

Principles of Cancer Treatment

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Objectives

- Discuss goals of treatment
- Describe modalities and mechanism of action for the following cancer treatments
 - Chemotherapy
 - Biotherapy and Targeted Therapy
 - Surgery
 - Complementary and Alternative Medicine
- List potential side effects of cancer treatments

Surgery...

- Is the oldest form of cancer treatment
- Is precise and local
- Is a method of diagnosing and staging cancer
- May be curative alone
- May be used with other modalities
- May remove some or all of the primary tumor
- May be palliative in nature

SURGERY

Goals of Cancer Surgery

- Preventative/Prophylactic
 - To prevent/reduce risk of cancer in high-risk patients
 - Barrett's esophagus: Esophagectomy
 - Familial Breast Cancer: Mastectomy
 - Familial Ovarian Cancer: Oophorectomy
 - Polyposis Coli or Ulcerative Colitis: Colectomy
 - Only used in high-risk patients after careful consultation with oncologist and genetic counselor/geneticist

Diagnosis and Pathologic Staging

- Treatment is based on biopsy results and tissue analysis
 - Determine extent of disease (staging)
 - Used for tumor markers and genetic testing

Diagnosis and Pathologic Staging

- Aspiration Biopsy
- Needle or Core Biopsy
- Incisional (sampling)
- Excisional (removal)
- Thorascopic or Laparoscopic

Goals of Cancer Surgery

- Cure!?!?!?
- Surgical Resection: To remove entire tumor, which may include...
 - “Negative Margins”
 - Affected regional lymph nodes
 - Adjacent affected organs (salpingo-oophrectomy)
 - Biopsy tracts (renal cancer)

Goals of Cancer Surgery

- Surgical Palliation
 - To improve comfort when cancer is not curable
 - Cytoreduction
 - Decrease tumor burden
 - Improve chemo/radiation effects
 - Decompression or diversion
 - Tube
 - Ostomy
 - Stent
 - Removal of metastasis deposit (spine)

Multimodal Surgical Treatment

- Chemotherapy, biologics, and immunotherapies
 - Preop (neoadjuvant)
 - Intraop
 - Postop (adjuvant)
- Radiation
 - Preop (neoadjuvant)
 - Intraop
 - Postop (adjuvant)

Surgical Technique

- Local excision
- Wide excision
- En bloc resection (contiguous tissues)
- Debulking
 - Decrease tumor mass
 - Improve chemosensitivity
 - Intraop?

Other “Surgery”

- Cryotherapy/Cryosurgery/Cryoablation
 - thermal-based energy to lyse small lesions
 - cryoprobe inserted to desired site
 - treat primary lesion (Renal/Prostate) or metastatic lesion
- Transarterial Chemo Embolization (TACE)
 - chemotherapy-filled microspheres injected directly into tumor
 - treat large volume lesions (often liver primary)

Nursing Role

- Preoperative teaching and care
- Post-operative care
 - Hemodynamic/cardiopulmonary stability
 - Skin/wound/drain/tube assessment and care
 - Communication
 - Pain management
 - Prevention and management of SE associated with surgery and cancer
 - DVT prophylaxis
 - Pulmonary toileting
 - Nutrition
 - Bowel function
 - Psychosocial support

Nursing Role

- For Discharge:
 - Continuous patient education and follow-up
 - Wound care
 - Discharge meds
 - Nutrition
 - Activity
 - Follow up appointment and plan
- Psychosocial support is key

QUESTIONS ABOUT SURGERY?

CHEMOTHERAPY

Chemotherapy Overview

- Systemic therapy using a chemical substance
 - Frequently given in combination with other chemotherapy or non-chemotherapy drugs
 - Toxic to both normal and cancerous tissues
 - Can be a limiting factor in dosage/use
 - Many routes of administration available
 - Often given in specific sequences (cycles) to maximize response and minimize side effects

Role of Chemotherapy

- Curative
 - intended to cure disease
- Control
 - increase length and quality of life when cure not possible
- Palliative
 - relieve tumor-related symptoms
 - comfort when cure/control not possible

Role of Chemotherapy

- Adjuvant
 - used after primary treatment
 - chemo after surgery or radiation
- Neoadjuvant
 - used before primary treatment
 - Chemo used to shrink a tumor before surgery
- Myeloablative
 - obliterates bone marrow
 - used before HSCT

