# WJEC England Biology GCSE

## 4.2 - Hormonal coordination and control in humans

Flashcards

# What is the endocrine system?

# What is the endocrine system?

A network of glands that produce and secrete hormones into the bloodstream

# What is a hormone?

# What is a hormone?

- A cell signalling molecule produced by endocrine glands and released into the blood
- Travels to a target organ and binds to receptors on effectors initiating a response

# What is the pituitary gland?

# What is the pituitary gland?

- Described as the ‘master gland’
- Endocrine gland that produces hormones which control other glands (e.g. adrenal glands)

# Where is the pituitary gland located?

Where is the pituitary gland located?

At the base of the brain

# What are the adrenal glands?

# What are the adrenal glands?

Endocrine glands that produce adrenaline

# Where are the adrenal glands located?

Where are the adrenal glands located?

Above the kidneys

# What is the thyroid gland?

# What is the thyroid gland?

Endocrine gland that produces thyroxine

# Where is the thyroid gland located?

# Where is the thyroid gland located?

In the neck

# What is the pancreas?

# What is the pancreas?

Endocrine gland that secretes insulin

# Where is the pancreas located?

# Where is the pancreas located?

Behind the stomach

# How do the ovaries act as an endocrine gland?

How do the ovaries act as an endocrine gland?

They secrete oestrogen into the bloodstream

# How do the testes act as an endocrine gland?

How do the testes act as an endocrine gland?

They secrete testosterone into the bloodstream

# What is negative feedback?

# What is negative feedback?

- Corrective mechanism, allows only small shifts from a set point
- Reverses a change in conditions e.g. if the concentration of a hormone increases, negative feedback systems work to reduce the concentration back to normal level
- Maintains optimum conditions within the body

# What is thyroxine? (higher)

# What is thyroxine? (higher)

A hormone secreted by the thyroid gland that controls metabolic rate, heart rate and temperature.

What is metabolic rate? (higher)

# What is metabolic rate? (higher)

The rate at which biochemical reactions occur in cells

# Describe how thyroxine is released (higher)

# Describe how thyroxine is released (higher)

- Hypothalamus secretes TRH into the bloodstream
- TRH stimulates secretion of TSH from pituitary gland
- TSH stimulates the release of thyroxine from the thyroid gland

What does TRH stand for? (higher)

# What does TRH stand for? (higher)

Thyrotropin releasing hormone

What does TSH stand for? (higher)

# What does TSH stand for? (higher)

Thyroid-stimulating hormone

Describe how a negative feedback system decreases blood thyroxine levels if they increase above a set point (higher)

# Describe how a negative feedback system decreases blood thyroxine levels if they increase above a set point (higher)

- Blood thyroxine levels **increase** above a set point
- TRH secretion inhibited
- Less TSH secreted
- Less thyroxine produced by thyroid gland
- Blood thyroxine levels return to normal

Describe how a negative feedback system increases blood thyroxine levels if they decrease below a set point (higher)

# Describe how a negative feedback system increases blood thyroxine levels if they decrease below a set point (higher)

- Blood thyroxine levels **decrease** below a set point
- TRH secretion stimulated
- Increased TSH secretion
- More thyroxine produced by thyroid gland
- Blood thyroxine levels return to normal

What is adrenaline? (higher)

# What is adrenaline? (higher)

A hormone produced by the adrenal glands that is involved in the ‘fight or flight’ response (where the body prepares to confront danger or flee from it)

State the effects of adrenaline on the body (higher)

# State the effects of adrenaline on the body (higher)

- Increases heart rate
- Increases depth and rate of breathing
- Increases blood flow to muscles

How does adrenaline increase blood flow to muscles? (higher)

# How does adrenaline increase blood flow to muscles? (higher)

- Increases heart rate so more blood is pumped out of the heart to the muscles every minute
- Dilates the blood vessels which supply the muscles with blood

What is the action of adrenaline an example of? (higher)

What is the action of adrenaline an example of? (higher)

Positive feedback

What happens to adrenaline in the liver? (higher)

What happens to adrenaline in the liver? (higher)

It is converted into a less active compound

# What is the function of reproductive hormones during puberty?

# What is the function of reproductive hormones during puberty?

- **Males** - cause the development of secondary sexual characteristics
- **Females** - cause the development of secondary sexual characteristics and the maturation of eggs

What is the main male reproductive hormone?

# What is the main male reproductive hormone?

Testosterone

# What is the function of testosterone?

# What is the function of testosterone?

Controls sperm production

# What is the main female reproductive hormone?

What is the main female reproductive hormone?

Oestrogen

# What is the menstrual cycle?

# What is the menstrual cycle?

The cycle in women (typically lasting 28 days) that involves:

- Shedding of uterus lining (menstruation)
- Repair of uterus lining
- Release of an egg (ovulation)
- Maintenance of uterus lining

# Describe the stages of the menstrual cycle

# Describe the stages of the menstrual cycle

- **Days 1-4:** if fertilisation and implantation do not occur the uterus lining sheds and the egg is expelled with it (menstruation)
- **Days 4-14:** uterus lining thickens and blood vessels grow in preparation for the implantation of an egg
- **Day 14:** egg released from a follicle into the oviduct (ovulation)
- **Days 14-28:** uterus lining maintained so implantation can occur

# Name the hormones that control the menstrual cycle

# Name the hormones that control the menstrual cycle

- Follicle stimulating hormone (FSH)
- Oestrogen
- Luteinising hormone (LH)
- Progesterone

