







L2&3 Ovarian cycle,Uterine cycle

Reproductive physiology



Objectives

-  Recognize the hypothalamic-pituitary-ovarian (HPO) axis.
-  Describe the physiological phases of ovarian and endometrial cycles.
-  Describe the structural changes that occur in the ovaries and endometrium during menstrual cycle and explain how these changes are hormonally regulated.
-  Describe the development and the fate of corpus luteum.
-  List the female hormones and describe their physiological functions
-  Describe the physiology of menopause and the disorders of menstruation.

Keywords: *17 β -estradiol, progesterone, graafian follicle, ovulation, corpus luteum.*



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[Editing File](#)

﴿أَيَحْسَبُ الْإِنْسَانُ أَنْ يُتْرَكَ سُدًى﴾ (36) أَلَمْ يَكُنْ نُطْفَةً مِنْ مَنِيٍّ يُمْنٍ (37) ثُمَّ كَانَ عَلَقَةً
نَفْلَقَ فُسْوًى (38) فَجَعَلَ مِنْهُ الزَّوْجَيْنِ الذَّكَرَ وَالْأُنثَى (39) ﴿

(أَيَحْسَبُ الْإِنْسَانُ أَنْ يُتْرَكَ سُدًى) أي: معطلا، لا يؤمر ولا ينهى، ولا يثاب ولا يعاقب؟ هذا حسبنا باطل وظن بالله بغير ما يليق بحكمته.
(أَلَمْ يَكُنْ نُطْفَةً مِنْ مَنِيٍّ يُمْنٍ) ؟ أي : أما كان الإنسان نطفة ضعيفة من ماء مهين يمني ، يراق من الأصلاب في الأرحام.
(ثُمَّ كَانَ عَلَقَةً فَخَلَقَ فُسْوًى) أي فصار علقه ثم مضغة ثم شكل ونفخ فيه الروح فصار خلقا آخر سويا سليم الأعضاء ذكرا أو أنثى بإذن الله وتقديره؟
[تفسير السعدي وابن كثير]

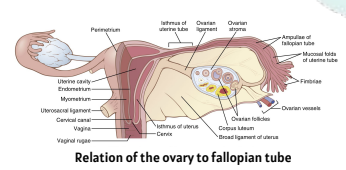
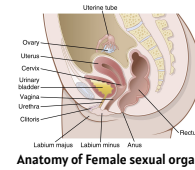
Introduction

Monthly Ovarian Cycle: Monthly rhythmical changes in the rates of secretion of female hormones & corresponding physical changes in the ovaries & other sexual organs

Duration of the cycle: average **28 days** (20-45 days) → in both slides M+F.

There are two results of the female sexual cycle:

- Single ovum is released from the ovaries each month
- Uterine endometrium is prepared for implantation for the fertilized ovum.



Female slides

By 16-20 weeks gestation: 6-7 million oogonia.

At birth: 1-2 million oocytes.

At puberty: 300,000 to 500,000 oocytes.

400-500 oocytes will normally ovulate during women's entire reproductive life.

By menopause: few, if any, oocytes remain.

Male slides

Ovary Functions:

- 1 Oogenesis.
- 2 Secretion of estrogens and progesterone.
In the ovaries, aromatase enzyme converts testosterone to 17β -estradiol, the major ovarian estrogen.

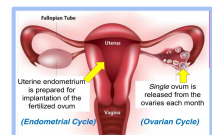
Male slides

Gonadotropic Hormones and their effect on ovary

- The ovarian changes during the reproductive cycle depend on FSH & LH secreted by AP.
- In the absence of these hormones, the ovaries remain inactive throughout childhood.
- **At puberty** the AP starts to secrete FSH & LH which lead to the beginning of monthly reproductive cycles.
- First menstrual cycle is called menarche.
- Both FSH and LH stimulate their ovarian target cells by combining with highly specific receptors to increase
 - -Rates of secretion,
 - -Growth & proliferation of the cells.

Female slides

Sexual(Menstrual cycle)



Ovarian cycle

Male slides



Endometrial cycle

2nd Lecture

Male doctor:
Focus on dominated hormone for each phase.

Follicular phase
(Preovulatory)

(Dominated by Estradiol) استروجين

Ovulation

Luteal phase
(postovulatory)

(Dominated by Progesterone)

Menstruation



Every 28 days a sequence of follicular development, ovulation, and formation and degeneration of a corpus luteum is repeated in the menstrual cycle. The first 14 days of the menstrual cycle involve follicular development and are called the follicular phase. The last 14 days of the menstrual cycle are dominated by the corpus luteum and are called the luteal phase. At the midpoint of the cycle, between the follicular and luteal phases, ovulation occurs.

EXTRA Overview

مبدئياً فيه 2 دورتين Cycles كل وحدة منهم لها phases أو مراحل (كل مرحلة يميزها أشياء محددة: إرتفاع / إنخفاض هرمونات معينة)، الدورتين هاذي تحدث بنفس الوقت ولهم تأثير على بعض وليست منفصلة عن بعضها وإنما كل وحدة بمكان (وحدة بالمبيض Ovary ووحدة بالرحم Uterus) وهاذي بتكون على محاضرتين، الصفحات القادمة يركز على:

