A Systematic Review of the Evidence on Symptom Management of Cancer-Related Anorexia and Cachexia

Jean K. Brown, PhD, RN, FAAN

Purpose/Objectives: To evaluate and synthesize the evidence regarding cancer-related anorexia and cachexia symptom management and make recommendations for future directions.

Data Sources: Cochrane Library, MEDLINE®, CANCERLIT®, CINAHL, Dissertation Abstracts, EBM Reviews—Best Evidence, EMBASE, and the Computer Retrieval of Information on Scientific Projects. Current overviews, clinical trials, systematic research reviews, and meta-analyses.

Data Synthesis: All studies focused on increasing food intake. Nonpharmacologic clinical trials increased caloric and protein intake but resulted in no improvement in nutritional status, weight, tumor response, survival, or quality of life. Weight, appetite, and well-being were improved with megestrol acetate, but nutritional status was not improved. Some exercise studies demonstrated improvements in nutrition-related outcomes, but these were not primary research outcomes.

Conclusions: Symptom management of anorexia and cachexia should focus on decreasing energy expenditure or minimizing factors creating a negative energy balance, as well as improving food intake. Increased measurement sensitivity also is needed.

Implications for Nursing: Improved nutritional assessment skills are needed with an emphasis on anticipated problems and current status.

Key Points . . .

➤ Anorexia and cachexia are prevalent cancer-related symptoms that have been understudied.

➤ Clinical trials focusing on increasing food intake using supplements, counseling, and pharmacologic agents were successful in increasing food intake but were not successful in improving body composition, nutritional status, tumor response to treatment, survival, or quality of life.

➤ Multifaceted interventions that focus on increasing food intake, decreasing energy expenditure, and minimizing factors that decrease food intake or increase energy expenditure need to be tested.

Cancer-related anorexia and cachexia were selected for assessment in phase I of the Oncology Nursing Society’s PRISM (Priority Symptom Management) Project (Ropka & Spencer-Cisek, 2001) because it was believed that the management of these symptoms has been understudied. The purpose of this systematic review, commissioned by the PRISM project, was to evaluate and synthesize the current evidence regarding management of these symptoms using

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Goal for CE Enrollees
To further enhance the nurse’s knowledge regarding the assessment and treatment of cancer-related anorexia and cachexia.

Objectives for CE Enrollees
On completion of this CE, the participant will be able to
1. Describe nursing implications of assessing cancer-related anorexia and cachexia based on research.
2. Describe pharmacologic and nonpharmacologic treatment for anorexia and cachexia.
3. Describe nursing implications for managing patients with anorexia and cachexia.

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the criteria described by Ropka and Spencer-Cisek. In addition, recommendations for clinical assessment, research measurement, and future directions in research, education, clinical practice, and healthcare policy are discussed.

**Definitions**

The first presenting symptom of cancer often is weight loss. Moreover, some degree of weight loss during treatment and the disease trajectory is common for patients with gastrointestinal (54%–87% prevalence) or lung cancers (46%–61% prevalence) (Chute et al., 1985; DeWys et al., 1980; Stanley, 1980). Progressive weight loss with muscle wasting is called cachexia. Unlike the protein-calorie malnutrition evident in starvation, adaptive mechanisms (e.g., preferential fat loss) do not appear to be present in cachexia, and visceral organs lose little or no volume (Heymsfield & McManus, 1985). Lindsey (1986a) proposed the following operational definition for the clinical diagnosis of cancer cachexia.

If a patient with cancer has a greater than 10% weight loss within a six-month period, has an intake that is less than a calculated basal energy expenditure times a factor of 1.5 for longer than one month, or has a triceps skin fold measurement and a mid-arm muscle circumference determination that fall 10% below the reference standard, or if a 10% change in those measures from the individual’s baseline values occurs, the clinical evidence strongly suggests that the individual has cachexia (pp. 123–124).

When Lindsey’s (1986a) weight loss criterion is applied to the classic DeWys et al. sample of patients with cancer, a 10% or greater weight loss in six months was identified in 38% of patients with gastric cancer, 26% of patients with pancreatic cancer, 15% of patients with lung cancer, 14% of patients with colon cancer, and 6% of patients with breast cancer.

Clinical manifestations of cachexia include anorexia (i.e., the loss of appetite combined with decreased food intake), weakness, fatigue, weight loss, muscle wasting, impaired immunocompetence, decreased motor and physical skills, and apathy (Costa & Donaldson, 1980; Lindsey, 1986b; Morrison, 1989). Assessments of food intake in weight-losing patients with cancer indicate deficits in calories, protein, zinc, iron, iodine, and vitamin B₁₂ (Cohn et al., 1981; Costa, Bewley, Aragon, & Siebold, 1981; Doerr et al., 1997; Enig, Petersen, Smith, & Larsen, 1987; Larson, Lindsey, Dodd, Brecht, & Packer, 1993; Lindsey, Larson, Dodd, Brecht, & Packer, 1994; Lindsey & Piper, 1985; Ovesen, Allingstrup, Hannibal, Mortensen, & Hansen, 1993; Ovesen, Hannibal, & Mortensen, 1993; Sarna, Lindsey, Dean, Brecht, & McCorkle, 1993; Theologides, Ehler, & Kennedy, 1976; Walsh, Bowman, & Jackson, 1983). In addition to a decline in nutritional status and body composition, several important outcomes have been associated with malnutrition and cachexia. Evidence exists of increased morbidity related to treatment (Hickman, Miller, Rombeau, Twomey, & Frey, 1980; Seltzer et al., 1979; Seltzer, Slocum, Cataldi-Betcher, Fileti, & Gerson, 1982), shorter survival (Chute et al., 1985; DeWys et al., 1980; Stanley, 1980), and longer, more costly hospitalizations (Ottery, 1995a; Robinson, Goldstein, & Levine, 1987). Moreover, evidence suggests decreased quality of life, especially in physical, psychological, and social functioning (Brown, 1991; Bruning et al., 1985; Lai & Perng, 1998; Larson et al.; Sarna et al.).

Cancer-related weight loss and anorexia may result from direct tumor effects, cancer treatment, or complex indirect systemic effects (Cunningham & Bell, 2000; Goldberg & Loprinzi, 1999). Direct effects of a tumor include anatomic or physiologic consequences, such as obstruction of the gastrointestinal tract. Treatment side effects, such as dysphagia, nausea, vomiting, and fistula formation, also may contribute to weight loss and anorexia. The pathophysiologic mechanism of indirect systemic effects producing anorexia and cachexia can be described as follows: Metabolic abnormalities related to malignant disease and tumor byproducts activate the host defense system, which releases cytokines, specifically tumor necrosis factor and interleukin-6 (Gagnon & Bruera, 1998). These cytokines are believed to act as anorexigenic agents that suppress the host’s appetite. The old model of cachexia resulting from the host’s energy supplies “feeding” the tumor has been rejected.

