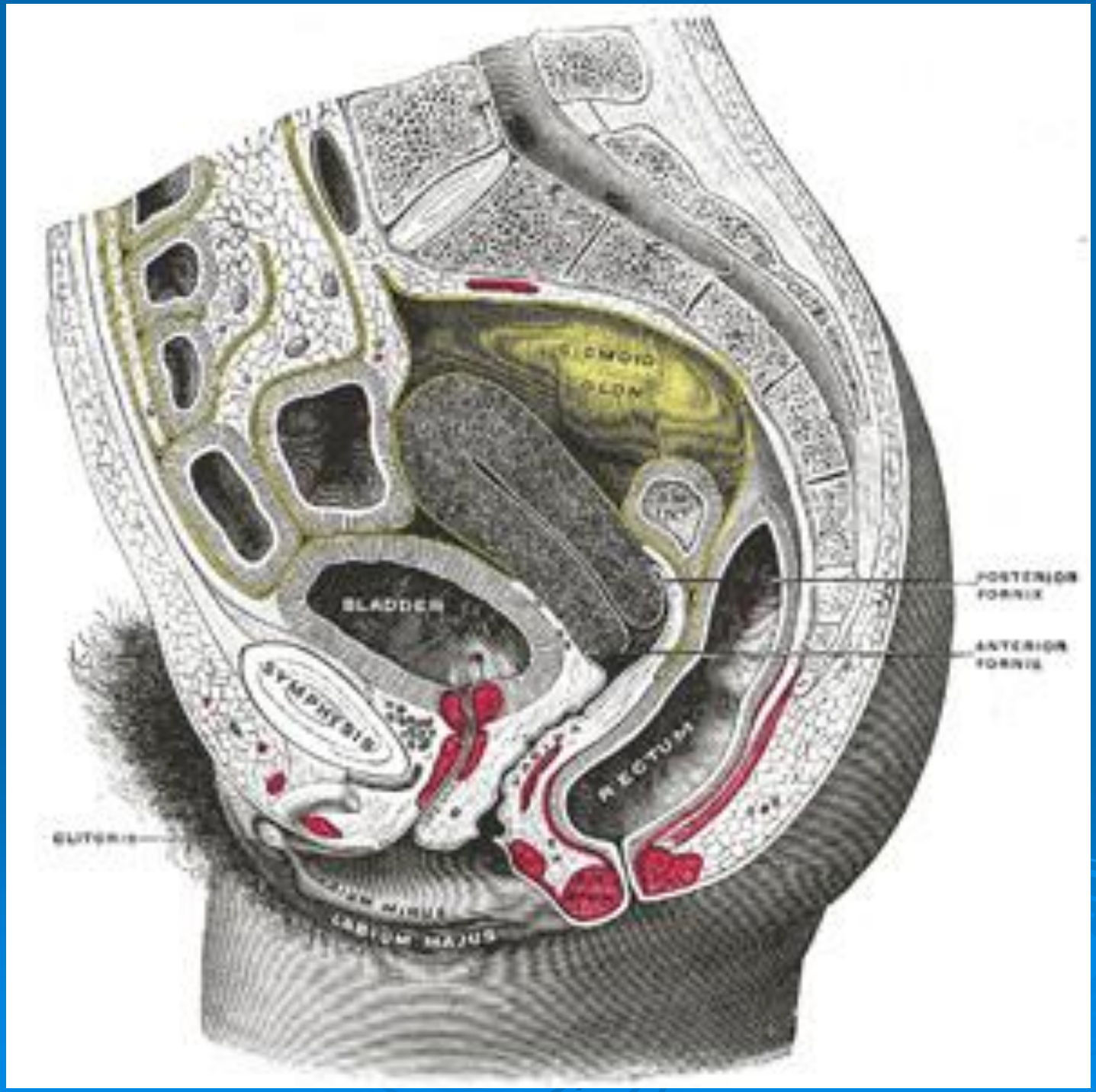
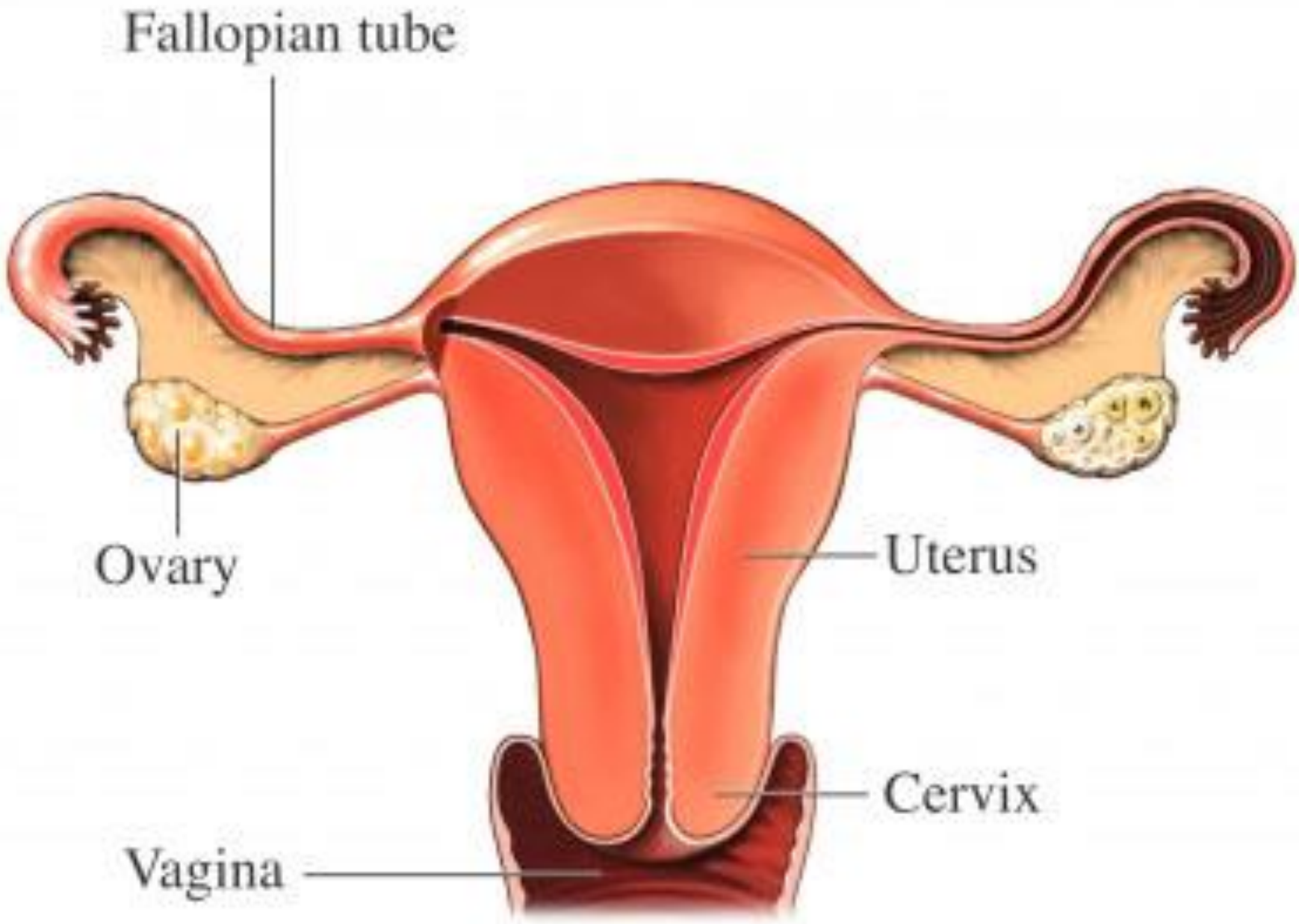
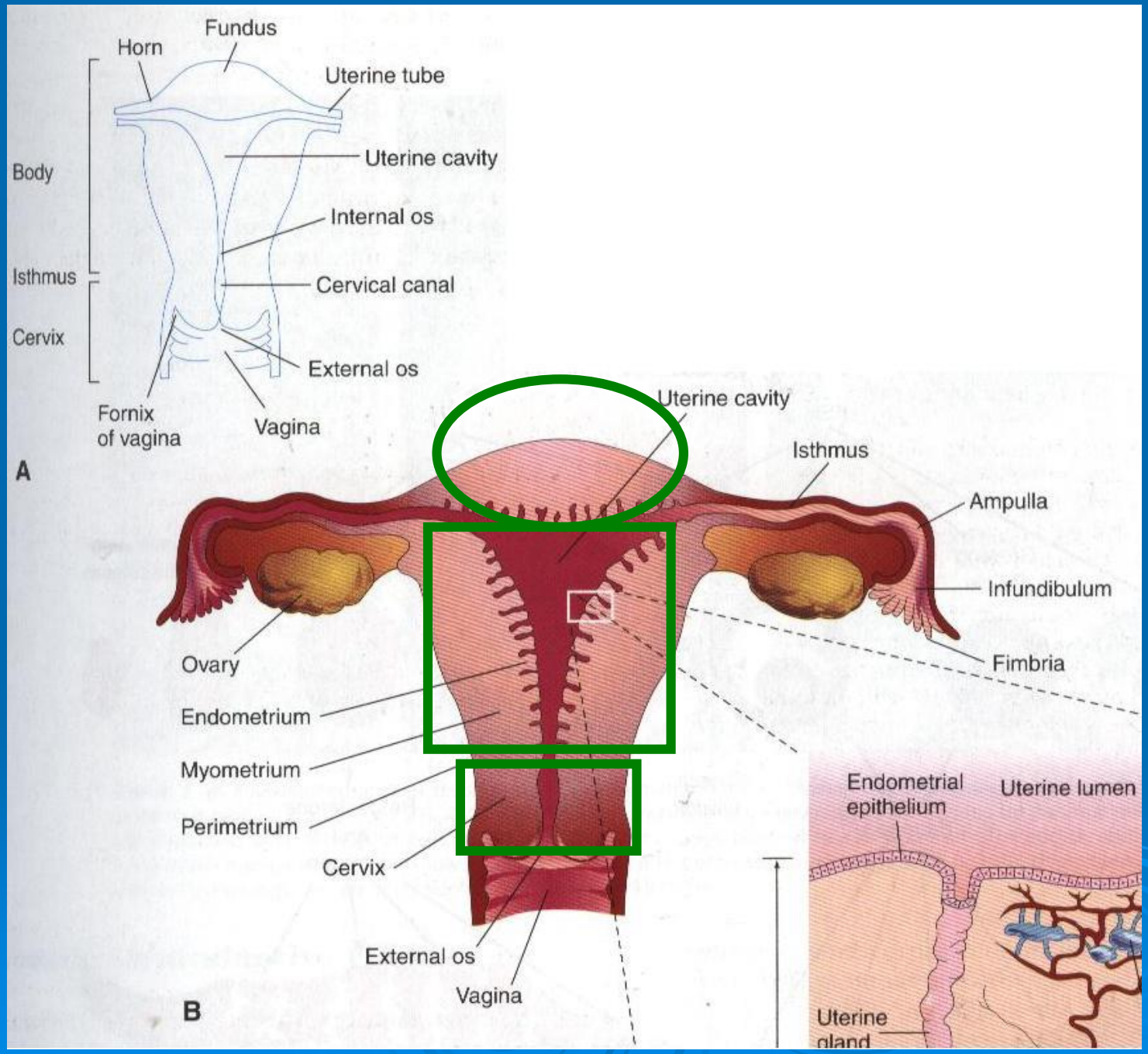
Ovarian Cycle

