

# Medical Nutrition Therapy Guidelines for Cancer in Adults

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# Medical Nutrition Therapy Guidelines for Cancer in Adults Working Group Committee



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# Contents

This is Medical Nutrition Therapy guidelines for Adults Cancer Patients.

## STATEMENT OF INTENT

This guideline is meant to be a guide for providing medical nutrition therapy to adult's cancer patients under the care of dietitian, based on the best available evidence at the time of development. Adherence to this guideline may not necessarily guarantee the best outcomes in every case. Every dietitian is responsible for the management of his/her unique patient based on the clinical, dietary and lifestyle picture presented by the patient.

## OBJECTIVES

The aim of the guideline is to provide evidence-based recommendations while taking into account the importance of an individualised approach in assisting dietitians to provide medical nutrition therapy to cancer patients.

## TARGET POPULATION

This guideline is applicable to adult cancer patients (above 18 years old) and not pregnant.

## TARGET GROUP

This guideline is meant mainly for dietitians involved in treating adult cancer patients. Other healthcare professionals may also use this guideline as reference, which include: medical doctors and specialists, nurses and pharmacists

## LEVEL OF EVIDENCE

The definition of types of evidence used in this guideline is based on Ministry of Health Malaysia Grading System as shown in the following table:

Grade A	At least one meta-analysis, systematic review or randomised controlled trial or evidence rated as good and directly applicable to the target population
Grade B	Evidence from well-conducted clinical trials, directly applicable to the target population and demonstrating overall consistency of results or evidence extrapolated from meta-analysis, systematic review or randomised controlled trial
Grade C	Evidence from expert committee reports or opinions and/or clinical experiences of respected authorities, indicates absence of directly applicable clinical studies of good quality.

This guideline is based largely on the findings of systematic reviews and meta-analyses in the literature, taking into consideration local practices. All literature retrieved were discussed during group meetings. The task force agreed on all statements and recommendations formulated. Where the evidence was insufficient, the recommendations were derived by consensus of the task force members.

However, in addition to the evidence-based recommendations, other factors such as cultural practice, individual conditions and preferences must be taken into consideration in the decision-making process.

# Introduction

The incidence of cancer is on the rise in Malaysia. National Cancer Registry (NCR) 2011, stated that a total of 18,219 new cancer cases were diagnosed in 2007, comprising of 8,123 males (44.6%) and 10,096 females (55.4%). The commonest cancers among males were trachea, bronchus, and lung cancer and for female were breast cancer.

The main aim of cancer treatments is to remove the cancer cells, prevent further tumour growth relieve symptoms and prolong survival. The use of available treatment regimens may threaten the health and nutritional status of the individuals by interfering with their ability to ingest, digest and absorb their food adequately which put them at risk of developing malnutrition (Arends et al. 2006).

Malnutrition is likely to develop or worsen during specific cancer treatments (surgery, systemic therapy\*, radiotherapy) especially when early and appropriate nutritional intervention is not properly indicated (Andreyev et al. 1998, Ross et al. 2004). The prevalence of malnutrition in cancer patients ranges from 8-84% depending on tumour site, stage and treatment (Maarten von Meyenfeldt 2005, Brown et al. 1991). Multiple etiology associated with malnutrition among cancer patients include complications arising from the tumour itself such as obstruction, tumour-induced anorexia or treatment-induced complications such as gastrointestinal symptoms, fatigue or loss of anatomy and psychological stress.

Hence, early nutrition intervention is important to prevent or reverse the onset of malnutrition and to improve the prognosis of cancer patients. Therefore, this medical nutrition therapy is developed to guide dietitians toward a standardised dietary management along the nutrition care process for cancer patients in order to improve patients' outcomes (ADA, 2007).

\* Systemic therapy is based on the biology of cancer. Types of systemic therapy including chemotherapy, targeted therapy, endocrine or hormonal therapy and biologic therapy.

## **OBJECTIVES OF NUTRITION MANAGEMENT**

Goals of MNT that apply to the management of cancer are as follows:

### For individual who is at pre-cancer treatment or pre-surgery

- To maintain or prevent declining (or further decline) in nutritional status and improve overall nutritional status and its associated outcomes in adults at risk of or with malnutrition

### For individual who is ongoing radiotherapy or/and systemic therapy

- To minimise a further decline in nutritional status, maintain quality of life (QoL) and for adequate symptom management.

## List Of Abbreviations

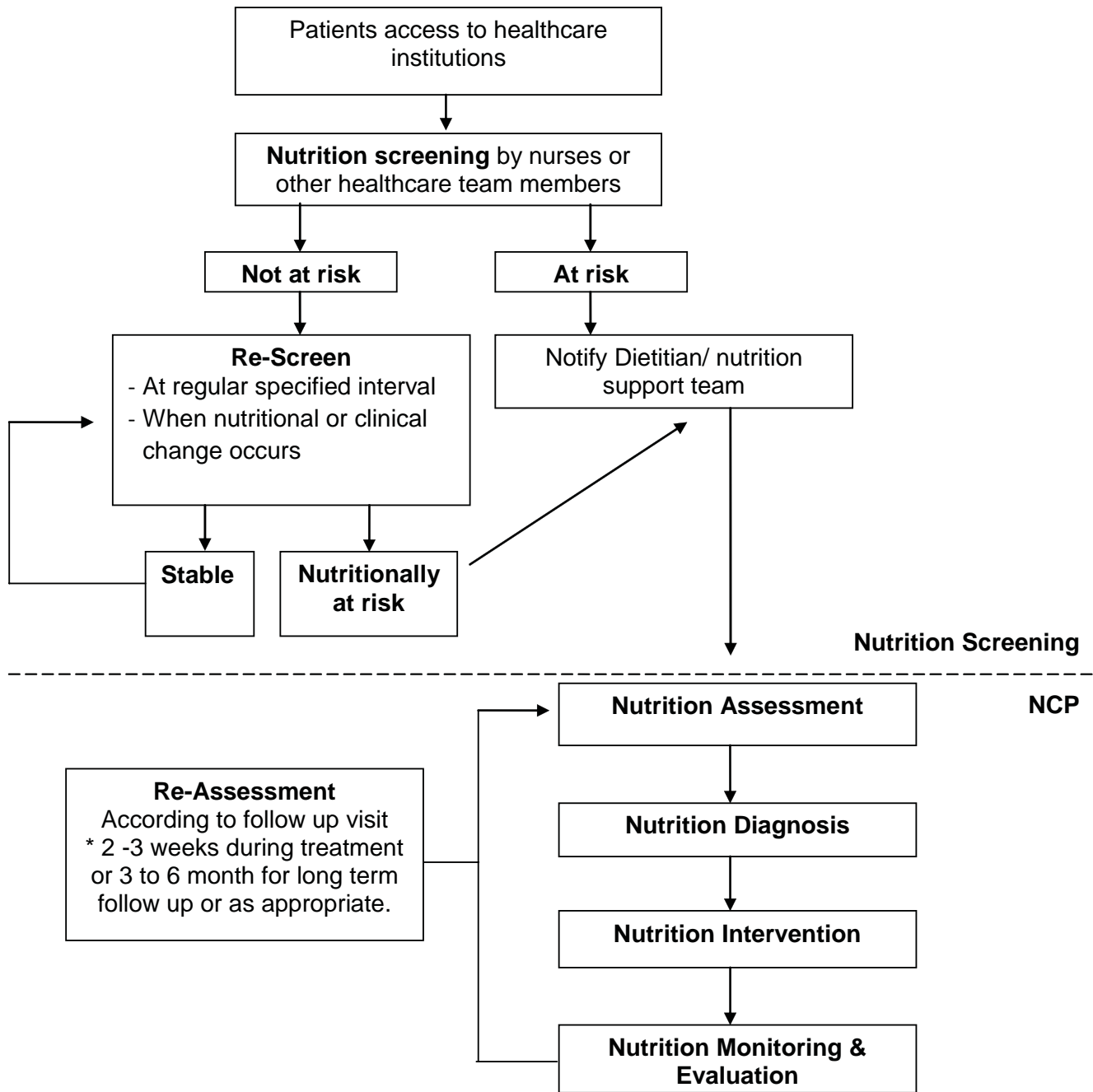
AA	Amino acid
BMI	Body Mass Index
CAM	Complementary and Alternative Medicine
CRP	C-reactive protein
CT	Chemotherapy
DHA	Docosahexaenoic acid
EEE	Estimated Energy Expenditure
e.g.	Example
EN	Enteral Nutrition
EORTC QLQ-C30	The European Organisation for Research and Treatment of Cancer Care Quality of Life Questionnaire
EPA	Eicosapentaenoic acid
exc	Exchange
GI	Gastrointestinal
GIT	Gastrointestinal Tract
GLA	Gamma-Linolenic Acid
HCT	Hematocrit
HNC	Head and Neck Cancer
HSCT	Hematopoietic Stem Cell Transplantation
Ht	Height
Kcal	Kilocalorie
KPS	Karnofsky Performance Scale
MAC	Mid-arm Circumference
MAMC	Mid-arm Muscle Circumference
MNA	Mini Nutritional Assessment

## List Of Abbreviations

MNT	Medical Nutrition Therapy
MST	Malnutrition Screening Tool
MUST	Malnutrition Universal Screening Tool
NCCFN	National Coordinating Committee on Food and Nutrition
NCP	Nutrition Care Process
NCR	National Cancer Registry
NGT	Nasogastric Tube
NRI	Nutritional Risk Index
NST	Nutrition Support Therapy
ONS	Oral Nutritional Supplements
PEG	Percutaneous Endoscopic Gastrostomy
PG-SGA	The Scored Patient-Generated Subjective Global Assessment
PN	Parenteral Nutrition
pt	Patient
QoL	Quality of Life
REE	Resting Energy Expenditure
RRT	Renal Replacement Therapy
RT	Radiotherapy
Se	Selenium
SGA	Subjective Global Assessment
tbsp	Tablespoon
T&CM	Traditional & Complementary Medicine
TF	Tube Feeding
TSF	Triceps Skinfold
tsp	Teaspoon
wt	Weight



**Figure 1: Nutrition Screening and NCP Flow Chart**



\*Follow up visit depends on nutritional problems and/or physician appointments.

Adapted from: The American Society for Parenteral and Enteral Nutrition (ASPEN) 2011

Encounter	Length of Contact
Initial Consultation	Minimum 30-45 minutes
Follow-up	Minimum 15-20 minutes

ADA 2006

# Nutrition Screening

Malnutrition Screening Tool (MST) is a reliable nutrition screening tool which can be incorporated into admission forms or patient information sheets. It can be performed by other hospital staff and patients.

It comprises of two simple questions with scoring. Refer Appendix 1

- Score  $\geq 2$  (at risk of malnutrition) → refer to dietitian
- Score  $< 2$  (not at risk of malnutrition) → re-screened weekly / next attending clinic to detect changes.