**Conceptualization of the Problem**

Based on the first law of thermodynamics, weight change is caused by an imbalance between energy intake (food) and energy expenditure. Several factors influence food intake and energy expenditure in individuals with cancer that can create an imbalance resulting in weight loss. These factors may include pre-existing characteristics (e.g., age, gender, nicotine use) and medical conditions (e.g., severe chronic obstructive pulmonary disease, diseases affecting metabolism), the malignant disease process (e.g., cytokine release) and related symptoms (e.g., pain, anorexia), treatment side effects (e.g., fatigue, difficulty swallowing, dry mouth), psychological responses (e.g., depression, anxiety), and socioeconomic conditions (e.g., living alone, low income). Therefore, symptom management interventions for cancer-related anorexia and weight loss/cachexia should focus on three basic approaches: increasing food intake, decreasing energy expenditure, and minimizing factors that decrease food intake or increase energy expenditure.

**Symptom Assessment**

**Clinical Assessment**

Clinical assessment is essential in identifying and managing cancer-related nutritional problems. All patients with cancer should be screened at diagnosis and re-evaluated at regular intervals for current and potential nutritional problems to prevent or treat malnutrition early and modify treatment plans as needed (McMahon & Brown, 2000). Screening should include weight change, dietary intake, functional status, symptoms affecting nutrition, physical examination findings, and projected nutritional problems from treatment or disease progression. In addition, biochemical indicators, such as albumin, prealbumin, transferrin, and retinol-binding protein, are important indicators of nutritional status. A nutritional screening tool that is easy to use in clinical settings is the Patient Generated Subjective Global Assessment (PG-SGA) (Ottery, 1994, 1995b). PG-SGA is tailored for use with patients with cancer and includes sections for patients’ self-report and healthcare providers’ assessments. If nutritional screening identifies a patient who is malnourished or at risk, a qualified healthcare professional should complete a comprehensive nutritional assessment (McMahon & Brown).

Little research has been reported in the literature on nutritional screening and assessment of patients with cancer. Al-
though the PG-SGA is being used widely, no research reports of its validity were found in the literature. One study of patients with non-small cell lung cancer found that routine nutritional assessments included only a few of the recommended screening areas (Brown & Radke, 1998). Most assessments identified in this study focused on weight change, anorexia, or decreased food intake and were completed primarily by nurses and physicians. Functional status, symptoms affecting nutrition other than anorexia, physical examination findings, and projected nutritional problems were addressed rarely, if ever.

**Research Measurement**

Because cancer-related weight loss and nutritional symptom management are very complex phenomena, the measurement of related concepts in research requires careful consideration to balance research needs with subject burden. Concepts and recommended instrumentation that should be considered for these studies are listed in Table 1. Recommendations are based on the author’s experience and from a conference sponsored by the National Institutes of Health, American Society for Parenteral and Enteral Nutrition, and American Society for Clinical Nutrition (Klein et al., 1997).

**Systematic Review of the Evidence**

**Identification of Evidence**

A literature search was conducted using the Cochrane Library, MEDLINE®, CANCERLIT®, CINAHL, Dissertation Abstracts, EBM Reviews–Best Evidence, EMBASE, and the Computer Retrieval of Information on Scientific Projects (CRISP). Two segments of the Cochrane Library were searched to identify systematic reviews and reviews of treatment effectiveness. The Cochrane Database of Systematic Reviews was searched using the term “cancer” combined with “anorexia, cachexia, weight loss, diet therapy, megestrol acetate, and exercise” as key words. Using the same terms and combinations, the Cochrane Database of Abstracts of Reviews of Effectiveness was searched.

MEDLINE, CANCERLIT, and CINAHL were searched for primary research articles, reviews, and clinical practice guidelines. Combinations of MeSH® (Medical Subject Headings) and key words were used including “neoplasms” with “cachexia, anorexia, weight loss, megestrol acetate, and exercise.” MEDLINE and CANCERLIT searches were limited to the English language, adults, clinical trials, consensus development conferences, National Institutes of Health or controlled clinical trials, randomized clinical trials, and meta-analyses. The CINAHL search was limited to adults, clinical trials, doctoral dissertations or master’s theses, research, research instruments, and systematic reviews. The same search strategy was utilized in Dissertation Abstracts.

The search on megestrol acetate, a drug used to counteract cachexia and anorexia, was extended to two drug-oriented databases: EBM Reviews–Best Evidence and EMBASE. EBM Reviews–Best Evidence was searched using the key words “megestrol acetate,” and EMBASE also was searched using “megestrol acetate” combined with “cancer, cancer therapy, weight reduction, and weight loss.”

CRISP was searched to find clinical trials funded by the U.S. government that are in progress. Key words included “cachexia, diet, anorexia, energy, exercise, and weight.” The search was limited to studies funded by the National Cancer

**Table 1. Concepts and Recommended Measurement Approaches for Studies of Cancer-Related Weight Loss and Nutrition**

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Recommended Instrumentation</th>
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</thead>
<tbody>
<tr>
<td><strong>Factors affecting food intake and energy expenditure</strong> (potential covariates)</td>
<td></td>
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<tr>
<td>Age</td>
<td>Medical record or self-report</td>
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<tr>
<td>Gender</td>
<td>Medical record</td>
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<tr>
<td>Nicotine use</td>
<td>Urine or salivary cotinine testing</td>
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<td>Diagnosis</td>
<td>Medical record</td>
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<tr>
<td>Stage of disease</td>
<td>Medical record</td>
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<tr>
<td>Treatment</td>
<td>Medical record</td>
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<tr>
<td>Treatment dose</td>
<td>Medical record</td>
</tr>
<tr>
<td>Previous treatment</td>
<td>Medical record or self-report</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Count of total symptoms present, relevant individual symptoms, and intensity</td>
</tr>
<tr>
<td>Cytokine levels</td>
<td>Tumor necrosis factor, interleukin-6</td>
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<tr>
<td>Food intake</td>
<td>Three-day food diary (to include one weekend day), food frequency questionnaire</td>
</tr>
<tr>
<td>Total energy expenditure</td>
<td>Doubly labeled water (gold standard), basal metabolic rate (measured or predicted) plus activity (Actograph, Caltrac™ [Muscle Dynamics Fitness Network, Torrance, CA], or activity questionnaire)</td>
</tr>
<tr>
<td>Weight and weight change</td>
<td>Balance beam or electronic strain gauge scale, body mass index (BMI) (kg/m²), regression slope of weight change, percentage weight change in past six months</td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
</tr>
<tr>
<td>Body composition</td>
<td>Bioelectrical impedance analysis, dual energy x-ray absorptiometry, creatinine height index (lean body mass)</td>
</tr>
<tr>
<td>Nutritional status</td>
<td>BMI, serum protein concentrations, immune competence</td>
</tr>
<tr>
<td>Treatment morbidity</td>
<td>Side effect severity, complications</td>
</tr>
<tr>
<td>Quality of life (global)</td>
<td>Diagnosis specific quality-of-life instrument; Padilla et al. (1995) quality-of-life instrument (includes nutritional subscale)</td>
</tr>
<tr>
<td>- Physical functioning</td>
<td>Medical Outcomes Study (MOS) Short Form-36 physical functioning subscale, muscle strength, other quality-of-life instrument physical subscales</td>
</tr>
<tr>
<td>- Psychological functioning</td>
<td>Profile of Mood States, MOS-36 emotional functioning subscale, other quality-of-life instrument psychological subscales</td>
</tr>
<tr>
<td>- Social functioning</td>
<td>MOS-36 social functioning subscale, Sickness Impact Profile, Leisure and Social Activity subscale, other quality-of-life instrument social subscales</td>
</tr>
<tr>
<td>Cost of care</td>
<td>Hospital charges, outpatient/physician office charges, complications, morbidity</td>
</tr>
</tbody>
</table>
Institute, the National Institute for Nursing Research, and the Office for Complementary Medicine.

