

**The University Of Jordan
Faculty Of Medicine**



Ovarian and Uterine cycle

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Ovarian cycle

- These are ***periodic changes*** which occur in the ***ovary*** every lunar month (28 days) during the ***fertile period*** of the ***non pregnant*** female.
- **The ovarian cycle is divided into three phases:**
 - ***Preovulatory*** (follicular) phase.
 - ***Ovulation***.
 - ***Postovulatory*** (Luteal phase).

Hormonal control

Hypothalamus secretes Gonadotropin releasing hormone (GnRH)

GnRH stimulate anterior lobe of the pituitary gland which secrete two gonadotrophic hormones (FSH, LH),

1. Follicle stimulating hormone (F.S.H): it acts in the first stage of the ovarian cycle and has the following effects.

- It induces maturation of primary follicle into Graffian follicle.
- It induces the follicular cells to secrete **estrogens**.

2. Lutenising hormone (L.H): it acts mainly in the second stage of the ovarian cycle and has the following effects:

1- It induces final maturation of Graffian follicle and ovulation.

2- It induces the conversion of the ruptured follicle into a corpus luteum .

3- It induces corpus luteum to secrete **progesterone**

I. PREEVULATORY (FOLLICULAR) PHASE: (1st half of the cycle)

- At the **beginning** of each ovarian cycle , the anterior lobe of pituitary gland secretes **FSH** which stimulates a number of **primordial follicles** to develop .
- **Only one follicle** reaches maturity and **secretes estrogen** which **inhibit** secretion of FSH by pituitary gland
- **Estrogen** stimulate secretion of luteinizing hormone (**LH**) leading to **degeneration** of the remaining follicles which become **atretic follicles** .
- The estrogen secreted in this phase is responsible for the **proliferative phase of the uterine cycle** .

II.OVULATION :

- **Luteinizing hormone (LH):**

1. Stimulates **collagenase** activity resulting in digestion of collagen fibers surrounding the mature Graafian follicle.

2. Increases **prostaglandin** activity resulting in **ovarian contraction**.

- **Rupture of the mature Graafian follicle** on the surface of the ovary leads to release of secondary oocyte together with the corona radiata and the zona pellucida

