

PHYSIOLOGY OF MENSTRUATION, OOGENESIS, PREGNANCY AND PARTURITION

OOGENESIS

- The process of formation of a mature female gamete is called oogenesis
- Some of germinal epithelial cells divide by mitosis to produce large number of gamete mother cells or oogonia by mitosis and primary oocyte
- Each primary oocyte then gets surrounded by a layer granulosa cells and are called primary follicle
- The primary follicle gets surrounded by more layers of granulosa cells and a new theca and are called as secondary follicles
- The secondary follicle soon transforms into a tertiary follicle which is characterised by a fluid filled cavity called antrum
- The theca layer is organised into an inner theca interna and outer theca externa
- The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division which is an unequal division and forms a large secondary oocyte and tiny first polar body
- The tertiary follicle changes into the mature follicle or graafian follicle
- The secondary forms a new membrane called zona pellucida
- The graafian follicle then ruptures to release the secondary oocyte from the ovary by the process called ovulation

- If a sperm can enter the secondary oocyte through zona pellucida layer, the secondary oocyte completes meiosis II and thus results in the formation of second polar body and an ovum

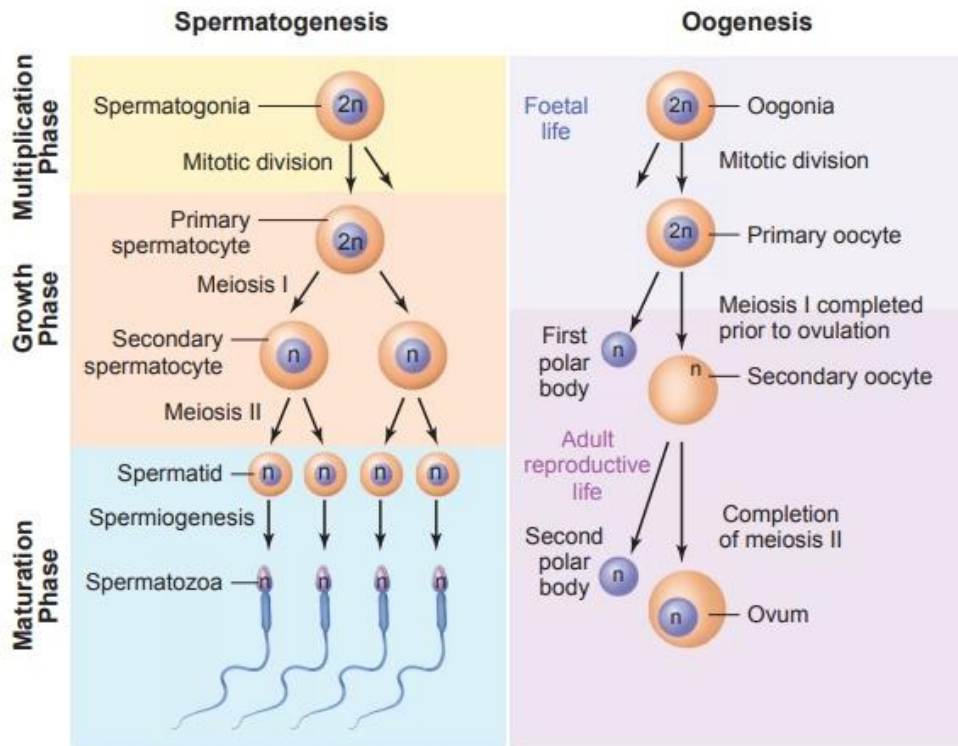
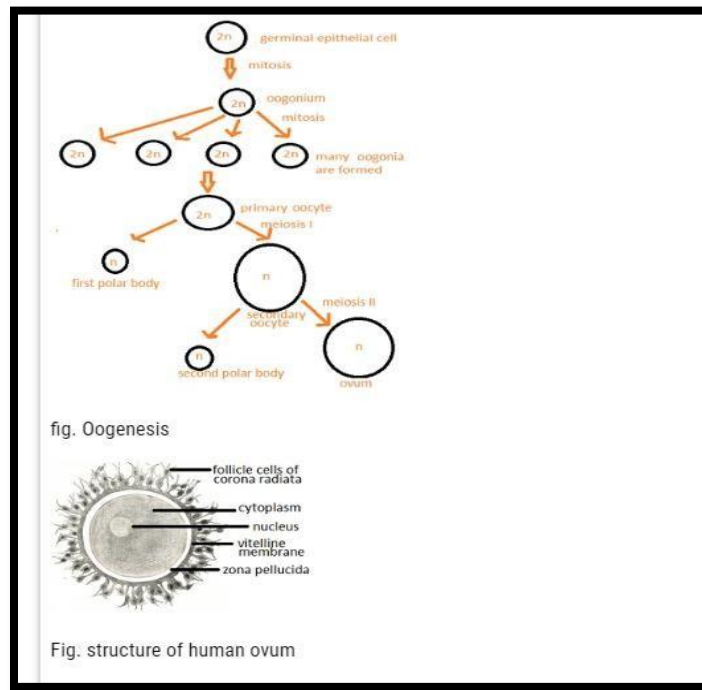