Nutrition screening is unnecessary if a patient is referred to dietitian by other methods, e.g. direct referral from an oncologist; straight away proceed to nutrition assessment (DAA, 2006).

**Table 1: Evidence Statement of Nutrition Screening**

Evidence Statement	Grade	References
MST is an effective and validated screening tool for identifying risk of malnutrition in cancer patients	B	DAA, 2006 COSA, 2011
Malnutrition screening should be undertaken in all patients at diagnosis to identify those at nutritional risk and should be repeated at intervals through each stage of treatment (e.g. surgery, radiotherapy / chemotherapy and post treatment). If identified at high risk, do refer to the dietitian for early intervention.	B	COSA, 2011
All HNC patients receiving radiation therapy should be referred to dietitian for nutrition support intervention	A	COSA, 2011

# Nutrition Assessment

Nutrition assessment is a comprehensive approach to gather pertinent data in order to define nutritional status and identify nutrition related problems.

**Table 2: Nutrition Assessment Criteria**

Criteria	Recommendation	Grade	Reference
Target Group	<ul style="list-style-type: none"> <li>• Suggested for all patients who are identified to be at nutrition risk (after conducting) nutrition screening</li> </ul>	C	ASPEN, 2011
Tools	<ul style="list-style-type: none"> <li>• Use a validated nutrition assessment tool to assess nutritional status               <ol style="list-style-type: none"> <li>1. <u>The Scored Patient Generated–Subjective Global Assessment (Appendix 2)</u> <ul style="list-style-type: none"> <li>- A gold standard assessment tool for oncology patients (Leuenberger et al., 2010)</li> </ul> </li> <li>2. <u>Subjective Global Assessment (Appendix 3)</u> <ul style="list-style-type: none"> <li>- Validated in a variety of patient population</li> <li>- Incomplete list of cancer specific nutritional impact symptoms, and it does not include a triage component</li> </ul> </li> </ol> </li> </ul>	B	Arends et al., 2006 DAA, 2006 DAA, 2008 Kwang & Kandiah, 2009 COSA, 2011  Mccallum, 2006
Assessment Parameters	<ul style="list-style-type: none"> <li>• Medical history               <ul style="list-style-type: none"> <li>- Diagnoses</li> <li>- Past medical history</li> <li>- Sensory limitation(s)</li> </ul> </li> <li>• Anthropometric data               <ul style="list-style-type: none"> <li>- Current weight</li> <li>- Weight history: usual body weight, recent weight changes (incorporated in the scored PG-SGA)</li> <li>- Height (measured, recumbent, knee height, or arm span)</li> <li>- BMI</li> <li>- TSF;MAC – calculation of upper arm muscle area; lean body mass</li> </ul> </li> <li>• Biochemical assessment               <ul style="list-style-type: none"> <li>- Indicators of protein status: albumin, pre-albumin, total protein, nitrogen balance, CRP</li> <li>- Hematological assessment: hemoglobin, HCT, platelet, total lymphocyte count, white blood cell</li> <li>- Renal profile: sodium, potassium, magnesium, phosphate, urea, creatinine</li> </ul> </li> </ul>	C	Charney & Cranganu, 2010

## Nutrition Assessment

Criteria	Recommendation	Grade	Reference
Assessment Parameters	<ul style="list-style-type: none"> <li>• Clinical assessment                             <ul style="list-style-type: none"> <li>- Gastrointestinal (GI) symptoms (nausea, vomiting, constipation, diarrhea, steatorrhea, early satiety) – can use the PG-SGA to identify barriers to food intake</li> <li>- Appetite and taste changes – can use the PG-SGA to identify barriers to food intake</li> <li>- Presence of pain</li> <li>- Mood change</li> <li>- Review (list of) medications and do note if patients are taking analgesics, enzymes, laxatives, antiemetics, alternative therapies.</li> </ul> </li> <li>• Dietary Information                             <ul style="list-style-type: none"> <li>- Estimate dietary intake especially energy and protein using 24-hour diet recall, diet history or food frequency questionnaire</li> <li>- Assess food/supplement intake: checklist on vitamin/mineral supplementations and complementary medicines (herbal/traditional products)</li> <li>- Food allergies</li> <li>- Food restrictions and belief</li> </ul> </li> <li>• Functional status and QoL                             <ul style="list-style-type: none"> <li>- Determine physical functional status and level of fatigue, using KPS (Appendix 4) (Karnofsky &amp; Burchenal, 1949). The KPS scale is typically used in general oncology care (Ma et al., 2010)</li> <li>- Measure QoL using EORTC QLQ-C30 (Appendix 5) (Aaronson et al., 1993)</li> <li>- Assess hand-grip strength</li> </ul> </li> </ul>	C	Charney & Cranganu, 2010
<p>The use of combination method (Tools and Assessment Parameters) is best suggested for nutritional assessment (Grade C). (Davies, 2005)</p>			

# Energy Requirement Estimation

**Table 3: Formulas for Calculation of Energy Requirement**

No	Equation		Remarks
1.	<p>Harris Benedict, 1919</p> <p>Men: <math>REE = 66 + 13.7W + 5H - 6.8A</math></p> <p>Women: <math>REE = 655 + 9.6W + 1.85H - 4.7A</math></p> <p>REE = resting energy expenditure (kcal/day)</p> <p>W = weight (kg)</p> <p>H = height (cm)</p> <p>A = age (years)</p>	<p>Multiply the REE or EEE calculated with activity factor and injury factor to calculate the energy requirement</p> <p><u>Activity Factors</u></p> <p>Patients on ventilator support : 1-1.1</p> <p>Bedridden patients : 1.2</p> <p>Ambulatory patients : 1.3</p> <p><u>Injury Factors</u></p> <p>Mild starvation : 0.85-1.0</p> <p>Cancer, based on severity : 1.1-1.45</p> <p>Cancer, weight maintenance : 1.15-1.3</p> <p>Cancer, nutritional repletion, weight gain : 1.5</p> <p>Ventilator support, catabolic : 1.5</p> <p>Sepsis : 1.5</p>	<ul style="list-style-type: none"> <li>• Poor agreement with measured REE in weight loss and weight stable patients with cancer (Johnson et al., 2008).</li> <li>• Overestimates REE by 5% to 15% in obese individuals if actual weight is used (McClave &amp; Snider, 1992, Frankenfield, 2001, Frankenfield et al., 2003)</li> <li>• Wide variation in accuracy for critically ill patients ( McClave &amp; Snider, 1992, Frankenfield D, 2001)</li> </ul>
2.	<p>Mifflin-St Jeor, 1990</p> <p>Men : <math>REE = 10W + 6.25H - 5A + 5</math></p> <p>Women : <math>REE = 10W + 6.25H - 5A - 161</math></p> <p>REE = resting energy expenditure (kcal/day)</p> <p>W = weight (kg)</p> <p>H = height (cm)</p> <p>A = age (years)</p>		<ul style="list-style-type: none"> <li>• Equation developed from a sample of obese and non obese healthy individuals. It may provides a more accurate estimation of REE than Harris-Benedict equation (Frankenfield et al., 2003)</li> </ul>

## Energy Requirement Estimation

No	Equation	Remarks
3.	<p>Ireton-Jones, 1992</p> <p>Ventilator dependent patients :</p> $EEE = 1784 - 11A + 5W + 244S + 239T + 804B$ <p>Spontaneous breathing patients :</p> $EEE = 629 - 11A + 25W - 609O$ <p>EEE = estimated energy expenditure (kcal/d)            A = age (years)            W = weight (kg)</p>	<ul style="list-style-type: none"> <li>• Equation developed from a sample of hospitalized patients including critically ill patients and patients with burn ( Ireton-Jones et al., 1992)</li> <li>• This equation underestimates energy requirements ( Frankenfield, 2004)</li> </ul>
4.	<p>Based on actual body weight (ADA, 2006)</p> <p>Hypermetabolism, nutritional repletion, weight gain : 30-35 kcal/kg/day</p> <p>Severely underweight patients: &gt; 35 kcal/kg/day</p> <p>Normometabolic, nonambulatory, inactive : 25-30 kcal.kg/day</p> <p>Bedridden : 20-25 kcal/kg/day</p> <p>Stem cell transplant : 30-35 kcal/kg/day</p> <p>Obese patients (when weight maintenance is the goal) : 21-25 kcal/kg/day</p>	<ul style="list-style-type: none"> <li>• Actual body weight is used for non obese patients ( Ireton-Jones &amp; Turner, 1991)</li> <li>• Ideal body weight should be used for obese patients because adjusted weight has not been validated ( Ireton-Jones &amp; Turner, 1991)</li> <li>• These formula lack evidence based validation (ADA, 2006)</li> </ul>

## Energy Requirement Estimation

No	Equation	Remarks
5.	Enteral Nutrition (ESPEN, 2006) Ambulant patients: 30-35 kcal/kgBW/day Bedridden patients: 20-25 kcal/kgBW/day  Parenteral Nutrition (ESPEN, 2009) Ambulant patients: 25-30 kcal/kgBW/day Bedridden patients: 20-25 kcal/kgBW/day	<ul style="list-style-type: none"><li>• These assumptions are less accurate for severely underweight and for severely overweight subjects</li></ul>
The above guidelines are recommended for estimating energy requirements for cancer patients; indirect calorimetry remains the gold standard for determining calorie requirement. (Charney & Cranganu, 2010)		

## Protein Requirement

**Table 4: Estimating Daily Protein Needs in Cancer Patients**

Medical condition	Estimated Protein Requirement, g/kg
Non stressed cancer patient	1.0-1.2
Hypercatabolism	1.2-1.6
Severe stress	1.5-2.5
Stem cell transplant	1.5-2.0
Renal disease <ul style="list-style-type: none"> <li>• Acute kidney injury (KDIGO AKI Guideline 2012)</li> <li>• Predialysis</li> <li>• Hemodialysis</li> <li>• Peritoneal dialysis</li> <li>• Nephrotic syndrome</li> </ul>	0.8-1.0 (unstressed pt and without dialysis) 1.0-1.5 (with stress and RRT) 0.6-0.8 1.2-1.5 1.2-1.5 0.8-1.0
Hepatic disease <ul style="list-style-type: none"> <li>• Hepatic failure</li> <li>• Hepatitis</li> <li>• End-stage liver disease with encephalopathy</li> <li>• Cirrhosis without encephalopathy</li> </ul>	1.0-1.5 0.8-1.0* 0.6-0.8* 1.0-1.2*
* Dry Weight	
Modified and adapted from ADA: Medical Nutrition Therapy in Oncology, 2006	
Use kilocalorie-to-nitrogen ratio of 125:1 to calculate protein needs (Dempsey & Mullen, 1985)	
Definition for non stressed cancer patients - palliative care; not on any treatment	
Definition for hypercatabolism - patient on treatment (CT or RT)	

## Age Specific for Fluid Requirement

**Table 5: Estimating Fluid Needs in Cancer Patients**

Age (years)	Fluid Requirement, ml/kg
16-30, active	40
31-55	35
56-75	30
76 or older	25
These recommendations are just for maintenance needs. Fluid requirement in fluid overload or dehydration patients need to be adjusted.	

