Nutrition and Cancer

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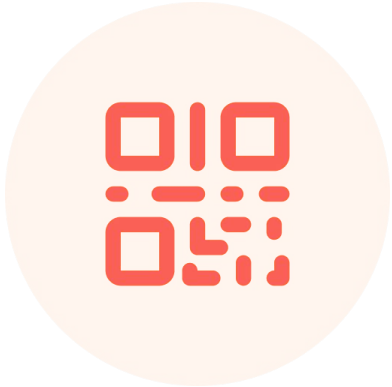

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Disclosures

none

Objectives

- To provide an overview of nutrition status as it pertains to the adult oncology population
- To discuss malnutrition in the adult oncology patient and its effect on patient outcomes
- To identify nutrition impact symptoms and provide appropriate interventions

Nutrition Status in the Oncology Patient

Causes of Decreased Nutrition Status in Cancer

- Patients do not feel well - decreased appetite → decreased PO intake
  - Depression, anxiety, stress, lack of sleep, pain

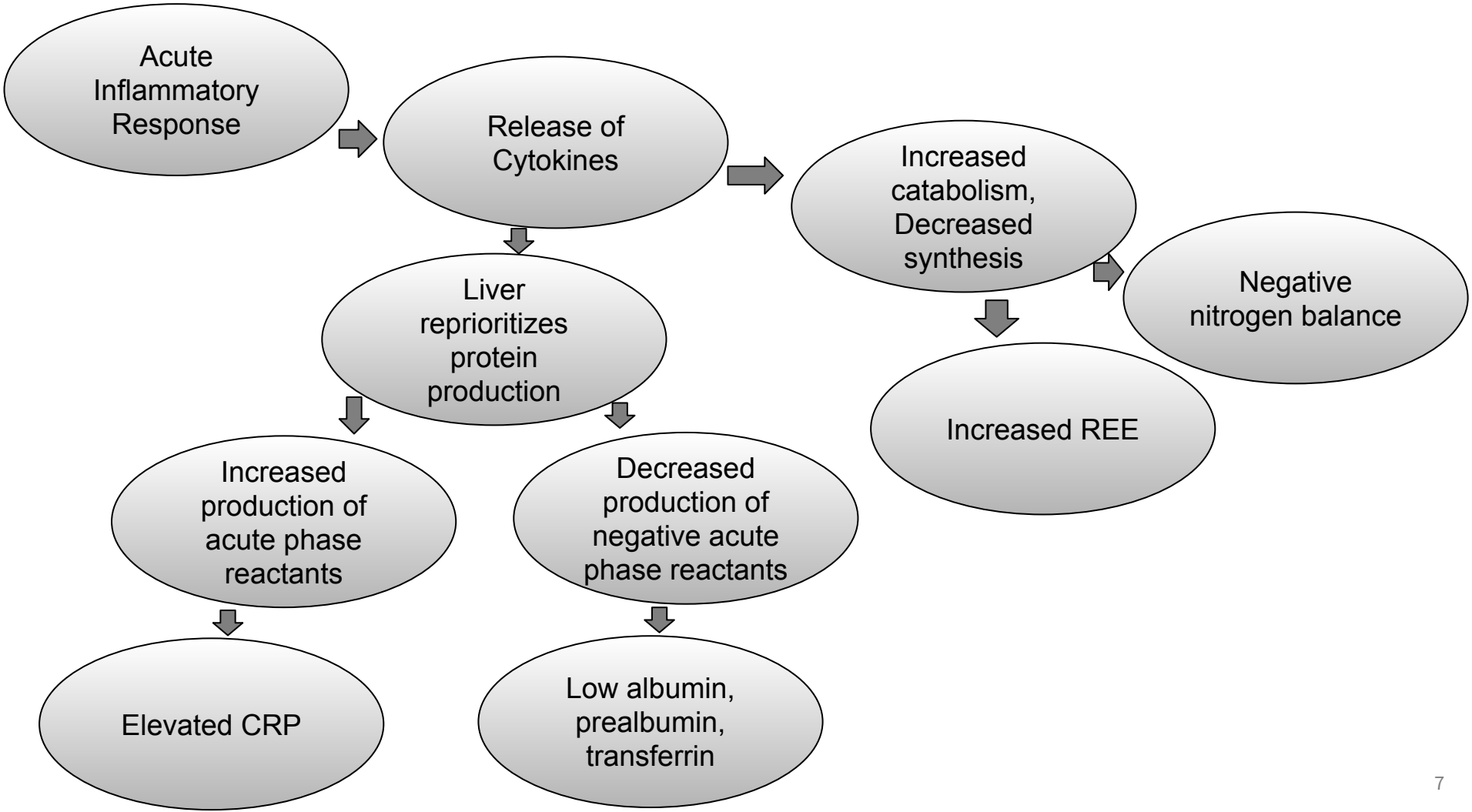
- Metabolic changes caused by cancer - systemic inflammation from pro-inflammatory cytokines released from tumor or immune cells
  - Protein - changes in protein synthesis and degradation - liver reprioritizes protein production* - loss of fat and muscle mass
  - Carbohydrate - increased insulin resistance, impaired glucose tolerance
  - Lipids - maintained or increased lipid oxidation (especially with weight loss)

- Increased nutrient loss and/or impaired nutrient absorption
  - Diarrhea, other GI symptoms

* This is why albumin is not a good indicator of nutrition status; acute phase proteins do not consistently or predictably change in response to changes in weight, nutrient intake, nitrogen balance

Baracos V, Arribas L. *Ann Oncol*. 2018;Supp2:ii1-ii9.

