

Reproduction

The only system of the body that is not required for survival of the individual.
Is required for the survival and evolution of populations.

Gametes

The cells that contain genetic information which will be passed on to the next generation.

Egg

The cells produced by the female; they contain half the amount of genetic material as body cells (1n or n or haploid cells.)

Are made in the ovaries.

Sperm

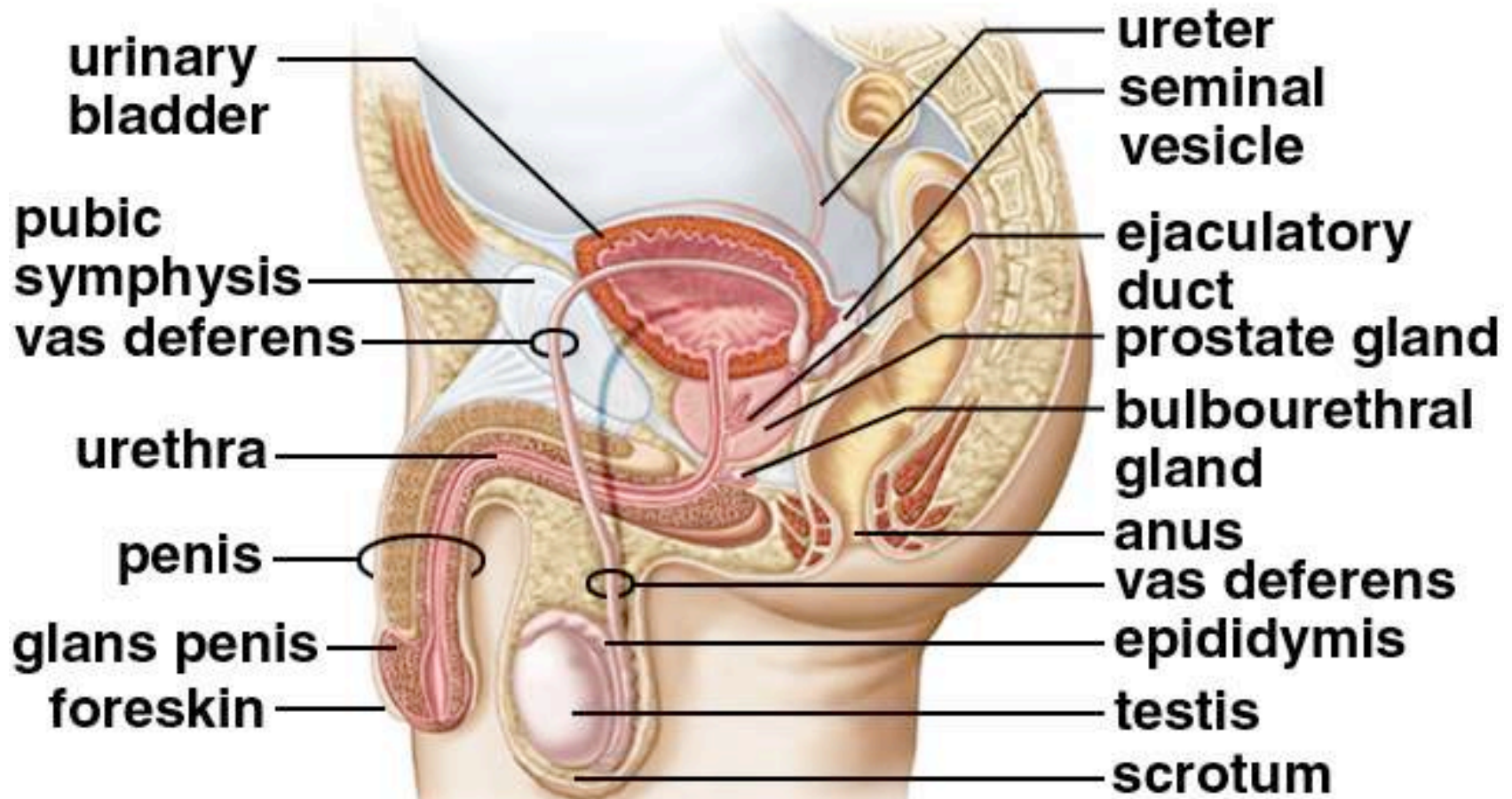
The cells produced by the male; they also contain half the amount of genetic material (1n or n.)

Are made in the testes.

The two cells combine ($n+n=2n$ or diploid) to form the zygote; a 2n cell with double the genetic material, one set from the mother, the other set from the father.

The zygote divides many time to form an individual.

The Male Reproductive System

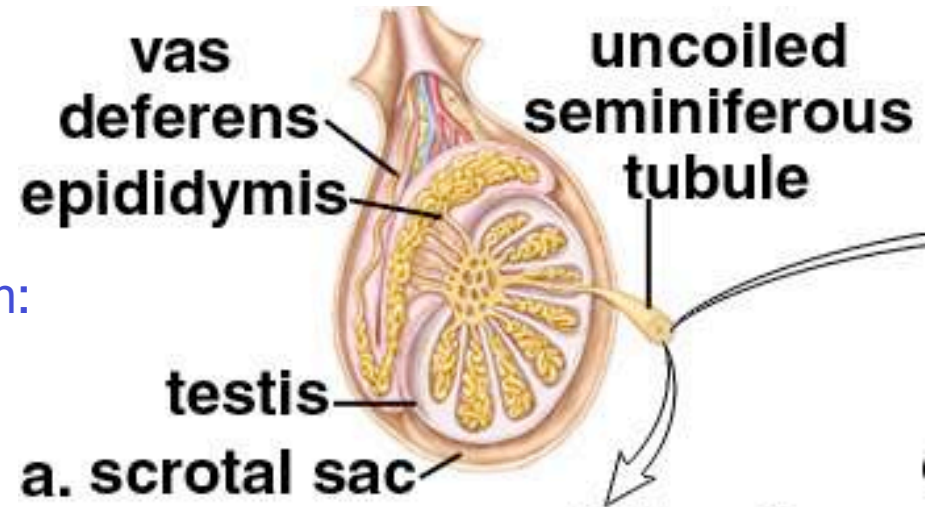


Male reproductive

Testes

...located within the scrotum. Contain:

- 1) cells which make sperm cells.
- 2) Tubules where sperm cells are stored and begin to mature
- 3) cells which make the male sex hormone, testosterone.



Scrotum

This is a skin covered pouch that contains and protects the testes.

With the scrotal sac walls are smooth muscle layers, which act to raise or lower the scrotum.

Sperm production requires a slightly lower temperature than body temp.

If the scrotal temp is too high; the testes are lowered to move them away from the body; this lowers the temp within the testes.

sperm

Haploid (n) cells made by the testes.

Head

Contains the genetic material which will be delivered to the egg cell.

acrosome cap

Contains enzymes which will allow the sperm cells to penetrate into the egg cell.

Midpiece

Lots of mitochondria are found here; these generate ATP for movement; energy source is a sugar called fructose found in semen.