Source: ADA, 2000



## Micronutrient Requirement

Optimal level for maximal health benefit has not yet been established for cancer patients to date. American Cancer Society (2005) has decided to conservatively recommend that people get antioxidants through food sources rather than from supplements. However, when inadequate intake and/or increased losses of micronutrients are suspected, a multivitamin and mineral supplement may be appropriate. (Bloch, 1998; ADA, 2000; Brown et al., 2003)

Please refer to Recommended Nutrient Intakes (NCCFN, 2005) for recommended amount of these essential nutrients in healthy individuals.

## EPA Requirement

Omega-3 fatty acid supplementation may help stabilize weight in cancer patients who are on oral diet and experiencing progressive, unintentional weight loss (Grade B). A total of 2 g EPA/day is recommended. This may be administered as commercially available EPA enriched liquid nutritional supplements or as over-the-counter EPA supplements (Grade B). (ASPEN, 2009).

EPA benefits patients with advanced cancer and weight loss, indicated for tumours of the pancreas and upper digestive tract. EPA favours weight and appetite gain, improve QoL while decreasing post-surgical morbidity. Tolerance was better with consumption of EPA enriched nutritional formula than fish oil capsules (FESEO, 2008).

2g of EPA can be obtained by consuming:

- 8-11 capsules of fish oil (180 mg EPA/capsule)
- 300-400 g of oily fish (8 – 10 exchange of ikan kembong or ikan tenggiri)
- 310-445 ml high protein energy supplement enriched with EPA (0.45 g EPA/100 ml)
- or combination of these (DAA, 2006).

Examples of oily fish rich in omega-3 fatty acid (EPA and DHA) include

- Mackerel (ikan kembong, tenggiri), 1450mg of omega 3/55g
- Salmon, 930mg of omega 3/55g

RNI Malaysia recommended minimum of 670 mg of omega-3 fatty acid intake per day (Ng, 2006).

Refer to Appendix 6 for EPA enriched formula.

# Nutrition Diagnosis

Nutrition diagnosis is the identification and labelling of the specific nutrition problem that dietetic professionals are responsible for treating independently. A nutrition diagnosis may be temporary, altering as the patient progresses or responds to the intervention.

**Table 6: Common Nutrition Diagnosis for Cancer Patients**

Category	Problem	Possible Etiology	Possible Sign / symptom
NI-1.2	Increased energy expenditure	<ul style="list-style-type: none"> <li>Anabolism or growth</li> </ul>	<ul style="list-style-type: none"> <li>Unintentional weight loss of <math>\geq 5\%</math> in 1 month or <math>\geq 10\%</math> in 6 months</li> <li>Increased proportional lean body mass</li> <li>Condition associated with a diagnosis/ treatment</li> </ul>
NI-2.1	Inadequate oral intake	<ul style="list-style-type: none"> <li>Pathologic / physiological causes that result in increased energy requirement or decreased ability to consume sufficient energy needs</li> <li>Psychological causes e.g. ; depression or disordered eating</li> </ul>	<ul style="list-style-type: none"> <li>Weight loss, insufficient growth velocity</li> <li>Dry skin, mucous membranes, poor skin turgor</li> <li>Diet history- insufficient intake of high biological quality protein from diet compared to requirement</li> <li>Anorexia, nausea or vomiting</li> <li>Change in appetite or taste condition associated with diagnosis or treatment</li> </ul>
NI-2.3	Inadequate enteral nutrition infusion	<ul style="list-style-type: none"> <li>Altered absorption or metabolism of nutrients</li> <li>Food- nutrition related knowledge deficit concerning appropriate formula/ formulation given for EN</li> <li>Physiological causes increasing nutrient needs</li> <li>Intolerance of EN</li> <li>Infusion volume not reached or schedule for infusion interruption</li> </ul>	<ul style="list-style-type: none"> <li>Lack of planned weight gain</li> <li>Unintentional weight loss</li> <li>Underweight</li> <li>Clinical evidence of vitamin/mineral deficiency</li> <li>Evidence of dehydration, loss of skin integrity, delayed wound healing, pressure ulcers ,loss of muscle mass/ subcutaneous fat</li> <li>Nausea, vomiting, diarrhea</li> <li>Inadequate EN volume compared to requirement</li> <li>Condition associated to diagnosis/ treatment</li> </ul>

## Nutrition Diagnosis

Category	Problem	Possible Etiology	Possible Sign / symptom
NI-2.5	Less than optimal enteral nutrition	<ul style="list-style-type: none"> <li>• Physiological causes</li> <li>• Food and nutrition knowledge deficit concerning EN product</li> <li>• End of life care if patient or family do not desire nutritional support</li> </ul>	<ul style="list-style-type: none"> <li>• Abnormal levels of markers specific for various nutrients</li> <li>• Weight gain with excess of lean tissue mass</li> <li>• Weight loss</li> <li>• Edema with excess fluid administration</li> <li>• Loss of subcutaneous fat and muscle store</li> <li>• Estimated intake from EN that is consistently more or less than recommended intake</li> <li>• Nausea, vomiting, diarrhea, high gastric residual volume</li> <li>• History of EN intolerance</li> </ul>
NI-3.1	Inadequate fluid intake	<ul style="list-style-type: none"> <li>• Psychological causes; depression</li> </ul>	<ul style="list-style-type: none"> <li>• Acute weight loss</li> <li>• Dry skin and mucous membranes, poor skin turgor</li> <li>• Thirst</li> <li>• Difficulty swallowing</li> </ul>
NI-4.1	Inadequate bioactive substance intake	<ul style="list-style-type: none"> <li>• Altered GI function e.g. pain or discomfort</li> </ul>	<ul style="list-style-type: none"> <li>• Low intake of plant foods containing soluble fibre</li> <li>• Discomfort or pain associated with intake of food rich in bioactive substance</li> </ul>
NI-5.1	Increased nutrient needs	<ul style="list-style-type: none"> <li>• Altered absorption or metabolism of nutrient e.g. from medication</li> <li>• Increased demand for nutrient e.g. accelerated growth, wound healing, chronic infection</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased cholesterol &lt;4.16mmol/L, albumin, prealbumin, CRP, indicating increased stress and increased metabolic needs</li> <li>• Unintentional weight loss of <math>\geq 5\%</math> in 1 month or <math>\geq 10\%</math> in 6 months</li> <li>• Loss of muscle mass, subcutaneous fat</li> <li>• Loss of skin integrity, delayed wound healing, or pressure ulcers</li> <li>• Inadequate intake of food / supplement</li> <li>• Fever</li> <li>• Medications affecting absorption or metabolism of needed nutrient</li> </ul>

## Nutrition Diagnosis

Category	Problem	Possible Etiology	Possible Sign / symptom
NI-5.2	Malnutrition	<ul style="list-style-type: none"> <li>• Food and nutrient-related knowledge deficit concerning amount of energy and amount and type of dietary protein</li> <li>• Physiological causes increasing nutrient needs due to illness, acute or chronic or injury/trauma</li> <li>• Psychological causes, e.g., depression or eating disorders</li> <li>• Alteration in gastrointestinal tract structure and/or function</li> </ul>	<ul style="list-style-type: none"> <li>• Unintentional weight loss of <math>\geq 5\%</math> in 1 month or <math>\geq 10\%</math> in 6 months</li> <li>• BMI <math>&lt;18.5</math> kg/m<sup>2</sup> for adult or BMI <math>&lt;23</math> kg/m<sup>2</sup> for elderly (age <math>&gt;65</math> years old)</li> <li>• Muscle wasting and/or loss of subcutaneous fat</li> <li>• Localized or generalized fluid accumulation</li> <li>• Estimated energy intake from diet less than estimated or measured REE</li> <li>• Food avoidance and/or lack of interest in food</li> <li>• Change in functional indicators e.g handgrip strength</li> </ul>
NI-5.9.1	Inadequate vitamin intake	<ul style="list-style-type: none"> <li>• Physiological causes increased nutrient needs due to prolonged catabolic illness, disease state, malabsorption or medication</li> <li>• Psychological causes e.g. depression or eating disorder</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate intake of foods containing vitamins</li> <li>• Lack of interest in foods</li> </ul>
NC-1.1	Swallowing difficulty	<ul style="list-style-type: none"> <li>• Mechanical causes e.g. inflammation, surgery, stricture, or oral, pharyngeal and oesophageal tumors</li> </ul>	<ul style="list-style-type: none"> <li>• Radiological findings e.g. abnormal swallowing</li> <li>• Evidence of dehydration e.g. dry mucous membranes, poor skin turgor</li> <li>• Observation e.g. : coughing, prolonged chewing</li> <li>• Avoidance of foods</li> <li>• Mealtime resistance</li> <li>• Condition associated with a diagnosis /treatment</li> </ul>

## Nutrition Diagnosis

Category	Problem	Possible Etiology	Possible Sign / symptom
NC-1.2	Biting/ chewing (masticatory) difficulty	<ul style="list-style-type: none"> <li>Xerostomia</li> </ul>	<ul style="list-style-type: none"> <li>Dry or cracked lips, tongue</li> <li>Oral lesion</li> <li>Alteration in food intake from usual</li> <li>Decreased intake or avoidance of food difficult to form into a bolus</li> <li>Spitting foods or prolonged feeding time</li> <li>Chemotherapy/ radiotherapy with oral side effect</li> </ul>
NC-1.4	Altered gastrointestinal function	<ul style="list-style-type: none"> <li>Compromised GI track function e.g. radiation therapy, infection</li> </ul>	<ul style="list-style-type: none"> <li>Abnormal digestive enzyme &amp; fecal fat study</li> <li>Gastric emptying and/ or small bowel transit time</li> <li>Wasting due to malnutrition in severe cases</li> <li>Abdominal distension</li> <li>History: anorexia, nausea, vomiting, diarrhea, steatorrhea, constipation, abdominal pain</li> </ul>
NC-2.2	Altered nutrition – related laboratory values	<ul style="list-style-type: none"> <li>Kidney, liver, cardiac, endocrine, and/ or pulmonary dysfunction</li> <li>Organ dysfunction that leads to biochemistry</li> </ul>	<ul style="list-style-type: none"> <li>Abnormal laboratory (specify) values</li> <li>Anorexia, nausea, vomiting</li> <li>Inadequate intake of micronutrients</li> <li>Condition associated with diagnosis treatment</li> </ul>
NC-3.1	Underweight	<ul style="list-style-type: none"> <li>Harmful beliefs/ attitudes about food, nutrition and nutrition-related topics</li> <li>Inadequate energy intake</li> <li>Increased energy needs</li> </ul>	<ul style="list-style-type: none"> <li>Decreased skinfold thickness and MAMC</li> <li>BMI &lt; 18.5 kg/m<sup>2</sup> (most adult)</li> <li>BMI for older adults (older than 65 years old) &lt; 23</li> <li>Decreased muscle mass, muscle wasting (gluteal and temporal)</li> <li>Inadequate intake of food compared to estimated or measured needs</li> <li>Malnutrition</li> <li>Illness or physical disability</li> <li>Medications that affect appetite</li> </ul>