White et al. *JPEN*. 2012; 36:275-283


Acute Inflammatory Response
Release of Cytokines
Increased catabolism, Decreased synthesis
Negative nitrogen balance
Liver reprioritizes protein production
Increased REE
Increased production of acute phase reactants
Decreased production of negative acute phase reactants
Elevated CRP
Low albumin, prealbumin, transferrin

Prevalence of Weight Loss

- 65% of patients experienced significant/severe weight loss during the previous 6 months at the time of their first medical oncology visit. Of those:
  - 28.4% lost >10% of body weight - severe
  - 36.2% lost 5-10% of body weight - significant
  - 35% lost <5% of body weight

Muscaritoli M, Lucia S, Farcomeni A, et al. *Oncotarget*. 2017;8(45):79884-79896

“But I needed to lose weight.”

Unintended weight loss (as little as 6%) correlates with:

- Decreased performance status
- Increased treatment toxicities
- Reduced response to oncology treatment
- Reduced quality of life

Classic paper by Dewys et al. on the Prognostic effect of weight loss prior to chemotherapy in cancer patients - 42 years later the same struggle persists.

Ryan A, et al. *Proc Nutr Soc.* 2016;75:199-211.
Dewys WD, et al. *Am J Med.* 1980;69(4): 491-497

Malnutrition: Nutrition imbalance (deficiency or excess) causing measurable change on tissue/body form, function and clinical outcome

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What is the incidence of malnutrition in oncology patients?

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Incidence of Malnutrition in Oncology

- As many as 40-80% of oncology patients will experience malnutrition at some point during treatment
  - Highest incidence seen in gastroesophageal, pancreatic, head/neck, lung, colorectal cancers

Dewys WD, et al. *Am J Med.* 1980;69(4): 491-497

Why do we care about malnutrition?

- Effects of malnutrition in oncology patients
  - Impaired immune response
  - Reduced muscle strength
  - Increased fatigue
  - Impaired wound healing
  - Impaired glucose function
  - Impaired psychosocial function, including depression
  - Reduced quality of life
  - Reduced response to treatment
  - Increased treatment toxicities
  - Treatment delays
  - Increased hospitalizations or length of stay

Thompson KL et al. J Acad Nutr Diet. 2017 Feb;117(2):297-310

Clinical Characteristics of Malnutrition

- Minimum of two of the six characteristics is recommended for diagnosis of severe (inflammation present) or non-severe (inflammation absent) malnutrition in acute illness or injury; chronic illness; or social or environmental circumstances.
- Energy Intake
    1. PO Intake meeting % of estimated requirement over time
- Interpretation of weight loss
    2. % lost from baseline weight over time
- Physical findings
    3. Body fat - loss of subcutaneous fat (orbital, triceps, fat overlying the ribs)
    4. Muscle mass - muscle loss (wasting) of temples, clavicles, shoulders, interosseous muscles, scapula, thigh, calf
    5. Fluid accumulation - generalized or localized; often masks weight loss and causes weight gain
    6. Reduced grip strength - measured by hand dynamometer

White, J.V., et al. Journal of Parenteral and Enteral Nutrition, 36: 275-283

	Malnutrition in Acute Illness or Injury		Malnutrition in Chronic Illness		Malnutrition in Social or Environmental Circumstances	
Clinical Characteristics	Nonsevere (moderate) malnutrition	Severe malnutrition	Nonsevere (moderate) malnutrition	Severe malnutrition	Nonsevere (moderate) malnutrition	Severe malnutrition
Energy intake	<75% of estimated energy requirement for >7 days	≤50% of estimated energy requirement for ≥ 5 days	<75% of estimated energy requirement for ≥ 1 month	≤75% of estimated energy requirement for ≥1 month	<75% of estimated energy requirement for ≥3 months	≤50% of estimated energy requirement for ≥1 month
Interpretation of weight loss	1-2% in 1 wk	>2% in 1 wk	5% in 1 mo	>5% in 1 mo	5% in 1 mo	>5% in 1 mo
	5% in 1 mo	>5% in 1 mo	7.5% in 3 mo	>7.5% in 3 mo	7.5% in 3 mo	>7.5% in 3 mo
	7.5% in 3 mo	>7.5% in 3 mo	10% in 6 mo	>10% in 6 mo	10% in 6 mo	>10% in 6 mo
			20% in 1 yr	>20% in 1 yr	20% in 1 yr	>20% in 1 yr
Physical Findings						
Body fat - loss of subcutaneous fat (orbital, triceps, fat overlying ribs)	mild	moderate	mild	severe	mild	severe
Muscle mass - muscle loss (wasting of temples, clavicles, shoulders, scapula, thigh, calf)	mild	moderate	mild	severe	mild	severe
Fluid accumulation - generalized or localized	mild	moderate to severe	mild	severe	mild	severe
Reduced grip strength - measured by dynamometer; use normative standards supplied by manufacturer	n/a	measurably reduced	n/a	measurably reduced	n/a	measurably reduced

White, J.V., et al. Journal of Parenteral and Enteral Nutrition, 36: 275-283

Clinical Characteristics of Malnutrition: Case Study

63 YOF with newly diagnosed stage III non-small cell lung cancer.

Height: 63”

Weight: 165#

BMI: 29.2 (overweight)

Usual weight: 187#

Unintended loss of 22# in the past 3 months - 12%

% anorexia, early satiety, fatigue, weakness

Reports eating 50% of normal intake

IS THIS PATIENT MALNOURISHED?

