Pregnancy in terms of Homoeopathy

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Introduction

This article covers the complete physiology and pathology of fertilization up to the delivery with role of miasms intermingled. It explains how the miasms tend to become inert or active during whole process and vital force carries on keeping them in balance.

Gametogenesis

It is the process of formation and development of gametes.

- **Male-** Spermatogenesis
- **Female-** Oogenesis

Fertilization

It is the process beginning with penetration of the secondary oocyte by the spermatozoon and completed by fusion of the male and female pronuclei.

Process of Fertilization

It occurs in the ampulla of the uterine tube.

- The sperm binds to the zona pellucida of the secondary oocyte and triggers the acrosome reaction (Psora), causing the release of acrosomal enzymes (e.g., acrosin).
- Aided by the acrosomal enzymes, the sperm penetrates the zona pellucida. Penetration of the zona pellucida elicits the cortical reaction, rendering the secondary oocyte impermeable to other sperm (Psora).
- The sperm and secondary oocyte cell membranes fuse, and the contents of the sperm enter the cytoplasm of the oocyte (Psora).
    - The male genetic material forms the male pronucleus.
    - The tail and mitochondria of the sperm degenerate (Syphilis). Therefore, all mitochondria within the zygote are of maternal origin.
- The secondary oocyte completes meiosis II, thus forming a mature ovum. The nucleus of the ovum is the female pronucleus.
- The male and female pronuclei fuse to form a zygote (Sycosis).

Aims of fertilization

- **Restoration of the diploid number of chromosomes**- half from the father and half from the mother making the zygote containing a new combination of chromosomes different from both parents.
- **Determination of the sex of the new individual**- An X-carrying sperm produces a female (XX) embryo, and a Y-carrying sperm produces a male (XY) embryo.
- **Initiation of cleavage-** Without fertilization, the oocyte usually degenerates 24 hours after ovulation (Syphilis).

Stages of development after fertilization

- **Zygote-** This is commonly referred to as a fertilized ovum. Half of the zygote's 46 chromosomes come from the egg's 23 chromosomes and the other half from the spermatozoon's 23. It has a unique DNA structure, different from that of the ovum and the spermatozoon. The zygote is biologically alive. It fulfills the four criteria needed to establish biological life- i.e. metabolism, growth, reaction to stimuli, and reproduction.

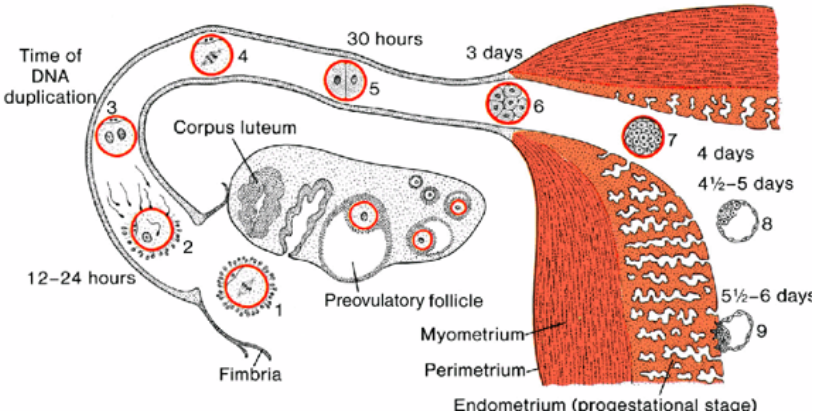
It can reproduce itself through twinning at any time up to about 14 days after conception; this is how identical twins are caused. The zygote is converted into pre-embryo which soon transforms into embryo and later on into fetus. During the whole way, all the three miasms along with their combinations are parallelly running. Slightest turmoil in their course may distort whole train of development and may lead to any degree of disability or total loss.

- **Cleavage-** it is a series of mitotic divisions of the zygote.
    - ***Blastomere-*** The zygote cytoplasm is successively cleaved to form a blastula which consists of increasingly smaller blastomeres (e.g., the first blastomere stage consists of two cells; the next, four cells; the next, eight cells). Blastomeres are considered totipotent up to the eight-cell stage (ie., each blastomere can, form a complete embryo by itself, which is important when considering monozygotic twinning).
    - ***Compaction-*** the 16 cell blastomere compacts the cells to

make the cells tightly grouped. During this period, blastomeres are surrounded by the zona pellucida, which disappears at the end of the fourth day.