القادمة يركز على:
Ovarian cycle وتحتوي على مرحلتين:
الأولي Follicular phase

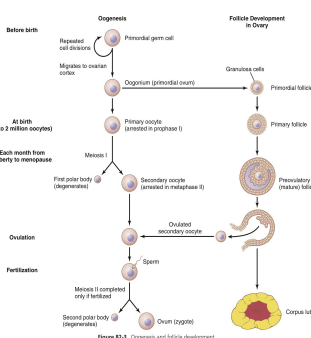
(الطور الجريبي Follicular Phase المرحلة الجرابية (أو الطور التكاثري) هو طور من اطوار الدورة الشهرية خلاله تنضج بصيلات المبيض ويبدأ هذا الطور بالحيض (أول يوم في الدورة الشهرية) وينتهي بإفراز هرمون الإباضة. وينتهي هذا الطور ببداية التبويض)

تبدأ من اليوم الأول وحتى اليوم 14 يكون فيها FSH مرتفع وبعدها يرتفع LH ويكون الإستروجين مرتفع
الثانية Luteal Phase

المرحلة الاصفرية أو الطور الاصفرى (Luteal phase): بعد التبويض وهي المرحلة المتأخرة من الدورة الشهرية وتبدأ بتكوين الجسم الأصفر، وتنتهي إما بالحمل أو بتحلل الجسم الأصفر. الهرمون الرئيس المتصل بهذه المرحلة هو هرمون البروجسترون الذي يكون مرتفعاً في هذه المرحلة أكثر من المراحل الأخرى من الدورة الشهرية. تبدأ من التبويض وحتى اليوم 28 (في حالة عدم حصول حمل يتحلل الجسم الأصفر وينزل الدم بعد اليوم 28)

The normal reproductive years of the female are characterized by monthly rhythmic changes in the rates of secretion of the female hormones and corresponding physical changes in the ovaries and other sexual organs. his rhythmic pattern is called the female monthly sexual cycle (or less accurately, the menstrual cycle). The duration of the cycle averages 28 days. It may be as short as 20 days or as long as 45 days in some women, although abnormal cycle length is frequently associated with decreased fertility. he female sexual cycle has two significant results. First, only a single ovum is normally released from the ovaries each month, so normally only a single fetus will begin to grow at a time. Second, the uterine endometrium is prepared in advance for implantation of the fertilized ovum at the required time of the month.

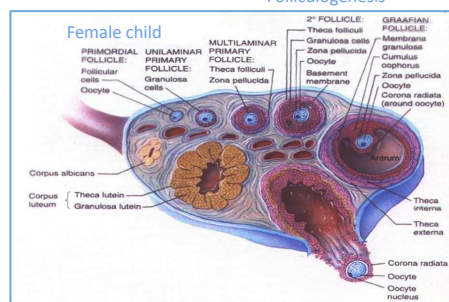
Ovarian cycle: Follicular phase Ovarian follicle growth

	What Happens From Childhood Until Puberty?	Extra
During childhood	<ul style="list-style-type: none"> ❖ In female child each ovum is surrounded by single granulosa cell sheath called primordial follicle. ❖ The granulosa cells: <ul style="list-style-type: none"> » Provide <u>nourishment</u> for the ovum. » Secrete <i>oocyte maturation inhibiting factor</i> which keeps the ovum in its primordial state. 	
After puberty	<ul style="list-style-type: none"> ❖ AP secrete FSH and LH which: <ul style="list-style-type: none"> » Stimulate the ovaries and result in growth of some follicles. » Growth of the follicle begins with increase in size of the ovum & growth of additional layers of granulosa cells of some follicles. » At this stage it is known as primary follicles. 	<p>* Each Oocyte is enclosed in a follicle (Each follicle composed of follicular cells = Granulosa cells)</p>

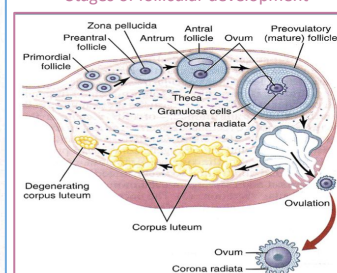
Explanation:

Before puberty: In the ovaries, we have the oocyte surrounded by a single layer of granulosa/follicular cells called the primordial follicle. This is only present during childhood. The main function of the single layer of follicular cells in childhood is protection, nourishment and secretion of maturation inhibiting factors.
At puberty: FSH will be secreted. This FSH will be increased gradually stimulating the receptors present on the follicular cells. When the cells are stimulated, the following processes occur: 1- Stimulation 2- Proliferation 3- Enlargement
The follicular cells over the ovum increase in size becoming a double layered cell.
As long as FSH is secreted, the follicles increase in size until they reach the pre-antrum. As the follicles increase in size, spindle shaped cells develop in the stroma of the ovaries. They are called theca cells. The greater the size of the ovaries, the more theca cells develop. Theca cells have 2 types: interna and externa. Theca interna cells develop in the exterior portion, after that theca interna develops. LH will be secreted and attached only to theca interna cells. Once the LH stimulates the theca interna cells, it will secrete the male androgen which are the weak androgens. The androgens will diffuse to the adjacent granulosa cells. Then by the action of aromatase enzyme present in the granulosa cells, it will convert the weak androgens into estrogen. This estrogen is dependent on the estrogen precursor which is the male androgens and it will be stored in the antrum (fluid filled space filled with estrogen). As long as the follicles increase in size, the antrum will also increase in size causing the ovum to get embedded at one side. By about the 12th day, the follicle will be ready to rupture. The follicle will send great amounts of estrogen to the anterior pituitary causing it to secrete high amounts of LH. This is known as the LH surge. LH will now attach to the theca externa/capsule of follicles leading to proliferation followed by increase in size then weakening of the wall. The wall will protrude forming a nipple like structure called stigma of the follicle. (weakest point in follicle). As long as LH increases, the weaker the follicular wall gets leading to degeneration of the stigma and then rupture.