Chemotherapy

- Significant role in solid and liquid malignancy
- Impact based on cellular kinetics
 - Cell cycle
 - Cell time
 - Cell growth fraction
 - Tumor burden

Chemotherapy- Cell Cycle

- G0—Resting/dormant phase
- G1—Synthesis of proteins and RNA; growth
- S—DNA is replicated
- G2—Preparation for mitotic spindle formation; growth
- M—Cell division occurs

BD Biosciences <http://www.bdbiosciences.com/index.jsp> Accessed August 25th, 2014

Cell Cycle Specificity

Cell Cycle Specific

- Exert an effect at a specific part of the cell cycle
- Work best when given in cycles, divided doses, or continuously
- Most effective when patient kept on regular treatment schedule

Cell Cycle Non-Specific

- Exert effects in all phases of cell cycle, including G0
- Cell kill is directly proportional to the amount of drug administered
- Dose dependent—easier to delay treatment so that higher dose can be given

Cell Cycle Specificity

- Cell Cycle-Specific
 - Antimetabolites
 - Plant alkaloids
 - Camptothecins
 - Etoposide/teniposide
 - Taxanes
 - Vinca alkaloids
 - Miscellaneous
- Cell Cycle-Nonspecific
 - Alkylating agents
 - Antitumor antibiotics
 - Nitrosoureas

Chemotherapy- Cell Time

- Cell time= Mitosis to mitosis
- Based on cell type
 - Highly mitotic cells include epithelial cells, embryonic tissue, and blood stem cells... and cancer cells

Short cell cycle=

↑ cell kill

Continuous infusion of a cell-cycle specific agent =

↑ cell kill

Chemotherapy- Growth Fraction

- Tumor Growth Fraction: proportion of cells dividing at one time
- ↑% = ↑ increased kill with cell cycle-specific drugs
- ↓% = ↑ sensitivity to cell cycle-nonspecific drugs

Chemotherapy- Tumor Burden

- Small tumors= increased chemosensitivity
- Growth slows as tumor burden increases
- The more tumor, the more types of cells, the more likely chemo-resistant baby cells will proliferate = scary

Routes of Administration

- Oral
- Intramuscular
- Subcutaneous
- Intravenous
- Intraperitoneal
- Intra-arterial
- Intrathecal
- Intrapleural
- intravesicular
- Advantages and disadvantages for each route
- Additional care areas may administer by specialized route
 - Interventional radiology
 - Operating suite
- Review your institution's policies and procedures

Chemotherapeutic Approaches

- Single agent
 - Favored in recurrent disease
 - Single-agent can lead to chemo-resistant clones
 - e.g. docetaxel in advancing NSCLC

Chemotherapeutic Approaches

Combo Therapy

- Additive/synergistic effects
- Different phases of cell cycle
- Alternating toxicities
- Decreased resistance potential
- Add targeted agents

Criteria for Combo

- Singularly effective on specific cancer
- Different toxicities
- Toxicities happening at alternating times
- Biologically enhanced cytotoxicity

How Chemotherapy is Ordered

- Cycles
 - Frequency drug delivered
- Days
 - The point at which the patient is in a cycle
- Example:
 - The very first day the patient receives treatment is Cycle 1 Day 1
 - Cycle 2- the drugs repeat starting back at day one
 - Sometimes of labs/follow up you might see orders for Day -1

Throw Your Patient a Line!

PIV

- Placed at bedside/chair side by competent RN/LPN
- High risk for extravasation
- Risk for sclerosis of veins
- Risk of phlebitis
- Low risk of infection

CVC

- PICC may be placed at bedside by specialized RN
- OR suite/IR placement
- Lower risk for dislodgement/extravasation
- High risk of infection

Alkylating Agents

- Cell cycle-nonspecific
- Interfere with DNA replication by breaking DNA helix strand
- Examples:
 - Carboplatin/Cisplatin
 - Cyclophosphamide
 - Oxaliplatin
 - Ifosfamide
 - Dacarbazine

Side Effects

- Myelosuppression is the most common and lethal dose-limiting toxicity
- Many agents are irritants/vesicants
- Secondary malignancies are possible with some agents

- **Additional:**
 - Hemorrhagic cystitis
 - ifosfamide
 - cyclophosphamide
 - Nephrotoxicity
 - cisplatin
 - Anaphylactic Reactions
 - oxaliplatin, thiotepa, carboplatin
- **Common:**
 - Nausea/vomiting/diarrhea, decreased fertility, skin irritation, mucositis, alopecia, fatigue, neuropathy

Mesna?