Fig. 2.5 Gametogenesis

MENSTRUAL CYCLE

The reproductive cycle starting from the one menstruation till the next one in the female primates is called menstrual cycle.

The first menstruation which begins at puberty and is called **menarche** .

The cycle is repeated at an interval of 28-29 days.

Menstrual cycle involve three phases-

1. **Menstrual phase,**
2. **Follicular phase and**
3. **Luteal phase.**

Menstrual phase:

- Menstrual flow occurs and lasts for about 3-5 days.

The **endometrial lining** of the uterus breaks along with the blood vessels which forms a red fluid and results in menstrual flow.

- If the ovum is fertilized by a sperm menstrual flow does not occur and hence indicates pregnancy.

Follicular phase-

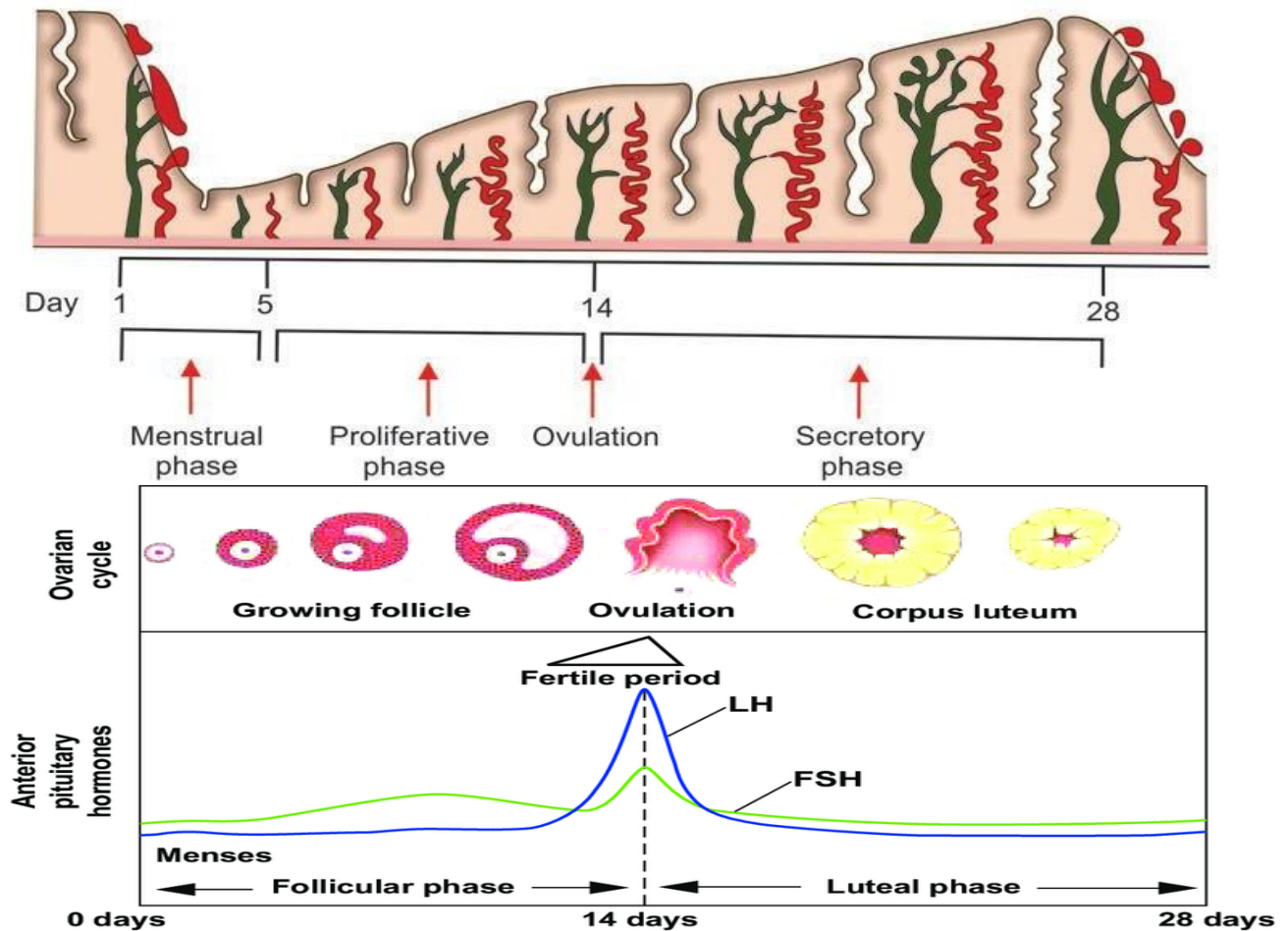
- In this phase, the primary follicles in the ovary grow to become a fully matured graafian follicle.
- Endometrium regenerates through proliferation.
- Changes in Pituitary hormone and ovarian hormones induce the formation of graafian follicle and regeneration of endometrium.
- The secretion of gonadotropins like **luteinizing hormone** and **follicular stimulating hormone** increases gradually during this phase and stimulates follicular development as well as secretion of estrogens by the growing follicles.
- Both LH and FSH attain a peak level in the middle of cycle about 14th day.
- Rapid secretion of LH leading to its maximum level during the mid-cycle called **LH**

