Principles of Cancer Treatment

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Objectives

- Describe the principles of cancer treatment
  - Surgery
  - Chemotherapy
  - Biotherapy & Targeted Therapy
  - Complementary and Alternative Medicine
Cancer Treatment Modalities

- Surgery
- Chemotherapy
- Biotherapy & Targeted Therapy
- **Radiation Therapy**
- **Hematopoietic Stem Cell Transplant**
- Complementary and Alternative Medicine (CAM) Therapies

Role of Cancer Surgery

- Establish tissue diagnosis
- Determine stage of disease
- Curative treatment
- Preventive treatment
- Palliative treatment

Establishing Tissue Diagnosis

- Tumor sample obtained to confirm diagnosis and to determine specific type of cancer (histology)
- Variety of biopsy techniques available
  - Provide sufficient tissue for pathologic and histologic diagnosis

Surgery to Treat Disease

**Curative Treatment**
- Resection of primary tumor to provide curative results.
- May need neoadjuvant or adjuvant therapy for optimum results.
- Localized tumors resected with adequate margins (i.e. lobectomy, mastectomy, hysterectomy)

**Preventive Treatment**
- Prophylactic surgery to reduce risk of cancer in high-risk patients
  - Ulcerative colitis: Colon cancer – colectomy
  - *BRCA* mutations
    - Breast cancer – bilateral mastectomies
    - Ovarian cancer – bilateral salpingo-oophorectomy
  - *MEN2A, MEN2B* mutations
    - Multiple endocrine neoplasia and thyroid carcinoma - thyroidectomy
Surgery to Treat Disease

**Palliative Therapy:**
- Promote comfort & QOL without goal of curing disease
- Requires assessment of the relative risk-to-benefit ratio
- Examples include:
  - Resection of primary tumor to alleviate pain or bleeding
  - Bowel resection for relief of obstruction
  - Bone stabilization

Role of Nursing & Surgical Team

- Expert assessment
- Psychosocial support
- Education
- Symptom management
- Prevention of complications

Chemotherapy

Cell Life Cycle

- **G-0 Phase (G = Gap)**
  - Resting (cells not committed to cell division)

- **G-1 Phase**
  - Enzymes produced in preparation for DNA synthesis & RNA synthesis

- **S Phase (S = Synthesis)**
  - DNA synthesized inside the nucleus

- **G-2 Phase**
  - RNA & protein synthesis occurs, DNA synthesis ends

- **M Phase (M = Mitosis)**
  - Cellular division

**Action of Antineoplastic Drugs**

- Alter cellular activity during one or more phases of cell cycle
- Affects *both* normal & malignant cells

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**Classification of Chemotherapy**

<table>
<thead>
<tr>
<th>Phase of Action During Cell Cycle</th>
<th>Pharmacologic Classifications</th>
</tr>
</thead>
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<td>Cell Cycle Specific</td>
<td>Alkylation agents</td>
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<td>Nitrosureas</td>
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<td>• Epipodophylotoxins</td>
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<tr>
<td>Cell Cycle Non-specific</td>
<td>Camptothecins</td>
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</tbody>
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Phase of Action During Cell Cycle

- Cell Cycle Specific agents
- Cell Cycle Non-specific agents

Cell Cycle Specific Agents

- Exerts effect only in specific phases of cell cycle
- Most effective against rapidly proliferating (cycling) cells
- Cell kill dependent on schedule (duration & timing rather than dose)
Cell Cycle Non-Specific Agents

- Affect cells in all phases of the cell cycle (including G₀).
- Both proliferating and nonproliferating cells are killed.
- Cell kill depends on the total dose rather than the schedule.
- Combined with cell cycle-specific agents.