- ***Morula-*** The compact blastomere forms a morula, which consists of an inner cell mass and outer cell mass.

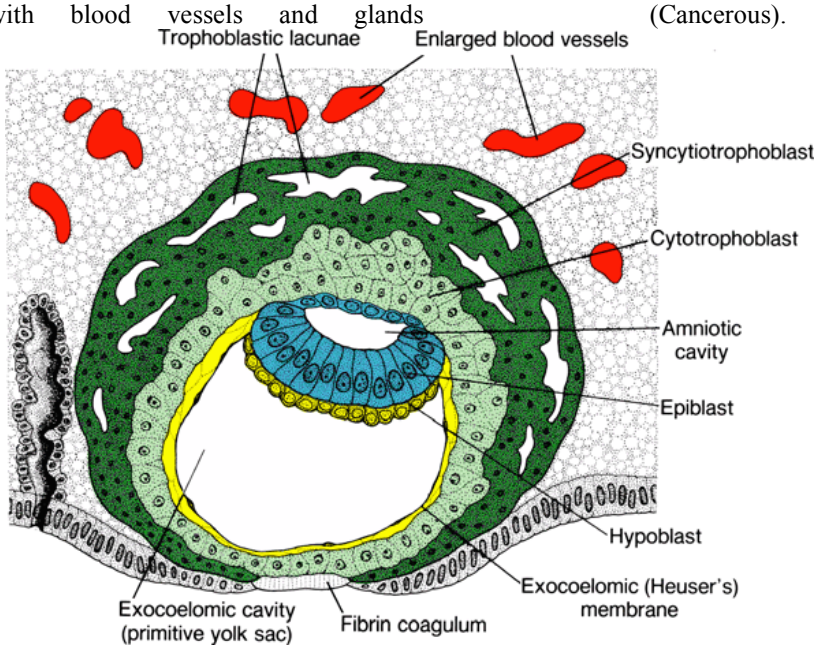
- **Blastocyst-** Blastocyst formation occurs when fluid secreted with the morula forms the blastocyst cavity.
  - ***Embryoblast-*** The inner cell mass, which becomes the embryo, is now called the embryoblast. It is at one pole of the blastocyst. It differentiates into two distinct cell layers i.e. epiblast and hypoblast, forming a bilaminar embryonic disk.
    - ***Epiblast-*** by clefting, it develops into amniotic cavity.
    - ***Hypoblast-*** it forms the yolk sac.
    - ***Prochordal Plate-*** it is the site of fusion of the above two, making point for development of mouth.
  - ***Extraembryonic Mesoderm-*** it is a new layer having two parts, derived from epiblast.
    - ***Extraembryonic somatic mesoderm (Somatopleuric mesoderm)-*** It lines the cytotrophoblast and forms the connecting stalk and covers the amnion. The conceptus is suspended into the chorionic cavity by connecting stalk. The wall of chorionic cavity is called chorion and has three components. Extraembryonic somatic mesoderm, cytotrophoblast and syncytiotrophoblast.
    - ***Extraembryonic visceral mesoderm (splanchnopleuric mesoderm)-*** It covers the yolk sac.
  - ***Trophoblast-*** The outer cell mass, which becomes part of the placenta, is now called the trophoblast.



Events during the first week of human development. 1, oocyte immediately after ovulation; 2, fertilization, approximately 12 to 24 hours after ovulation; 3, stage of the male and female pronuclei; 4, spindle of the first mitotic division; 5, two-cell stage (approximately 30 hours of age); 6, morula containing 12 to 16 blastomeres (approximately 3 days of age); 7, advanced morula stage reaching the uterine lumen (approximately 4 days of age); 8, early blastocyst stage (approximately 4.5 days of age; the zona pellucida has disappeared); and 9, early phase of implantation (blastocyst approximately 6 days of age). The ovary shows stages of transformation between a primary follicle and a preovulatory follicle as well as a corpus luteum. The uterine endometrium is shown in the progestational stage.

