

Reproductive System

MED 164

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Objectives

- Structure of reproductive organs in males and females
- Function of reproductive organs in males and females
- Menstrual Cycles
- Hormonal changes
- Pregnancy

Functions

- Location of organs for sexual reproduction
- Manufacture hormones for development of reproductive organs and secondary sexual characteristics

Sex Cells

- Gametes – specialized germ cells produced by gonads
 - Formed by meiosis
 - Contain 23 pairs of chromosomes
- Oogenesis – formation of gametes in females
- Spermatogenesis – formation of gametes in males
- Female gametes carry an X chromosome
- Male gametes can carry an X or Y chromosome

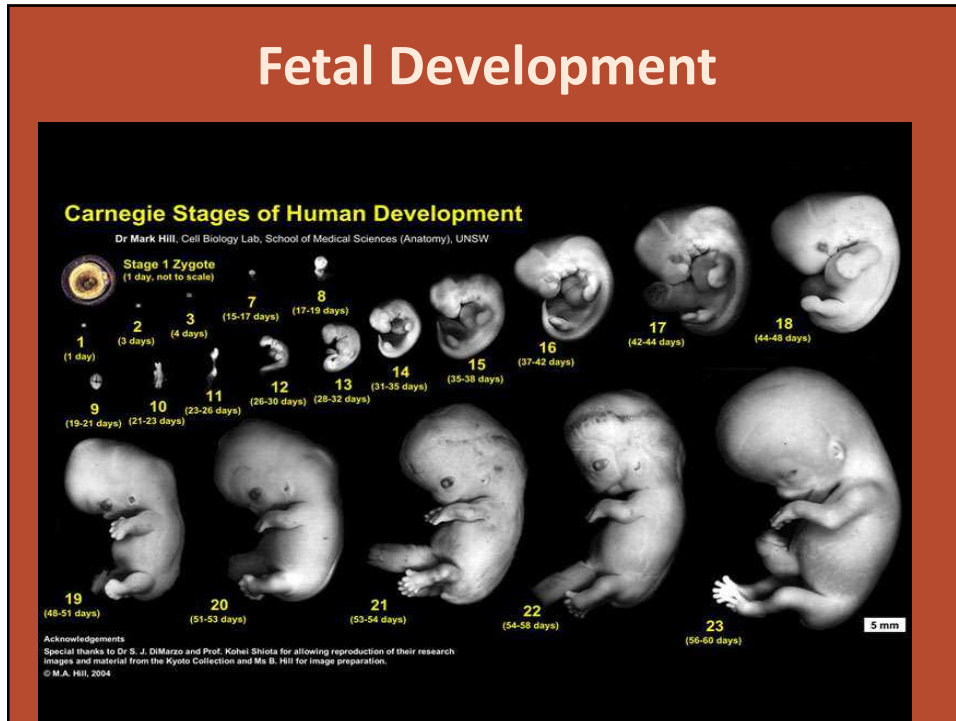
Fertilization

- Fertilization occurs as a result of coitus or intercourse
 - Usually within 24-48 hours of ovulation
- Millions of sperm are deposited into vagina and travels to fallopian tubes
 - Sperm cells can survive in vagina for 2 days
 - Acidity of vagina kills many of the cells
 - Survivors continue to fallopian tube
- Most fertilization takes place in tube
 - A fertilized ovum becomes a zygote

Fertilization

- When sperm enters the ovum, the full complement of 46 chromosomes are returned
- All inherited traits are determined at the time of fertilization
- Boys = XY
- Girls = XX