Polowich, M. et al (Eds) (2014).
Chemotherapy & Biotherapy Guidelines &
Recommendations for Practice, 4th ed.,
ONS, Pittsburg, PA.

Antitumor Antibiotics (Alkylating Agents)

- Cell cycle-nonspecific
- Bind with DNA; inhibits DNA/RNA synthesis
- Examples:
 - Bleomycin
 - Mitomycin
 - Mitoxantrone
 - Anthracyclines
 - Doxorubicin
 - Epirubicin
 - Idarubicin
 - Daunorubicin

Side Effects

- Myelosuppression is the most common dose limiting toxicity
- Many agents are vesicants
- Drugs are colored (not clear)
 - Teach patient that urine/sclera might be discolored after administration

- **Additional:**
 - Cardiotoxicity
 - Anthracyclines
 - Lifetime cumulative dose limits
 - Pulmonary toxicity
 - Bleomycin
 - Test dose often used
 - Radiation Recall
 - Photosensitivity
 - Nephro/hepatotoxicity
- **Common:**
 - Nausea/vomiting, alopecia, electrolyte imbalance, decreased fertility, PPE (hand-foot syndrome), mucositis

Nitrosoureas (Alkylating Agents)

- Cell cycle non-specific
- Interfere with DNA replication by breaking DNA helix
- Cross blood-brain barrier
- Examples:
 - Carmustine
 - Lomustine
 - Streptozotocin

Side Effects

- Myelosuppression is the most common dose limiting toxicity
 - Also renal toxicity
- Delayed nadir: 4-6 weeks after treatment
- Agents can be irritating to veins if given rapidly

• Additional:

- Nephrotoxicity
- Hepatotoxicity
- Pulmonary fibrosis
 - lomustine
- Altered glucose metabolism
 - streptozocin

• Common:

- Nausea/vomiting, anorexia, impaired fertility

Antimetabolites

- Cell cycle-specific
- Act in S phase; inhibit DNA synthesis and/or repair
- Given via many different routes
- Examples:
 - Capecitabine
 - Cytarabine
 - Fluorouracil
 - Gemcitabine
 - Methotrexate
 - Pemetrexed

Side Effects

- Major dose-limiting toxicity is myelosuppression
 - Also nephrotoxicity, hepatotoxicity, diarrhea, PPE, neurotoxicity, mucositis
- Dosing is highly variable depending on route and indication

• Additional:

- Many agents are folic acid agonists or antagonists
 - Folic acid is either supplemented OR avoided!
- Patients with hematologic malignancy may require hydration/allopurinol to prevent TLS

• Common:

- Nausea/vomiting, alopecia, photosensitivity, constipation, fatigue, peripheral edema

Leucovorin?

- Folinic acid (broken down folic acid)
- When given with fluorouracil
 - Improves binding of 5-FU to cancer cells
 - 5-FU lasts longer
- When given with methotrexate
 - About 24 hours after
 - Rescues the normal cells

Camptothecins

- Plant alkaloid
- Cell cycle specific
- Act in S phase; inhibits topoisomerase I, causing double-strand DNA changes
- Examples:
 - irinotecan
 - topotecan

Side Effects

- Diarrhea is major dose-limiting toxicity
 - Early onset (within 24 hours) usually cholinergic
 - Treated with atropine

- **Additional:**
 - Myelosuppression
 - Interstitial lung disease
 - Topotecan
- **Common:**
 - Nausea, vomiting, alopecia, anorexia, fatigue, mucositis

Epipodophyllotoxins

- Plant alkaloid
- Cell cycle specific
- Act in G2 and S phase; interfere with topoisomerase II
- Examples
 - etoposide
 - teniposide

Side Effects

- Myelosuppression is major dose-limiting toxicity
- Can cause hypotension if administered rapidly
- Consider dose reduction in patients with renal/hepatic impairment

- **Additional:**
 - Hypersensitivity reactions
 - Secondary malignancy
- **Common:**
 - Nausea, vomiting, alopecia, anorexia

Taxanes

- Plant alkaloid
- Cell cycle specific
- Act in G2 and M phases; inhibit cell division by stabilizing microtubules
- Examples:
 - cabazitaxel
 - docetaxel
 - paclitaxel

Side Effects

- Peripheral neuropathy is major dose-limiting toxicity
- Agents are irritants/vesicants
- Do not use PVC bag/tubing to administer