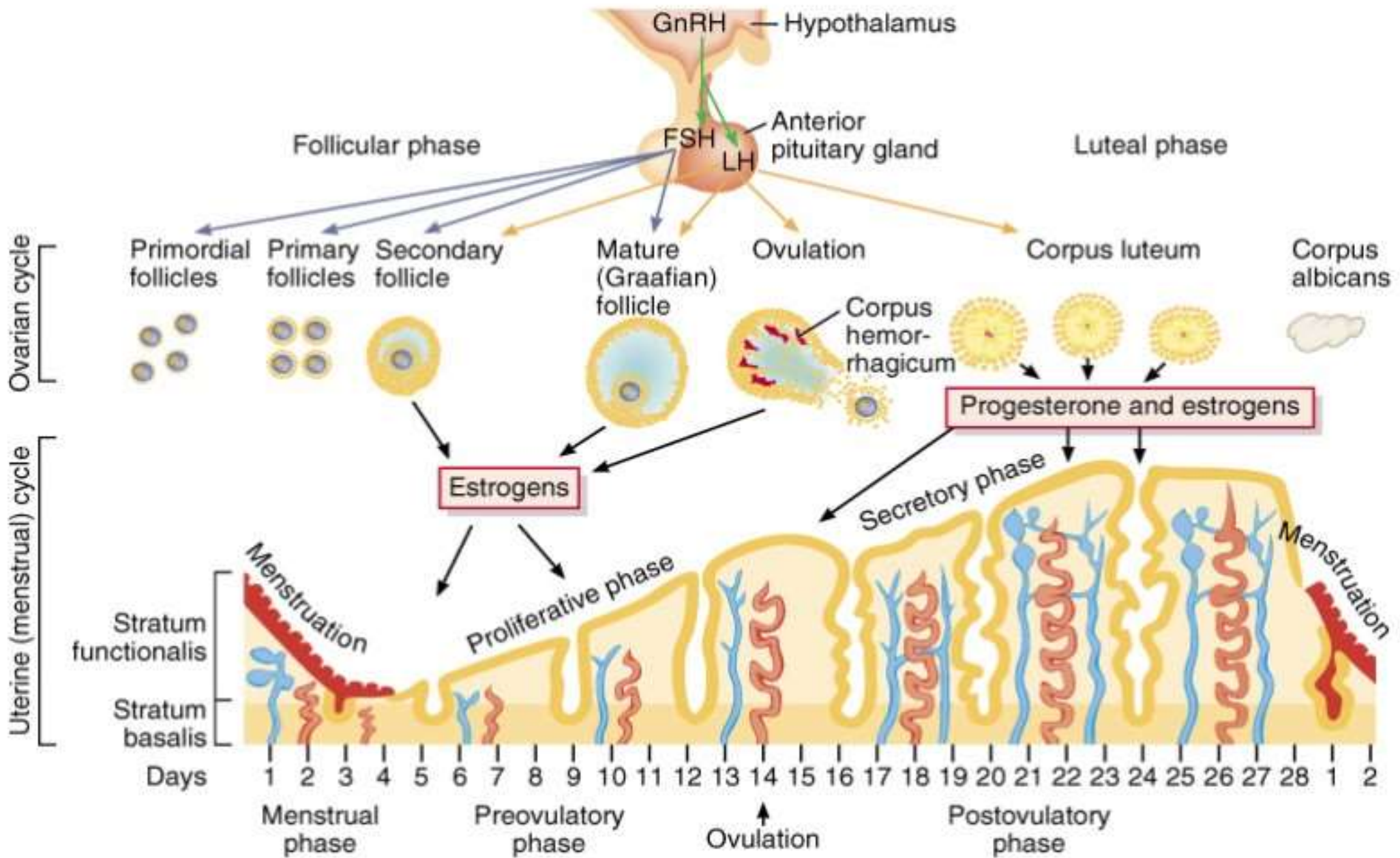
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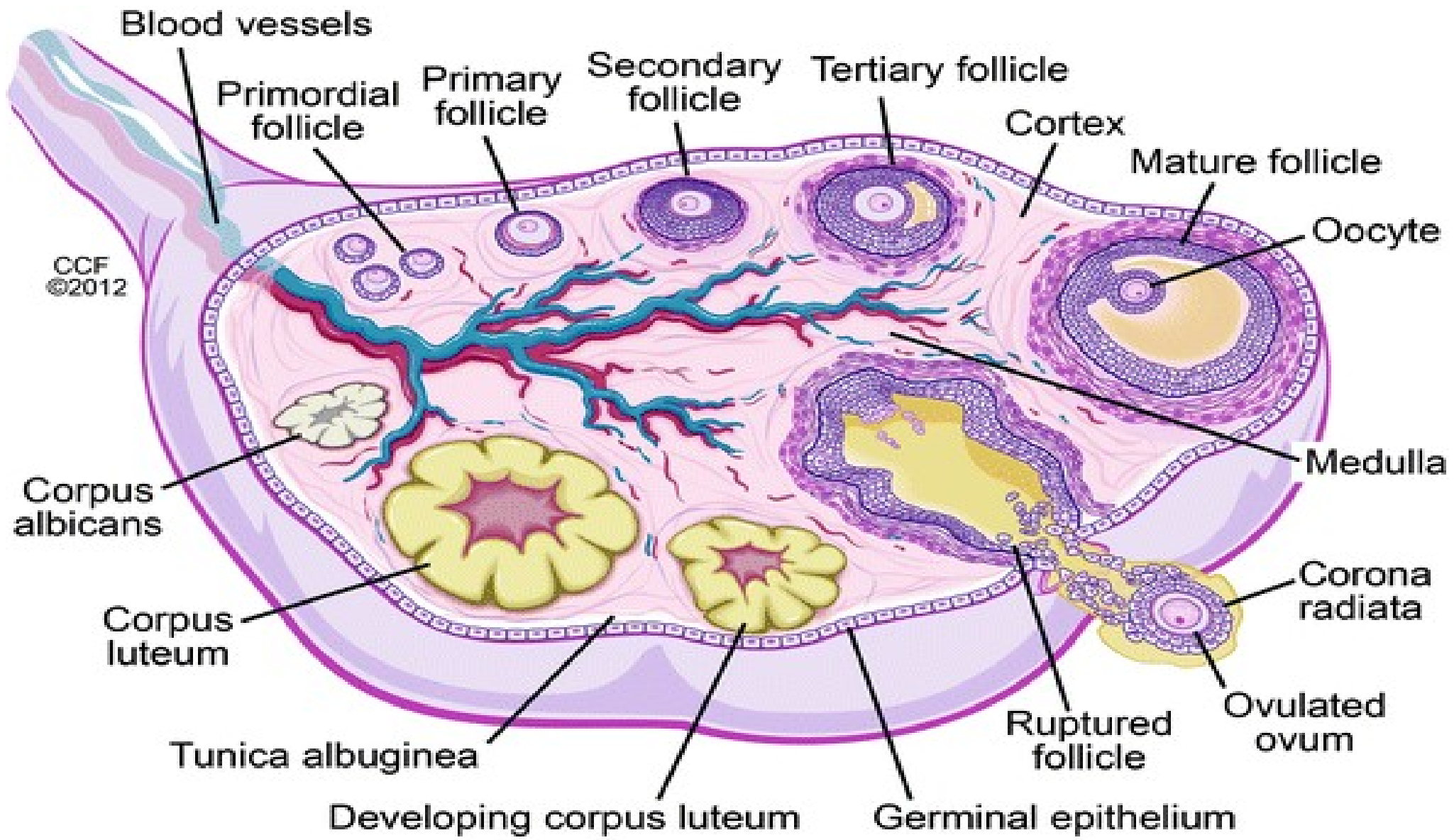
- At the time of ovulation the body **temperature** is slightly elevated and the female feel **pain** in the iliac fossa (mid-cycle pain) . If this pain occurs on the right side , it may be miss diagnosed as **acute appendicitis** .
- Ovulation occur **once every lunar month** , approximately **14 days** (plus or minus one day) before the beginning of next menstruation .
- Ovulation does **not occur** during pregnancy and occurs to **less extend** during lactation .

