Nutrition in Cancer Care

Megan May, Pharm.D., BCOP

Learning Objectives

- Identify treatment-related nutritional deficiencies such as anorexia, dysphagia, mucositis, and xerostomia in cancer patients
- Outline management strategies in oncology patients with anorexia, dysphagia, mucositis, and xerostomia
- Recognize the importance of reducing drug-drug interactions with supplements
- Distinguish between the different diet trends in cancer nutrition

Nutrition Therapy

- Maintenance of adequate nutrient stores and muscle mass
- Improved strength and energy
- Management of side effects
- Improved quality of life
- Fewer complications, infections, hospitalizations, treatment breaks
- Improved survival and outcome

Malnutrition in Cancer Patients

- 30% to 85% of patients experience malnutrition prior to diagnosis
  - 80% of upper GI cancer patients and 60% of lung cancer patients have already experienced significant weight loss at time of diagnosis
- 40-80% of patients are expected to experience malnutrition during treatment
  - As little as a 6% weight loss predicts a reduced response to treatment, reduced survival, and a reduced quality of life

Bozzetti F, et al. Support Care Cancer. 2012;20(8):1919-1928.

Unintentional Weight Loss

- 13% of renal cell cancer patients had dose reductions, while 21% had treatment termination due to unintentional weight loss
- Body weight and lean body mass are considered risk factors for chemotherapy tolerance and survival in gastric cancer
- Toxicity from radiation can lead to unplanned treatment breaks that result in lower loco-regional control and survival rates in patients with head and neck cancer

Antoun et al. *Annals of Oncology.* 2010.

Prevalence of Malnutrition

Tumor Site	Prevalence of Malnutrition
Pancreas	80-85%
Stomach	65-85%
Head & Neck	65-75%
Esophagus	60-80%
Lung	45-60%
Colon/Rectum	30-60%
Gynecological	15%
Urological	10%

Stratton et al, eds. Disease-Related Malnutrition: An Evidence-Based Approach to Treatment. CABI Publishing; Wallingford:2003.

Prevalence of Treatment-Related Nutrition Effects

Treatment	Weight Loss	Dysphagia	Nausea/ Vomiting	Mucositis	Taste Alterations	Xerostomia	Diarrhea	Constipation
Chemotherapy	✓	✓	✓	✓	✓	✓	✓	✓
Radiation		✓	✓	✓	✓	✓	✓	✓
Surgery	✓	✓	✓				✓	✓
Biotherapy	✓	✓	✓	✓	✓		✓	✓

Grant BL. Oncology Nutrition Dietetic Practice Group. 2013: 97-113.

Nutrition Issues for Oncology Patients

- Anorexia
  - Taste changes
- Dysphagia
- Mucositis
- Xerostomia
- Side-effects from treatment
  - Constipation
  - Diarrhea
  - Dehydration
  - Nausea and Vomiting

Anorexia

- Loss of desire to eat
- Experienced by 15-25% of cancer patients
- Results in decreased survival and adherence to chemotherapy
- Risk factors
  - Tumor effect
  - Treatment effect
  - Psychosocial effect
  - Age

Bruera E. BMJ. 1997;315(7117):1219-1222.

Management of Anorexia

- Remove the cause
- Non-pharmacologic interventions
  - Symptom-related nutritional interventions
- Pharmacologic therapy
- Nutrition support

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Pharmacologic Anorexia Management

- Weight gain primarily seen in fat mass
- Medications
  - Megestrol 160-1600 mg PO daily
  - Dexamethasone 0.75 mg PO four times daily
  - Prednisone 5 mg PO three times daily
  - Dronabinol 2.5 mg PO two times daily

Jatoi A, et al. J Clin Oncol. 2002;20(2):567-573.
PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Nutrition Management of Anorexia

- Small, frequent meals
  - High in protein and calories
- Eat every 2.5-3 hours
- Find food that is tolerable
- Beverages with calories
- Increase physical activity

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Oral Nutrition Supplements

- Boost or Ensure
- Supplement energy, protein, fat, carbohydrate, and fiber intake
- Systemic review showed results in improvement of
  - Increase total energy
  - Increase protein intake
  - Reduce incidence of complications

