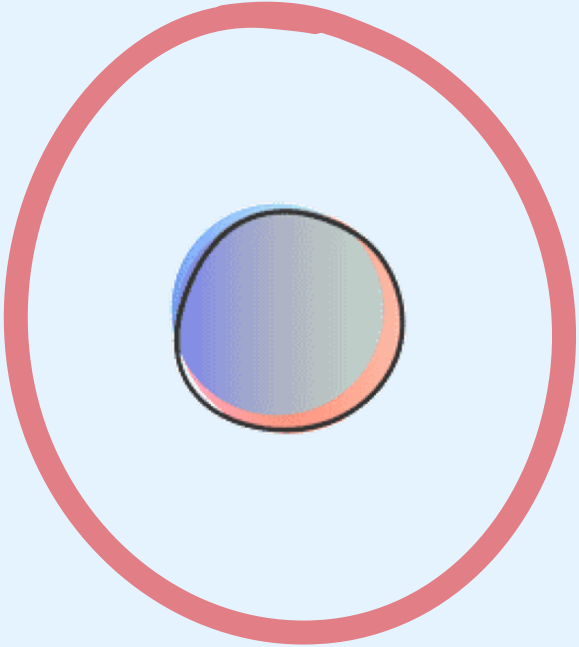
Cell Division in Normal Cells

Elmasa elhoni : 2475 , Samah Zied : 2605

Contents:

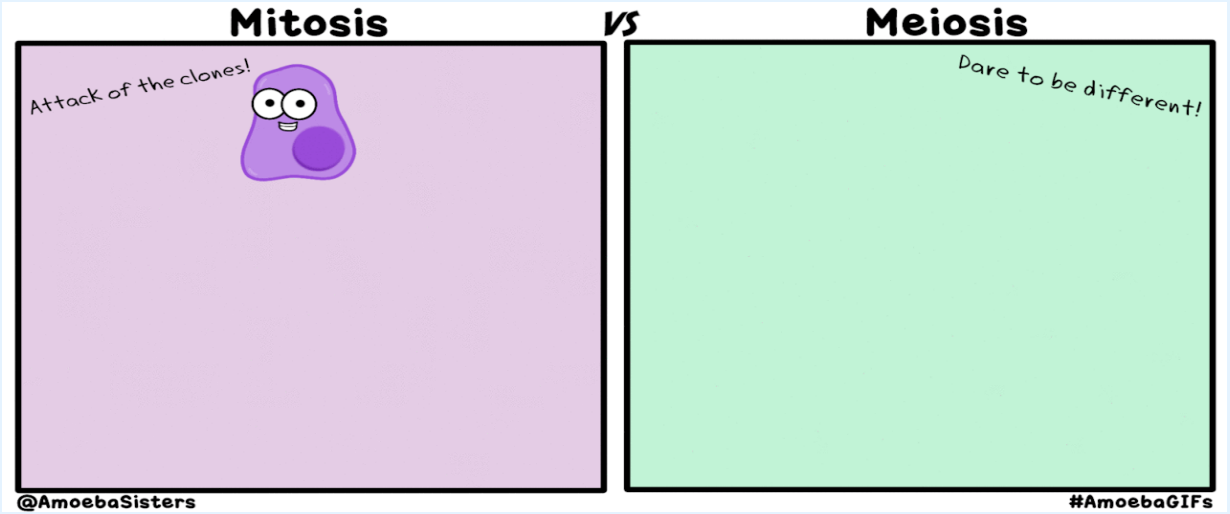
What is cell division & cell cycle ?



Cell division is a very important process in all living organisms. During the division of a cell, DNA replication and cell growth also take place. All these processes, have to take place in a coordinated way to ensure correct division and formation of progeny cells containing intact genomes. The sequence of events by which a cell duplicates its genome, synthesizes the other constituents of the cell and eventually divides into two daughter cells is termed cell cycle.