Selection of Study Reports

After carefully reviewing the abstracts of articles and dissertations, three current (i.e., from 1998–2000) overviews of the problem, seven nonpharmacologic clinical trials, four topical research reviews (pharmacologic treatment and exercise), and one meta-analysis on cancer nursing symptom management were identified as substantively relevant to this systematic review. Clinical trials were selected for inclusion in this review if the substantive focus of the study was increasing food intake, decreasing energy expenditure, minimizing weight loss in patients with cancer, or minimizing factors affecting food intake or energy expenditure. Studies of micronutrient supplementation over recommended daily allowances and alternative dietary cancer treatments were not included.

Critical Appraisal of the Evidence

The current study’s researcher attempted to organize the evidence into the three basic approaches so that anorexia and cachexia could be managed from a conceptual perspective (i.e., increasing food intake, decreasing energy expenditure, and minimizing factors that decrease food intake or increase energy expenditure). However, interventions identified in the literature only addressed increasing food intake. Seven studies of nonpharmacologic food intake interventions were identified. Table 2 presents a critical methodologic appraisal of those studies.

All seven nonpharmacologic studies were randomized clinical trials that examined the effects of nutritional counseling and/or commercial oral liquid supplements. Sample sizes ranged from 26–180, and subject retention rates at the end of the studies ranged from 60%–100%. Samples were heterogeneous in composition within and across studies. Heterogeneity of diagnoses, treatments, and other demographic and clinical characteristics within studies rarely was controlled in the analysis. The most commonly measured outcomes (five studies) were tumor response to treatment and survival. In addition, four studies measured dietary intake and nutritional status as outcomes, and two studies measured quality-of-life outcomes. One study measured anorexia and treatment-tolerance outcomes. The methodologic strengths of these studies included the pre- and post-test experimental designs with two and three randomly assigned groups and multiple follow-up measurements, well-described interventions, measurement of subject adherence to intervention protocols, and 77%–100% subject retention rates in four of the studies (Arnold & Richter, 1989; Evans et al., 1987; McCarthy & Weihofen, 1999; Ovesen, Allingstrup, Hannibal, Mortensen, & Hansen, 1993). Two studies had sample sizes greater than 100 (Evans et al.; Ovesen, Allingstrup, et al.). Weaknesses included small sample sizes of 26–84 in five studies (Arnold & Richter; Grant, 1988; McCarthy & Weihofen; Moloney, Moriarty, & Daly, 1983; Ovesen & Allingstrup, 1992), lack of power analysis to determine the number of subjects needed to detect statistically significant differences in all but one study (Ovesen, Allingstrup, et al.), significant baseline group differences in two studies despite random assignment (Grant; Moloney et al.), and 60% and 69% subject retention rates in two studies (Evans et al.; Ovesen & Allingstrup).

Nonpharmacologic study findings are summarized in Table 3. Despite the weaknesses in these studies, considerable consistency exists among their findings. All studies reported improved caloric intake resulting from nutritional counseling and oral liquid supplement interventions, and protein intake improved significantly in the five studies in which it was measured. Studies also consistently reported no differences in survival, tumor response, and nutritional status as a result of the interventions. Five studies reported findings on weight loss, and two reported findings on quality of life. No difference between experimental and control groups was reported in four studies, whereas one study of 26 subjects reported that progressive weight loss was halted in patients with advanced cancer following a nutritional counseling and liquid oral supplement intervention (Ovesen & Allingstrup, 1992). No differences in quality of life were found.

Recommendations From Summary Sources

Recent summary sources were used to evaluate the evidence regarding oncology nursing symptom management effectiveness (Smith, Holcombe, & Stullenbarger, 1994), pharmacologic treatment (Gagnon & Bruera, 1998; Goldberg & Loprinzi, 1999; Maltoni et al., 2001), and physical activity (Courneya & Friedenreich, 1999).

Oncology Nursing Symptom Management Effectiveness

A meta-analysis of the effectiveness of oncology nursing symptom management interventions was conducted by Smith et al. (1994). Twenty-eight randomized clinical trials testing cancer symptom management interventions were identified in published and unpublished nursing research reports from 1981–1990. Only one of these studies focused on anorexia and cachexia (Grant, 1988). This study was described earlier in this article; however, the meta-analysis provided additional information regarding the intervention success rate and practical importance of this study’s findings. By being in the experimental group, subjects improved their chances for symptom management from 35%–64% and responded about one-third of a standard deviation better than controls on the study outcomes (Grant). The meta-analysis concluded that insufficient evidence existed at the time to recommend any of the nursing interventions in the meta-analysis, including Grant’s nutritional teaching intervention.

A review of this meta-analysis (Center for Reviews and Dissemination Reviewers, 2000) was found in the Cochrane Library Database of Abstracts of Reviews of Effectiveness (http://www.cochrane.org). The Center for Reviews and Dissemination at the University of York supported the methods and findings of the meta-analysis.

