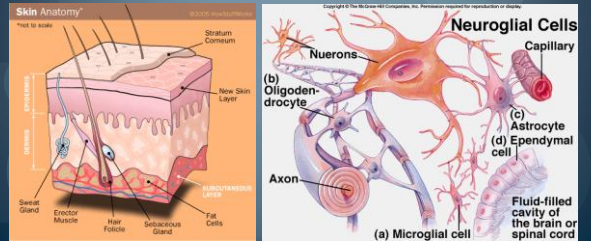


SECTION 10.3 REGULATING THE CELL CYCLE

Mrs. Michaelsen
Biology B

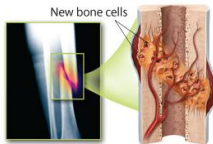
THINK ABOUT IT

- Most muscle and nervous cells do not divide.
- Blood, skin, and digestive tract cells divide rapidly throughout life.

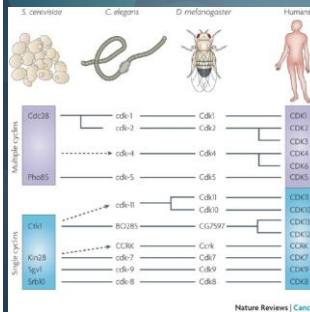


Controls on Cell Division

- Cells in the laboratory will grow and divide until they contact each other.
- Controls on cell growth and division can be turned on and off.
- Our body is able to control healing of bone or skin.
 - Cells divide quickly and then as healing ends, the process slows down.



Controls on Cell Division



- ### The Discovery of Cyclins
- Family of proteins that regulate timing of the cell cycle in eukaryotes.
 - Proteins are found both inside and outside the cell.

abcam

abcam Antibodies

Cyclins and Cell Cycle Regulation

Abcam in the USA: 100 Brook Hill Drive, Beverly, MA 01915, USA. Tel: +1 978 683 9200. Fax: +1 978 683 9201. www.abcam.com

Abcam in Europe: 1 King's Lane, Biotech Park, Cambridge CB2 2PQ, UK. Tel: +44 (0)1223 326000. Fax: +44 (0)1223 326001. www.abcam.com

Abcam in Japan: 2-24-14 Higashi-Shinjuku, Nishi-Shinjuku-ku, Tokyo 162-8601, Japan. Tel: +81 3 5561 3500. Fax: +81 3 5561 3501. www.abcam.co.jp

Controls on Cell Division

- Internal Regulators
 - Respond to events inside the cell.
 - Makes sure cell doesn't enter mitosis until chromosomes are replicated.
- External Regulators
 - Respond to events outside the cell.
 - Speeds up or slows down cell cycle.
 - Growth factors: stimulate growth and division of cells.
 - Important in embryonic development and wound healing.

Controls on Cell Division

- Apoptosis
 - Process of programmed cell death "self destruction".
 - Cells between fingers and toes.
 - Disease: AIDS and Parkinson's disease.

Some viruses exploit apoptosis - the AIDS virus may persuade immune cells to kill themselves.
A T-cell (orange) killing a cancer cell (mauve).

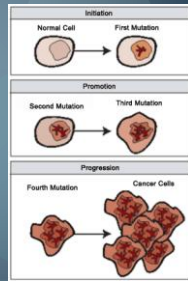
normal WBC apoptotic WBC

In the United States, approximately one infant in every 2,000 births is born with webbed fingers or toes. Both hands are involved in 50% of cases; the middle finger and ring finger in 41%; the ring finger and little finger in 27%; the index finger and middle finger in 23%; and the thumb and index finger in 9%.

Webbed Fingers (Syndactyly Release)

Cancer: Uncontrolled Cell Growth

- **Cancer** is a disorder in which body cells lose the ability to control cell growth.
- Cancer cells divide uncontrollably to form a mass of cells called a **tumor**.



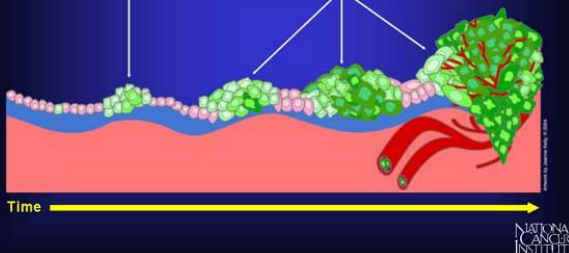
Cancer: Uncontrolled Cell Growth

- A benign tumor is noncancerous. It does not spread.
- A malignant tumor is cancerous. It invades and destroys surrounding healthy tissue and can spread to other parts of the body.
 - The spread of cancer cells is called metastasis.

Malignant versus Benign Tumors

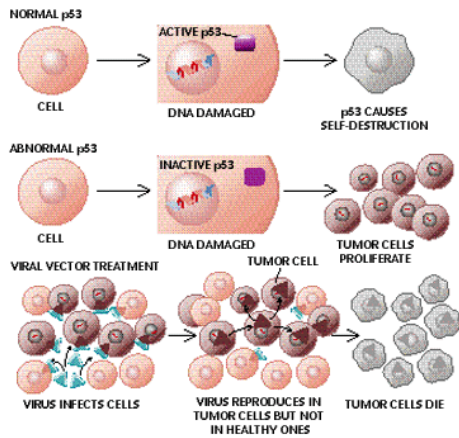
Benign (not cancer) tumor cells grow only locally and cannot spread by invasion or metastasis

Malignant (cancer) cells invade neighboring tissues, enter blood vessels, and metastasize to different sites



What Causes Cancer?

- **Cancers** are caused by defects in genes that regulate cell growth and division.
- Some sources are smoking tobacco, radiation exposure, defective genes, and viral infection.
- A damaged or defective p53 gene is common in cancer cells. It causes cells to lose the information needed to respond to growth signals.



Treatments for Cancer

- Some localized tumors can be removed by surgery.
- Many tumors can be treated with targeted radiation.
- Chemotherapy is the use of compounds that kill or slow the growth of cancer cells.