Clinical Characteristics of Malnutrition: Case Study

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Nutrition Risk is identified -

- Inflammation present or absent: **present** in stage III lung cancer - indicates malnutrition in **chronic illness** (>3 mos)
- **poor PO intake** x 3 mos due to anorexia, early satiety - indicates severe malnutrition
- unintended weight loss - **12% in 3 mos** - indicates severe malnutrition
- fatigue/weakness - decreased grip strength likely, though not examined.

Diagnosis of severe malnutrition in the context of chronic illness

Sarcopenia

- Characterized by ongoing and progressive loss of muscle mass and function
  - Risk associated with age, level of physical activity, chronic conditions
  - Also a diagnostic criterion of malnutrition
  - May see increase in body fat mass masking the loss of skeletal muscle mass
- Sarcopenic obesity
  - Independently associated with increased toxicity from chemotherapy, shorter disease free survival, poorer outcomes of surgery, physical impairment and shorter survival - Prado et al. *Proceedings of the Nutrition Society* (2016), 75, 188–198

Baracos V and Arribas L. *Ann Oncol.* 2018;(Supplement 2):ii1-ii9

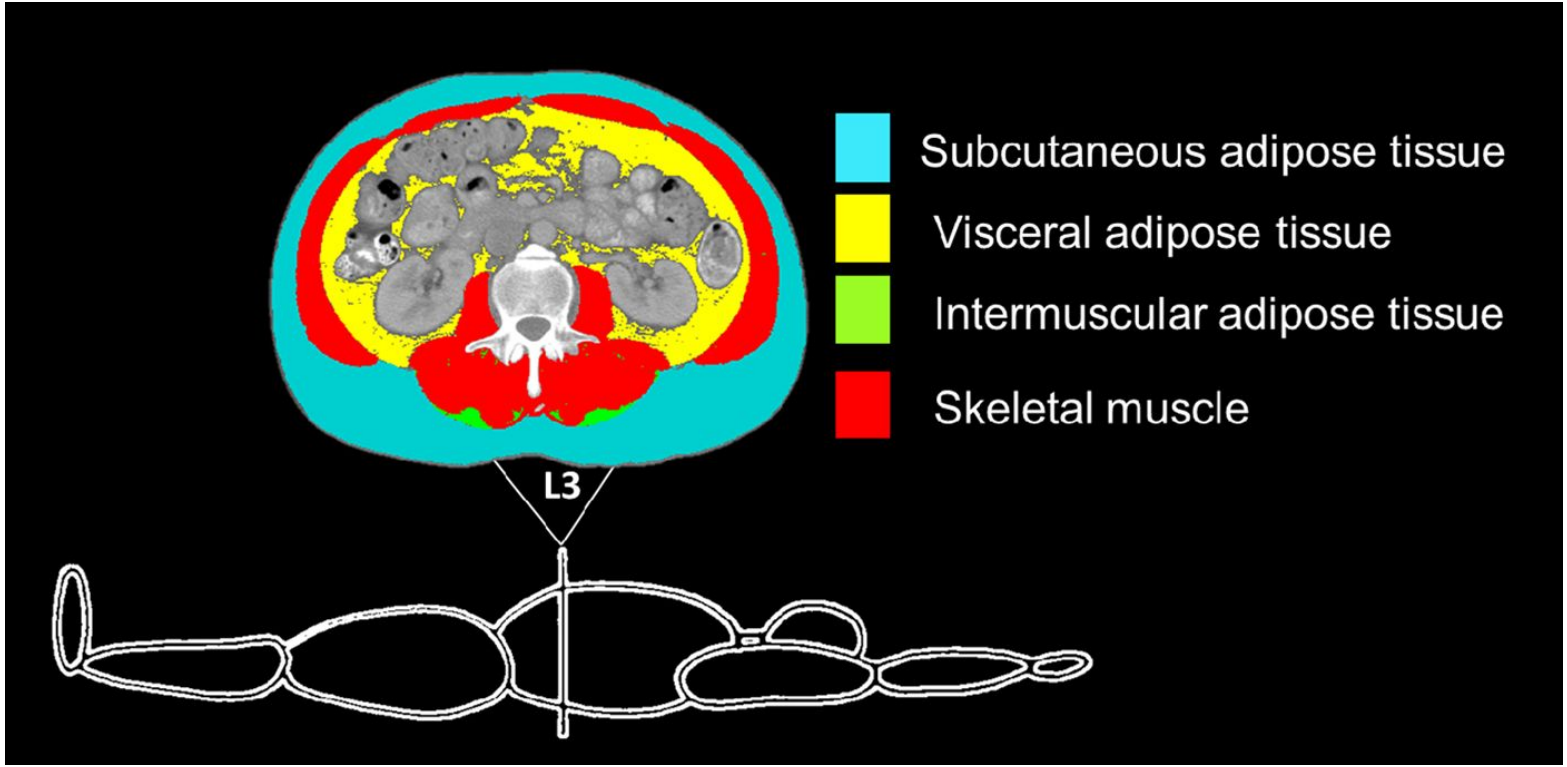
Santilli et al. *Clin Cases Miner Bone Metab*. 2014;11(3):177-180.