Pharmacologic Treatment of Cancer Cachexia

Four classes of drugs have been tested for their impact on anorexia, cachexia, and related factors in patients with cancer: progestational agents, corticosteroids, hydrazine, and cyproheptadine (Gagnon & Bruera, 1998; Goldberg & Loprinzi, 1999; Maltoni et al., 2001). Progestational agents include megestrol acetate and medroxyprogesterone. Fifteen clinical trials were reviewed including 12 randomized placebo-
<table>
<thead>
<tr>
<th>Author</th>
<th>Design/Setting</th>
<th>Sample</th>
<th>Intervention and Adherence Measures&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Outcomes: Measurement</th>
<th>Analysis</th>
<th>Comments</th>
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<tr>
<td>Moloney et al.,</td>
<td>Randomized clinical trial (RCT) at St. Luke’s Hospital, Dublin, Ireland</td>
<td>N = 84; 100% retention. Convenience sample of patients receiving radiotherapy to the head and neck, chest, and abdomen</td>
<td>Intervention: Individualized nutritional counseling by dietitian and use of oral liquid supplements versus no special nutritional counseling Adherence measure: Supplements recorded in three-day diet food record</td>
<td>Nutritional intake: Three-day food records completed at home in first and last weeks of radiotherapy Morbidity: Tumor response to radiotherapy Long-term prognosis: No evidence of disease, alive with recurrence, or deceased</td>
<td>Descriptive statistics t-test</td>
<td>Experimental and control groups were significantly different at baseline for all nutrients except dietary fiber. This was not factored into the analysis.</td>
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<td>1983</td>
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<td>Evans et al.,</td>
<td>Multicenter RCT at Emory University, Memorial Sloan Kettering, and University of Toronto Princess Margaret Hospital; subjects blocked by pre-illness weight loss, gender, performance status, diagnosis, and study site</td>
<td>N = 180; 108 evaluable (60%). Convenience sample of patients with metastatic non-small cell lung cancer (n = 102) or colorectal cancer (n = 90) receiving chemotherapy, greater than 16 weeks life expectancy, ECOG performance status less than or equal to 3, measurable disease, greater than or equal to 21 days since major surgery, and able to consume an oral diet. Exclusion criteria: no prior chemotherapy, adequate bone marrow, renal and hepatic function, no central nervous system metastasis, no superior vena cava obstruction, and no chronic illness preventing protocol adherence</td>
<td>Intervention: Standard nutritional counseling versus augmented nutritional counseling compared with ad lib oral diet Adherence measure: Weekly 24-hour diet recall diary</td>
<td>Tumor response to chemotherapy: Complete response, partial response greater than 50% decrease, progression with new lesions or 25% increase, and stable disease Survival: To September 1985 Factors predicting survival duration: Pretreatment weight loss, serum albumin, and pretreatment caloric and protein intake</td>
<td>Kaplan-Meier survival analysis Cox regression methods for prognostic factors Chi square for proportions Wilcoxon rank sum test or Kruskal-Wallis test for comparing more than two groups</td>
<td>Results may be biased by 60% as subjects' evaluable and apparent use of pairwise deletion for each analysis may have resulted in varying sample size.</td>
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<td>1987</td>
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<td>Grant, 1988</td>
<td>RCT</td>
<td>N = 41; 100% retention to end of radiotherapy, 88% retention at first post-radiotherapy visit; convenience sample of patients with head and neck cancer receiving radiotherapy</td>
<td>Structured nutritional teaching program with weekly analysis of dietary intake versus usual care Adherence measure: Nutrition symptom management knowledge test</td>
<td>Anorexia: Appetite and ability to eat linear analogue scales Nutritional status: Weight loss history, weight loss during radiotherapy, triceps skinfold change, midarm</td>
<td>Descriptive statistics Analysis of variance (ANOVA) Pearson correlations Chi-square test</td>
<td>Small sample size and pre-intervention group differences after random assignment; apparent use of pairwise deletion</td>
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<sup>a</sup> Adherence measure is a procedure used to determine the extent to which the subject received the experimental intervention or control treatments.
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<tr>
<td>Arnold &amp; Rich-&lt;br&gt;ter, 1989</td>
<td>RCT at Fox Chase Can-&lt;br&gt;cer Center. Subjects were blocked by stage of disease and tumor site.</td>
<td>N = 50; 100% retention. Conve-&lt;br&gt;nience sample of ambulatory patients with head and neck cancer receiving radiotherapy only</td>
<td>Sustacal™ (currently manu-&lt;br&gt;factured as Boost® by Mead-Johnson Nutritional, Evan-&lt;br&gt;ston, IL) oral liquid supplement with nutritional coun-&lt;br&gt;selling versus nutritional counseling alone Adherence measure: 24-hour dietary recall before treat-&lt;br&gt;ment and at 3-, 5-, 7-, and 10-week and six-month intervals</td>
<td>Nutritional status: Nutri-&lt;br&gt;tional assessment includ-&lt;br&gt;ing weight, serum albumin, and transferrin measured before treat-&lt;br&gt;ment and at 3-, 5-, 7-,&lt;br&gt;and 10-week and six-month intervals Supplement contribution to total food intake: 24-hour dietary recall Tolerance to radiotherapy: Total treatment complica-&lt;br&gt;tions and interruptions as a result of side effects Treatment outcome: Tumor response three to four months post radiotherapy</td>
<td>t-test Mann-Whitney (one-tailed)</td>
<td>Sign tests</td>
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<tr>
<td>Ovesen &amp; Allingstrup, 1992</td>
<td>RCT conducted at Bispebjerg University Hospital, Copenhagen, Denmark</td>
<td>N = 26; 69% retention rate. Conve-&lt;br&gt;nience sample of ambulatory patients with small cell lung, ovary, or breast cancer with progressive weight loss greater than 5% in two months, ECOG performance status less than or equal to three, no ascites or brain me-&lt;br&gt;~</td>
<td>Two commercial oral liquid supplements used as sip feeds in addition to usual food intake plus nutritional counseling Adherence measure: Three-day dietary records includ-&lt;br&gt;ing volume of supplement used</td>
<td>Nutritional status: Height, habitual and actual weights, midarm circum-&lt;br&gt;ference, and triceps skinfold thickness measured at baseline, one &lt;br&gt;month, and two months</td>
<td>Group differ-&lt;br&gt;ences by inde-&lt;br&gt;pendent t-test</td>
<td>Change within groups by de-&lt;br&gt;pendent t-test</td>
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<td>Ovesen, Allingstrup, et al., 1993</td>
<td>RCT conducted at Bispebjerg University Hospital and Municipal Hospital, Copenhagen, Denmark. Subjects were blocked by diagnosis, weight loss during the preceding three months (less or equal to 5% versus greater than 5%), and ECOG performance status.</td>
<td>N = 137; 105 (77%) subjects evaluable. Convenience sample of patients with breast (n = 29), ovary (n = 58), or small cell lung cancer (n = 50) receiving a variety of chemotherapy regimens with curative intent. Exclusion criteria: hormonal therapy, major surgery in last month, ascites, edema, non-cancer diseases requiring intervention, and brain metastasis.</td>
<td>Regular and frequent nutritional counseling from start of chemotherapy versus no nutritional counseling with ad lib food intake. Adherence measure: Three-day food records used as a basis for nutritional changes in the counseling group.</td>
<td>Dietary intake: Three-day diet record at baseline before chemotherapy and during the week before each subsequent chemotherapy cycle for five cycles. Anthropometric measures: Weight, armfold circumference, skinfolds to calculate fat-free mass. Tumor response rates: Complete remission, partial remission greater than 50% decrease; progressive disease, new lesions, or greater than 25% increase; stable disease; evaluated after three and six treatment cycles. Overall survival: Not described. Quality of life: Spitzer et al. (1981) Quality-of-Life Index.</td>
<td>Chi-square Two factor repeated measures ANOVA Cox’s test for differences in survival distribution. Kaplan-Meier survival curves.</td>
<td>Rigorous study. Power analysis indicated the need for approximately 50 subjects per group. Only patients with at least five data time points were included in the analysis.</td>
</tr>
<tr>
<td>McCarthy &amp; Weihofen, 1999</td>
<td>RCT at large midwestern U.S. National Cancer Institute-designated comprehensive cancer center</td>
<td>N = 40; 80% retention rate. Convenience sample of patients with stage I and II cancer beginning their first course of curative radiotherapy. Patients with head and neck cancer were excluded.</td>
<td>Commercial oral liquid supplements versus no supplement. Adherence measure: Weekly three-day food records with volume of supplement recorded.</td>
<td>Total daily caloric and protein intake: Weekly three-day food records for four weeks. Daily food-derived caloric and protein intake: Weekly three-day food records.</td>
<td>t-test for demographics Two-factor (group and time) repeated measures ANOVA.</td>
<td>Small sample.</td>
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</table>

