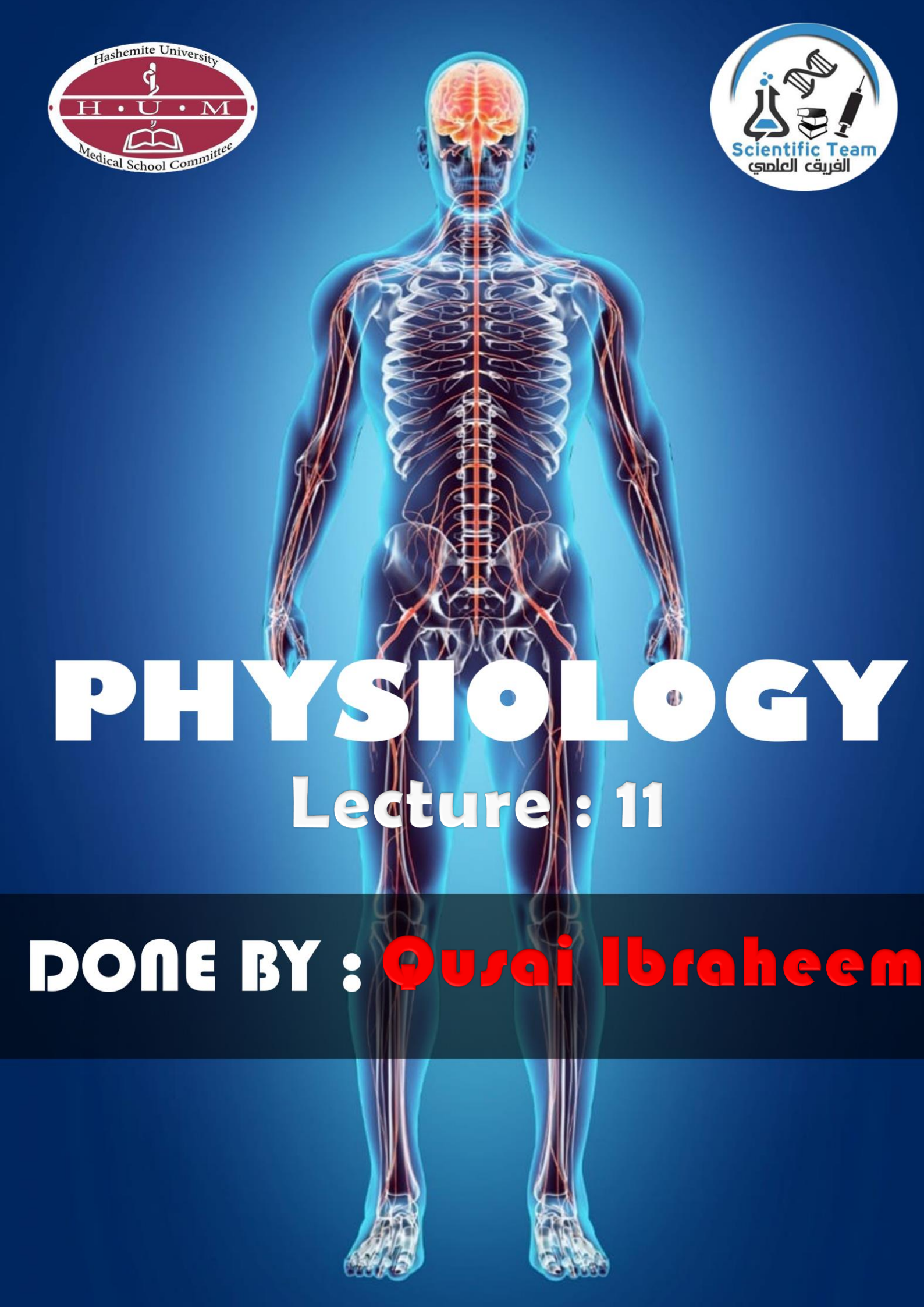

PHYSIOLOGY

Lecture : 11

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Female Physiology Before Pregnancy and Female Hormones-II