Sarcopenic Obesity

- Prevalence
  - 9% of solid tumor patient populations overall
  - 24.7% of patients with BMI >30 kg/mg2
- Lack of standardized diagnostic criteria
  - Physical exam/anthropometry
  - Bioeletrical impedance
  - Dual energy x-ray imaging
  - CT - cross sectional imaging in axial view at the 3rd lumbar vertebra is highly representative of whole body composition
    - Using image specific analysis software (free-of-charge and paid): SliceOMatic, Tomovision; MeVislab, MeVis Medical Solutions AG; UltraVisual, UltraVisual Medical Systems Inc; ImageJ, National Institutes of Health; OsiriX, Pixmeo; analyzer Synapse Vincent 3D image analysis system, Fujifilm Medical

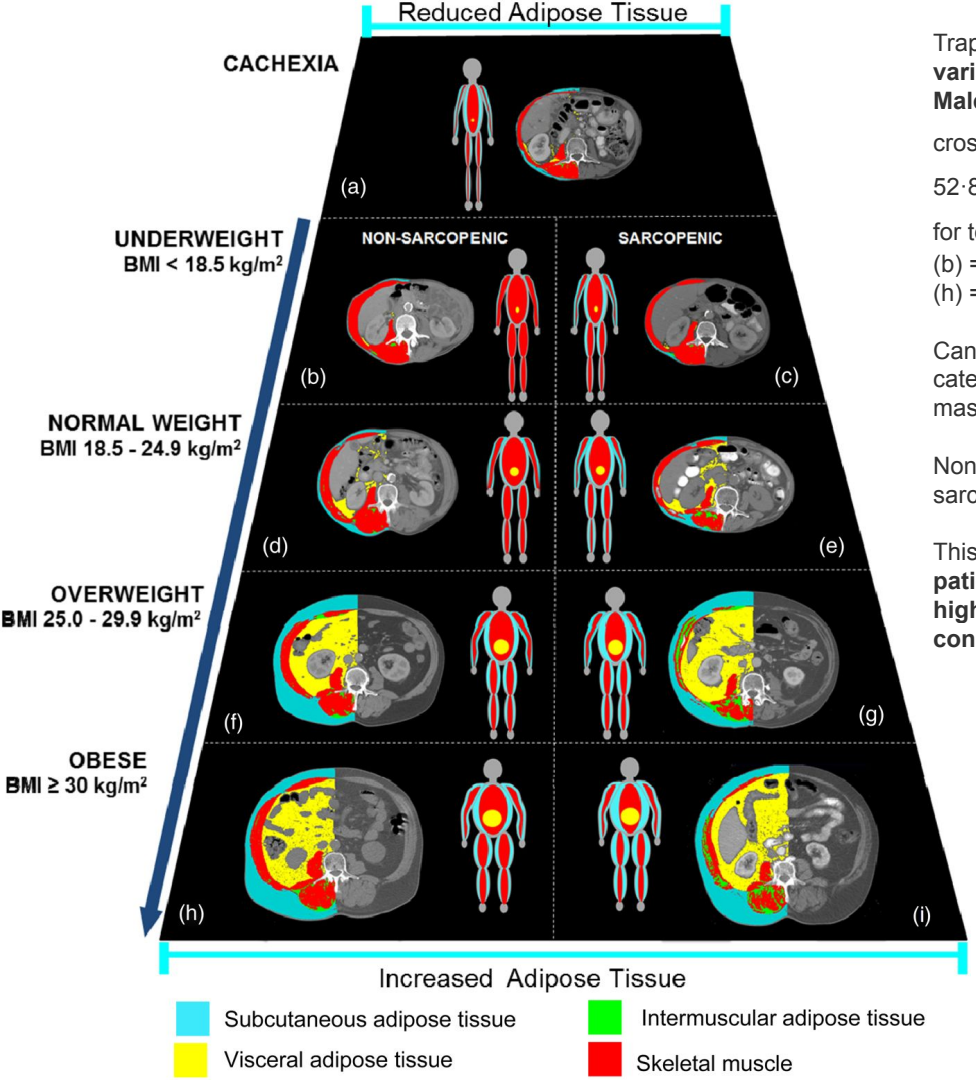
Baracos V and Arribas L. *Ann Oncol.* 2018;(Supplement 2):ii1-ii9

Prado, C., et al. *Proceedings of the Nutrition Society,* 2016; *75*(2), 188-198



Cross-sectional area at the third lumbar vertebra (L3) region analysed for body composition. Note muscle green area termed intermuscular adipose tissue represents both intra- and extra-myocellular lipid.

Prado, C., Cushen, S., Orsso, C., & Ryan, A. (2016). Sarcopenia and cachexia in the era of obesity: Clinical and nutritional impact. *Proceedings of the Nutrition Society, 75*(2), 188-198.



Trapezium model of body composition in cancer illustrating the **variability in body composition in patients with identical BMI. Male patients with lung or colorectal cancer**. Muscle cross-sectional area (cm^2): (a) = 28·6, (b) = 51·5, (c) = 40·3, (d) = 52·8, (e) = 35·3 (f) = 51·3, (g) = 33·7, (h) = 70·7, (i) = 50·1 and for total adipose tissue cross-sectional area (cm^2/m^2): (a) = 2·7, (b) = 5·0, (c) = 3·5, (d) = 27·9, (e) = 27·9, (f) = 146·8, (g) = 161·2, (h) = 175·3, (i) = 218·3.