- **Additional:**
 - Use of in-line filter is required in some agents
 - paclitaxel
 - Consider dose adjustment or alternative agent in hepatic or renal dysfunction
- **Common:**
 - Hypersensitivity reactions
 - Premedicate with H2 antagonist, antihistamine, corticosteroid
 - Alopecia, facial flushing, fatigue, nausea, vomiting, myelosuppression, fluid retention

Vinca Alkaloids (Plant Alkaloid)

- Plant alkaloid
- Cell cycle specific
- Act in G2 phase to block DNA production, and M phase to prevent cell division
- Examples:
 - Vinblastine
 - Vincristine
 - Vinorelbine

Side Effects

• Myelosuppression and neurotoxicity are major dose-limiting toxicities

• Agents are vesicants

- **Additional:**
 - FATAL IF GIVEN INTRATHECALLY!
 - Nephrotoxicity
 - Hepatotoxicity
- **Common:**
 - Constipation, alopecia, nausea, vomiting

Miscellaneous Agents

- Cell cycle specific
- Have varied mechanisms of action
- Examples:
 - arsenic trioxide
 - hydroxyurea
 - vorinostat
 - asparaginase
 - procarbazine
 - ixabepilone

Side Effects

• Myelosuppression is most common dose-limiting toxicity

• Also peripheral neuropathy

• Given by different routes, many PO

- **Additional:**
 - Alcohol should be avoided with procarbazine use
 - Antabuse-like reactions
 - Regular monitoring of labs and ECG needed with several agents
 - Asparaginase carries risk of anaphylactic reactions
- **Common:**
 - Nausea, vomiting, mucositis, hepatotoxicity, nephrotoxicity, fatigue, diarrhea

Complications of Chemotherapy

- Hypersensitivity reaction
 - Often prevented by premedications
- Extravasation
 - Irritants
 - Vesicants
- Anaphylaxis
 - True allergic response
 - Can be a Code situation!
- Know your institutional policies!!

- You will all take a closed-book test on everything you just learned regarding every drug that I just named.
- Good Luck! ☺

Why is this a ridiculous expectation?

So about Mr. Potter

- Harry Potter, age 57 in overall good health presented to his primary with hematochezia x3 months (has not had screening colonoscopy)
- Colonoscopy biopsy shows poorly differentiated adenocarcinoma of the colon
- CT of chest, abdomen, pelvis shows no distant metastases and limits the disease to loco/regional
- Sent to Dr. McGonagall: Surgical Oncologist

Post Op Mr. Potter

- Laparoscopic versus open?
 - Outcomes are similar ☺ Thanks New England Journal of Medicine!
- Dr. McGonagall completed a laparoscopic resection of a sigmoid colon with en bloc lymph node sampling
- What are our immediate interventions!?!
- What do we want to make sure he has before he leaves us?

Mr. Potter Pathology

- <https://cancerstaging.org/references-tools/quickreferences/Documents/ColonMedium.pdf>
- Tumor invades into the pericolon tissues
- 3/12 lymph nodes positive for malignancy
- T3, N1b, M0
- Stage?
- Medical Oncologist is consulted: Dr. Dumbledore!
- So..... Now what?

At Tumor Board

- Dr. McGonagall presents Mr. Potter's case
- Radiologist review scans
- Pathologists review slides
- Tumor Registrar provides the NCCN guidelines
- Medical Oncologist Dr. Dumbledore reviews standard of care
- Research nurse looks for a clinical trial
- Office nurse anticipates patient needs
- Radiation therapy says "not today"
- http://www.nccn.org/professionals/physician_gls/pdf/colon.pdf

Chemo Regimen

- Dr. Dumbledore orders FOLFOX
- FOL- folinic acid (leucovorin)
- F- flurouricil (5-fu)
- OX- (oxaliplatin)
- Every two weeks x 12 cycles... OR a clinical trial comparing 6 and 12 cycles

Ordering

- Leucovorin 400 mg/m² iv over 2 hrs, prior to 5-FU d1
- 5-FU 400 mg/m² iv bolus d1 followed by 2400 mg/m² iv over 46 hrs
- Oxaliplatin (Eloxatin) 100 mg/m² in 500 ml dextrose 5% iv over 2 hours d1
- Q2w x 12 cycles

