

Embryology, 2nd Stage.....Lec.1, by Alaa K. abdulla

References

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- 3- Langman's Medical Embryology, by Thomas W. Sadler, (2006)
4. Human Embryology , by William J. (2001)

Embryology

Is the study of growth and differentiation undergone by an organism in the course of its development from a single fertilized egg to fetus. Or the embryology is a term include all developmental process up to maturity.

Vertebrate and invertebrate embryology

Many principles of embryology apply to invertebrates as well as to vertebrates.

Therefore, the study of invertebrate embryology has advanced the study of vertebrate embryology. However, there are many differences as well. For example, numerous invertebrate species release a larva before development is complete; at the end of the larval period, an animal for the first time comes to resemble an adult similar to its parent or parents. Although invertebrate embryology is similar in some ways for different invertebrate animal.

Modern embryology research

Currently, embryology has become an important research area for studying the genetic control of the development process (e.g. morphogens), its link to cell signalling, its importance for the study of certain diseases and mutations, and in links to stem cell research.

The Embryological development is a very complex and intricate set of processes that are carried out by the zygote to create the billions and billions of cells that make up the adult organism . Every one of the higher animals starts life as single cell. The fertilized ovum has technical name ((Zygote)) its formed by the fusion of germ cell from the male and female parents.

Gametogenesis (Spermatogenesis & Oogenesis)

is a biological process by which the cell division and differentiation to form mature gametes. Depending on the biological life cycle of the organism, gametogenesis occurs by mitotic division of gametogenous cells or by meiotic division of gametocytes into various gametes .

Mitosis:-

is a part of the cell cycle in which chromosomes in a cell nucleus are separated into two identical sets of chromosomes, each in its own nucleus. In general, mitosis (division of the nucleus) ,the divides occur in the cytoplasm, organelles and cell membrane into two new cells containing roughly equal shares of these cellular components .

Meiosis:-

is a specialized type of cell division which reduces the chromosome number by half. This process occurs in all sexually reproducing single-celled and multi-celled eukaryotes, including animals, plants, and fungi.

Gametogenesis

Is the process of gametes formation (spermatozoa and oocyte) (sperm and ovum)

A- Spermatogenesis (Male Gametogenesis) (Spermatocytogenesis) (Male gametocytogenesis)

** Is the formation of the male gametocyte (formation of the sperm) which possessing half the normal of genetic material. This process take place in the seminiferous tubules which are located within the testes. The epithelia of the seminiferous tubules its form type of columnar epithelium in testes called (Sertoli cell).