There are two distinct types of cell division :

A vegetative division : whereby each daughter cell is genetically identical to the parent cell (mitosis), and a reproductive cell division, whereby the number of chromosomes in the daughter cells is reduced by half to produce haploid gametes (meiosis).



The stages of cell cycle :

The cell cycle is divided into two basic phases :

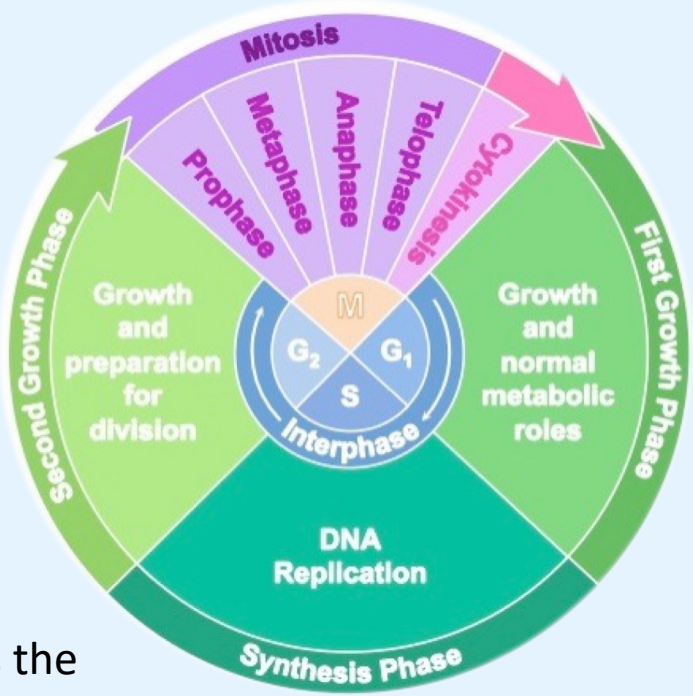
1. Interphase :

G1 phase (Gap 1) :

Metabolic changes prepare the cell for division. At a certain point - the restriction point - the cell is committed to division and moves into the S phase.

S phase (Synthesis) :

S phase. DNA synthesis replicates the genetic material. Each chromosome now consists of two sister chromatids.



G2 phase (Gap 2) :

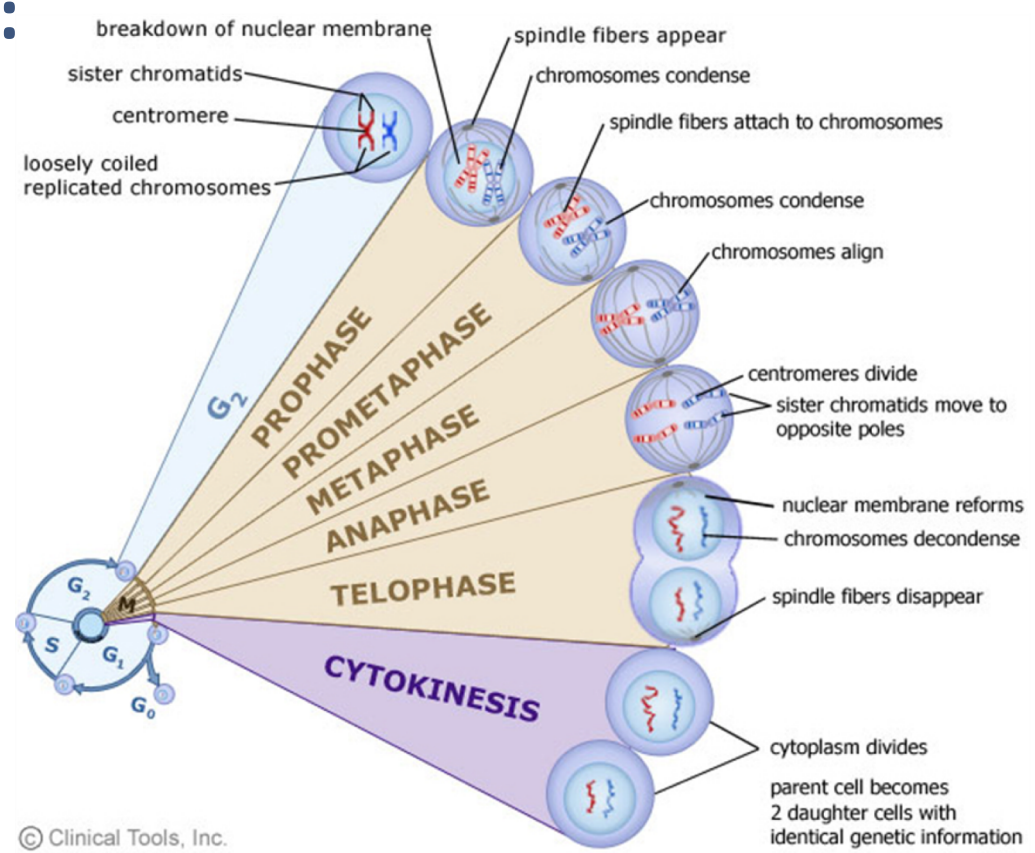
G2 phase. Metabolic changes assemble the cytoplasmic materials necessary for mitosis and cytokinesis.

