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# A Review on Cell Cycle

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***Abstract*: Cell is a basic unit of life, Structural and functional unit of all living organisms and is also defined as a mass of protoplasm surrounded by a plasma membrane. It is the fundamental building block, which when joined with comparative cells frames a tissue and organs. The cell goes through a progression of occasions that outcome in the duplication of cell alongside the DNA. This is known as the cell cycle. These occasions incorporate duplication of its genome and combination of the cell organelles followed by division of the cytoplasm. Occasions occurring in a cell cycle is hereditarily controlled. From the single cells that make up the most fundamental life forms to the trillions of cells that establish the mindboggling design of the human body, every single living being on Earth is involved cells. In the view of cell division, this paper tries to provide necessary information about the cell cycle.**

***Keywords*: Cell cycle, Cell division, Mitosis, Meiosis.**

## 1. Introduction

The division of cytoplasm and chromosomes of a cell into two daughter cells is known as cell division, the cell which undergoes a division is known as parent cell and the cells which are derived from the parent cell are called as daughter cells. Careful guideline of the cell division program is crucial for appropriate cell development, advancement, and gametogenesis. Cell division is an exceptionally controlled and painstakingly coordinated process. Understanding the components that advance appropriate cell division is a significant stage toward un ravelling significant inquiries in cell science and human wellbeing. Cell division consists of two types those are mitosis and meiosis, Mitosis, this is the cell division in which one parent cell goes through division to create two daughter cells which are indistinguishable from one another and to the parent. Meiosis, this is the cell division on which one parent cell goes through division to bring about four haploid daughter cells. In mitosis, embryo develops from zygote through repeated mitotic divisions and in plants mitosis is restricted to meristematic tissues, young leaves and also mitosis leads to production of new organs like shoot and root branches in plants. In meiosis, prompts the production of gametes with half of the chromosome number, therefore the union of one female gamete with one male gamete during fertilization re-establishes the diploid state of the chromosome number, the sexual propagation in plants and animals could be conceivable simply because of advancement of meiosis.

Types of cell division:

1. Mitosis
2. Meiosis

*1) Mitosis*

The division in which one parent cell undergoes division to create two daughter cells which are indistinguishable from one parent to another parent.

Stages of mitosis:

a) Interphase
b) Prophase
c) Metaphase
d) Anaphas
e) Telophase

*Interphase:* Interphase is the longest stage of Cell Cycle. It is generally known as DNA synthesis phase. It consists of three sub phases: G1, S, G2.

*G1 Phase (First gap):*

G1 phase is the Pre-DNA replication phase. In which protein and RNA synthesis takes place.

*S Phase (Synthesis phase):*

Synthesis phase takes less time than G1 phase. In this phase chromosomes and DNA replications takes place.

*G2 Phase (Second gap):*

G2 phase is the Post DNA replication phase and this is the stage of interphase. Synthesis of RNA and protein takes place during this phase.

*Prophase:*

Prophase is the second stage of mitotic division. In this stage appearance of definite-thread like structures in nuclei, and also chromosomes become condensed.

*Metaphase:*

Metaphase is the third stage of mitotic division. In this stage disappearance of nucleolus occurs, appearance of spindle fibres, in which the chromosomes are arranged in equatorial plate. Thickest and shortest stage of chromosomes and finally chromosomes will clearly visible at metaphase.

*Anaphase:*

Anaphase is the fourth stage of mitotic division. In which chromatids separate at centrosomes of each chromosome and move towards opposite poles.

*Telophase:*

Telophase is the last stage of the mitotic division. In this stage nucleolus and nuclear membrane will reappear, finally cell plate divides the cell into two daughter cells.

*Cytokinesis:*

Cytokinesis occurs at the end of the telophase. In plants, division of cytoplasm takes place through the formation of cell

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plate and in animals by a process known as cleavage, forming s cleavage furrow.

## 2. Meiosis

Meiosis is the division, on which one parent cell goes through the division to bring about four haploid cells n daughter cells. Meiosis is confined to reproductive cells because it takes place during spore or gamete formation.

Stages of meiosis:

*Interphase*

*Meiosis-1:*

a) Prophase-1
b) Metaphase-1
c) Anaphase-1
d) Telophase-1

Meiosis-2:

a) Prophase-2
b) Metaphase-2
c) Anaphase-2
d) Telophase-2

*Interphase:* It is the Pre meiotic interphase, in which DNA duplication occurs during S-phase.

*Meiosis-1:*

*Prophase-1:*

Prophase is longest in duration and also very complex. It is divided into five sub-stages.

*Leptotene:* During leptotene, chromosomes condensation takes place so that they visible as fine thread like structures called Bouquets.

*Zygotene:* During zygotene, synapsis occurs which is pairing of homologous chromosomes.

*Pachytene:* During pachytene, chromosomes appeared as thread-like structures and exchange of segments between non-sister chromatids of homologous chromosomes known as crossing over occurs.

*Diplotene:* During diplotene, chiasmata occur which means attachment of homologous chromosomes to each other.

*Diakinesis:* During diakinesis, bivalents appears as round darkly stained bodies and they are evenly distributed throughout the cell and also nucleolus and nuclear membrane disappear.

*Metaphase-1:* In metaphase nucleus and nuclear membrane are absent, chromosomes are exactly in equatorial plate but not necessarily centromere. Spindle fibre is connected with centromere only at one side.

*Anaphase-1:* Centromere doesn't divide, chromosomes in a bivalent move to opposite poles and also nucleolus, nuclear membrane are absent at anaphase stage.

*Telophase-1:* Finally, nucleolus and nuclear membrane will reappear and chromosomes reached to the respective poles.

*Cytokinesis-1:* At the end of the first telophase, the cytoplasm of each cell divides into two halves. The two halves of each cell doesn't separate, they stay together and this two celled structure is called as dyad.

*Meiosis-2:*

*Prophase-2:* In Prophase, the chromosomes are much more condensed hence the chromosomes become shorter and thicker. The nucleolus and nuclear membrane disappear.

*Metaphase-2:* Centromere are connected by spindle fibres on both sides. Centromere are exactly on the equatorial plane.

*Anaphase-2:* The centromeres of every chromosome partition longitudinally in which the two sister chromatids of each chromosome separate and move to the opposite poles.

*Telophase-2:* The chromatids go through uncoiling so that they show up as free bundle of dainty fleece.

*Cytokinesis:* The cytoplasm of each of the two cells of a dyad divides into two parts. After the completion of the meiotic cell division one parent cell produces four haploid daughter cells. These four daughter cells together known as tetrad.

## 3. Conclusion

Cautious guideline of the cell division program is critical for appropriate cell development, improvement, and gametogenesis. Brokenness or mis-regulation of cell division can prompt development surrenders and proliferative sicknesses like malignant growth and maturing related illnesses, including Alzheimer's infection. In this way, investigations of the pathways and instruments that advance legitimate cell division are significant roads through which we can grasp cell guideline and its mis-regulation in human sickness.

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