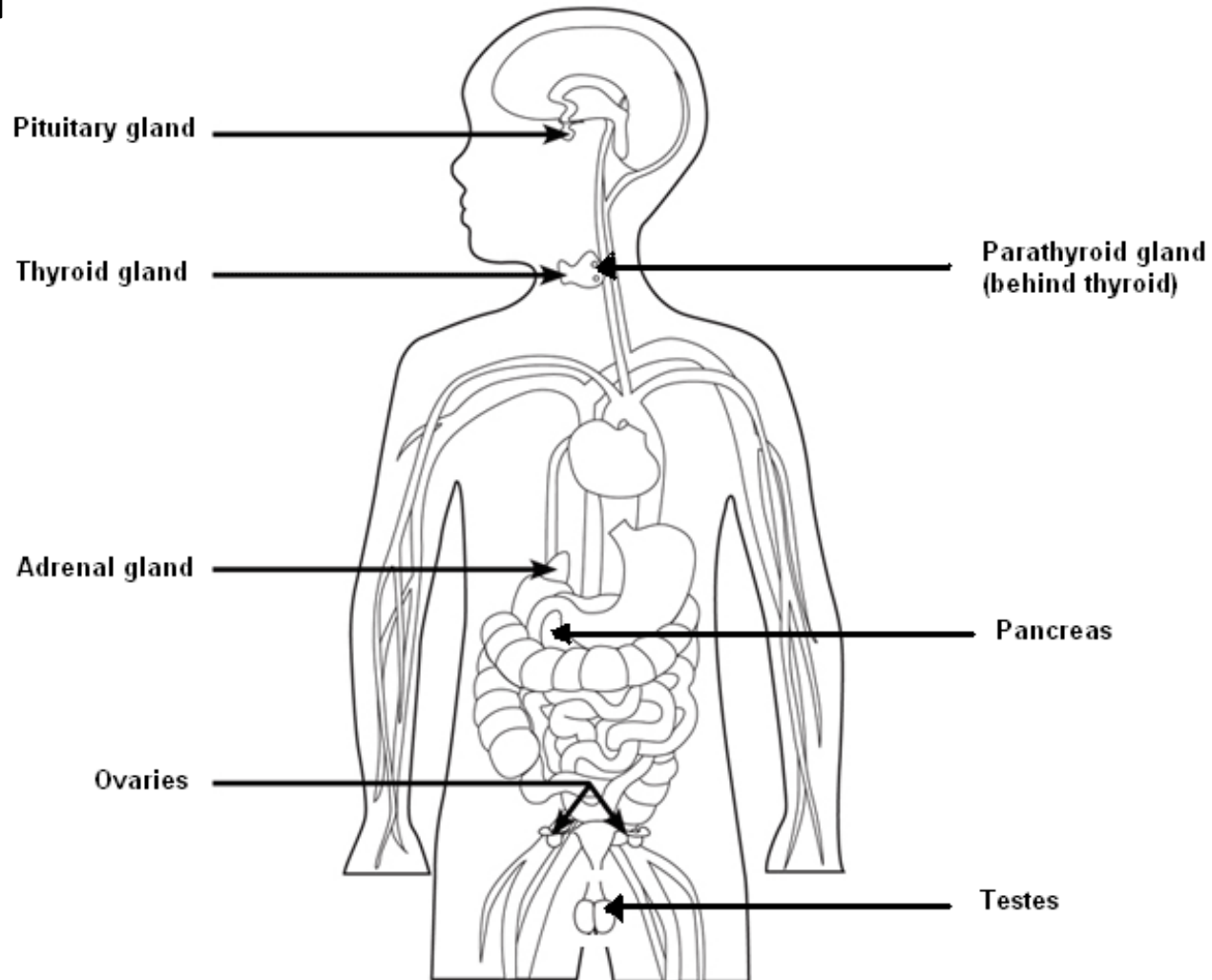
The endocrine system

- **Negative feedback loop** – The most common form of feedback loop and the usual means of maintaining homeostasis
- The body detects an internal change and activates mechanisms that reverse that change, for example, the stimulation of the pancreas to secrete insulin in response to high blood glucose levels or stimulation of the parathyroid glands to secrete parathyroid hormone when blood calcium levels are low

The endocrine system

- **Positive feedback loops** – These are less common and rather than reversing a change will activate responses that speed up a detected change
- An example of this is the action of oestrogen during the menstrual cycle. Oestrogen released by the ovaries stimulates other endocrine glands to secrete hormones that further increase levels of oestrogen

The glands



Hormone summary

Gland	Location	Main hormone(s)	Actions
Hypothalamus and pituitary	Base of the brain	Growth hormone	<ul style="list-style-type: none"> Increases fat metabolism Increases glycogen synthesis Increases blood glucose levels Promotes growth in children and young adults Promotes muscle mass
Adrenals	Top of the kidneys	Adrenaline & noradrenaline (catecholamines)	<ul style="list-style-type: none"> Facilitates sympathetic nervous system activity
		Corticosteroids	<ul style="list-style-type: none"> Regulates stress and immune responses Control of carbohydrates, fats and protein metabolism
Thyroid	Neck	Thyroxine	<ul style="list-style-type: none"> Increases fat metabolism Increases glycogen synthesis Increases blood glucose levels Promotes growth in children and young adults Promotes muscle mass

Hormone summary continued

Gland	Location	Main hormone(s)	Actions
Parathyroid	Neck (behind the thyroid)	Parathyroid hormone	<ul style="list-style-type: none"> Controls levels of blood calcium to maintain muscle contraction and nerve impulse transmission
Pancreas	Abdominal cavity close to stomach	Insulin & glucagon	<ul style="list-style-type: none"> Control blood sugar levels
Ovaries	Pelvic region	Oestrogen & progesterone	<ul style="list-style-type: none"> Promote feminisation
Testes	Pelvic region	Testosterone	<ul style="list-style-type: none"> Promote masculinisation

The effects of exercise on the endocrine system

- Increases in testosterone and human growth hormone post resistance training
- Improved insulin sensitivity
- Increases in Insulin growth factor-1
- Greater glucagon production
- Impaired adrenal and growth hormone responses during overtraining