<sup>a</sup> Adherence measure is a procedure used to determine the extent to which the subject received the experimental intervention or control treatments.
controlled studies and three crossover designs with a total subject accrual of 2,102 (Maltoni et al.). Eleven of the clinical trials studied the effects of megestrol acetate, and four studied the effects of medroxyprogesterone acetate. With dosages of 160–1,600 mg/day of megestrol acetate, improvements in appetite, caloric intake, body weight (mostly fat), and sensation of well-being consistently were reported. The optimal dose is 800 mg/day, but dosages of 160 mg/day have been reported to stimulate appetite (Gagnon & Bruera). In the medroxyprogesterone acetate studies, dosages ranged from 300–1,000 mg/day and results indicated outcomes similar to megestrol acetate. One study compared the effectiveness of megestrol acetate with prednisone in patients receiving radiotherapy (Fietkau, Riepl, & Kettner, 1997). Findings indicated both drugs stimulated appetite, but megestrol acetate yielded significantly better results than prednisone. Potential adverse effects of megestrol acetate and medroxyprogesterone include thromboembolic phenomena, breakthrough bleeding, peripheral edema, hyperglycemia, hypertension, Cushing’s syndrome, alopecia, adrenal suppression, and adrenal insufficiency if the drug is stopped abruptly. Edema was a common side effect of both agents in most studies.

The effectiveness of corticosteroids has been studied in five randomized, placebo-controlled clinical trials reviewed by Gagnon and Bruera (1998). Principal outcomes reported were improved appetite, food intake, performance status, and quality of life, but no change was found in body weight. Symptom management was short and lasted up to four weeks at most. Despite many adverse effects, use in patients with short expected survival rates is accepted widely.

Hydrazine has been studied in six placebo-controlled trials reviewed by Gagnon and Bruera (1998). Early small studies indicated that hydrazine improved appetite, caloric intake, and nutritional status. However, recent large placebo-controlled clinical trials found no gain in body weight, significant toxicity, and significant decline in quality-of-life scores for subjects taking hydrazine compared to the placebo control group. Thus, hydrazine is not recommended for the treatment of cancer-related anorexia and cachexia.

Only one placebo-controlled clinical trial (N = 295) of the use of cytoheptadine in patients with cancer was reviewed (Gagnon & Bruera, 1998). Findings indicated a mild increase in appetite and food intake, as well as considerable sedative effects. Thus, its clinical usefulness in cancer is limited.

Current evidence suggests that the two best options for pharmacologic treatment of anorexia and cachexia are progestational agents (especially megestrol acetate) or corticosteroids. One study reported greater appetite stimulation with megestrol acetate (Fietkau et al., 1997). Several new drugs that influence tumor necrosis factor, interleukin-6, muscle protein breakdown, and the central nervous system also are under study but have not reached the clinical trial stage. These include thalidomide, melatonin, β2-adrenoceptor agonists, pentoxifylline, anabolic-androgenic steroids, cannabinoids, nonsteroidal anti-inflammatory drugs, and eicosapentaenoic acid (Gagnon & Bruera, 1998; Goldberg & Loprinzi, 1999).

Physical Activity in Patients With Cancer

Physical activity is the second largest contributor to total energy expenditure after metabolism. Depending on the individual, physical activity accounts for 15%–20% of total energy expenditure and metabolism accounts for 60%–75% (Shils, Olson, Shike, & Ross, 1999). Thus, the individual’s physical activity could influence a weight change. In addition, physical activity increases lean body mass, muscle strength, and level of physical functioning, which, in turn, may increase muscle mass and decrease fat in weight-gaining patients with cancer. Thus, a review of the effects of physical exercise in patients with cancer is logical in an analysis of the evidence related to anorexia, weight loss, and cachexia.

Courneya and Friedenreich (1999) reviewed 18 exercise intervention studies (10 quasi-experimental and 8 experimental) published from 1980–1997. Nine of the studies sampled patients with breast cancer, four sampled patients with leukemia undergoing bone marrow transplant, three sampled patients with other solid tumors, and one each sampled cancer survivors and pediatric patients. Most (n = 14) used an aerobic exercise intervention. Outcomes measured included functional capacity (n = 15), body composition (n = 5), muscle endurance/strength (n = 4), flexibility (n = 2), natural killer cells (n = 2), and hematologic indices (n = 2), and most included some or all dimensions (i.e., physical, functional, social, and psychological) of quality of life. Sixteen of 18 studies indicated significantly improved quality of life, and statistically significant results were found even though most of the studies had small sample sizes (average size was 25 participants). Benefits relevant to nutritional status included improved functional capacity, muscle strength, body composition, hematologic indicators, nausea, fatigue, diarrhea, anxiety, and depression.

Synthesis of Evidence

Major Areas of Consistency

All symptom management strategies (i.e., nutritional counseling, liquid oral supplements, and drugs) examined in the reviewed studies focused on increasing food intake. Although most of the nonpharmacologic interventions were successful in increasing food intake, they were consistently unable to improve desired outcomes of body composition, nutritional status, tumor response to treatment, survival, or quality of life. Weight, appetite, and well-being were improved with progestational agents, and megestrol acetate had the most supporting evidence. However, weight gain did not improve body composition or nutritional status.

The studies of exercise (physical activity) also had considerable agreement among findings. Most of the studies (88%) showed improved quality of life with aerobic exercise. Some of these studies measured relevant nutrition-related outcomes and found improvements in physical functioning, body composition, muscle strength, and hematologic indicators. However, none of the studies focused primarily on nutrition-related outcomes.

Areas of Disagreement

Little or no disagreement was found among the study results. Although most nonpharmacologic intervention studies reported no difference in weight loss among experimental and control patients, Ovesen and Allingstrup (1992) reported that their liquid oral supplement intervention halted progressive weight loss in patients with advanced cancer.
Table 3. Summary of Interventions Tested and Findings