Cancer patients of the same height, weight and hence BMI category can present with very distinct amount of skeletal muscle mass.

Non-sarcopenic patients are depicted on the left side, while sarcopenic patients are shown on the right side.

This figure also illustrates how **overweight and obese cancer patients can present with severe muscle depletion, highlighting how sarcopenic obesity is a potential hidden condition to health care professionals.**

Prado, C., Cushen, S., Orsso, C., & Ryan, A. (2016). Sarcopenia and cachexia in the era of obesity: Clinical and nutritional impact. *Proceedings of the Nutrition Society, 75*(2), 188-198.

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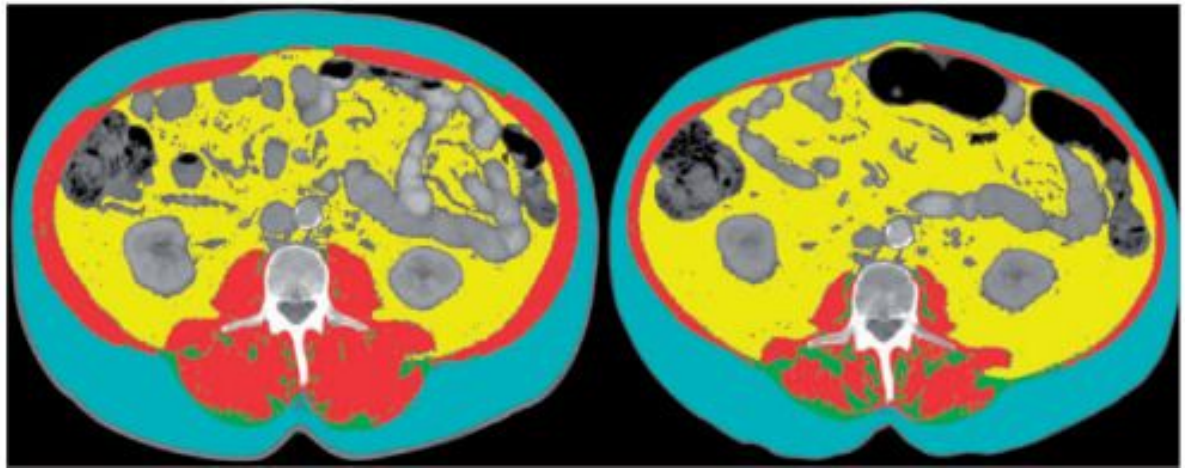

C. Obesity with low and high muscle mass. Axial cross-sectional lumbar images are from a male with a diagnosis of non-small-cell lung cancer stage IV. Images are taken 10 months apart. **At both time points the BMI was 30.7 kg/m2.**
At the first time point (left-hand image) the patients was muscular: muscle area=172.5 cm2; fat area=452 cm2; at second time point (right-hand image) patient was sarcopenic: muscle area=86.7 cm2; fat area=506 cm2

Baracos V and Arribas L. *Ann Oncol.* 2018;(Supplement 2):ii1-ii9

Case Study

66 YOM with advanced pancreatic cancer

Height: 71”

Weight 222#

BMI 31 (obese)

Usual weight: 292#

Pt reports loss of 70# in the past 6-7 months - 24%

% diarrhea/constipation, but reports eating well with good appetite. No change in normal PO intake.

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Is this patient malnourished?

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Case Study

- Physical exam shows severe loss of muscle mass of deltoid region with protruding acromion process (note: squaring).
- Despite BMI in obese range, reported normal PO intake, pt exhibits severe malnutrition in the context of (likely) chronic illness.
- Sarcopenic overweight/obesity was an independent predictor of survival on multivariate analysis on a study of patients with advanced pancreatic cancer on palliative therapy.

Benjamin, et al. Clin Cancer Res 2009;15(22): 6973-9

Cancer Cachexia

- A multifactorial syndrome characterized by ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutrition support and leads to progressive functional impairment
- Driven by abnormal metabolism (due to chronic inflammatory state) combined with negative protein and energy balance (reduced food intake)

Thompson KL, et al. J Acad Nutr Diet. 2017 Feb;117(2):297-310

Stages of Cancer Cachexia

- Precachexia (in cancer)
  - Weight loss
  - Anorexia
  - Impaired glucose tolerance
  - Progression depends on cancer type/staging, response to treatment, PO intake
- Cancer Cachexia
  - Weight loss of >/=5% over 6 months or
  - BMI <20 and any degree of weight loss >2% or
  - Sarcopenia and >2% weight loss with
  - Reduced food intake and
  - Presence of systemic inflammation
- Refractory Cachexia
  - Active catabolism
  - Management of weight loss is not possible
  - Very advanced or rapidly progressive cancer that is not responsive to treatment
  - Low performance score with life expectancy <3 months

Fearon K, et al. Lancet Oncol. 2011 May;12(5):489-95

Cancer Cachexia

- Most prevalent in gastric, pancreatic, esophageal, head/neck, lung, colorectal and prostate cancers
- May be present in patients with any BMI
- The inflammatory response may limit the effectiveness of the nutrition intervention
- The malnutrition may compromise the response to cancer treatment
- **Successful intervention for cachexia must include addressing the underlying cancer and the patient's nutritional needs**

Thompson KL, et al. J Acad Nutr Diet. 2017 Feb;117(2):297-310

Case Study

68 YOM with adenocarcinoma of the distal esophagus with plans for concurrent chemoradiation followed by esophagectomy.

Height: 70”

Weight: 274#

BMI: 39.3 (obese)

Usual weight: 358#

Unintended loss of 84# in the past 8 months - 23%

% severe dysphagia (unable to swallow saliva at times), nausea, vomiting, constipation

DOES THIS PATIENT HAVE CANCER CACHEXIA?

