

I. Fertilization and Development

- Fertilization occurs in the oviduct and implantation occurs in the uterus

How does the newly formed embryo assist to maintain the endometrium?

- It secretes hCG (human chorionic gonadotropin) which causes the corpus luteum to stay. When the corpus luteum stays, estrogen and progesterone continue to be produced and the endometrium stays

Which structures help to form the placenta?

- Uterus from mom and trophoblast (outer cells) cells from embryo
- The placenta is where gas, nutrient, and waste exchange occurs

How does blood travel to and from the placenta?

Blood travels from the embryo to the placenta through arteries and returns to the embryo through the veins (so oxygenated blood travels in the veins! → opposite of the adult circulation)

Explain how labor is induced

- the FETAL ADRENAL GLAND sends estrogen precursors to the placenta, which causes the placenta to release estrogen
- estrogen activates oxytocin receptors on the surface of the placenta
- oxytocin binds to the placenta and causes the placenta to make prostaglandins and stimulates contractions
- prostaglandins stimulate the uterus to contract even more

What are three ways the growing embryo is protected from the mother's immune system?

- a. the trophoblast cells send out signal molecules that are immunosuppressant's (they act on t-cells)
- b. the trophoblast cells send out molecules that break down tryptophan. Tryptophan is an amino acid needed for t-cell survival and function
- c. MHC molecules on placental cells secrete a hormone that activates death activation membrane protein called FasL
 - activated t-cells have FasL receptors and bind the the placenta. Placenta membranes stimulates the death protein in t-cells and they undergo apoptosis
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Explain how the sperm penetrates the egg and how polyspermy is prevented?

The sperm digests the hyaluronic acid in the cumulus cells that surround the egg. The sperm binds with ZPIII which causes the acrosome to burst and release hydrolytic enzymes which digests the zona. The sperm now turns sideways and binds to ZPII which tells the egg to let the sperm in.

Once the sperm enters it activates IP3 which causes the release of calcium. Calcium causes vesicles to move to the surface of the egg and dump out cortical granules. The granules cut off ZPII and ZPIII. This is called the CORTICAL REACTION and prevents any more sperm from entering the egg

What three things are necessary for development?

Cell division, differentiation of structure and function, and morphogenesis

How does the egg begin to divide once it has been fertilized?

Mitosis!

The egg divides into a 4 cell stage then an 8 cell stage. After more rounds of cell divisions it grows into the blastula, which eventually gains a hollow center known as the blastocoel.

* At first the egg isn't growing in size (lots of mitosis but zygote stays same size). Why? At first, all the developing egg wants to do is increase its number of cells. It doesn't care much about organelle synthesis and cytoplasm. It mainly wants to synthesize DNA and divide.

What is the basic process of gastrulation and which tissues are formed?

Gastrulation is the process by which embryonic tissue layers form. It forms the ectoderm, endoderm, and mesoderm

How does the neural tube form?

The notochord induces neural tube formation. The neural tube forms when the neural plate folds inward and separates from the ectoderm. Neural crest cells then migrate and cause formation of other tissues. The neural tube becomes the nervous system.