Functions of the ovarian hormones

1-Estrogens

- Primary function of the estrogen promote proliferation and growth of specific cells in the body that are responsible for the development of most **secondary sexual characteristics** of the female like uterus ,vagina ,breat,..
- In non pregnant secrete estrogen mainly from ovary and very little from the adrenal cortex.
- In pregnancy the placenta secretes very large amount of estrogen.
- **Three estrogens.**
- β-estradiol (the principle one and most potent) is secret by ovary
- Estrone: most of this is formed in the peripheral tissues from androgens secreted by the adrenal cortices
- Estriol: weak, Increase in pregnancy

2-progestins

- Function mainly to prepare the uterus for pregnancy(thickness of uterus and secretory change into the endometrial cavity that make uterus to pregnancy and to fetus implantation) and the breast for lactation (development duct and alveoli but not affect in the production of milk so use as a contraceptive in lactating woman)
- the most important progesterone
- 17-α- hydroxyprogesterone is little secretion with progestron and have the same effect
- In non-pregnant progesterone is secreted mainly from corpus luteum.
- In pregnancy, large amount by placenta especially after 4th month of pregnancy

Estrogens and Progesterone Are Transported in the Blood Bound to Plasma Proteins -not dissolve in the blood- (albumin and with specific estrogen and progesterone-binding globulins)

Functions of estrogen:

The primary function of esrtogen is to cause cellular proliferation and growth of tissue of the sex organs and other tissue related to productive

During childhood, estrogn secret only in small amount but at puberty the quantity secreated in female under influence of the pituitary GnTR is increase

At this time female sex organ change from child to adult so:

- External female sex organs: at puberty, increase in size of ovaries, fallopian tubes, uterus and vagina, external genitalia

deposition of fat in mons pubis and labia majora and enlargement of labia minora

- change vaginal epithelia from cuboidal to stratified type which is consider more resistant to trauma & infection so in vaginal infection in children can often be cure by administration estrogen
- endometrium: proliferation of stroma and endometrial glands (important in nutrition of fertilized ovum)
- Fallopian Tubes: proliferation of **glandular tissues** of this lining to proliferate to increase the secretion which important for nutrition of fertilize ovum , and especially important, **increase number of ciliated** epithelial cells that line the fallopian tubes and also the activity of cilia is enhance and these cilia beat towered uterus which propel the fertilized ovum into the endometrium
- Breasts: fat deposition(main function is estrogen), development of stromal cells, growth of ducts

The lobule s and alveoli of the breast develop slight under the influence of the estrogen but the progesterone and prolactin cause ultimate growth and function of these structures

(progesterone (mainly), prolactin important in milk production. estrogen influence growth of alveoli & lobules)

- Skin: increase vascularization of skin and development of soft skin so skin become thicker and because become more vascularization these association with increase warmth of the skin also promote greater bleeding of cut surface
- Hair: little effect -pubic & axillary hair which mainly affect by adrenal androgens after puberty
- Bones: estrogen inhibits osteoclastic activity by stimulation osteoprotegerin/osteoclastogenesis inhibitory factor which is cytokines that inhibit bone resorption, so height increases after puberty, but epiphyses and shafts of bones unite early and growth stops, so the estrogen is much stronger than the similar effect of the testosterone

عشان هيك بالmale النمو بكون ابطىء بس الepiphyses بسكر ببطىء فبنمو اطول اما الfemale بعد الpuberty بنمو بسرعة بس الepiphyses بسكر early

- After Menopause no estrogen secretion these lead to increase osteolatic activity, decrease bone matrix and decrease deposition of Ca and phosphate these lead to osteoporosis which lead to bone fracture so many postmenopausal woman treated prophylactic with estrogen to prevent osteoporotic effect
- Estrogens slightly increase protein deposition but the enhance of protein deposition is more and powerful than estrogen
- Estrogen has chemical similarity to adrenocortical so cause hormone Sodium and water retention by the kidney. Slight effect but during pregnancy the tremendous formation of estrogens by the placenta may contribute to body fluid retention or the woman who take contraceptive which have large amount of estrogen lead to body water retention and increase body Wight
- Estrogens increase body metabolism and fat deposition (subcutaneous tissues, breasts, buttocks and thighs) which give the woman characterize appearance
- More subcutaneous fat in women than men