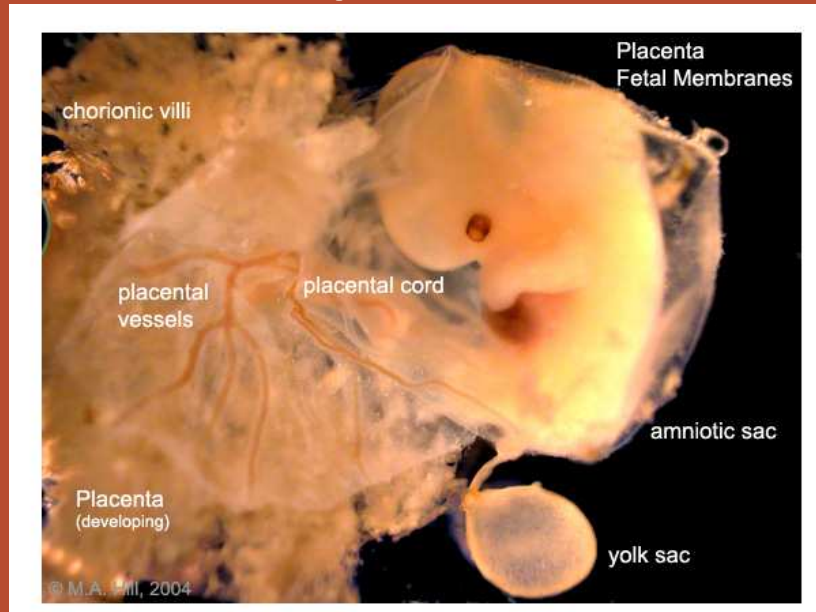
Fetal Development



Fetal Development

- Early stages of development, the fetus will implant in the thickened uterine wall under normal circumstances
 - If fetus implants any where but uterus, it is an ectopic pregnancy
 - Most ectopic pregnancies occur in fallopian tube but they can be in abdominal or thoracic cavity
- Placenta develops around the fetus to protect and nourish the fetus

Implantation



Hormonal Changes of Pregnancy

- Progesterone is secreted during the entire pregnancy
 - Prevents smooth muscle contraction of uterus
 - Relaxes smooth muscle sphincters (esophageal)
 - Causes gastric reflux
 - Softens cartilage in pelvis in preparation of delivery
- Beta- Human Chorionic Gonadotrophin Hormone (BHCG) is produced when the zygote implants in uterine wall and continues to build until approx. day 70
 - Ensures ovarian production of progesterone
 - Causes morning sickness

Hormonal Changes of Pregnancy

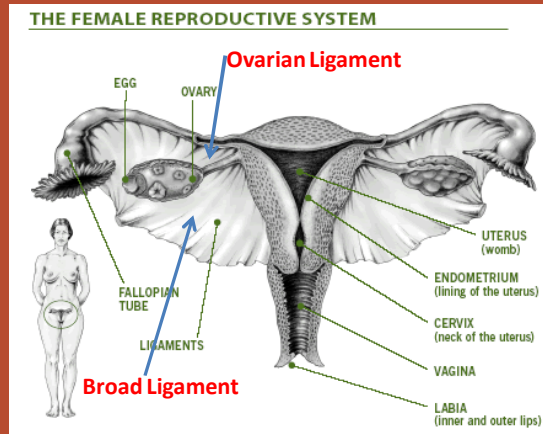
- Estrogen
 - Helps to maintain uterine blood flow
- Prolactin
 - Production of prolactin is caused by increasing levels of estrogen
 - Causes breast tissue to produce milk
- Following birth or termination of pregnancy, hormonal levels fall rapidly to normal levels
 - In many women, this can cause post-partum depression
 - Even short term pregnancies can result in post-partum depression
 - Consider if miscarriage or elective abortion

Sexual Development of Fetus

- For the first two months, the fetus has no sexual identity
- Sex chromosomes release androgens that begin to influence development of sexual organs
 - Androgens cause male organs to develop
 - Androgen insensitivity syndrome – Condition in which an XY chromosomal person develops female organs
 - Jamie Lee Curtis was rumored to suffer from AIS
- Testes and ovaries develop from same tissue type

Female Sex Glands

- Ovaries = primary sex organs of female
 - Reside in lower abdominal cavity
 - Attached to uterus by ovarian ligament and broad ligament



Female Sex Glands

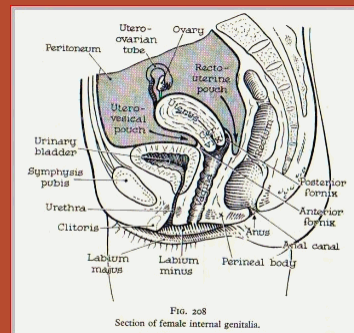
- Function of ovaries
 - Produce germ cells (ova)
 - Produce sex hormones
 - Estrogen –
 - Produces secondary sex characteristics
 - Affects development of tubes, uterus and vagina
 - Assists with the preparation of uterus for zygote implantation
 - Progesterone-
 - Develops cells necessary for milk production
 - Prepares uterus for implantation of zygote
 - Decreases uterine contractions during pregnancy
 - » Drop in progesterone level may signal the start of labor