Folliculogenesis



Stages of follicular development



Ovarian cycle: Follicular phase

During the first few days of the monthly female reproductive cycle there is increase in secretion of **FSH and LH**:

Female slides

1- Increase in FSH is slightly more & earlier than LH which causes the acceleration of growth of many primary follicles each month.

لزيادة القهم انظر صفحة 12

2- There is proliferation of the granulosa cells to many layers. The ovary interstitium collect in several layers outside the granulosa cells to form a second mass of cells called **theca**.

3- This theca is divided into TWO layers:

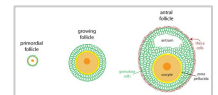
1. Theca interna, the cells have epithelioid characteristics and similar to the granulosa cells and secrete sex hormones (estrogen and progesterone).

2. Theca externa, the outer layer, develops into a highly vascular connective tissue capsule of the developing follicle.

Multilaminar Primary Follicles and Secondary Follicles:

Female slides

- ❖ Few days after proliferation & growth of the follicles, the granulosa cells secrete **follicular fluids** contain high concentration of **estrogen**.
- ❖ This fluids accumulate to form **antrum** within the mass of the granulosa cells.
- ❖ The early growth of the follicle up to the antral **stage** is under **FSH stimulation only** → in both slides M+F.



Tertiary Vesicular Follicles (Known As Graafian Follicles):

Then there is accelerated growth of the follicle to larger follicle called vesicular follicle (**Graafian**) caused by:

1

Estrogen secreted into the follicle causes the granulosa cells to form increasing number of/ **increase** FSH receptors which causes **positive feedback effect**.

2

Both estrogen & FSH combine to promote LH receptors on the **original** granulosa cells **in addition** to **FSH stimulation**, allowing more increase follicular secretion.

3

The increasing estrogen from the follicle plus increasing LH from the **AP** causes proliferation of the follicular **theca** cells & increase their secretion.

-The antral follicles begin to grow. The ovum enlarges & remains embedded at one pole of the granulosa cells of the follicle.

-After a week or more of growth—but before ovulation occurs—one of the follicles begins

to outgrow all the others, and the remaining 5 to 11 developing follicles involute (a process called atresia),

❖ caused by:

1 **Rising estrogen levels**

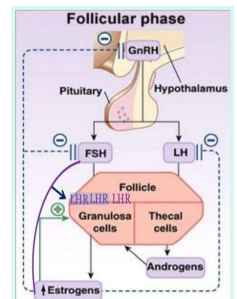
(positive feedback locally and negative feedback centrally)

2 **Rising inhibin levels**

(further negative feedback).

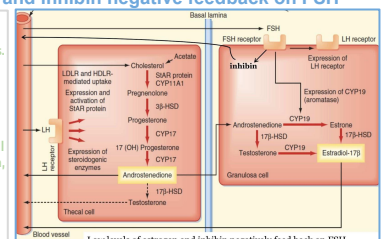
3 **Declining FSH levels**

(Withdraw growth support, causing atresia in lesser follicles).



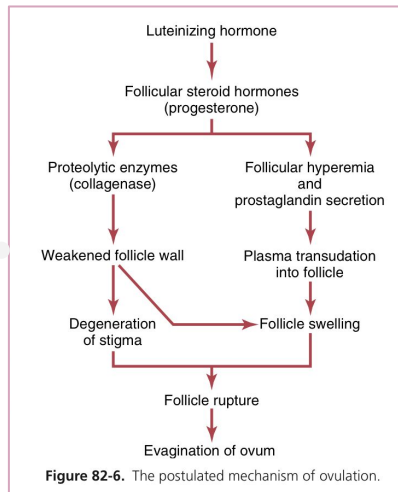
Low levels of estrogen and inhibin negative feedback on FSH

Before the antrum is formed, LH is released and it will bind to theca cells. When LH binds to theca cells it will secrete male weak androgens, which will diffuse to the adjacent granulosa cells. By the action of aromatase enzyme that is present in granulosa cell, it will convert weak androgen into estrogen, and then estrogen will be stored in the antrum.



Ovarian cycle: Ovulation

(Needs LH surge)



► Initiation of Ovulation:

Large quantity of LH secreted by the AP causes rapid secretion of progesterone from the follicle few hours.

► Two events occur which are necessary for ovulation:

1» The theca externa begins to secrete proteolytic enzymes & causes weakening of the wall result in swelling of the follicle & degeneration of the stigma

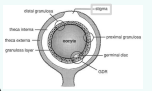
2» Rapid growth of new blood vessels into the follicle wall & prostaglandins are secreted into the follicular tissue.

Those two changes causes swelling of the follicle & plasma transudation into the follicle & degeneration of the stigma with discharge of the ovum.

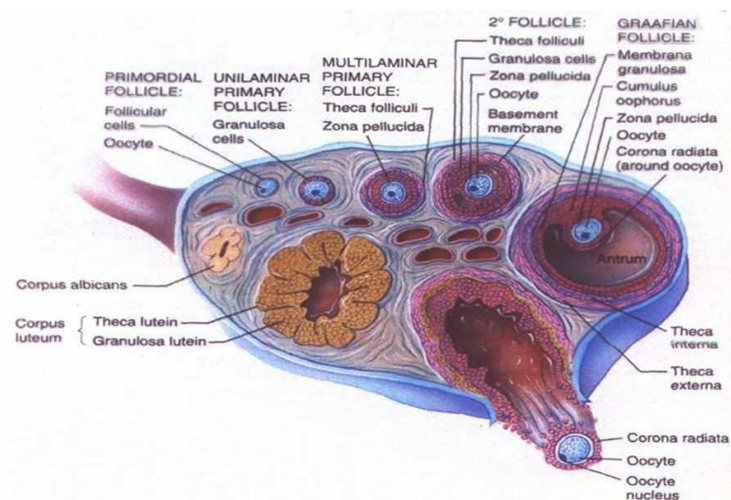
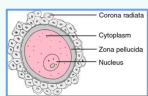
Female slides

■ It occurs 14 days after the onset of menstruation in 28 days cycle. من أول نزول للدم حتى 14 يوم.