Approach to Targeted Therapy

- Neoadjuvant
 - Downsize tumor → complete response
- Primary Treatment
 - Single agent
 - *imatinib* for the treatment of Philadelphia chromosome-positive CML
 - Combo agent
 - CHOP (cyclophosphamide, doxorubicin, paclitaxel and Herceptin (trastuzumab))

Approach to Targeted Therapy

- Adjuvant Setting
 - Single
 - Postop imatinib to maintain disease-free interval after GIST resection
 - Combo
 - TCH- docetaxel (Taxotere) and carboplatin + trastuzumab in HER2+ breast cancer

Targeted Therapy

- Drugs that block cancer growth/spread
 - Interfere with molecules that act on tumor growth and progression
 - Therapies focus on signaling pathways
 - Mutations in signaling pathways are found in many cancers
 - These mutations can be targets of therapy

Targeted Therapy

- Substantial growth in field in last 15 years
 - The first: rituximab approved 1994
 - Targets and blocks CD20 receptors on cancer cells
 - Within the last three years, 36 new oncology drugs received FDA approval
 - Most were targeted therapies
- Monoclonal antibodies (mAbs)
- Small Molecule Inhibitors

HER2/neu by IHC

Monoclonal Antibodies

- Cell signaling directs cellular growth, function, and death
 - Done by biochemical or molecular messengers
 - Cytokines, enzymes, etc
 - Cancer cells have super signals
- Mechanism of action
 - Signal transduction
 - Generated inside or outside of the cell
 - Triggers a signaling cascade that directs the cell to do a specific activity

Monoclonal Antibodies in Action

Rituximab

- Targets the CD20 extracellular antibodies on B lymphocytes
- Binds to receptors, recruiting NK cells
- Activates complement

Bevacizumab

- Targets vascular endothelial growth factor (VEGF)
- Prevents VEGF from binding to and inhibiting new vessel growth

Examples of mAbs

Agent	Target	Source	Indication	Year Approved
rituximab	CD20	Chimeric	Non-Hodgkins Lymphoma	1994
trastuzumab	HER-2	Humanized	Breast, gastric cancer	1998
cetuximab	EGFR	Chimeric	HN, colorectal cancer	2004
bevacizumab	VEGF	Humanized	Colorectal, GBM, NSCLC	2004
panitumumab	EGFR	Human	Colorectal cancer	2006
ofatumumab	CD20	Human	CLL	2009
Brentuximab vedotin	CD30	chimeric	HD, anaplastic lymphoma	2011

Adapted from http://www.actip.org/pages/library/Table_Monoclonal_Antibodies.pdf

Side Effects

- Highly dependent on the cellular pathway being disrupted and agent administered
- Hypersensitivity reactions are possible
- Dermatologic toxicities can be severe (acneiform rash, PPE, dry/cracked skin, fissuring); can be dose-limiting
- Also cardiac dysfunction, hepatotoxicity, nausea, vomiting, hypertension, fatigue

Small Molecule Inhibitors

- Mechanism of Action
 - Act on signaling pathways that control tumor growth, proliferation, and invasion
 - Either moderate, control, and/or kill cancer cells
 - Most require chronic or long-term therapies
- Tyrosine Kinase Inhibitors (TKIs)
 - Erlotinib, Sorafenib, Sunitinib
- Mammalian target of rapamycin (mTOR)
 - Temsirolimus, everolimus

Examples Small Molecule Inhibitors

Agent	Target	Indication	Route
Bortezomib (Velcade)	26S proteasome	Multiple myeloma, mantle cell lymphoma	IV, SC
Erlotinib (Tarceva)	EGFR	NSCLC, pancreatic cancer	PO
Everolimus (Afinitor)	mTOR	Breast, renal cell	PO
Imatinib mesylate (Gleevec)	MCR-ABL	Ph+ CML	PO
Sorafenib (Nexavar)	Multikinase inhibitor	Hepatocellular, renal cell carcinoma	PO
Temsirolimus (Torisel)	mTOR	Renal cell carcinoma	IV

Not-so-small Molecule Side Effects

- Very drug specific!
- Dermatologic toxicities
 - Rash, acneiform/maculopapular, itching, stomatitis (oral lesions)
 - Topical corticosteroids, oral antihistamines, oral corticosteroids
- Cardiac dysfunction
 - Edema, fluid retention, cardiomyopathy, decreased LVEF, QT prolongation, hypertension
- Miscellaneous
 - Electrolyte imbalances, hair color changes, hepatotoxicity, skin discoloration, bleeding

-mAb v. Kinase Inhibitors

	Monoclonal Antibodies	Small-Molecule Kinase Inhibitors
Size	Large	Small
Site of Action	Extracellular	Intracellular
Usual Method of Admin	IV	Oral
Half-life	Days	Hours
Type of Target	Single	Single/Multiple
Immune system activation potential?	Yes	No
Drug/Drug Interaction	No	ABSOLUTELY!