# Describe the role of FSH in the menstrual cycle (higher)

# Describe the role of FSH in the menstrual cycle (higher)

- Secreted by the pituitary gland
- Transported in the bloodstream to the ovaries
- Triggers the development of a follicle in the ovaries which releases oestrogen

# Describe the role of oestrogen in the menstrual cycle

# Describe the role of oestrogen in the menstrual cycle

- Secreted by the ovaries
- Repairs and thickens the uterus lining

(higher):

- Inhibits secretion of FSH from the pituitary gland
- Stimulates secretion of LH from the pituitary gland

# Describe the role of LH in the menstrual cycle (higher)

# Describe the role of LH in the menstrual cycle (higher)

- Secreted by the pituitary gland
- Transported in the bloodstream to the ovaries
- Surge in LH triggers ovulation
- Stimulates follicle remains to develop into a corpus luteum which then secretes progesterone

What is a corpus luteum? (higher)

# What is a corpus luteum? (higher)

- Temporary endocrine structure
- Mass of cells that releases progesterone
- Degenerates after a few days

# Describe the role of progesterone in the menstrual cycle (higher)

# Describe the role of progesterone in the menstrual cycle

- Stimulates the growth of blood vessels in the uterus lining in preparation for implantation

(higher):

- Inhibits the release of FSH and LH

What happens to progesterone levels if fertilisation and implantation do not occur? (higher)

What happens to progesterone levels if fertilisation and implantation do not occur? (higher)

Progesterone levels decrease and the uterus lining sheds. FSH increases and the cycle starts again.

What happens to progesterone levels if fertilisation and implantation occur? (higher)

What happens to progesterone levels if fertilisation and implantation occur? (higher)

The placenta produces progesterone so levels remain high. This prevents further ovulation and maintains the uterus lining.

# What are contraceptives?

# What are contraceptives?

A method or device utilised to prevent pregnancy

# What are the two types of oral contraceptives?

# What are the two types of oral contraceptives?

- Combined pill (oestrogen and progesterone)
- Mini-pill (progesterone only)

# How does progesterone prevent pregnancy?

# How does progesterone prevent pregnancy?

- Sperm find it more difficult to enter the uterus as the cervical mucus is thickened
- Thins the uterine lining, reducing the likelihood of egg implantation
- Prevents ovulation in some women (but not all)

Other than in the mini-pill, how else can progesterone be administered as a contraceptive?

Other than in the mini-pill, how else can progesterone be administered as a contraceptive?

- Injection
- Implant under the skin
- Intrauterine system (IUS)

# What is an intrauterine system (IUS)?

# What is an intrauterine system (IUS)?

A plastic device (T-shaped) inserted into the uterus which releases progesterone

# How does oestrogen prevent pregnancy?

# How does oestrogen prevent pregnancy?

Oestrogen inhibits FSH, preventing ovulation.

Other than in the combined pill, how else can progesterone and oestrogen be administered as a contraceptive?

Other than in the combined pill, how else can progesterone and oestrogen be administered as a contraceptive?

Skin patch

(worn continuously for 3 weeks then without for 1 week)

# What are the benefits of hormonal contraceptive methods? (3)

# What are the benefits of hormonal contraceptive methods? (3)

- 99% effective when used properly
- Generally longer lasting than non-hormonal methods
- Used to treat other conditions e.g. painful/heavy periods

# What are the risks of hormonal contraceptive methods? (4)

# What are the risks of hormonal contraceptive methods? (4)

- Side effects e.g. nausea, thrombosis
- Do not protect against STIs
- May involve uncomfortable medical procedures
- Not effective if used incorrectly

# Describe the barrier methods of contraception

# Describe the barrier methods of contraception

Prevent the sperm and egg meeting

e.g. condoms, diaphragms (fit over cervix)

What are the benefits of barrier methods of contraception? (3)

# What are the benefits of barrier methods of contraception? (3)

- Condoms are simple and quick to use
- Condoms prevent the spread of STIs
- No side effects

What is the main risk of barrier methods of contraception?

What is the main risk of barrier methods of contraception?

Less effective than hormonal methods e.g. condom may split whilst in use.

# Describe how hormones can be used to treat infertility (higher)

# Describe how hormones can be used to treat infertility (higher)

FSH and LH injections increase the probability of pregnancy:

- FSH stimulates the maturation of follicles
- LH causes ovulation

Some chemicals also inhibit oestrogen production

How does the inhibition of oestrogen production prevent pregnancy? (higher)

How does the inhibition of oestrogen production prevent pregnancy? (higher)

Inhibition of oestrogen production causes an increase in FSH secretion

# Describe the role of hormones in IVF (higher)

# Describe the role of hormones in IVF (higher)

1. **FSH and LH given to a woman to stimulate egg production and ovulation**
2. Eggs retrieved from the woman's ovaries and fertilised in vitro
3. Resultant embryo transferred to the woman's uterus

What are the advantages of fertility treatments? (2) (higher)

# What are the advantages of fertility treatments? (2) (higher)

- Allows infertile couples to have children
- Can store a woman's eggs for future

What are the disadvantages of fertility treatments? (4) (higher)

What are the disadvantages of fertility treatments? (4) (higher)

- Expensive
- Low success rate (especially for older couples)
- Increased chance of multiple pregnancies
- Side effects of fertility drugs