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Learning Objectives

- Explain cancer-related anorexia and the significance of unintentional weight loss
- Describe the evidence for specific nutritional interventions for patients experiencing anorexia and unintentional weight loss
- Identify proper assessment tools for identifying indicators of malnutrition risk and appropriate nutritional interventions

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Unintended weight loss and anorexia in patients with cancer are associated with decreased performance status, reduced response and tolerance to treatment, decreased survival, and reduced quality of life.

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Anorexia Defined

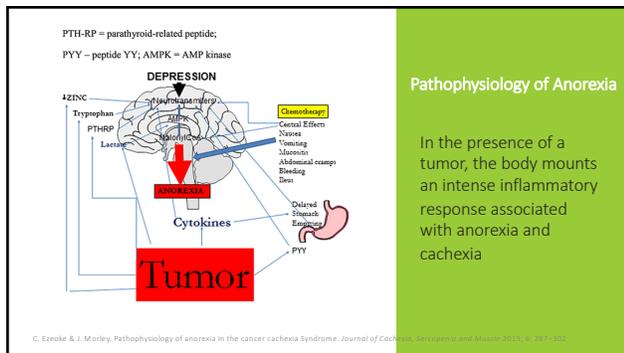
“Loss of appetite and inability to eat”

“A lack or loss of appetite for food (as a medical condition)”

“Loss of appetite, especially as a result of disease”

Anorexia ≠ Cachexia

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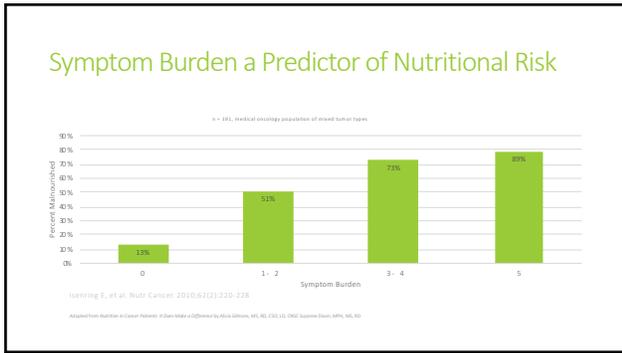
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Causes of Anorexia in Individuals with Cancer

- Nausea and vomiting
- Early satiety
- Taste alterations/sensitivity to food smells
- Dry mouth
- Constipation/ Diarrhea
- Mucositis/stomatitis
- Intestinal obstruction
- Dysphagia
- Anxiety
- Depression
- Stress (many sources)
- Fatigue
- Medications

M. Muscarelli et al. Prevalence of malnutrition in patients at first medical oncology visit: the PreMO study. Oncotarget. 2017 Oct 3; 8(45): 79884-79896

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Managing the Challenges of Anorexia

Oncology Dietitian's Role

- Be creative
- Rely on patience, persistence and repetition
- Be advocate
- Involve family/caregivers

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Calorie and Protein Needs for Individuals with Cancer

Calories
25-30 kcal/kg/day

*if resting energy expenditure (REE) and/or total energy expenditure can't be measured directly

*Direct calorimetry, indirect calorimetry, and prediction equations attempt to mirror actual expenditures and account for changes in metabolic state

*Predictive equations are dependent on individual's status—*healthy, acutely ill, critically ill, or obese*

Protein
0.8 g/kg/day for healthy individuals
1.2 to 2 g/kg/day for catabolic individuals
1.5 g/kg/day for those who are metabolically stressed

For cancer patients in general, 1.0 to 1.5 g/kg/day of actual weight
(1.2 to 1.5 g/kg/day serves as a target range to maintain or restore lean body mass)

Nutrition Therapy for Adults Receiving Radiation Treatment By Julia Lansford, MPH, RDH, CDE, LDH <https://www.foodandnutrition.com/new-articles/0915e44-eb.html>

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Cachexia Defined

Sarcopenia = Severe muscle depletion

“The presence of significant weight loss or *sarcopenia* in the absence of simple starvation.

