

Chapter V: The fertilization

I. The definition:

For successful fertilization, the mature sperm must enter the Cytoplasm of the mature egg.

Fertilization is the process in which a sperm enters the Cytoplasm of the ovocyte II. This ovocyte II then ends its evolution to give the ovule and the second polar globule. The genome of the two haploid nucleus (n chr)

It is associated to form a diploid genome (2n chr) of the fertilized egg (zygote).

II. The phases of fertilization:

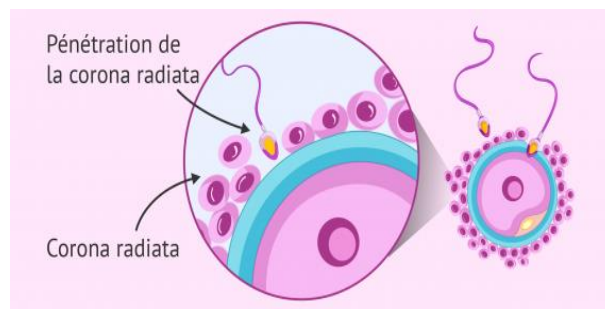
II.1. Features of the corona radiata:

Fertilization begins with the penetration of sperm in the layer of sperm.

The follicular cells surrounding the ovocyte: **the corona radiata**

Sperm passes through this set of cells through the release of enzymes and the movements of their flags.

Once the corona radiata passes, the sperm faces a second barrier: The pellucid area, the external layer that surrounds the egg. **Fig.1**



**Figure 01: Scheme of the 1st phase of fertilization
(Penetration of the corona radiata)**

2. Penetration of the pellucid area:

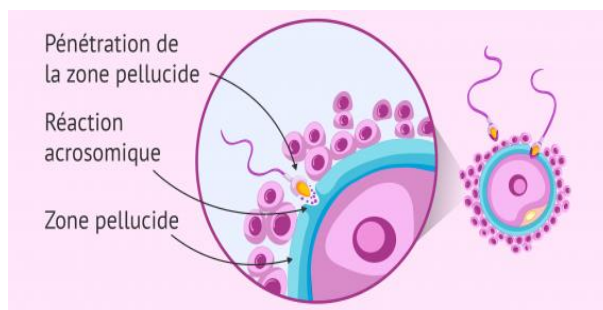
It takes more than one sperm to penetrate it even if in the end there is only one sperm can enter the ovocyte.

To pass through the sperm, it establishes a contact with the ZP3 receptor.

(zone pellucidaglycoprotein 3) which triggers an acrosomic reaction that releases the Enzymes:

Hyaluronidases and acrosin that dissolve the pellucid zone and allow the passage of sperm.

This acrosomic reaction is a series of changes in the sperm that it allows its final capacity or functional maturity to be able to enter the interior of the ovule by fusion of membranes. Fig.02.

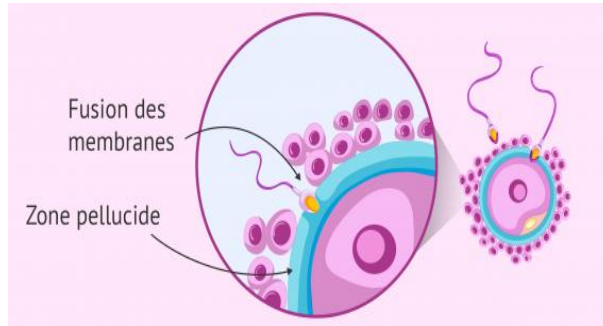


**Figure 02: Scheme of the 2nd Phase of Fertilization
(Penetration of the pellucid area)**

3. Fusion of membranes:

When the sperm enters into contact with the plasma membrane of the egg; different processes are triggered in the egg:

- The formation of the fertilizing cone (permits the fusion of the two membranes .
- Instant depolarisation of its membrane (the entrance of a Second spermatozoa is avoided).
- The release of cortical granules in the perivitellin space.Fig.03.



