

O O G E N E S I S

INTRODUCTION :-

- The process of formation of haploid female (♀) gamete ovum in the follicle of ovary is called oogenesis.
- Oogenesis starts during embryonic stage.
- Germinal epithelium of ovary divides mitotically to produce millions of gamete mother cell or oogonia.
- No oogonia enters into meiosis-1. It proceeds Prophase-1, get suspended and forms Primary Oocytes.
- During Puberty, the Primary oocyte restarts its 1st meiotic division.
- The important events of oogenesis are:
 - a) Premeiotic or Proliferative phase
 - b) Meiotic phase
 - c) Maturation of Egg.

a) PREMEIOTIC PHASE/PROLIFERATIVE PHASE :-

- The oocytes arise from the Primordial germ cells and multiply by mitosis to form population of oogonia.
- This phase occurs within the ovary, usually during embryonic, larval or foetal life.
- In mammals and birds, Primordial germ cells Proliferated into a limited number of oogonia.
- This phase is completed once in the life of an organism long before sexual maturity.

- No Proliferative oogonia are seen in an adult ovary.
- All oogonia are not matured into functional eggs. Only surviving oogonia usually begin meiosis and become Primary oocytes.
- This marks the transition between Premeiotic and meiotic phase.

b) MEIOTIC PHASE :-

- Before oogonia enter meiosis, they increase in size and replicate their chromosome, leading to the formation of Primary oocyte.
- Shortly after prophase begins and replicated chromosomes condense but Prophase is markedly prolonged, lasting for months and even years.
- Thus arrested prophase (diplotene stage) is the most peculiar feature of oocyte meiosis.
- During meiotic prophase, the oocyte grows and acquires developmental information.
- The dual function of an egg, its role as a sexual recombinant and its morphogenetic potential are acquired during this prophase.
- This phase can be subdivided into following phases :-
 1. Growth Phase of Primary oocytes
 2. Establishment of egg organization.

1. GROWTH PHASE OF PRIMARY OOCYTES :-

- This phase involves the following events :-

a) GROWTH AND DIFFERENTIATION OF OOCYTES :-

- It is not involve only the accumulation of nutrients but also genetic programming for development.

b) MAGNITUDE OF GROWTH :-

- This growth is due not so much to an increase in the active cytoplasm, as to an increase in the reserve yolk.

c) RATE OF OOCYTES GROWTH :-

- The rate of growth of Primary oocyte may be slow or higher.

d) SITE OF OOCYTE GROWTH :-

- It is different in different animals.
- In most, oocyte develop in a localized organ, an ovary.
- They may mature independently of surrounding ovarian cells with follicle or nurse cell.

e) MODE OF GROWTH OF OOCYTE :-

- In this phase qualitative and quantitative changes takes place these are —

i) GROWTH OF NUCLEAR SUBSTANCES :-

- oocytes developing independently of nurse cell.

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- Its newly extended lambrush chromosomes are metabolically active.
 - By Contrast, Oocytes surrounded by the nurse cells lack lambrush chromosomes.
 - The mRNA molecules synthesized during oogenesis is three types : —
 - i) immediately translating mRNA.
 - ii) Masked mRNA (informosome).
 - iii) Heat shocked mRNA (in Amphianocyte).
 - The nucleus is the Principal organelle for ribosome biosynthesis and assembly.

ii) STOCKPILING OF MEMBRANOUS ORGANELLES : —

- Membranous organelles like mitochondria ER and Golgi apparatus make up an essential portion of egg's developmental organization.

iii) VITELLOGENESIS (SYNTHESIS & DEPOSITION OF YOLK) : —

- Yolk accumulate during Vegetative growth phase and accounts for the rapid increase in size of the maturing eggs.
- It is composed of Protein, Phospholipids and neutral fats.
- It may be Protein yolk or Fatty Yolk.
- It is of two types : —

a) GRANULAR YOLK : —

- Invertebrates & Lower Chordate (Amphibian & tunicates)