III.POST OVULATORY (LUTEAL) PHASE:

- **After ovulation** , Under the effect of **luteinizing hormone** , the cells of **membrana granulosa** and **theca interna** cells are changed to the ***luteal cells*** to form the **corpus luteum** .

Corpus luteum secretes **progesterone** hormone responsible for **secretory phase of uterine cycle** and **inhibit** pituitary LH .





- Fate of corpus luteum:

A. If fertilization does not occurs

the corpus luteum **degenerate** , after **9 days** from ovulation , and becomes a fibrous body called ***corpus albicans*** .

Degeneration of corpus luteum leads to **decrease progesterone** level in the blood .

B. If fertilization occurs the corpus luteum changes to ***corpus luteum of pregnancy*** (which is maintained till the **4th month** of pregnancy by the human ***chorionic gonadotropin hormone*** secreted from the embryo). After that, the formed **placenta** will secrete progesterone till labor.

Fate of Corpus Luteum

No Pregnancy

↓ LH

Corpus Luteum
of Menstruation

(10-18 days)

Pregnancy

HCG = LH

Corpus Luteum
of Pregnancy

(4-5 months)

Corpus
Albicans

Uterine (Menstrual) Cycle

- These are **periodic changes** which occur in the **endometrium** (mucous membrane of the uterus) every lunar month (28 days) during the **fertile period** of the **non pregnant** female.
- It is affected by the ovarian cycle and the ovarian hormones.

It passes through three phases :