■ Before ovulation, a small area in the center of the follicle called **stigma**, during ovulation stigma protrude & fluids ooze from the follicle.



■ The stigma ruptures allowing more viscous fluid outward carrying with it the ovum surrounded by mass of granulosa cells called **corona radiata**.



-Primordial follicle → primary follicle → secondary follicle (All of them under the influence of FSH) why???

to proliferate & increase its size.

-Secondary follicle → GRAAFIAN follicle.

-Androgens are synthesized in theca cells then converted into Estrogen by granulosa cells.

LH surge during Ovulation

Female slides:

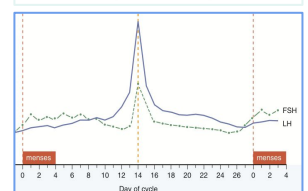
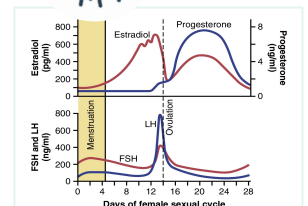
Two Days before ovulation, the rate of LH secretion from the AP increase markedly to 6-16 fold & peak about 16 hrs before ovulation.

FSH also increases to 2 to 3 fold & acts synergistically with LH what's the point behind that?? to cause rapid swelling of the follicle before ovulation.

LH has specific effect on the granulosa cells & theca cells converting them to **progesterone secreting cells** so the rate of **estrogen secretion** begins to fall about 1 day before ovulation while **progesterone secretion** begin to increase.

Male Slides:

The LH surge induces release of inflammatory cytokines and hydrolytic enzymes from the theca and granulosa cells, which lead to the breakdown of the follicle wall.



Ovarian cycle: Luteal phase

Luteal phase of the ovarian cycle:

- ↳ After expulsion of the ovum from the follicle, the remaining granulosa & theca interna cells change to lutein cells & become filled with lipid inclusions giving them yellowish appearance.
- ↳ The granulosa cells with the theca cells called corpus luteum.
- ↳ The granulosa cells in corpus luteum develop extensive intracellular endoplasmic reticula & form large amount of progesterone & estrogen.
- ↳ The theca cells form mainly androgens which are converted by granulosa cells into female hormones.

- ↳ The corpus luteum grow to about 1.5 cm in diameter, at about 7 to 8 days after ovulation .
- ↳ Then begins to involute & losses its secretory function & its yellowish characteristic about 12 days after ovulation becomes **corpus albicans** & replaced by connective tissue & absorbed. It is removed by macrophages.

Luteinizing function of LH

A local hormone in the follicular fluid called luteinization – inhibiting factor hold the luteinization process until after ovulation.

After extrusion of the ovum from the follicle the following changes occur:

- Conversion of granulosa and theca interna cells into lutein cells.
- Secretion of progesterone & estrogen from the **corpus luteum**.

If pregnancy occur, the chorionic gonadotropin hCG from the placenta act on the corpus luteum to prolong its life for 2 to 4 months of pregnancy.

Functions of LH:

- 1- Causes Ovulation.
- 2-Causes Luteinization (change the granulosa and theca cells into lutein cells).
- 3-Maintain secretion of progesterone & estrogen from the corpus luteum.

Involution of corpus luteum and onset of the next ovarian cycle

◆ Lutein cells of the corpus luteum secrete:

Progesterone & Estrogen which inhibit the secretion of FSH & LH.

Inhibin which inhibit secretion of FSH by AP.

Female slides

- ◆ Low levels of both FSH & LH & causes the corpus luteum to degenerate completely, called involution of the corpus luteum.
- ◆ Around 26th days of normal reproductive cycle & after involution of corpus luteum, sudden cessation of secretion of estrogen, progesterone & inhibin removes the feedback inhibition of the AP & allowing increase secretion of FSH & LH again.
- ◆ FSH & LH initiate the growth of new follicles, beginning a new ovarian cycle.

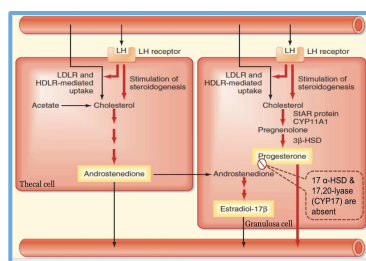


Figure 2-10 Vascularization of the corpus luteum makes low LDL available to the granulosa-lutein cells. LH causes upregulation of 3β-HSD, CYP17 and cholesterol uptake.

- Consequently large amounts of progesterone are formed, and not all of it can be converted to androgens and then to estrogens.
- Consequently, both estrogen and progesterone secretion is increased in this stage.
- Degeneration of the basal lamina between the two cells that was present in the previous stage creating a **Lutein cell**.
- The absence of the hormones in the figure will prevent conversion of progesterone into androgens, therefore more progesterone will be released.