Nutrition Impact Symptoms

- Complex symptoms caused by cancer and cancer treatment that negatively affect food intake, digestion, absorption, utilization of nutrients, and overall nutritional health.
- Anorexia, early satiety, dysphagia, odynophagia, dysgeusia/ageusia, fatigue, mucositis, esophagitis, oral candidiasis, GER, xerostomia, thick saliva, nausea, vomiting, diarrhea, constipation + others

Arends J, et al. Clin Nutr. 2017 Feb;36(1):11-48

Nutrition Impact Symptoms

- The National Cancer Institute's Common Terminology for Adverse Events (CTCAE) grading system
  - Provides descriptive terminology for documenting adverse events

Grade 1	Mild; asymptomatic or mild symptoms; clinical or diagnostic observations only; intervention not indicated
Grade 2	Moderate; minimal, local or noninvasive intervention indicated; limiting age appropriate instrumental ADL
Grade 3	Severe or medically significant but not immediately life-threatening; hospitalization or prolongation of hospitalization indicated; disabling; limiting self care ADL
Grade 4	Life-threatening consequences; urgent intervention indicated.
Grade 5	Death

Nutrition Impact Symptoms

- Most patients identify at least one or more of these symptoms during cancer treatment
- Many of these symptoms can be prevented or minimized when identified early and managed effectively by:
    - Patient education, behavior modification, appropriate use of medication
- Effective management of nutrition impact symptoms can help patients maintain their nutrition status, quality of life and promote tolerance of treatment

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What are the most common nutrition impact symptoms? (Choose 3)

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Common Nutrition Impact Symptoms and Interventions

Changes in Taste and Smell

Nutrition and Behavioral Interventions

- For smell sensitivity:
  - Eat food that is served at cold or room temperature (hot temperature foods have a stronger aroma)
  - Avoid foods with strong odors (fish, onions, cabbage, etc.)
  - Avoid cooking areas during food preparation
  - Avoid lengthy cooking processes (slow cooking)
  - Use a cup with a lid and straw for beverages and soups to reduce exposure

Pharmacotherapy

- Salt/soda mouthrinse:
  - Mix ¾ tsp salt and 1 tsp baking soda in 1 quart of water (warm or cool, depending on preference). Rinse mouth frequently, especially before and after eating/drinking and spit out solution.

Changes in Taste and Smell

Food tastes too:

- Bland, “off” or metallic, bitter, sweet, salty, sour

Nutrition Intervention:

- FASS™ Fixes for Troubled Taste Buds by Chef Rebecca Katz
  - Use of Fat, Acid, Salt, Sweet Flavor Adjustments
  - Fighting Cancer -- with Food! — Rebecca Katz

Changes in Taste and Smell

If your taste buds are saying _____ , use this FASS™ fix:

Things have a metallic taste. Add a little sweetener, like grade B maple syrup or agave nectar, and a squeeze of lemon. You could also try adding fat, such as a nut cream or butter.