Female Sex Glands

- Fallopian Tubes (oviducts)
 - Approx. 10 cm long; not attached to the ovary
 - It is possible for an egg to slip from ovary into the abdominal cavity and cause an ectopic pregnancy
 - Infundibulum is portion of tube nearest ovary
 - Fimbriae are finger like projections of the infundibulum that help to “attract” egg
 - Conception (fertilization) normally occurs in the fallopian tube

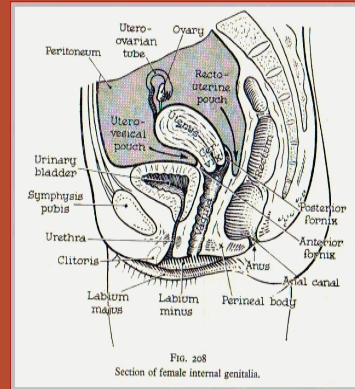
Female Sex Glands

- Uterus
 - Hollow, muscular organ located dorsally to urinary bladder and ventrally to rectum
 - Broad ligament supports uterus
 - Three parts of uterus
 - Fundus
 - Upper rounded part of uterus
 - Body
 - Middle region
 - Cervix
 - Lower narrow region that opens into vagina



Female Sex Glands

- Uterus
 - Three layers of uterus
 - Peritoneum = outer layer
 - Myometrium = middle, muscular layer
 - Endometrium = inner mucous layer



Female Sex Glands

- Vagina
 - Short canal that open externally; extends from cervix to vulva
 - Accepts penis during intercourse
 - Lubricated with mucous discharge during arousal
 - Hymen is a membrane that may be found at entrance to vagina
 - Often ruptured during the first sexual encounter

Female Sex Glands

- External genitalia
 - Mons pubis = mound above perineal region
 - Vulva = external genitalia
 - Vestibule = area of tissue surrounding vaginal and urethral openings
 - Labia
 - Two folds of skin that surround vestibule
 - Bartholin's Glands = Located at the entrance to the vagina and secrete mucous discharge to facilitate penile entry during intercourse
 - Perineum = Area between vagina and anus

Female Sex Glands

- Breasts
 - Accessory organs of female reproductive system
 - Contain milk producing glands that are stimulated by prolactin hormone
 - External breast tissue contains areola and nipple
 - Areola changes color during pregnancy and breast tissue enlarges

Menstrual Cycle

- Menarche is the beginning of menstruation and normally occurs at the age of 12-13
- Menopause is the end of menstruation and normally occurs around the age of 48-50
 - Associated with anatomical changes
 - Internal reproductive organs atrophy
 - External genitalia atrophy
 - Vagina changes shape
 - Vagina becomes dry
- Menses is shedding of uterine lining when pregnancy doesn't occur

Menstrual Cycle

- Each ovary contains 1000's of graafian follicles that are capable of producing an ovum
- Every 28 days, a mature ovum is released (ovulation) from ovary into the fallopian tube
 - Occurs approx. 14 days before menstrual period
- Once released, the follicle will rupture and release the ovum into the fallopian tube