surge induces rupture of Graafian follicle and thereby the release of ovum known as **ovulation**

Luteal phase-

- In this phase, the ruptured part of Graafian follicle transforms into yellow body called **Corpus luteum**.
- The corpus luteum secretes large amounts of **progesterone** hormone which maintains the endometrium for implantation of the fertilized ovum.
- During pregnancy all events of the menstrual cycle stop and there is no menstruation.
- In the absence of fertilization, the corpus luteum degenerates hence causes disintegration of the endometrium leading to menstruation and a new cycle begins.

- In human beings, menstrual cycles ceases around 50 years of age and known as **menopause**



PREGNANCY:

- Pregnancy is defined as the course of embryo and fetal growth and development in uterine.
- It begin at the fertilization and end the delivery of the fetal and it's attachment.
- Fertilization is defined as the course of combination of the oocyte and sperm.
- It onset 12h after ovulation usually in ampulla of the oviduct.
- The Development of the fertilized egg.
- 3 days after ovulation, the morula (early blast)is fomulated

- 4 days after ovulation, the late blast is fomulate.
- 6-7days after ovulation, the egg imbeds in the uterus .

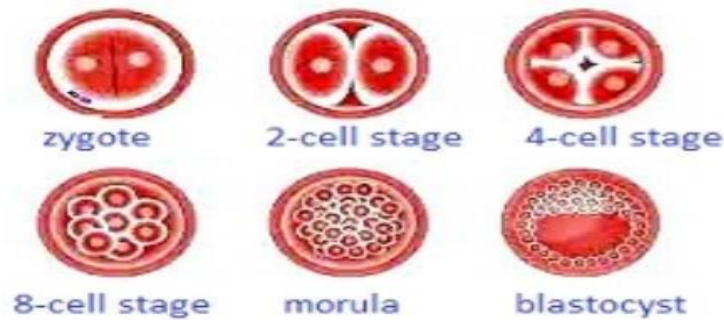


fig. foetus with placenta

- The stage of egg imbed 1.Apposition 2.Adhesion3. Penetration
- After implantation, finger like projections appear on the trophoblast called as **chorionic villi**.
- Uterine tissue and maternal blood surrounds the chorionic villi.
- The chorionic villi and uterine tissue together form a structural and functional organic structure between developing embryo and tissues of the mother called as **placenta**

Functions of placenta-

- The placenta facilitates the supply of oxygen and nutrients to the embryo.
- Help in the removal of carbon dioxide and excretory/waste materials produced by the embryo.
- The placenta is connected to the embryo through an **umbilical cord** which helps in the transport of substances to and from the embryo.
- Placenta also acts as an endocrine tissue and produces several hormones like **human chorionic gonadotropin (hCG),human placental lactogen (hPL),estrogens, progestogen**. etc.
- A hormone called **relaxin** is secreted by the ovary in the later phase of pregnancy.