## Nutrition Diagnosis

Category	Problem	Possible Etiology	Possible Sign / symptom
NC-3.2	Unintended weight loss	<ul style="list-style-type: none"> <li>• Physiological causes increased nutrient needs due to prolonged catabolic illness</li> <li>• Psychological causes eg ; depression or eating disorder</li> <li>• Lack of self feeding ability</li> <li>• Prolonged hospitalization</li> <li>• Lack of or limited access to food</li> <li>• Decreased ability to consume sufficient energy</li> </ul>	<ul style="list-style-type: none"> <li>• Weight loss of 5% within 30 days, 7.5% in 90 days, 10% in 180 days</li> <li>• Increased heart rate and respiratory rate</li> <li>• Loss of subcutaneous fat and muscle stores</li> <li>• Poor intake, change in eating habit</li> <li>• Medication associated with weight loss , such as certain antidepressant or cancer chemotherapy</li> </ul>
NB-1.1	Food and nutrition- related knowledge deficit	<ul style="list-style-type: none"> <li>• Harmful beliefs/ attitudes about food, nutrition and nutrition- related topics</li> <li>• Lack of prior exposure to information</li> <li>• Prior exposure to incompatible information</li> <li>• Prior exposure to incorrect information</li> <li>• Unwilling or uninterested in learning information</li> </ul>	<ul style="list-style-type: none"> <li>• Client history: new medical diagnosis or change in existing diagnosis or condition</li> <li>• No prior knowledge of need for food- and nutrition- related recommendations</li> <li>• Demonstrates inability to apply for food- and nutrition- related information e.g. select food based on nutrition therapy</li> <li>• Verbalizes unwillingness or disinterest in learning information</li> </ul>

## Nutrition Diagnosis

Category	Problem	Possible Etiology	Possible Sign / symptom
NB-1.2	Harmful beliefs/ attitudes about food- nutrition-related topics	<ul style="list-style-type: none"> <li>• Desire for a cure for a chronic disease through the use of alternative therapy</li> <li>• Disbelief in science –based food and nutrition information</li> <li>• Exposure to incorrect food and nutrition information</li> </ul>	<ul style="list-style-type: none"> <li>• Food faddism</li> <li>• Intake that reflects an imbalance of nutrients/ food groups</li> <li>• Avoidance of foods / food groups</li> <li>• Condition associated with a diagnosis or treatment</li> </ul>
NB-3.2	Limited access to food and/ or water	<ul style="list-style-type: none"> <li>• Caregiver not providing access to food</li> <li>• Physical/ psychological limitations that diminish ability to shop</li> </ul>	<ul style="list-style-type: none"> <li>• Underweight</li> <li>• Hunger/ inadequate food intake</li> <li>• Limited supply of food/ variety of foods</li> <li>• Illness /physical disability</li> <li>• Lack of suitable support systems</li> </ul>

Source: ADA (2011) Third edition, International dietetics & nutrition terminology (IDNT) reference manual.

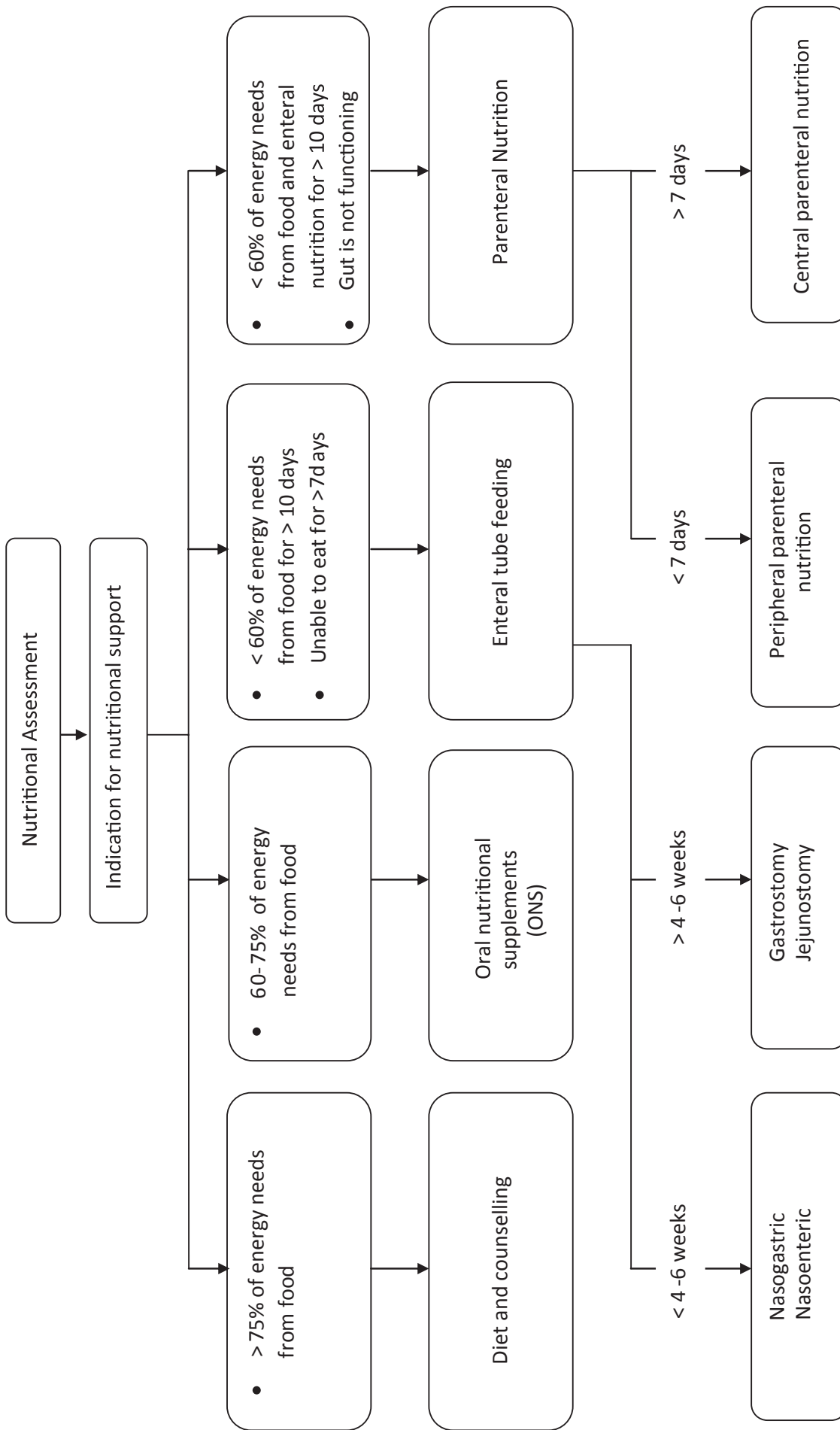


Figure 2: Algorithm of Nutritional Support for Cancer Patients (ESPEN, 2006; FESEO, 2008)



## Nutrition Intervention

Nutrition intervention is a process of planning, implementing and documenting evidence-based interventions that target actual or potential causes of the identified nutrition problems. Table 7 shows the summary of major nutrition recommendations for cancer patients.

**Table 7: Summary of Major Nutrition Recommendations and Evidence Level**

Nutrition Intervention	Recommendation	Grade	Reference
Diet and Counselling	<ul style="list-style-type: none"> <li>Weight stabilization is an appropriate goal for patients with cancer cachexia.</li> </ul>	B	DAA, 2005
	<ul style="list-style-type: none"> <li>Intensive dietary counselling and ONS are able to increase dietary intake and to prevent therapy-associated weight loss and interruption of radiation therapy in patients undergoing radiotherapy of gastrointestinal or head and neck areas.</li> </ul>	A	ESPEN, 2006; FESEO, 2008; DAA, 2008
	<ul style="list-style-type: none"> <li>Dietitian should be part of the multidisciplinary team and frequent dietitian contact (refer nutrition monitoring part) has been shown to improve patients' nutrition outcomes and QoL.</li> </ul>	A	DAA, 2008; COSA, 2011
	<ul style="list-style-type: none"> <li>Improving energy and protein intake remains the first step in nutrition intervention for weight losing cancer patients</li> </ul>	C	DAA, 2006
	<ul style="list-style-type: none"> <li>For at low nutritional risk patients (MST = 0-1)                             <ul style="list-style-type: none"> <li>Recommend a well balanced diet</li> <li>Recommend healthy traditional diet according to needs, preferences and symptomatology</li> <li>Healthy, balanced, assorted, appetizing and adequate amount of food and nutrients</li> </ul> </li> </ul>	C	Bauer, 2007; FESEO, 2008.
	<ul style="list-style-type: none"> <li>Patients should not use alternative diets to treat cancer e.g.(refer Appendix 10):                             <ul style="list-style-type: none"> <li>Macrobiotic diet</li> <li>Gonzalez regimen</li> <li>Gerson diet</li> </ul> </li> </ul>	C	ASPEN, 2009
	<ul style="list-style-type: none"> <li>At moderate nutritional risk patients (MST = 2)                             <ul style="list-style-type: none"> <li>Recommend high protein-energy diet</li> <li>High protein and high energy diet</li> <li>Try 6 smaller meals/snacks per day</li> <li>Include 3-4 servings of energy and protein rich foods or drinks daily</li> <li>Oral nutritional supplements 2-3 servings per day</li> </ul> </li> </ul>	C	Bauer, 2007
	<ul style="list-style-type: none"> <li>Ensure adequate alternative sources of protein if vegetarian. For patients with chewing and swallowing difficulties, ensure protein is adequate in texture modified diets</li> </ul>	C	DAA, 2006
	<ul style="list-style-type: none"> <li>At high nutritional risk patients (MST = 3-5)                             <ul style="list-style-type: none"> <li>Recommend high protein high energy diet</li> <li>Recommend high protein high energy supplements 2-3 times per day</li> <li>Consider intensive nutrition support</li> </ul> </li> </ul>	C	Bauer, 2007

