DRUGS FOR NEOPLASIA

Chapter 37
Keywords- You tell Me!

- **Cancer**
  - dz characterized by abnormal, uncontrolled cell division

- **Tumor**
  - swelling, abnormal enlargement or mass of tissue

- **Carcinogen**
  - any substance or agent that tends to produce a cancer

- **Benign**
  - favorable, not malignant; self-limiting

- **Malignant**
  - characterized by uncontrolled growth; cancerous, invasive,

- **Metastasis**
  - to spread to other parts of the body by way of the blood or lymphatic vessels or membranous surfaces
Cancer is not a single disease
Cancer is an umbrella term referring to > 300 diseases with a common characteristic: uncontrolled growth & spread of abnormal cells
Characterized by rapid, uncontrolled growth of cells
Cells lose normal functions and invade normal tissues.
Metastasize: travel to another location
Causes of Cancer

- Chemical
  - Tobacco (responsible for one-third of all cancers)
  - Asbestos (lung cancer)
  - Benzene (leukemia)

- Physical
  - X-rays (leukemia)
  - Ultraviolet (UV) light from sun (skin cancer)
Causes of Cancer (continued)

- **Biological**
  - **Viruses (associated with 15% of all cancers)**
    - Examples: herpes simplex viruses, Epstein-Barr, papillomavirus, cytomegalovirus
  - **Factors that suppress immune system**
    - HIV
    - Medications given after transplants
  - **Oncogenes (genetic predisposition)**
ONCOGENES

- Certain abnormal genes that may predispose close relatives to a certain type of cancer
- In some families, several members have same type of cancer.
- Oncogenes somehow interact with chemical, physical & biologic agents to promote cancer formation
WHAT CAN EACH OF US DO TO DECREASE OUR RISK OF DEVELOPING CANCER?
Environmental and Lifestyle Factors

- Many associated with higher risk of cancer
- Encourage clients to adopt healthy lifestyle habits
  - Eliminate use and exposure to tobacco.
  - Limit alcohol use
  - Reduce animal fats/organ meats in diet
Environmental and Lifestyle Factors (continued)

- Increase plant fiber in diet
- Exercise regularly; keep weight normal
- Use protection from sun
- Get periodic screenings (mammogram, prostate exam, fecal occult blood test, Pap test, pelvic exam)
HOW IS CANCER TREATED?

- SURGERY
- RADIATION
- CHEMOTHERAPY
  - To cure
  - For palliation
  - For prophylaxis
Surgery

- Performed to remove tumor
  - When localized
  - When pressing on nerves, airways, or other vital tissues

- Radiation and drug therapy more successful

- Surgery sometimes not an option
  - If tumors affect blood cells
  - If surgery would not extend lifespan or improve quality of life
Radiation

- Can destroy tumor cells
- Ionizing radiation aimed directly at tumor
- May follow surgery
- Used as palliation for inoperable cancers
  - Shrinks size of tumor
  - Relieves pain, difficulty breathing or swallowing
Chemotherapy

- Transported through blood
  - Has potential to reach each cancer cell
- Some drugs can cross blood-brain barrier
- Some drugs distilled directly into body cavities (ex: bladder)
- Chemotherapy is most effective against small tumors
- Removal of large, localized tumors by surgery decreases tumor cell burden & contributes to successful therapy

**Generally, combination chemotherapy produces increased kill of cancer cells than single agent chemotherapy - WHY?**
CELL CYCLE

- All cells go through mitosis-cell cycle/ division
- Various stages
- ANTINEOPLASTICS Work in different phases of cell cycle, & are classified as:
  - Cell-cycle specific
  - Cell-cycle nonspecific
Cell Cycle

- **Cell cycle**
  - **G0** Phase: resting stage
  - **G1** Phase: synthesizes material needed to duplicate DNA
  - **S** Phase: duplicates DNA
  - **G2** Phase: premitotic phase
  - **M** Phase: mitosis occurs
  - Cell returns to G0 phase
SIDE EFFECTS