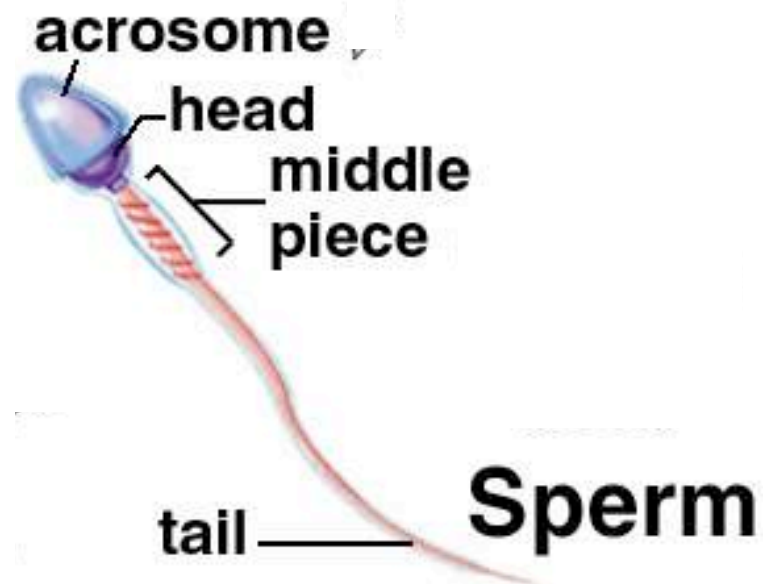
Tail

...or the flagella. This propels the sperm cell towards the egg cell.

Becomes motile (starts to move) only when in contact with semen.

Each ejaculation contains about 500 million sperm cells.

On average, a male makes about 50 million sperm cells per day.



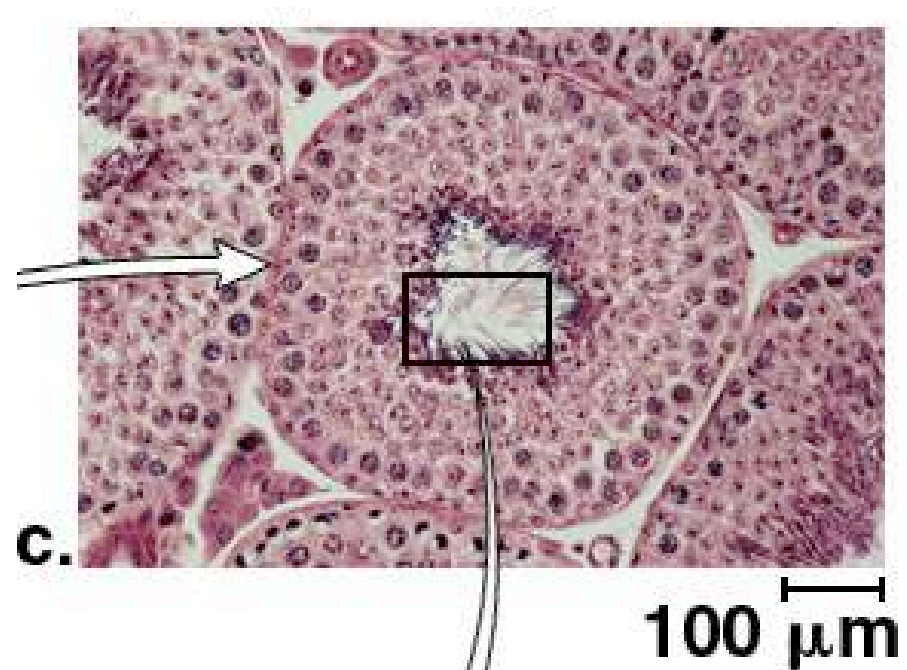
interstitial cells skip

... are found within the testes,
between the tubules where
sperm cells are made.

These cells make the male sex
hormone...

testosterone

This hormone is responsible for maintaining male primary sexual characteristics, such as penis and testicular development. Also maintains the secondary characteristics, such as muscle mass, fat distribution, body hair, voice, etc. Determines male sex drive and behaviors.

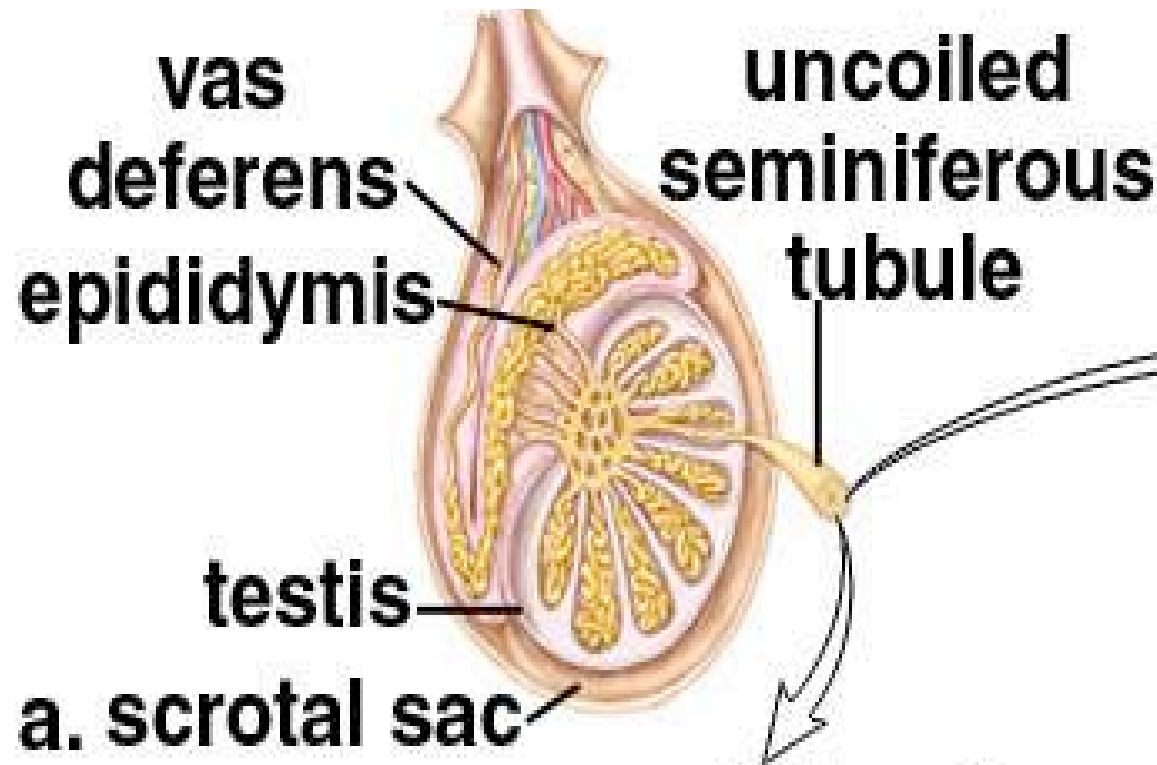


Vas Deferens

Is a tube which leads out of the testes, passes into the lower part of the abdominal cavity and joins the urethra just below the urinary bladder.

Functions:

- 1) Carries sperm cells into the urethra
- 2) Stores sperm cells until needed.