“A progressive wasting syndrome characterized by weakness and a marked and progressive loss of body weight, fat, and muscle. Tumor-related factors prevent maintenance of fat and muscle”

- Weight loss >5% over the past 6 months; or
- Body mass index <20 and degree of weight loss >2%; or
- Sarcopenia and any degree of weight loss >2%

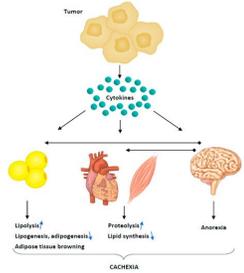
Cachexia ≠ Anorexia

https://www.cancer.gov/about-cancer/treatments/side-effects/appetite-loss/nutrition-hs-pdfr_19

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Physiology of Cachexia

- Deranged metabolic state, with abnormal hormonal environment
- Typically occurs in conjunction with anorexia, but not always
- Pathophysiology hinders nutritional repletion
- Protein and calories alone will not improve nutritional status



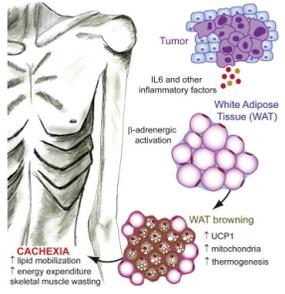
The diagram shows a central 'Tumor' (orange cells) releasing 'Cytokines' (green dots). These cytokines lead to 'Lipolysis' (yellow lipid droplets), 'Protein catabolism' (red heart and muscle), and 'Anorexia' (brain). Below these, 'Lipogenesis, adipogenesis, Adipose tissue browning' and 'Lipid synthesis' are shown with downward arrows, indicating inhibition. The entire process is labeled 'CACHEXIA'.

A. Bonaventura et al. Tumor Cachexia. *Nat Rev Clin Oncol*. 2016;12(12):709-720. doi:10.1038/nrco.2016.121

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Hallmarks of Cachexia

- Insulin resistance
- Hyperglucagonemia
- Hyperglycemia
- Hyperlipidemia
- Failure to utilize glucose and free fatty acids for energy
- ↑ metabolism due to white fat to brown fat conversion
- Lean body mass becomes primary energy source



The diagram shows a skeletal figure with 'CACHEXIA' (↑ lipid mobilization, ↑ energy expenditure, skeletal muscle wasting) and 'White Adipose Tissue (WAT)' (β-adrenergic activation, WAT browning, ↑ UCP1, ↑ mitochondria, ↑ thermogenesis). A 'Tumor' releases 'IL6 and other inflammatory factors'.

Foster KV, et al. Cancer Cachexia: Mediators, Signaling, and Metabolic Pathways. *Cell Metab*. 2012; 16(2): 173-185.
 Petruzzelli M, et al. A switch from white to brown fat increases energy expenditure in cancer-associated cachexia. *Cell Metab*. 2014;20(3):433-47.
 https://doi.org/10.1016/j.cmet.2014.06.004

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Reality of Unintentional Weight Loss

- Well-designed study of 17 head and neck patients in active, concurrent therapy protocol
- DEXA, Indirect Calorimetry, Physical Performance Assessment, Fasting Blood Measures, Serial 24-Hour Dietary Recalls

Over 9 Week Follow Up Through Treatment:

- ✓ Weight loss began immediately
- ✓ Average total loss of 6.8 kg (15 lbs) ~ 1.7 lbs per week
- ✓ LBM accounted for 71% of loss

Unintentional Weight Loss
Induced by combination of calorie deficit and underlying inflammatory response, and the switch from LBM and fat for energy to predominantly fat **does not occur**



Silver HJ, et al. Changes in body mass, energy balance, physical function, and inflammatory state in patients with locally advanced head and neck cancer treated with concurrent chemoradiation after low-dose induction chemotherapy. Head Neck. 2022;36(10):959-969.

