5. Cell division

5.1. Introduction:

All living organisms first exist, then grow and come up with an idea, division which is caused by the tendency to be solicitous to maintain the homeostasis. this fundamental property of a living being is also required to repair and regenerate the tissues, also produce more complex organisms.

Actually, there are different types of division such as Prokaryotic cell division or binary fission that is based on a division of a unicellular organism into two daughter cells, and Eukaryotic cell division which may be classified as Asexual (mitosis) in somatic cells and Sexual reproduction (meiosis) in germline cells .

Cell division is under control of a mechanism named Cell Cycle consisting of a few stages in the Eukaryotic cells. The first stop is **Interphase** which is the preparation process for the division in three steps.

5.2. The Cell Cycle

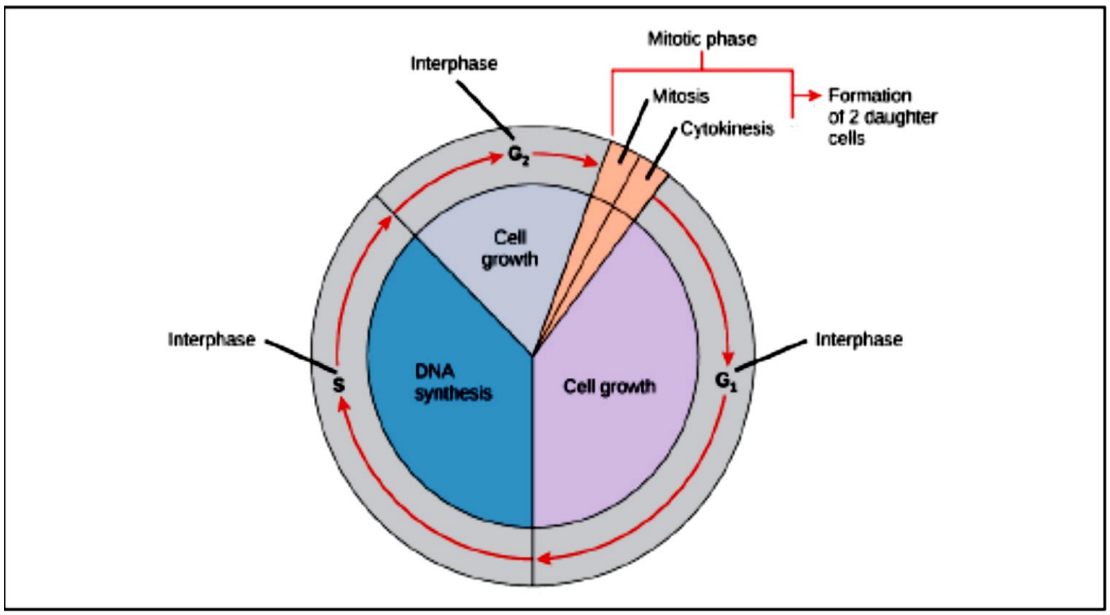
The cell cycle is an ordered series of events involving cell growth and cell division (i.e. Mitosis) that produces two new daughter cells. Cells on the path to cell division proceed through a series of precisely timed and carefully regulated stages of growth, DNA replication, and division that produce two genetically identical cells. The cell cycle has two major phases: interphase and the mitotic phase . During (interphase, the cell grows and DNA is replicated. During the mitotic phase, the replicated chromosomes separate (via mitosis), the cytoplasm divides (via cytokinesis, and the cell formally divides into two daughter cells.

G1 phase (the first gap phase) where the duplication of organelles, cell enlargement physically and production of the molecular units such as RNA and proteins occur.

S phase where the duplication of the DNA (2n chromosomes) in the nucleus and production of centromeres that are types of microtubule formations helping separation of DNA .

G2 phase enlargement of the cell and its volume continues while the last preparations as more protein and organelles synthesis for the mitosis are supplied .

The M phase containing mitosis and cytokinesis stages. Mitosis is the process of producing two identical cells from the mother cell consisting of prophase, metaphase, anaphase, and telophase.



((The cell cycle))

Table 1: Stages of Mitosis under x 400 Å magnification

Interphase (x 400 Å)	Early Prophase (x 400 Å)	Late Prophase (x 400 Å)	Metaphase (x 400 Å)

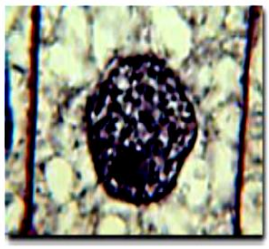
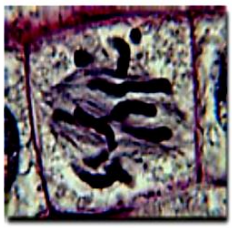
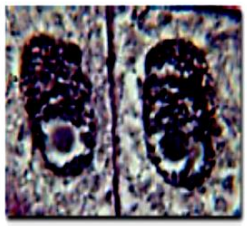

			

figure 1: the cell in the interphase (G1, S, and G2)	*figure 2: the cell in the early prophase where the chromosomes start to condense*	*figure 3: the cell in the late prophase where chromosomes totally condensed*	*figure 4: the cell in the metaphase where the chromosomes line up at metaphase plate*

Early Anaphase (x 400 Å)	Late Anaphase (x 400 Å)	Telophase (x 400 Å)	Daughter Cells (x 400 Å)
			
figure 5: the cell in the early anaphase where the kinetochore microtubules pull the chromosomes towards poles	*figure 6: the cell in the late anaphase where the cell plate is slightly formed and chromosomes got in the poles (in the animal cell there would be a slight furrow)*	*figure 7: the cell in the telophase where chromosomes start to recondense and the cell plate shows up clearly (in animal cells there will be a furrow)*	*figure 8: the cell has divided into two identical daughter cells*

"*Mitosis stages figure:1-8*" by Molecular Expressions Photo Gallery: Mitosis

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