Stages of Spermatogenesis

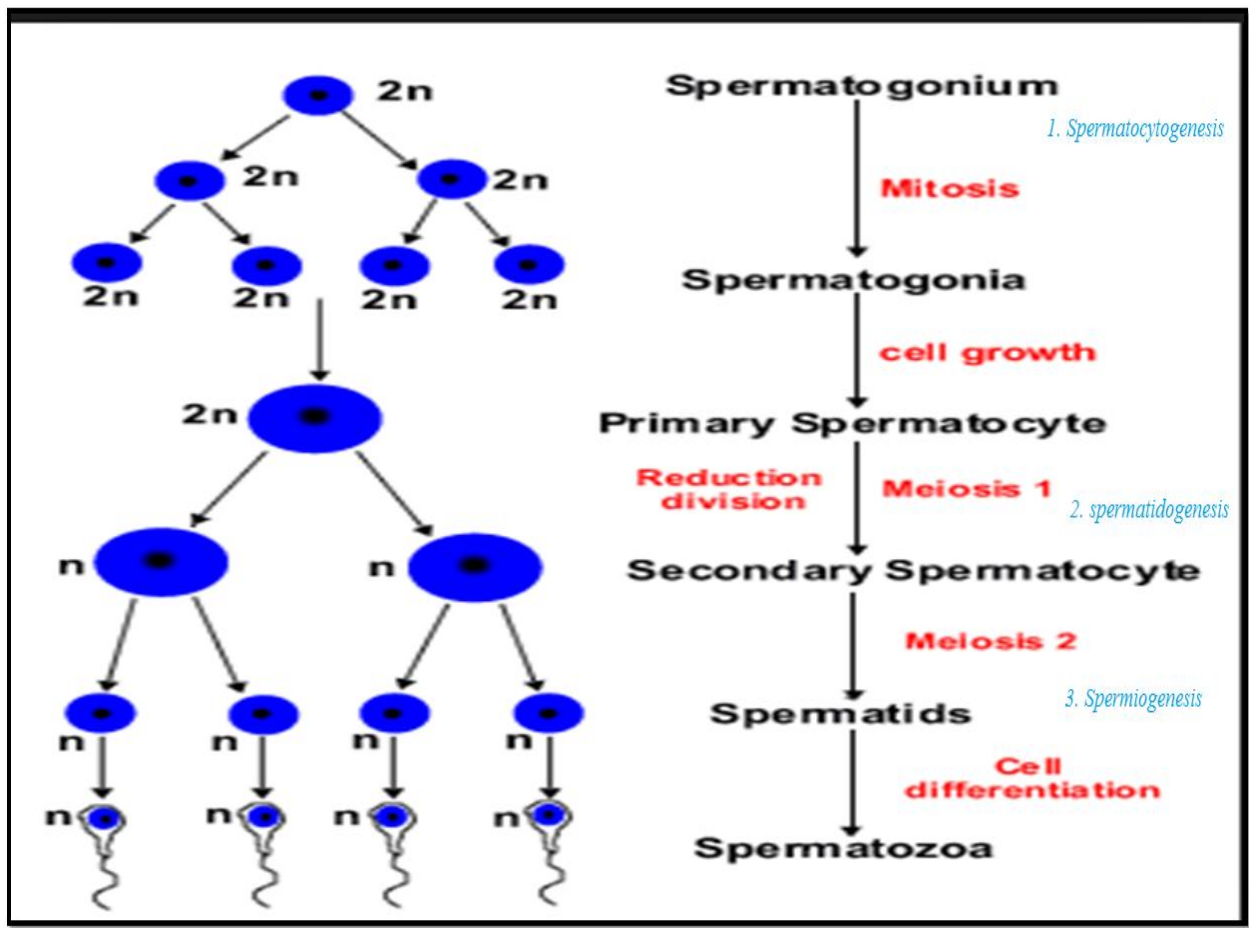
1- In early embryogenesis the primordial germ cells develop to spermatogonia (spermatogonium) ($2n$, 46).

2- Spermatogonia are mitotically active germ cell (Spermatogonia remain in the mitotic cycle throughout the reproductive life of the male).

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- 3- Spermatogonia develop to Primary Spermatocyte (2n , 46).
- 4- ****During puberty** Primary Spermatocyte undergo meiosis division (I) to generate Secondary Spermatocyte (1n , 23).
- 5- Secondary Spermatocyte (1n , 23) immediately enter meiosis division (II) to form Spermatide (1n , 23) (immature male sex cell) by an operation called spermatidogenesis.
- 6- The spermatide develop to spermatozoa by an operation called spermiogenesis.

Stage of Spermatogenesis



B. Oogenesis (female Gametogenesis) (Oocytogenesis)

Is the formation of the ovum (oocyte) female gametogenesis.

**Early in embryogenesis primordial germ cell develop to form Oogonia which mitotically active germ cell and during the development of fetus and before birth or at birth the Oogonia begin to undergo mitotic division to primary oocyte (which surrounded by a layer of granulose cells called primordial follicle)

**After birth the primary oocyte enter meiosis I (prophase) and remain dormant until puberty which completes meiosis I to develop to form Secondary oocyte which enter meiosis II to form Oocyte which surrounded by Graafian Follicle.

stage of Oocytogenesis