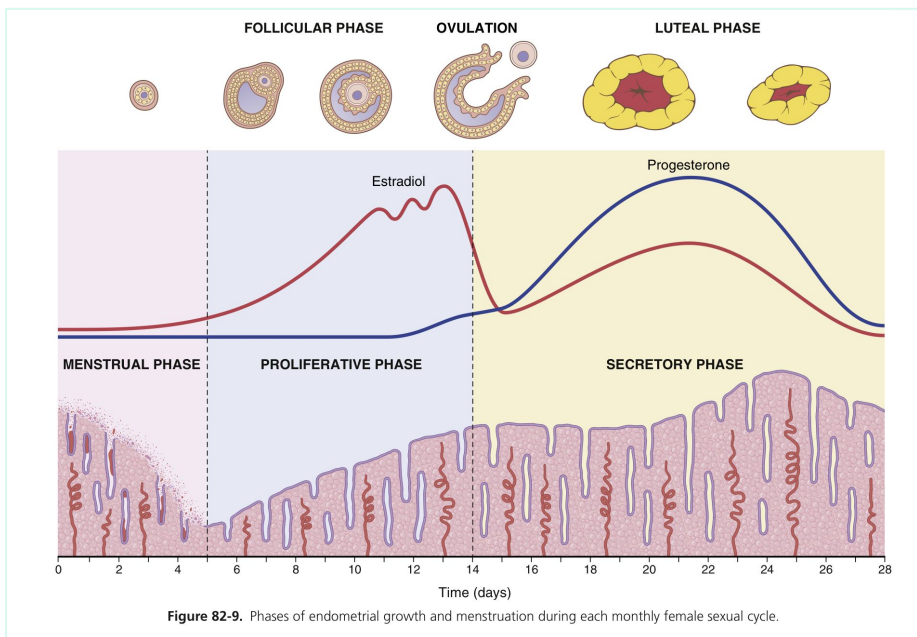
Uterine cycle

Monthly endometrial cycle and menstruation: associated with monthly cyclical production of estrogens & progesterone by ovaries, endometrial lining of uterus pass through the following stages:

1-Proliferative (estrogen) phase: before ovulation.

2-Secretory (progestational) phase: after ovulation.

3-Menstruation: if the ovum is not fertilized.



The endometrium is composed of two layers: Functional layer Basal layer. During menstrual phase the functional layer of the endometrium will be desquamated "endometrial shedding" while the basal layer remain intact to regenerate the functional layer.

ما هو سبب تقلبات المزاج والإكتئاب إلخ... قبل بداية الـ Menstruation ؟
اضغط هنا لتزى الدراسة كاملة عن premenstrual syndrome بالاختصار:

Research suggests that interactions among emotional and behavioral sensitivities to fluctuations in ovarian hormones across the menstrual cycle may be, for some women primary factors leading to depressive symptoms. The concept of premenstrual mood worsening has been a focus of investigation for decades, with many but not all, studies finding some evidence of symptom exacerbation (i.e., mood worsening) in this phase. Also, Symptoms of anxiety and stress have been examined in healthy women's menstrual cycles across a variety of laboratory protocols. Research focusing on daily symptoms of anxiety, as well as anxiety in response to stressors, has found clear premenstrual exacerbations of anxiety.

1-Proliferative (Estrogen) phase

At the beginning of each cycle, most of the endometrium has been desquamated by menstruation.

After menstruation only thin layer of the endometrial stroma remains & the deeper portions of the glands & crypts of the endometrium.

Under the influence of estrogens, secreted in large quantities by the ovaries, the stromal cells & epithelial cells proliferate rapidly.

The endometrial surface re-epithelialized within 4-7 days after the beginning of menstruation.

Before ovulation, the endometrial thickness increases due to increase in the number of stromal cells, progressive growth of the glands & the new blood vessels.

At the time of ovulation, the endometrium is 3-5 mm thick. The endometrial glands in cervical region secrete a thin, stringy mucus which helps to guide sperm in the proper direction from the vagina into the uterus.

2-Secretory (Progestational) phase

❖ After ovulation, in the later half of monthly cycle *:

1. Estrogen & progesterone are secreted in large quantities by corpus luteum.
 - Estrogen → causes *slight* endometrium proliferation.
 - Progesterone → causes *marked* endometrial swelling & secretory development.
2. Increase in gland tortuosity & excess secretory substances accumulate in glands.
3. Increase endometrial blood supply → become more tortuous.
4. Increase Stromal cells cytoplasm with ↑ lipid & glycogen deposits.

❖ Peak of secretory phase, around **one week after ovulation**:

- Endometrium thickness: 5 - 6 mm.

❖ Secretory changes prepare endometrium (stored nutrients) for fertilized ovum implantation *.