I. Menstrual phase

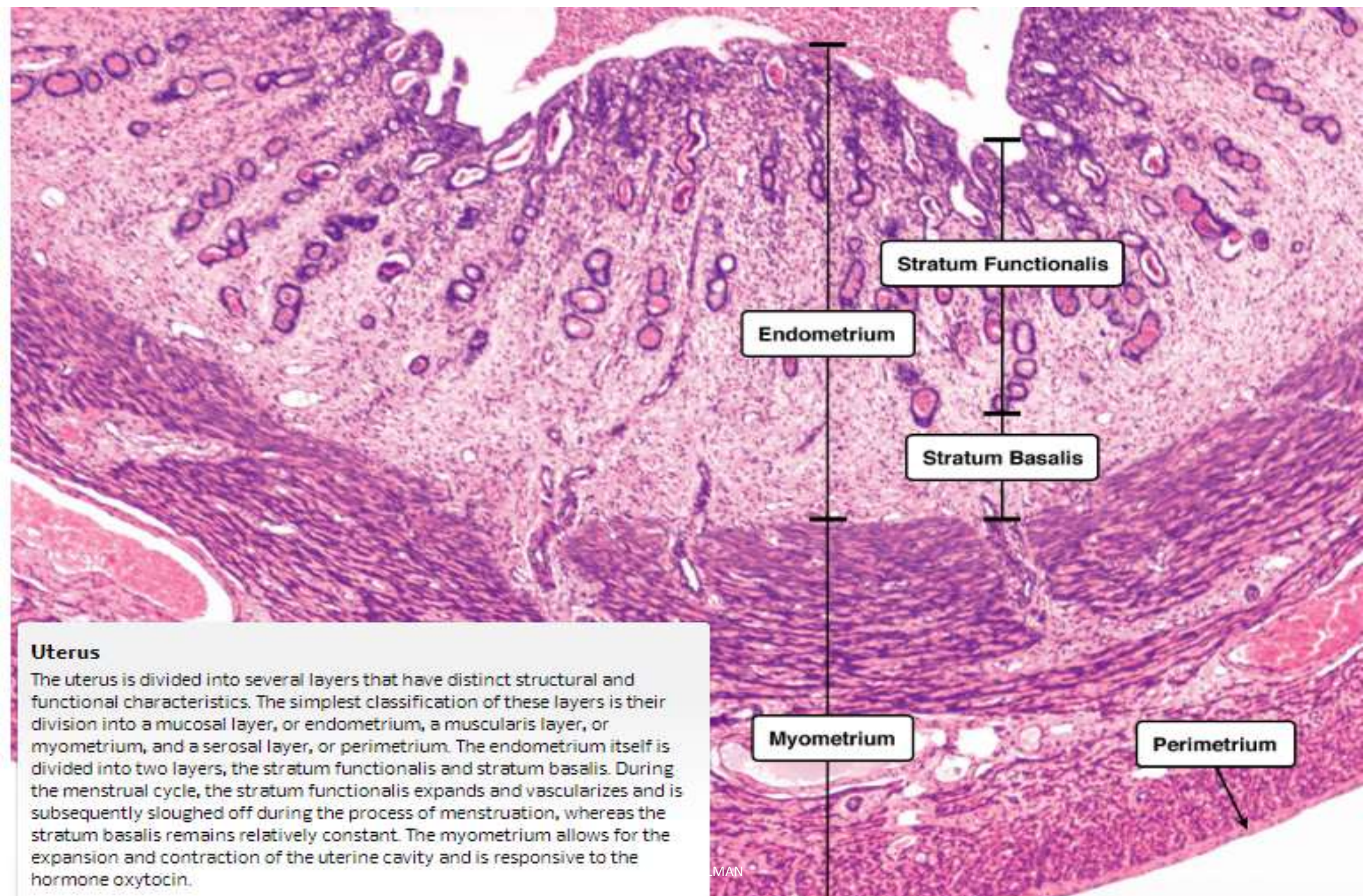
II. Proliferative (estrogenic or postmenstrual) phase

III. Secretory (premenstrual or progestational) phase

The uterine wall has 3 layers and the uterine cycle has 3 phases under the effect of the ovarian hormones

A. The uterine wall has 3 layers :-

- 1. Perimetrium:** is a layer of **peritoneum**, which covers the external aspect of the uterus.
- 2. Myometrium:** is a thick layer of **smooth muscle** fibers.
- 3. Endometrium:** is the **inner mucosa** of the uterus.



Uterus

The uterus is divided into several layers that have distinct structural and functional characteristics. The simplest classification of these layers is their division into a mucosal layer, or endometrium, a muscularis layer, or myometrium, and a serosal layer, or perimetrium. The endometrium itself is divided into two layers, the stratum functionalis and stratum basalis. During the menstrual cycle, the stratum functionalis expands and vascularizes and is subsequently sloughed off during the process of menstruation, whereas the stratum basalis remains relatively constant. The myometrium allows for the expansion and contraction of the uterine cavity and is responsive to the hormone oxytocin.

During the **secretory** phase of the menstrual cycle, the **endometrium** itself is formed of :

1. Stratum functional

2. Stratum basalis

- The **Stratum functional** are supplied by long spiral arteries, which are dilated by progesterone hormone.
- The functional layer of the endometrium shed at menstruation.

- The **basal layer** is supplied by its own short straight arteries and it does not shed during menstruation.
- It forms the regenerative layer of the endometrium, which is responsible for reformation of the uterine glands after menstruation.

