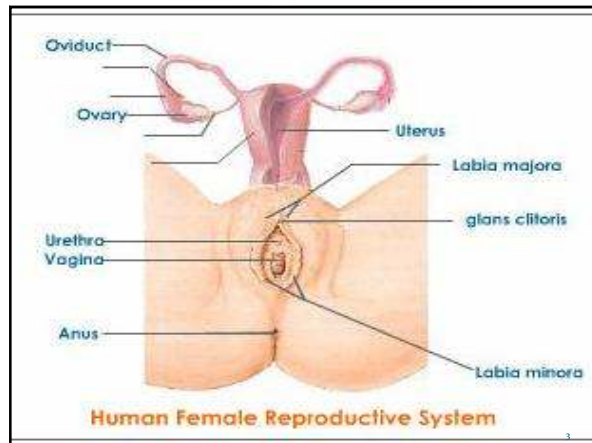


THE FEMALE REPRODUCTIVE SYSTEM

EXTERNAL GENITALIA

- Labia majora
- Labia minora
- Clitoris
- Vagina orifice
- The vestibule
- The hymen and
- The vestibular gland



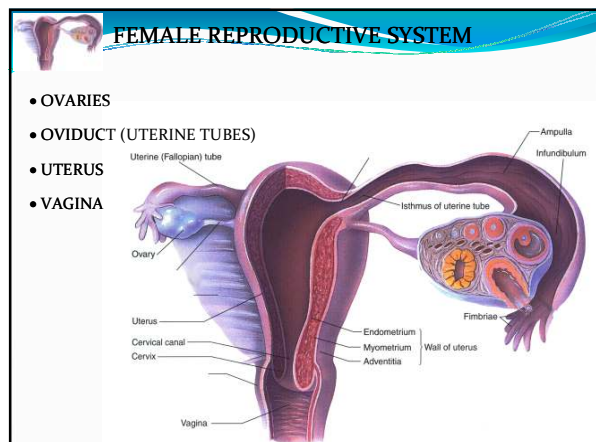
Internal genitalia

- **Vagina:** muscular tube (8-10cm) with elastic tissue which stretches during birth and sexual intercourse.
- **Cervix:** Narrow entrance to the uterus from the vagina.
- **Uterus:** 7-5 cm and 5 cm wide and lies behind the bladder. It is made of endometrium, myometrium and perimetrium. Implantation occurs after fertilization occurs.
- **Oviduct (fallopian tube):** 12 cm and carries eggs from ovaries to the uterus.

Ovaries: 2 ovaries are the female gonads, the sites where female gametes are made and they secrete sex steroid hormones (androstenedione, estrogen and progesterone).

Organised into two principal parts;

- Medulla, loose connective tissues containing blood vessels and associated nerves
 - Cortex, it contains female gametes
- Eggs are only released during adult reproductive years, when sex steroid secretion is greatest but ovaries are physiologically active throughout life.



- OVARIES
- OVIDUCT (UTERINE TUBES)
- UTERUS
- VAGINA

FEMALE REPRODUCTIVE SYSTEM

- **OVARY**

GERMINAL EPITHELIUM

TUNICA ALBUGINEA
- thin connective tissue capsule underlying germinal epithelium

CORTEK
- surrounds the medulla and contains maturing follicles

MEDULLA
- central connective tissue containing vascular supply and nervous innervation