Dr. Sumeya


BLADDER
SYMPHYSIS
RECTUM
POSTERIOR FORNIX
ANTERIOR FORNIX


Fallopian tube
Ovary
Uterus
Cervix
Vagina


Fundus
Horn
Uterine tube
Body
Uterine cavity
Internal os
Isthmus
Cervical canal
Cervix
External os
Fornix of vagina
Vagina
A
Uterine cavity
Isthmus
Ampulla
Infundibulum
Fimbria
Ovary
Endometrium
Myometrium
Perimetrium
Cervix
External os
Vagina
B
Endometrial epithelium
Uterine lumen
Uterine gland

Ovarian Cycle

- At puberty, female undergo regular monthly cycles.
- (GnRH), produced by hypothalamus, acts on anterior pituitary gland, secrete gonadotropins (FSH) & (LH).
- These hormones stimulate & control cyclic changes in ovary.
- At beginning of each ovarian cycle, 15 to 20 PF are stimulated to grow .
- Normally, only one of these follicles reaches full maturity, and others become atretic.
- **Corpus atreticum:** When a follicle becomes atretic, oocyte degenerate & replaced by CT.

- In the course of a normal menstrual cycle, the ovary will go through three phases:
- 1 Follicular phase
- 2 Ovulation
- 3 Luteal phase.

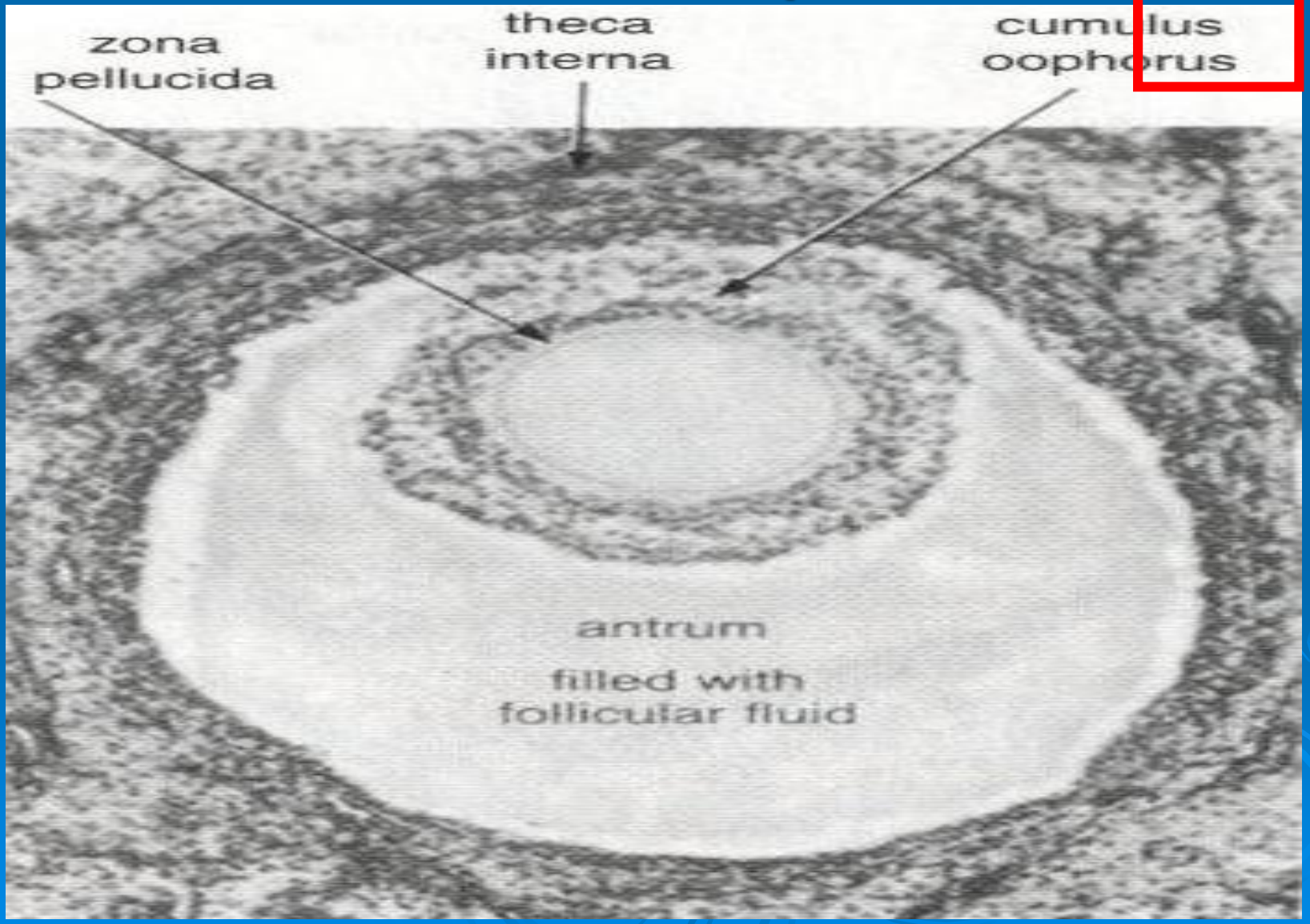
- In cooperation , theca interna and granulosa cells produce estrogens: theca interna cells produce androstenedione and testosterone , and granular cells convert these hormones to estrone and 17 B-estradiol. As a result of this estrogen production,
- The uterine endometrium enters the follicular or proliferative phase

- Thinnig of the cervical mucous occurs to allow passage of sperm and

- The anterior lobe of the pituitary gland is stimulated to secrete LH

- At midcycle, there is an LH surge that :
- Elevate concentration of maturation-promoting factor, causing oocyte to complete meiosis 1 and initiate meiosis 11 :
- Stimulate production of progesterone by follicular stromal cells (lutinization):and
- Cause follicular rupture and ovulation.