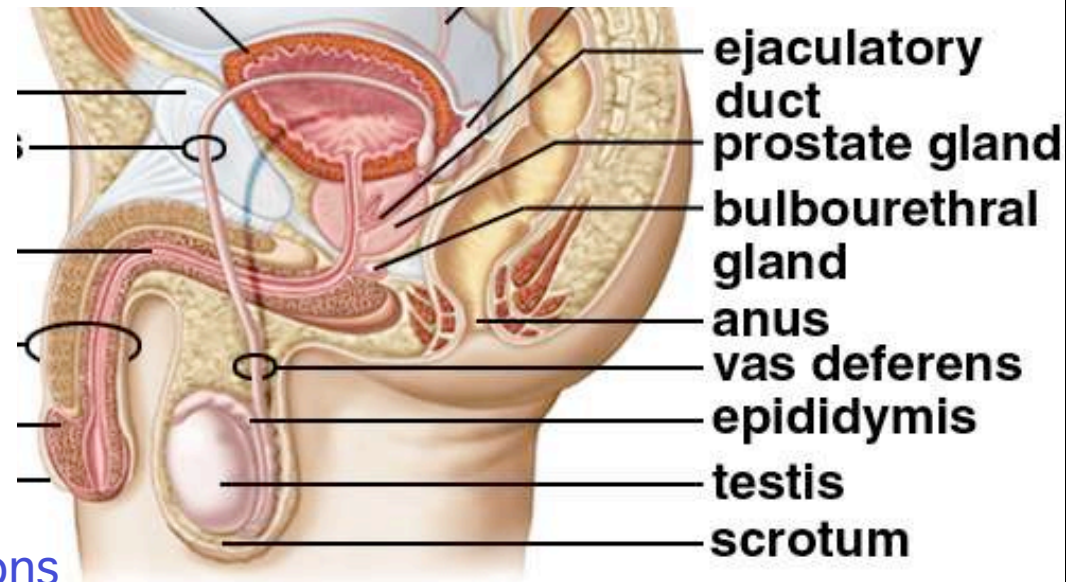


prostate glands

Semen is made of
sperm+seminal fluid

Seminal fluid made by the secretions of several glands.

- 1) Seminal vesicles: provides fructose
- 2) Prostate gland: makes an alkaline secretion; counters the acidic environment of the vagina
- 3) Bulbourethral glands: a mucus secretion for lubrication during coitus (sexual activity). skip



penis

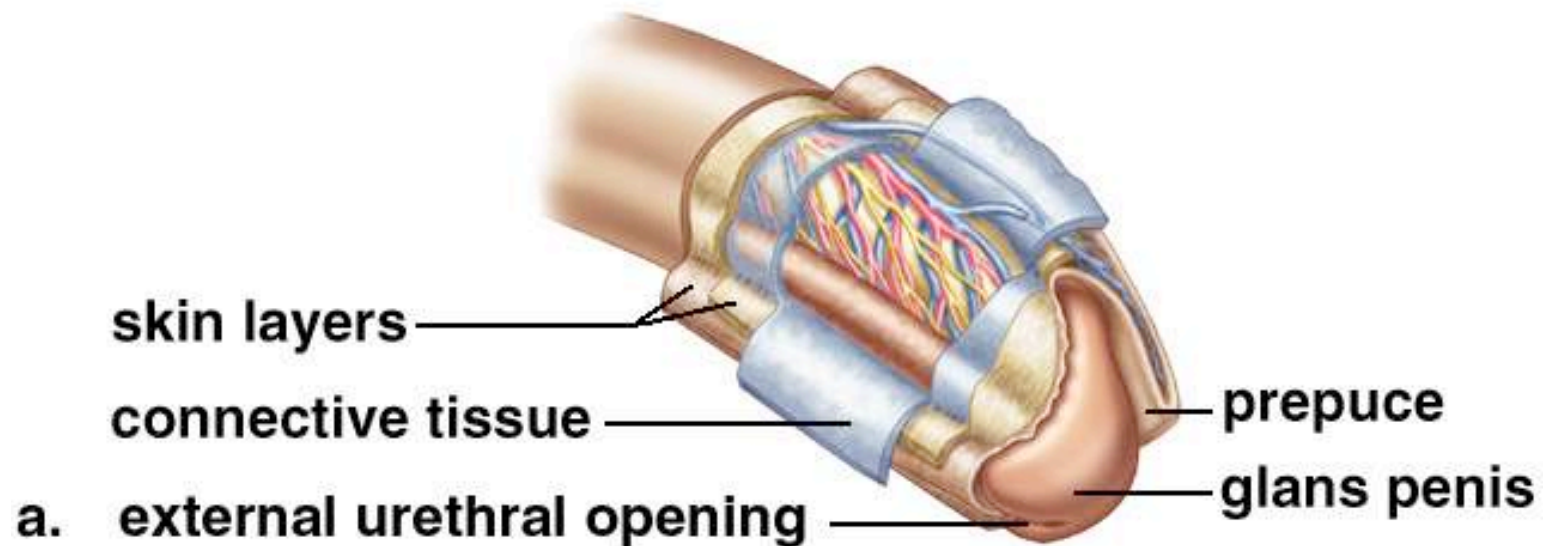
Shaft

Contains erectile tissue which fill with blood during an erection.

Glans The expanded end of the shaft of the penis.
Contains erectile tissue.

Foreskin Covers the glans; is removed during circumcision.

Penis Anatomy



Erection

...of the penis is caused by stimulation of the ANS.

This causes blood vessels draining the erectile tissues to close down, while those supplying the same tissues open up.

As a result the erectile tissues fill with blood, which results in a stiffening of the penis.

Impotency ... or an inability to achieve or maintain an erection has many causes.

Damage to the nerves that supply the blood vessels that feed or drain the erectile tissues. Low BP; psychological issues.

Ejaculation

During coitus, stimulation of receptors in the glans triggers a series of involuntary muscular contractions which propels semen out of the urethra into the vagina; this is called ejaculation.

refractory period

Quickly after ejaculation the vessels draining the erectile tissues open, erection diminishes and the penis becomes flaccid

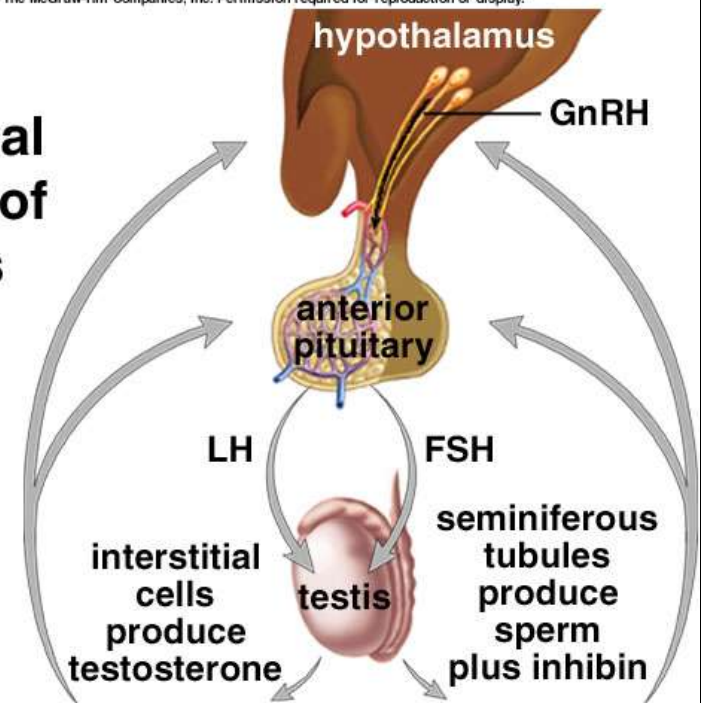
During an erection blood flow into and out of the penis is restricted; by preventing another erection within a short time period, the tissues of the penis can receive nutrients before the next erection.

