

Chpt. 29 Development (pgs. 1075-1088)

Development:

Differentiation:

Fertilization:

Zygote:

Embryological development: events that occur during first 2 months after fertilization

Fetal development: 9th week until birth

Fertilization:

oocyte is viable _____ hrs. after it leaves the ovary

sperm retain their fertilizing power w/i female reprod. tract _____ days after ejaculation. ("super sperm" are viable for ____ days.)

intercourse must occur no more than 5 days before ovulation and no later than 24 hrs. after the oocyte is ovulated

Sperm Transport:

roughly 200 million ejaculated and estimated that only a few thousand sometimes <500 sperm make it to the uterine (fallopian) tube.

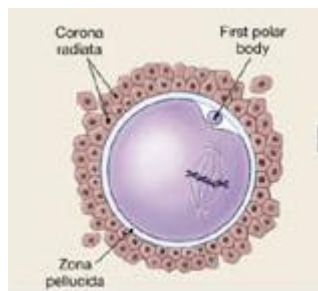
male with sperm count < 20 million/ml considered sterile

Fertilization

sperm must be capacitated

fertilization occurs in ampulla of fallopian (uterine) tube

secondary oocyte has layer of glycoproteins surrounding it termed zona pellucida and entire structure is surrounded by corona radiata (protects oocyte)



multiple sperm necessary to create openings in corona radiata
acrosomal cap of sperm releases hyaluronidase & acrosin
Hyaluronidase digests zona pellucida so sperm can get to oocyte

Acrosin – proteolytic enzyme

single sperm binds with receptors on zona pellucida of oocyte:

Sperm fuses to oocyte membrane and activates it (depolarizes)

Depolarization also causes Ca^{++} ions to be released from smooth ER which:

-triggers cortical reaction (exocytosis of enzymes) which inactivates sperm receptors & hardens zona pellucida

-completes meiosis II

-activates enzymes for mRNA for rapid protein synthesis

-male pronucleus fuses with female pronucleus = zygote

Gestation period: the time during which development occurs

First Trimester

- Rudiments of all major organ systems appear

Second Trimester

- Development of organs and organ systems
- Body shape and proportions change
- By end, fetus looks distinctively human

Third Trimester

- Rapid fetal growth and deposition of adipose tissue
- Most major organ systems are fully functional

Pre-embryonic Development

Cleavage: fairly rapid mitotic divisions of the zygote

-not much time for growth

-by 36 hrs. after fertilization, the 1st cleavage division produces

2 ID cells which divide to produce 4 cells then 8: eventually form solid ball of cells termed morula

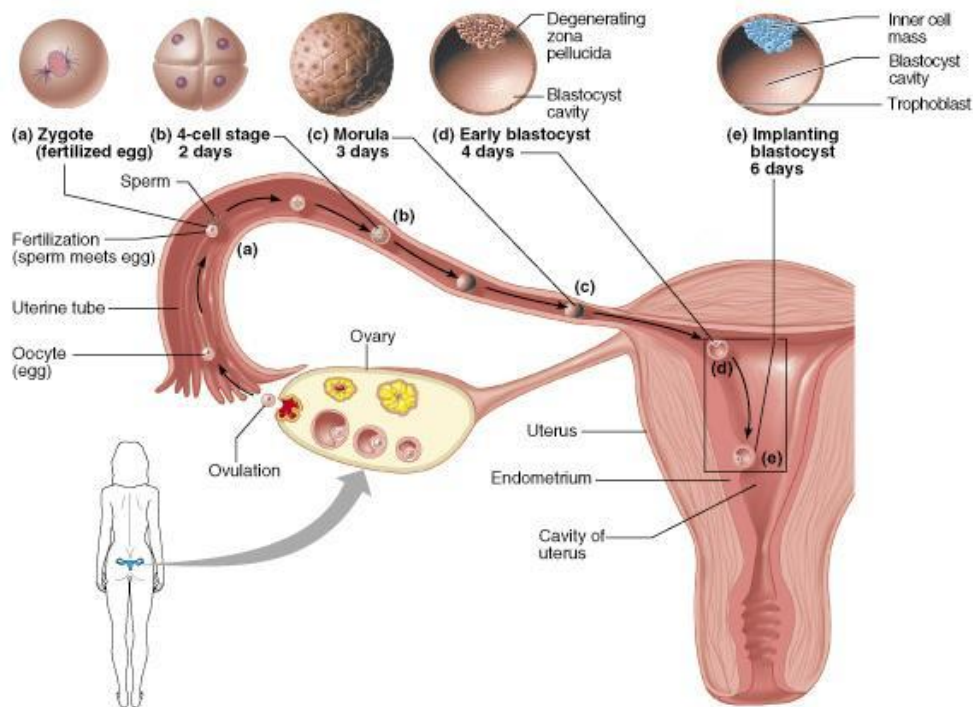
Blastocyst:

blastocoele: inner cavity

trophoblast

inner cell mass

-cleavage begins with the zygote and ends with the blastocyst



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Implantation

-when the blastocyst reaches the uterine cavity it usually floats freely in uterine secretions for ___ days: then about _____ days after ovulation the process of implantation begins.

trophoblast thickens

cellular trophoblast (cytotrophoblast): cells closest to the interior

syncytial trophoblast (syncytiotrophoblast) secretes hyaluronidase into endometrium

trophoblast forms villi which grow into endometrium

-implantation is completed when the blastocyst is entirely surrounded by endometrial tissue about 14 days after ovulation.

HCG: Human Chorionic Gonadotropin: secreted by the trophoblast

-this hormone prompts the corpus luteum

-HCG usually detectable in mothers blood by 3rd week of gestation

-HCG levels decline after 4 months

Placenta formed by third/fourth month

Placenta: originates from both embryonic & maternal (endometrial) tissues.

-the trophoblast changes & becomes the chorion which develops finger like projections called chorionic villi

-placenta is usually fully formed and functional as a nutritive, respiratory, excretory, and endocrine organ by the ___ month.

-placenta secretes HCG, produces estrogen, progesterone

Gastrulation: cells move toward primitive streak (central line)
produces 3 layered sheet of cells termed embryonic disc which will become the embryo

ectoderm: superficial cells

mesoderm

endoderm

Embryonic Membranes formed from rest of blastocyst

Embryonic Development:

Embryonic membranes: amnion, yolk sac, chorion, & allantois

1. yolk sac: small sac hangs from the ventral surface of the embryo in birds & reptiles
-human eggs contain very little yolk

2. amnion

-produces a bouyant environment that protects the developing embryo against physical trauma & helps to maintain

-fluid also keeps the rapidly growing embryonic parts from adhering & fusing together & allows the embryo

-initially amniotic fluid derived from mother's blood, but

-the water portion turns over rapidly

3. chorion:

-arises from the trophoblast to help

4. allantois:

-in egg-laying animals:

-in humans

Important Hormones During Pregnancy:

Placental Prolactin

Helps convert mammary glands to active status

Relaxin

Increases flexibility of pubic symphysis, permitting pelvis to expand during delivery

Causes dilation of cervix

Suppresses release of oxytocin by hypothalamus and delays labor contractions