

WJEC (Wales) Biology A-level

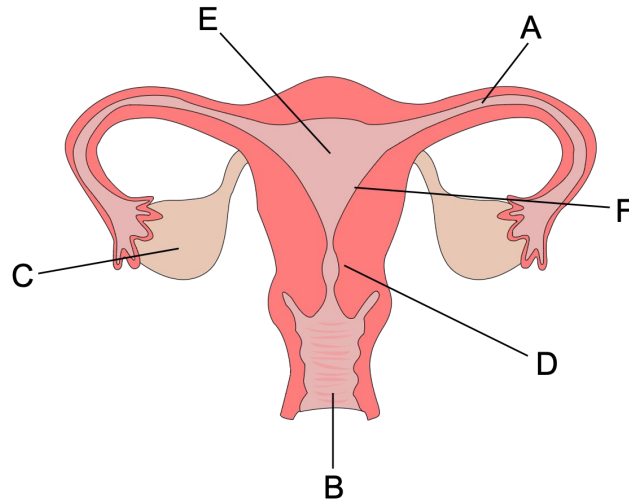
Unit 4.1 - Sexual reproduction in humans

Flashcards

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Identify the structures of the female reproductive system labelled in the diagram below.



Identify the structures of the female reproductive system labelled in the diagram below.

A = Fallopian tube (oviduct)

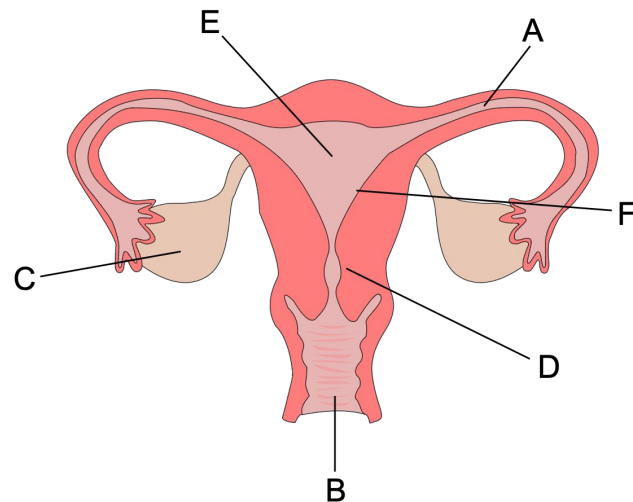
B = Vagina

C = Ovary

D = Cervix

E = Uterus

F = Endometrium



List parts of the female reproductive system and explain their function.

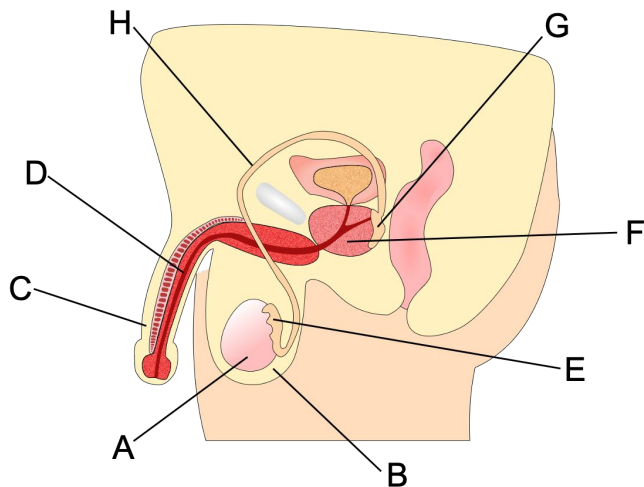


List parts of the female reproductive system and explain their function.

- **Ovaries** = produce egg cells in follicles
- **Fallopian tubes** = transports an egg cell from ovary to uterus
- **Uterus** = where embryo develops
- **Cervix** = separates uterus from vagina, protects fetus
- **Vagina** = leads from the cervix to outside of the body



Identify the structures of the male reproductive system labelled in the diagram below.



Identify the structures of the male reproductive system labelled in the diagram below.