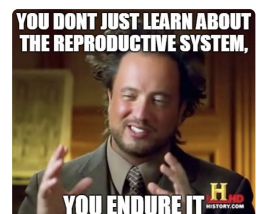
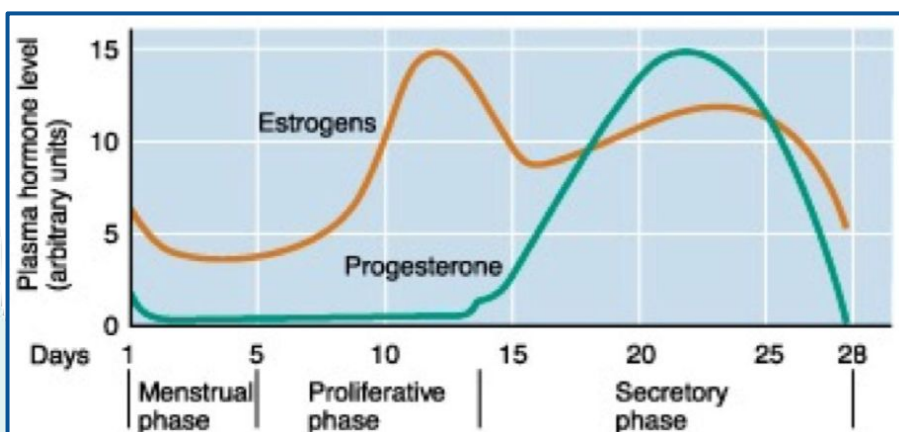
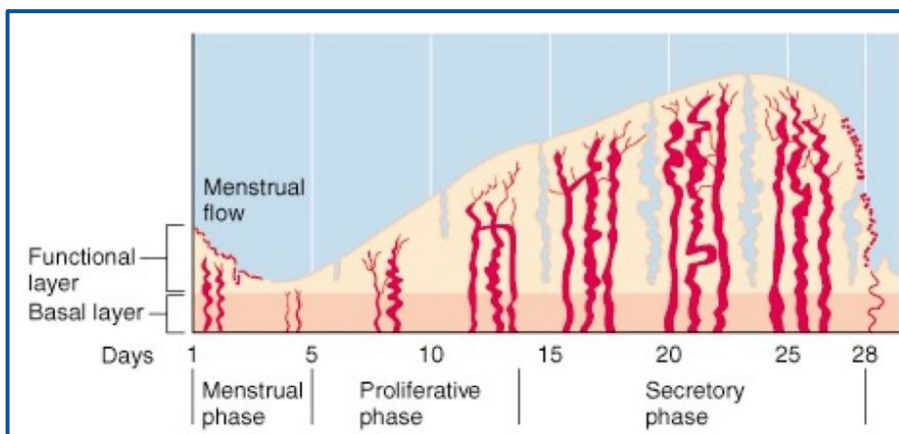
❖ Uterine secretions (uterine milk) provide nutrition for the dividing ovum.

❖ Trophoblastic cells on implanted ovum surface begin to digest the endometrium & absorb endometrial stored substances*.

❖ Feedback oscillation of the hypothalamic-pituitary-ovarian system: Postovulatory secretion of the ovarian hormones and depression of the Pituitary gonadotropins *:

During the Postovulatory phase (between ovulation & beginning of menstruation) *: corpus luteum secrete large quantities of progesterone, estrogen & inhibin → negative feedback effect on AP & hypothalamus → inhibit FSH & LH secretion.

- Lowest FSH & LH level: 3 - 4 days before the onset of menstruation.



3-Menstruation

24 hours preceding the menstruation:
release of prostaglandins (vasoconstrictor) →
vasospasm of tortuous blood vessels → necrosis is
initiated in the endometrium, especially blood
vessels, due to:
1-Vasospasm.
2-↓ nutrients to endometrium.
3-Loss of hormonal stimulation.
-Gradual necrosis of endometrial outer layer →
separation from uterus at hemorrhage sites.

The mass of desquamated tissue & blood
+ contractile effects of prostaglandins →
initiate contractions → expel uterine
contents.

Within 4 to 7 days after menstruation: blood loss
ceases & endometrium become re-epithelialized.

If Ovum is not fertilized, about 2 days before the end
of the monthly cycle:

1-Corpus luteum involutes.

2-Estrogens and progesterone ↓ to low levels → ↓
endometrial stimulation → endometrial involution
(≈ 65% of its previous thickness).

48 hours after the onset of menstruation:
all endometrial superficial layers desquamated in the
uterine cavity.

Normal menstruation: ≈ 40 ml of blood (fibrinolysin
presence → non-clotting)
+ 35 ml of serous fluid are lost.

Leukorrhea during menstruation: leukocytes are
released with necrotic material & blood → uterus is
highly resistant to infection (protective
mechanism).

Estrogen & Progesterone

Male
slides

Estrogen	Progesterone
<ul style="list-style-type: none"> ❖ Estrogens increase the size of ovaries, fallopian tubes, uterus, and external genitalia. ❖ Estrogens cause marked proliferation of the endometrial stroma and greatly increased development of the endometrial glands. ❖ Estrogens cause: <ul style="list-style-type: none"> ◇ Development of the stromal tissues of the breasts ◇ Growth of an extensive ductal system ◇ Deposition of fat in the breasts. ❖ Estrogens stimulate bone growth and slightly increase protein deposition. ❖ Estrogens increase body metabolism and fat deposition. ❖ Estrogens cause sodium and water retention by the kidney tubules. 	<ul style="list-style-type: none"> ❖ Progesterone promotes the secretory changes in the uterine endometrium. ❖ Progesterone promotes increased secretion by the mucosal lining of the fallopian tubes. ❖ Progesterone promotes development of the lobules and alveoli of the breasts, causing the alveolar cells to proliferate, enlarge, and become secretory. ❖ Progesterone decreases the frequency and intensity of uterine contractions. ❖ What maintains the functional layer? -Progesterone (very important)

Menopause

- ❖ **Menopause: period during which the cycle ceases & female sex hormones diminish to almost none.**
 - Age: **40 - 50 (45 - 51)** years.
 - Pathogenesis: estrogens production falls below critical value → no gonadotropin (FSH & LH) inhibition → sexual cycle becomes irregular + ovulation fails to occur → cycle ceases.
- ❖ **With advanced age, ovaries become unresponsive to gonadotropins → ↓ primordial follicles + ovaries' function (no longer secrete estrogen and progesterone) → reproductive cycles disappear (menopause).**
- ❖ **Uterus and vagina atrophy.**
- ❖ **Due to the Removal of negative feedback effect → ↑ secretion of FSH & LH.**

Physiological changes due to estrogen loss:

Hot flushes, characterized by extreme flushing of the skin.