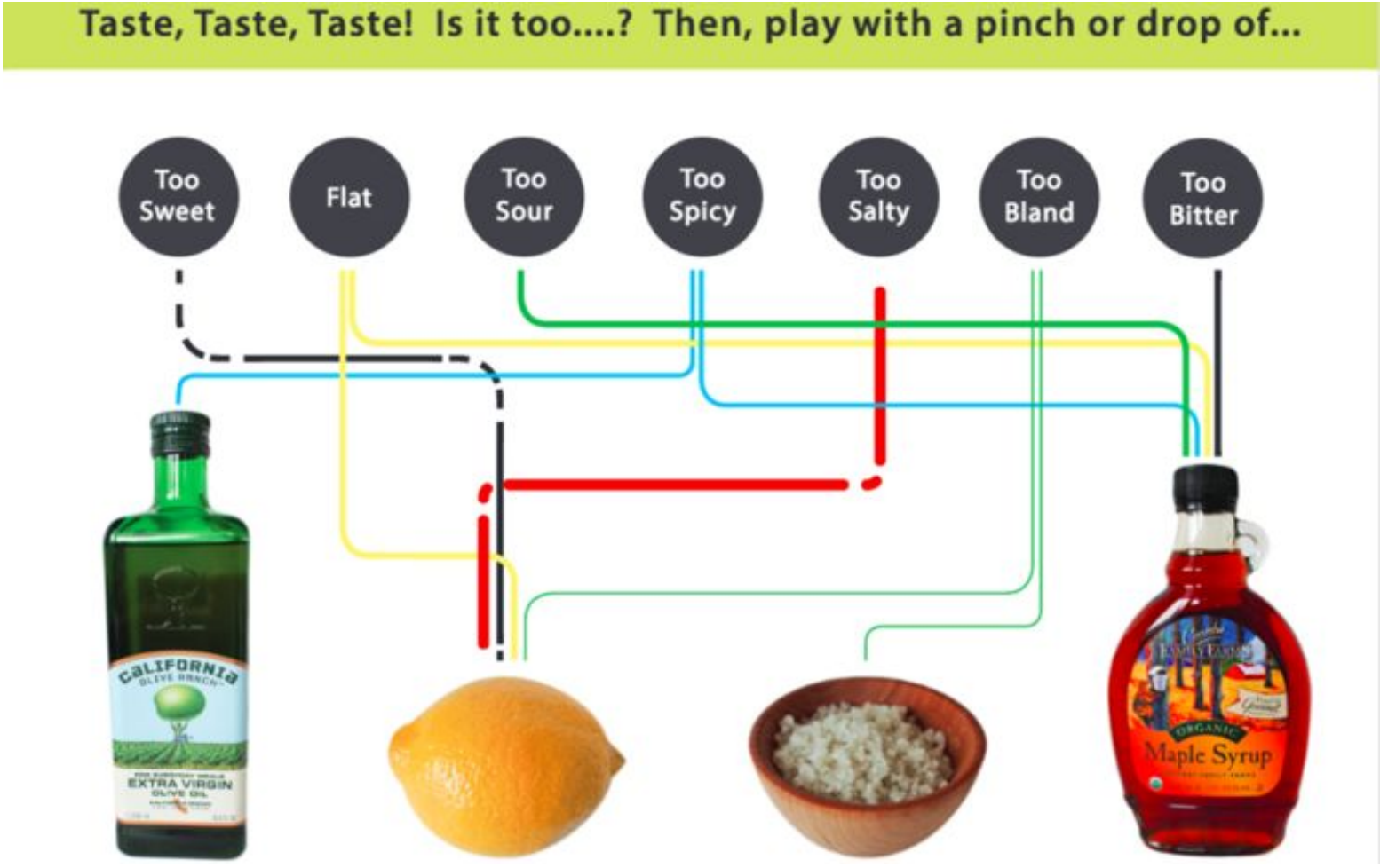
Things taste too sweet. Start by adding 6 drops of lemon or lime juice. Keep adding it in small increments until the sweet taste becomes muted.

Things taste too salty. Add ¼ teaspoon of lemon juice. It erases the taste of salt.

Things taste too bitter. Add a little sweetener, like maple syrup or agave nectar.

Everything tastes like cardboard. Add more sea salt until the flavor of the dish moves toward the front of the mouth. A spritz of fresh lemon juice also helps.

Fighting Cancer -- with Food! — Rebecca Katz



Fighting Cancer -- with Food! — Rebecca Katz

Anorexia and Early Satiety

Nutrition and Behavioral Interventions

- Small, frequent nutrient-dense meals
- Eat by the clock rather than by hunger cues
- Maximize intake at the time of day appetite is best (typically AM)
- Oral nutrition supplements
- Consume liquids between meals rather than with meals
- Engage in light physical activity

Pharmacotherapy

- Dexamethasone
- Megestrol acetate
- Metoclopramide
- Dronabinol
- Mirtazapine

Constipation

Nutrition and Behavioral Interventions

- Adequate fluid intake (64-80 oz per day)
  - Increase fluid further if using medicinal fibers
- Adequate dietary fiber
  - 25-35 grams per day; increase slowly
- Include hot beverages, hot cereals, high fiber foods in daily routine to stimulate bowel movements
- Engage in light physical activity

Pharmacotherapy

- Combination of stimulant laxative plus stool softener with use of opioids
- Insoluble food fibers - bran, flaxseed, wheat germ, inulin
- Medicinal fibers - psyllium, wheat dextrin, methylcellulose
- Osmotic laxatives
- Stimulant laxatives
- Probiotics, if appropriate

Diarrhea

Nutrition and Behavioral Interventions

- Assess etiology of diarrhea
- Small, frequent meals
- Adequate fluid intake + 8oz for each loose bowel movement
- Low fat, low insoluble fiber, low lactose diet or any combination
- Increase intake of soluble fiber (applesauce, bananas, oatmeal, white rice)
- Limit gas-producing foods; avoid use of straws and chewing gum
- Avoid caffeine, alcohol and spicy/heavily-spiced foods
- Avoid sugar-alchols (sugar free gums, candy)

Pharmacotherapy

- Loperamide, dipheoxylate atropine
- Octreotide
- Camphorated tincture of opium
- Cholestyramine
- Psyllium - take with minimal water about 30 minutes before meals
- Enterade - a nutrition drink containing a proprietary blend of amino acids
- Probiotics, if indicated

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- Small, frequent meals
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Pharmacotherapy

- Loperamide, dipheoxylate atropine
- Octreotide
- Camphorated tincture of opium
- Cholestyramine
- Medicinal fiber - psyllium or methylcellulose
- Enterade - a nutrition drink containing a proprietary blend of amino acids
- Probiotics, if indicated

Dry Mouth (xerostomia)

Nutrition and Behavioral Interventions

- Assess etiology - may be transient (related to chemotherapy) or more permanent (related to radiation-induced changes to oral cavity)
- Small, frequent meals
- Alternate bites of food and SIPS of liquid at meals
- Add broth, gravies, sauces to foods
- Sip liquids throughout the day; carry a water or small spray bottle
- Swish and spit club soda or carbonated water
- Use a humidifier at home
- Good oral hygiene
- Suck on sugar free hard candy
- Avoid alcohol-containing mouthwash
- Avoid alcoholic beverages and tobacco products

Pharmacotherapy

- Mouth conditioners, artificial salivas: Biotene products, BioXtra, Caphosol, Glandosane, Salivary, Xero-Lube, MouthKote, Xylimelts
- Prophylaxis therapy: amifostine (Ethyol), pilocarpine (Salagen)
- Cleansing mouth rinse: Mix ¾ tsp salt + 1 tsp baking soda in 4 cups water - swish in mouth and spit several times daily as needed.