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Diet and Counselling	<ul style="list-style-type: none"> <li>To continue nutrition intervention for 3 months post treatment to improve/maintain nutritional status and QoL for HNC patients</li> </ul>	A	COSA, 2011
Enteral Nutrition (General)	<ul style="list-style-type: none"> <li>Standard formula are recommended for EN of cancer patients</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Nutritional therapy should be started if undernutrition already exists or if it is anticipated that the patients will be unable to eat for more than 7 days</li> </ul>	C	
	<ul style="list-style-type: none"> <li>EN should be started if an inadequate food intake (&lt; 60% of EEE) is anticipated for more than 10 days</li> </ul>	C	
	<ul style="list-style-type: none"> <li>In patients who are losing weight due to insufficient nutritional intake, EN should be provided to improve or maintain nutritional status</li> </ul>	B	
	<ul style="list-style-type: none"> <li>EN reduces morbidity in selected malnourished patients.</li> </ul>	A	FESEO, 2008
Enteral Nutrition (Perioperative)	<ul style="list-style-type: none"> <li>NST should not be used routinely in patients undergoing major cancer operation</li> </ul>	A	ASPEN, 2009
	<ul style="list-style-type: none"> <li>Patients with severe nutritional risk should be given nutritional support for 10–14 days prior to major surgery even if surgery has to be delayed</li> </ul>	A	ESPEN, 2006; FESEO, 2008
	<ul style="list-style-type: none"> <li>Pre operative immunonutrition has no additional benefits compared to standard nutrition support for patients undergoing surgery for HNC patients</li> </ul>	C	COSA, 2011
	<ul style="list-style-type: none"> <li>Post operative immunonutrition for HNC patients may be considered to reduce length of stay, although the mechanism is unclear, as other clinical benefits such as reduced complications and infections were not demonstrated</li> </ul>	B	
	<ul style="list-style-type: none"> <li>Perioperative nutrition support therapy may be beneficial in moderate or severely malnourished patients if administered for 7-14 days preoperatively but the potential benefits of nutrition support must be weighed against the potential risks of the nutrition support therapy itself and of delaying the operation</li> </ul>	A	ASPEN, 2009
	<ul style="list-style-type: none"> <li>In all cancer patients undergoing major abdominal surgery preoperative EN preferably with immune modulating substrates (arginine, <math>\Omega</math>-3 fatty acids and nucleotides) is recommended for 5–7 days independent of their nutritional status</li> </ul>	A	ESPEN, 2006 ASPEN, 2009
	<ul style="list-style-type: none"> <li>Tube feeding using standard formula can be used to minimise weight loss for HNC patients in the acute post operative period</li> </ul>	C	COSA, 2011

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Enteral Nutrition (Perioperative)	<ul style="list-style-type: none"> <li>EN should be given to patients with normal nourishment that supposedly will be unable to reach requirements orally for a period of 7-10 days after surgery</li> </ul>	C	FESEO, 2008
	<ul style="list-style-type: none"> <li>EN should be started during first 24 hours after surgery for patients undergoing head and neck surgery or upper GIT and also in seriously malnourished individuals</li> </ul>	A	
Enteral Nutrition During Chemo/Radio-Therapy	<ul style="list-style-type: none"> <li>Routine EN is not indicated during radiation therapy of other body regions</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Routine EN during chemotherapy has no effect on tumor response to chemotherapy nor on chemotherapy-associated unwanted effect</li> </ul>	B	ESPEN, 2006
	<ul style="list-style-type: none"> <li>NST should not be used routinely as an adjunct to chemotherapy and in patients undergoing head and neck, abdominal or pelvic irradiation</li> </ul>	B	ASPEN, 2009
	<ul style="list-style-type: none"> <li>NST is indicated in patients receiving active cancer treatment who are malnourished and who are anticipated to be unable to ingest and/or absorb adequate nutrients for a prolonged period of time</li> </ul>	B	ASPEN, 2009
	<ul style="list-style-type: none"> <li>Patients that are losing weight because of insufficient intake, EN improves and maintain the nutritional status</li> </ul>	B	FESEO, 2008
	<ul style="list-style-type: none"> <li>Tube feeding should be used to improve protein and energy intake for HNC patients when oral intake is inadequate</li> </ul>	B	COSA, 2011
	<ul style="list-style-type: none"> <li>Tube feeding should be used for HNC patients in reducing unplanned hospital admissions and disruptions to treatment compared to oral intake alone</li> </ul>	C	
	<ul style="list-style-type: none"> <li>If an obstructing head and neck or esophageal cancer interferes with swallowing, EN should be delivered by tube</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>TF is also suggested if severe local mucositis is expected, which might interfere with swallowing, e.g. in intensive radiotherapy or in combined modality radio-chemotherapy regimens including radiation of throat or esophagus</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>TF can either be delivered via the transnasal or percutaneous routes. Because of radiation induced oral and esophageal mucositis a PEG may be preferred</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Nasogastric tube (NGT) and percutaneous endoscopic gastrostomy (PEG) feeding are effective in achieving higher protein and energy intakes and weight maintenance in HNC patients undergoing radiation therapy compared with oral intake alone</li> </ul>	B A	DAA, 2008 ADA, 2007

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Enteral Nutrition During Chemo/Radio-Therapy	<ul style="list-style-type: none"> <li>Nutrition support via gastrostomy/jejunostomy for HNC patients during radiation therapy improves Patient-centred outcomes (QoL) compared with oral diet alone</li> </ul>	C	DAA, 2008
Parenteral Nutrition	<ul style="list-style-type: none"> <li>The routine use of PN during chemotherapy, radiotherapy or combined therapy is not recommended</li> </ul>	A	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN should be started if an inadequate food intake and/or EN(&lt;60% of estimated energy expenditure) is anticipated for more than 10 days</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>If patients are malnourished or facing a period longer than one week of starvation and enteral nutritional support is not feasible, PN is recommended</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN can maintain or improve nutritional status in cancer patients but only if the nutritional depletion is not extreme</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>Special attention should be paid to patients with frank cachexia requiring PN for several weeks, using a higher than usual percentage of lipid in the admixture (e.g. 50% of non-protein energy), is beneficial</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>There are no data on <math>\Omega</math>-3 fatty acids in PN</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN is ineffective and probably harmful in oncological patients without swallowing difficulty and gastrointestinal failure</li> </ul>	A	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN is recommended in patients with severe mucositis or severe radiation enteritis</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>If patients develop gastrointestinal toxicity from chemotherapy or radiation therapy, short-term PN is usually better tolerated (and more efficient) than EN to restore the intestinal function and prevent nutritional deterioration</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN should not be used as a routine procedure in patients undergoing major surgery</li> </ul>	A	FESEO, 2008
	<ul style="list-style-type: none"> <li>Perioperative PN should not be used in well-nourished cancer patients</li> </ul>	A	ESPEN, 2009
<ul style="list-style-type: none"> <li>Perioperative PN starting 7–10 days pre-operatively and continuing into the post-operative period is recommended in malnourished candidates for artificial nutrition, when EN is not possible</li> </ul>	A	ESPEN, 2009	

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Nutrition During Transplantation of Hematopoietic Precursor Cells	<ul style="list-style-type: none"> <li>Patients should receive dietary counselling regarding foods which may pose infectious risks and safe food handling during the period of neutropenia</li> </ul>	C	ASPEN, 2009
	<ul style="list-style-type: none"> <li>The routine use of EN is not recommended</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>NST is appropriate in patients who are malnourished and who are anticipated to be unable to ingest and/or absorb adequate nutrients for a prolonged period of time</li> </ul>	B	ASPEN, 2009
	<ul style="list-style-type: none"> <li>EN should be used in patients with a functioning GIT in whom oral intake is inadequate to meet nutrition requirements</li> </ul>	C	ASPEN, 2009
	<ul style="list-style-type: none"> <li>Not to recommend the enteral administration of glutamine or EPA in patients undergoing haematopoietic stem cell transplantation</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Glutamine supplemented PN should be used in HSCT patients for possible health benefit</li> </ul>	B	ESPEN, 2009
	<ul style="list-style-type: none"> <li>No clear recommendation can be made as to the time of introduction of PN in HSCT patients. Its withdrawal should be considered when patients are able to tolerate approximately 50% of their requirements enterally</li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>PN should be reserved for those with severe mucositis, ileus, or intractable vomiting</li> </ul>	B	ESPEN, 2009
	<ul style="list-style-type: none"> <li>In addition, if oral intake is decreased, the increased risk of haemorrhage, and infections associated with enteral tube placement in immuno-compromised and thrombocytopenic patients has to be considered; in certain situations, therefore (e.g. allogeneic HSCT) parenteral nutrition (PN) may be preferred to TF</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Some oral food consumption is advised to stimulate maintenance of intestinal mucosa</li> </ul>	C	FESEO, 2008
<ul style="list-style-type: none"> <li>When PN is used, it should be discontinued as soon as toxicities have resolved after stem cell engraftment</li> </ul>	B	ASPEN, 2009	
Nutrition During Terminal Illness	<ul style="list-style-type: none"> <li>The palliative use of NST in terminally ill cancer patients is rarely indicated</li> </ul>	B	ASPEN, 2009
	<ul style="list-style-type: none"> <li>EN should be provided in order to minimize weight loss, as long as the patient consents and the dying phase has not started</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>When the end of life is very close, most patients only require minimal amounts of food and little water to reduce thirst and hunger</li> </ul>	B	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Give small amounts of fluid to avoid states of confusion induced by dehydration</li> </ul>	B	ESPEN, 2006

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Nutrition During Terminal Illness	<ul style="list-style-type: none"> <li>• Subcutaneously infused fluids in hospital or at home may be helpful and also provide a vehicle for the administration of drugs</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>• “Supplemental” PN should be used in supporting incurable cancer patients with weight loss and reduced nutrient intake</li> </ul>	B	ESPEN, 2009
	<ul style="list-style-type: none"> <li>• In intestinal failure, long-term PN should be offered, if                             <ul style="list-style-type: none"> <li>- Enteral nutrition is insufficient</li> <li>- Expected survival due to tumor progression is longer than 2–3 months</li> <li>- It is expected that PN can stabilize or improve performance status and QoL,</li> <li>- Patient desires this mode of nutritional support</li> </ul> </li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>• Home PN may be recommended in incurable cancer patients if                             <ul style="list-style-type: none"> <li>- They are estimated to die sooner from starvation than from tumor progression (typically because of intestinal obstruction and/or aphagia)</li> <li>- Their performance status and QoL are acceptable</li> <li>- There is strong patient and family motivation for a demanding procedure the success of which has not yet been fully validated</li> </ul> </li> </ul>	C	ESPEN, 2009
	<ul style="list-style-type: none"> <li>• Advanced cancer patients who are to benefit from PN                             <ul style="list-style-type: none"> <li>- Must be physically and emotionally capable of participating in their own care.</li> <li>- Should have an estimated life expectancy of &gt; 40-60 days.</li> <li>- Require strong social and financial support at home.</li> <li>- Must have failed trials of less invasive medical therapies such as appetite stimulants and enteral feedings.</li> </ul> </li> </ul>	C	ASPEN, 2009

## Nutrition Intervention

Nutrition Intervention	Recommendation	Grade	Reference
Others	<ul style="list-style-type: none"> <li>In the presence of systemic inflammation, in addition to nutritional interventions pharmacological efforts are recommended to modulate the inflammatory response</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Steroids or progestins are recommended in order to enhance appetite (prevention of weight loss), modulate metabolic derangements and prevent impairment of QoL in cachectic patients</li> </ul>	A	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Steroids should preferably be administered for short term periods only and their benefits weighed against their adverse side effects</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>The risk of thrombosis during progestin therapy has to be considered</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>There are no reliable data that show any effect of EN on tumour growth. Such theoretical considerations should, therefore, have no influence on the decision to feed a cancer patient</li> </ul>	C	ESPEN, 2006
	<ul style="list-style-type: none"> <li>Although PN supplies nutrients to the tumour, there is no evidence that this has deleterious effects on the outcome. This consideration should therefore have no influence on the decision to feed a cancer patient when PN is clinically indicated</li> </ul>	C	ESPEN, 2009

### Dietary Guidelines for Immunosuppressed Patients – Neutropenic Diet

The use and effectiveness of neutropenic diet is not scientifically proven. In addition, neutropenic diets are not standardized. Further research is needed to better evaluate the benefit of neutropenic diet (Steven, 2011). However, food safety education and high risk foods restriction is needed when handling immunosuppressed patients (ADA, 2006).