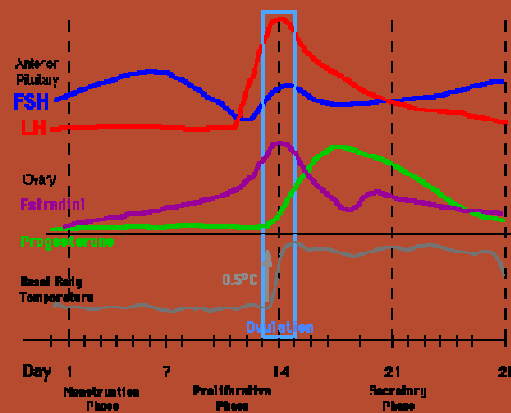
Ovum

- Consists of cytoplasm and a yolk sac



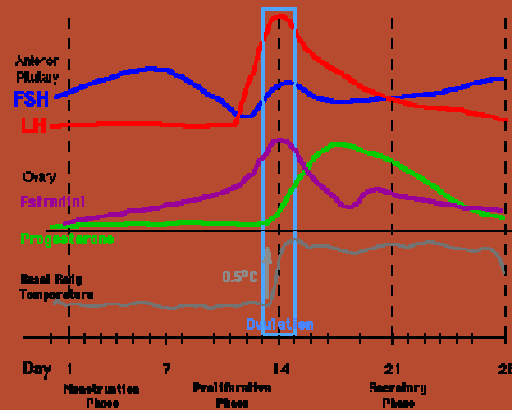
Follicle Development

- Development of follicle and release of ovum are under control of 2 important hormones
 - Leutinizing Hormone
 - Spikes around time of ovulation
 - Helps sustain uterus for first two weeks of pregnancy
 - Used to predict ovulation in home pregnancy kits to increase chances of becoming pregnant
 - Follicle Stimulating Hormone
 - Initiates the growth and maturation of follicle
 - Drops in conjunction with LH surge



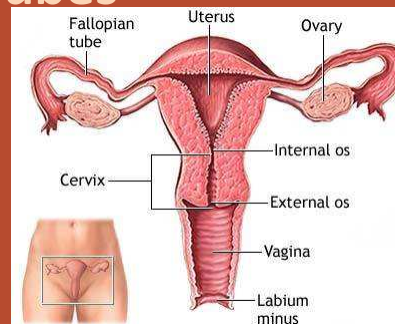
Follicle Development

- After ovulation, follicle ruptures and becomes the corpus luteum (CL)
 - CL secretes progesterone to maintain uterine lining for implantation
 - If CL is not fertilized, corpus luteum degenerates, progesterone level decreases, and uterine lining sloughs off (menstruation)



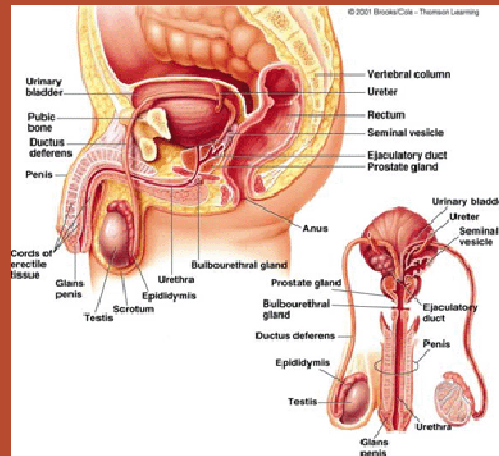
Fallopian Tubes

- Approx. 10 cm long, not attached to ovaries



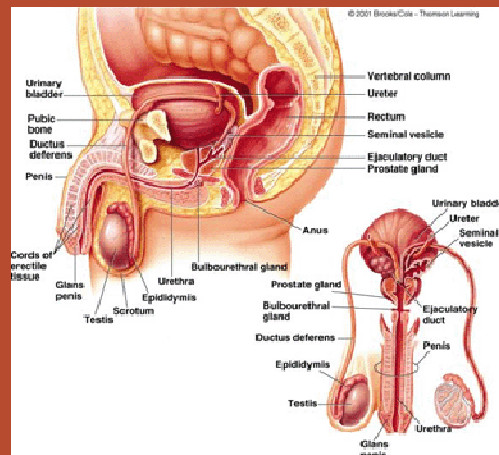
Male Reproductive Glands

- Testes are responsible for producing male gametes (spermatozoa) and testosterone
- System of ducts carries sperm from testes to urethra
- Accessory glands aid in release of sperm into vagina
- Penis deposits sperm into vagina



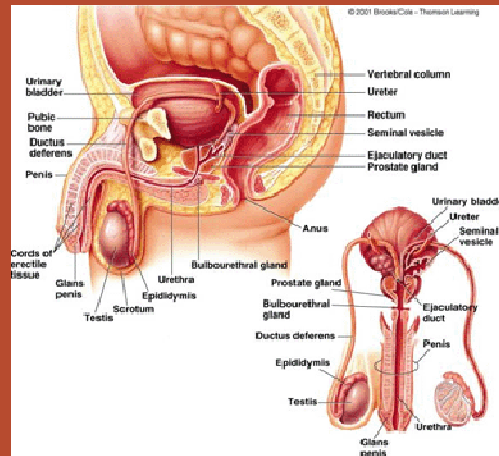
Male Reproductive Glands

- Testes
 - Primary male reproductive organ
 - Housed in scrotum outside of body cavity
 - Sensitive to temperature changes
 - Increased temp. of testes increases risk of cancer
 - Attached to epididymis
 - Contains numerous twisted tubes called seminiferous tubules