FEMALE REPRODUCTIVE SYSTEM

- **OVIDUCT (UTERINE TUBES)**
INFUNDIBULUM, AMPULLA, ISTHMUS, UTERINE
- **UTERUS**
FUNDUS, BODY (CORPUS), CERVIX

Gametogenesis

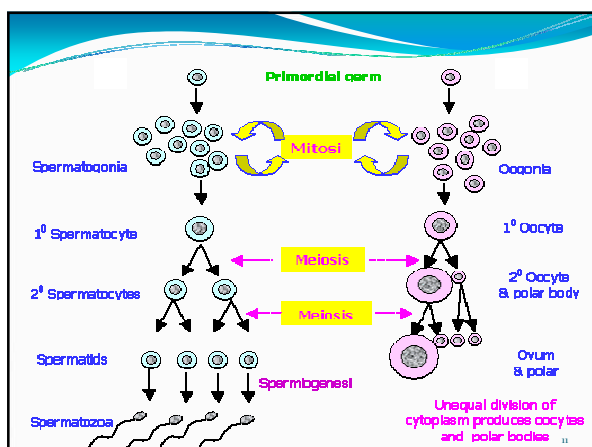
- There are three stages of reproduction; gametogenesis, fertilisation and embryo development.
- Spermatogenesis and Oogenesis

Both involve meiosis which halves the number of chromosomes from diploid to haploid condition.

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- Process starts with cells in the outer layer of the gonad (germinal epithelium)
- Process involves 3 stages, multiplication, growth and maturation.
- Unlike spermatogenesis which only begins at puberty, oogenesis begins before birth

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Ovarian function in childhood

- **Physical changes at puberty.** Puberty extends from the earliest signs of sexual maturation until the attainment of physical, mental, and emotional maturity.
- In girls pubertal development occurs between 8-14 years. Breast budding is usually the first pubertal change followed by pubic hair appearance with menarche occurring late in pubertal development.

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- Time from breast budding to menarche approximates 2 years.
- Breast development results from increasing ovarian estrogen production
- Pubic and axillary hair results from increasing ovarian androgen production and estrogen as well.

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Aberrations in pubertal development

- **Precocious puberty:** Pubertal changes before the age of 8.
- **Delayed (interrupted) puberty:** Absence of any secondary sex characteristics by 13 years or of menarche by 16 years or by passage of 5 years or more from breast budding to menarche. This may be due to primary amenorrhea or failure to initiate pubertal development.

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- **Heterosexual puberty:** One that occurs at the appropriate time but with some features characteristic of the opposite sex.
- Masculinization occurs in affected girls.
- In affected girls, defeminization occurs with breast flattening, severe hirsutism, relatively short stature and obesity.

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Menstrual cycle

- Menstruation is the shedding of the endometrium accompanied by bleeding.
- It occurs in approximately monthly cycles throughout a woman's reproductive life i.e. between 12 and 51 years, except during pregnancy.
- The cycle is coordinated by the hypothalamic-pituitary-ovarian axis.

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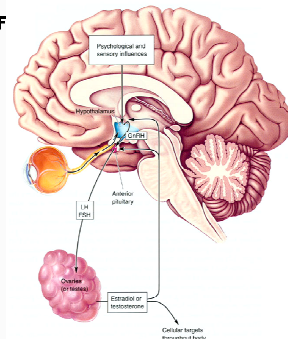
- It begins with day 1 of genital bleeding (menses) and ends just prior to the next menstrual period.
- Median menstrual cycle length is 28 days (15-20% of women) but normal ovulatory menstrual cycles may range from 21-40 days.
- Menstrual cycle is divided into 3 distinct phases; follicular, ovulatory and luteal phases.

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FEMALE REPRODUCTIVE SYSTEM

HORMONAL REGULATION OF OOGENESIS AND OVULATION

HYPOTHALAMUS release of GnRH which stimulates release of LH and FSH from the adenohypophysis (ANTERIOR PITUITARY)



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Hormonal functions during menstrual cycle

- Hypothalamus secretes LHRH which stimulates the anterior pituitary to secrete;
 - a) FSH, promotes maturation of ovarian follicles and secretion of estrogen leading to ovulation.
 - b) LH, which triggers ovulation, stimulates development of corpus luteum and secretion of progesterone.

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- **Follicular phase**; it begins with first day of menstrual bleeding.

Decrease in estrogen and progesterone causes top layers of uterus to breakdown and be shed. Here FSH increases slightly stimulating development of several ovarian follicles.

