med433 Embryology team

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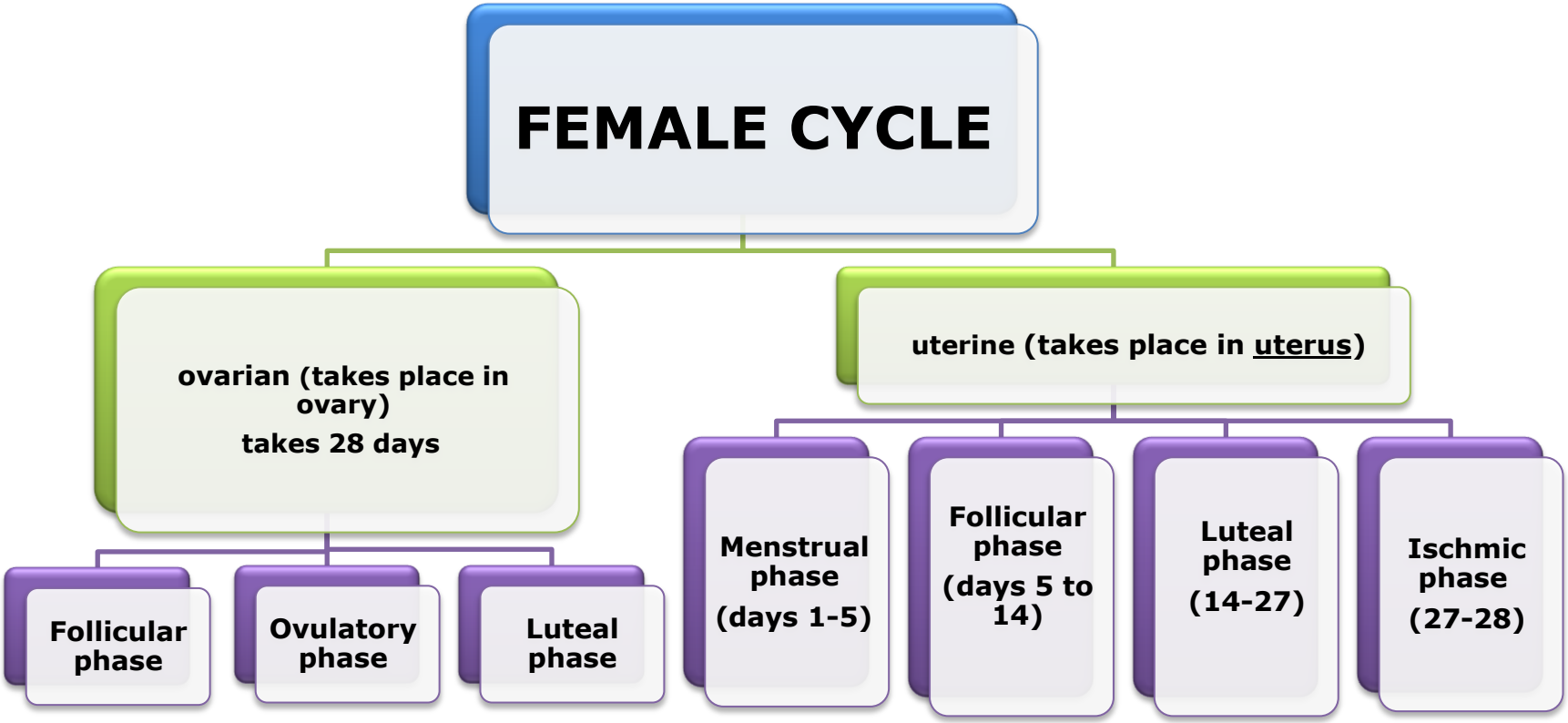
overview MIND MAP