Hormonal regulation

FSH Follicle stimulating hormone
FSH is released by the pituitary;
it stimulates the testes to
produce sperm cells.

LH Lutenizing hormone
Or interstitial cell stimulating hormone
(ICSH) causes the interstitial cells of the
testes to produce testosterone.

Hormonal Control of Testes



feedback (via hypothalamus)

As testosterone levels rise in the blood, this suppresses the release of LH (ICSH) from the pituitary.

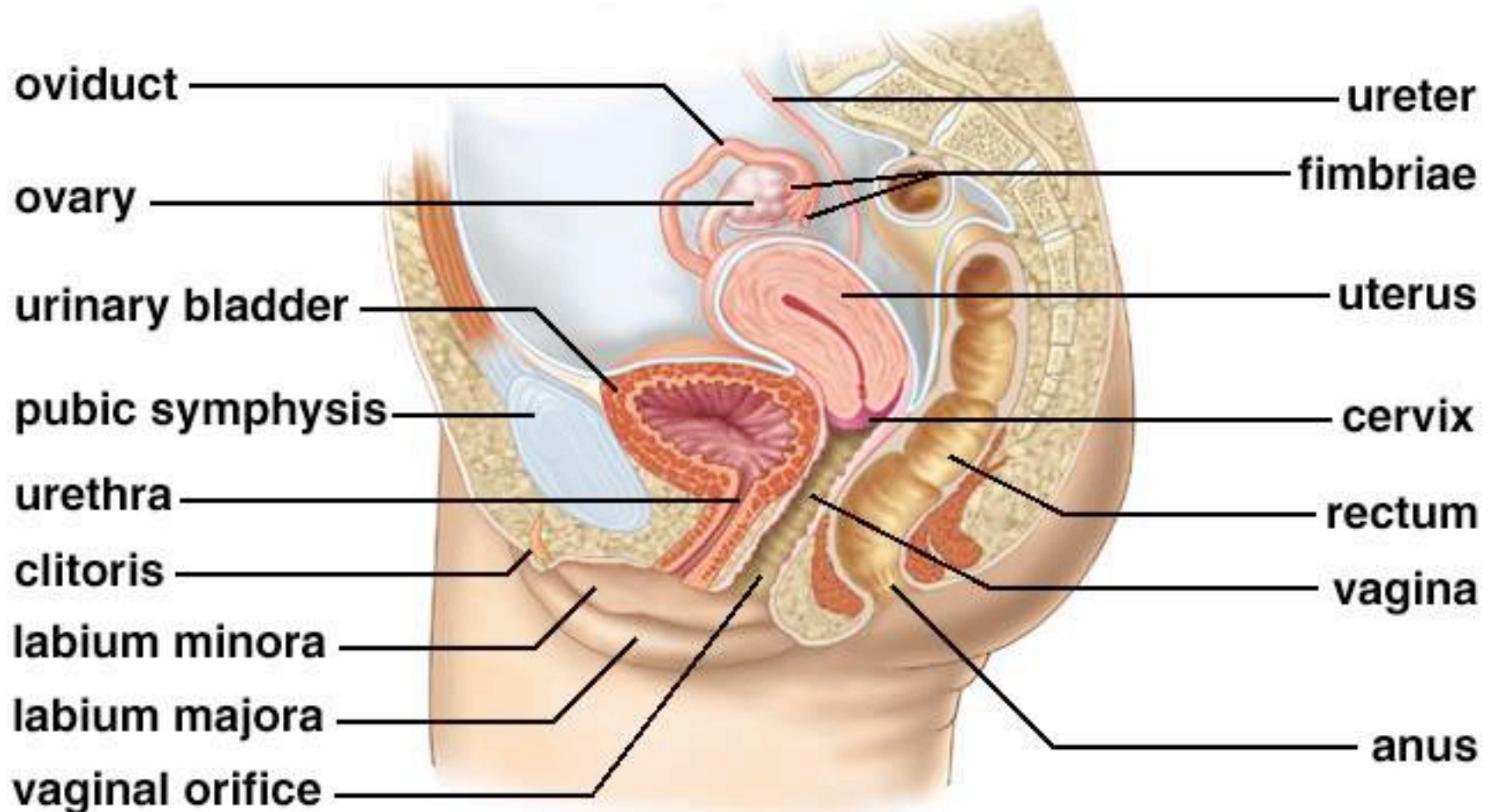
So testosterone is kept within a certain range within the blood.

Puberty skip

During puberty, under the influence of FSH and ICSH, the testes start to produce sperm and increasing levels of testosterone.

The increase in testosterone is responsible for the changes that accompany puberty; change in muscle mass, fat distribution, voice, hair growth (beard in males) and sexual behaviors.

The Female Reproductive System



Female reproductive

Generally more complex than males. Two functions rather than one:

- 1) make egg cells
- 2) support a developing fetus.

Ovaries

Produce egg cells and make the female hormones; estrogen and progesterone. Are located within the abdominal cavity; above and to the side of the uterus.

Follicles

The ovaries, at birth, contains about 400,000 follicles with an immature egg cell in a suspended state.

eggs or oocytes

Only about 400 of the immature egg cells will develop into viable egg cells; during the reproductive lifetime of the female, from puberty to menopause.

corpus luteum

A space is left behind on the ovary, when an egg cell is released.

This space converts into a hormone producing structure called the corpus luteum. See later.

Progesterone

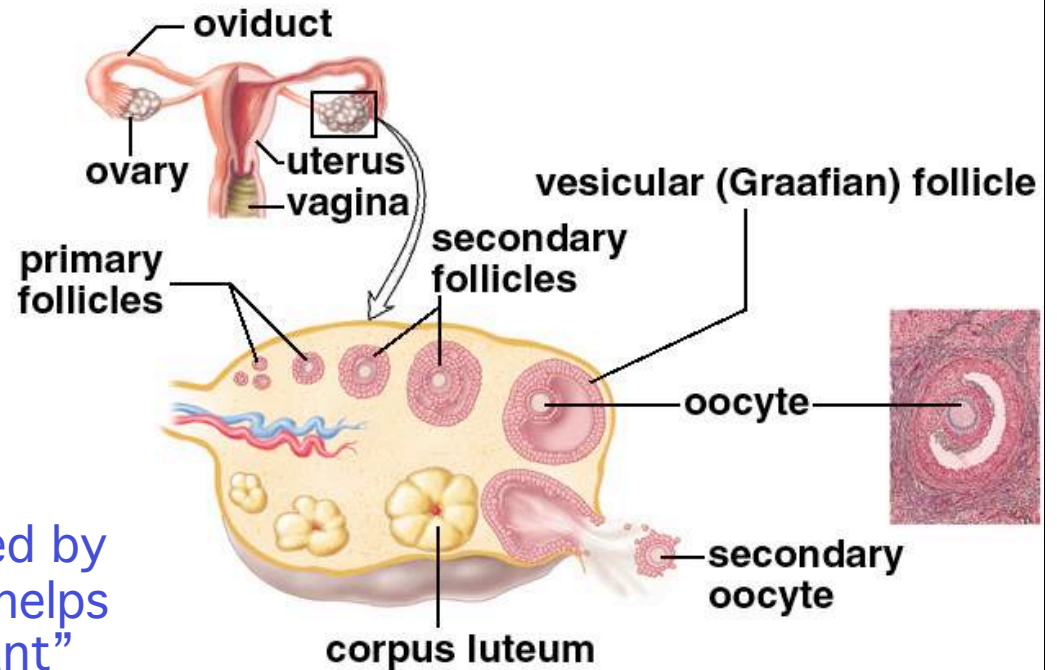
One of the main hormones produced by the corpus is progesterone, which helps to maintain the uterus in a “pregnant” state. More on this later.

