

"Fertilization"

' Introduction: '

- Fusion of male (sperm) and female (egg) gametes
 - Zygote formation
- Fusion occurs at ampullary region of fallopian tube
- Zygote travels from Ampulla to anterior or posterior wall of Uterus
 - Ectopic pregnancy may occur
- During fertilization, sperms pass from cervix to oviduct in 30 minutes to 6 days
- Sperm movement occurs less by their own propulsion and majorly by the muscular contractions of the uterus and uterine tube

' Requirements: '

1) Capacitation:

- Conditioning period
- Occurs in female reproductive tract
 - Time required: 7 hours
- Glycoprotein coat + Seminal plasma protein removed

- Cause: Epithelial interactions between the sperm and the uterine mucosal surface
- Result: Only capacitated sperm can pass through Corona Radiata cells and undergo acrosome reaction

(Corona Radiata: Tightly adherent cumulus oophorus cells that rearrange themselves around the zona pellucida of the ovulated oocyte form corona radiata)

2) Acrosome Reaction:

- Releases: acrosin- and trypsin- like substances
- Required for penetration of Zona Pellucida

' Steps of Fertilization: '

1) Penetration of Corona Radiata:

- 200 million to 300 million sperms deposited in female genital tract
- 300-500 reach the site of fertilization
 - Only one fertilizes the egg
- Others help in penetrating the barriers
- Capacitated sperm passes freely through the Corona Radiata

2) Penetration of Zona Pellucida

- Occurs due to a Zona Protein: Ligand ZP3
 - Acrosome reaction occurs
 - Release of acrosin- and trypsin- like substances

3) Fusion of Cell Membrane:

' Changes Taking Place After These Steps: '

i) Cortical and Zona Reactions:

- Zona Pellucida becomes Impermeable to any other sperm

- Chances of polyspermy decrease

ii) Second Meiotic Division resumed

iii) Metabolic Activation of egg: Early phase of embryogenesis related cellular and molecular events

' Pronuclei: '

- Male pronucleus(n)+ Female pronucleus(n)
 - > their DNA replicates -> Two Cell stage achieved via normal Mitotic division

' Results of Fertilization: '

- Restoration of $2n$ chromosomes
 - Sex determination (XX or XY)
 - Cleavage initiation
- Without fertilization, oocyte degenerates 24 hours after ovulation