

Nutrition in Cancer: The Practical Perspectives

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The syndrome of Cancer cachexia is characterized by an involuntary, sustained loss of weight and skeletal muscle mass, which negatively affects patients' evolution and their quality of life, increasing the incidence of infection, hospital stay, and mortality. The proportion of patients who present weight loss at diagnosis varies between 15 and 40% and may go up to 70 % depending on the type, stage of cancer, and disease course. Patients with tumors of the gastrointestinal tract, head, and neck, liver, and lung cancers are at high risk for malnutrition.^{1,2}

Patients with advanced cancer have compromised immunity, impaired quality of life, reduced physical activity and worsened clinical outcomes, including increased treatment toxicities, and decreased overall survival. Weight loss in various cancers appears multifactorial, one of them may be inadequate food intake which may, in turn, be due to anorexia and abnormalities in digestion and absorption caused by an underlying disease, and it occurs with or without the presence of systemic inflammation, which leads to tissue breakdown that finally results in significant weight loss, alterations in body composition, and decline in physical functioning. Energy expenditure in cancer patients may be higher than normal in the resting state but due to reduced physical activity, total daily energy expenditure in patients with advanced cancer usually is similar to that of healthy controls. Similarly, draining of energy or substrates by hyperactive tumour tissues cannot reasonably explain weight loss, since the presence of small tumours may produce weight loss when host tissues outweigh the tumour

by a factor of 1000 or more.^{2,3} All oncology patients should be screened at the time of diagnosis and throughout treatment using, a malnutrition screening tool validated in the setting in which the tool is intended for use. Survivors should also be included in this evaluation. Although there is no single universal scale or tool for assessment of nutritional state in cancer patients. The commonly used screening tools used for assessing nutritional intake, weight changes, and BMI are;

- 1) Malnutrition Universal Screening Tool (MUST) for the outpatient clinic.
- 2) Nutrition Risk Screening 2002 (NRS-2002) for inpatients.
- 3) Mini Nutritional Assessment Short Form (MNA-SF) for the elderly.
- 4) The Malnutrition Screening Tool (MST) for inpatient and outpatient settings.
- 5) The Subjective Global Assessment Generated by the Patient (PG-SGA).

The Subjective Global Assessment Generated by the Patient (PG-SGA) is a tool that combines qualitative and semi-quantitative data is valid and reliable in identifying malnutrition as part of a comprehensive nutritional assessment in oncology patients in both ambulatory and acute care settings.

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Also reduction in muscle mass (sarcopenia) can be recognized by dual energy X-ray absorptiometry (DEXA) and Physical performance can be rated using performance scales like Eastern Cooperative Oncology Group (ECOG) and Karnofsky. Systemic inflammation can be estimated by serum C-reactive protein (CRP) and albumin.

Nutritional assessment of food intake, muscle mass, physical performance, and systemic inflammation is recommended for all patients identified as being at risk for malnutrition by nutrition screening.¹

The most basic and critically important step in improving food intake is diligent but compassionate and usually repeated counseling by a professional nutrition expert. The goal is to ensure adequate energy and nutrient intake by considering the individual food habits, tolerances, and preferences as well as the presence of nutrition impact symptoms and derangements expected during the course of planned or ongoing anticancer treatments. Establishing and maintaining rapport with the patient is an essential component and requires adequate training of the expert as well as sufficient time and a supportive atmosphere during the counseling sessions. When counseling is provided by experts, beneficial effects are observed on energy intake, body weight, and quality of life.²

Patients should be advised to ensure adequate nutrition intake via oral, enteral, or parenteral depending on the condition and needs of the patient and some kind of regular physical activity.

NUTRITIONAL REQUIREMENTS

Enriching foods with proteins or fats may be achieved by, e.g. adding protein powders (1030g/day) to liquids and cream or oils to foods and sauces. Taste and tolerance need to be taken into account on an individual basis.^{1,2}

In patients with malnutrition or risk of malnutrition, the use of dietary restrictions is not recommended and is even considered dangerous. Energy intake should initially aim to be from 2025 to 35 kcal/kg body weights, choosing the higher range for ambulatory, younger, underweight, and male patients, while choosing the lower range for bedridden, older, obese, and female patients. During follow up, energy provisions need to be adapted according to the nutritional status and the metabolic condition. Protein intake should be above 1 g/kg and aiming for 1.21.5 g/kg body weight per day.

Fat and carbohydrates may provide non-protein energy, with each nutrient group providing a similar amount of energy. Vitamins and essential trace elements should be provided daily in doses analogous to recommended daily allowances for healthy subjects either via habitual diet or in cases of inadequate food intake, as a daily oral, enteral or intravenous supplement.