Cawood AL, et al. Ageing Res Rev. 2012;11(2):278-296.
PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Nutrition Management of Taste Changes

- Plastic utensils
- Add spices and sauces to food
- Tart foods and drinks
- Eat foods that appeal to you
- Sugar-free lemon drops, gum or mints

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Dysphagia

- Common in head and neck and esophageal cancers
- Approximately 25% of cancer patients
- Due to tumor, radiation, strictures, dysmotility issues, dry mouth/throat
- Essential for optimal nutrition
- Quickly leads to malnutrition
- Dehydration becomes significant issue

Martinez JC, et al. ISRN Gastroenterol. 2011;719575;1-9.

Nutrition Management of Dysphagia

- Define location of concern
- Avoid very hot and very cold
- Work on foods that are slippery, have sauces, gravies or will travel more easily
- Avoid irritant foods
  - Spicy, caffeine, high fat, acidic foods
- Liquids and very soft foods easier to tolerate
- Mouth rinses

Mucositis

- Inflammation of any mucosal membranes, including the oral cavity
- Onset: 4-7 days
- Duration: 1-6+ weeks
- Complications
  - Pain, nutrition, infection
- Risk Factors
  - Poor oral health
  - Tobacco and alcohol
  - Females > Males
  - Dehydration
  - Chemotherapy regimen: especially high doses
  - Radiation

Shord SS. Chapter 104. Cancer Treatment and Chemotherapy. Pharmacotherapy: A Pathophysiologic Approach, 2014.
http://www.oralcancerfoundation.org/complications/mucositis.php
http://www.cancernetwork.com/cancer-management/dermatologic-adverse-events-associated-systemic-anticancer-agents#sthash.T3Cy5yTU.dpuf

Mucositis Management

- Prevention
  - Good oral hygiene
  - Baking soda and salt rinses; saline rinses swish/spit QID
    - 1 tsp salt, 2 tsp baking soda, 8 oz warm water
- Treatment: supportive management
  - Oral hygiene
  - Topical/systemic analgesics
  - “Magic” mouthwash
  - Anti-infectives
    - Candida
    - HSV

Peterson M. *Support Care Cancer* 2013; 21:2341- 2349.
http://www.oralcancerfoundation.org/complications/mucositis.php

Nutrition Management of Mucositis

- Easy to swallow food
  - Puree foods
- Drink with straw
- Suck on ice chips
- No tobacco products
- Avoid certain foods
  - Hot foods
  - Citrus
  - Spicy
  - Tomatoes and ketchup
  - Salty
  - Raw vegetables
  - Sharp, crunchy foods
  - Alcohol

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Xerostomia

- Dry mouth
- Occurs in 50-90% of cancer patients
- Risk factors
  - Cancer treatment related
  - Immune disorders
  - Comorbid diseases
  - Medications
- Treatment: amifostine

Jensen SB, et al. Support Care Cancer. 2010;18:1029-1060.
Brizel DM, et al. J Clin Oncol. 2000;18:3339-3345.

Nutrition Management of Xerostomia

- Sip water
- Chew gum or suck on hard candy, ice pops, or ice chips
- East to swallow foods
- Keep lips moist
- No alcohol-containing mouthwash
- No tobacco products

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Constipation Management

- Bulk-forming laxatives
  - Metamucil
- Stimulant laxatives
  - Senna and bisacodyl
- Osmotic laxatives
  - Miralax and Milk of Magnesia
- Stool softeners
  - Docusate
- Mineral oil, castor oil, fiber, milk of magnesia generally not recommended

Nutrition Management of Constipation

- Increase fluids
- Increase fiber
- Dietary GI stimulants
  - Warm beverage/coffee
  - Prune juice
- Fiber supplement
- Increase physical movement

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Diarrhea

- Moderate to severe
  - 14% of chemotherapy agents
- Causes
  - Direct and indirect toxic effects of treatment
  - Abdominal/pelvic radiation
  - Surgical intervention of GI tract
  - Malignancy
  - Infection