I. Menstrual phase : (3-5 days)

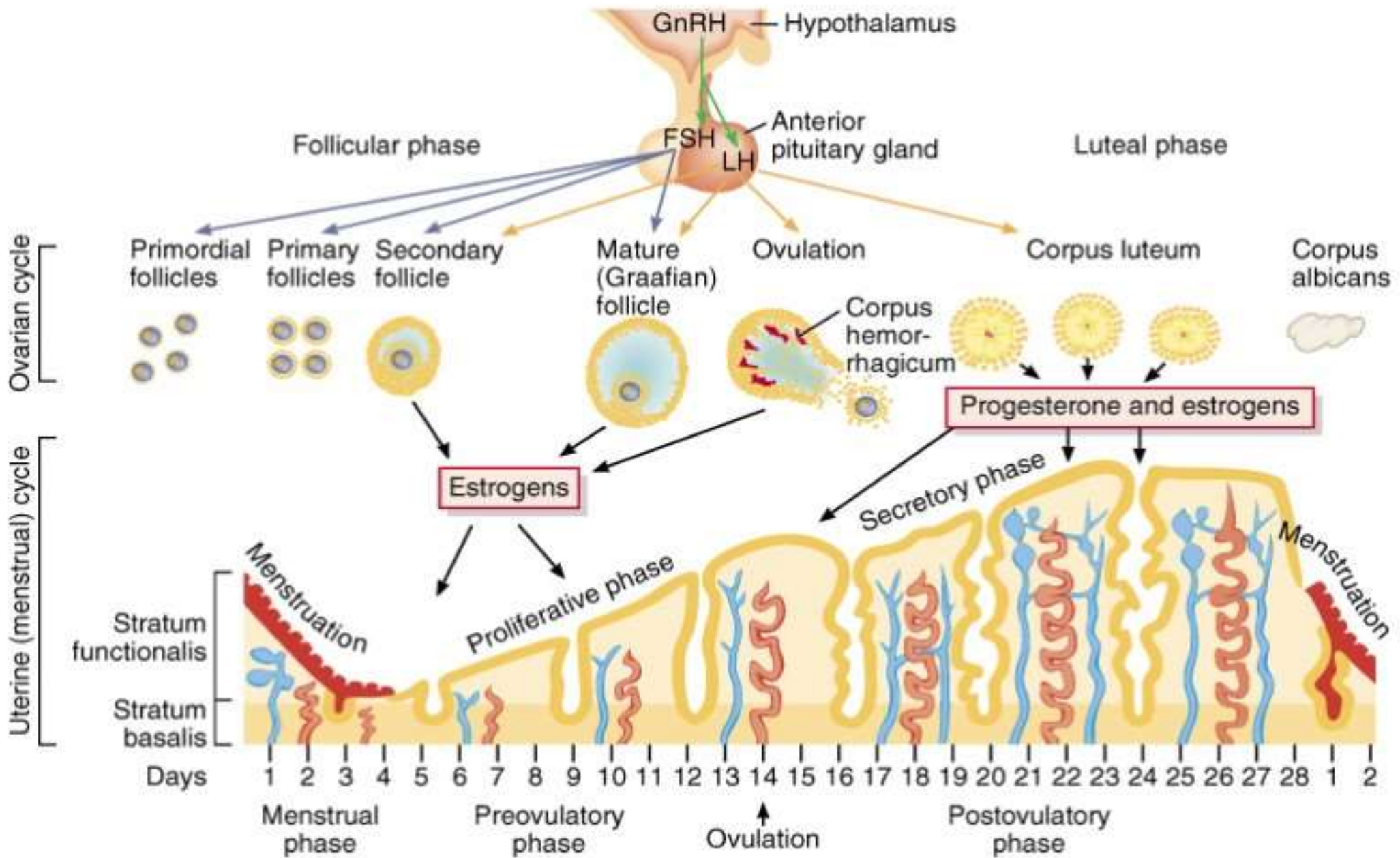
- It corresponds to the **beginning** of the **pre-ovulatory phase** of the ovarian cycle.
- **Cause** :It is mainly due to **decreased** progesterone level & estrogen level to less extent (at the end of the previous luteal phase of ovarian cycle) , leading to **constriction of spiral arteries** supplying the superficial part of endometrium .
- The superficial part of **endometrium** degenerates and expelled with **mucous & unclotted blood** (due to presence of proteolytic enzymes) from the ulcerated uterus .
- At the end of this phase the endometrium is reduced in thickness .
- The **basal layer** of the endometrium is not affected.

