

NURS 821 Advanced
Pathophysiology
Margaret H. Birney PhD,RN

Lecture 3 Mechanisms and
Manifestations of Disease (cont'd)
Part 2 Neoplasia

Cancer

- Public inaccurately perceives it to be “diagnosis of death”, much fear
- Second leading cause of death, after heart disease
- 60% all cancer deaths-cancer of sex organs, GI, lung

Cancer

- Definition-Neoplasia-new growth
 - Refers to process of accelerated or uninhibited division and growth of genetically abnormal cells
 - May be benign or malignant, but malignant tumor referred to as cancer
 - Group of diseases
 - Chronic illness
 - Common synonyms-tumor, mass

Tumor Classification

- Benign
 - Well-differentiated
 - Slow growth
 - Non-invasive
 - Remain localized
- Malignant
 - Poorly differentiated
 - Rapid growth
 - Invasive
 - Metastasize through blood and lymphatics
 - Angiogenesis
 - Nitrogen traps

What causes cancer?

1. Everything, nothing, combination of ideal circumstances..... Difficult to prove...A stirred pot....
2. High risk-immune suppressed, risky behaviors, chronic inflammation...
3. Oncogenes-gene found in chromosome of tumor cells, associated with initial and continuing cell conversion

High Risk Behaviors

- Smoking-30% of cancer mortality
- Poor diet-35% of cancer mortality-high fat, low roughage, preservatives
- Alcohol?
- Sedentary lifestyle
- Sexual lifestyle
- Stressful habits

Potential Carcinogens (NCI, 2000)

- Fluoride in water-no
- Food additives-unlikely
- Formaldehyde-brain, nasopharyngeal cancers
- Nitrates in drinking water-non-Hodgkins Lymphoma
- Oral contraceptives-
 - Increased breast, cervical, liver cancers
 - Decreased ovarian and endometrial cancers

Potential Carcinogens (NCI, 2000)

- Deodorant-NA
- Artificial sweeteners-
 - Saccharin-bladder cancers
 - Aspartame-brain cancers
- Coffee-decaffeinated
- Fertility drugs-ovarian cancer-?
- Heterocyclic amines in cooked meat-stomach cancer
- HRT-
 - Endometrial cancer-no
 - Breast cancer-WHI

Potential Carcinogens (NCI, 2000)

- DES-diethylstilbesterol-synthetic form of estrogen given 1938-1971 to prevent miscarriages
- During 1st 5 months-interferes w fetal reproductive system
- Daughters-abnormal vaginal and cervical cells; clear cell adenocarcinoma of vagina and cervix
- Sons-may increase testicular cancer
- Mothers-increased risk of breast cancer

Carcinogen Sources

- Workplace-farming, manufacturing, construction, transportation, mining, machinery
- Natural environment-air, water pollution and hazardous waste

Cancer Facilitators

- Viruses, oncogenic viruses
- Chronic inflammation
- Aging-as grow old, immunity naturally declines
 - Incidence dramatically increases between 50-80
 - Cells do not mutate, change, and replace as fast
 - Mortality and morbidity often treatment related
 - Lifetime exposures

Childhood Cancers (NCI, 2000)

- 1998-8,500 diagnosed; 1,700 deaths
- Leading cause of death by disease under 15
- Yet, still relatively rare-1-2/10,000 U.S. children
- Past 20 years-little change in incidence, but survival rates increased from 55.6% (1974-1976) to 73.8% (1989-1994)-due to treatment with cure or long-term remission

Common Childhood Cancers (NCI, 2000)

- The most common childhood cancers have increased, accounting for > 1/2 new cases
 - Leukemias-1/3; 2,300 under 15 diagnosed 1999
 - Acute lymphocytic most common
 - Brain tumors-most common solid tumors; increase probably due to better diagnostic tests
 - greatest increase from 1983-1986
 - gliomas and medulloblastomas

Etiologies of Childhood Cancers (NCI, 2000)

- Small % Down's syndrome, chromosomal and genetic abnormalities, therapeutic radiation
- Environmental-difficult to prove
- Cancer clusters-hazardous waste and contaminated groundwater
- Associated w high ionizing radiation; diagnostic X-rays during pregnancy, **PATERNAL**
PRENATAL SMOKING!

Cancer Theories: Failure of Immune Surveillance

- Nonantigenic Tumors
- Nonimmunogenic Tumor AG
- Immune Tolerance

Failure of Immunosurveillance

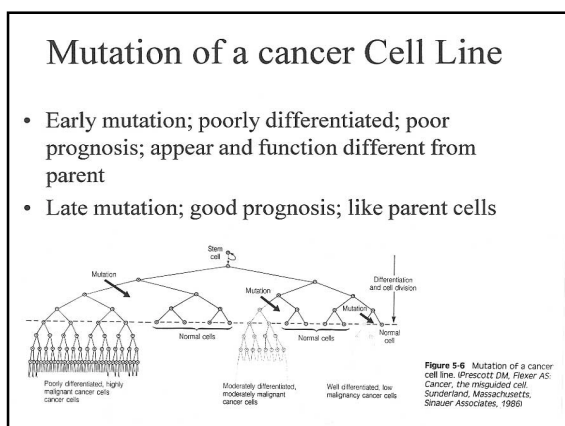
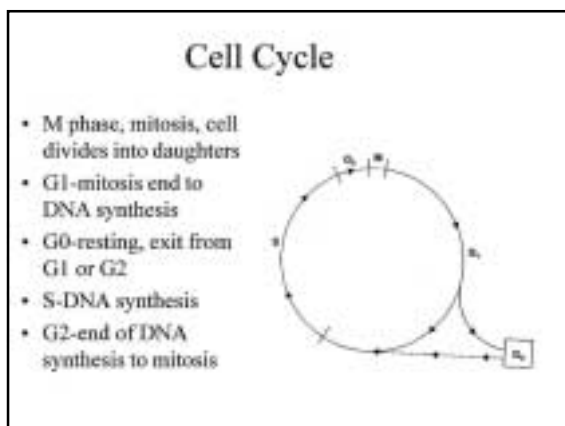
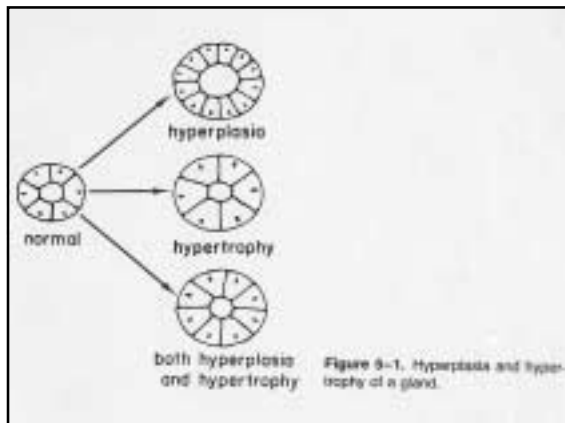
- Immunosuppression
- Immune enhancement
- Antigenic modulation

Failure of Immune Surveillance

- Imbalance of immunity and tumor mass
- Immunoselection of nonantigenic clones

Failure of Immunosurveillance

- Suppressor cells
- Immune privileged site
- Immunostimulation



Characteristics of Cancer Cells

- Polyploidy-cell division resulting in cell receiving more than 2 complete sets of chromosomes
- Aneuploidy-abnormal cell division in which daughter cells receive uneven numbers of chromosomes
- Cancer cells undergo abnormal mitosis displaying aneuploidy or polyploidy