Cumulus Oophorus

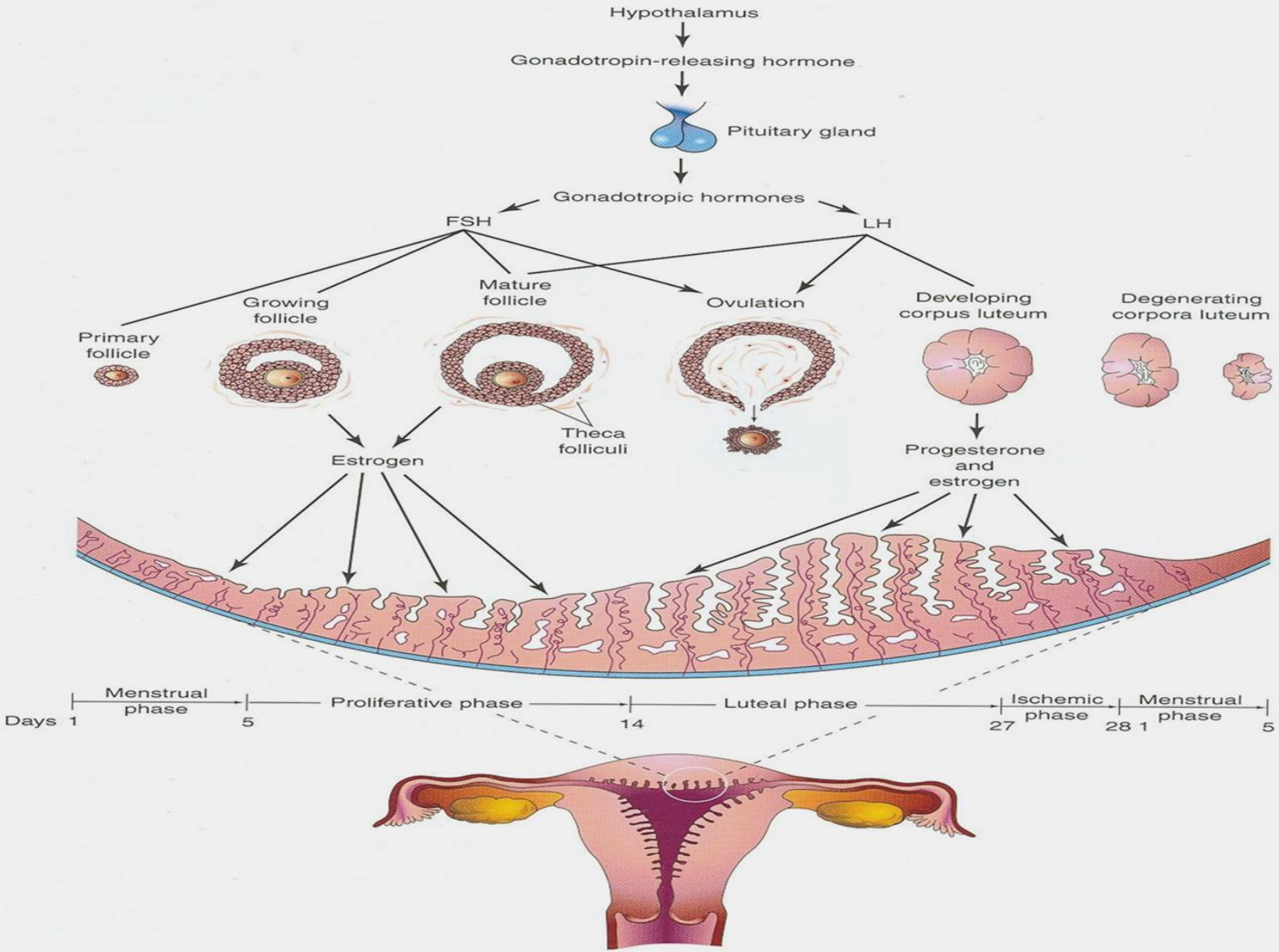


Ovulation

In the meantime, the surface of the ovary begins to bulge locally, and at the apex, an avascular spot, the stigma, appears. The high concentration of LH increases

•collagenase activity, resulting in digestion of collagen fibers surrounding the follicle.
•Prostaglandin levels and cause local muscular contractions in the ovarian wall.
The oocyte, in metaphase of meiosis II, is discharged from the ovary together with a large number of cumulus oophorus cells. Some of the cumulus oophorus cells then rearrange themselves around the zona pellucida to form the corona radiate

During ovulation, some women feel a slight pain "middle pain" because it normally occurs near the middle of the menstrual cycle.
Ovulation is also generally accompanied by a rise in basal temperature, which can be monitored to aid couples in becoming pregnant or preventing pregnancy.


Hypothalamus
Gonadotropin-releasing hormone
Pituitary gland
Gonadotropic hormones
FSH
LH
Primary follicle
Growing follicle
Mature follicle
Ovulation
Developing corpus luteum
Degenerating corpora luteum
Theca folliculi
Estrogen
Progesterone and estrogen
Days 1
Menstrual phase
5
Proliferative phase
14
Luteal phase
27
Ischemic phase
28 1
Menstrual phase
5

Corpus Luteum

After ovulation, granulosa cells remaining in the wall of the ruptured follicle, together with cells from the theca interna, are vascularized by surrounding vessels.

Under the influence of LH, these cells develop a yellowish pigment and change into lutean cells, which form the corpus luteum and secrete the hormone progesterone .

Progesterone, together with estrogenic hormones, causes the uterine mucosa to enter the progestational or secretory stage in preparation for implantation of the embryo.

Fate of the corpus luteum

If fertilization does not occur:

the corpus luteum reaches maximum development approximately 9 days after ovulation. Subsequently, the corpus luteum shrinks because of degeneration of lutean cells and forms a mass of fibrotic scar tissue, the corpus albicans.

Fate of the corpus luteum

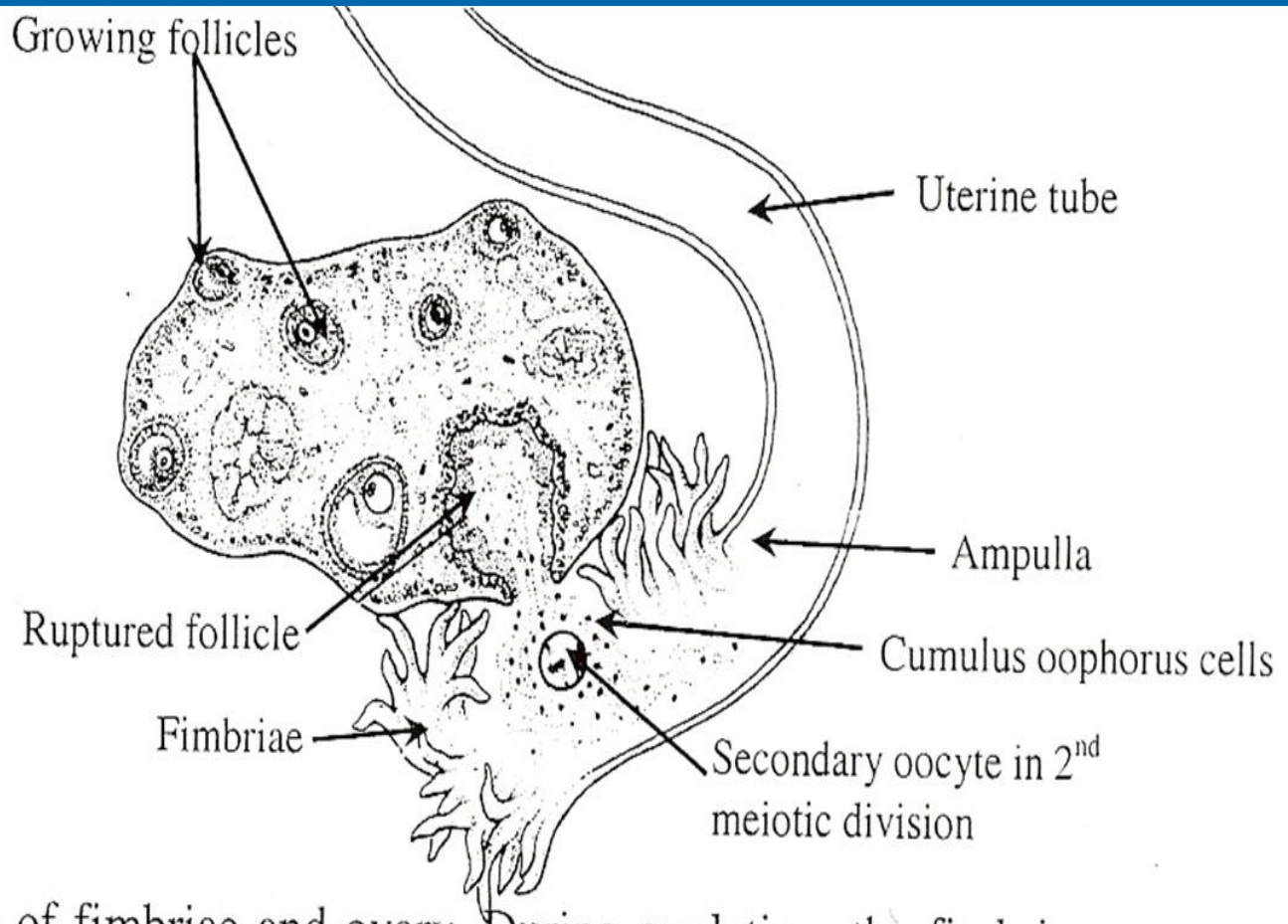
If the oocyte is fertilized

degeneration of the corpus luteum is prevented by human chorionic gonadotropin (hCG), a hormone secreted by the syncytiotrophoblast of the developing embryo. The corpus luteum continues to grow and forms the corpus luteum of pregnancy (corpus luteum graviditatis).