Fatigue

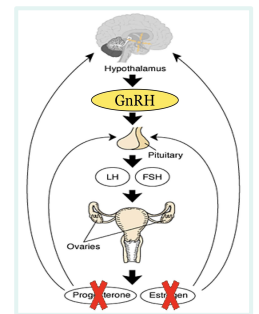
Occasionally various psychotic states.

Psychic sensations and dyspnea.

Anxiety

Decreased strength and calcification of bones throughout the body

Irritability



Menstrual Disorders

Primary amenorrhea: in which menstrual bleeding has never occurred.

Secondary amenorrhea: Cessation of cycles in a woman with previously normal periods. Causes:

- Pregnancy (the most common cause).
- Emotional stimuli and changes in the environment.
- Hypothalamic diseases (decreased GnRH pulses).
- Pituitary disorders (**decreased FSH & LH**)
e.g. Sheehan syndrome (postpartum hypopituitarism)
- Hypothyroidism (TRH stimulates prolactin which decreases GnRH)
- Primary ovarian disorders and various systemic disease.

Amenorrhea
(absence of menstruation)

Menorrhagia

Refers to abnormally **heavy or prolonged bleeding or profuse flow during regular periods.**

Hypomenorrhea

Refers to scanty flow.

Dysmenorrhea

Painful menstruation (cramps due to accumulation of prostaglandins in the uterus)

- **Treated with inhibitors of prostaglandin synthesis.**

Oligomenorrhea

Refers to infrequent (irregular) menstrual periods.

Graphs/ Summaries

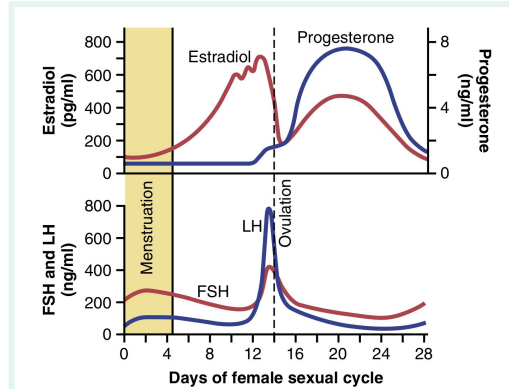
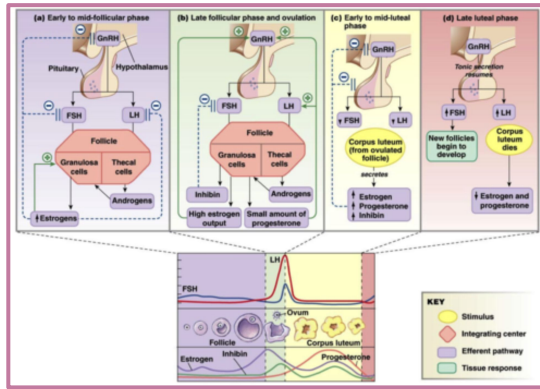
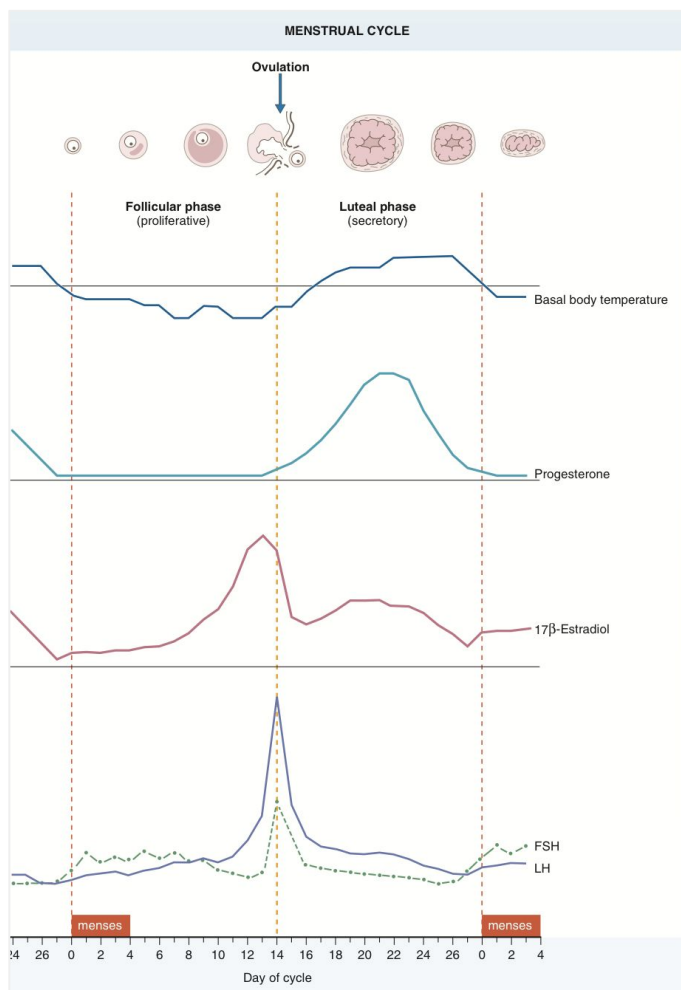
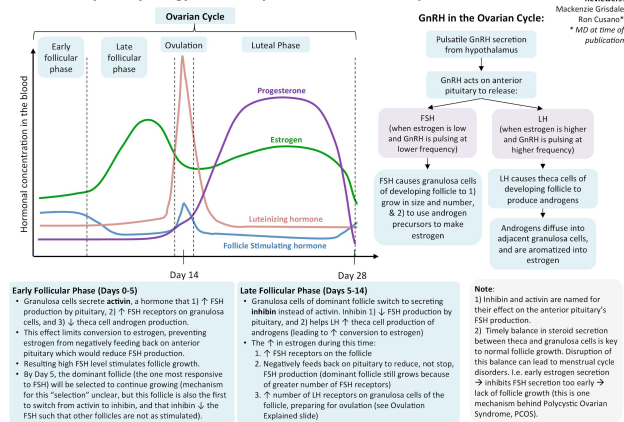


Figure shows the approximate changing concentrations of the anterior pituitary gonadotrophic hormones FSH and LH (bottom two curves) and of the ovarian hormones estradiol (estrogen) and progesterone (top two curves). During each month of the female sexual cycle, there is a cyclical increase and decrease of FSH and LH, as shown in the bottom. These cyclical variations cause cyclical ovarian changes.