## Sample Menu

A sample menu of 1500 kcal/day and its modification to 1800 kcal/day and 2000 kcal/day is shown in Table 8. It is designed to provide 50% carbohydrate, 20% protein and 30% fat from prescribed energy. As for Table 9, it is a modification of texture which is based on food groups that will encourage dietary intake in cancer patients.

**Table 8: Sample menu of 1500 kcal and modification to increase calories to 1800 kcal & 2000 kcal.**

Calories Meals	1500 kcal	1800 kcal	2000 kcal
<b>Breakfast (8am)</b>	<ol style="list-style-type: none"> <li>1. Keow teow soup                             <ul style="list-style-type: none"> <li>- 2/3 chinese bowl of keow teow (cut)</li> <li>- 1/2 cup of minced vegetables</li> <li>- 1 matchbox of minced meat</li> <li>- 1 tsp of oil</li> </ul> </li> <li>2. 1 glass (250 ml) of low fat milk                             <ul style="list-style-type: none"> <li>- To add coffee/tea / chocolate / malt as flavouring (optional)</li> </ul> </li> </ol>	<p><u>Modification:</u></p> <ol style="list-style-type: none"> <li>1. To add 1 matchbox of minced meat in keow teow soup</li> <li>2. To add 3 tsp of sugar in low fat milk with coffee / tea</li> </ol>	<p><u>Modification:</u></p> <p>As in menu 1800 kcal</p>
<b>Lunch (12pm)</b>	<ol style="list-style-type: none"> <li>1. Tosai                             <ul style="list-style-type: none"> <li>- 1 piece of tosai (cut)</li> </ul> </li> <li>2. Dhall curry                             <ul style="list-style-type: none"> <li>- 1/2 cup of dhall</li> <li>- 1/2 piece of tau kua</li> <li>- 1/4 bowl of vegetables</li> <li>- 1 tsp of oil</li> </ul> </li> <li>3. Fruit juice (1 fruit)</li> </ol>	<p><u>Modification:</u></p> <p>As in menu 1500 kcal</p>	<p><u>Modification:</u></p> <ol style="list-style-type: none"> <li>1. To add 1 glass (250ml) of low fat milk or ice cream for morning tea (around 10am and if possible to make breakfast earlier; 7am).</li> </ol>
<b>After-noon Tea (3pm)</b>	<ol style="list-style-type: none"> <li>1. Blended fruit with yogurt                             <ul style="list-style-type: none"> <li>- 1 fruit</li> <li>- 3/4 cup low fat yogurt</li> </ul> </li> <li>2. Bread                             <ul style="list-style-type: none"> <li>- 1 piece of white bread</li> </ul> </li> </ol>	<p><u>Modification:</u></p> <ol style="list-style-type: none"> <li>1. To add 1 fried egg ( 1 tsp oil) for the bread or 2 tsp heap of peanut butter</li> <li>2. To add 3 tsp of sugar in blended fruit yogurt</li> </ol>	<p><u>Modification:</u></p> <p>As in menu 1800 kcal</p>



## Sample Menu

Calories Meals	1500 kcal	1800 kcal	2000 kcal
<b>Dinner (6pm)</b>	<ol style="list-style-type: none"> <li>1. Rice                             <ul style="list-style-type: none"> <li>- 2/3 chinese bowl of white soft rice</li> </ul> </li> <li>2. Kurma ayam                             <ul style="list-style-type: none"> <li>- 1/2 drumstick (minced)</li> <li>- 1 hard boiled egg</li> <li>- 1/2 tsp of oil</li> </ul> </li> <li>3. Stir fried vegetables                             <ul style="list-style-type: none"> <li>- 1/2 cup vegetables (cut)</li> <li>- 1/2 tsp of oil</li> </ul> </li> <li>4. Fruit juice                             <ul style="list-style-type: none"> <li>- ( 1 fruit)</li> </ul> </li> </ol>	<p><u>Modification:</u></p> <p>As in menu 1500 kcal</p>	<p><u>Modification:</u></p> <p>As in menu 1800 kcal</p>
<b>Supper (9pm)</b>	<ol style="list-style-type: none"> <li>1. Low fat milk                             <ul style="list-style-type: none"> <li>- 1 glass (250ml) of low fat milk</li> <li>- To add chocolate / malt as flavouring (optional)</li> </ul> </li> </ol>	<p><u>Modification:</u></p> <p>As in menu 1500 kcal</p>	<p><u>Modification:</u></p> <ol style="list-style-type: none"> <li>1. To add 3 rounded tablespoon of oats into low fat milk.</li> </ol>

**Note:**

1. If patient has difficulty in chewing cut / minced food, then proceed to blended food.
2. If patient has difficulty to fulfil <75% of the dietary requirement, then consider nutritional support (ESPEN, 2006; FESEO, 2008).

# Sample Menu

**Table 9: Examples of modification for different food groups**

<b><u>Modification for grains:</u></b>	<b><u>Modification for fruits:</u></b>	<b><u>Modification for milk:</u></b>	<b><u>Generally to increase protein and calories, add:</u></b>
<p><b><u>To increase protein and calories, add:</u></b></p> <ul style="list-style-type: none"> <li>-egg (as whole or plus oil and beaten then mix well with porridge)</li> <li>-fried tofu (dice)</li> <li>-minced / blend fish / chicken / meat (with oyster or soy sauce as to cover the metallic taste)</li> <li>-fried anchovies ( small pieces )</li> <li>-serve with baked beans</li> <li>-nuts / coconut milk (e.g. bubur lambuk)</li> </ul> <p><b><u>To increase vegetables intake, add:</u></b></p> <ul style="list-style-type: none"> <li>-soft vegetable (dice): cauliflower, tomato / capsicum without skin, canned corn, French beans, carrot, potato, celery, spinach etc.</li> </ul>	<p><b><u>To increase protein and calories, add:</u></b></p> <ul style="list-style-type: none"> <li>- soft fruits (cut) + yogurt + cheese + raisin + mayonnaise / salad dressing</li> <li>- fruit juice + milk + sweeten jelly</li> <li>- fruit juice + milk (ice cube) / honey</li> <li>- fruit (dice) + ice cream + chocolate chips / nuts (flake)</li> <li>- fruit (mango/ honeydew/ watermelon etc) (cut) + sago + coconut milk</li> <li>-fruits dip into chocolate</li> </ul>	<p><b><u>To increase protein and calories, add:</u></b></p> <ul style="list-style-type: none"> <li>- chocolate / malted / coffee / tea (variety of taste)</li> <li>- cereal / baby cereal / oats / cornflakes + raisin / soft fruits / honey</li> <li>- into jelly / pudding</li> </ul> <p><b><u>Modification of gravy:</u></b></p> <p><b><u>To increase calories, add:</u></b></p> <ul style="list-style-type: none"> <li>- more oil and sugar</li> <li>- thicken with corn flour</li> <li>- milk / yogurt / coconut milk</li> <li>- blended potato</li> </ul>	<ul style="list-style-type: none"> <li>- milk / cheese / yogurt</li> <li>- soy bean milk / tofu</li> <li>- egg</li> <li>- nuts / legume</li> <li>- coconut milk</li> <li>- oil / butter</li> <li>- sugar / jam / honey</li> </ul>

**Note:**

1. Marinate fish with juice for improve toleration of bitter taste.
2. If honey / milk and milk products to be used do choose pasteurized or use it in cooking.
3. Ensure clean and fully cooked food to avoid contamination risk.

Common Nutrition impact symptoms of cancer treatment.

**Table 10: Surgery and Related Nutrition Impact Symptoms**

Anatomic Site	Common Nutrition Impact Symptoms
Oral cavity	<ul style="list-style-type: none"> <li>• Difficulty with chewing or swallowing</li> <li>• Aspiration potential</li> <li>• Sore mouth</li> <li>• Xerostomia</li> <li>• Alteration of taste and smell</li> </ul>
Larynx	<ul style="list-style-type: none"> <li>• Alteration in normal swallowing; dysphagia</li> <li>• Aspiration potential</li> </ul>
Esophagus	<ul style="list-style-type: none"> <li>• Gastroparesis</li> <li>• Indigestion or acid reflux</li> <li>• Alteration in normal swallowing; decreased mortality</li> <li>• Anastomotic leak/breakdown</li> </ul>
Lung	<ul style="list-style-type: none"> <li>• Shortness of breath</li> <li>• Early satiety</li> </ul>
Stomach	<ul style="list-style-type: none"> <li>• Dumping syndrome</li> <li>• Dehydration</li> <li>• Early satiety</li> <li>• Gastroparesis</li> <li>• Fat malabsorption</li> <li>• Vitamin and mineral malabsorption (vitamin B-12 and D, calcium and iron)</li> </ul>
Gallbladder and bile duct	<ul style="list-style-type: none"> <li>• Gastroparesis</li> <li>• Hyperglycemia</li> <li>• Fluid and electrolyte imbalance</li> <li>• Vitamin and mineral malabsorption (vitamin B-12, A,D,E and K; magnesium; zinc; calcium and iron)</li> </ul>
Hepatocellular	<ul style="list-style-type: none"> <li>• Hyperglycemia</li> <li>• Hypertriglyceredemiia</li> <li>• Fluid and electrolyte imbalance</li> <li>• Vitamin and mineral malabsorption (vitamin A,D,E, K and thiamin; folic acid; magnesium; zinc)</li> </ul>
Pancreas	<ul style="list-style-type: none"> <li>• Gastroparesis</li> <li>• Fluid and electrolyte imbalance</li> <li>• Hyperglycemia</li> <li>• Fat malabsorption</li> <li>• Vitamin and mineral malabsorption (vitamin B-12, A,D,E and K; zinc; calcium and iron)</li> <li>• Chyle leak</li> </ul>