Stages of cell cycle :

2. M Phase (Mitosis phase):

Mitosis, although a continuous process, is conventionally divided into five stages:

prophase, prometaphase, metaphase, anaphase and telophase



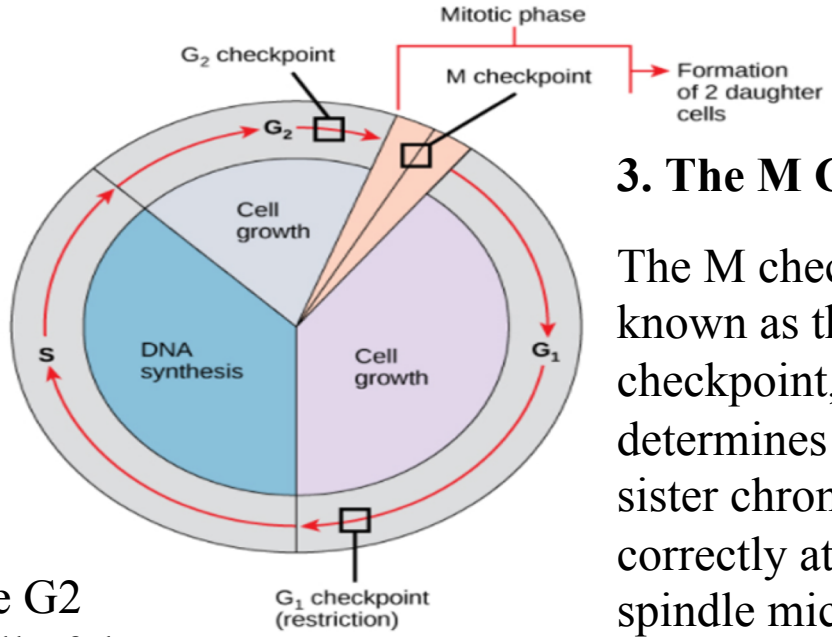
The regulation of the cell cycle :

1. The G_1 Checkpoint :

Also known as the restriction point it determines whether all conditions are favorable for cell division to proceed

2. The G2 Checkpoint :

the most important role of the G2 checkpoint is to ensure that all of the chromosomes have been replicated and that the replicated DNA is not damaged

