

Cancer

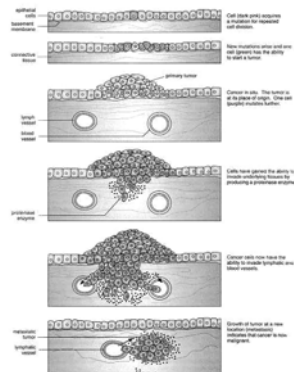
- **Cancer** = mass of undifferentiated cells that exhibit uncontrolled growth and the ability to invade other tissues.
- Cause: mutation(s) in gene(s) involved in cell growth.



Cancer

- **Tumor** = an abnormal mass of cells.
Benign tumor = mass of cells that does NOT invade other tissues
Malignant tumor = mass of cells that does invade other tissues
Benign tumors can become malignant over time.
- **Carcinogenesis** = development of cancer.

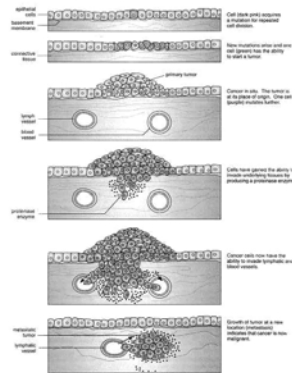
Carcinogenesis



Cancer Cells

1. Cells undifferentiated (unspecialized)
2. Large nuclei
3. Can divide an without limit.
4. Cells form tumors (do not stop dividing when contacting another cell).
Induce angiogenesis
Angiogenesis = forming blood vessels
5. Metastasize (migrate elsewhere)
Metastasis = forming new tumors

Carcinogenesis



Origin of Cancer

- **Proto-oncogenes** = genes producing proteins that stimulate cell division.
- **Oncogene** = when a proto-oncogene experiences a gain-of-function mutation and then causes cancer.
- **Tumor suppressor genes** = genes producing proteins that inhibit cell division.
Tumor suppressor genes cause cancer when they experience a loss-of-function mutation.

Types of Cancer

- **Oncology** = study of cancer.
- **Carcinoma** = cancer of epithelia (e.g., skin, breast, liver, colon, lung, and prostate cancers).
- **Sarcoma** = cancer of muscle or connective tissues (e.g., bone cancer).
- **Lymphoma** = cancer of immune cells in the lymphatic tissues.
- **Leukemia** = cancer of blood cells (almost always white blood cells).

Most Common Cancers*

1. **Prostate** (Only in men) – 33%
2. **Breast** (Primarily in women) – 31%
3. **Lung** – 12-13%
4. **Colon** – 10-11%
5. **Uterus** (Only in women) – 6%
6. **Bladder** – 2-6%
7. **Skin** (all types) – 4-5%
8. **Lymphoma** (B and T cell) – 4%

*Percent of all reported cancers in the U.S. in 2006.

Most Deadly Cancers*

1. **Lung** – 26-31%
2. **Breast** (Primarily in women) – 15%
3. **Colon** – 10%
4. **Prostate** (Only in men) – 9%
5. **Pancreas** – 6%
6. **Ovary** (Only in women) – 6%
7. **Leukemia** (all types) – 4%
8. **Lymphoma** (B and T cell) – 3%

*Percent of all reported cancer deaths in the U.S. in 2006.

Causes of Cancer

- **Mutagen** = substance that increases the chance of a mutation.
- **Carcinogen** = substance that contributes to the development of cancer. (subclass of mutagens)
- **Radiation** = carcinogenic.
Ultraviolet radiation in sunlight.
Radon gas.
Diagnostic X-rays

Causes of Cancer

- **Certain Organic Chemicals**
Tobacco smoke
Certain high fat foods (in high dosages)
Saccharin (in high dosages)
Certain pollutants (benzene, asbestos, dioxin, etc.)
- **Some viruses**
- **Heredity**

Diagnosis of Cancer

- **Seek a physician when one or more of the following occur...**
- C** – Change in bowel or bladder habits.
- A** – A sore that does not heal.
- U** – Unusual bleeding or discharge.
- T** – Thickening in breast or elsewhere.
- I** – Indigestion develops or difficulty swallowing.
- O** – Obvious change in a wart or mole.
- N** – Nagging cough or hoarseness.

Review Page 412 for Self Breast and Testicular Exam

Treating Cancer

- **Radiation** = cancer cells more susceptible to death caused by radiation.
- **Chemotherapy** = Interferes with and kills cancer cells more than normal cells. (Specific to the type of cancer.) Reasonably successful with testicular cancer, lymphomas, & leukemias.

Treating Cancer

- **Bone Marrow Transplants** = Bone marrow often destroyed by chemotherapy and radiation; Transplants replace bone marrow.
- **Surgery** = The entire tumor can be removed early in carcinogenesis. In later stages of carcinogenesis used in conjunction with other methods.

New/Future Cancer Treatments

- **Cancer Vaccines** – stimulates the cytotoxic T-cells of the immune system to destroy certain cancer cells.
- **Gene Therapy** – “fixes” the cancer-causing gene in the cancer cells.
- **Inhibitory Drugs** – drugs to inhibit angiogenesis and metastasis are in development; drugs to inhibit other cancer processes possible.