The route of administration should be tailored to the patient's physical condition. Patients with inadequate food intake who are able to eat should receive adequate dietary counseling, including fortification of foods as well as oral nutrition supplement (ONS). If oral nutrition remains inadequate or is not feasible, enteral nutrition (EN) is recommended. Should EN not be feasible or fail to improve the nutritional status of the patient, parenteral nutrition (PN) should be implemented, either as supplemental, or, if not otherwise possible to supply adequate nutrition, as total or complete PN.³

Counseling, especially in conjunction with high-protein energy supplements, has been shown to increase intake and attenuate weight loss in a number of cancer patients. Prognosis, economic circumstances, and client preferences need to be considered in decisions regarding supplement usage.

Nutrition counseling is effective during phases of both active treatments (chemotherapy and radiotherapy) and supportive care. Recent studies in patients with cancer have demonstrated effective clinical outcomes with weekly to fortnightly nutrition intervention.⁴ While most experts agree on preferring oral over enteral or parenteral nutrition, in a number of settings, oral nutrition will not suffice to provide adequate amounts of nutrients and energy. Even when using appetite stimulants like steroids, hormones or cannabinoids, anorexia, and early satiety may make it impossible to motivate a patient to continually consume adequate amounts of (enriched or liquid) foods. If further worsening of malnutrition and subsequent impairment of clinical outcome is expected, the option of intermittent or supplemental tube feeding should be discussed with the patient. This option has been studied most frequently in patients with head and neck cancers undergoing combined radio-chemotherapy, but may be offered for severe dysphagia or anorexia if gastrointestinal functions distal to the tube are known to be normal. Tubes may be placed via the nasal or percutaneous route. Both nasogastric tubes and

either endoscopically like percutaneous endoscopic gastrostomy feeding tubes (PEG) or radiologically inserted gastrostomies (RIG) carry a risk of regurgitation and aspiration, but long-term (more than 3weeks) placement is more reliable with PEG or RIG.²

PHYSICALACTIVITY

Exercise has been proposed to modulate muscle metabolism, insulin sensitivity, and levels of inflammation and thus to attenuate the effects of cancer cachexia. Physical activity is well tolerated and safe at different stages of cancer and patients with advanced stages of cancer are able and willing to engage in physical activity. Resistance

Evidence-Based Nutritional Recommendations for Cancer Patients	
Screening and nutritional assessment	All cancer patients should be screened at the time of diagnosis and throughout treatment using a validated malnutrition screening tool
	Nutritional assessment is recommended for all patients who are identified to be at risk for malnutrition by nutrition screening
Energy and nutritional requirements	Cancer patients' nutritional requirements are largely similar to those of the healthy population
	Proteins, water, and minerals requirements should be evaluated especially in certain situations. The administration of high -doses of vitamins and trace elements is not recommended
Types of nutritional interventions	Nutrition counseling should be recommended to all cancer patients who are able to eat, but are malnourished or are at risk for malnutrition
	Enteral nutrition, if oral intake remains inadequate despite nutritional counseling and parenteral nutrition, if enteral nutrition is not sufficient or feasible
Role of physical exercise in nutritional status	Physical exercise in cancer patients to support or improve muscle mass and function
Interventions relevant to specific patient categories	Nutritional assessment, individualized nutritional counseling, and, if necessary, oral nutritional supplements in all patients undergoing radiation of the gastrointestinal tract or of the head and neck
	In severe mucositis or in obstructive tumours of the head - neck or thorax, enteral feeding is recommended using nasogastric or gastrostomy tubes
	Parenteral nutrition is recommended if adequate oral or enteral nutrition is not possible (severe radiation enteritis or malabsorption)
	During anticancer drug treatment, personalized dietary counselling, with oral nutritional supplements, is recommended in cases of frank malnutrition and patients with decreased oral intake
	Malnourished cancer patients receiving anticancer treatment who are expected to be unable to ingest and or absorb adequate nutrients for more than 1 –2 weeks are candidates for artificial nutrition (enteral or parenteral)
	In advanced terminal phases of the disease, artificial nutrition is unlikely to provide any benefit for most patients
	In cancer survivors: maintaining a BMI between 18.5 and 25 kg/m2, physical activity, and a healthy diet

training at moderate intensity has been shown to improve immune activity and decrease inflammatory status in patients with cancer. Resistance and aerobic training, as well as a combined training program may increase muscle strength and maintain patients' functional ability. The role of physical and muscle activity initiates essential anabolic stimuli. Increasing or maintaining muscle mass may be hampered by inactivity. Indeed, inactivity prevents optimal incorporation and utilization of nutrients by muscle. Therefore, muscle training should accompany every nutritional intervention and should be an essential component of the parallel supportive pathway. The benefits of exercise reported in patients with cancer include increased exercise capacity, improved activity levels, and reduced fatigue, the latter of which is the most frequent and burdensome side effect of chemotherapy. Exercise has also been shown to preserve physical well-being. Clinical guidelines recommend individualized resistance exercises in addition to aerobic exercises to maintain muscle strength and muscle mass.^{2,3}

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