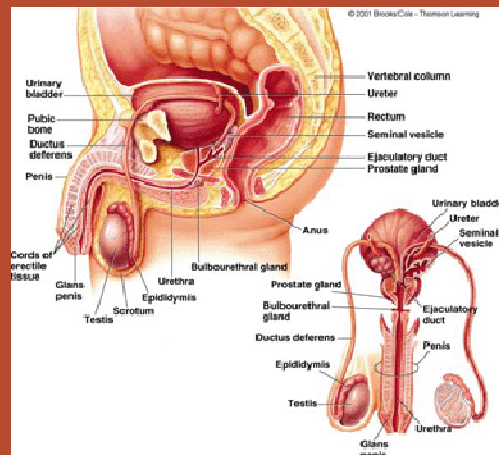
Male Reproductive Glands

- Testes
 - Cells that line the seminiferous tubules produce sperm
 - Stimulated by FSH
 - Interstitial cells support seminiferous tubules and produce hormone testosterone
 - Stimulated by interstitial cell stimulating hormone



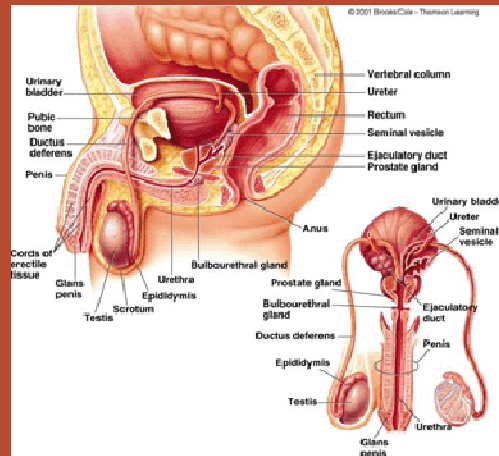
Male Reproductive Glands

- Testes
 - Begin development in abdomen and descend into scrotum during last trimester of pregnancy
 - Cryptorchidism is condition in which one or both of the testicles fails to descend
 - Unilateral
 - Bilateral
 - Can be surgically corrected



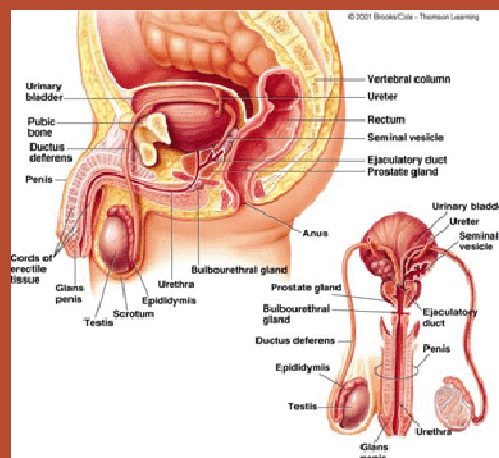
Male Reproductive Glands

- Ductus deferens
 - Continuations of epididymis
 - Stores sperm
 - Excretory duct of testis
 - Ductus deferens join together at the seminal vesicles and form the ejaculatory duct



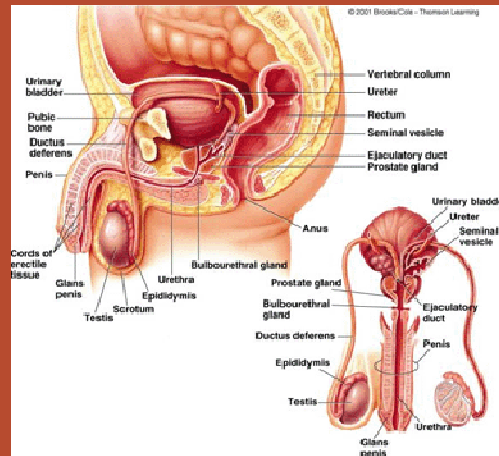
Male Reproductive Glands

- Seminal Vesicle
 - Highly convoluted tubule that produces secretions that nourish and protect sperm
 - Seminal fluid (pre-ejaculatory fluid) added to fluid that contain sperm to form ejaculate just at the moment of ejaculation