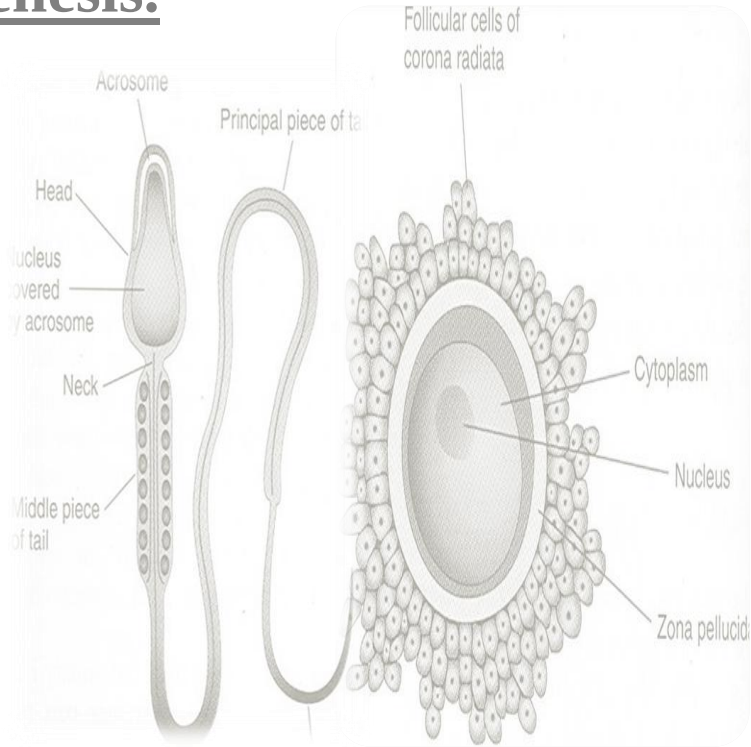


Embryology
GAMETOGENESIS
& FEMALE CYCLES

By the end of this lecture you should be able to know :

- Define gametogenesis.
- Differentiate the types of gametogenesis.
- Describe the process of spermatogenesis.
- Describe the process of oogenesis.
- Describe the female cycles.

Good luck :)



The female cycle is divided into two parts : (Ovarian cycle & Uterine cycle)

OVARIAN AND UTERINE CYCLES:

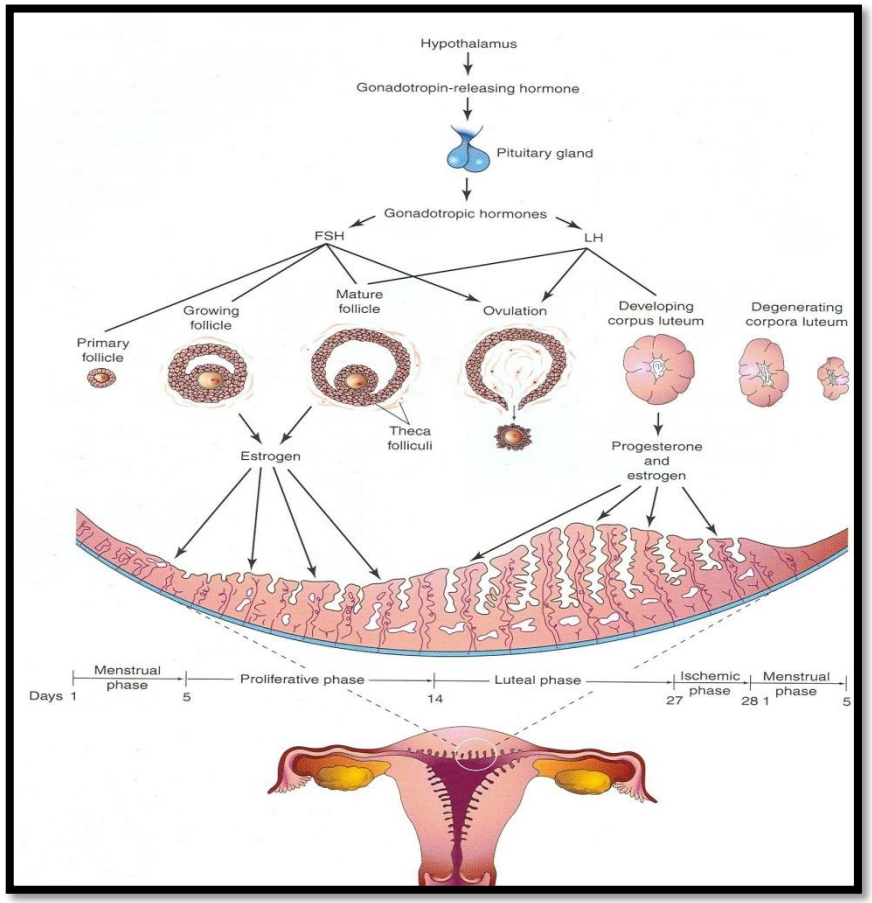
***Start at puberty and finish at the age of menopause. "different from one female to other"**

GnRh = Gonadotrophin Releasing Hormone

neurosecretory cells "secreting the GnRh hormone" in Hypothalamus stimulates => Pituitary gland (anterior lobe) => release Two *Hormones* in ovaries (FSH +LH)

FSH = Follicle-stimulating hormone

LH = Luteinizing hormone (sometimes we call it the ovulation hormone)



OVARIAN CYCLE :

Placed in the ovary. (under control of the pituitary gland through FSH & LH)

