

## CELL CYCLE

- constantly changing structure
  - keeps up with its changing environment (maintains homeostasis)
- why split?
  - must reproduce when surface area can no longer supply much larger volume w/nutrients & need to rid of wastes
  - 1<sup>st</sup> stage of cell cycle

### INTERPHASE

#### G1

- Resting stage of cell
- Cell is carrying out it's normal/everyday activities (growing)
- May last days → years depending on the cell type
- when the surface area to volume imbalance occurs, S phase begins

#### S

- Genetic material makes copies of itself
- Gives cell enough material to fully supply 2 cells after division
- once the cell has replicated the genetic material, G2 phase begins

#### G2

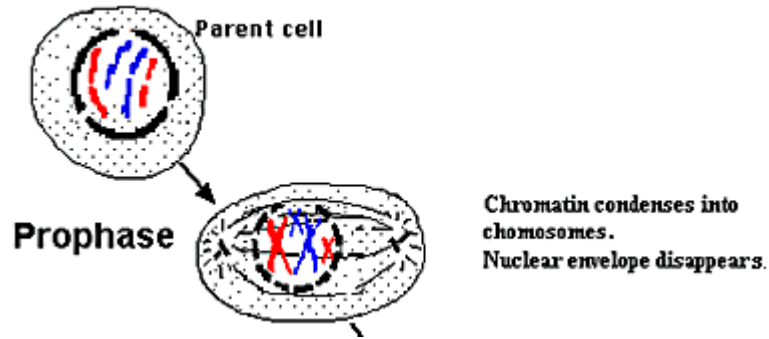
- Cellular organelles (mitochondria, ribosomes, organelles, etc.) are produced to supply the new cells
- after Interphase, Mitosis begins

### MITOSIS

- Considered nuclear division b/c focus is on genetic material of the cell

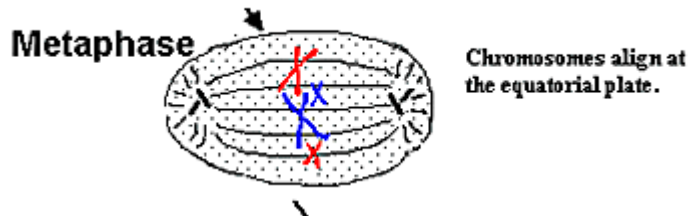
### **PROPHASE**

- Nucleus begins to disappear
- Chromatin pulls together and forms pairs of rope-like structures called chromatid pairs
- Chromatid pairs are held together by a centromere
- Spindle fibers begin to appear
- Spindle fibers and centrioles migrate to the poles (opposite ends) of the cell



## METAPHASE

- Begins when the chromatid pairs line up along the center (equator) of the cell
- Lining up along the equator makes it possible for the chromatids to position themselves so they can migrate to the opposite poles of the cell



## ANAPHASE

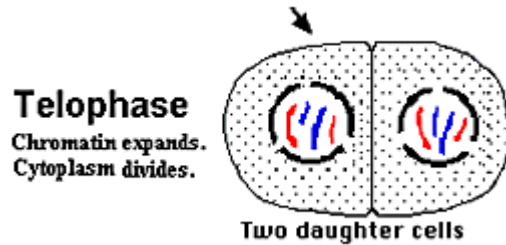
- Phase where the chromatids actually migrate to the opposite poles of the cell
- Chromatid pairs split, spindle fibers contract pulling each chromosome toward the pole
- Nucleus reappears
- Spindle fibers disappear



## TELOPHASE

- Begins when the nucleus reappears and spindle fibers are gone
- Continues until cell splits in 2
- Cytokinesis = splitting of cells
- Result in 2 daughter cells in mitosis
- Identical in number and type of chromosomes

- Smaller than original cell
- Develop; starting interphase again



## NORMAL CONTROL OF THE CELL CYCLE

### A. Enzymes

1. enzymes are proteins
2. production is controlled by genes on chromosomes
3. control each step in cell cycle

### B. Contact Inhibition

1. cell-to-cell communication
2. cells give each other chemical signals
3. When cells touch each other, they stop dividing

## Cancer- A mistake in the cell cycle

### A. Cancer- uncontrolled division of cells

### B. At cell level- caused by wrong signal given by genes controlling enzymes

### C. Results in tumors-

1. Masses of tissue
2. deprive normal cells of nutrients
3. disrupt the fxning of organs

### D. Second leading cause of death in the U.S. (only heart disease is higher)

### E. Causes

1. Genetic factors
2. Environmental Factors
  - a. different countries have different cancer rates
  - b. when people move, cancer rates follow the patterns of the country in which they live
  - c. environmental factors include:
    - cigarette smoking
    - air/water pollution
    - exposure to UV radiation of sun

- Infection with certain viruses

Risk factors associated with cancer-

1. Tobacco use
2. Diet-high in fat
3. UV Radiation
4. Alcohol – heavy use
5. ionizing radiation – x-rays and radiation
6. chemicals and other substances – pesticides & asbestos
7. close relatives with certain types of cancer – melanoma, breast, ovarian, prostate, colon, testicular

Warning signs of cancer

1. thickening or lump in the breast or any other part of the body
2. obvious change in a wart or mole
3. a sore that does not heal
4. nagging cough or hoarseness
5. changes in bowel or bladder habits
6. indigestion or difficulty swallowing
7. unexplained changes in weight
8. unusual bleeding or discharge