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention</th>
<th>Direct Effect of Intervention</th>
<th>Major Findings</th>
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</thead>
<tbody>
<tr>
<td>Moloney et al., 1983</td>
<td>Individualized nutritional counseling (experimental) was compared with no counseling (control). The nutritional counseling group was individually counseled two to three times per week by a dietitian over the duration of their radiotherapy (three to five weeks). Counseling focused on approaches to improve nutritional intake based on Irish Recommended Dietary Allowances (RDAs). Sustagen and Isocal® (Mead-Johnson, Evanston, IN) were used to supplement intake as needed. The control group received no special nutritional counseling.</td>
<td>Intake was significantly higher in the nutritional counseling group. Unfortunately, this difference was present at both baseline and the end of treatment. Because of the pre-intervention group differences, it is difficult to ascertain the effect of this intervention.</td>
<td>Nutritional counseling did not improve the response to treatment or long-term outcome. Pretreatment group differences were not controlled in the statistical analysis, so their effects are unknown.</td>
</tr>
<tr>
<td>Evans et al., 1987</td>
<td>Nutritional counseling (experimental) and augmented nutritional counseling (experimental) by dieticians was compared with ad-lib oral diet (control). Both nutritional counseling and augmented nutritional counseling subjects were instructed to achieve their target caloric intake by implementing dietary changes and using commercial oral liquid supplements, if necessary. In addition, the augmented nutritional counseling subjects were counseled to ingest 25% of calories as protein by regular diet or protein supplements, 150 mg/day oral zinc, and 266 mg/day oral magnesium. If either nutritional counseling or augmented nutritional counseling intervention subjects did not achieve at least 90% target caloric intake for two consecutive weeks, enteral nutrition was instituted. 68% of subjects required enteral nutrition by protocol criteria, but only 6% received enteral nutrition mostly as a result of subject refusal. If subjects completed four weeks of enteral nutrition without achieving greater than 90% target caloric intake, parenteral nutrition was initiated. One subject received parenteral nutrition. Ad-lib oral diet subjects were allowed to eat as desired and were given a package of printed nutritional information.</td>
<td>When combined, the nutritional counseling and augmented nutritional counseling interventions increased caloric intake at all three measurement points for patients with non-small cell lung and colorectal cancers compared with controls (p &lt; 0.05).</td>
<td>No significant differences were found between nutrition intervention groups and the control group in - Weight change - Response rate to treatment - Median time to progression - Percent of planned dose of chemotherapy - Toxicity - Frequency of treatment delays. In patients with non-small cell lung cancer, survival duration was predicted by - Serum albumin - Alkaline phosphatase - Lactic dehydrogenase - Percentage target caloric intake.</td>
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<td>Grant, 1988</td>
<td>A structured nutritional teaching program (experimental) was delivered by a nurse versus usual care (control). A structured, individualized, nutritional-teaching program designed to provide patients with ways to interrupt anorexia and diminish nutritional depletion included information about individualized caloric needs, foods to increase calorie and protein intake, common problems with dietary intake and management approaches, and weekly analysis of dietary intake. Usual care focused primarily on nutritional information given to deal with major problems.</td>
<td>The experimental group had significantly higher nutrition symptom management knowledge scores at the end of treatment.</td>
<td>No differences were found between groups for - Functional status - Treatment response - Quality of life - Rate of weight loss. Statistical trends indicated that the experimental group had - Better appetites - Higher caloric and protein intake. Pretreatment group differences were not controlled in the analysis, so their effects on the findings are unknown.</td>
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### Table 3. Summary of Interventions Tested and Findings (Continued)

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<td>Arnold &amp; Richter, 1989</td>
<td>An oral liquid supplement with nutritional counseling (experimental) or nutritional counseling alone (control) were administered. Oral liquid supplement, Sustacal® (currently manufactured as Boost®, Mead-Johnson Nutritionalts, Evanston, IN), was given in doses of 960 or 1,080 kcal/day for ten weeks beginning the first day of radiotherapy. Intensive weekly nutritional counseling was performed. Subjects were encouraged to eat their normal diet ad libitum and consume full liquid, pureed, or soft common household foods when appropriate.</td>
<td>Supplement contribution to total food intake was significant. An increase was found in mean total protein for the experimental group (+ 22 g, p = 0.035, one-tailed), which was derived mostly from supplements. Total energy intake for the experimental group was 300 kcal greater than the control (p = 0.005, one-tailed), which mainly was derived from supplements.</td>
<td>Oral supplements did not result in differences in transferrin levels or weight loss between groups. Serum albumin was better in the experimental group. Nutritional supplements added to the nutrient content of the diet, which increased kcal and protein in the supplemented patient. No significant difference in tolerance to radiotherapy was identified. No significant difference in response to treatment was identified.</td>
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<td>Ovesen &amp; Allingstrup, 1992</td>
<td>Two commercial oral liquid supplements used as sip feeds were compared, in addition to usual diet and nutritional counseling for two months. One commercial liquid supplement was based on intact milk protein (Salvimulsin MCT™, Ercopharm, Copenhagen, Denmark) and the other used hydrolyzed soy protein (Standard Top Up™, Novo-Nordisk, Copenhagen, Denmark). Both were nutritionally complete, lactose-free, and contained almost the same amounts of macro- and micronutrients. Basic tastes were different with the soy product having a slightly sour taste (i.e., pineapple or lemon flavor) and the milk product having a milky taste (i.e., chocolate or vanilla nut). Subjects were asked to drink at least 500 mL daily and were encouraged to drink as much as possible. Nutritional counseling was individualized and given twice per month when subjects visited the oncology clinic. Nutritional counseling focused on the general content of the National Cancer Institute booklet Eating Hints.</td>
<td>Subjects drinking the soy-based supplement increased their total energy and protein intakes significantly over baseline whereas subjects drinking the milk-based supplement did not increase their intakes over baseline.</td>
<td>Use of soy-based supplements increased total energy and protein intakes significantly within that group. Neither supplement improved nutritional status, but both supplements halted progressive weight loss.</td>
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<tr>
<td>Ovesen, Allingstrup, et al., 1993</td>
<td>Regular and frequent nutritional counseling (experimental) versus no nutritional counseling and ad-lib oral diet (control) was tested. Regular and frequent nutritional counseling by one study dietitian was given before the start of chemotherapy and twice monthly for the next five months. Additional appointments could be scheduled as desired. The goal of counseling was an intake meeting or exceeding calorie and protein requirements of Nordic RDAs. Nutritional counseling was individualized based on three-day food records that were reviewed with the subject after completion. Subjects were offered commercial liquid diets, protein supplements, and/or maltodextrin, if indicated.</td>
<td>Daily calorie and protein intakes increased significantly in the experimental group (approximately 1 MJ (240 kcal) and 10 g protein). Those subjects most nutritionally depleted did not show any benefit from nutritional counseling. Those with weight loss did not eat less than weight-stable patients, but weight-stable patients had significantly higher quality-of-life scores.</td>
<td>The nutritional counseling intervention increased calorie and food intakes, but had no effect on weight, fat-free mass, tumor response, survival, or quality of life. Weight-stable patients had significantly higher quality-of-life scores than weight-losing patients.</td>
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Table 3. Summary of Interventions Tested and Findings (Continued)

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<td>McCarthy &amp; Weihofen, 1999</td>
<td>Commercial oral liquid nutritional supplements (experimental) versus no nutritional supplements (control) were examined. Experimental subjects were instructed to drink one eight-ounce serving of supplement between meals and at bedtime. Supplements used were Ensure™ (Abbott Laboratories, Ross Products Division, North Chicago, IL), Sustacal, and Carnation Instant Breakfast™ (Nestle USA, Inc., Glendale, CA). All contain similar nutrient compositions. To minimize taste fatigue, subjects could vary supplements among these three choices. The research nurse or dietician reviewed individual RDA of calories and protein and the food guide pyramid with each subject. Subjects drinking oral supplements had significantly greater total caloric and protein intake than control subjects consuming 500–600 kcal in supplements. Food-derived calories and protein were not significantly different between groups, but the supplement group declined 100–150 kcal and 5–10 g protein from food sources.</td>
<td>Use of oral supplements increased total caloric and protein intake (500–600 kcal/day). Supplements resulted in a small, nonsignificant decrease in calories and protein from food sources.</td>
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Research

**Nutritional assessment:** Recommended nutritional assessment indicators focus heavily on current nutritional status. These indicators usually do not take into account the nutritional problems that patients with cancer can be expected to experience related to their treatment and disease. The result is that proactive interventions generally are not utilized in clinical practice, except in patients with head and neck cancer. Studies are needed to determine constellations of factors that predict nutritional risk for various cancer diagnoses and treatments. Empirically-based, high-risk profiles then could be used in clinical assessment and guide proactive nutritional interventions.