Phases	Follicular	Ovulatory.	Luteal
What happen in the phase ?	*Primary follicles stimulated by FSH to become mature graafian follicle. (GROWTH). Also, the FSH stimulate the follicles to produce Estrogen. Note : the primary follicles are "very small cells in cortex consist of large nucleus surrounded by single layer of flat follicular cells" *Final stages of maturation require LH	One of the mature follicles is going to move near to the surface ويحصل لها ما يسمى بالـOvulation. وهو عبارة عن مرحلة تخرج فيها النواة وتكون الـ ova.	When the nucleus leave the follicle to be an ova, the follicle body (الجسم اللي كان يحيط بالنواة وأصبح فارغ) It is going to form a yellow mass called the corpus luteum and it secrets Progesterone. Now the ova is ready to be fertilized : (2 cases) : *If it's fertilized =in the first 4th month of pregnancy Corpus Luteum still there. *If it is not fertilized the CL involutes and degenerates in 10-12 days and look like a Scar.
hormones	Estrogen from FSH Note : Estrogen is also called the feminine hormone	Under the control of LH.	It secretes Progesterone* and some Estrogen (LH)
Days	14 days	1 day only (half 28 is 14) so 14 is the day of ovulation Note: the average menstrual cycle is 28 days	
	*(stick in the surface of ovary).	*rupture of the mature follicle and the nucleus goes out.	

ملاحظة :

*هرمون البروجسترون هو المسؤول عن تهيئة الرحم لاستقبال الجنين ، وفي حالة عدم حدوث التلقيح هرمون البروجسترون هو المسؤول عن اعادة تهيئة الرحم كما كان عليه من قبل .

Uterine Cycle: Palced in uterus.

*** Cyclic changes occurs in the endometrium of the uterus is caused by (estrogen & progesterone).**

- **28 days.**
  Day 1 is the day when menstrual flow begins

phases	**Menstrual Phase**	**Proliferative phase**	**Luteal Phase**** a Secretory or Progesterone phase.	**Ischemic Phase***
What happen in this phase ?	Starts in the first day with bleeding blood + some pieces which sloughed from endometrium. (discharged from vagina)	Everything will rebuild : -Thickness of the endometrium is increased -The glands increase in number and length and the spiral arteries elongate. *Coincides with growth of ovarian follicle*	Spiral arteries grow into the superficial layer and coiled. and Glandular epithelium secrete glycogen rich material. *Coincides with formation, functioning and growth of Corpus Luteum*	-Marked shrinking of endometrium -Rupture of damaged vessel wall. -Blood seeps into the surrounding connective tissues -Stoppage of glandular secretion. - Loss of interstitial fluid.
Days:	Lasts for 4-5 days	Lasts for 9 days.	Lasts about 13 days.	In the day of 27th
Hormones:		Controlled by Estrogen	Endometrium thickens under the influence of estrogen and progesterone	Decreased levels of estrogen & progesterone

Note♥:

** Luteal phase Is a Secretory or Progesterone phase.

*Ischemic phase تحدث فيه اعراض ماقبل الدورة الشهرية من صداع أو ألم في الظهر و أسفل البطن

Meiosis

It is the cell division that takes place in the germ cells to produce male & female gametes.

It consists of two cell divisions, (meiosis I , meiosis II)

during which the Diploid number of the chromosomes (46) is reduced to Haploid number (23).

1.At the beginning of meiosis I, (prophase) male and female germ cells replicate their DNA so that each of the 46 chromosomes is duplicated into sister Chromatids.

2.By the end of the first meiotic division, each new cell formed (Secondary Spermatocyte or Secondary Oocyte) has haploid (half) number of chromosomes.

It is half number of chromosomes of the Primary Oocyte or Spermatocyte.