- **Implantation-** The zona pellucida must degenerate for implantation to occur (Syphilis). The blastocyst implants within the functional layer of posterior superior wall of the uterus (Psora-Sycosis), during the secretory phase of the menstrual cycle. The trophoblast differentiates into the cytotrophoblast and syncytiotrophoblast.
  - ***Cytotrophoblast-*** The inner layer of the trophoblast. It divides mitotically and adds in growth of syncytiotrophoblasts in the form of primary chorionic villi (Sycosis).
  - ***Syncytiotrophoblast-*** The syncytial outer layer of the trophoblast; site of synthesis of human chorionic gonadotropin. It does not divide mitotically. Its growth continues into the endometrium to get connectivity

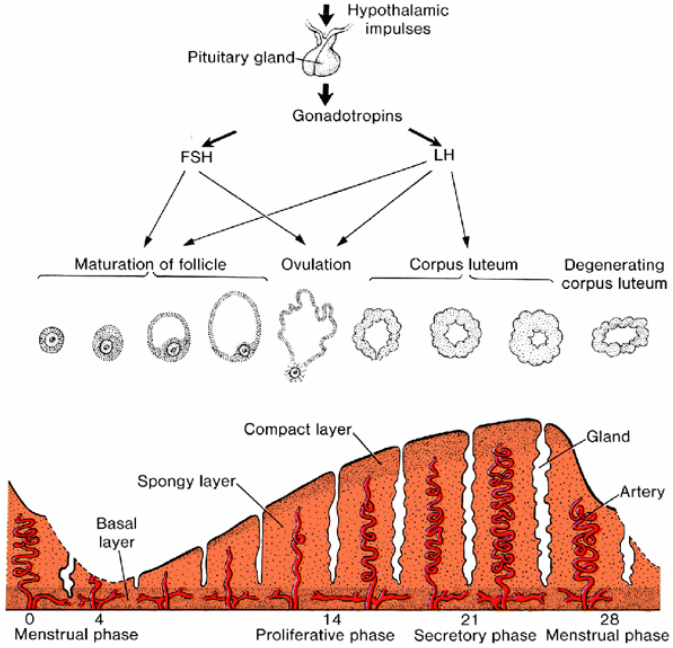
with blood vessels and glands (Cancerous).



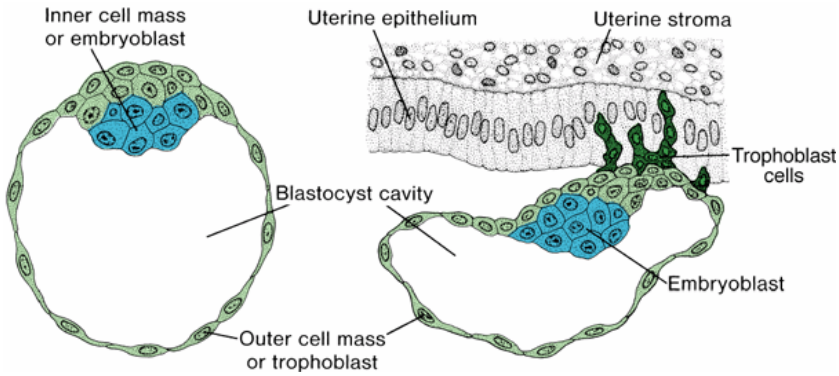
A 9-day human blastocyst. The syncytiotrophoblast shows a large number of lacunae. Flat cells form the exocoelomic membrane. The bilaminar disc consists of a layer of columnar epiblast cells and a layer of cuboidal hypoblast cells. The original surface defect is closed by a fibrin coagulum.

Changes in Uterus during Implantation-

In the human, trophoblastic cells over the embryoblast pole begin to penetrate between the epithelial cells of the uterine mucosa on about the sixth day. L-selectin on trophoblast cells and its carbohydrate receptors on the uterine epithelium mediate initial attachment of the blastocyst to the uterus. At the time of implantation, the mucosa of the uterus is in the secretory phase and, during which time uterine glands and arteries become coiled and the tissue becomes succulent (Psora). 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.