Pharmacologic Classifications

Cell Cycle Non-specific
- Alkylating agents
- Nitrosureas
- Antitumor antibiotics

Cell Cycle Specific
- Antimetabolites
- Plant Alkaloids (Mitotic inhibitors)
  - Vinca alkaloids
  - Taxanes
  - Epipodophyllotoxins
- Topoisomerase I inhibitors

Alkylation Agents

- Cell cycle non-specific
- Break DNA helix, interferes with DNA replication

Examples of alkylating agents
- Cyclophosphamide (Cytoxan)
- Ifosfamide (Ifex)
- Cisplatin (Platinol)
- Carboplatin (Paraplatin)
- Oxaliplatin (Eloxatin)

Alkylation Agents Toxicities

Hematopoietic
- Myelosuppression

GI
- Nausea/vomiting

Reproductive
- Azoospermia, amenorrhea

Integumentary
- Alopecia

Carcinogenic
- Secondary malignancies

Hemorrhagic cystitis
- Ifosfamide, cyclophosphamide

Neuropathy
- Cisplatin analogs

Hypersensitivity
- Carboplatin (after 6-7 doses)
Nitrosureas

- Cell cycle non-specific
- Breaks DNA helix, interferes with DNA replication
- Cross blood-brain barrier

*Examples of Nitrosureas:*
- **Carmustine** (*BiCNU*)
- **Lomustine** (*CeeNu*)
- **Streptozocin** (*Zanosar*)

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Nitrosureas Toxicities

- **Hematopoietic**
  - *Delayed* myelosuppression
  - Nadir 4-6 weeks after therapy starts
- **GI**
  - Severe nausea/vomiting
- **Renal**
  - Increased BUN (usually reversible)
- **Pulmonary toxicity** (*Carmustine & Lomustine*)
  - Pulmonary fibrosis

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Antitumor Antibiotics

- Cell cycle non-specific (most agents)
- Binds with DNA, inhibits DNA & RNA synthesis

**Examples of antitumor antibiotics**
- Bleomycin (Blenoxane)
- Dactinomycin (actinomycin D, Cosmegen)
- Mitomycin (Mutamycin)
- Mitoxantrone (Novantrone)
- Anthracycline Antitumor antibiotics
  - Daunorubicin (Daunomycin)
  - Doxorubicin (Adriamycin)
  - Epirubicin (Ellence)
  - Idarubicin (Idamycin)
  - Liposomal doxorubicin (Doxil)
  - Liposomal daunorubicin (DaunoXome)

Antitumor Antibiotics Toxicities

- **Hematopoietic**
  - Myelosuppression (all drugs except Bleomycin)

- **GI**
  - Nausea/vomiting
  - Stomatitis, mucositis

- **Reproductive**
  - Ovarian or sperm suppression

- **Integumentary**
  - Alopecia
  - Vesicants (except Bleomycin, Mitoxantrone, & liposomal anthracyclines)
  - Radiation recall

- **Cardiotoxicity**
  - Anthracycline antibiotics (dose dependent)

- **Pulmonary fibrosis**
  - Bleomycin
Pharmacologic Classifications

Cell Cycle Specific Agents

- Antimetabolites
- Plant Alkaloids (Mitotic inhibitors)
  - Vinca alkaloids
  - Taxanes
  - Epipodophyllotoxins
- Camptotecins

Antimetabolites

- Cell cycle specific (S Phase)
- Mimics & incorrectly substitutes for metabolites (nutrients) needed for cellular function (e.g. folate)

**Antimetabolite examples**

- **Azacitidine** (Vidaza)
- **Cytosine arabinoside** (Cytarabine/Ara C)
- **Fluorouracil** (5-FU)
- **Capecitabine** (Xeloda)
- **Methotrexate** (Mexate)
- **Pemetrexed** (Alimta)
- **Gemcitabine** (Gemzar)

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- Pemetrexed (*Alimta*)
- Gemcitabine (*Gemzar*)


Chemotherapy & Biotherapy Guidelines & Recommendations for Practice, 4th ed (pp. 25-50), ONS, Pittsburg, PA.