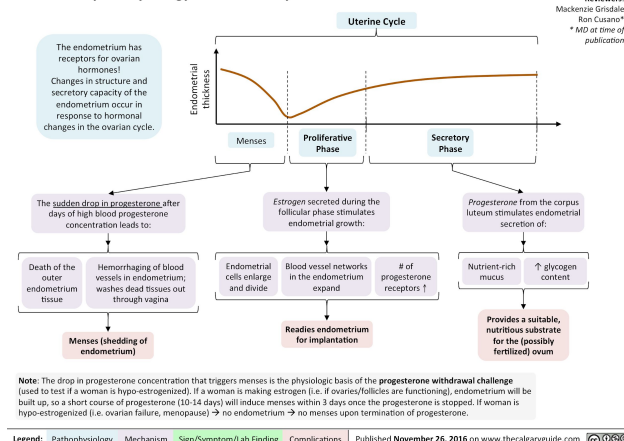
Summaries



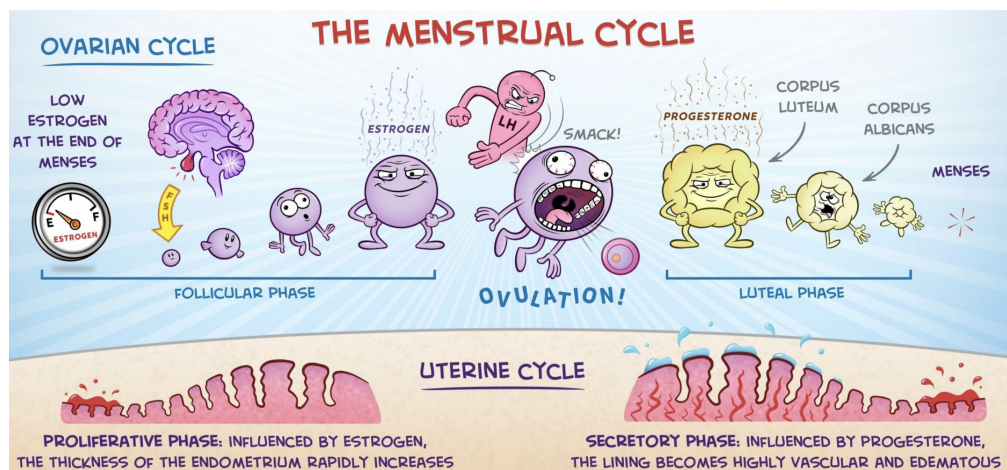
Menstrual Cycle Physiology: Ovarian Cycle - Follicular Phase Explained



Menstrual Cycle Physiology: the Uterine Cycle



Ovarian Cycle	Uterine Cycle
1. Follicular Phase (Days 1-14) FSH → Follicles (contain eggs) develop and release estrogen	1. Menstrual Phase (Days 1-5) Shed stratum functionalis (inner layer of endometrium) due to drop in progesterone from dying corpus luteum
2. Ovulation (Day 14) Rising estrogen triggers LH surge LH surge triggers ovulation (release of egg from follicle)	2. Proliferative Phase (Days 6-14) Regrow stratum functionalis due to rise in estrogen from follicular phase
3. Luteal Phase (Days 14-28) Follicle becomes corpus luteum Corpus luteum releases progesterone (and estrogen)	3. Secretory Phase (Days 14-28) Stratum functionalis secretes nutrient broth (to support growing embryo) due to rise in progesterone from luteal phase



رکړو علي ال LH شوږمو ايش قاعد
يسوي و ماراج تنسونه ايد .

MCQs

A young woman is given daily injections of a substance beginning on the 16th day of her normal menstrual cycle and continuing for 3 weeks. As long as the injections continue, she does not menstruate. The injected substance could be which of the following?

Testosterone	FSH	An inhibitor of progesterone's actions	HCG
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During the 12-hr period preceding ovulation, which of the following is true?

The plasma concentration of estrogen is rising	A surge of luteinizing hormone is secreted from the pituitary	The surge occurs immediately after the formation of the corpus luteum	The surge followed immediately by a fall in the plasma concentration of progesterone
--	---	---	--

During the first few years after menopause, follicle-stimulating hormone (FSH) levels are normally extremely high. A 56-year-old woman completed menopause 3 years ago. However, she is found to have low levels of FSH in her blood. Which of the following is the best explanation for this finding?

She has been receiving hormone replacement therapy with estrogen and progesterone since she completed menopause	Her adrenal glands continue to produce estrogen	Her ovaries continue to secrete estrogen	She took birth control pills for 20 years before menopause
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If a woman has a tumor secreting large amounts of estrogen from the adrenal gland, which of the following will occur?

Progesterone levels in the blood will be very low	Her luteinizing hormone secretion rate will be totally suppressed	She will not have normal menstrual cycles	All of the above
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Want Explanation ? [Your Finger HERE!](#)

Leaders

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