Estrogen

Is mostly produced by the follicle cells under the influence of FSH (follicle stimulating hormone) from the pituitary gland.

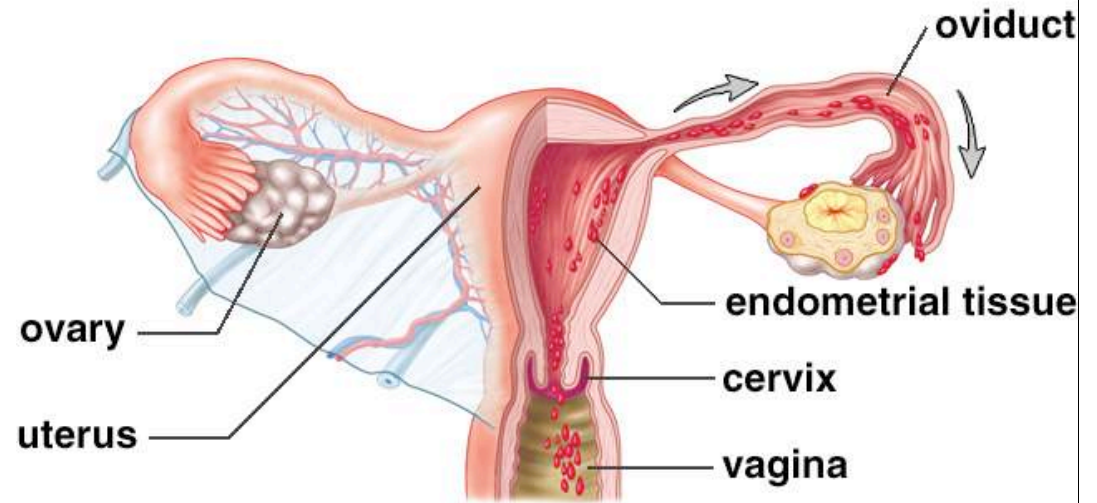
Skip frame

Anatomy of the Ovary and Follicle



Fallopian tubes

The egg cells are released into the abdominal cavity, fluid flow carries ova into the fallopian tubes (oviducts) passes on to the uterus.



Fertilization within the oviduct, not the uterus.

Fertilized egg, now called a zygote, implants into the endometrium; the wall of the uterus.

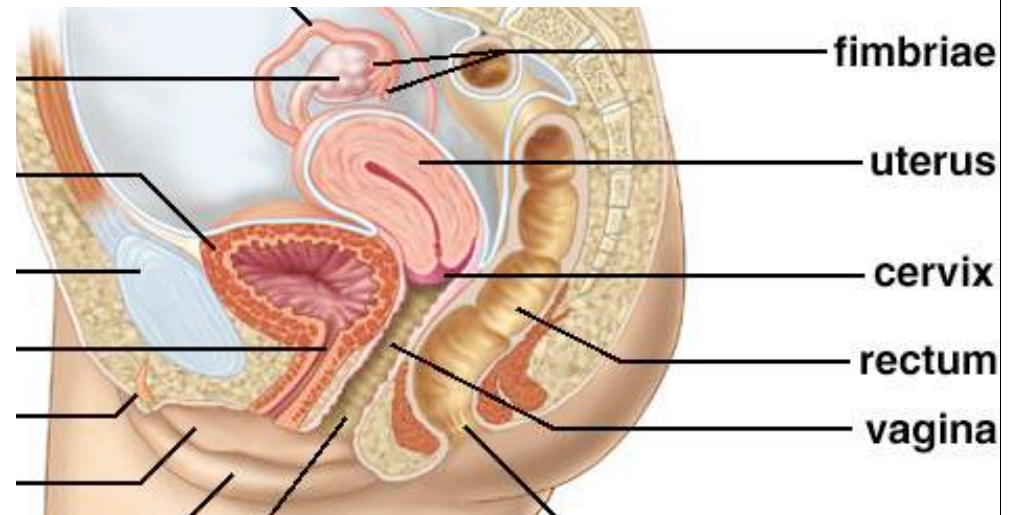
ectopic pregnancy

zygote may implant and start to develop within the oviduct; this is not an ideal location

More rarely, a zygote will enter abdomen; implant anywhere within the abdominal cavity there. The fetus cannot develop here.

Uterus

The site where a fetus develops; consists of an inner endometrium (a lining tissue layer) and several outer layers of smooth muscle.



Cervix

Is the lowest part of the uterus, that projects into the upper part of the vagina.

cancer of cervix (Pap test)

A Pap test is performed to detect the presence of pre-cancerous or cancerous cells of the cervix or uterus.

A small sample of cells are removed, stained with chemicals and examined under the microscope. A trained pathologist would make a determination of the state of the cells. Skip

hysterectomy

If cancer is detected then a hysterectomy is performed; this is surgical removal of the uterus. skip

Vagina

Is a muscular tube that extends from the lower part of the uterus to the exterior of the body.

- 1) Receives the penis during coitus (sexual activity)
- 2) Lets menstrual flow out of the body.

Vulva

A term referring, collectively, to the female external genitalia.

labia majora, minora

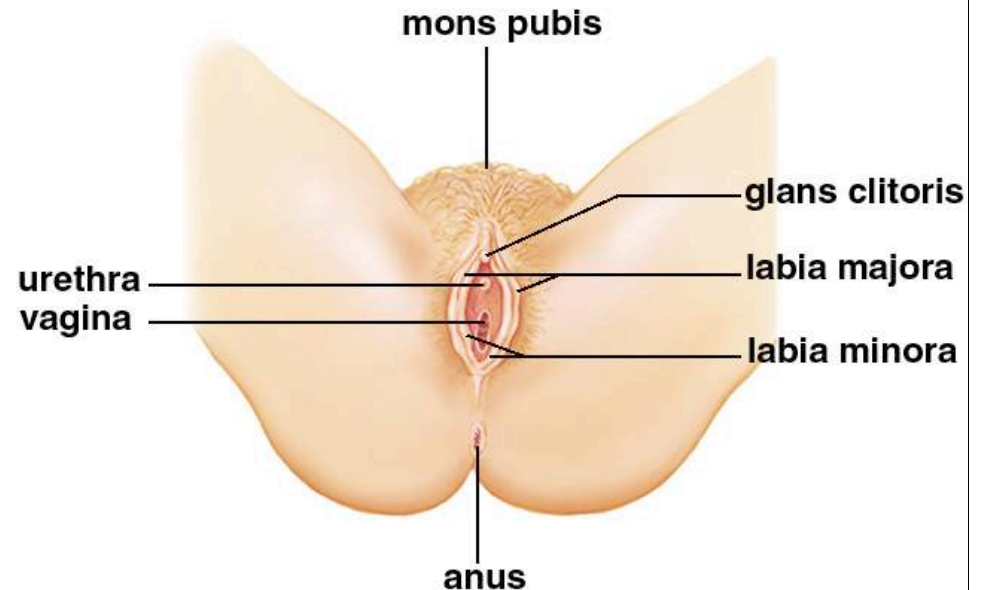
These are folds of skin that border the external opening to the vagina. The minor is just lateral to the vagina, with the larger majora even more lateral.