Antimetabolite Toxicities

**Hematopoietic**
- Myelosuppression

**GI**
- Nausea, vomiting
- Mucositis/stomatitis
- Diarrhea

**Integumentary**
- Capecitabine: “Hand/foot syndrome” (palmar-plantar erythrodysesthesia)
- 5FU: photosensitivity

**Ocular toxicity**
- Ara-C high-dose: keratitis
- 5FU: photosensitivity

Plant Alkaloids
(Mitotic Inhibitors)

- Vinca alkaloids
- Taxanes
- Epipodophylotoxins

Vinca Alkaloids

- Acts in late G2 & M phase
- Prevents formation of mitotic spindle (prevents cell mitosis)

Examples of Vinca Alkaloids

- Vinblastine *(Velban)*
- Vincristine *(Oncovin)*
- Vinorelbine
Vinca Alkaloid Toxicities

- **Hematopoietic**
  - Myelosuppression *(except vincristine)*

- **GI**
  - Nausea/vomiting *(except vincristine)*

- **Integumentary**
  - All are vesicants
  - Alopecia

- **Neurotoxicity**
  - Sensory-motor peripheral neuropathy
  - Constipation *(autonomic neuropathy)*

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Epipodophyllotoxins

- Acts in late G2 & S phase
- Interferes with topoisomerase II enzyme reaction

*Examples of Epipodophyllotoxins:*

- **Etoposide** *(VP-16, VePesid)*
- **Teniposide** *(VM-26, Vumon)*
Epipodophyllotoxin Toxicities

- **Myelosuppression**
- **GI**
  - Nausea/vomiting
  - Mucositis (*high-dose etoposide*)
  - Diarrhea (*high-dose etoposide*)
- **Cardiovascular**
  - Hypotension if infused too rapidly

### Taxanes

- Inhibits cell division in G2 & M phase
- Promotes early microtubule assembly and prevents disassembling, arresting mitosis
- **Examples of Taxanes:**
  - Cabazitaxel (*Jevtana*)
  - Docetaxel (*Taxotere*)
  - Paclitaxel (*Taxol*)
  - Paclitaxel Protein-bound particles (*Abraxane*)

Taxane Toxicities

- Hematopoietic
  - Myelosuppression
- GI
  - Nausea/vomiting
- Integumentary
  - Alopecia
- Neurologic
  - Sensory-motor peripheral neuropathy
  - Arthralgia & myalgias
- Hypersensitivity reactions
  - Cabazitaxel, paclitaxel & docetaxel

Camptothecins

- Cell cycle phase specific
- Acts in S phase to prevent unwinding of DNA strand (by inhibiting topoisomerase I)

Examples of Camptothecins

- Irinotecan (Camptosar)
- Topetecan (Hycamtin)


Camptothecins Toxicities

**Hematopoietic:**
- Myelosuppression

**GI:**
- Nausea/vomiting
- Diarrhea
  - Irinotecan:
    - Early diarrhea (cholinergic – reversed with atropine)
    - Late diarrhea (motility)

**Integumentary:**
- Alopecia

Routes of Chemotherapy Administration

- Intra-arterial
- Oral
- Subcutaneous
- Intrathecal/
  intraventricular
- Intraperitoneal
- Intrapleural
- Intravesicular
- Intravenous
Oral

Advantage:
• Convenience
• Decrease time in clinic or hospital
• Increase sense of independence

Disadvantage:
• Cost/reimbursement
• Difficulties with adherence
• Inconsistency of absorption
• Potential interactions (drugs, herbs, diet)

SC or IM Injection

Advantages
• Ease of administration
• Rapid absorption
• Decreased side effects for some agents

Disadvantages
• Inconsistent absorption
• Risk of drug misplacement (patients with ↓ adipose tissue)
**Intrathecal/Intraventricular**

**Advantage**
- Direct and consistent drug level in CSF
- Bypasses the blood-brain barrier
- Sample CSF

**Disadvantage**
- Requires lumbar puncture or surgical procedure to place intraventricular device
- Requires physician or advanced-practice provider to administer chemotherapy

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**Intraperitoneal**

**Advantages**
- Provides direct exposure
- Bypasses the cellular enclosure of the peritoneal cavity
- Allows instillation of radioactive or colloid materials
- Allows for cyclic treatments