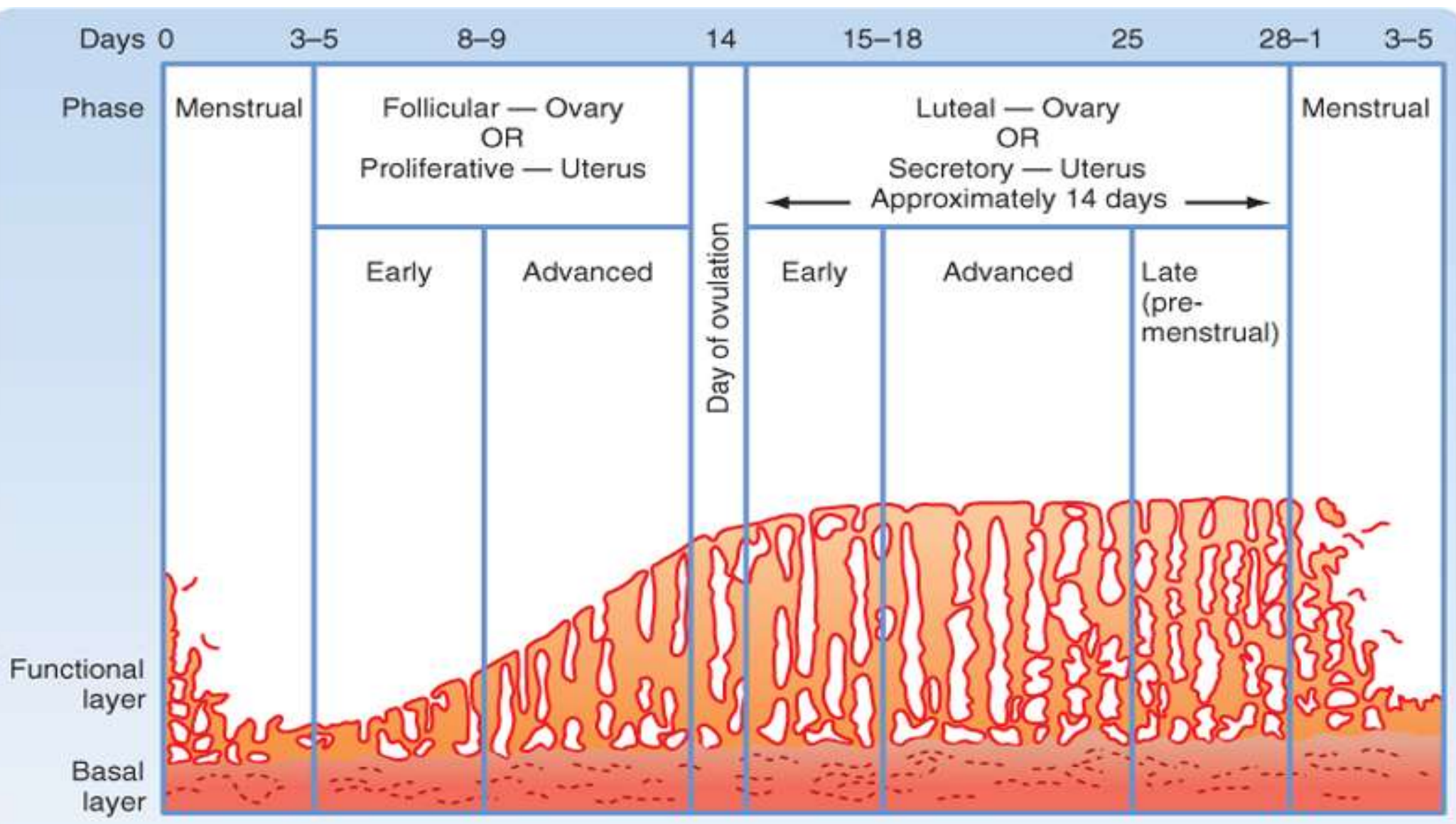
II. Proliferative (estrogenic or postmenstrual) phase : (10 days)

- It corresponds to the **last 10 days** of the **pre-ovulatory** phase of the ovarian cycle.
- It is under the effect of **estrogen** hormone secreted by developing follicle.
- The **endometrium** gradually thickens; its blood supply increases and its mucous glands enlarge.
- There is a gradual **regeneration and repair** of the endometrial glands and their spiral arteries.