Meet Dori

- Dori is a 59 y.o. female presenting to the ED with increased shortness of breath, abdominal pain, also complains of fatigue and general malaise
- Physical assessment shows bulky cervical lymphadenopathy
- CT of chest/abdomen/pelvis shows bulky mediastinal, axillary, and cervical lymphadenopathy
- Admitted to floor to manage pain, correct electrolyte imbalance, and monitoring

Enter Dr. Marlin

- Dr. Marlin, Medical Oncologist is consulted
 - Orders U/S guided biopsy of mediastinal mass
 - Bone marrow aspirate to be performed at bedside
 - Many, Many, Many lab tests
 - Histochemical stains, flow cytometry, peripheral smear, HIV antibody, you name it, he ordered it
- Results of all that: CD20+ high-grade diffuse Large B cell lymphoma

Summary

- Effect specific cellular markers/signals on both healthy and cancerous cells
 - Cancerous cells over-express tumor markers
- Infusion reactions are common in mAbs
- Many agents are PO
 - Patient education is important
 - some agents cannot be crushed; know whether or not they can be taken with food
- Side effects are highly drug specific

The Regimen

- Dori is going to start her first cycle of EPOCH-R
- E- etoposide
- P-prednisone
- O-vincristine [Oncovin]
- C- Cyclophosphamide
- H- Doxorubicin [hydroxydaunorubicin]
- R-Rituxumab

Orders

- **Day 1:** Rituximab 375mg/m² IV day 1
- **Days 1–4:** Etoposide 50mg/m² IV, doxorubicin 10mg/m², and vincristine 0.4mg/m²
- **Day 5:** Cyclophosphamide 750mg/m² IV
- **Days 1–5:** Prednisone 60mg/m² PO BID.
- Administer G-CSF 5 mcg/kg SQ daily until an ANC >5 × 10⁹/L above nadir level starting day 6.
- Repeat cycle every 3 weeks for 6 cycles

What is happens next?

- What kind of line do we need?
- What are we monitoring?
- What are we teaching?

COMPLEMENTARY AND ALTERNATIVE
THERAPIES
OR
COMPLEMENTARY AND INTEGRATIVE
THERAPIES

Holism and Holistic Health Care

- Modalities that integrate mind/body/spirit/environment
- Integrative Medicine
 - “A personalized and holistic approach that takes into account each patient’s unique circumstances (e.g. diagnosis, patient values and preferences, expected toxicities related to standard treatment regimen) to customize treatment programs”

“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
 - A domain of therapies that fall outside of conventional medicine

Prevalence in the US

- Approximately 38% of adults and 12% of children use CAM
 - Most use is underreported
 - Use has risen significantly in recent years
 - Spans all cultural/ethnic backgrounds
- **\$33.9 BILLION** spent in 2007 alone
 - Out-of-pocket visits, supplies, materials
- Some CAM practices are more regulated than others
 - Supplements/herbals are not always FDA regulated

Top Patient-Reported Reasons for Using

- Disease prevention
- Pain management
- Treatment of specific chronic health conditions
- Supplements to conventional medicine

Health Care Providers are Catching On!

- As number of providers offering complementary therapies increases, cancer care becomes more integrative
- Hospice care provider offerings:
 - Massage
 - Supportive group
 - Music

NCI Support of CAM

- \$105,341,737 spent on CAM in 2011
 - \$64 million for prevention research
 - \$19 million for treatment
 - \$16 million for symptom management
- Examples of NCI Funded Studies
 - Green Tea for Bladder Cancer
 - Curcumin for Radiation Dermatitis
 - Acupuncture for Dry Mouth

Types of CAM

- NCI's office of Cancer and Complementary and Alternative Medicine lists 8 major categories:
 - Alternative medical systems
 - Energy therapies
 - Exercise therapies
 - Manipulative and body-based methods
 - Mind/body interventions
 - Nutritional therapeutics
 - Pharmacologic/biologic treatments
 - Spiritual therapies

Whole Medical Systems

Ayurveda

- Mind/body/consciousness balance treat illness and preserve health
- Goals include proper diet/hydration
- Sleep-wake routines
- Mantras (specific movements/spoken words)

Chiropractic Medicine

- Re-establish CNS functioning
- Contraindicated in patients with:
 - Bone mets
 - Spinal cord compression
 - Thrombocytopenia
 - VTE

Whole Medical Systems

- Traditional Chinese Medicine
 - Acupuncture
 - Herbs
 - Mind-body therapy
 - Find balance between opposing complementary forces
 - Cold/heat, excess/deficiency

And the list goes on...