**Disadvantage**
- Requires placement of peritoneal catheter or port
- Requires small enough tumor volume

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**Intrapleural**

**Advantage**
- May prevent recurrence of malignant pleural effusions
- Multiple agents can be used as sclerosing agents (chemotherapy, antibiotics, talc, biotherapy agents)

**Disadvantage**
- Requires insertion of thoracotomy tube
- Must be administered by physician or advanced-practice provider

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**Intravenous**

**Advantages**
- Consistent absorption
- Direct route into bloodstream

**Disadvantages**
- Requires nursing/patient time in healthcare setting
- Damage to peripheral veins may necessitate central venous access

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Principles of Cancer Treatment

Why is most chemotherapy administered in cycles?

- For example:
  - Chemotherapy administered on day 1, repeated every 3 weeks for 6 cycles
  - Chemotherapy administered on day 1 & day 8, repeated every 3 weeks for 6 cycles

Principles of Cancer Treatment: Cell Kill Hypothesis

- A given dose kills a constant proportion of a tumor cell population (rather than a constant number of cells)

![Figure 1: Log-Kill Kinetics](image)
Implications of Cell Kill Hypothesis

- Early diagnosis & start to treatment is (obviously) helpful
- Treatment must continue past the time when cancer cells can be detected using conventional treatment
- **On time, full dose treatment** required to ensure sufficient log-kill obtained (curative tumors)

![Log-Kill Kinetics](image)

Factors Affecting Outcomes

<table>
<thead>
<tr>
<th>Tumor-Related</th>
<th>Patient-Related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Fraction of Tumor</td>
<td>Performance status</td>
</tr>
<tr>
<td>Tumor burden</td>
<td>Bone Marrow Capacity</td>
</tr>
<tr>
<td>Type of cancer</td>
<td>Liver Function</td>
</tr>
<tr>
<td>Stage of disease</td>
<td>Kidney Function</td>
</tr>
<tr>
<td>Drug Resistance</td>
<td>Other Co-Morbidities</td>
</tr>
<tr>
<td></td>
<td>Age</td>
</tr>
</tbody>
</table>

**Combination Chemotherapy**

- Combine drugs with different mechanisms of action
- Increases proportion of cells killed at any one time
- Reduces drug resistance
- Must have proven efficacy as single agents with minimally overlapping organ toxicity
- Uses drug synergy to maximize effects


**Goals of Cancer Therapy**

- Prevention
- Cure
- Control
- Palliation

Chemotherapy Treatment Approaches

**Adjuvant Therapy**
- Therapy given *after* the primary treatment modality such as surgery
  - Example: adjuvant chemotherapy following lumpectomy for breast cancer
- Rationale & goal of adjuvant therapy:
  - Reduce risk of recurrence by eliminating small sites of disease or microscopic disease (micrometastases)

**Neoadjuvant Therapy**
- Use of one or more treatment modalities *prior to* the primary treatment (i.e. chemotherapy prior to surgery)
- Rational for neoadjuvant therapy:
  - Decrease tumor size for surgical removal (shrink tumor prior to removal)
  - Evaluate effectiveness of chemotherapy (before surgery)

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Hazardous Drug Safe Handling

Drugs defined as hazardous if they exhibit one or more of the following characteristics:

- a. Carcinogenicity
- b. Tetratogenicity or developmental toxicity
- c. Reproductive toxicity
- d. Organ toxicity at low doses
- e. Genotoxicity

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Principles of Safe Handling

- Personal protective equipment
- Preparation in biologic safety cabinet with vertical laminar airflow
- Label as hazardous drugs
- Safe techniques during storage, transport, administration


Chemotherapy Dosing

- Fixed dosing: mg
- Weight based dosing: mg/kg
- Body surface area (BSA) based dosing: mg/m²
- Area under the curve (AUC):
  - Used for Carboplatin
  - Calculation includes renal function