♥What should you know about *MEIOSIS :*

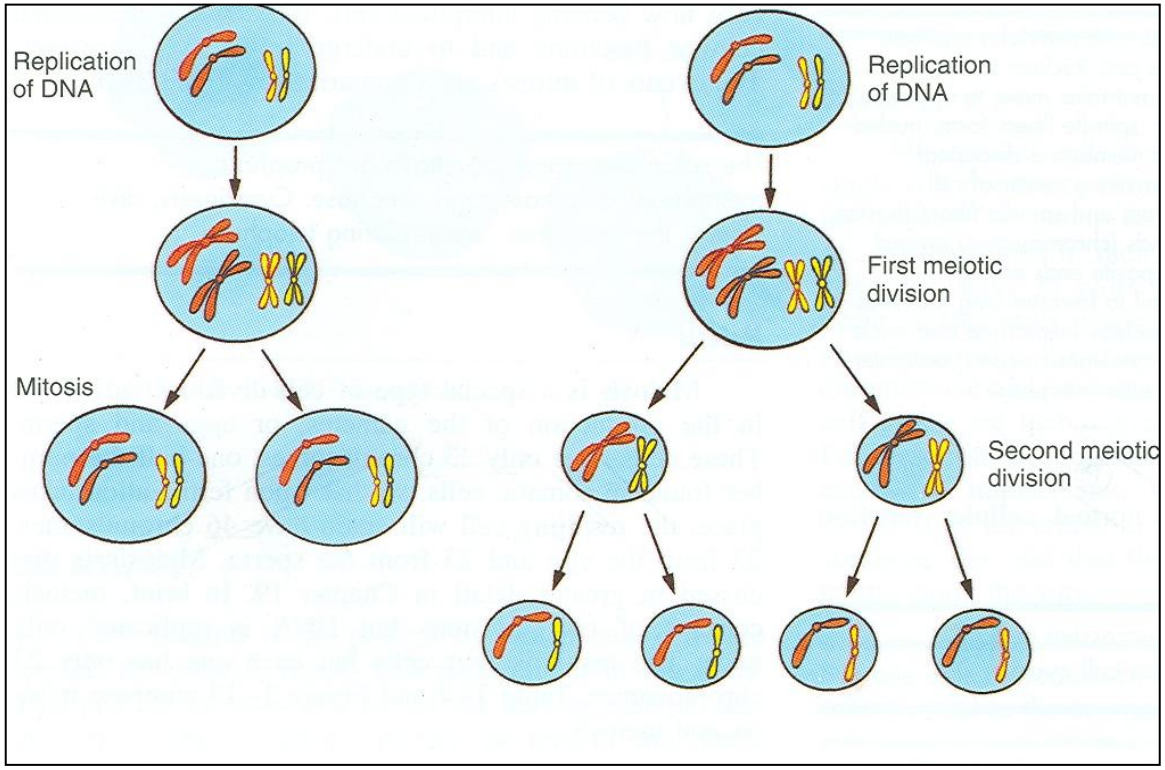
- **1. Reduces the Diploid number of chromosomes to Haploid.**
- **2. Allows shuffling of maternal & paternal chromosomes between the gametes (Segregation)**
- **3. Allows Crossing Over of chromosome segments:**

  It is the interchange of chromatid segments between paired homologus chromosomes which redistributes genetic material.

- **4. It enhances genetic variability through cross over and segregation.**

What is the differences between meiosis and mitosis?

Notice the number of chromosomes at the end



Gametogenesis

(Gamete formation)

It is the production of mature male & female gametes (sperms & ova)..

	Spermatogenesis	Oogenesis
Definition :	Spermatogonia (primitive germ cells) is transformed into mature sperms.	Oogonia (primitive germ cells) is transformed into mature oocytes.
Aim :	Formation of sperms with haploid number of chromosome	Formation of secondary oocytes with haploid number of chromosome.
Site :	Seminiferous tubules of the testis.	Cortex of the ovary.
Time :	From puberty till old age.	Starts during fetal life Completed after puberty & Continues until menopause.
Duration :	About 2 months	It occurs monthly EXCEPT during pregnancy.
	N.B. Sperms are stored and become functionally mature in the Epididymis.	

Note♥ : This table is a summary for the main headlines. For more explanation refer to the slides.

Summary

https://www.youtube.com/watch?v=POpbN6RHOO0

Spermatogenesis

Spermatogonium (mitosis)

Spermatogonia (grows)

↓

Primary spermatocyte(46) (Meiosis) (meiotic)

↓

Secondary spermatocyte(23) (Divides and redivides)

↓

Spermatids(23)

↓

Metamorphosis)(

Change in shape through which the spermatides are transformed into

↓

Mature sperms

↓

Nucleus	Golgi apparatus	mitochochondria	centriole
Condensed and forms most of the head	Forms the acrosome	Forms a spiral sheath	Elongates to form the axial filament

Oogenesis

Fetal life	After puberty	After fertilization
Oogonium ↓ mitosis Oogonia(46) ↓ grow Primary oocyte (46): It begin the first meiotic division and stops at prophase	Before ovulation : The first meiotic division completed ↓ Secondary oocyte (23) At the ovulation : The second meiotic division begins and stops at metaphase	the second meiotic division is completed: the secondary oocyte divides into mature ovum (23)

this youtube video can help :

Female reproductive cycle

https://www.youtube.com/watch?v=MLJTLAKFM3k

*Simple multiple-choice questions :

Oogenesis occurs monthly Except during :

1) **Pregnancy**. 2)sickness. 3)headache.

The ovarian cycle occurs under the control of the :

1) Thymus gland. 2) **Pituitary gland**. 3 Thyroid gland.

The proliferative phase is Coincides with :

1) Ovulation. 2) **growth of ovarian follicle**. 3) secreting GnRh hormone.