Changes in the uterine mucosa (endometrium) and corresponding changes in the ovary during a regular menstrual cycle without fertilization.



A- Schematic representation of a human blastocyst recovered from the uterine cavity at approximately 4.5 days. Blue, inner cell mass or embryoblast; green, trophoblast. B- Schematic representation of a blastocyst at the sixth day of development showing trophoblast cells at the embryonic pole of the blastocyst penetrating the uterine mucosa. The human blastocyst begins to penetrate the uterine mucosa by the sixth day of development.

Fetal Development

9 or 10 days after conception the blastocyst is fully attached to endometrium. Primitive placental blood circulation begins. 12 days or so after conception, the blastocyst has started to produce hormones (hCG) (Psora) which can be detected in the woman's urine defining the start of pregnancy. Now the fetus starts its development.

First trimester

- **13 or 14 days after conception:** A "primitive streak" appears. It later develops into the fetus' central nervous system. The pre-embryo is now referred to as an embryo. It is a very small blob of undifferentiated tissue at this stage of development.
- **3 weeks:** The embryo is now about 1/12" long. Its heart begins to beat about 18 to 21 days after conception.
- **4 weeks:** The embryo is now about 1/5" long. It looks something like a tadpole. The developing head is visible. The embryo has structures like the gills of a fish in the area of future throat.
- **5 weeks:** Tiny arm and leg buds are formed. Hands with webs between the fingers are formed at the end of the arm buds. Fingerprints become detectable. The face "has a distinctly reptilian aspect. The embryo still has a tail and cannot be distinguished from pig, rabbit, elephant, or chick embryo.
- **6 weeks:** The embryo is about 1/2" long. The face has two eyes on each side of its head; the front of the face has connected slits where the mouth and nose eventually develop.
- **7 weeks:** The embryo almost loses its tail. The face is mammalian but somewhat pig-like. Pain sensors appear. However, the higher functions of the brain are yet to develop, and the pathways to transfer pain signals from the pain sensors to the brain are not developed at this time.
- **2 months:** The embryo's face resembles that of a primate but is not fully human in appearance. Some of the brain begins to form; this is the primitive "reptilian brain" that functions throughout life. The embryo responds to prodding, although it has no consciousness at this stage of development. The brain's higher functions do not develop till this time.
- **10 weeks:** The embryo is now called a fetus. Its face looks human; its gender may be detectable via ultrasound.
- **13 weeks or 3 months:** The fetus is about 3 inches long and weighs about an ounce. Fingernails and bones can be seen.

Second trimester

- **17 weeks or 3.9 months:** It is 8" long and weighs about a half pound. The fetus' movements may begin to be felt. Its heartbeat can usually be detected.
- **22 weeks or 5 months:** 12" long and weighing about a pound, the fetus has hair on its head. Its movements can be felt. Half-way through the 22nd week, the fetus' lungs may be developed.
- **26 weeks or 6 months:** The fetus 14" long and almost two pounds. The lungs' bronchioles develop. Interlinking of the brain's neurons begins. The higher functions of the fetal brain turn on for the first time. Some rudimentary brain waves can be detected. The fetus is able to feel pain for the first time. It becomes conscious of its surroundings. The fetus has become a sentient human life for the first time.

Third trimester

- **7 months:** 16" long and weighing about three pounds. Regular brain waves are detectable which are similar to those in adults.
- **8 months:** 18" long and weighing about 5 pounds.

- **9 months:** 20" long and with an average weight of 7 pounds, a full-term fetus' is typically born about this time.

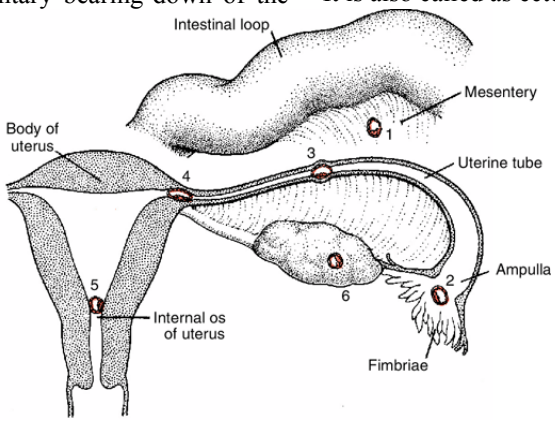
Labor and Delivery

Labor begins with involuntary uterine contractions that first result in effacement and dilation of the cervix, and then, in conjunction with voluntary bearing-down of the mother, the progress of the baby downs the birth canal. Presentation of the baby's head at the introitus or vaginal opening is called Crowning. Delivery occurs with thecomplete birth of the baby.