Anatomic Site	Common Nutrition Impact Symptoms
Small bowel	<ul style="list-style-type: none"> <li>• Lactose intolerance</li> <li>• Bile acid depletion</li> <li>• Diarrhea</li> <li>• Fluid and electrolyte imbalance</li> <li>• Vitamin and mineral malabsorption (vitamin-12, A,D,E and K; zinc; calcium and iron)</li> </ul>
Colorectal	<ul style="list-style-type: none"> <li>• Increased transit time</li> <li>• Diarrhea</li> <li>• Dehydration</li> <li>• Bloating, cramping or/and gas</li> <li>• Fluid and electrolyte imbalance</li> <li>• Vitamin and mineral malabsorption (vitamin B-12,sodium, potassium, magnesium and calcium)</li> </ul>
Gynaecological	<ul style="list-style-type: none"> <li>• Early satiety</li> <li>• Bloating, cramping or/and gas</li> </ul>
Brain	<ul style="list-style-type: none"> <li>• Nausea and vomiting</li> <li>• If on corticosteroids, possible hyperglycemia</li> </ul>

Adapted from Eldridge B. Medical nutrition therapy and neoplastic disease. In: Mahan LK, ed. Krause's Food, Nutrition, and Diet Therapy. 12th ed. Philadelphia, Pa: WB Saunders; 2008

**Table 11: Systemic Therapy and Related Nutrition Impact Symptoms**

Chemotherapeutic Agents	Common Nutrition Impact Symptoms
<p><b>Cytotoxics</b></p> <ul style="list-style-type: none"> <li>• Alkylating agents—cisplatin, oxaliplatin, ifosfamide, cyclophosphamide, busulfan</li> <li>• Antitumour antibiotics —doxorubicin, epirubicin, mitomycin, bleomycin</li> <li>• Anti-metabolites—5-fluorouracil (5-FU), methotrexate, fludarabine, gemcitabine, capecitabine</li> <li>• Antimitotic spindle agent —vincristine, docetaxel, paclitaxel</li> <li>• Topoisomerase inhibitors: irinotecan, topotecan, etoposide</li> </ul>	<ul style="list-style-type: none"> <li>• Myelosuppression, anorexia, nausea, vomiting, renal toxicities, fatigue</li> <li>• Myelosuppression, anorexia, nausea, vomiting, diarrhea, mucositis, fatigue</li> <li>• Myelosuppression, anorexia, nausea, vomiting, diarrhea, mucositis, fatigue</li> <li>• Myelosuppression, anorexia, nausea, vomiting, diarrhea, mucositis, fatigue, peripheral neuropathy</li> </ul>
<p><b>Hormonals</b></p> <ul style="list-style-type: none"> <li>• Glucocorticoids—prednisone, dexamethasone</li> <li>• Antiandrogens—flutamide</li> <li>• Antiestrogens—tamoxifen</li> <li>• Progestins—megesterol acetate</li> <li>• Gonadotropin-releasing hormone analog—leuprolide acetate</li> </ul>	<ul style="list-style-type: none"> <li>• Sodium and fluid retention, gastrointestinal upset, glucose intolerance, potassium wasting, osteoporosis</li> <li>• Nausea, diarrhea, hot flashes</li> <li>• Nausea, bone pain, fluid retention, hot flashes, hypercalcemia</li> <li>• Increased appetite, weight gain, fluid retention, hypercalcemia</li> <li>• Nausea, bone pain</li> </ul>
<p><b>Immunologicals</b></p> <ul style="list-style-type: none"> <li>• Interferon alfa</li> <li>• Interleukin</li> </ul>	<ul style="list-style-type: none"> <li>• Myelosuppression, anorexia, nausea, vomiting, flu-like symptoms</li> <li>• Myelosuppression, nausea, vomiting, hypotension, chills, fatigue, capillary leak syndrome</li> </ul>
<p><b>Immunologicals—hematopoietic agents</b></p> <ul style="list-style-type: none"> <li>• Epoetin alpha—erythropoietin; EPO</li> <li>• Filgrastim—granulocyte colony stimulating factor; G-CSF</li> <li>• Sargramostin—granulocyte macrophage stimulating factor; GM-CSF symptoms</li> </ul>	<ul style="list-style-type: none"> <li>• Fever; iron supplementation may be necessary</li> <li>• Fever, bone pain, flu-like symptoms</li> <li>• Fever, bone pain, flu-like</li> </ul>
<p><b>Targeted therapy</b></p> <ul style="list-style-type: none"> <li>• Small molecule inhibitors                         <ul style="list-style-type: none"> <li>- Imatinib</li> <li>- Sunitinib</li> <li>- Sorafenib</li> </ul> </li> <li>• Monoclonal antibodies—rituximab; trastuzumab,</li> </ul>	<ul style="list-style-type: none"> <li>• Myelosuppression, mucositis, diarrhea,</li> <li>• Myelosuppression, nausea, vomiting, fever, chills, rash</li> </ul>

Adapted from Eldridge B. Medical nutrition therapy and neoplastic disease. In: Mahan LK, ed. Krause's Food, Nutrition, and Diet Therapy. 12th ed. Philadelphia, Pa: WB Saunders; 2008

**Table 12: Radiation and Related Nutrition Impact Symptoms**

Site of Radiation Therapy	Common Nutrition Impact Symptoms	
	Acute Effects	Late Effects (>90 days after treatment)
<b>Central Nervous System</b> <ul style="list-style-type: none"> <li>Brain and spinal cord</li> </ul>	<ul style="list-style-type: none"> <li>Nausea, vomiting</li> <li>Elevated blood glucose due to steroid administration</li> <li>Fatigue</li> <li>Loss of appetite</li> </ul>	<ul style="list-style-type: none"> <li>Headache, lethargy</li> </ul>
<b>Head and Neck Area</b> <ul style="list-style-type: none"> <li>Tongue, larynx, pharynx, oropharynx, nasopharynx, tonsils, salivary glands</li> </ul>	<ul style="list-style-type: none"> <li>Xerostomia</li> <li>Sore mouth and throat</li> <li>Dysphagia, odynophagia</li> <li>Mucositis</li> <li>Alterations in taste and smell</li> <li>Fatigue</li> <li>Loss of appetite</li> </ul>	<ul style="list-style-type: none"> <li>Mucosal—atrophy, dryness, ulceration</li> <li>Salivary glands xerostomia, fibrosis</li> <li>Usteoradionecrosis</li> <li>Trismus</li> <li>Alterations in taste and smell</li> </ul>
<b>Thorax</b> <ul style="list-style-type: none"> <li>Esophagus, lung, breast</li> </ul>	<ul style="list-style-type: none"> <li>Dysphagia, odynophagia</li> <li>Heartburn</li> <li>Fatigue</li> <li>Loss of appetite</li> </ul>	<ul style="list-style-type: none"> <li>Esophageal—fibrosis, stenosis, necrosis</li> <li>Cardiac—angina on effort, pericarditis, cardiac enlargement</li> <li>Pulmonary—dry cough, fibrosis, pneumonitis</li> </ul>
<b>Abdomen and Pelvis</b>	<ul style="list-style-type: none"> <li>Nausea, vomiting</li> <li>Changes in bowel function—diarrhea, cramping, bloating, gas</li> <li>Changes in urinary function—increased frequency,</li> <li>Acute colitis or enteritis</li> <li>Lactose intolerance</li> <li>Fatigue</li> <li>Loss of appetite</li> </ul>	<ul style="list-style-type: none"> <li>Diarrhea, malabsorption, maldigestion</li> <li>Chronic colitis or enteritis.</li> <li>Intestinal—stricture, ulceration, obstruction, perforation, fistula</li> <li>burning sensation with urination</li> <li>Urinary—hematuria, cystitis</li> </ul>

Adapted from Eldridge B. Medical nutrition therapy and neoplastic disease. In: Mahan LK, ed. Krause's Food, Nutrition, and Diet Therapy. 12th ed. Philadelphia, Pa: WB Saunders; 2008

**Table 13: Tips for Managing Nutrition Impact Symptoms**

Symptom	Potential Secondary Problems	Tips for Symptom Management
Nausea	Vomiting, anorexia, weight loss, dehydration, electrolyte imbalances	<ul style="list-style-type: none"> <li>• Have a small, frequent feedings</li> <li>• Take liquids between meals/sips throughout the day/ice chips</li> <li>• Have room temperature or cold foods</li> <li>• Eat dry, starchy, and/or salty foods (potatoes, noodles, cooked cereals)</li> <li>• Sip ginger ale or ginger candy</li> <li>• Eat peppermint candies</li> <li>• Do light exercise and cleansing breaths of fresh air</li> <li>• Choose plain foods. Avoid sweet, rich, greasy, and/or spicy foods,</li> <li>• Choose mild odour food</li> <li>• Avoid favourite foods when nauseated to decrease potential aversions</li> <li>• Avoid liquids on an empty stomach</li> <li>• Avoid lying down for about an hour after eating</li> <li>• Eat and drink your food slowly</li> <li>• Eat soft foods (jelly, ice cream, and yogurt) in small amounts, often. Juices, nectars or glucose drinks may also be well tolerated.</li> <li>• Ask your doctor about medication to relieve nausea.</li> </ul>
Vomiting	Anorexia, weight loss, dehydration, electrolyte imbalances	<ul style="list-style-type: none"> <li>• If nausea precedes vomiting, try nausea management tips</li> <li>• If gagging on secretions is triggering vomiting, consider the following:                             <ul style="list-style-type: none"> <li>- Increase fluid intake to thin secretions (oral, pharyngeal, and respiratory)</li> <li>- Rinse and gargle frequently with baking soda solution (1 Tbsp baking soda/l quart water) to clean oropharynx and temporarily remove thick, ropey secretions</li> <li>- Eat fresh pineapple, which might help thin oral and pharyngeal secretions</li> <li>- Limit caffeine, as it is dehydrating</li> <li>- Use a cool mist humidifier</li> <li>- Avoid mouthwashes that contain alcohol, which can dry the mouth</li> </ul> </li> </ul>