clitoris

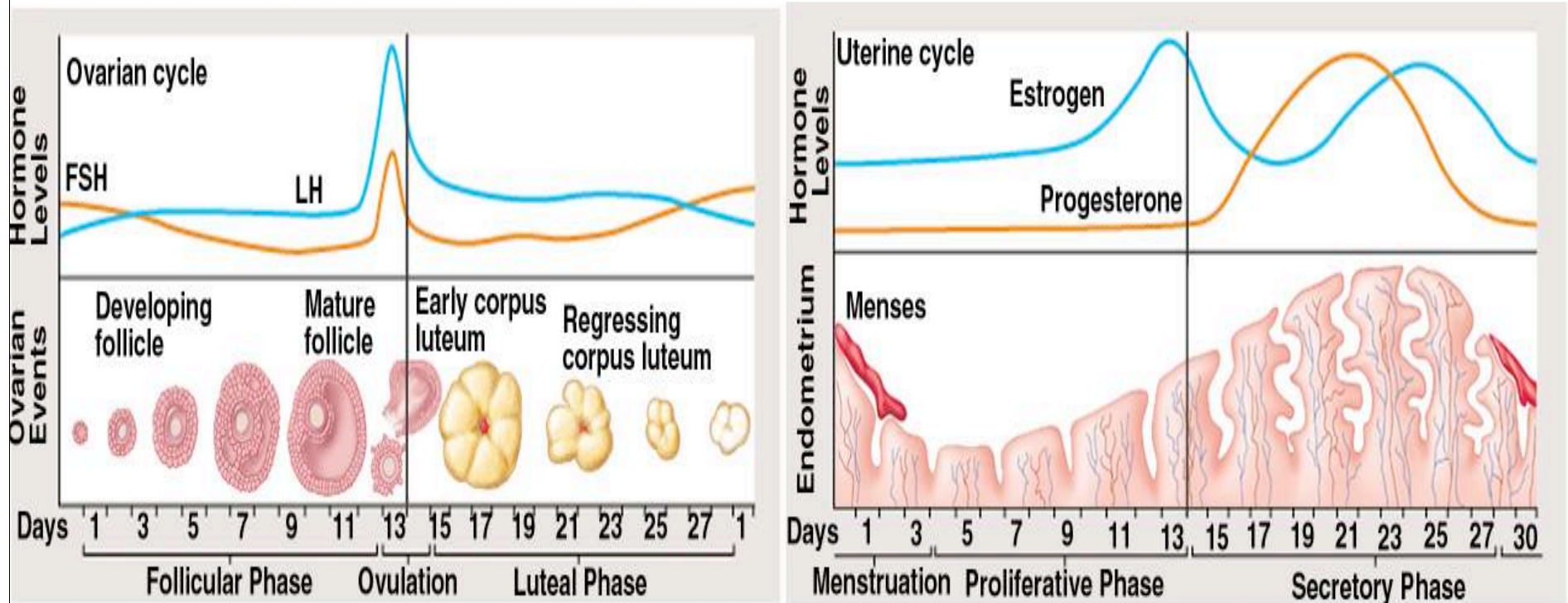
Is similar to the penis; contains erectile tissue which engorge during coitus.

Increases sensitivity during coitus.

External Genitals of the Female



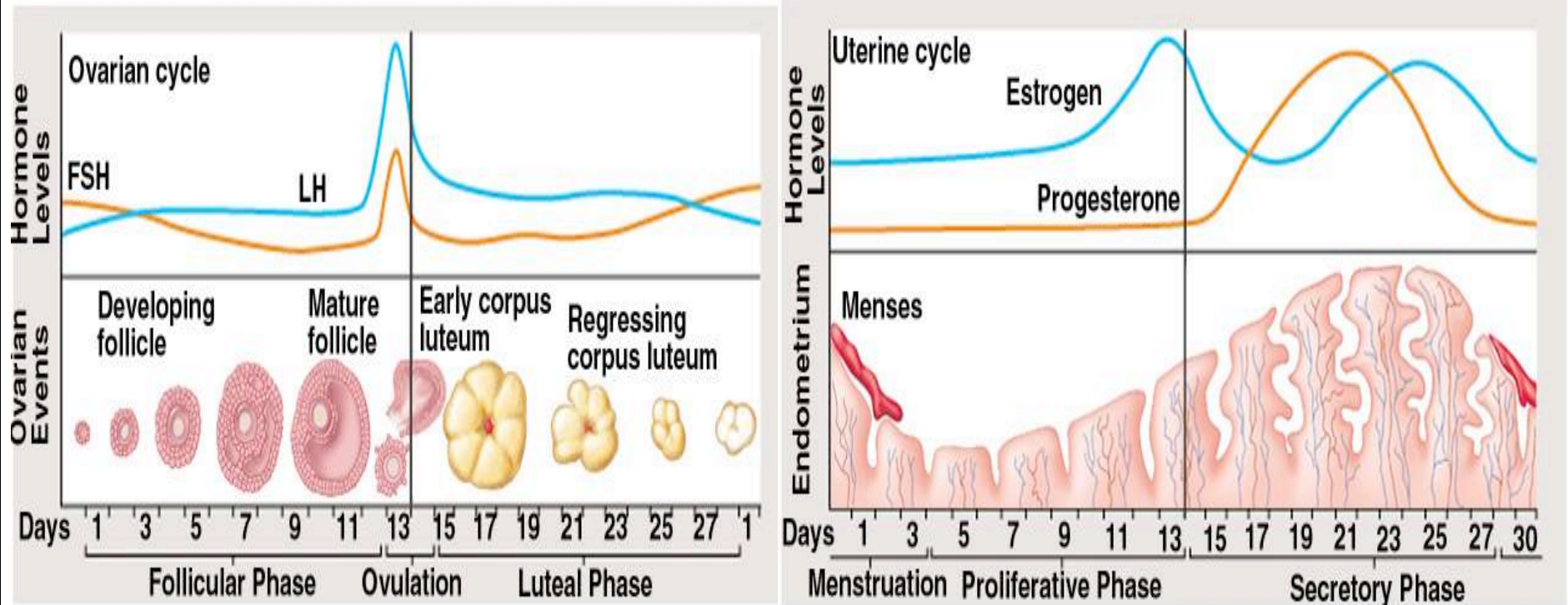
Hormone regulation 28 day cycle



Day1 menstruation

The first day of menstruation marks the beginning of the period (28 day.)
There are many changes that occur during the 28 day cycle.
These changes can be grouped into the ovarian and uterine cycles.