Benson AB, et al. *Journal of Clinical Oncology* 2004;22: 2918-26.
http://www.cancer.gov/about-cancer/treatment/side-effects/constipation/GI-complications-hp-pdq#link/stoc_h2_1

Diarrhea Management

- Treatment
  - Loperamide
    - 4mg PO at the first sign of diarrhea
    - 2mg PO q 2h until diarrhea free for 12 hours
    - Do not take > 12 tablets/day
  - Diphenoxylate/atropine
    - 5 mg PO QID
    - May alternate with loperamide
  - Octreotide
    - 50-150 mcg SQ q 8h; up to 500 mcg SQ q8h

http://www.cancer.gov/about-cancer/treatment/side-effects/constipation/GI-complications-hp-pdq#link/stoc_h2_1

Nutrition Management of Diarrhea

- Rehydrate
- BRAT diet
  - Low fiber, low residue
- Slow down gut function
  - Identify stimulants and avoid
  - Avoid lactose
- Watch electrolytes; K, Mg, Na, Cl

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Nutrition Management of Nausea and Vomiting

- BRAT diet
- Small, frequent meals
- Remain upright for 1 hour after eating
- Suck on peppermints or lemon drops
- Do not skip meals and snacks
- Keep record of nausea and the cause

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Long-Term Complications

- Chemotherapy
  - Electrolyte imbalances due to nephrotoxins
- Radiation
  - Enternal nutrition and/or stents for upper GI tract strictures or fistulas
- Surgery
  - Chronic malabsorption after extensive bowl resections
  - Adhesions and bowel obstruction

Vitamins and Supplements

Supplements

- Use is highest in chronic disease
  - In 2016 spend was $34 billion on vitamins/herbs
- 64-81% of cancer patients start a supplement after diagnosed
- Viewed as harmless by majority of patients
- Drug interactions seen between these and prescription medications
- May interact with chemotherapy
  - Compete for target cells
  - Increase/decrease the toxicity and uptake of drugs
- Even multivitamins may have > 200% daily value

Velicer CM, et al. J Clin Oncol. 2008;26(4):665-673.
Hagerty M. Oncology Nurse. 2011.

Vitamins

- Calcium
  - Food source preferable for increased absorption
  - Increased calcification seen in those who used dietary and supplement source
  - Amount: 1200-1500 mg daily
- Vitamin D
  - Significant research indicating improved health with adequate levels
    - Check for baseline before supplementing
    - Limited availability in foods; fortified dairy, some fish
    - Depending upon level;
      - < 15 IU recommend 50,000 IU D2
      - >15 – 30 IU recommend 2,000 IU D3 daily
      - > 30 IU recommend 1,000 IU D3 daily

Hagerty M. Oncology Nurse. 2011.

Vitamins

- High-dose vitamin C
  - May stimulate or inhibit tumor growth
  - May be dangerous to consume excessive amounts
- Probiotics
  - Prevent radiation and chemotherapy-induced diarrhea
  - Starting upon initiation may be beneficial
- Glutamine
  - Reduce mucositis and diarrhea
  - Aids in faster healing of the mucosal cells and entire GI tract

PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Herbal Supplement Issues in Cancer

- Overlapping in multiple products
- Herbs that affect anesthesia
  - Kava kava, Valerian
- Drug interactions changing metabolism
  - St John's Wort, Grapefruit juice, Pomegranate
- Antiplatelet, blood thinners
  - Garlic, Ginkgo, E, Ginger, Ginseng, Feverfew, Echinacea, Omega 3; hold 1 week around surgery
- Unlabeled prescription drugs
  - Valium in some Chinese herbals, PC-SPES
- Recommendations
  - Lowest dose, one herb at a time, not long term

Terrie YC. Pharmacy Times. 2018.

Specific Potential Interactions with Supplements

- Ascorbic acid
  - Reduces bortezomib activity
- Black cohosh
  - May lower lipids and increase absorption and toxicity of tamoxifen
- CoQ10
  - May interfere with effectiveness of chemotherapy
- Echinacea
  - May interfere with immunotherapy
- Garlic
  - May increase bleeding in cancer patients
- St. John's wort
  - May decrease absorption of irinotecan and imatinib

McCune JS, et al. Support Care Cancer. 2004;12(6):454-462.

