Cell Division & Mitosis

Reminder…

- Organisms that have only one cell are called… unicellular
- Organisms made of more than one cell are called… multicellular

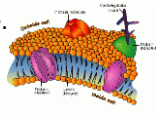
Why do Cells Divide?

- Unicellular organisms - cell division is ONLY for the purpose of reproduction
- Multicellular organisms – use cell division for growth, development, repair and reproduction.

Growth

Cells can grow in size, but there is a limit to how large a cell can get.

Cells need a lot of surface area because the materials that it needs to function travel across its cell membrane.



As a cell gets bigger, its needs increase to a larger degree than its surface area, so it will divide instead of growing bigger and bigger.

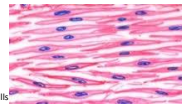
Development

Multicellular organisms all start as one cell and grow larger through cell division.

But, cell division is not the only thing that leads to the development of an organism.

During development, cells become specialized to perform specific functions like; skin cells, liver cells, brain cells, etc.

Skin Cells

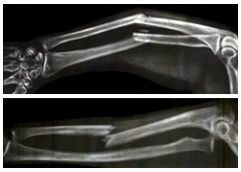


Smooth muscle cells

Repair

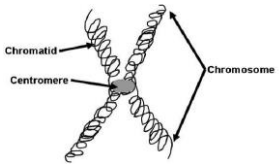
The body repairs injuries, like cuts and broken bones, through cell division.

Cells also get old and die and need to be replaced.



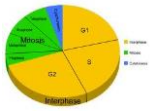
What part of the cell is involved in cell division?

- DNA (Deoxyribonucleic Acid) - the chemical that contains information for an organism's growth and function
- Chromosomes- DNA wrapped around proteins and compacted into two chromatids held together by a centromere.

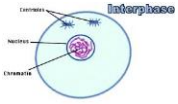


The Cell Cycle

❖Cell cycle - the normal sequence of development and division of a cell



1. Interphase- normal cell function, part of cell cycle before division occurs. DNA duplicates exactly.

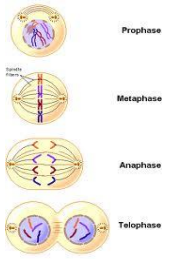


Cell Cycle Continued

2. Mitosis- nucleus divides (eukaryotes only- cells with a nucleus)

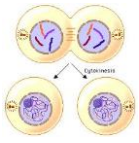
Four steps

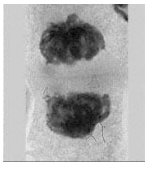
a. Prophase- chromosomes form and the membrane around the nucleus disappears
b. Metaphase- chromosome line up in the middle of the cell
c. Anaphase- chromatids split and are pulled to opposite sides of the cell
d. Telophase- nuclei form, new nuclear membranes develop



Cell Cycle continued

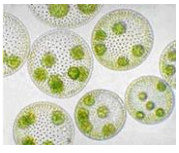
3. Cytokinesis- cytoplasm divides. Two new, identical daughter cells form.





Cell Division in Reproduction

- Asexual reproduction- one organism produces one or more new, **identical** organisms that can live independently (most unicellular organisms and a few multi-cellular organisms reproduce this way)

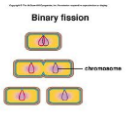


Asexual Reproduction

1. Binary fission- prokaryotic, unicellular organisms. Cell division **is** reproduction. Cytokinesis only.

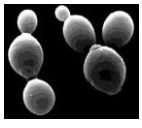
   Bacteria reproduce this way.

- Eukaryotic, unicellular organisms undergo mitosis and Cytokinesis. (algae, yeast, protozoan)



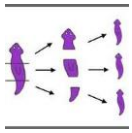
Asexual Reproduction continued

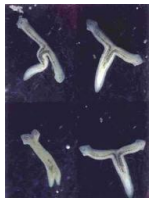
2. Budding- organisms develop tiny buds on their bodies which grow into a complete organism and then breaks free. (hydra, some types of plants)



Asexual Reproduction continued

- Regeneration- new tissue growth at the site of a lost limb (starfish, Planaria)





Sexual Reproduction

- Sexual reproduction - genetic material from two parents. Allows for great diversity.