III. Secretory (premenstrual or progestational) phase : (last 14 days)

- It corresponds to the **postovulatory** phase of the ovarian cycle.
- It is under the effect of **progesterone** hormone mainly (from corpus luteum) & estrogen to less extent .
- The thickness of the **endometrium** is markedly increased. The **arteries** become spiral and the **mucous glands** become long , tortuous & distended with secretion .
- These changes in the endometrium can be regarded as the **preparation of the endometrium** for the reception and nourishment of the suspected blastocyst if fertilization occur .





Koeppen & Stanton: Berne and Levy Physiology, 6th Edition.
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- **If fertilization does not occur:** the corpus luteum degenerates with drop in the progesterone hormone which leads to **vasoconstriction** of the spiral arteries leading to **ischemia** of the **functional** layer of the endometrium followed by its **shedding with bleeding**.

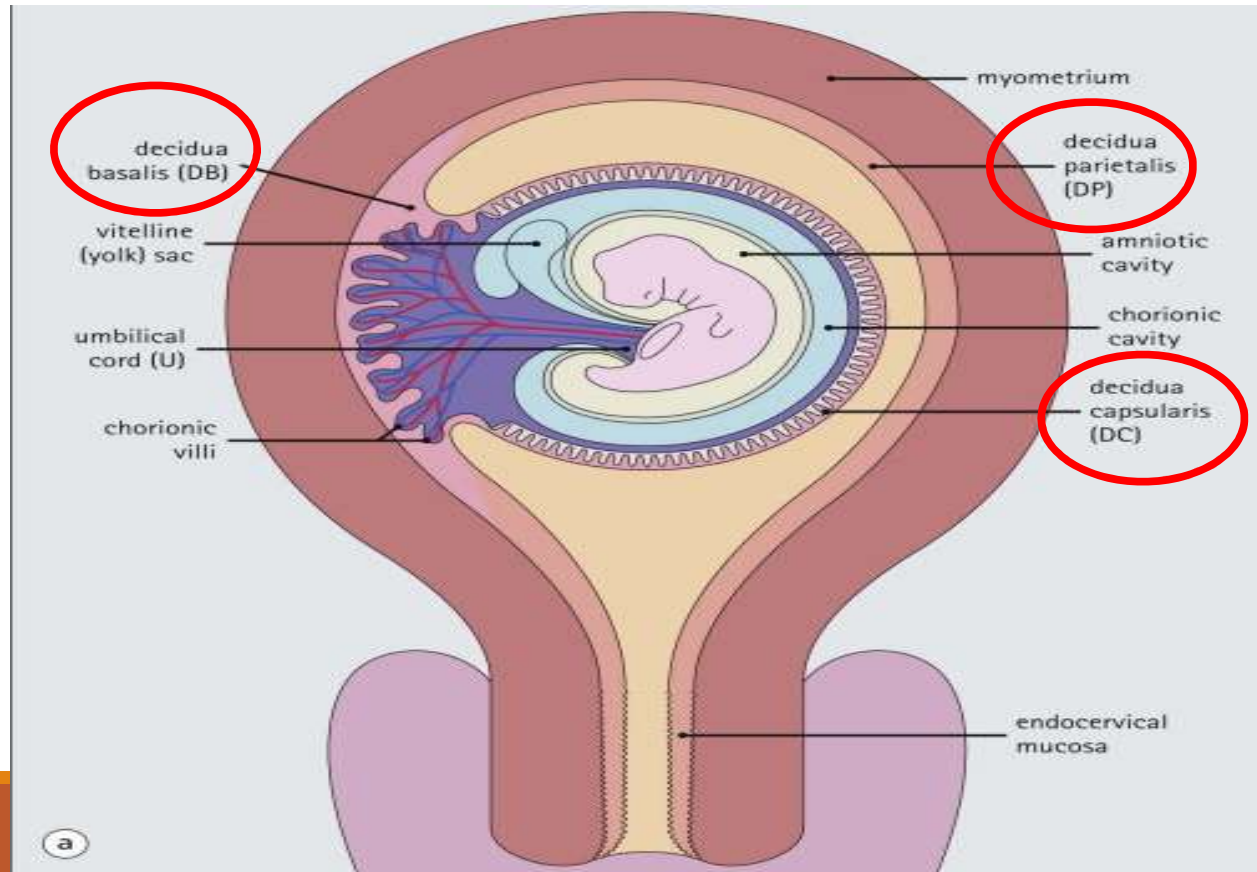
-**If fertilization occurs:** **corpus luteum** is transformed into **corpus luteum** of pregnancy and **continues** to secrete **progesterone**.