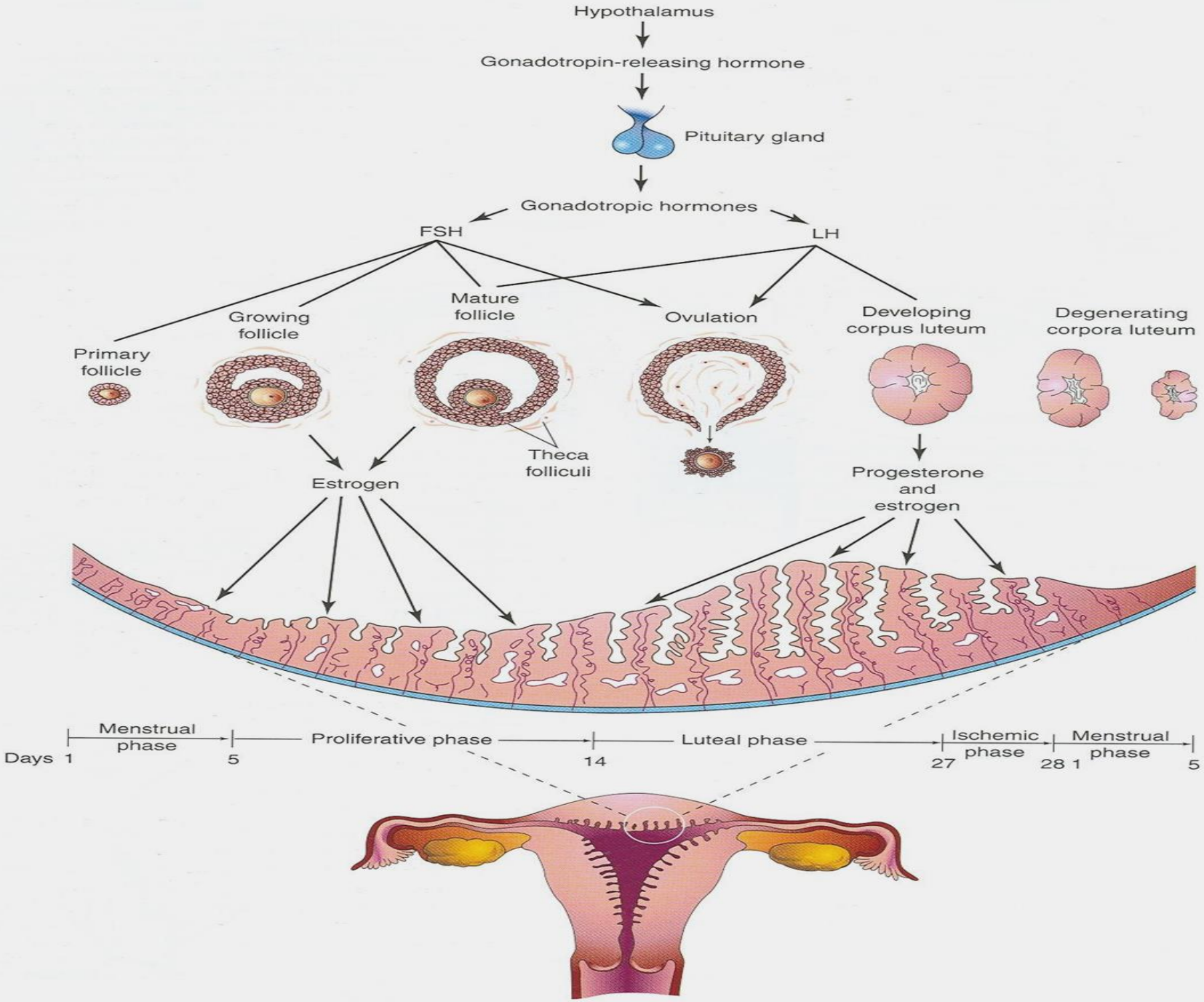
By the end of the third month, this structure may be one third to one half of the total size of the ovary. Yellowish luteal cells continue to secrete progesterone until the end of the fourth month; thereafter, they regress slowly as secretion of progesterone by the trophoblastic component of the placenta becomes adequate for maintenance of pregnancy. Removal of the corpus luteum of pregnancy before the fourth month usually leads to abortion.

Oocyte Transport

- Shortly before ovulation, fimbriae of the uterine tube sweep over the surface of the ovary, and the tube itself begins to contract rhythmically. It is thought that the oocyte, surrounded by some granulosa cells), is carried into the tube by these sweeping movements of the fimbriae and by motion of cilia on the epithelial lining.
- Once in the tube, cumulus cells withdraw their cytoplasmic processes from the zona pellucida and lose contact with the oocyte.
- Once the oocyte is in the uterine tube, it is propelled by peristaltic muscular contractions of the tube and by cilia in the tubal mucosa with the rate of transport regulated by the endocrine status during and after ovulation.
- In humans, the fertilized oocyte reaches the uterine lumen in approximately 3 to 4 days.



13: Relations of fimbriae and ovary. During ovulation, the fimbriae sweep over upturing follicle, collecting the oocyte and guiding it into the uterine tube.