A = Testis

B = Scrotum

C = Penis

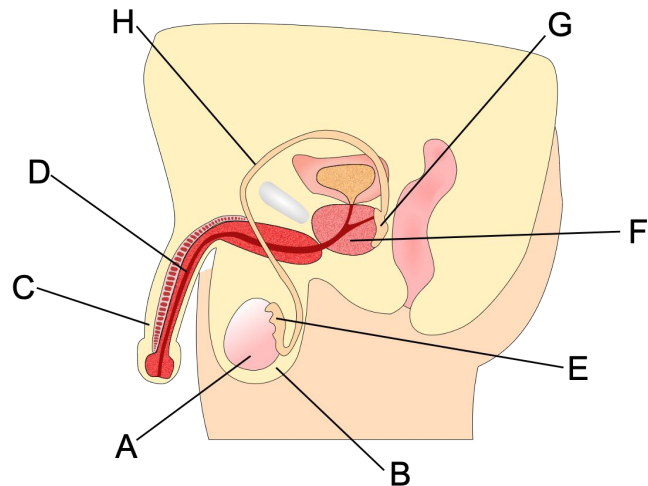
D = Urethra

E = Epididymis

F = Prostate gland

G = Seminal vesicle

H = Vas deferens



List parts of the male reproductive system and explain their function.



List parts of the male reproductive system and explain their function.

- **Testes** = production of sperm cells and testosterone
- **Vas deferens** = carry sperm from testes to urethra
- **Prostate gland** = secretes alkaline fluid to counteract vaginal acidity
- **Urethra** = allows excretion of urine and semen from the body
- **Seminal vesicle** = secretes fluid (proteins and fructose) to nourish sperm
- **Penis** = penetrates vagina, releases sperm
- **Epididymis** = stores sperm
- **Scrotum** = holds and maintains an optimum temperature for testes



How does the human body produce gametes?



How does the human body produce gametes?

Via gametogenesis.



Name the two types of gametogenesis.



Name the two types of gametogenesis.

- Spermatogenesis
- Oogenesis



What is spermatogenesis?



What is spermatogenesis?

Gametogenesis in males that results in the production of spermatozoa.



Where does spermatogenesis take place?



Where does spermatogenesis take place?

Seminiferous tubules



Outline the stages of spermatogenesis.



Outline the stages of spermatogenesis.

Primordial germ cells → spermatogonia → primary spermatocytes → secondary spermatocytes → spermatids → **four spermatozoa**



What is the germinal epithelium?



What is the germinal epithelium?

A surface layer of cells surrounding the ovaries in females and testicles in males that is involved in gametogenesis.



How do primary spermatocytes form?



How do primary spermatocytes form?

- **Primordial germ cells** divide by mitosis, forming **spermatogonia**
- Growth period of spermatogonia without further division forms **primary spermatocytes**



How are spermatids formed?



How are spermatids formed?

- **Primary spermatocytes** divide in meiosis I to form haploid **secondary spermatocytes**
- Secondary spermatocytes divide in meiosis II to form four haploid **spermatids**



How do spermatozoa form?



How do spermatozoa form?

Spermatids differentiate to gain flagellum, acrosome and many mitochondria.



Name the three types of cells within testes.



Name the three types of cells within testes.

- Spermatogonia
- Sertoli cells
- Interstitial cells (cells of Leydig)



What are Leydig cells?



What are Leydig cells?

- Cells located adjacent to the seminiferous tubules in the testes that secrete **testosterone**
- Also called interstitial cells of Leydig



What are sertoli cells?



What are sertoli cells?

Cells located within the seminiferous tubules in the testes that provide nourishment and protection to cells produced during spermatogenesis.

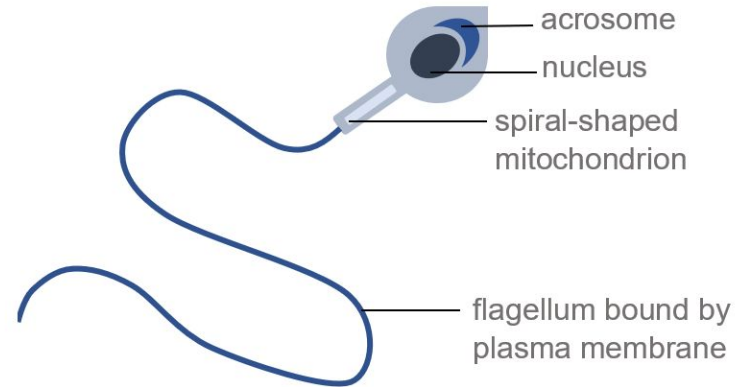


Describe the structure of a mature sperm cell.



Describe the structure of a mature sperm cell.

- **Acrosome** contains digestive enzymes which break down the zona pellucida of the egg
- **Flagellum** for propulsion
- Many **mitochondria** for energy



What is oogenesis?



What is oogenesis?

Gametogenesis in females that results in the production of secondary oocytes.



Where does oogenesis take place?



Where does oogenesis take place?

Ovaries



Outline the stages of oogenesis.



Outline the stages of oogenesis.