- Antineoplastics not only affect cancer cells, but also health cells.
- They especially affect fast growing cells: hair, GI tract mucosa,
TOXICITY OF ANTINEOPLASTICS

- ALOPECIA (usually reversible)
- MUCOSITIS
- NAUSEA/VOMITING
- BONE MARROW SUPPRESSION
- TISSUE INJURY (SECONDARY TO VESICANTS)
- FATIGUE
- TERATOGENIC PROPERTIES
- INFERTILITY
- DEVELOPMENT OF A SECONDARY CANCER
- CARDIAC- some non reversible
ANTICANCER DRUGS
ADVERSE REACTIONS/PRECAUTIONS

Bone Marrow Suppression
Nausea and Vomiting

Anorexia
GI Disturbances

Alopecia
Avoid Pregnancy
Necrosis after Extravasation

- Monitor IV site frequently
- Many antineoplastics are given IV
- Many are vesicants (agents that can cause severe tissue injury if they escape from a vessel during infusion)
- Can lead to loss of limb.
SPECIAL POPULATIONS

- ELDERLY
- CHILDREN
- PREGNANT OR NURSING WOMAN
MAJOR CATEGORIES OF ANTINEOPLASTIC DRUGS

1. ALKYLATING DRUGS
2. ANTIMITABOLITES
3. ANTIBIOTICS
4. HORMONES & HORMONE ANTAGONISTS WITH ANTINEOPLASTIC ACTIVITY
5. NATURAL PRODUCTS HAVING ANTINEOPLASTIC ACTIVITY
6. BIOLOGIC RESPONSE MODIFIERS & MISCELLANEOUS ANTICANCER DRUGS
**Alkylating Agents**

- **Prototype drug:** cyclophosphamide (Cytoxan)
- **Mechanism of action:** attaches to DNA and disrupts replication
- **Primary use:** These drugs have a broad range of clinical activity. They treat a wide variety of cancers, including Hodgkin’s disease, lymphoma, multiple myeloma, breast cancer, ovarian cancer
- **Adverse effects:** immunosuppressant effects, thrombocytopenia
  - Nausea, vomiting, anorexia, diarrhea
  - Alopecia, hemorrhagic cystitis
Antimetabolites

- **Prototype drug:** methotrexate (Folex, Mexate, others)
- **Mechanism of action:** blocks synthesis of folic acid (vitamin B9) to inhibit replication. Most effective against rapidly growing tumors. Most are cell cycle specific.
- **Primary use:** to treat choriocarcinoma, osteogenic sarcoma, leukemias, head and neck cancers, breast carcinoma, lung carcinoma
- **Adverse effects:** fatal bone-marrow toxicity at high doses
  - Hemorrhage and bruising, low platelet counts
  - Nausea, vomiting, anorexia
  - Gastrointestinal ulceration, intestinal bleeding
Antitumor Antibiotics

- Not same type of med as those used to treat infections
- **Prototype drug:** doxorubicin (Adriamycin)
- **Mechanism of action:** non-cell cycle specific and interfere with cellular processes attaches to DNA
  - Distorts double helical structure and prevents normal DNA and RNA synthesis
- **Primary use:** solid tumors of the lung, breast, ovary, and bladder, and for various leukemias and lymphomas
PRECAUTIONS

- Nurse & pharmacist must be extra careful when administering antibiotic antineoplastics.
- They are easily absorbed through skin & inhalation.
- Serious Side effects: cardiotoxicity, dysrhythmias, irreversible heart failure, lower blood-cell counts.
- Nausea, vomiting
- Wear protective clothing
- One of problems: irreversible cardiotoxicity (usually chf) can occur.
- Unusual side effects: soles of feet, palms of hands, nails & skin turn dark; urine turns red.
Natural Products (plants)