Functions of Progesterone:

1. Promotes **secretory changes** in the uterus during the latter half of the monthly female sexual cycle suitable for implantation of an embryo (secretory phase).
2. Decreases contraction of uterine tubes and myometrium (decreases expulsion of implanted ovum and prevent abortion). When use the progesterone contraceptive lead to prevent transition the ovum to the fallopian tube
3. Stimulates breast growth, and swelling particularly glandular tissue but dose not cause the alveoli to secret milk.

هاض بادي لpain breast cycle بالlater half of menstrual cycle نتيجة ال progesterone وبكون ال pain bilateral

4. Increase mucosal secretions of the fallopian tubes to provide nutrition to the fertilized dividing ovum which traverses the tubes towards the uterus body.
5. Changes the cervix mucus into thick and sticky (cervical plug) so block passage of the sperm.

Progesterone contraceptive gives to woman with lactating baby because estrogen have inhibition the milk production but progesterone does not affect in milk production

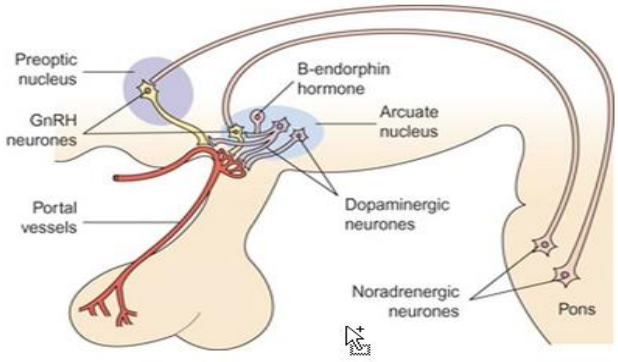
-secreation pituitary hormone is controlled by releasing hormone from hypothalamus and then transport to anterior pituitary by hypothalamic-hypophysial portal system.

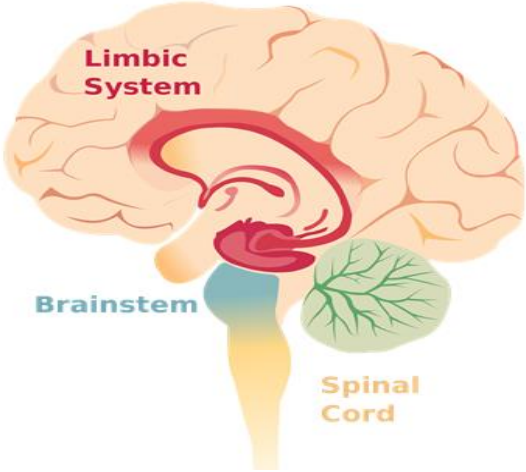
-so hypothalamus secret GnRH which act on gonadotropins which stimulate gonadotropin to release LH and FSH

The hypothalamus does not secret GnRH continuously but it is secretes it in pulses lasting 5 to 25 min over 1 to 2 hour and also LH release in pulsatile secretion every 20 min

So if GnRH is infuse .it is ability to cause release of LH and FSH by anterior pituitary is lost

-the neural activity that cause pulsatile release of GnRH occur in the arcute nuclei and there are multiple neuronal center in high brain "limbic system" transmitted signal into arcute nuclei to modified both intensity of GnRH release and frequency of pulses so these explanation why psychic factor often modify female sexual function





Feedback oscillation of the hypothalamic-pituitar-yovarian system

In follicular phase, the secretion of LH and FSH increase

LH act on theca cell to production of androgen and FSH act on granulosa cell to convert androgen to estrogen

So estrogen in small amount have a feedback inhibition on FSH and LH these feedback inhibition mainly b act on anterior pituitary and when progestron present, the inhibitory effect of estrogen is multiplied