**Symptom management interventions:** Based on the conceptualization of the cancer-related anorexia and cachexia presented, interventions should be directed toward improving food intake, decreasing energy expenditure, and minimizing factors that contribute to a negative energy balance between food intake and energy expenditure. At the time of this review, the studies of symptom management of cancer-related anorexia and cachexia were focused on improving food intake, and only seven nonpharmacologic clinical trials were found. No studies were found that addressed the energy expenditure portion of the energy balance/imbalance equation or that intervened with factors affecting both food intake and energy expenditure. In other words, one approach (i.e., increasing food intake with drugs, counseling, or liquid oral supplements) has been used with little or no success to manage a complex, multifactorial symptom. This suggests that multifaceted interventions are needed to achieve desired outcomes.

Future direction should include combining effective methods of improving food intake with methods to conserve energy expenditure and managing nutrition-related symptoms, such as anorexia, dysphagia, fatigue, and dyspnea. Nonpharmacologic energy conservation methods should focus primarily on the thermic effect of eating and physical activity components of energy expenditure because the basal metabolic rate has very limited avenues for change. New drugs mediating cytokine response that currently are under investigation may contribute as well. Investigators conducting nutrition-related symptom management clinical trials should consider adding nutritional outcome indicators to better understand the impact of improved management of these symptoms on nutritional status. Three such clinical trials on fatigue symptom management by nurse scientists currently are underway, but nutritional outcome indicators do not appear to be measured based on published abstracts (Barsevick, 1999; Dodd, 1999) and a symposium presentation (Mock, Pickett, Ropka, Poniatowski, & Drake, 2001).

Exercise is an interesting potential intervention. On one hand, it can be viewed as increasing energy expenditure, but on the other, it improves lean body mass, muscle strength, and physical functioning. Studies need to be conducted to determine when, where, and what kind of exercise might be useful for improving nutritional status. For example, would the use of prostaglandin drugs that increase body weight combined with light resistive exercise result in increased lean body mass instead of fat deposits? Courneya (1999) is conducting a study to determine the effects of exercise on quality of life in patients with cancer, but it is not known if nutritional status indicators have been included in this study.
Micronutrient deficiencies in the food intake and serum levels of patients with cancer have been reported, but few studies have been conducted testing the effect of administering recommended daily allowances of micronutrients. The only studies found in the literature focused on zinc supplementation for patients with head and neck cancer (Doerr, Marks, Shamsa, Mathog, & Prasad, 1998; Ripamonti et al., 1998). Dietary deficits in micronutrients interfere with a multitude of physiologic mechanisms (Shils et al., 1999) and can lead to changes in physical, cognitive, emotional, and behavioral functioning (Morley & Levine, 1985; Somers, 1995). Thus, clinical trials testing the administration of micronutrients at the level of U.S. recommended daily allowances or dietary reference intakes for optimal health are reasonable.

Nutrition-related outcomes: The outcomes consistently measured in the majority of nonpharmacologic clinical trials reviewed included food intake, weight change, tumor response, and survival. In the drug studies reviewed, appetite, body weight, and well-being or quality of life consistently were measured. The absence of significant findings for several of these outcomes may be the result of lack of sensitivity of the outcome. For example, one might measure nutritional status indicators (e.g., serum albumin level), as well as weight change to increase measurement sensitivity. In addition to measuring global quality of life, particular attention should be given to physical, emotional, and social functioning quality-of-life outcomes. Other outcomes that have received minimal or no consideration are treatment complications and side effects, muscle strength, immune function, and cost of care.

Methods: Most studies reviewed used powerful experimental designs with randomly assigned treatment and control groups. Most drug studies used placebo controls, which added to the strength of their designs. However, sample heterogeneity may have introduced confounding variables. For example, four of the seven nonpharmacologic studies sampled weight-losing populations, whereas the other three included mixed diagnoses, such as little weight loss (e.g., breast cancer) or early stage nonhead and neck cancers. Other potential confounding factors, such as age, gender, nicotine use, stage of disease, treatment dose, and symptoms or side effects (Brown, 1993), were not explicitly controlled in the design or statistical analysis in most drug and nondrug studies. In the nonpharmacologic studies, only one study reported using power analysis to determine sample size, and adequate subject retention often was a problem. Additional issues include a variety of instrumentation used to measure outcomes, and weight change often was reported in absolute values of end minus beginning weight even though weight change usually is not linear.

Based on these methodologic issues, several recommendations can be made. Populations sampled should include those diagnoses and treatments in which weight loss can be expected to occur or populations already experiencing weight loss. Interestingly, the study of malnutrition in children with cancer is almost nonexistent. Only one clinical trial of megestrol acetate, conducted with a Spanish pediatric population, was identified (Azcona, Castro, Crespo, Jimenez, & Sierrasumaga, 1996). Controlling and studying the effects of nutritional interventions over and above personal and clinical factors, such as age, gender, nicotine use, stage of disease, previous treatment, treatment dose, symptom or side effect intensity, and cytokine levels can be achieved with analysis of covariance or factorial designs (Brown, Knapp, & Radke, 1997). To build knowledge, future investigations should use similar instrumentation. To better capture nonlinear weight change for analysis, regression slopes of individual subject weight change over time are recommended (Kraemer & Thiemann, 1989). Lastly, considerable attention and effort needs to be focused on sample retention. In particular, subject burden needs to be minimized as much as possible.

Education and Clinical Practice

Improved nutritional assessment skill is the primary educational and clinical practice need at this time. Most in- and outpatient services providing cancer care do not have dietitians with oncology expertise readily available; therefore, nurses and physicians assess and intervene to manage most nutritional problems of patients with cancer. However, most nurses have one basic nutrition course in their nursing curricula, and most physicians have no nutritional content in their medical curricula. This results in a situation whereby healthcare providers with a paucity of knowledge of nutrition are expected to deal with one of the most complex cancer symptom management problems. Clearly, continuing-education efforts are needed to improve clinical nutritional assessment skills and teach management strategies. Two resources are available for this purpose. The Oncology Nutrition Dietetic Practice Group of the American Dietetic Association published a manual for nurses and dietitians titled The Clinical Guide to Oncology Nutrition (McCallum & Polisena, 2000). A training video on the PG-SGA also is available from the American Dietetic Association (McCallum & Polisena, 2001). In addition, the American Cancer Society convened a workgroup of expert scientists and clinicians to write a report titled “Nutrition During and After Cancer Treatment: A Guide for Informed Choices by Cancer Survivors” (Brown et al., 2001). These experts concluded that the science supporting nutrition and physical activity for patients with cancer and survivors is weak, but enough evidence exists in some areas to make informed choices. Thus, the state of the science and best clinical judgment are combined in this report to assist healthcare professionals, patients with cancer, and cancer survivors in making informed choices.