Nausea and Vomiting

Nutrition and Behavioral Interventions

- Assess etiology of N/V - anticipatory (prior to treatment), acute (24 hours after treatment), delayed (1-7 days after treatment), breakthrough (occurs despite prophylactic meds; requires rescue meds), refractory (all medications have failed)
- Education on recommended antiemetic therapy - identify barriers to adherence
- Small, frequent PO intake attempts
- Bland, starchy foods, clear liquids served at room temperature
- Avoid high fat, highly seasoned foods
- Consume liquids between meals rather than with meals
- Limit exposure to cooking odors
- Elevate head for 30 minutes after eating
- Time meals for when nausea medications work best
- Take pain medications with food

Pharmacotherapy

- For acute N/V: ondansetron, granisterol, palonosetron
- For delayed N/V: prochlorperazine, promethazine, fosaprepitant
- Metoclopramide
- Dronabinol
- For anticipatory: lorazepam, diazepam
- Dexamethasone, prednisone
- Complementary therapies:
    - Ginger tea, ginger ale, 0.5-1g ginger extract
    - Acupressure bracelets
    - Acupuncture
    - Massage
    - Relaxation techniques

Summary of Common Nutrition Interventions

- Small, frequent meals
  - Attempt every 2-3 hours or as frequent as every 15 minutes
  - Keep foods/fluids near bedside, chair
- Nutrient-dense food choices
  - Maximize kcal/protein content of foods
- Adequate fluid intake
  - Use of electrolyte-containing beverages as needed
- Adjust fiber intake
  - Diarrhea = increase soluble, decrease insoluble; constipation = increase insoluble, decrease soluble
- Use of oral nutrition supplements, enteral or parenteral nutrition as indicated

Oral Nutrition Supplements

- Used for patients with poor food intake, poor appetite, at risk for malnutrition
- Shown to improve outcomes in oncology patients
- Commercially prepared or homemade
- Typically used to supplement intake, but some may be used as an interim sole source of nutrition

Oral Nutrition Supplements - readily available at retail

- Standard formulation - 200-250 calories, 9-10 grams protein per bottle
  - Ensure Original, Boost Original
  - Interim sole source nutrition
- High calorie-high protein formulation - 350-360 calories, 13-14 grams protein per bottle
  - Ensure Plus, Boost Plus
  - Interim sole source nutrition
- High protein formulation - 160-250 calories, 16-20 grams protein
  - Ensure High Protein, Boost High Protein
  - Not sole source nutrition (low in dietary fat)
- Clear liquid formulation - 180-250 calories, 8-9 grams protein
  - Ensure Clear, Boost Breeze
  - Not sole source nutrition; contains no dietary fat
- Diabetes-friendly formulations - 180-190 calories, 10-16 grams protein, 16 grams carbohydrate
  - Glucerna Original, Boost Glucose Control
  - Not sole source nutrition

Summary - Case Study

74 YOF with colorectal cancer.

Height: 71”

Weight: 194#

BMI 27 (overweight)

Usual body weight: 207#

Pt reports loss of ~10# in the past month - 5%; % anorexia, early satiety, fatigue increasing over the past month.

- Malnutrition risk is identified (weight loss, decreased appetite.
- Pt meets criteria for moderate malnutrition in the context of chronic illness - loss of 5# x 1 month; PO intake meeting <75% x 1 month
    - Possibly increased to severe depending on results of physical exam

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Pt reports loss of ~10# in the past month - 5%; % anorexia, early satiety, fatigue increasing over the past month.

- Refer to RD for nutrition intervention 🙂
- Recommend small, frequent meals
- Eat by the clock, not based on hunger
- Physical activity to prevent sarcopenia and help with fatigue
- Consider oral nutrition supplements (standard vs. high calorie)
- Consider appetite stimulant if no improvement

Key Points

- Nearly half or more of oncology patients may experience malnutrition during cancer treatment
- Malnutrition can affect treatment tolerance, outcomes, and quality of life
- Identify using clinical criteria and intervene early for better to prevent/reverse cancer cachexia
    - Cancer cachexia is successfully treated by addressing the pt's underlying cancer AND the pt's nutritional needs
    - Make more referrals to your friendly neighborhood RD
- Use of physical exam and/or imaging studies to identify sarcopenia/sarcopenic obesity
        - May be more prevalent and at higher nutrition risk than underweight patients
- Management of nutrition impact symptoms using nutritional and behavioral interventions +/- pharmacotherapy

Questions


Chocolate comes from cocoa, which comes from of a tree.
That makes it plant.
Therefore, chocolate counts as salad.
You're welcome.
someecards
user card