For unknown rezone, anterior pituitary secret large amount of LH for 1 to 2 day before ovulation , LH increase 6 to 8 fold and FSH increase 2 fold

يعني هسا ببداية الcycle الFSH and LH بنفرز وهذول بعملو على تصنيع الestrogen ولكن زيادة كمية الestrogne بعمل feedback inhibition على الanterior pituitary ليش هاض بصير لانو كل cycle تقريبا في 12-20 follical بصيرهم maturation بس وحدة منهم الي بتكمل الي هي الاسرع فبصير negative feed back حتى وحدة تكمل والباقي بصيرلهم atresia وهاي ال follicla الي كملت حتى يصير ovulation لازم يرتفع كمية الLH

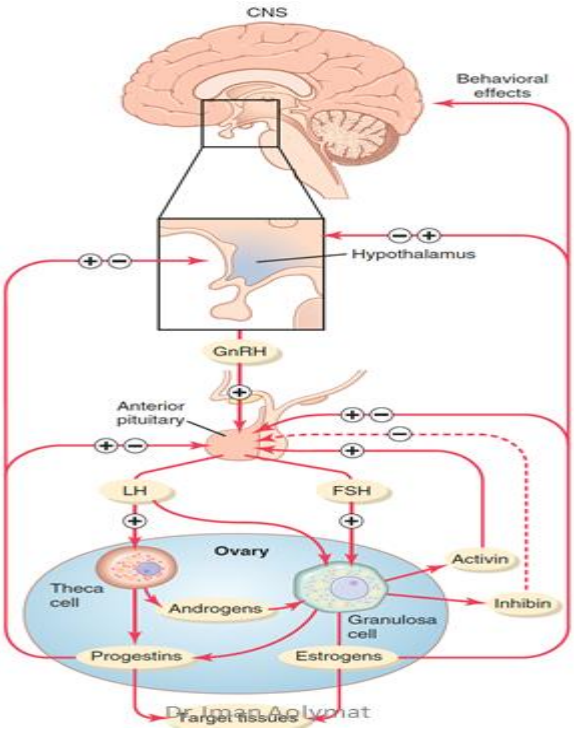
So the cause of this abrupt LH surge unknown .howerver several possible explanation are as follow :1-it has suggest that estrogen at this point in cycle highly increase so has positive feed back effect

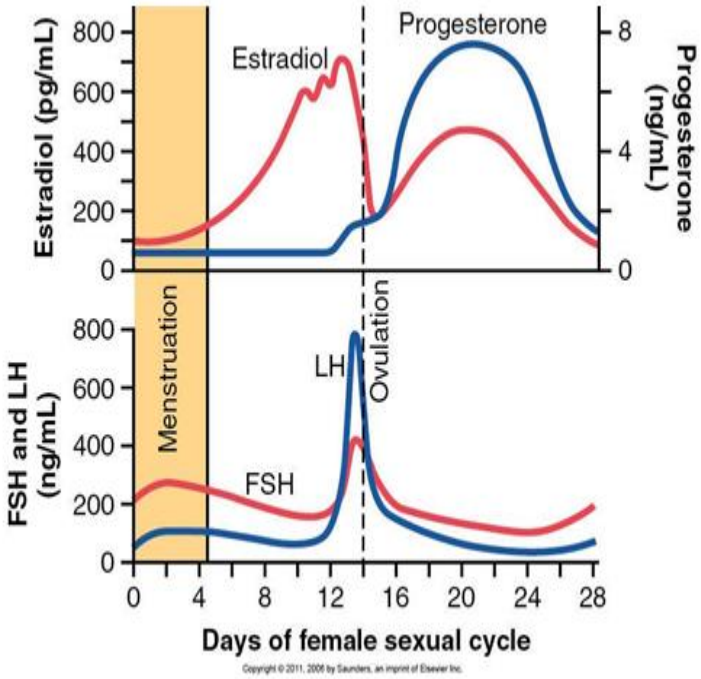
2- the granulosa cell begin to secret progestron before the preovulation LH surge and it has been suggest that this might be the factor that stimulate excess LH