Verification of Dose Calculation

- Requires complete prescriber order
  - Height, weigh, BSA or AUC, & total calculated dose
- Two chemotherapy-competent individuals (nurse and/or pharmacist), in addition to prescriber, independently double-check dosage calculations

Immediate Complications of Cytotoxic Therapy

- Extravasation
  - Vesicants
  - Irritant
- Flare reaction
- Hypersensitivity reaction
- Anaphylaxis
Chemotherapy Summary

Mechanisms of action:
- Interferes with DNA
- Blocks cell replication in dividing cells (leading to cell death)

Affects both normal and malignant cells

Chemotherapy toxicities related to effect on:
- Normal, frequently dividing cells
  - Hematopoietic (bone marrow suppression)
  - GI mucosa (nausea, vomiting, diarrhea)
  - Reproductive (amenorrhea, azoospermia)
  - Integumentary (alopecia)
- Drug-specific organ toxicities
  - Cardiac (e.g. anthracycline antitumor antibiotics cardiomyopathy)
  - Pulmonary (e.g. Bleomycin pulmonary fibrosis)
  - Neurons (e.g peripheral neuropathy)

Chemotherapy Summary

Administered by multiple routes
- Typically administered over “cycles”
- Classified as hazardous agents
  - Require special handling and use of personal protective equipment
- Most agents dosed according to body surface area
- Requires special training to:
  - Verify dose calculations
  - Safely handle & administer
  - Monitor, assess, and provide nursing actions to manage side effects
Biotherapy & Targeted Therapies

Biotherapy

- Use of agents:
  - Derived from biologic sources
    - or
  - That affect biologic responses.
- Therapy that capitalizes on the use of natural body proteins and their functions to fight cancer.

Types of Biotherapy & Targeted Therapy

- **Biotherapy**
  - Cytokines
  - Monoclonal antibodies
  - Vaccines

- **Targeted Therapies**
  - Monoclonal antibodies
  - Small Molecules

- **Antiangiogenic agents**
  - Monoclonal antibody
  - Oral agents

Cytokines

- Small protein molecules released by diverse cells throughout the body
- Provide communication between cells of the immune system
- Cytokines include
  - Interferons
  - Interleukins
  - Hematopoietic growth factors

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**Interferons**

- **Actions:**
  - Antiviral (*inhibit viral replication*)
  - Antiproliferative (*prevent proliferation of tumor cells*)
  - Immunomodulatory (*modulate immune response of host*)

- **Examples:**
  - Interferon alfa-2b (Intron A®)
  - Interferon-gamma (Actimmune®)

- **Side Effects:**
  - Fever, chills, headache, N/V, diarrhea, fatigue, depression, anorexia, confusion, myelosuppression, injection site erythema

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**Interleukins**

- **Stimulate activation of immune cells (T and B cells, NK cells, LAK cells, tumor-infiltrating lymphocytes).**

- **Examples:**
  - Aldesleukin (IL-2, Proleukin®)
  - Oprelvekin (IL-11, Neumega®)

- **Side Effects:**
  - Fever, chills, headache, N/V, diarrhea, myelosuppression, cardiac changes, capillary leak syndrome
Hematopoietic Growth Factors

- Stimulates the differentiation, proliferation, maturation, and functioning of hematopoietic cells.

**Erythropoietic stimulating agents:**
- Stimulate red blood cell production
- Epoetin alfa (ProCrit®, Darbepoetin (Aranesp®)

**Granulocyte colony stimulating factors (G-CSF)**
- Regulates production of neutrophils
- Filgrastim (Neupogen®), pegfilgrastim (Neulasta™), Tbo-filgrastim (Granix™)

**Granulocyte macrophage colony stimulating factor (GM-CSF)**
- Regulates differentiation neutrophils, monocytes, macrophages & dendritic cells
- Sargramostim (Leukine®)

Targeted Therapies

- Advances in molecular biology led to development of "targeted therapies"

**Types of "targeted therapies"**
- Monoclonal antibodies
  - Target receptors on cell surface
  - Parenteral (injected) agents
- Small Molecules
  - Target intracellular processes
  - Oral agents
Targeted Therapies

