

OCR (B) Biology A-level

Topic 4.2 - Mammalian Reproduction

Definitions and Concepts

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4.2.1 Fertility and assisted reproduction

Acrosome - An organelle in the tip of a sperm containing hydrolase enzymes which digest the zona pellucida of a secondary oocyte.

Cervix - A neck of tissue that connects the uterus and the vagina and protects the fetus.

Corona radiata - An outer layer of follicular cells that protect the secondary oocyte in the oviduct.

Endometriosis - A condition associated with infertility which is caused by the growth of endometrial tissue in the oviducts and ovaries.

Endometrium - The inner lining of the uterus, which, during the menstrual cycle, thickens in preparation for embryo implantation.

Epididymis - A coiled tube in the male reproductive system that links a testicle to a vas deferens and stores sperm prior to ejaculation.

Fertilisation - The fusion of the nuclei of a male and female gamete to form a diploid zygote.

Flagellum - A whip-like structure found on sperm cells that is used for propulsion.

Follicle-stimulating hormone (FSH) - A hormone secreted by the anterior pituitary gland that binds to follicle cells, stimulating them to mature and secrete oestrogen.

Frozen embryo replacement - Frozen embryos from an IVF treatment cycle can be thawed and used for a subsequent cycle.

Gamete intra-fallopian transfer - A fertility treatment in which an ovum is removed from the ovaries and placed in the oviduct before insemination.

Gametogenesis - A sequence of nuclear and cellular divisions that result in the production of gametes.

Gonadotropin releasing hormone (GnRH) - A hormone produced by the hypothalamus which stimulates the anterior pituitary gland to release FSH and LH.

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

Infertility - Inability to conceive, which may be caused by a range of factors, including problems with ovulation or low sperm count.

Inhibin - A hormone secreted by the ovaries which inhibits FSH release from the anterior pituitary gland.

Insemination - The introduction of sperm into the female reproductive system.

Intracytoplasmic sperm injection (ICSI) - Injection of a single spermatozoon into the cytoplasm of an ovum during IVF.



Intrauterine insemination - A fertility treatment which involves direct injection of sperm into the uterus.

In vitro fertilisation (IVF) - A fertility procedure in which ova are collected from the ovaries and fertilised with sperm outside of the body. When a viable embryo forms, it can be implanted into the uterus.

Luteinising hormone (LH) - A hormone secreted by the anterior pituitary gland that initiates ovulation and stimulates the development of the Graafian follicle into a corpus luteum.

Meiosis - A type of cell division used to produce gametes that produces four genetically different haploid daughter cells from one parent cell.

Menstrual cycle - The monthly cycle in women that involves the development of the endometrium, ovulation and the shedding of the endometrium.

Mitosis - The division of a cell to produce two genetically identical daughter cells.

Monoclonal antibodies - Antibodies which have been produced by plasma cells that are identical clones of the same parent cell.

Oestrogen - A female sex hormone secreted by a mature follicle that inhibits the production of FSH and causes a surge in LH production. During pregnancy, it stimulates uterine growth and the development of the mammary glands.

Oogenesis - The production of one ovum from a primordial germ cell in the ovaries.

Oogonia - Immature female reproductive cells which form when primordial germline cells in the ovaries and oviduct divide by mitosis. They mature to form primary oocytes.

Ovary - An organ in the female reproductive system responsible for the production of egg cells in follicles.

Oviducts - The tubes that transport egg cells from the ovaries to the uterus. They are the site of fertilisation and are commonly known as fallopian tubes.

Ovulation induction - Hormones are administered orally or via injection to stimulate FSH release or directly increase FSH levels and promote ovulation.

Ovum - Female gamete formed when an influx of Ca_{2+} during fertilisation stimulates meiosis II.

Penis - The male sex organ that penetrates the vagina and releases sperm.

Polar body - A haploid cell that buds off and sticks to the oocyte during the first meiotic division of oogenesis. It then divides during the second meiotic division. All polar bodies eventually degenerate and cannot be fertilised.

Primary oocyte - A diploid female gamete precursor formed by the maturation of oogonia. It remains in prophase I in follicles until puberty.



Primary spermatocyte - Formed by a growth period of spermatogonia without further division.

Primordial germline cells - Diploid precursors to gametes.

Progesterone - A female sex hormone secreted by the corpus luteum that causes the development of the endometrium and inhibits the production of FSH and LH. During pregnancy, it suppresses contractions of the uterine wall.

Prostate gland - A gland found between the bladder and the penis that secretes an alkaline fluid to neutralise vaginal acidity.

Scrotum - A pouch of skin that holds and maintains an optimum temperature for the testes.

Secondary oocyte - Haploid cells with all of the cytoplasm formed by the first meiotic division of oogenesis.

Secondary spermatocyte - A diploid cell formed after meiosis I of a primary spermatocyte.

Seminal vesicles - A pair of glands in the male reproductive system that secrete a protein- and fructose-rich fluid to nourish sperm.

Sperm - Male haploid gamete formed when spermatids differentiate to gain a flagellum, an acrosome and many mitochondria.

Spermatid - An undifferentiated haploid cell formed when primary spermatocytes undergo meiosis.

Spermatogenesis - The production of four spermatozoa from a primordial germline cell in the seminiferous tubules.

Spermatogonia - Formed by primordial germline cells of seminiferous tubules of testes divide by mitosis.

Testes - A pair of organs in the male reproductive system that produce sperm and testosterone.

Testosterone - A male sex hormone which regulates secondary sex characteristics, red blood cell production and muscle mass.

Ureters - Tubes between the kidneys and the bladder which propel urine.

Urethra - A tube responsible for the transfer of urine during urination (in both males and females) and semen during ejaculation (in males).

Urinogenital system - The organs systems involved in reproduction and urinary excretion.

Uterus - The organ in the female reproductive system in which the embryo develops.

Vagina - The canal that extends from the cervix to the outside of the body. During sexual intercourse, it stimulates the penis to ejaculate.



Vas deferens - A tube in the male reproductive system that transfers sperm from the epididymis during ejaculation.

Zona pellucida - A glycoprotein coating above the cytoplasm of an ovum which prevents polyspermy and hardens when cortical granules release chemicals.

Zygote - A diploid cell formed by the fusion of a haploid oocyte and spermatozoa during fertilisation.

4.2.2 The effects of ageing on the reproductive system

Andropause - Changes caused by a gradual decline in the production of androgens (male sex hormones) which is experienced by some older men.

Benign prostate hyperplasia - An non-cancerous enlargement of the prostate gland associated with aging which can cause frequent urination, an inability to fully empty the bladder and pain during urination.

Erectile dysfunction (ED) - A condition where males cannot achieve or sustain an erection. It is more common in older men but can affect men of any age.

Fertility - The capacity of an individual to reproduce.

Hormone replacement therapy (HRT) - A combination of oestrogen and progesterone can be taken to relieve menopausal symptoms.

Impotence - See erectile dysfunction.

Menopause - The time during which oestrogen levels decrease and menstruation no longer occurs.