Hypothalamus
Gonadotropin-releasing hormone
Pituitary gland
Gonadotropic hormones
FSH
LH
Primary follicle
Growing follicle
Mature follicle
Ovulation
Developing corpus luteum
Degenerating corpora luteum
Theca folliculi
Estrogen
Progesterone and estrogen
Days 1
Menstrual phase
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Proliferative phase
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Luteal phase
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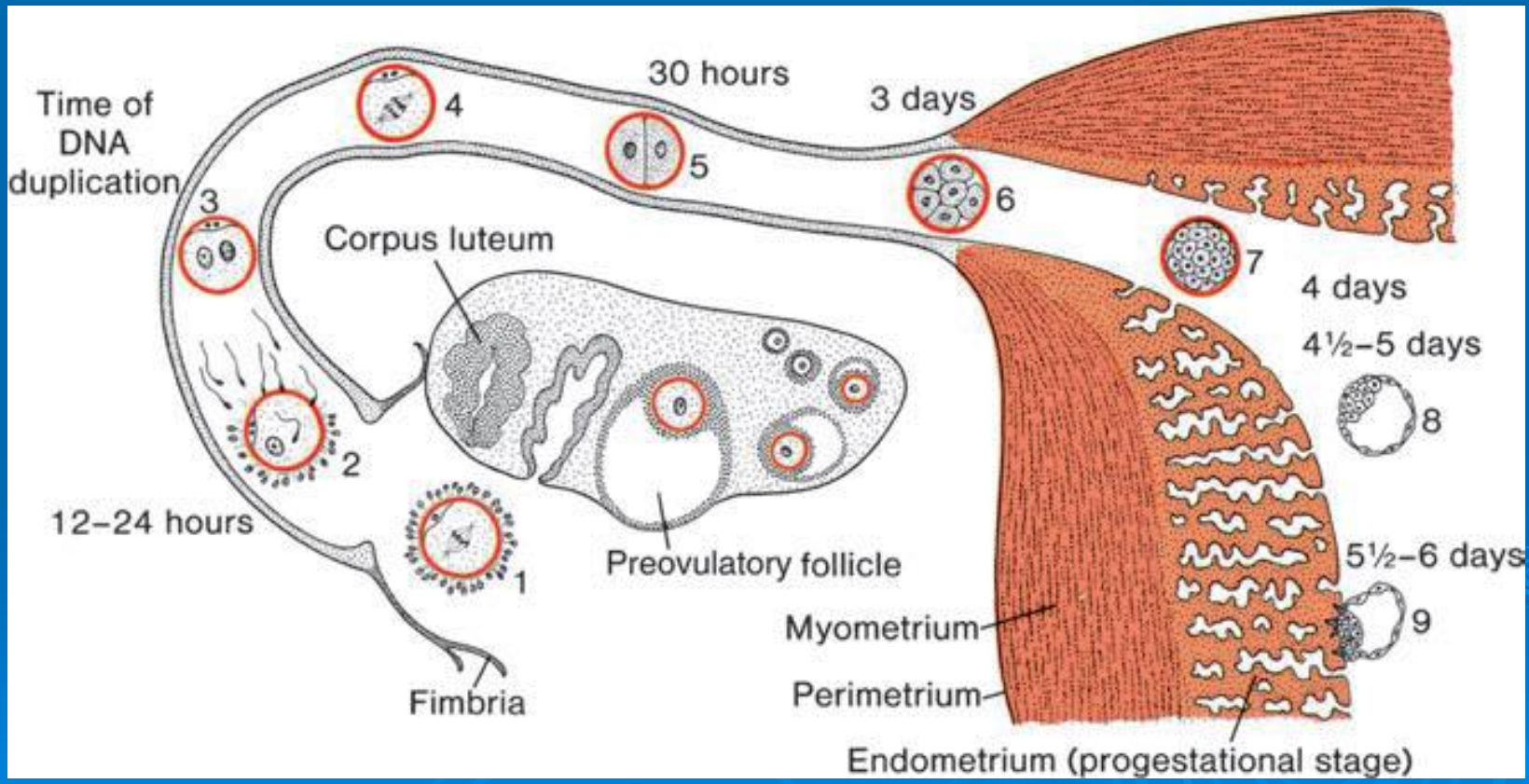
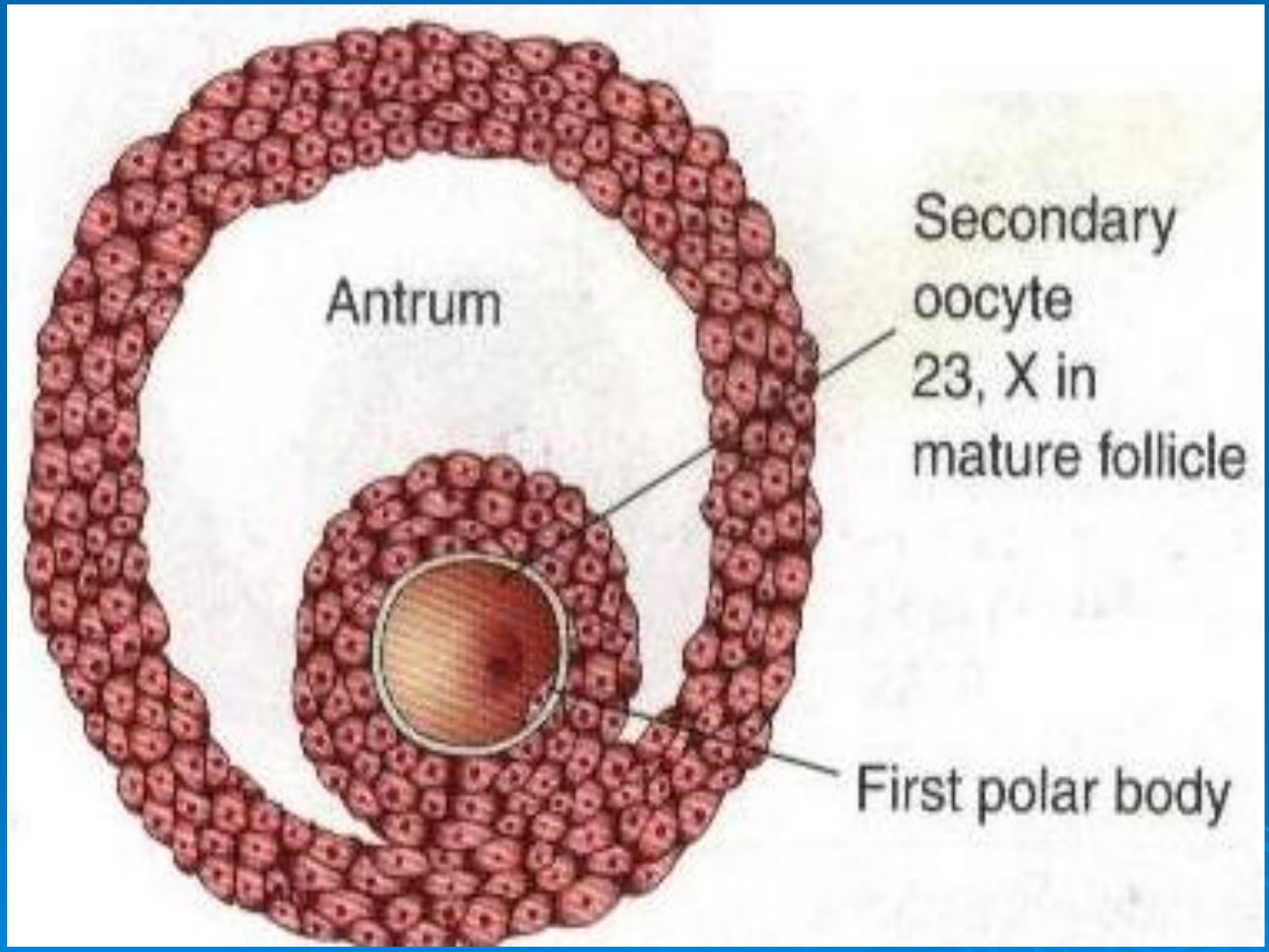
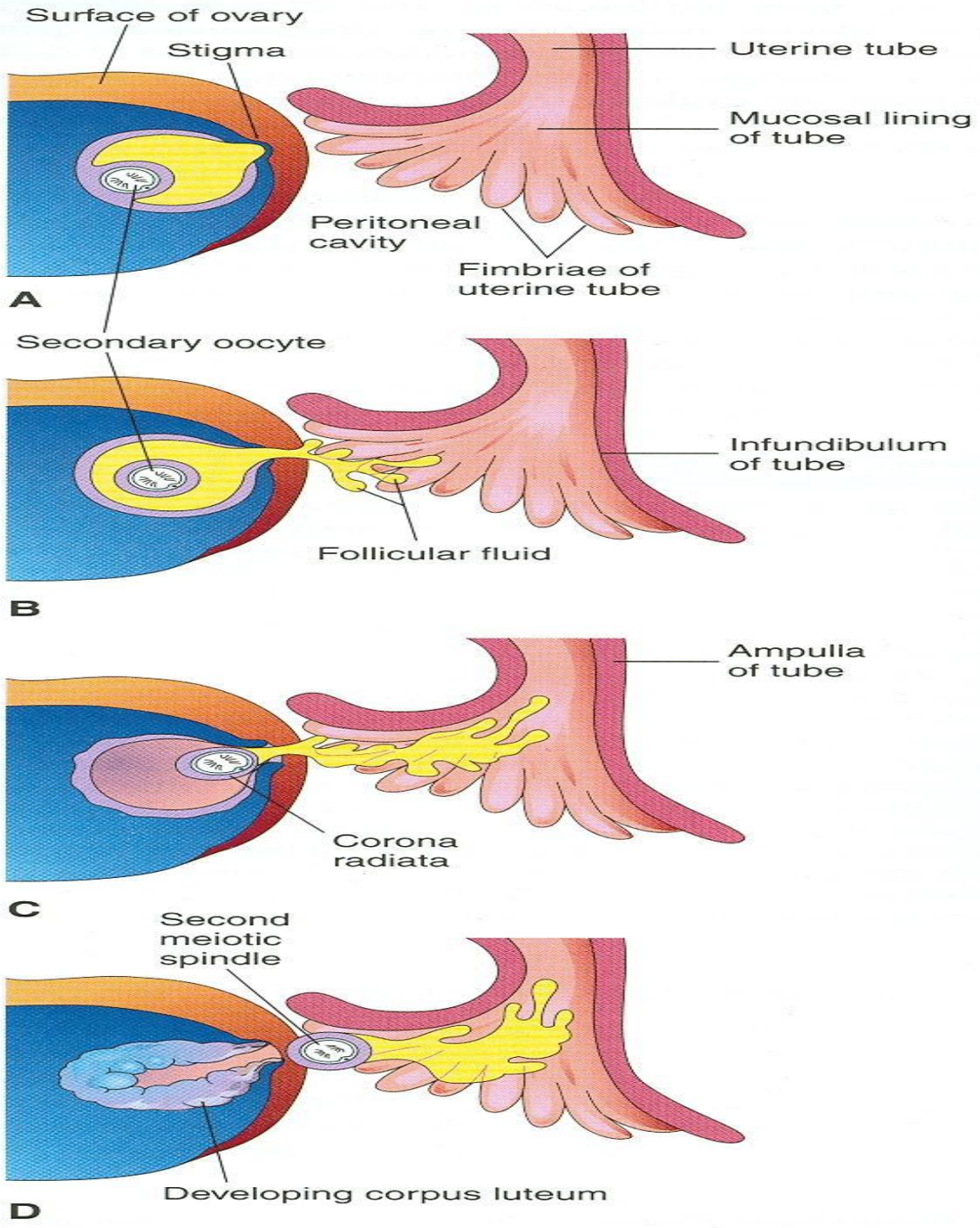
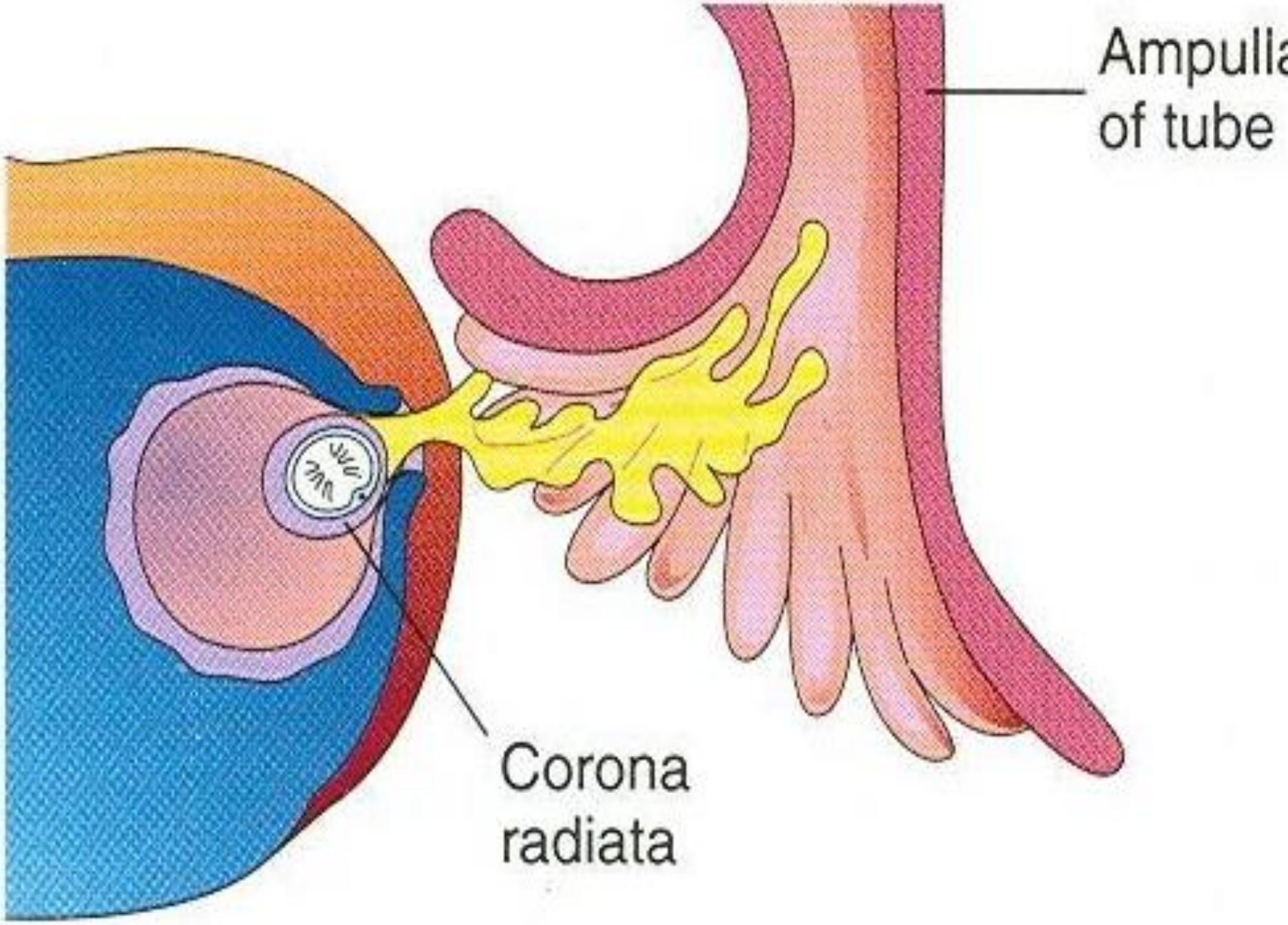
Ischemic phase
28 1
Menstrual phase
5