Dangerous Herbs

• Aristolochia	Renal failure, renal cancer
• Comfrey	Liver damage/deaths, carcinogenic
• Androstene	Increased cancer, lower HDL
• Chaparral	Liver dysfunction, carcinogenic
• Germander	Abnormal liver function
• Kava	Liver dysfunction and coagulation
• Glandular extract	Risk mad cow disease
• Lobelia	Rapid heart rates, SOB
• Skullcap	Liver damage
• Yohimbe	Blood pressure, arrhythmias, MI

McCune JS, et al. Support Care Cancer. 2004;12(6):454-462.

Pharmacist Role in Supplement Management

- Communication with patient and health care team
- Educate patient on the risk versus benefits
- Complete a drug-supplement interaction report
- Respect cultural beliefs

Diet Trends in Cancer Patients

Vegetarian or vegan diet

Macrobiotic diet

Ketogenic diet

Vegetarian or Vegan Diet

- If followed carefully, will not result in nutrition deficiencies
- Reduces the incidence of GI cancers
- May prevent tumor progression in men with localized prostate cancer

Saxe GA, et al. Integr Cancer Ther. 2006;5(3):206-213.
PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Macrobiotic Diet

- High-carbohydrate, low-fat, plant-based diet
  - Whole grains
  - Vegetables
  - Soup
  - Cooked and sea vegetables
  - Fish
- Multiple variables in calculating macros
  - Person's sex, level of activity, and local area

Lerman RH. Nutr Clin Pract. 2010;25(6):621-626.
Kushi LH, et al. J Nutr. 2001;Suppl 11:3056S-3064S.
PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

Ketogenic Diet

- Research: brain tumors; prostate/breast
  - Anti-inflammatory properties of ketones
  - High in saturated fats, known to be pro-inflammatory
- Tolerance
  - Ketones are appetite suppressing
  - Delayed gastric emptying aggravated by high fat
  - 27 current trials listed; terminated/recruiting
- Risks
  - Excessive weight loss
  - Kidney stones (occurs in 1 out of 20 patients)
  - Constipation, multiple vitamin and mineral deficiencies
  - Serum TG (often >400), micronutrient deficiencies

Champ CE, et al. J Neurooncol. 2014;117(1):125-131.
PDQ® Supportive and Palliative Care Editorial Board. PDQ Nutrition in Cancer Care. Bethesda, MD: National Cancer Institute. Updated <11/17/2017>. Available at: https://www.cancer.gov/about-cancer/treatment/side-effects/appetite-loss/nutrition-hp-pdq. Accessed <10/02/2018>.

‘Sugar Feeds the Tumor’

- Glucose feeds all cells; deficit of glucose causes increased protein breakdown
- Sugar’s relationship to higher insulin levels may influence cancer cell growth. Cancer cells have insulin receptors; insulin may promote growth
- Stress from this causes some people to avoid all carbohydrate
- Stress turns on the fight or flight mechanisms
  - Increases hormone levels that can raise blood glucose and suppress immune function
  - May reduce any possible benefit of eliminating sugar in the first place
- Promote CHO + protein/fat combining for more modulated blood glucose

Supplement Resources

- Benefits and Dangers of Vitamin Supplements for Cancer Patients
  - MD Anderson Cancer Center website
- Nutrition for the Person with Cancer During Treatment
  - American Cancer Society website
- Natural Medicines Comprehensive Database
  - Naturaldatabase.com
- Cancer: In Depth
  - National Institutes of Health website
- Complementary and Alternative Medicine
  - National Cancer Institute website
- About Herbs, Botanicals & Other Products
  - Memorial Sloan Kettering Cancer Center

Summary

- Early identification of nutrition status and treatment-related nutrition risk
- Cancer patients' nutrition status should be screened and routinely monitored during anticancer treatment
- Counseling by nutrition support specialist
- Prophylactic management and control of nutrition treatment-related side effects
- Long-term follow-up and assessment of nutrition therapy-related complications

Nutrition in Cancer Care

Megan May, Pharm.D., BCOP