- **Prototype drug:** vincristine (Oncovin)
- **Mechanism of action:** cell-cycle-specific (M-phase) agent that kills cancer cells by preventing their ability to complete mitosis
- **Primary use:** treatment of Hodgkin’s and non-Hodgkin’s lymphomas
  - Leukemias, Kaposi’s sarcoma, Wilms’ tumor
  - Bladder carcinoma, breast carcinoma
- **Adverse effects:** nervous system toxicity, numbness and tingling in limbs
  - Muscular weakness, loss of neural reflexes, pain
  - Paralytic ileus, constipation, alopecia
Hormones/Hormone Antagonists

- **Prototype drug:** tamoxifen (Nolvadex)
- **Mechanism of action:** blocks estrogen receptors on breast cancer cells
- **Primary use:** clients with breast cancer
  - Also given to high-risk clients to prevent disease
- This group is more selective & less toxic than other antineoplastics
- They treat tumors that are sensitive to hormonal growth controls; can be very effective
- **Adverse effects:** nausea and vomiting
  - Association with increased risk of endometrial cancer and thromboembolic disease
  - Hot flashes, fluid retention, vaginal discharges common
MISCELLANEOUS ANTINEOPLASTICS

- BIOLOGIC RESPONSE MODIFIERS (THEY ARE DIFFERENT BECAUSE THEY ACTIVATE IMMUNE SYSTEM, OR CHANGE A BIOLOGIC RESPONSE TO AN UNWANTED STIMULUS)

- EXAMPLES:
  - Interferon alfa-2a, recombinant
  - NEUPOGEN
  - EPOGEN
Question Time

Type of chemo blocks estrogen receptors on breast cancer cells?

Hormone Antagonist

Type of chemo works by blocking synthesis of folic acid

Antimetabolites

Type of chemo attaches to DNA to disrupt replication

Alkylating Agents

Type of chemo that prevents cancer cell mitosis

Natural Products (plants)
NURSING MANAGEMENT

- TO ENSURE SAFE & EFFECTIVE ADMINISTRATION OF ANTINEOPLASTICS
- MOST CHEMO ADMINISTERED BY SPECIALLY TRAINED NURSES
- MAY BE DONE IN HOSPITAL, IN SPECIAL TREATMENT UNIT, IN PT’S HOME
ONE OF OUR BIGGEST CHALLENGES IS IN HELPING PATIENT DEAL WITH SIDE EFFECTS, & HELPING HIM/HER DECIDE TO CONTINUE WITH THERAPY DESPITE THE SIDE EFFECTS.
Role of the Nurse

- Monitor client’s condition
- Provide client education
- Obtain medical, surgical, drug history
- Assess lifestyle and dietary habits
- Emotional support to patient & to family
- Obtain description of symptomology and current therapies
- One of most devastating side effects is alopecia
- One of most irritating side effects is N/V
What can the patient do?

- Adequate rest
- Adequate nutrition
- Adequate (or increased) fluids
- Avoid certain people, especially those with infectious diseases
- Accept assistance (physical & emotional)
- Be aware of occurrence of side effects/adverse reactions.
What can family/friends do?

- Be there, emotionally & physically
- Allow patient to talk about cancer, fears, future plans, etc.
- Do for patient what he/she can not do for self
- Don’t be “gloom & doom” but be positive and honest with patient
1. Spread of cancer to other sites in patient’s body is called _
2. What is alopecia
3. _____ drugs are designed to attack a cell during the phases of cell division.
4. Many antineoplastic drugs interfere with the bone marrow’s ability to make new cells this is called _____________.
5. Reduction in neutrophil type of white blood cells is called ?
6. ____________ occurs as the result of a decreased production of red blood cells in the bone marrow.
7. Antineoplastic drugs are contraindicated in patients with leukopenia. T or F
8. What precaution will the nurse take to protect him/herself
9. What the name for injury caused by leakage of toxic substances into surrounding tissue?
That is a Wrap
Have a Great Day!