Hormone regulation Ovarian and uterine cycle



Day 1-13- follicular

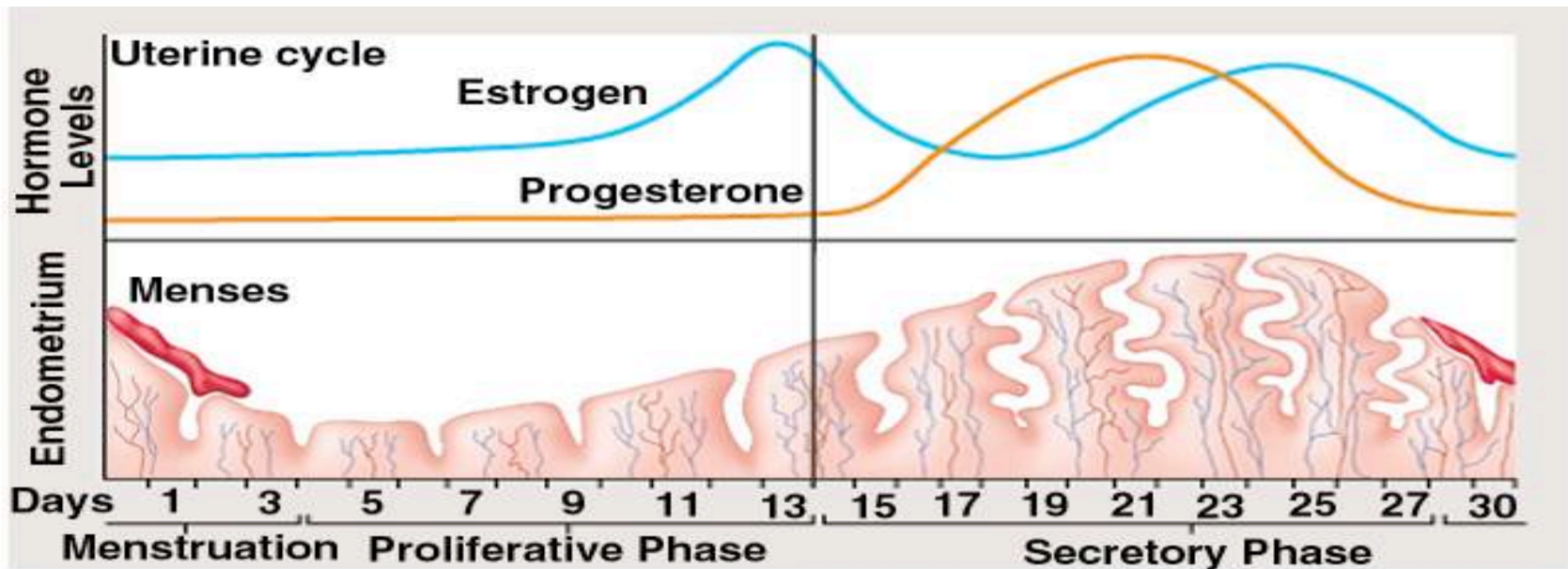
Follicles develop; produce estrogen.
 Follicles grow; antrum develops within follicle.
 Antrum; fluid filled cavity.
 One follicle reaches maturity.

FSH under influence of FSH
 (follicle stimulating hormone)

Day 1-5- menstrual

Endometrium of the uterus breaks down
 progesterone levels are low.
 The tissue along with blood is discharged through the vagina as menstrual flow.

Hormone regulation Uterine cycle

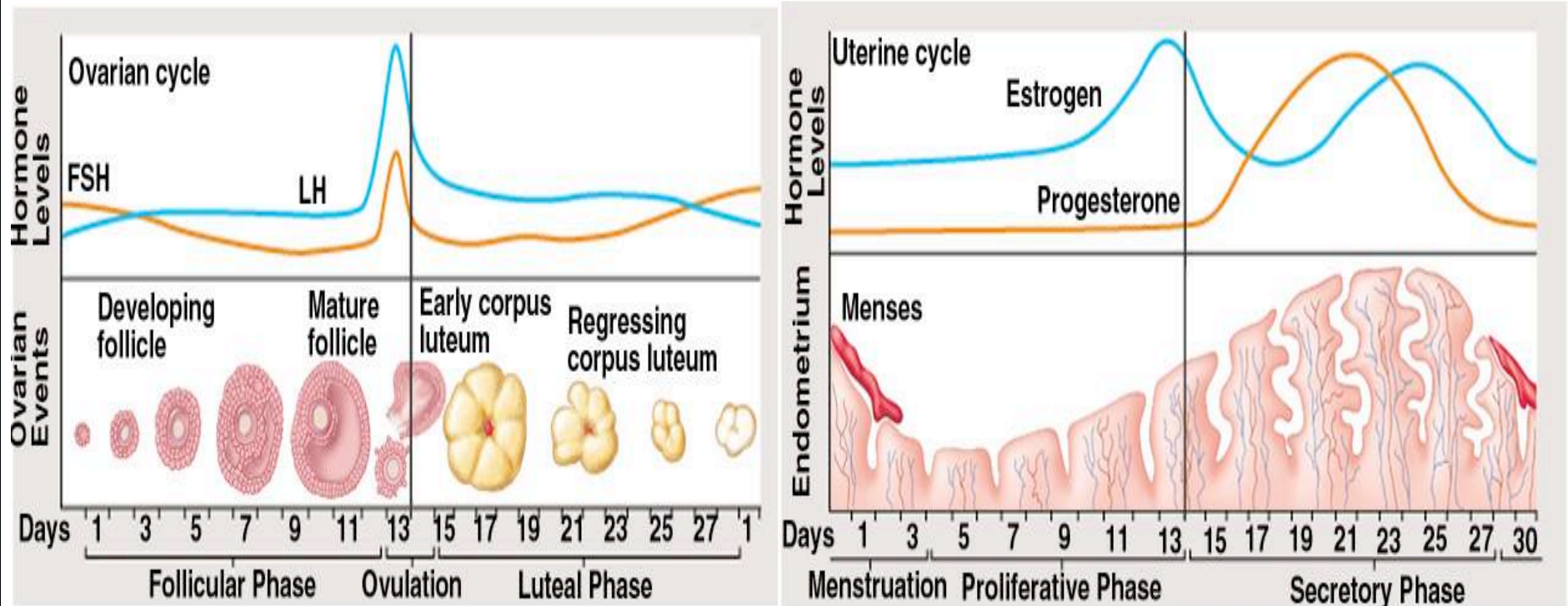


Day 6-13- proliferation

During the second week of the cycle, the levels of estrogen start to rise. This hormone is being released by the developing follicles.

Estrogen stimulates the endometrium to grow. This replaces the tissue lost during menstruation.