CLINICAL CORRELATIONS

A- Abnormal Implantation

It is also called as ectopic pregnancy.



Abnormal implantation sites of the blastocyst. 1, implantation in the abdominal cavity [the ovum most frequently implants in the rectouterine cavity but may implant at any place covered by peritoneum]; 2, implantation in the ampullary region of the tube; 3, tubal implantation; 4, interstitial implantation, e.g., in the narrow portion of the uterine tube; 5, implantation in the region of the internal os, frequently resulting in placenta previa; and 6, ovarian implantation.

1. Tubal pregnancy occurs when the blastocyst implants within the uterine tube owing to delayed transport (Psora).
2. The ampulla of uterine tube is the most common site of an ectopic pregnancy. The rectouterine pouch (pouch of Douglas) is a common site for an ectopic abdominal pregnancy.
3. Ectopic pregnancy is most commonly seen in women with endometriosis (Sycosis) or pelvic inflammatory disease (Pseudopsora).

B- Twinning

1. Dizygotic (fraternal) twins result from the fertilization and two different secondary oocytes by two different sperms (Psora). The resultant two zygotes form two blastocysts, each of which implants separately into the endometrium of the uterus. Thus, these twins are no more genetically alike than are siblings born at different times.
2. Monozygotic (identical) result from the fertilization of one secondary oocyte by one sperm. The resultant zygote forms a blastocyst in which the inner cell mass (embryoblast) splits into two (Psora-Sycosis). Therefore, the twins are genetically identical.
3. Conjoined (Siamese twins) - in these monozygotic twins, the inner cell mass (embryoblast) does not completely split (Cancerous). The two embryos are joined by a tissue bridge (e.g. at the head, thorax or pelvis).

C- Spontaneous abortion

A combination of factors protects the conceptus, including production of immunosuppressive cytokines and proteins and the expression of an unusual major histocompatibility complex class IB molecule (HLA-G) that blocks recognition of the conceptus as foreign tissue. Psora inhibits the action of these factors causing abortion.

If the mother has autoimmune disease, for example, systemic lupus erythematosus, antibodies generated by the disease may attack the conceptus and reject it (Pseudopsora).

D- Emryonic Malformation

In some cases, the trophoblast develops and forms placental membranes (Cancerous), although little or no embryonic tissue is present. Such a condition is known as a hydatidiform mole. Moles secrete high levels of hCG and may produce benign or malignant tumors e. g. invasive mole and choriocarcinoma.

Certain diseases, such as Huntington chorea, neurofibromatosis, familial cancer disorders like Wilms tumors, familial retinoblastoma, and myotonic dystrophy, Fragile X syndrome also involve imprinting are under syphilitic influence and cause preimplantation and postimplantation reproductive failure. Even in some fertile women under optimal conditions for pregnancy, 15% of oocytes are not fertilized, and 10% to 15% start cleavage but fail to implant. Of the 70% to 75% that implant, only 58% survive until the second week, and 16% of those are abnormal. Hence, when the first expected menstruation is missed, only 42% of the eggs exposed to sperm are surviving. Of this percentage, a number will be aborted during subsequent weeks, and a number will be abnormal at the time of birth (Psora).

E- Teratogenesis Associated with Gastrulation

At the beginning of the third week of development, when gastrulation is initiated fate maps can be made for various organ systems, such as the eyes and brain anlage, and these cell populations may be damaged by teratogens (Syphilis).

Gastrulation itself may be disrupted by genetic abnormalities (Sycosis- Syphilis) and toxic insults (Psora). In caudal dysgenesis (sirenomelia) (Pseudopsora), insufficient mesoderm is formed in the caudalmost region of the embryo. Because this mesoderm contributes to formation of the lower limbs, urogenital system (intermediate mesoderm), and lumbosacral vertebrae, abnormalities in these structures ensue.