Primordial germ cell → oogonia → primary oocyte → secondary oocyte and polar body → ootid and polar bodies → **ovum**



How do primary oocytes form?



How do primary oocytes form?

- **Primordial germline cells** in the ovaries (and oviduct) divide by mitosis, forming **oogonia**
- Growth period of oogonia without further division forms **primary oocytes**
- Meiosis begins but pauses in prophase I until puberty



What happens during the first meiotic division of oogenesis?



What happens during the first meiotic division of oogenesis?

- Primary oocyte divides in meiosis I to form secondary oocyte
- Polar body buds off and sticks to the oocyte



What is a polar body?



What is a polar body?

A haploid cell produced during meiosis in females that does not have the ability to be fertilised.



When is the second meiotic division of oogenesis completed?



When is the second meiotic division of oogenesis completed?

Meiosis II initiated but pauses in metaphase II unless fertilisation takes place.



When happens during the second
meiotic division?



What happens during the second meiotic division?

Secondary oocyte develops into a fertilised ovum and a second polar body.



Describe the structure of a secondary oocyte

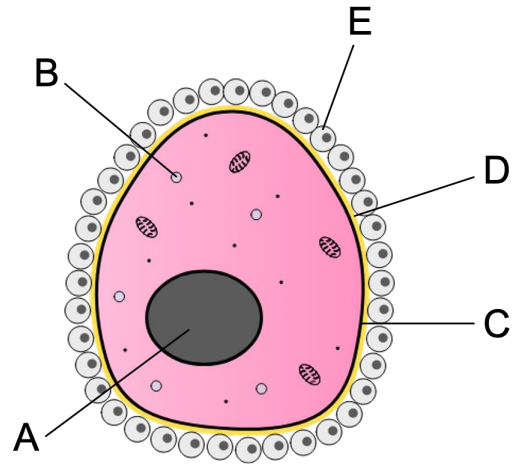


Describe the structure of a secondary oocyte.

- **Corona radiata** - outer layer of follicle cells
- **Zona pellucida** - coating above cytoplasm that prevents polyspermy and hardens when **cortical granules** release chemicals
- **Haploid** nucleus - fertilisation restores diploid chromosome number



Identify the structures of the secondary oocyte labelled in the diagram below.



Identify the structures of the secondary oocyte labelled in the diagram below.

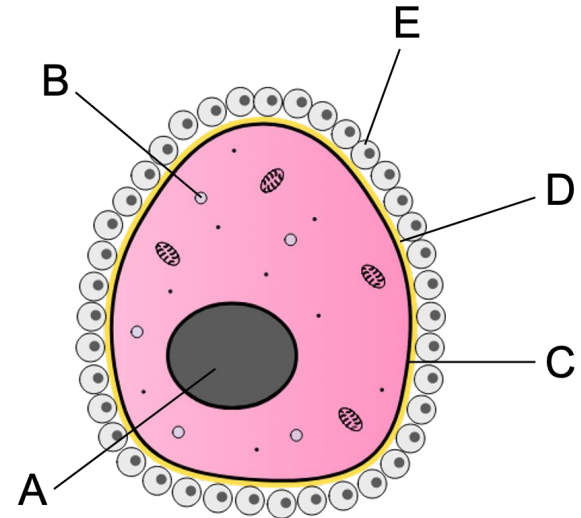
A = haploid nucleus

B = cortical granule

C = cell surface membrane

D = zona pellucida

E = corona radiata



Outline the stages in the development of a follicle.



Outline the stages in the development of a follicle.

primary follicle → secondary follicle →

Graafian follicle → ovulation → corpus luteum



What is a primary follicle?



What is a primary follicle?

An immature ovarian follicle surrounded by two layers of follicular cells.



What is a secondary follicle?



What is a secondary follicle?

A larger follicle that has developed from a primary follicle.



Define Graafian follicle.



Define Graafian follicle.

A mature fluid-filled follicle in the ovary within which an egg cell develops.



What is a corpus luteum?



What is a corpus luteum?

A mass of cells that forms from the Graafian follicle after ovulation. It serves as a temporary endocrine structure during pregnancy, secreting progesterone.



What is sexual intercourse?



What is sexual intercourse?

The entry of the male reproductive organ and the deposition of sperm into the female reproductive tract.



Explain what happens during fertilisation.



Explain what happens during fertilisation.

1. Spermatozoa move into fallopian tubes
2. **Acrosome** binds to zona pellucida and releases **hydrolase** enzymes that digest the zona pellucida
3. **Membranes** of sperm and secondary oocyte **fuse**, allowing sperm nucleus to enter oocyte
4. **Nuclei fuse**, forming a diploid zygote
5. **Cortical reaction** causes zona pellucida to **harden**, preventing polyspermy



Outline the stages of early embryo development.