As FSH decreases only 1 follicle continues to develop.

Divergence in LH and FSH may be due to inhibin which specifically inhibits FSH.

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- **Ovulatory phase**; begins with a surge in LH and FSH levels.

- About 12-24 hours after ovulation LH can be measured in urine.

- Eggs can be fertilized only 12 hours after release.

- Around time of ovulation some women experience mittelschmerz.

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- **Luteal phase**; it begins after ovulation (14 days) and ends before menstrual period.

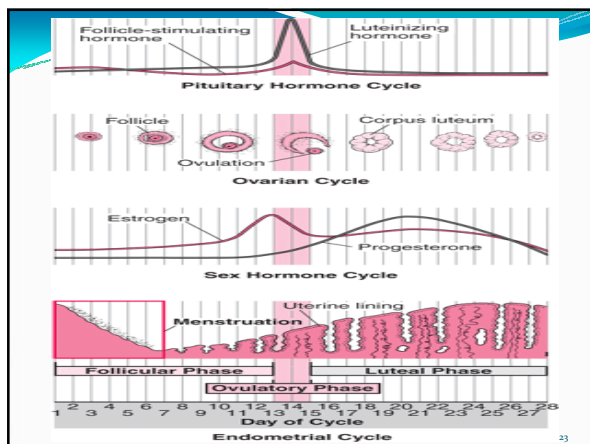
- Here corpus luteum forms which produces more progesterone.

- Progesterone also causes mucus in cervix to thicken rendering sperms and bacteria less likely to enter the uterus.

- This also causes a slight increase in body temperature.

- Estrogen also cause endometrium to thicken.

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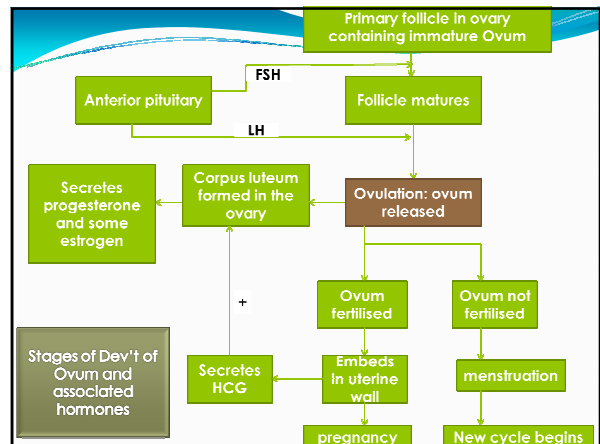
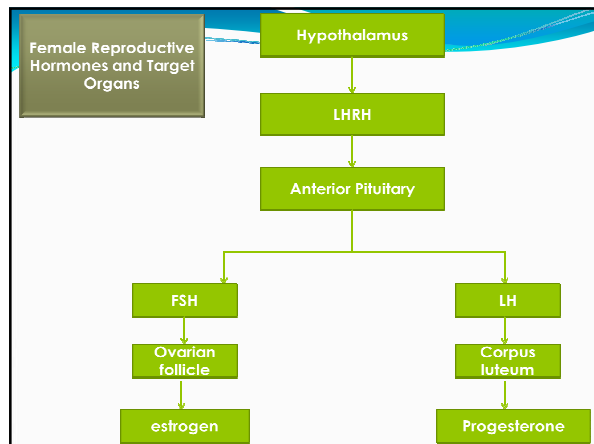
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- If egg is not fertilized, the corpus luteum then degenerates into corpus albicans.