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Dietary Interventions

On-going Coaching, Encouragement, Advocate

- Taste /Smell
- Presentation
- Atmosphere
- Meal preparation
- Fractional intake- meal frequency and snacks
- Family dynamics
- Honor patient's preferences
- Nutritional supplements
- Enteral nutrition

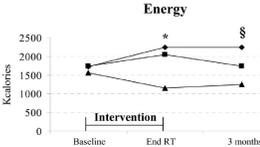


A. Topp et al. J Support Palliat Pract 2019;15(10):438-449

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Nutrition Intervention

Nutritional counseling (diamonds) can increase intakes and improve outcomes better than protein supplements (squares) or no intervention (triangles).



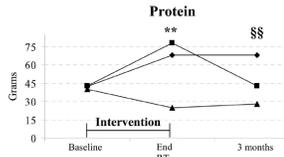
Time Point	Intervention (Diamonds)	Protein supplements (Squares)	No intervention (Triangles)
Baseline	~1800	~1800	~1800
End RT	~2200*	~1800	~1300
3 months	~2200*	~1800	~1300

Ravasco et al. Head and Neck 27:659-668, 2005.
Ravasco et al. J Clin Oncol 23:1431-1438, 2005.

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Ravasco et al. *Head and Neck* 27:659-668, 2005.
Ravasco et al. *J Clin Oncol* 23:1431-1438, 2005.

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Non-Dietary Interventions

First address contributory factors: anxiety, depression, family and spiritual distress, malabsorption, pain, oral complications, constipation, insomnia, correctable hormonal factors (thyroid, hypogonadism, adrenal insufficiency, etc), lack of support/help

- Progestational agents and corticosteroids
- Cannabinoids – medical cannabis appears more effective than pharmaceuticals; consult knowledgeable resource
- Prokinetic agents and Proton pump inhibitors
- Non-steroidal anti-inflammatory agents
- Nutrients – omega-3s, amino acids, zinc, vitamins (IV and oral)
- Exercise – almost always underutilized

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Validated Screening Tools

- Patient Generated Subjective Global Assessment (PG-SGA)
- Malnutrition Screening Tool (MST)
- Malnutrition Screening Tool for Cancer Patients (MSTC)
- Malnutrition Universal Screening Tool (MUST)

- Valid
- Specific
- Quick and easy to use

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Screening for Malnutrition Risk

Screening Tool	Items Evaluated	Populations Validated	Components
PG-SGA	7	Inpatient and Outpatient	Conducted by patient and RN Includes diagnosis and physical exam
MST	2	Inpatient and Outpatient	Weight loss How much weight loss Is patient is eating less d/t poor appetite
MSTC	4	Inpatient	Change in intake Weight loss Body mass index Eastern Cooperative Oncology Group (ECOG) performance measure
MUST	4	Inpatient	BMI Unintentional weight loss Acute disease effect Potential for no oral intake

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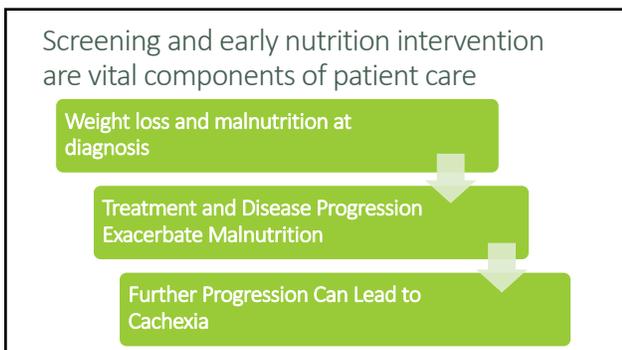
Nutrition Matters



- Loss of just 5% of baseline weight can shorten survival
- Intervening early allows repletion when metabolic changes are not working against you
- Allowing patients to lose nutritional reserves early leads to death from malnutrition before death from disease process
- *It is estimated that the deaths of 10-20% of patients with cancer can be attributed to malnutrition rather than to the malignancy itself.*
- Consider Days/Weeks/Months For Nutritional Approach

J. Arends et al. (2017) ESPEN expert group recommendations for action against cancer related malnutrition. Clin. Nutr. 36, 1187-1196

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