Healthcare Policy

Reports published from 1979–1987 found that malnutrition in general and cancer-related malnutrition are associated with longer and more costly hospital stays and increased treatment complications and morbidity (Hickman et al., 1980; Robinson et al., 1987; Seltzer et al., 1979, 1982). Only one study was identified that reported on hospital costs and complications related to cancer malnutrition (Ottery, 1995a). As a result of the dramatic changes in the American healthcare system in the 15–25 years since most of these studies were conducted, a clear need is present for current studies of the relationships of cancer malnutrition with hospital and outpatient costs, complications, and morbidity.

Reimbursement for nutritional services also is a health policy issue. In many states, nutritional assessment and consultation by dieticians is not directly reimbursable. Hospitals, physicians, and nurse practitioners can use the International...
Classification of Diagnoses (ICD-9) codes for malnutrition (260 to 263.1) for reimbursement, but it is not known to what extent these codes are utilized. Studies describing utilization of malnutrition ICD-9 codes for reimbursement, evaluating nutrition-reimbursed services, and testing cost-saving nutritional interventions are needed to provide data to advocate for improved quality of care for patients with cancer-related anorexia, weight loss, or cachexia.


These Web sites are provided for information only. The hosts are responsible for their own content and availability. Links can be found using ONS Online at www.ons.org.
ONF Continuing-Education Examination

A Systematic Review of the Evidence on Symptom Management of Cancer-Related Anorexia and Cachexia

Credit Hours: 1.6
Passing Score: 80%
Test ID #02-29/3-03
Test Processing Fee: $15

The Oncology Nursing Society is accredited as a provider of continuing education (CE) in nursing by the
• American Nurses Credentialing Center’s Commission on Accreditation.
• California Board of Nursing, Provider #2850.

CE Test Questions

1. Studies of symptom management of anorexia and cachexia support decreasing
   a. Fat intake.
   b. Energy expenditure.
   c. Nutritional supplements.
   d. Factors creating positive energy.

2. The first presenting symptom of cancer often is
   a. Weight loss.
   b. Bowel changes.
   c. Flu-like symptoms.
   d. Shortness of breath.

3. Cachexia is progressive
   a. Loss of appetite.
   b. Weight loss with fat depletion.
   c. Decreased food and liquid intake.
   d. Weight loss with muscle wasting.

4. Clinical manifestations of cachexia include
   a. Lethargy.
   b. Anorexia.
   c. Depression.
   d. Fat wasting.

5. Outcomes associated with malnutrition and cachexia include
   a. Increased survival.
   b. Increased morbidity.
   c. Taste changes.
   d. Shorter hospital stays.

6. Cancer-related weight loss and anorexia may result from
   a. Anxiety.
   b. Taste changes.
   c. Cancer treatments.
   d. Energy supplies feeding the tumor.

7. Symptom management interventions for cancer-related anorexia and weight loss/cachexia often focus on increasing
   a. Fat intake.
   b. Food intake.
   c. Antidepressants.
   d. Energy expenditure.

8. All patients with cancer should be screened at diagnosis and re-evaluated at regular intervals for

   a. Blood cultures.
   b. Vitamin deficiencies.
   c. Nutritional problems.
   d. Medication noncompliance.

9. Nutritional screenings should include assessing
   a. Bowel patterns.
   b. Urinary output.
   c. Dietary intake.
   d. Vitamin supplements.

10. Individuals in nonpharmacologic intervention clinical trials of cachexia showed increased
    a. Weight.
    b. Survival.
    c. Tumor response.
    d. Caloric/protein intake.

11. A common side effect experienced by patients taking medroxyprogesterone acetate and megestrol acetate is
    a. Edema.
    b. Hypotension.
    c. Hypoglycemia.
    d. Hypersensitivity.

12. What medication is recommended for treatment of cancer-related anorexia and cachexia?
    a. Ensure
    b. Hydrazine
    c. Cytoheptadine
    d. Megestrol acetate

13. Studies of the use of megestrol acetate showed no improvement in patients’
    a. Weight.
    b. Appetite.
    c. Well-being.
    d. Nutritional status.

14. The second largest contribution to total energy expenditure is
    a. Bathing.
    b. Sleeping.
    c. Metabolism.
    d. Physical activity.

15. Physical exercise in patients with cancer seems logical because physical activity increases
    a. Fat reserves.
    b. Metabolism.
    c. Mental functioning.
    d. Physical functioning.

16. Proactive interventions, such as nutritional assessments prior to treatment, generally are utilized in clinical practice for patients with what type of cancer?
    a. Lung
    b. Urinary tract
    c. Head and neck
    d. Gastrointestinal
A Systematic Review of the Evidence on Symptom Management of Cancer-Related Anorexia and Cachexia (Test ID #02-29/3-03)

To receive continuing-education (CE) credit for this issue, simply
1. Read the article.
2. Take the test and record your answers on the form below.
   Also, complete the program evaluation listed below. (You may make copies of the answer form.)
3. Mail the completed answer/enrollment form along with a check or money order for $15 per test payable to the Oncology Nursing Society. Payment must be included for your examination to be processed.
4. The deadline for submitting the answer/enrollment form is two years from the date of this issue.
5. Contact hours will be awarded to registered nurses who successfully complete the program. Successful completion is defined as an 80% correct score on the examination and a completed evaluation program. Verification of your CE credit will be sent to you. Certificates will be mailed within six weeks following receipt of your Answer/Enrollment Form. For more information, call 412-921-7373, ext. 296.

Instructions: Mark your answers clearly by placing an “x” in the box next to the correct answer. This is a standard form; use only the number of spaces required for the test you are taking.

Name __________________________ Telephone # __________________________
Address __________________________ Social Security # __________________________
City __________________________ State __________________________ Zip __________________________

State(s) of licensure/license no(s). __________________________

Program Evaluation

1. How relevant were the objectives to the CE activity’s goal?
   Not at all Low Medium High
   □ □ □ □
2. How well did you meet the CE activity’s objectives (see page 517)?
   • Objective #1
     Not at all Low Medium High
     □ □ □ □
   • Objective #2
     Not at all Low Medium High
     □ □ □ □
   • Objective #3
     Not at all Low Medium High
     □ □ □ □
3. To what degree were the teaching/learning resources helpful?
   Not at all Low Medium High
   □ □ □ □
4. Based on your previous knowledge and experience, do you think that the level of the information presented in the CE activity was
   Too basic Appropriate Too complex
   □ □ □
5. How long did it take you to complete the CE activity? ________ minutes
   □ My check or money order payable to the Oncology Nursing Society is enclosed. U.S. currency only. (Do not send cash.) After completing this form, mail it to: Oncology Nursing Society, P.O. Box 3575, Pittsburgh, PA 15230-3575. For more information or information on the status of CE certificates, call 412-921-7373, ext. 296.