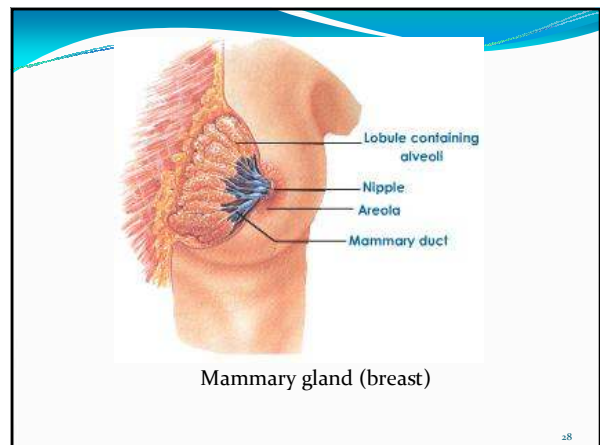
- If egg is fertilized, cells around developing embryo begin to produce human-chorionic gonadotrophin (HCG).

- HCG maintains corpus luteum which continues to produce progesterone until growing fetus can produce its own hormones.

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- **BREAST (Mammary glands)**
- Accessory glands of the female reproductive system.
- Are small and immature until puberty.
- Grow and develop under the influence of estrogen and progesterone.
- After birth prolactin from anterior pituitary stimulates milk production.
- Oxytocin from posterior pituitary stimulates milk release.



- ### Changes in target organs
- **Endometrium**, undergoes remarkable changes which culminate with menstrual bleeding when corpus luteum ceases to secrete progesterone.
 - Regeneration of superficial layer of the uterus and intermediate layer of spongiosa.
 - In follicular phase, glands here proliferate under estrogen influence for mucosa to thicken.
 - Fibrinolytic activity also peaks at menstruation.

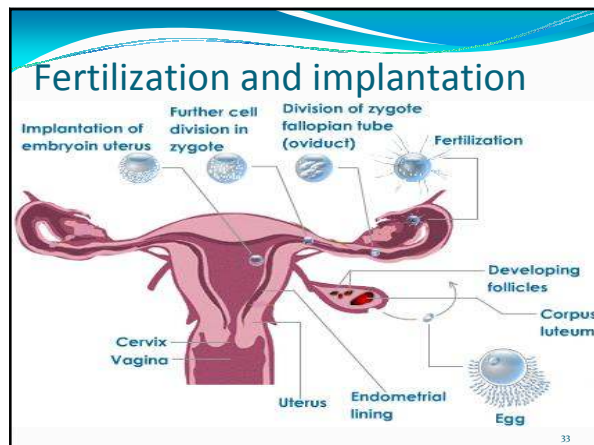
- **Cervix**, In follicular phase cervical vascularity, congestion and oedema increase progressively under the influence of estrogen.
- Cervical diameter opens to 3mm at ovulation and then decreases to 1mm.
- In luteal phase cervical mucus thickens, becomes less watery and loses its elasticity under progesterone influence.

- **Ovary**, produces a single dominant follicle that secretes a mature egg into the oviduct to be fertilized.
- It always appear to contain a pool of small graafian follicles from which a dominant one can be selected which then grows and develops.
- Follicles not selected die by atresia or by a programmed cell death mechanism (apoptosis).

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- **Vagina**; Its epithelium is pale and thin in early follicular phase when estrogen level is low.
- Epithelium also thickens under estrogen influence in follicular phase.
- Changes in vaginal epithelium and cervical mucus are the most sensitive indicators of estrogen status in body.

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Diseases and Disorders of the Female Reproductive System

- **Vulvovaginitis**: is an inflammation of the vulva and vagina.
- **Nonmenstrual vaginal bleeding**.
- **Ectopic Pregnancy**.
- **Polycystic ovary syndrome** is a hormone disorder in which too many hormones are produced by the ovaries.
- **Ovarian tumors**.

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- **Trichomonas vaginalis** inflammatory condition of the vagina usually a bacterial infection also called vaginosis.
- **Dysmenorrhea** is painful periods.
- **Menorrhagia** is when a woman has very heavy periods with excess bleeding.
- **Oligomenorrhea** is when a woman misses or has infrequent periods, even though she has been menstruating for a while and is not pregnant.
- **Amenorrhea** is absence of menstruation for 3 or more months in women.

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THANKS FOR LISTENING

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