Outline the stages of early embryo development.

zygote → blastocyst → implantation



How does a blastocyst form?



How does a blastocyst form?

Several mitotic divisions of zygote (cleavage) produce a ball of cells, the blastocyst.



Define implantation.



Define implantation.

The early stage of pregnancy in which the blastocyst adheres and sinks into the endometrium.



What is the placenta?



What is the placenta?

A temporary organ attached to the lining of the uterus during pregnancy.



Name the hormones involved in the menstrual cycle.



Name the hormones involved in the functioning of the female reproductive system.

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



Where is FSH secreted from?



Where is FSH secreted from?

Anterior pituitary gland.



What is the function of FSH in the menstrual cycle?



What is the function of FSH in the menstrual cycle?

Binds to follicle cells, stimulating them to mature and secrete oestrogen.



Where is LH secreted from?



Where is LH secreted from?

Anterior pituitary gland.



What is the function of LH in the menstrual cycle?



What is the function of LH in the menstrual cycle?

Initiates ovulation and stimulates the development of the Graafian follicle into a corpus luteum.



What is the function of oestrogen in the menstrual cycle?



What is the function of oestrogen in the menstrual cycle?

Inhibits the production of FSH and causes a surge in LH production.



What structure secretes progesterone in the menstrual cycle?



What structure secretes progesterone in the menstrual cycle?

Corpus luteum



What is the function of progesterone in the menstrual cycle?



What is the function of progesterone in the menstrual cycle?

Causes the development of the endometrium and inhibits the production of FSH and LH.



What happens if implantation does not occur during the menstrual cycle?



What happens if implantation does not occur during the menstrual cycle?

- Corpus luteum degenerates due to decreasing FSH and LH levels
- Progesterone levels decrease
- Endometrium breaks down



What is HCG?



What is HCG?

- Human chorionic gonadotropin
- Hormone secreted by the developing embryo that maintains the corpus luteum during early pregnancy



Describe the role of the placenta during pregnancy.



Describe the role of the placenta during pregnancy.

- Exchange of gases and nutrients
- Barrier between fetal and maternal blood
- Secretes **progesterone** and **oestrogen**
- Protects the mother's immune system
- Protection from the difference between maternal and foetal blood pressure



What is the role of progesterone during pregnancy?



What is the role of progesterone during pregnancy?

It suppresses contractions of the uterine wall.



What is the role of oestrogen during pregnancy?



What is the role of oestrogen during pregnancy?

It stimulates uterine growth and the development of the mammary glands.



How do the levels of progesterone and oestrogen change prior to birth?



How do the levels of progesterone and oestrogen change prior to birth?

- Oestrogen levels increase
- Progesterone levels decrease



Why do progesterone levels decrease just before birth?



Why do progesterone levels decrease just before birth?

Allows the uterine wall to contract.



Where is oxytocin secreted from?



Where is oxytocin secreted from?

Posterior pituitary gland.



Describe the role of oxytocin.



Describe the role of oxytocin.

Triggers the contraction of the uterus wall.



What type of feedback is the secretion of oxytocin an example of?



What type of feedback is the secretion of oxytocin an example of?

Positive feedback.



Where is prolactin secreted from?



Where is prolactin secreted from?

Anterior pituitary gland.



Describe the role of prolactin.



Describe the role of prolactin.

Stimulates lactation during and after birth.



What is amniotic fluid?



What is amniotic fluid?

The liquid surrounding the embryo in the amniotic sac.



Describe the role of amniotic fluid during fetal development.



Describe the role of amniotic fluid during fetal development.

It protects the foetus and acts as a shock absorber.



Describe how the placenta is adapted for the exchange of substances between maternal and fetal blood.



Describe how the placenta is adapted for the exchange of substances between maternal and fetal blood.

- **Counter-current** blood flow
- **Chorionic villi** provide a **large surface area** for the exchange of products
- Fetal capillaries lie close to the surface giving a **short diffusion distance**
- Abundance of maternal blood vessels



What are intervillous spaces?



What are intervillous spaces?

Spaces between the chorionic villi that contain maternal blood.



Describe the role of the umbilical artery.



Describe the role of the umbilical artery.

Carries deoxygenated blood from the fetus to the placenta.



Describe the role of the umbilical vein.



Describe the role of the umbilical vein.

Carries **oxygenated** blood from the placenta to the fetus.