- hCG, hPL and relaxin are produced in women only during pregnancy.
- Levels of other hormones like **estrogens, progestogens, cortisol, prolactin, thyroxine**, etc., are increased several folds in the maternal blood.
- Increased production of all the hormones is essential for supporting the fetal growth, metabolic changes in the mother and maintenance of pregnancy.
- After implantation, the inner cell mass is differentiated into outer layer called **ectoderm** and an inner layer called **endoderm** with a middle
- Three layers give rise to all organs in adults.
- The cells which have the potency to give rise to any types of cells in the body are called **stem cells**.
- The human pregnancy lasts for 9 months, heart develops after one month of pregnancy, limbs develop by the end of second month, major organ systems are formed by the end of 3 months.
- First movement and appearance of hairs are during fifth month of pregnancy.
- By the end of 24 weeks, the body covers with fine hair, eye-lids separate, eyelashes form.
- By the end on nine month, the fetus fully develops.

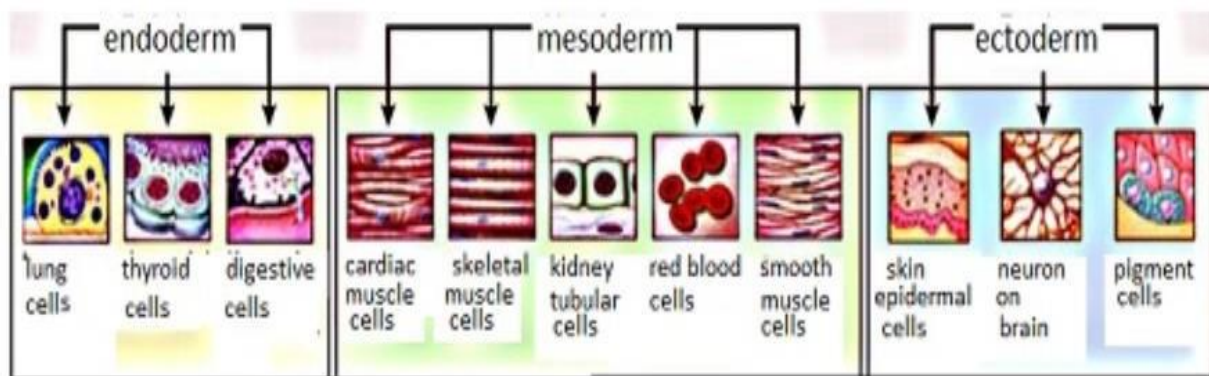


Fig. embryonic development

PARTURITION

- Parturition is the expulsion or delivery of the fetus from the mother's body. It occurs at the end of pregnancy.
- The process by which the delivery of fetus occurs is called **labor**.
- **It involves various activities such as** contraction of uterus, dilatation of cervix and opening of vaginal canal.

BRAXTON HICKS CONTRACTIONS

- Braxton Hicks contractions are the weak, irregular, short and usually painless uterine contractions, which start after 6th week of pregnancy.
- These contractions are named after the British doctor, **John Braxton Hicks** who discovered them in 1872.
- It is suggested that these contractions do not induce cervical dilatation but may cause softening of cervix.
- Often called the **practice contractions**, **Braxton Hicks contractions help the** uterus practice for upcoming labor.
- Braxton Hicks contractions are triggered by several factors such as:

1. Touching the abdomen
2. Movement of fetus in uterus
3. Physical activity
4. Sexual intercourse
5. Dehydration.

FALSE LABOR CONTRACTIONS

- While nearing the time of delivery, the Braxton Hicks contractions become intense and are called **false labor contractions**.

- **The false labor contractions are believed** to help cervical dilatation.

STAGES OF PARTURITION

Parturition occurs in three stages:

First Stage

- First, the strong uterine contractions called **labor contractions**
- commence.
- Labor contractions arise from fundus of uterus and move downwards so that the head of fetus is pushed against cervix
- It results in dilatation of cervix and opening of vaginal canal.
- Exact cause for the onset of labor is not known.
- This stage extends for a variable period of time.

Second Stage

- In this stage, the fetus is delivered out from uterus through cervix and vaginal canal.
- This stage lasts for about 1 hour.

Third Stage

- During this stage, the placenta is detached from the decidua and is expelled out from uterus.
- It occurs within 10 to 15 minutes after the delivery of the child.

