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1. Discuss ovulation

Answer: Around midcycle, the ovarian follicle, under the influence of follicle stimulating hormone and leutinizing hormone, undergoes a sudden growth spurt, producing a cystic swelling or bulge on the surface of the ovary. A small avascular spot, the stigma, soon appears on this swelling. Before ovulation, the secondary oocyte and some cells of the cumulus oophorus detach from the interior of the distended follicle.

Ovulation is triggered by a surge of leutinizing hormone production. Ovulation usually follows the leutinizing hormone peak by 12 to 24 hours. The leutinizing hormone surge, elicited by the high estrogen level in the blood, appears to cause the stigma to balloon out, forming a vesicle. The stigma soon ruptures, expelling the secondary oocyte with the follicular fluid. Expulsion of the oocyte is the result of intrafollicular pressure and possibly contraction of smooth muscle in the theca externa owing to stimulation by prostaglandins. Enzymatic digestion of the follicular wall seems to be one of the principal mechanisms leading to ovulation. The expelled secondary oocyte is surrounded by the zona pellucida and one or more layers of follicular cells, which are radially arranged as the corona radiata (see Fig. 2-10C), forming the oocyte-cumulus complex. The leutinizing hormone surge also seems to induce resumption of the first meiotic division of the primary oocyte. Hence, mature ovarian follicles contain secondary oocytes.

2. Differentiate between meiosis 1 and meiosis 2.

Meiosis 1	Meiosis 2
1. Crossing over occurs in pro phase 1	Crossing over does not occur
2. There is charisma formation	There is no chiasma formation
3. Synopsis is present	Synaapsis is absent
4. Produces two diploid daughter cells	Produce for haploid daughter cells
5. It reduces the policy number from $4n$ to $2n$	It divides the policy number from $2n$ to n
6. 1 pair of chromosome is distributed to each daughter cells during meiosis 1	Daughter cells have only one chromosome each
7. Equilateral.plane is central	Equilateral plane is rotated 90 degrees
8. It is complicated and has a long duration	It is simple and has a short duration

3. Discuss the stages involved in fertilization.

Fertilization: This is the union of the sperm and oocyte. The usual site of fertilization is the ampulla of the uterine tube. The fertilization process take approximately 24 hours. It is a sequence of coordinated events which include the following stages| **Passage of a sperm through the corona radiata:** For sperms to pass through the corona radiata,

they must have been capacitated (removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane that overlies the acrosomal region of the spermatozoa).

II Penetration of the zona pellucida: The zona is a glycoprotein shell surrounding the egg that facilitates and maintains sperm binding and induces the acrosome reaction. The intact acrosome of the sperm binds with a zona glycoprotein (ZP3/ zona protein 3) on the zona pellucida. Release of acrosomal enzymes (acrosin) allows sperm to penetrate the zona pellucida, thereby coming in contact with the plasma membrane of the oocyte. As soon as the head of a sperm comes in contact with the oocyte surface, the permeability of the zona pellucida changes. When a sperm comes in contact with the oocyte surface, lysosomal enzymes are released from cortical granules lining the plasma membrane of the oocyte. In turn, these enzymes alter properties of the zona pellucida to: prevent sperm penetration and inactivate binding sites for spermatozoa on the zona pellucida surface.

III. Fusion of plasma membranes of the oocyte and sperm The plasma or cell membranes of the oocyte and sperm fuse and break down at the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte, but the sperm's plasma membrane remains behind.

IV. Completion of the second meiotic division of oocyte and formation of female pronucleus.

Penetration of the oocyte by a sperm activates the oocyte into completing the second meiotic division and forming a mature oocyte and a second polar body. The nucleus of the mature ovum/oocyte is now called the female pronucleus.

V. Formation of the male pronucleus

Within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus and the tail of the sperm degenerates.

VI. The 2 pronuclei fuse into a single diploid aggregation of chromosomes, the ootid becomes a zygote The chromosomes in the zygote become arranged on a cleavage spindle in preparation for cleavage of the zygote.

4. Differentiate between monozygotic and diagnostic twins.

Monozygotic twins	Dizygotic twins
1. Form from single zygote	Form from two zygote
2. Genetically identical	They are not genetically identical
3. Are often called conjoined twins	Not seen as conjoined twins
4. Incidence is more common	Incidence is less common
5. Twins are of the same sex	