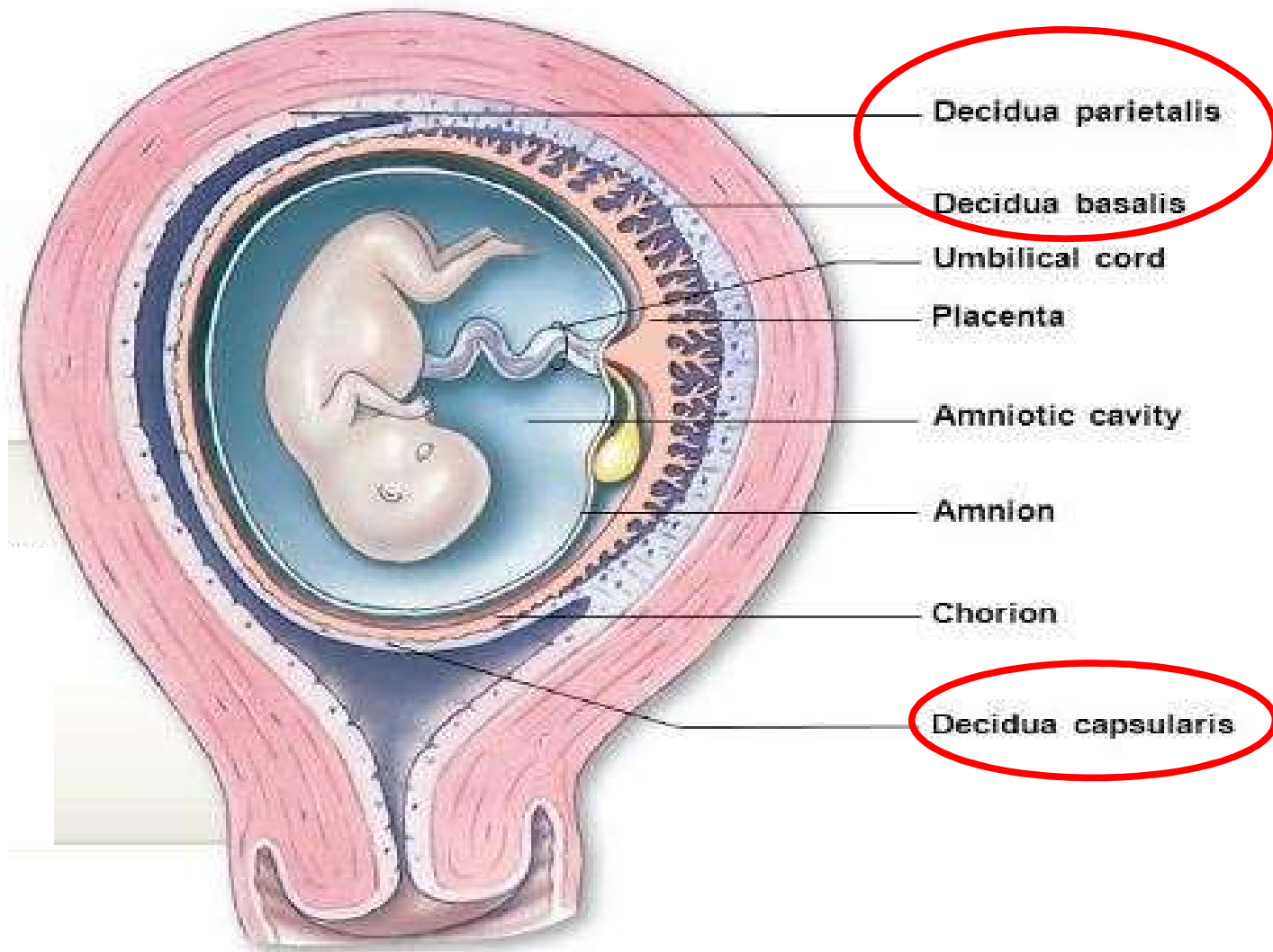
Now the uterine endometrium is transformed into what is called decidua of pregnancy to receive the blastocyst, which reaches the uterine cavity **6 days** after fertilization.

C. The decidua has three parts :

-Decidua is the endometrium of pregnancy which is divided into three parts:

- 1. Decidua basalis:** between the fetus and myometrium. It will form the maternal part of the placenta
- 2. Decidua capsularis:** covers the rest of the foetus.
- 3. Decidua parietalis:** lines the uterine cavity.







THANK YOU