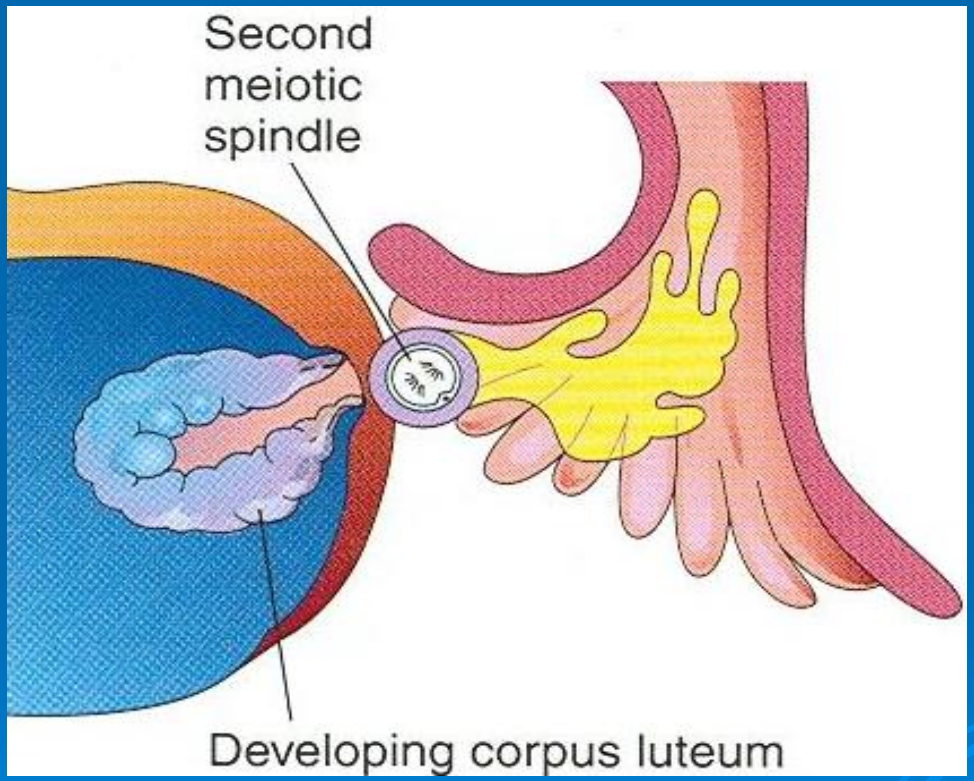

Time of DNA duplication
30 hours
3 days
4
5
6
3
7
Corpus luteum
4 days
4½–5 days
8
2
12–24 hours
1
Preovulatory follicle
5½–6 days
9
Myometrium
Perimetrium
Fimbria
Endometrium (progestational stage)


Antrum
Secondary oocyte 23, X in mature follicle
First polar body


Surface of ovary
Stigma
Uterine tube
Mucosal lining of tube
Peritoneal cavity
Fimbriae of uterine tube
A
Secondary oocyte
Infundibulum of tube
Follicular fluid
B
Ampulla of tube
Corona radiata
C
Second meiotic spindle
Developing corpus luteum
D


Ampulla
of tube
Corona
radiata

Corpus Luteum



Uterine cycle (uterus at time of implantation)

The wall of the uterus consist of three layers :

1- Endometrium or mucosa lining the inside wall.

2-Myometrium , athick layer of smooth muscle

3- Perimetrium , the peritoneal covering lining the outside wall

From puberty (11-13) until menopause (45 -55years), the endometrium undergoes changes in a cycle of approximately 28 days under hormonal control by the ovaries . During this menstrual cycle , the uterine endometrium passes through three stages , the