- Cellular growth, function, & apoptosis are regulated by complex network of biochemical & molecular signals
- Referred to as "cell signaling"
- "Signal transduction" is generation of a signal from either
  - Outside the cell (growth factors and growth factor receptors)
  - Inside the cell (tyrosine kinase inhibitors)
- Produces signaling cascade that travels down a pathway to the cell nucleus

Monoclonal Antibodies

- Antibodies cloned from a single antibody
  - Recognize and bind to only one tumor associated antigen
- Highly specific proteins
- Target receptors that support tumor growth
### Monoclonal Antibodies

<table>
<thead>
<tr>
<th>MOAB</th>
<th>TARGET</th>
<th>DISEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rituximab (Rituxan®)</td>
<td>CD20</td>
<td>Non-Hodgkin’s Lymphoma</td>
</tr>
<tr>
<td>Trastuzumab (Herceptin®)</td>
<td>HER2</td>
<td>Breast</td>
</tr>
<tr>
<td>Bevacizumab (Avastin®)</td>
<td>VEGF</td>
<td>Multiple types (colorectal, NSCLC, etc)</td>
</tr>
<tr>
<td>Cetuximab (Erbitux®)</td>
<td>HER1/EGFR</td>
<td>Colorectal cancer Head &amp; neck cancer</td>
</tr>
<tr>
<td>Alemtuzumab (Campath®)</td>
<td>CD52</td>
<td>Chronic lymphocytic leukemia</td>
</tr>
<tr>
<td>Panitumumab (Vectibix®)</td>
<td>EGFR</td>
<td>Colorectal cancer</td>
</tr>
</tbody>
</table>

Courtesy of Brenda Keith, RN, MN, AOCN®

### Small Molecule Inhibitors

<table>
<thead>
<tr>
<th>Name</th>
<th>Target</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lapatinib</td>
<td>Tyrosine kinase inhibitor of EGFR and HER2</td>
<td>Breast cancer</td>
</tr>
<tr>
<td>(Tykerb®)</td>
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<td></td>
</tr>
<tr>
<td>Nilotinib</td>
<td>BCR-ABL kinase</td>
<td>CML</td>
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<tr>
<td>(Tasigna®)</td>
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<tr>
<td>Sorafenib</td>
<td>Multikinase inhibitor</td>
<td>HCC</td>
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<tr>
<td>(Nexavar®)</td>
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<td>RCC</td>
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<tr>
<td>Sunitinib</td>
<td>Multikinase inhibitor</td>
<td>GIST</td>
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<tr>
<td>(Sutent®)</td>
<td></td>
<td>RCC</td>
</tr>
</tbody>
</table>

Courtesy of Brenda Keith, RN, MN, AOCN®
Antiangiogenic Agents

Action: Target the neovasculature of tumors to halt their growth, prevent tumor invasion, and preclude metastatic spread.

Examples:
- Bevacizumab (Avastin®)
- Thalidomide (Thalomid®)
- Lenalidomide (Revlimid®)

Biotherapy Summary

Agents
- Derived from biologic sources or
- That affect biologic responses

Mechanisms of action
- Vary depending on classification of agents
- Directed towards identifiable molecular targets on tumor cells
Complementary and Alternative Therapies in Cancer Care

Complementary and Alternative Medicine (CAM)

- **Complementary Methods**
  - Supportive methods used in addition to (complementary to) conventional treatments (such as radiation, chemotherapy, & surgery)

- **Alternative Therapies**
  - Used in place of conventional medicine

Complementary and Alternative Medicine (CAM)

- **Complementary and alternative medicine (CAM)**
  - Any medical system, practice, or product that is not thought of as standard care

- **Complementary Medicine**
  - A CAM therapy used **along with** standard medicine

- **Alternative Medicine**
  - A CAM therapy used **in place of** standard treatments


Integrative Medicine/Oncology

- A practice where health care practitioners and patient work together to combine conventional medical treatments and CAM modalities