Affected individuals exhibit a variable range of defects, including hypoplasia and fusion of the lower limbs (Psora), vertebral abnormalities, renal agenesis (Psora), imperforate anus (Psora), and anomalies of the genital organs. In humans, the condition is associated with maternal diabetes (Pseudopsora) and other causes.

F- Situs inversus

Situs inversus is a condition in which transposition of the viscera in the thorax and abdomen occurs (Psora).

G- Tumors Associated with Gastrulation

Sometimes, remnants of the primitive streak persist in the sacrococcygeal region. These clusters of pluripotent cells proliferate and form tumors, known as sacrococcygeal teratomas (Cancerous) that commonly contain tissues derived from all three germ layers.

H- Capillary hemangiomas

These are abnormally dense collections of capillary blood vessels that form the most common tumors of infancy. Insulin-like growth factor 2 is highly expressed in the lesions (Psora- sycosis) and may be one factor promoting abnormal vessel growth.

I- Birth Defects

Eighth week's period is called the period of Organogenesis. Stem cell populations are establishing each of the organ primordia, and these interactions are sensitive to insult from genetic (Sycosis- Syphilis) and environmental influences (Psora). Thus, this period is when most gross structural birth defects are induced.

J- Low Birth Weight

There is considerable variation in fetal length and weight. Intrauterine growth restriction (IUGR) is a term applied to infants who are at or below the 10th percentile for their expected birth weight at a given gestational age. Sometimes these infants are described as small for dates, small for gestational age (SGA), fetally malnourished, or dysmature (PSora). Approximately 1 in 10 babies have IUGR and therefore an increased risk of neuro-logical deficiencies, congenital malformations, meconium aspiration, hypoglycemia, hypocalcemia, and respiratory distress syndrome (RDS) (Psora). Causative factors include chromosomal abnormalities (10%) (Sycosis- syphilis); teratogens (Cancerous); congenital infections like rubella, cytomegalovirus, toxoplasmosis, and syphilis (Psora- Sycosis- Syphilis)); poor maternal health like hypertension and renal and cardiac disease (Psora- Sycosis); the mother's nutritional status and socioeconomic level; her use of cigarettes, alcohol, and other drugs; placental insufficiency; and multiple births (e.g., twins, triplets).

The major growth-promoting factor during development before and after birth is insulin-like growth factor-I (IGF-I), which has mitogenic and anabolic effects. Fetal tissues express IGF-I, and serum levels are correlated with fetal growth. Mutations in the IGF-I gene result in IUGR, and this growth retardation is continued after birth. The miasms can affect this factor causing several abnormalities.

K- Preeclampsia

Preeclampsia is a condition characterized by maternal hypertension, proteinuria, and edema (Psora-Sycosis). It may begin suddenly anytime from about 20 weeks' gestation to term and may result in fetal growth retardation, fetal death, or death of the mother. The condition appears to be a trophoblastic disorder (Cancerous) related to failed or incomplete differentiation of cytotrophoblast cells (Cancerous), many of which do not undergo their normal epithelial to endothelial transformation. As a result, invasion of maternal blood vessels by these cells is rudimentary. Causes for preeclampsia include placental mosaicism, in which trophoblast cells have genetic defects (Sycosis- syphilis), and maternal diseases that cause vascular problems, such as diabetes (Pseudopsora). Women who smoke also have a higher incidence of preeclampsia.

L- Erythroblastosis Fetalis and Fetal Hydrops

During pregnancy, some red blood cell antigens can stimulate a maternal antibody response against fetal blood cells (Psora). This process is an example of isoimmunization, and if the maternal response is sufficient, the antibodies will attack and hemolyze fetal red blood cells (Syphilis), resulting in hemolytic disease of the newborn (Psedopsora). The disease is sometimes called erythroblastosis fetalis because the hemolysis (Syphilis) of so many blood cells stimulates numbers of immature fetal blood cells called erythro-blasts (Psora).

In some cases, the anemia becomes so severe that fetal hydrops i.e. edema and effusions into the body cavities (Psora- Sycosis) occurs, leading to fetal death.

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