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1. DISCUSS OVULATION

This is the release of a secondary oocyte from the ovarian follicle. Ovulation is triggered by a surge of LH production and it usually follows the LH peak by 12 to 24 hours.

In a few days before ovulation, the secondary follicle grows rapidly to become a mature vesicular/ mature secondary or Graafian follicle. Coincident with the final development of the vesicular follicle, there is an abrupt increase in LH that causes the primary oocyte to complete Meiosis I. Meiosis II is also initiated, but the secondary oocyte is arrested in metaphase approximately 3 hours before ovulation.

In the meantime, the surface of the ovary begins to bulge locally, and at the apex, the stigma, appears. The LH surge, elicited by the high estrogen level in the blood, appears to cause the stigma to balloon out, forming a vesicle.

For the oocyte to be released, 2 events occur which are caused by the LH surge:

I. It increases collagenase activity, resulting in the digestion of collagen fibers surrounding the follicle

II. Prostaglandin levels increase and cause local muscular contractions in the ovarian wall

These contractions cause ovulation in which the oocyte floats out of the ovary together with its surrounding follicular cells. Some of the cumulus oophorus cells then rearrange themselves around the zona pellucida to form the corona radiata.

2. DIFFERENTIATE BETWEEN MEIOSIS I AND MEIOSIS II

Meiosis I	Meiosis II
1. Synapsis	No synapsis
2. Chiasma formation	No chiasma formation
3. There is crossing over	No crossing over
4.Alignment of 46 duplicated chromosomes at the metaphase plate	Alignment of 23 duplicated chromosomes at the metaphase plate
5.Disjunction of 46 duplicated chromosomes to form 23 duplicated chromosomes	Disjunction of 23 duplicated chromosomes to form 23 single chromosomes
6. Centromeres do not split	Centromeres split
7. 2 gametes are formed	4 gametes are formed

3. DISCUSS THE STAGES INVOLVED IN FERTILIZATION

Fertilization is a sequence of coordinated events including the following stages:

a. Passage of sperm through the corona radiata: for sperm to pass through the corona radiata, they must have been capacitated (removal of the glycoprotein coat

and seminal plasma membranes from the plasma membrane overlying the acrosomal region).

b. Penetration of zona pellucida: release of acrosomal enzymes allows the sperm to pass through the zona pellucida, thereby coming in contact with the plasma membrane of the oocyte. This alters the permeability of the zona pellucida, preventing further sperm penetration.

c. Fusion of plasma membranes of the sperm and oocyte: the plasma membranes of the 2 sex cells fuse together and break down at the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte, while the plasma membrane is left behind.

d. Completion of meiosis 2 of oocyte and formation of female pronucleus: penetration of the oocyte by the sperm causes the oocyte to complete meiosis II, forming a mature oocyte and a 2nd polar body. The nucleus of the mature ovum is the female pronucleus.

e. Formation of male pronucleus: within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus while the tail degenerates. The oocyte containing 2 pronuclei is known as an ootid.

f. Fusion of pronuclei: the 2 pronuclei fuse into a single nucleus with a diploid aggregation of chromosomes. The ootid becomes a zygote and the chromosomes in the zygote are arranged on a cleavage spindle in preparation for cleavage.

4. DIFFERENTIATE BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

Monozygotic twins	Dizygotic twins
1. Form from a single zygote	Form from 2 zygotes
2. Incidence is more common	Incidence is less common
3. Genetically identical	Not genetically identical
4. Are of the same sex	May be either same or different sex
5. Often called conjoined twins	Not seen as conjoined twins
6. Mostly diamniotic, monochorionic with a single placenta	Mostly diamniotic, dichorionic with 2 placentas