After ovulation corpus luteum secret estrogen and progesterone which have negative feedback effect to FSH an LH and also corpus luteum secret inhibin which has negative feed back on FSH and lesser on LH by the anterior pituitary

At the end of cycle ,the corpus luteum become involution so progestron, estrogen and inhibin decrease so the negative feedback stop and FSH and LH increase to follicular growth

3 to 4 day before menstruation هي LH and FSH اقل كمية ل





Anovulatory Cycles—Sexual Cycles at Puberty

If the preovulatory surge of LH is not sufficient ovaulation is not occur and these called anovulatory cycle

The phase of sexual cycle continue, but they are altered in the following way:

1-Lack of ovaulation cause failure of development of corpus luteum

So no secretion of progesterone during the latter portion of the cycle

cycle is shortened but the rhythm is continuous

The first few cycles after the onset of puberty are usually anovulatory, as are the cycles occurring several months to years before menopause because LH surge is not enough to cause ovulation

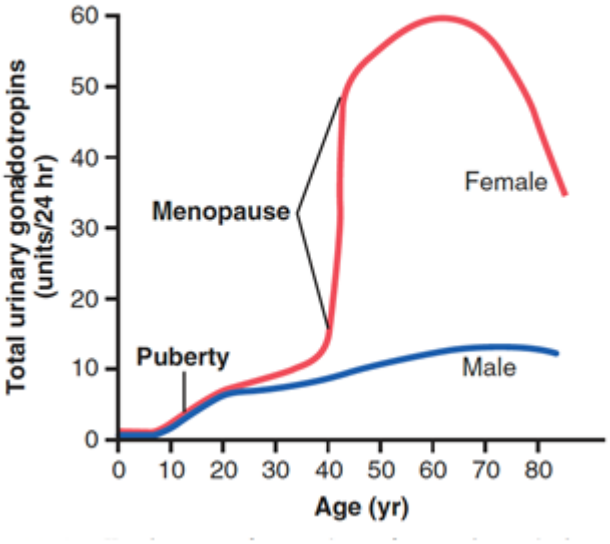
لذلك مع بداية البلوغ مستحيل يصير pregnancy وكذلك قبل ال menopause

PUBERTY AND MENARCHE

Puberty mean the onct of sexual life and menarche is the beginning of the cycle of menstruation

The period of puberty is caused by a gradual increase in GnRH by the pituitary beginning in about the eighth year of life, and usually culminating in the onset of puberty and menstruation between ages 11 and 16 years in girls(average, 13 years) and has many factor effect like environment so hot area become puberty early than cold area .

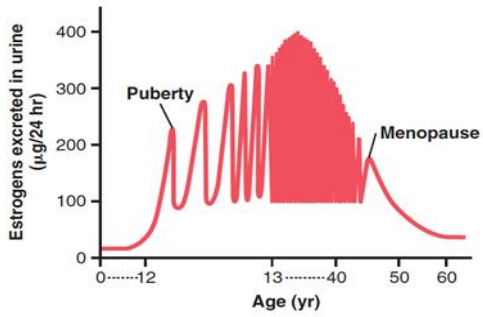
the hypothalamus does not secrete significant quantities of GnRH during childhood.



male and female before puberty, the GnRH is low after male puberty ,the GnRH is increase and continuous for life .

After female puberty, the GnRH is increase but around 40 year become sharp increase of GnRH because no ovulation so no hormone so these make positive feedback on the anterior pituitary and hypothalamus so these lead to increase FSH and LH mainly FSH

So increase GnRH is sign bad in productive female and normal in old female



the picture show that estrogen increase at puberty and there is cyclic variation during the month sexual cycle and further increase during the first few year of reproductive life and progression decrease in estrogen secretion towered the end of reproductive life and finally almost no estrogen or progesterone secretion beyond menopause

-First year, estrogen secretion less cyclic

Menopause

At age 40 to 50 years, the sexual cycle usually becomes irregular and ovulation often fails to occur.

