

Cell Cycle

- *Living organisms are constantly making new cells.
- *They make new cells in order to grow and to replace old dead cells.
- *The process by which new cells are made is called **cell division**.
- *Cell division is occurring all the time.
The cells reproduce for ***Repair, Growth, Replacement***

- There are three main types of cell division: ***binary fission, mitosis, and meiosis***.
- ***Binary fission*** is used by simple organisms like bacteria.
- More complex organisms gain new cells by either mitosis or meiosis.

Cell Division

- Cell cycle is the process in which the mother cell splits into two new identical “daughter cells.” Cell Cycle is broken up into 2 parts: **Interphase and Mitosis.**
- **Mitosis** is the simple duplication of a cell and all of its parts. It duplicates its **DNA** and the two new cells (**daughter cells**) have the same pieces and genetic code. Two identical copies come from one original. Examples of cells that are produced through mitosis include cells in the human body for the skin, blood, and muscle.
- *Mitosis is used when a cell needs to be replicated into exact copies of itself. Everything in the cell is duplicated. The two new cells have the same DNA, functions, and genetic code. The original cell is called the mother cell and the two new cells are called daughter cells.

Steps of Cell Division:

Interphase

- Cells go through different phases called the cell cycle. The "normal" state of a cell is called the "**interphase**". The genetic material is duplicated during the **interphase** stage of the cell.
- **Interphase:** Stage cycle when the cell is preparing itself to duplicate.
 - 1) **G1:** The first part of the entire cell cycle. The cell duplicates its organelles and grows in size. There is cell growth and increase in proteins
 - 2) **S Phase** The DNA is duplicated
 - 3) **G2:** Cell continues to grow and duplicate its organelles, while preparing for the second part of cell division.

Mitosis

(division of the nucleus)

- Mitosis, also known as the M-Phase, part of the cell cycle in which the cell splits into 2 separate cells. There will be 2 new nuclei each with complete copies of the DNA.
- The cells produced from mitosis are called **diploids** because they have two complete sets of chromosomes.
- Mitosis has 4 phases (PMAT)
 - Prophase (pre)
 - Metaphase (middle)
 - Anaphase (away)
 - Telophase (two)

Prophase

- Nuclear Membrane dissolves and chromatin (loose DNA) condenses into chromosomes, it becomes tighter.
- Centrioles need to get in the right position. They help with cell division. They are a small set of microtubules arranged in a specific way.

Metaphase

- Duplicated chromosomes lined up in the middle
- Centrioles in the cell turn in spindle fibers and attach to the chromosomes (connect to centromeres/center). They are aligned by the equator of the cell

Anaphase

- Separation Begins: half to one side, half to the other
- The chromosomes separate and move to opposite sides of the cell.
- The spindle fibers begin to tighten and shorten, causing the chromosomes to split in halves called ***chromatids or daughter chromosomes.***
- These chromatids are pulled to the poles of the cell.

Telophase

- Chromosomes unwind, Spindle fibers disappear and nuclear membrane forms
- During telophase the cell forms two nuclear membranes around each set of chromosomes and the chromosomes uncoil. The cell walls then pinch off and split down the middle. The two new cells, or daughter cells, are formed.

Cytokinesis

- Division of cytoplasm into two new cells
- After cytokinesis, the cell goes back into interphase, where the cycle is repeated. If cytokinesis were to occur to a cell that had not gone through mitosis, then the daughter cells would be different or not function properly.