1-Follicullar or proliferative phase

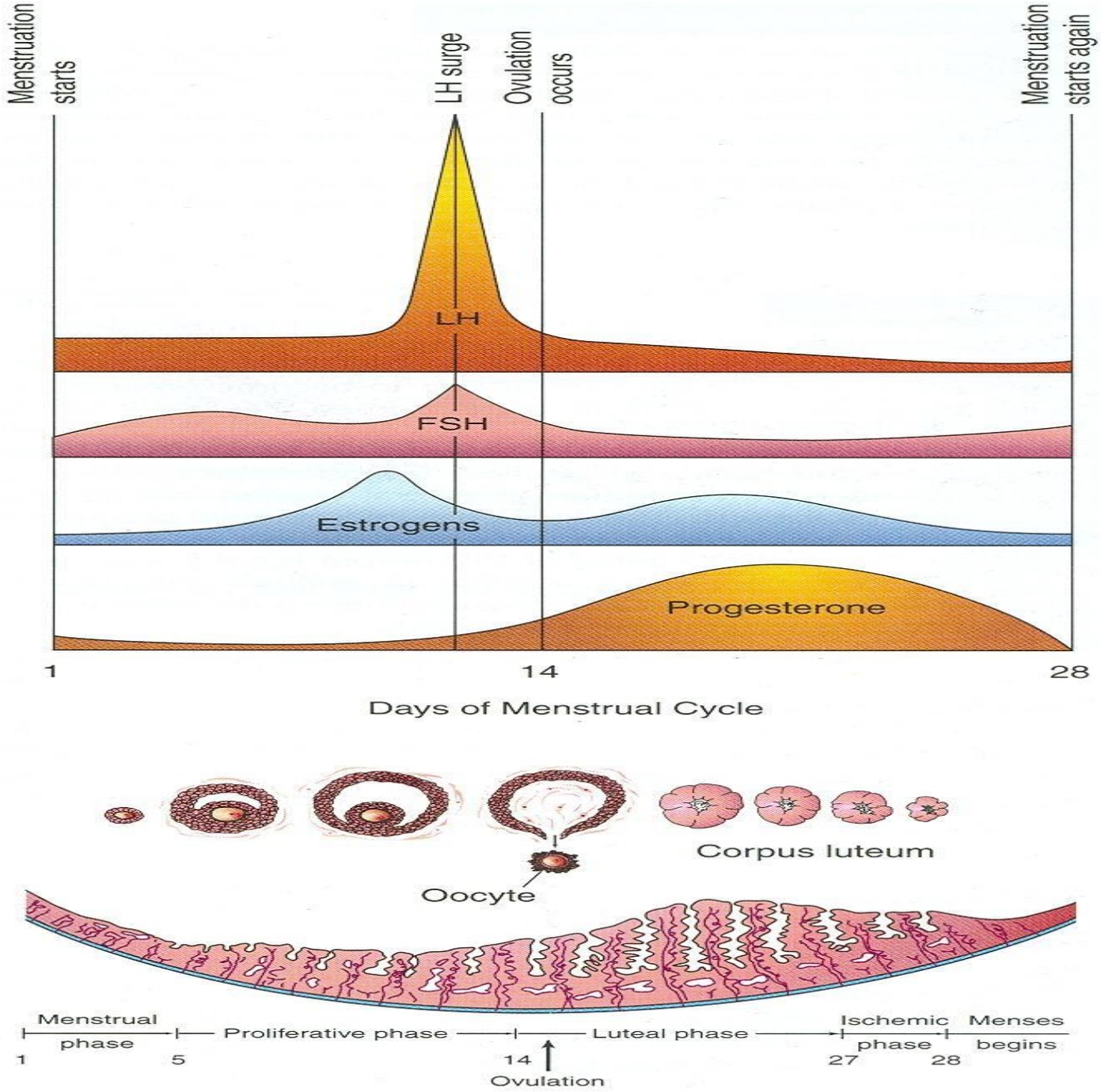
2-Secretory or progestational phase

3-menstrual phase

- The proliferative phase begins at the end of the menstrual phase, is under the influence of estrogen, and parallels growth of the ovarian follicles.

- The secretory phase begins approximately 2 to 3 days after ovulation in response to progesterone produced by the corpus luteum.

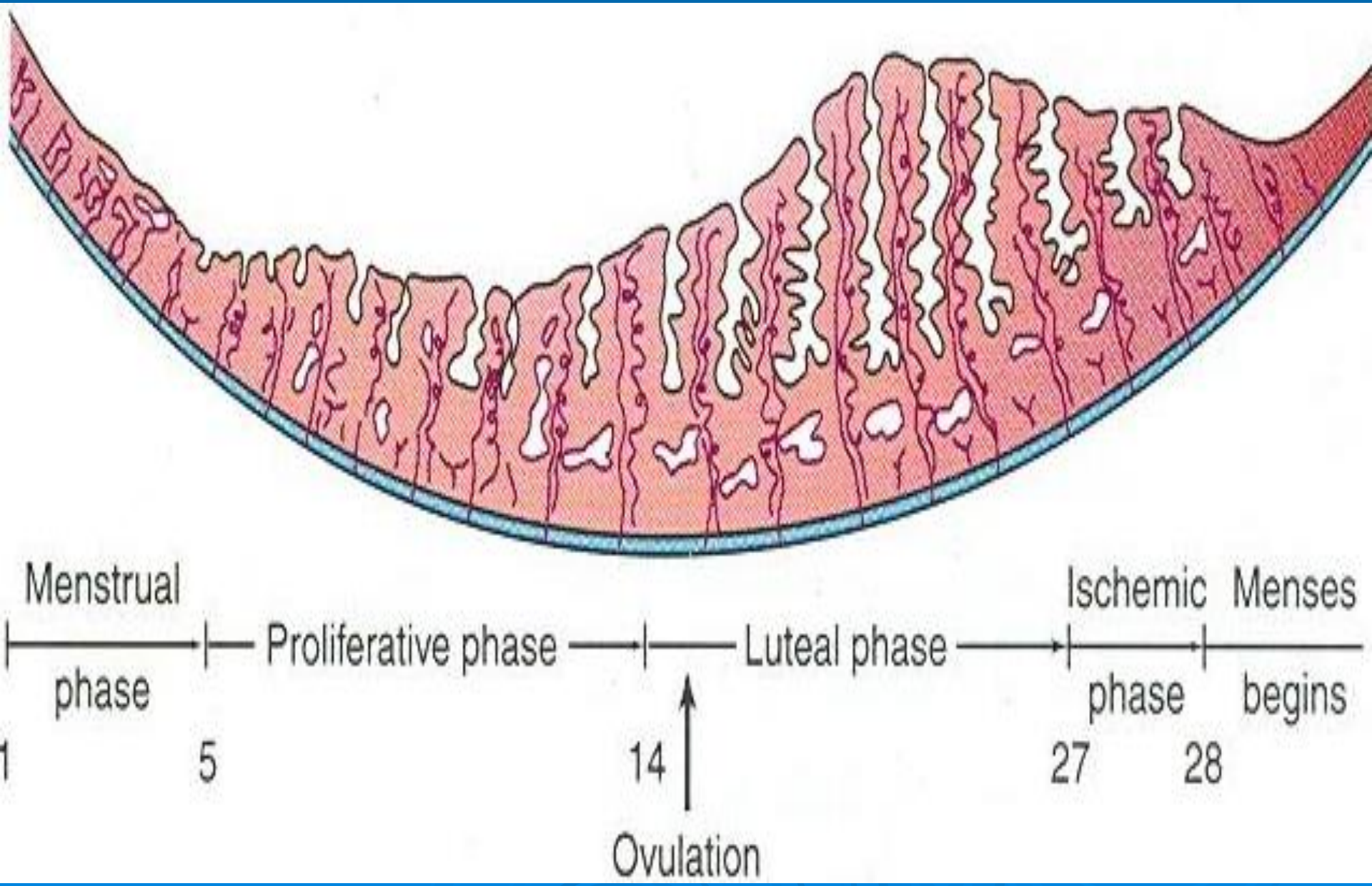
- If fertilization does not occur, shedding of the endometrium (compact and spongy layers) marks the beginning of the menstrual phase


Menstruation starts
LH surge
Ovulation occurs
Menstruation starts again
LH
FSH
Estrogens
Progesterone
1
14
28
Days of Menstrual Cycle
Corpus luteum
Oocyte
Menstrual phase
Proliferative phase
Luteal phase
Ischemic phase
Menses begins
1
5
14
Ovulation
27
28

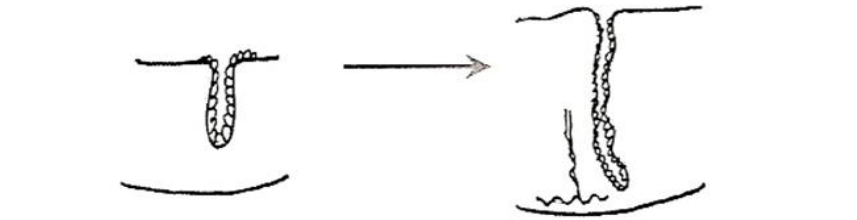
. If fertilization does occur, the endometrium assists in implantation and contributes to formation of the placenta.

- Later in gestation, the placenta assumes the role of hormone production, and the corpus luteum degenerates.

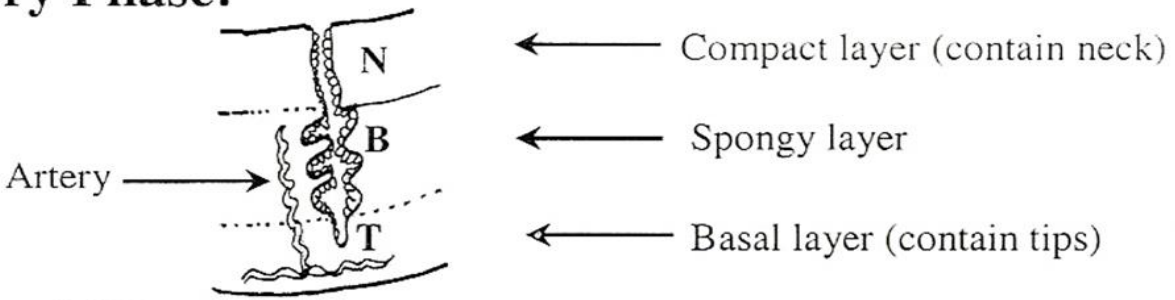
- At the time of implantation, the mucosa of the uterus is in the secretory phase .during which time uterine glands and arteries become coiled and the tissue becomes succulent.