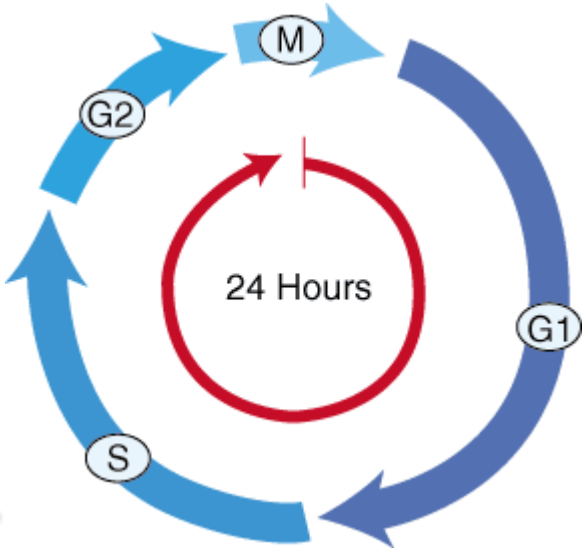


3. The M Checkpoint :

The M checkpoint is also known as the spindle checkpoint, because it determines whether all the sister chromatids are correctly attached to the spindle microtubules.

The cell cycle timing :

G1-phase	**10 to 12 hr.**
S-phase	**8 to 10 hr.**
G2-phase	**4 to 6 hr.**
M-phase	**1 to 2 hr.**
Total	**24 hr.**

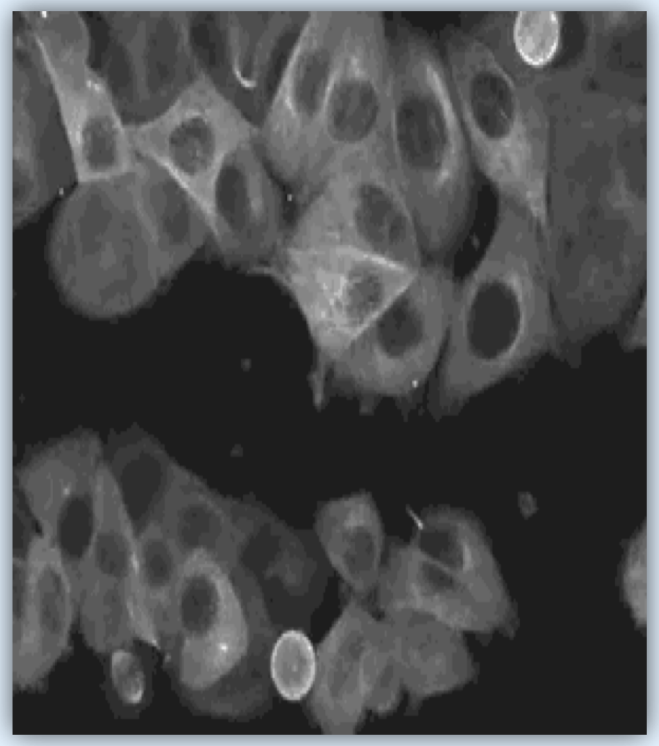


Defects of cell cycle :

Cancer is increasingly viewed as a cell cycle disease.

Four main classes of genes that are altered into Cancer

- Proto-oncogenes
- Tumor suppressor genes
- MicroRNA (miRNA) genes
- Mutator genes



Summary

- The cell cycle is a repeating series of events that include growth, DNA synthesis, and cell division
- cell cycle has two major phases: interphase and mitotic phase
- There are a number of main checkpoints in the regulation of the cell cycle.
- Cancer is a disease that occurs when the cell cycle is no longer regulated , because the cell's DNA has become damaged. Cancerous cells grow out of control and may form a mass of abnormal cells called a tumor.

Reference

- https://courses.lumenlearning.com/biology1/chapter/control-of-the-cell-cycle/
- https://www.sparknotes.com/biology/cellreproduction/cellcycle/section2/
- Four main classes of genes are altered frequently in cancer: - Proto-oncogenes - Tumor suppressor genes - MicroRNA (miRNA) genes - Mutator genes
- Book : Principles of genetics


THANK
YOU!