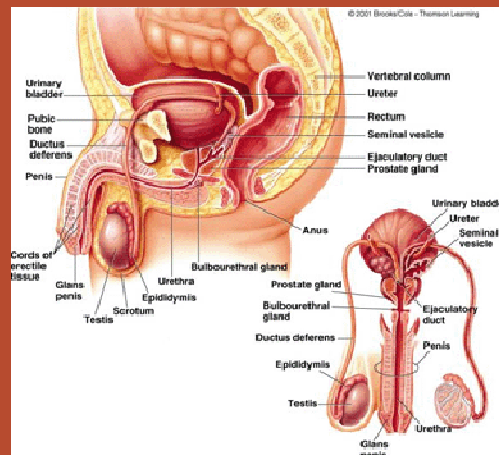
Male Reproductive Glands

- Urethra
 - Ejaculatory duct meets urethra in the prostate gland
 - Urethra continues through the penis and deposits ejaculate into vagina



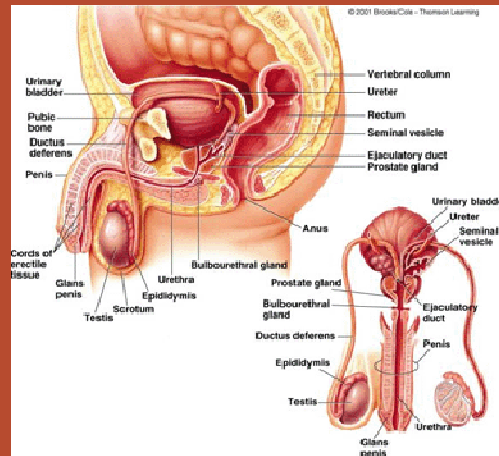
Male Reproductive Glands

- Prostate Gland
 - Location of merging between ejaculatory duct and urethra
 - Contracts during ejaculation and prevents urine from entering ejaculate
 - Injects prostatic alkaline fluid (characteristic color and odor of ejaculate) into ejaculate
 - Responsible for neutralizing acidity of vagina



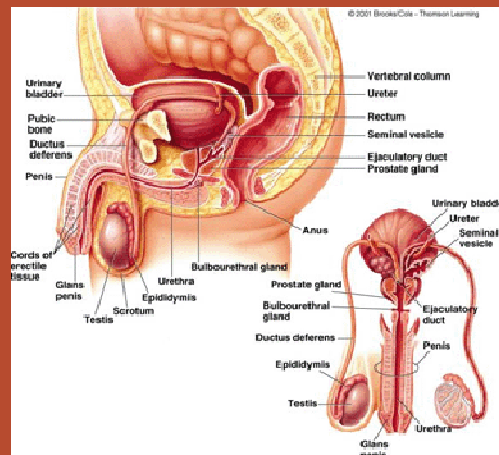
Male Reproductive Glands

- Cowper's Glands
 - Located below prostate and add alkaline fluid to ejaculate



Male Reproductive Glands

- Penis
 - External male genitalia
 - Glans of penis is normally covered by a prepuce and must be retracted before inserting foley catheter if not circumcised



Semen

- Mixture of sperm cells and secretions from seminal vesicles, prostate, and Cowper's glands
- Normally semen contains well over 20,000,000 cells/milliliter
- Levels below that are considered to be sterile

Contraception

- Against conception
- Abstinence = the only sure way to avoid pregnancy
- Tubal ligation = nearly 100% effective; but there are rare cases of failure
 - Surgical cutting or tying of fallopian tubes
- Oral contraceptive = 95 -99% effective if taken every day
 - Hormones that prevent ovulation
 - Antibiotics can limit effectiveness
- IUD = 93-99%
 - Plastic inserted into uterus to prevent implantation
- Diaphragm = 90-99%
 - Barrier that covers cervix and prevent sperm from entering uterus

Contraception

- Condom = varying degrees of success
 - Sheath that covers penis and prevents ejaculate from entering vagina
- Spermicides = 70 -75%
 - Chemical that kills sperm before fertilization
- Withdrawl 70-80%
 - Not effective because some sperm are released before ejaculation
- Rhythm = 65-85%
 - Avoiding critical periods of menstrual cycle
 - Works well for women who are extremely regular