After a few months to a few years, the cycle ceases

The period during which the cycle ceases and the female sex hormones diminish to almost none is called menopause estrogens can no longer inhibit FSH and LH

FSH and LH (mainly FSH) are produced after menopause in large and continuous quantities

the production of estrogens by the ovaries falls virtually to zero

decrease testosterone in men dose not affect the sexual organ but in female decrease esrtrogen lead to atrophy of sexual organ like uterus back infertile size

The loss of estrogens :

(1)“hot flushes” characterized by extreme flushing of the skin

(2)psychic sensations of dyspnea

(3) Irritability

(4) Fatigue

(5) anxiety

(6) Decreased strength and calcification of bones throughout the body

Administration of estrogen (HRT) after menopause to treat symptoms of menopause, may increase the risk for cardiovascular disease

Female sexual response

Stimulation of the Female Sexual Act like in male depend on psychic stimulation, local sexual stimulation &sexual thoughts.

Sexual desire is based on psychological and physiological drive

sexual desire does increase in proportion to the level of sex hormones

Desire also changes during the monthly sexual cycle, reaching a peak near the time of ovulation, probably because of the high levels of estrogen secretion during the preovulatory period.

Local Sexual stimulation in women is initiated by stimulation of the vulva, vagina, and other perineal regions can create sexual sensations.

The glans of the clitoris is very sensitive the sexual stimulation

sensory signals form sexual organ transmitted to sacral segments of the spinal cord by pudendal nerve and sacral plexus and once inter spinal cord it transmitted to Cerebrum

Female Erection and Lubrication

Erection located around the introits and extend to into the clitoris

And these erection like penis , is controlled by parasympathetic nerve that pass from sacral plexus to the erectile tissue located around the introits and dilate the artery of the erection tissue by release ach and NO and VIP these lead to accumulation blood around in the erectile tissue these lead introits tightens around the penis and this aid male sufficient sexual stimulation for ejaculation

And also parasympathetic stimulate Bilateral Bartholin glands located in lab minora and cause them to secret Mucus inside introits and this mucous is responsible for mush Lubrication during sexual intercourse and also lubrication is caused by vaginal epithelium and small amount from the male urethral gland

Female Orgasm

Female Orgasm (female climax) : happens when maximal sexual sensation is reached and especially when local stimulation is support supported by psychic conditioning signals from the cerebrum this cause female orgasm and also called female climax

female orgasm is analogous to emission and ejaculation in the male, and it may help promote fertilization of the ovum so more fertile when inseminated by normal sexual intercourse than by artificial method

Process is similar in males and females:

1) Excitement phase: caused by psychological or physical stimulation; engorgement and erection of clitoris, vaginal congestion -- parasympathetic nerves

2) Plateau phase: intensification of these responses, increased HR, BP, respiratory rate, muscle tension

3) Orgasmic phase:culmination of sexual excitement, intense physical pleasure

4) Resolution phase:returns genitalia and body systems to pre-arousal state

Differences Male and female sexual response

Women don't require refractory time before beginning excitation again but man enter into refractory period can enter into sexual act again and these refactory period is different between male and female

No ejaculation in the female but man has ejaculation

Fertile Period of Each Sexual Cycle

The ovum remains viable and capable of being fertilized → 24 hours after it is expelled from the ovary.

Therefore, sperm must be available soon after ovulation if fertilization is to take place.

A few sperm can remain fertile in the female reproductive tract for up to 5 days.

Therefore, for fertilization to take place, intercourse must occur sometime

between 4 and 5 days before ovulation up to a few hours after ovulation.

Thus, the period of female fertility during each month is short—about 4 to 5 days.

هسا الovum بعد ما يصيرلهاovulation معها 24 ساعة لحتى يصيرلها fertilization يعني حتى تصير
pregnancy لازم الintercourse يكون around ovulation تقريبا قبل 5 ايام او بعد الovulation على طول لانو
الsperm بقدر يعيش تقريبا 5 ايام in female reproductive tract

Concept of contraception

وهاض الخكي بستعملوه في الcontraception بانو ما يصير intercourse بوقت الovulation

نهاية التلخيص سامحونا على اي اخطاء