- Provides a collaborative holistic approach to health care
  - Considers body, mind, soul, and spirit

Prevalence CAM Use in US

**General Population**
- 62% adults have used some form of CAM therapy during the previous 12 months
- Spans all ethnic backgrounds
- Greatest use if hospitalized in last year, former smoker, female, higher education levels

**Oncology Populations**
- 25-80% adults (studies since 2000)
- 40-70% are not reporting use of CAM to their health care practitioners

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Prevalence CAM Use in US

**General Population**
- Four out of ten adults use a CAM therapy
- Spans all ethnic backgrounds

**Oncology Populations**
- Therapies used most often:
  - 61%: Prayer and spiritual practices
  - 44%: Relaxation
  - 42%: Faith and spiritual healing
  - 40%: Nutritional supplements and vitamins
- 40-70% are not reporting use of CAM to their health care practitioners

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Gansler, et al. (2014). Topics in Complementary and Alternative Therapies (PDQ). Retrieved 02/10/14 from:
Major Types of CAM

- Alternative medicine systems
- Energy therapies
- Exercise therapies
- Manipulative and body-based methods
- Mind-body interventions
- Nutritional therapies
- Pharmacologic and biologic treatments
- Spiritual therapies


Oncology Nursing Responsibilities

- Evaluate personal & professional beliefs re: use of complementary & alternative therapies
  - Recognize how own values can affect patient care
  - Establish a collaborative relationship with patients
- Assess patients for use of CAM with each contact
  - Side effects or changes in patients condition at each appointment
- Assist with locating reliable, evidence-based information and resources

**Oncology Nursing Responsibilities**

- Understand and appropriately utilize terms (complementary, alternative, integrative therapies)
- Promote integrated education with other health disciplines
- Awareness of therapies that potentially can interfere with the outcome of other cancer treatments

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**Questions for Patients to Ask**

- Can this treatment:
  - Support the immune system or other systems?
  - Counteract the cancer?
  - Enable the conventional treatment to work better?
  - Relieve symptoms or side effects?
- Have results of this treatment been published in any recognized medical journals?
- Can the provider give you any references published by others?

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Adapted from American Cancer Society and Eisenberg, D. Recommendations to MD’s on Counseling Patients’ Use of Alternative Medicine. *Annals of Internal Medicine, 127*(11): 61-69.
Questions for Patients

₁ Does the provider believe in this treatment because he/she has seen benefits with similar patients?
   - If so, would it be possible to speak to some of these patients?
₂ How will you know that the therapy is working or not working?
₃ Are there potential side effects?
₄ Is the provider willing to communicate with the patient’s primary care physician?

Adapted from American Cancer Society and Eisenberg, D. Recommendations to MD’s on Counseling Patients’ Use of Alternative Medicine, Annals of Internal Medicine, 127 (1): 61-69.

Web Resources

₁ American Cancer Society/Complementary and Alternative Therapies
   - www.cancer.org/Treatment/TreatmentsandSideEffects/ComplementaryandAlternativeMedicine

₂ National Institute of Health: National Center for Complementary and Alternative Medicine (NCCAM)

₃ Society of Integrative Oncology
   - www.integrativeonc.org
Web Resources

- Medline Plus: Cancer Alternative Therapies
  - [Webpage](www.nlm.nih.gov/medlineplus/canceralternativetherapies.html)
- MD Anderson Cancer Center: Integrative Medicine Center site
- Memorial Sloan Kettering Cancer Center Integrative Medicine site

The most common lethal side effect of chemotherapy is:

a. Respiratory distress
b. Electrolyte imbalance from nausea, vomiting, and diarrhea
c. Myelosuppression
d. Increased liver function tests
Following surgery for cancer, a patient has been told that adjuvant chemotherapy is needed. The nurse explains that adjuvant chemotherapy refers to:

a. Immunotherapy used to boost the body's immune system
b. Drugs given to target minimal disease or micrometastases
c. Investigational drugs used in combination with surgery
d. Regimens given to patients who can not tolerate aggressive therapies