Hormone regulation Ovarian and uterine cycle

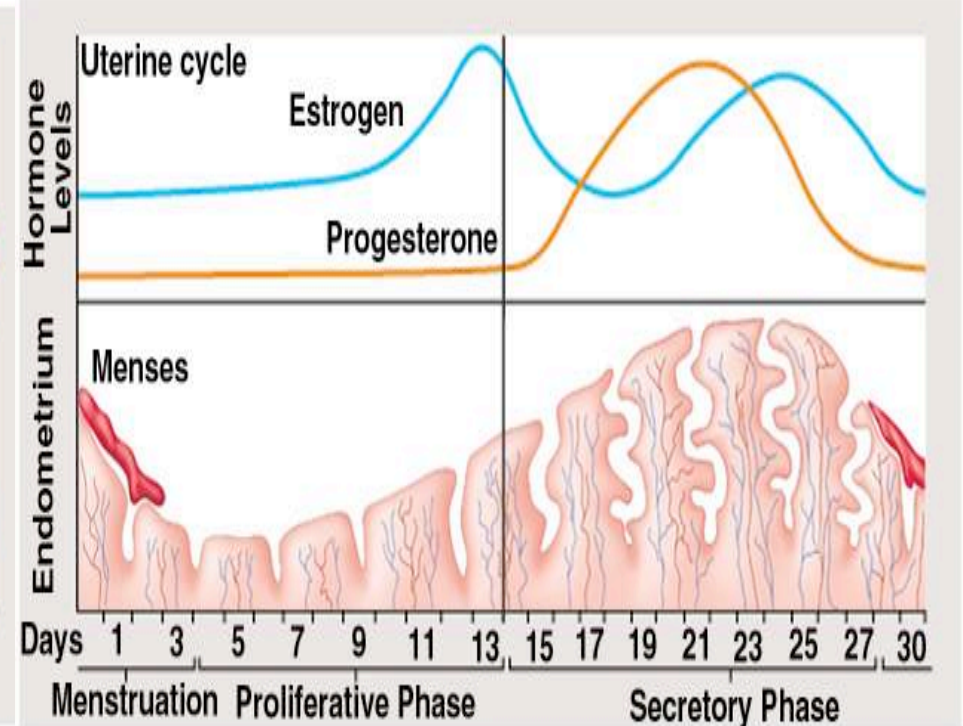
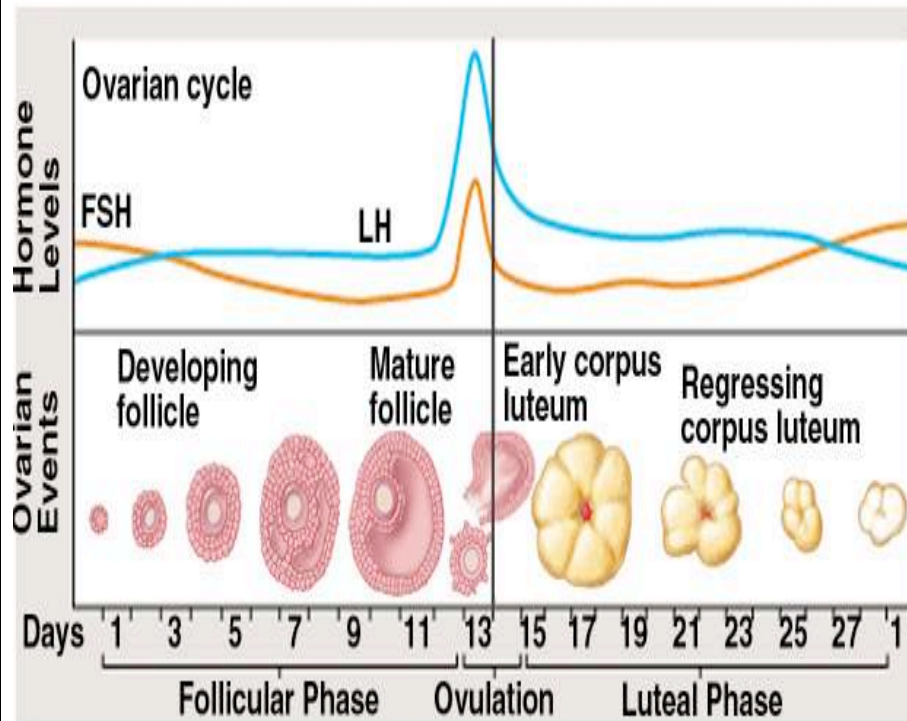


Day 14 ovulation

Antrum fluid pressure increases.
Spike in FSH and LH (lutening hormone.)

The LH surge causes the sharp increase in antrum fluid pressure, which ruptures the follicle and the ovum is released from the ovary.

Hormone regulation Ovarian and uterine cycle



Day 15-28- luteal phase

Empty space on ovary collapses and converts corpus luteum (yellow body). Produces the hormone progesterone

LH LH maintains the corpus luteum.

At the end of the cycle the FSH start to rise again to trigger a new round of follicle growth.

Day 15-28- secretory phase

Endometrium thickens; develop secretory glands.

Under the influence of the progesterone Endometrium is getting ready for a fertilized egg.

No fertilized egg; progesterone levels fall; endometrium breaks down.

New period.

Pregnancy

Zygote

If an egg is fertilized the resulting cell is called a zygote (2n). It starts to produce a hormone called...

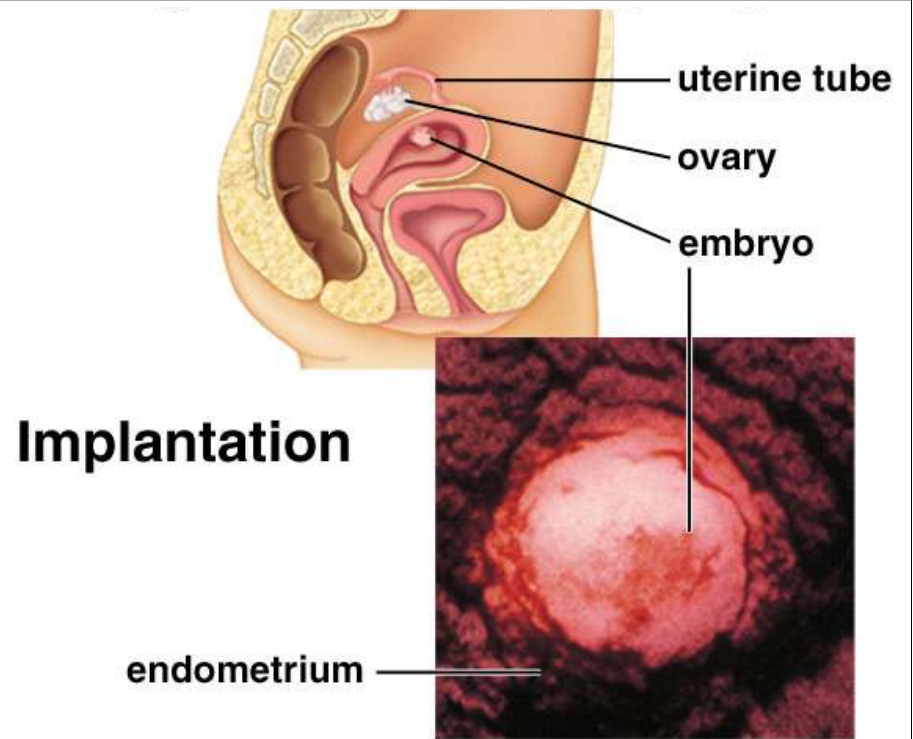
HCG

Human chorionic gonadotropin maintains the corpus luteum, which it turn keeps the endometrium intact.

As long as HCG is present the endometrium will maintain the implanted zygote. The zygote, through a series of on-going cell divisions will form the embryo and then the fetus.

pregnancy tests

HCG is the basis for pregnancy tests. Extra HCG ends up in the urine, which can be detected using home pregnancy tests.



Sex hormones

Estrogen and Progesterone

Estrogen is responsible for female sex characteristics; fat distribution, muscle mass, body hair, voice, behaviors, breast development.

Progesterone is responsible for maintaining the endometrium so that it can support a pregnancy.

Menopause

Menopause occurs as the ovaries ability to produce hormones start to decline; anywhere from late-forties to late fifties.

With the decline of these hormones the monthly cycles stops and the female becomes infertile; no new follicles develop.

Also changes in body metabolism occur; also higher risk for heart disease and osteoporosis, etc.