

BIOL 341  
DNA Replication/Growth/Cancer

I. DNA Replication

A. DNA polymerase

1. unzips the DNA strands
2. each strand used as a template
3. complementary strands constructed
4. new chain identical to “unzipped” chain
5. enzyme also “proofreads” chain for errors
6. errors missed in one in a billion base pairs

B. Semiconservative---half of original DNA is “conserved”

II. Cell Cycle

A. Daughter cells continue to divide

B. Genetic info passed on through the generations

C. 2 major phases

- a.
- b.

D. Interphase

1. cell is not dividing
2. protein synthesis, differentiation, growth
3. 3 phases
  - a. G<sub>1</sub> phase-
  - b. S phase-- each chromosome copies itself
  - c. G<sub>2</sub> phase--
  - d. arrested cells are in G<sub>0</sub>

III. Mitosis

A. Nucleus divides, forming two daughter nuclei

B. Chromatids

1. duplicated chromosomes, joined by a centromere
2. 2 chromatids contain identical DNA
3. each chromatid will be a chromosome in a daughter cell

C. Prophase

1. begins mitosis
2. nuclear membrane fades and nucleoli disappear

3. chromatids tightly coiled and visible

4. centrioles migrate

5. spindle fibers produced

#### D. Metaphase

1. orderly alignment of chromosomes

2. on equatorial plate

3. microtubules radiate from centromere, attach to centrioles

#### E. Anaphase

1. centromeres have split

2. separated chromosomes pulled toward opposite poles

3. each pole gets one copy of the 46 chromosomes

#### F. Telophase

1. final stage of mitosis

2. reverse of prophase

- a. chromosomes uncoil

- b. nuclear membrane reappears

- c. nucleoli reappear

3. two daughter nuclei present

#### G. Cytokinesis

1. often begins during anaphase and ends during telophase

2. plasma membrane folds inward

### IV. Cancer

#### A. Neoplasms (tumors)

1. cells multiply faster than they die

2. can be benign

#### B. Malignancy (cancer)

- 1.

- 2.

- 3.

#### C. Carcinogens

1. chemical

2. radiation

3. viruses:

4. are mutagens

D. Growth factors (and their receptors)

E. Oncogenes

1. may code for growth factors or receptors

2. called proto-oncogenes when functioning normally

F. Tumor suppressor genes

V. Growth

Hyperplasia =

Hypertrophy =

Anaplasia