Menstrual
phase
Proliferative phase
Luteal phase
Ischemic
phase
Menses
begins
1
5
14
27
28
Ovulation

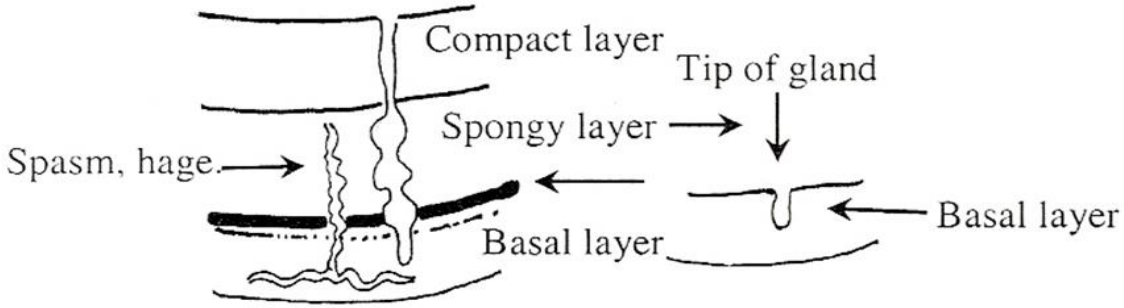
Repair and Proliferative Phase:

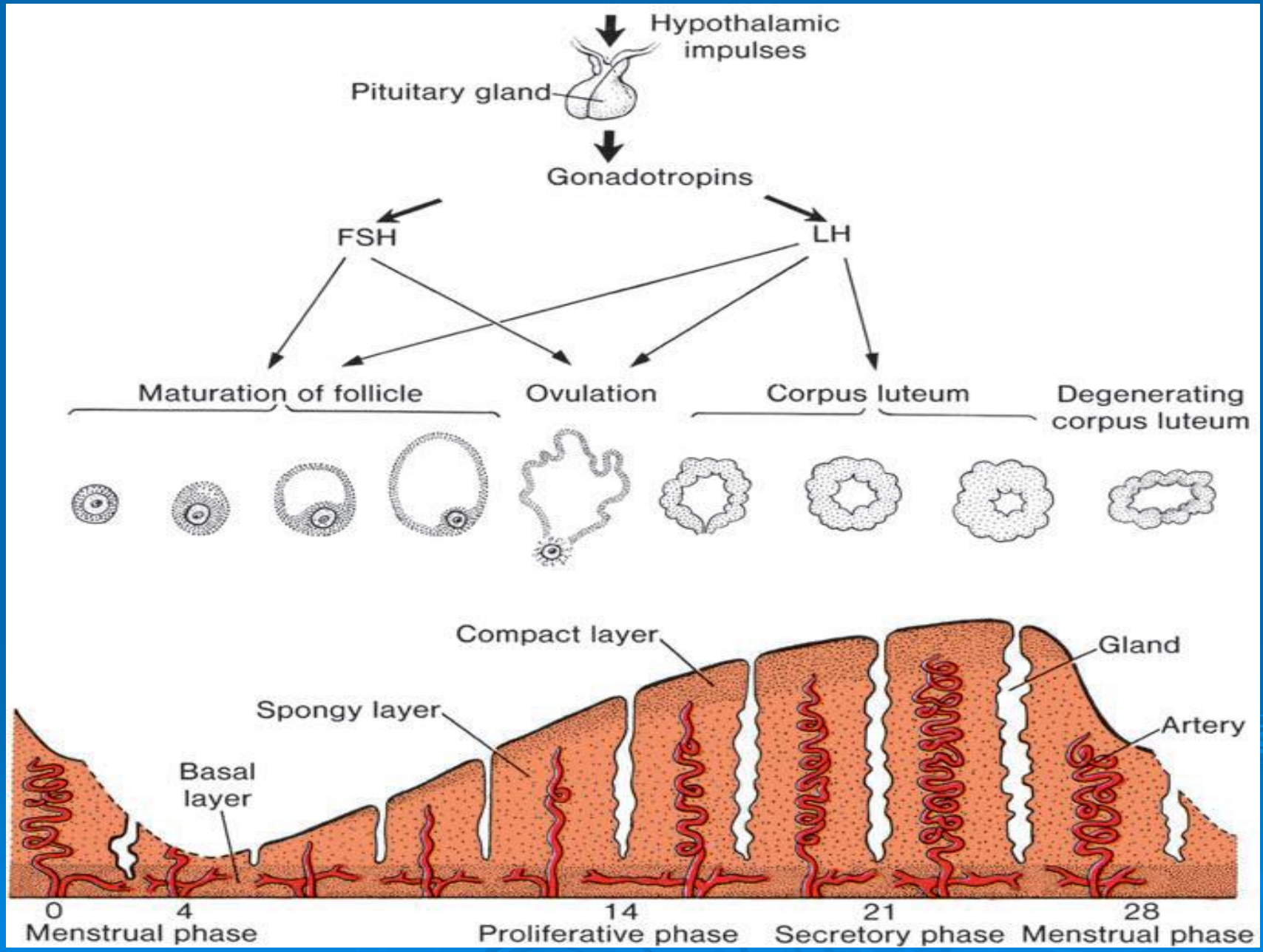


Secretory Phase:



Menstrual Phase:




Hypothalamic impulses
Pituitary gland
Gonadotropins
FSH
LH
Maturation of follicle
Ovulation
Corpus luteum
Degenerating corpus luteum
Compact layer
Gland
Spongy layer
Artery
Basal layer
0
4
14
21
28
Menstrual phase
Proliferative phase
Secretory phase
Menstrual phase

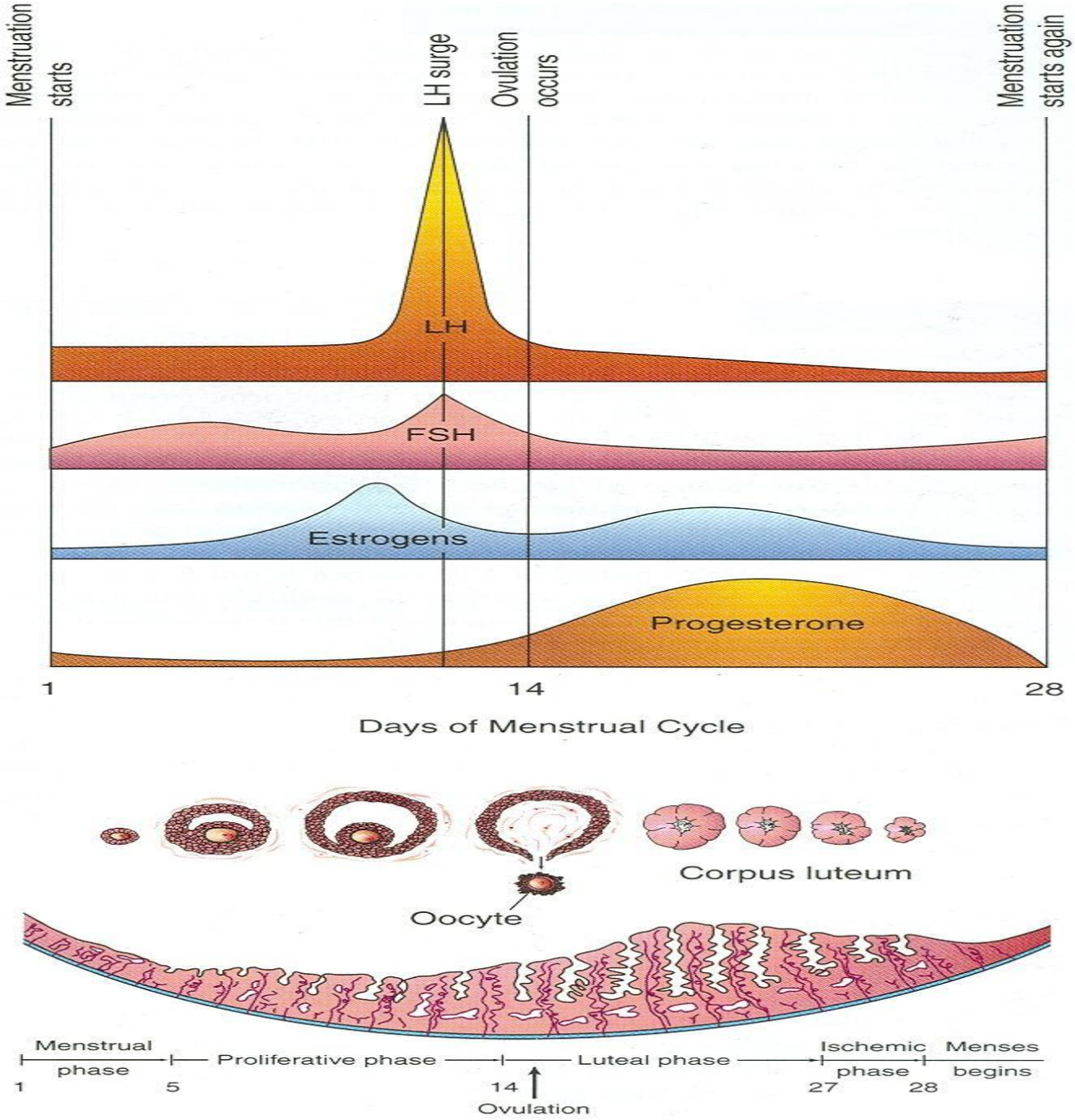
As a result, three distinct layers can be recognized in the endometrium:

- a superficial compact layer,
- an intermediate spongy layer,
- and a thin basal layer .
- Normally, the human blastocyst implants in the endometrium along the anterior or posterior wall of the body of the uterus, where it becomes embedded between the openings of the glands .

- If the oocyte is not fertilized, venules and sinusoidal spaces gradually become packed with blood cells.
- When the menstrual phase begins, blood escapes from superfi cial arteries, and small pieces of stroma and glands break away.

- During the following 3 or 4 days, the compact and spongy layers are expelled from the uterus, and the basal layer is the only part of the endometrium that is retained .

- This layer, which is supplied by its own arteries, the basal arteries, functions as the regenerative layer in the rebuilding of glands and arteries in the proliferative phase .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Thank you