- Acupressure
- Aromatherapy
- Dance therapy
- Lymphatic therapy
- Massage
- Physical therapy
- Trigger point therapy
- Art therapy
- Color therapy
- Guided imagery
- Meditation
- Music therapy
- T'ai chi
- Yoga

Must Love Research!

- Pranayama
 - A series of breathing techniques
 - Taught in weekly classes
 - Instructed to practice at home
- Findings
 - Dose-response relationship found between pranayama use and improvements in chemotherapy-associated symptoms and quality of life
- Be on the look out for CAM-related research articles in Oncology and other journals!

Herbs and Supplements

- Herbs have been used to treat disease for 1000s of years
- Continue to be used by as many as 50% of Americans
- Many are proven to be beneficial
 - Ginger prevents nausea
 - St. John's wort is effective at treating depression
 - English ivy leaf treats bronchitis and asthma

Drug Interaction: CYP3A4

- Goldenseal: topical antiseptic and systemic GI disorder treatment
 - CYP3A4 inhibitor (prevents drug metabolism)
- St. John's Wort: depression
 - CYP3A4 inducer (increased drug metabolism)
 - Shortens the half life of alprazolam (Xanax) from 12 hours to 6 hours

Nursing Assessment

- Should include directed questions regarding CAM
- Question in culturally-sensitive and non-judgmental way
- CAM practices can be tied to cultural and spiritual beliefs
- All CAM therapies should be documented in assessment
- Are you taking any medications?

Hazardous Medications

- Must meet one or more of these criteria:
 - Genotoxicity – causes DNA damage
 - Carcinogenicity – causes cancer development
 - Teratogenicity/developmental toxicity – fetal damage, loss
 - Reproductive toxicity – sterility, infertility
 - Organ toxicity – at low doses

HAZARDOUS MEDICATIONS

Principles of Safe Handling

- Preparation in biologic safety cabinet (BSC) under laminar flow hood
- Safe handling techniques during storage, mixing, and transport
- Processes in place for labeling, administration, and disposal
- Personal Protective Equipment

Washington State Law

- Passed in 2012 by state legislature
 - Requires all facilities that handle hazardous drugs to comply with NIOSH recommendations
 - List of hazardous drugs defined by NIOSH and formulary
 - Implemented in three stages:
 - January 1st, 2015– written hazardous drug control program implemented
 - July 1st 2015– provided employee training
 - January 1st, 2016– installed appropriate ventilated BSC
- Be aware of your facility-specific policy and procedure for hazardous medication handling

Questions?

- Thank you!!

References

- Bonjer, H.J., et al. (2015). A randomized trial of laparoscopic versus open surgery for rectal cancer. *The New England Journal of Medicine*, 2015(372) 1324-1332. [<http://www.nejm.org/doi/full/10.1056/NEJMoa1414882>]
- Genetech. (2015). *Rituxan*. Retrieved from <http://www.rituxan.com>.
- Genetech. (2015). *Avastin for U.S. healthcare professionals*. Retrieved from <http://www.avastin-hcp.com/>.
- Itano, J.K. (2016). *Core curriculum for oncology nursing* (5th ed.). St. Louis, MO: Elsevier.
- Lanca, A.J. (2013). Herbal medications: An evidence-based review. *Continuing Education for ANCC Certified Nurses*, 140(13), 20-49.
- NCI. (2012). Annual report on complementary and alternative medicine. Retrieved from http://cam.cancer.gov/cam_annual_report_fy11.pdf
- Polovich, M. et al (Eds) (2014). *Chemotherapy & Biotherapy Guidelines & Recommendations for Practice*, (4th ed.). Pittsburg, PA: ONS.
- The Johns Hopkins Hospital. (2014). TACE. Retrieved from http://www.hopkinsmedicine.org/liver_tumor_center/treatments/intraarterial_therapies/tace.html