**Figure 03: Scheme of the Third Fase of Fertilization
(Fusion of Membranes)**

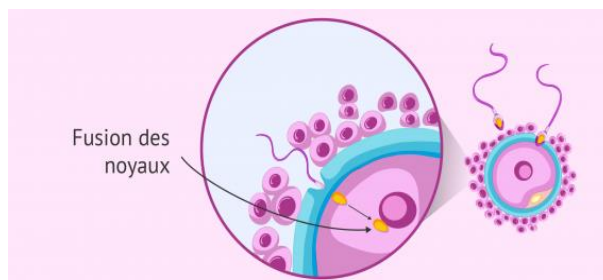
4. Fusion of the core and formation of the zygote:

With the entrance of the sperm, the egg is activated to end myosis, phenomenon which allows the reduction of the number of chromosomes, so the 2nd GP is expelled and Chromosomes form a structure called the pronucleus female (the pronucleus of the nucleus of the gamets they have half of the Chromosomes 23chr compared to other cells in the body).

The sperm advances its neck which contains the core is located next to the female.

The flagship is separated and ends with degeneration.

This is the moment when the fusion of the two occurs. Fig.04



**Figure 04: Scheme of the Fourth Fase of Fertilization
(Fusion of the core)**

The whole process of fertilization ends with the formation of the human zygote. The first cell of the body is the result of the union between the ovocyte and the spz.

It is at the time of fertilization that the sex of the future baby is determined according to The sexual chr:

Male Zygote: His sex chr is XY and the future baby will be a boy

Female Zygote: Her sex chr is XX and the future baby will be a girl

The egg is always the carrier of the chr X, so the embryo's sex will be defined by the spz, depending on whether it will be carrier of a chr X or Y

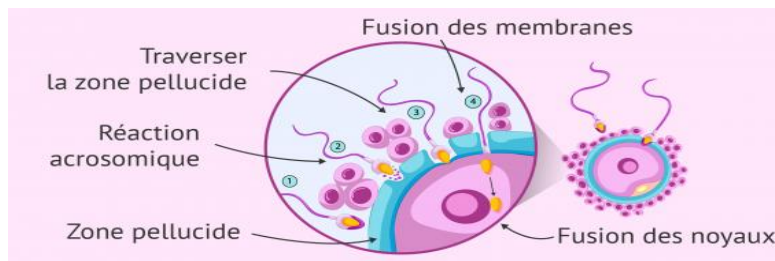


Figure 05: Summary of the stages of the penetration of the sperm

Time of Fertilization

III. The case of Twins:

Twins are two children born of the same pregnancy. In an interval of a few minutes to a few hours. But they are not similar.

They are not always the same sex. There are two major categories.

the monozygot twins (MZ), the so-called “real twins,” and the twins DZ (False Twins) is called the DZ (False Twins).

III.1. Twins (DZ) or “fake” twins:

Genital births give in their vast majority the dizygotes, resulting in of simultaneous fertilization, in any case during the same menstrual cycle, of two different ovules by two different sperm.

This situation occurs when two ovules are fertilized by two sperm. Neds on the walls of the uterus. This involves double ovulation occur spontaneously or under the effect of certain medications.

This occurs most often in the same monthly cycle.

The two eggs then form two different egg cells and the twins so designed.

They are called dizygotes (genetically it is called heterosygotes). Sharing only 50% of their genome, they may be of different gender and their morphology is also diverse.

III.2. Monozygot Twins (MZ) or “real” Twins:

The “real twins” are the result of the fertilization of a single egg and a single sperm, for which a premature division of the egg cell, or zygote, results in the development of two complete, but identical and shared embryos. They share the same genetic heritage. These are the only human cells.

We have only twenty-three chromosomes, instead of fourteen own chromosomes of species. The genetic identity of monozygotic twins has as a result that they have the same sex and the same physiognomy.

IV. The fertile period:

If the ovulation lasts 24 hours, the fertile period extends 5 days, 3 days before the date of the ovulation, the day of the ovulation and the day after that corresponds to a period of between the 11th and the 15th day

The lifetime of sperm in the female body is 72 hours (3 days)

Make a report on the day after the ovulation possible to get pregnant the duration

The egg's life is 24 hours and it has increased its chances of being fertilized by a sperm.