Symptom	Potential Secondary Problems	Tips for Symptom Management
Anorexia	Weight loss/ cachexia, dehydration, electrolyte imbalances	<ul style="list-style-type: none"> <li>• Eat nutrient-dense meals and snacks frequently</li> <li>• Add protein and calories to favourite foods Refer Table 9</li> <li>• Have meals and snacks in pleasant atmosphere</li> <li>• Drink nutrient-dense beverages between meals avoid feeling too full with meals</li> <li>• Do light exercise to stimulate appetite</li> <li>• Have a meal when you can eat most (breakfast often the best meal of the day)</li> </ul>
Weight loss, cachexia	Electrolyte imbalances, impaired organ function, immunosuppression	<ul style="list-style-type: none"> <li>• If cause of weight loss can be determined, treat appropriately</li> <li>• If cause cannot be determined, the patient may consider the following:</li> <li>• Eat small, frequent, nutrient-dense meals and snacks</li> <li>• Add protein and calories to favourite foods</li> <li>• Take meals in snacks in pleasant atmosphere</li> <li>• Keep nutrient-dense snacks close at hand and snack frequently</li> <li>• Capitalize on the times when feeling best (breakfast is often the best meal of the day)</li> </ul>
Early satiety	Anorexia, weight loss, cachexia, electrolyte imbalances, bloating, nausea	<ul style="list-style-type: none"> <li>• Eat small, frequent, nutrient-dense meals and snacks</li> <li>• Add protein and calories to favourite foods</li> <li>• Drink a nutrient-dense liquid diet, which may be more quickly digested and absorbed than solid food</li> <li>• Drink nutrient-dense liquids between meals to avoid feeling too full with meals</li> <li>• Avoid fried, greasy, or rich foods, which take longer to digest</li> <li>• Avoid gaseous foods, which can cause bloating</li> <li>• Have a meal when you can eat most (breakfast is often the best meal of the day)</li> <li>• Do light exercise to stimulate digestion</li> </ul>
Constipation	Nausea, bloating, anorexia, weight loss,	<ul style="list-style-type: none"> <li>• Eat at regular intervals throughout the day</li> <li>• Increase fluid intake to 8-10 cup/day</li> <li>• Avoid caffeine</li> <li>• Increase dietary fibre, if able to take adequate fluids</li> <li>• Drink hot beverages as a bowel stimulant</li> <li>• Eat prune juice, preferably hot, as a bowel stimulant</li> </ul>



Symptom	Potential Secondary Problems	Tips for Symptom Management
		<ul style="list-style-type: none"> <li>• Increase physical activity, as able to increase bowel movement</li> <li>• Establish a schedule for having bowel movements</li> </ul>
Diarrhea	Dehydration, electrolyte imbalances, malabsorption, anorexia, weight loss	<ul style="list-style-type: none"> <li>• Add soluble fibre to diet at regular intervals throughout the day</li> <li>• Limit/avoid insoluble fibre</li> <li>• Eat small, frequent meals and snacks throughout the day</li> <li>• Avoid greasy, fried, spicy, or very rich foods</li> <li>• Avoid alcohol and caffeine</li> <li>• Avoid dairy products, or use lactase enzyme, if lactose intolerant</li> <li>• Avoid excessive amounts of sweetened beverages (fruit juice cocktails, fruit drinks, sodas, teas) and juices that might contribute to osmotic diarrhoea</li> <li>• Avoid sugar-free gum and candy made with sorbitol</li> <li>• Increase fluid intake (1 cup water for each diarrheal stool)</li> <li>• Increase consumption of high-potassium foods if diarrhoea is severe (potatoes and bananas are especially good, since they are also sources of soluble fibre)</li> <li>• Increase consumption of high-sodium foods if diarrhoea is severe (commercially prepared broths and soups are good sources of fluid and sodium)</li> <li>• Other foods that aggravate the bowel include spices and condiments, very hot or cold foods, “gas-producing” foods like cabbage, onions and brussel sprouts. These should be avoided at first and slowly re-introduced</li> <li>• If diarrhoea is prolonged, speak with your doctor</li> </ul>
Malabsorption	Nutrient deficiencies	<ul style="list-style-type: none"> <li>• Eat small, frequent meals and throughout the day</li> <li>• Avoid fluids and foods that promote diarrhea (intake and output should be monitored, along with the numbers, colour and consistency of stools to determined food that are problematic.</li> <li>• Increase fluid intake (1 cup water for each diarrheal stool)</li> </ul>

Symptom	Potential Secondary Problems	Tips for Symptom Management
Lactose intolerance	Avoidance of dairy products without diet instruction or supplementation could lead to calcium and vitamin D deficiencies	<ul style="list-style-type: none"> <li>• Try lactase enzyme supplement to help digest dairy products; dosage should be titrated to alleviate symptoms</li> <li>• Try dairy products treated with lactase enzyme</li> <li>• Limit/avoid dairy products; substitute milk with soy or rice milk or Vita Mite non dairy beverage; increase consumption of non dairy high-calcium foods</li> </ul>
Xerostomia	Difficulty chewing and swallowing, decreased intake of food	<ul style="list-style-type: none"> <li>• Try tart foods to stimulate saliva</li> <li>• Sip on liquids or suck on ice chips throughout the day (aim for 8-10 cups of fluid per day)</li> <li>• Try sipping fruit juice throughout the day</li> <li>• Try drinking through a straw</li> <li>• Rinse the mouth frequently with baking soda solution (1 Tbsp baking soda/1 quart water)</li> <li>• Try sucking on lemon drops, eating frozen grapes, pop- sides or chewing sugar-free gum</li> <li>• Avoid caffeine</li> <li>• Avoid alcohol and tobacco</li> <li>• Avoid alcohol-containing mouthwashes</li> <li>• Try soft and/or moist foods with extra sauce, dressings, or gravies</li> <li>• Try using a cool mist humidifier</li> </ul>
Taste changes	Anorexia, decreased intake of food, weight loss	<ul style="list-style-type: none"> <li>• Take a different protein source—like poultry, fish, eggs, dairy products, beans, and soy products—if red meat unappealing</li> <li>• Marinades and spices to mask strange tastes</li> <li>• Use plastic utensils rather than stainless steel to help alleviate metal taste</li> <li>• Eat foods at room temperature or chilled</li> <li>• Add lemon, lime, vinegar, or salt to foods that seem to taste sweet</li> <li>• Add lemon, lime, instant decaffeinated coffee powder, or mint to milkshakes or commercially prepared supplements</li> <li>• Rinse the mouth frequently with baking soda solution (1 Tbsp baking soda/1 Quart water)</li> <li>• Sipping pleasant-tasting beverages, sucking popsides or hard candy, or eating sherbet or sorbet to mask bad taste between meals</li> <li>• Eat fresh or frozen foods rather than canned</li> <li>• Brushing your teeth before eating may help</li> </ul>

Symptom	Potential Secondary Problems	Tips for Symptom Management
Dysphagia	Decreased intake, weight loss	<ul style="list-style-type: none"> <li>• Follow instructions regarding diet consistency and swallowing techniques provided by the speech pathologist</li> <li>• Eat soft, moist, or pureed foods—uniform consistency is best, as opposed to chunky soups and stews</li> <li>• Eat smaller, more frequent meals and snacks</li> <li>• Use commercially prepared food thickeners, tapioca, flour, instant mashed potatoes, infant rice cereal, and/or cornstarch to thicken liquids, as advised by the speech pathologist</li> <li>• Avoid breads, cakes, cookies, and crackers, or soak in milk, juice, gravy, or sauce before eating</li> <li>• Try ice, sherbet/sorbet, or popsicles before a meal to stimulate the swallowing reflex, as advised by the speech pathologist</li> </ul>
Mucositis	Decreased intake, weight loss	<ul style="list-style-type: none"> <li>• Try soft, moist foods with extra sauce, dressings, and gravies (watch for acidic ingredients like tomatoes, citrus, or vinegar, however)</li> <li>• Use a straw to direct fluid away from the painful parts of the mouth</li> <li>• Avoid alcohol, citrus, caffeine, tomatoes, vinegar, and hot peppers</li> <li>• Avoid dry, coarse, or rough foods</li> <li>• Avoid spicy foods</li> <li>• Try foods at room temperature or chilled</li> <li>• Try sucking popsicles or ice chips to numb the mouth</li> <li>• Rinse the mouth frequently with baking soda solution (1 Tbsp baking soda/1 quart water)</li> <li>• Avoid alcohol-containing mouthwashes</li> </ul>
Esophagitis	Decreased intake, weight loss	<ul style="list-style-type: none"> <li>• Try soft, moist foods with extra sauce, dressings, and gravies (watch for acidic ingredients like tomatoes, citrus, or vinegar, however)</li> <li>• Use a straw to direct fluid away from the painful parts of the mouth</li> <li>• Avoid alcohol, citrus, caffeine, tomatoes, vinegar, and hot pepper s</li> <li>• Avoid dry, coarse, or rough foods</li> <li>• Avoid spicy foods</li> <li>• Take foods in the room temperature or chilled</li> </ul>

Symptom	Potential Secondary Problems	Tips for Symptom Management
		<ul style="list-style-type: none"> <li>• Suck popsicles or ice chips to numb the mouth</li> <li>• Rinse the mouth and gargle frequently with baking soda solution(1 tbsp baking soda/1 quart water)</li> <li>• Avoid alcohol-containing mouthwashes</li> </ul>
Oral candidiasis	Taste changes, sore mouth, decreased intake, weight loss; can spread to the pharynx and esophagus, causing and sore throat and dysphagia	<ul style="list-style-type: none"> <li>• Try soft, moist foods with extra sauce, dressings, and gravies (watch for acidic ingredients like tomatoes, citrus, or vinegar, however)</li> <li>• Use a straw to direct fluid away from the painful parts of the mouth</li> <li>• Avoid alcohol, citrus, caffeine, tomatoes, vinegar, and hot peppers</li> <li>• Avoid dry, coarse, or rough foods</li> <li>• Avoid spicy foods</li> <li>• Take foods at room temperature or chilled</li> <li>• Try sucking popsicles or ice chips to numb the mouth</li> <li>• Rinse the mouth and gargle frequently with baking soda solution (1 Tbsp baking soda/1 quart water)</li> <li>• Avoid alcohol-containing mouthwashes</li> </ul>
Pain (not specific to the Anorexia, nausea and vomiting, alimentary tract)weight loss	Anorexia, nausea and vomiting, weight loss	<ul style="list-style-type: none"> <li>• Eat small frequent feedings</li> <li>• Take soft foods at room temperature or chilled</li> <li>• Try deep cleansing breaths of fresh air</li> <li>• Eat dry, starchy, and/or salty foods frequently throughout the day to manage nausea</li> <li>• Take sips of cool, soothing beverages between meals</li> <li>• Take peppermint candy or gum to relieve nausea</li> <li>• Take ginger candy</li> <li>• Take pain medications as ordered (usually around the clock, rather than PRN), to avoid “catching up with the pain”</li> </ul>

Modified and adapted from:

American Dietetic Association, The Clinical Guide to Oncology Nutrition 2nd Ed. 2006.  
pp 241-245

## Coordination of Care

Multidisciplinary cancer team is highly recommended to meet the comprehensive needs of cancer patients which include regular monitoring during hospitalization and at home, and continues after the patient achieves remission (Raynard, 2010).

**Coordination Mechanisms** (Modified and adapted from Bickell & Young, 2001) Grade B

- a. Multidisciplinary meetings
- b. Patient support programs
- c. Information systems
- d. Scheduling and follow-up

**Table 14: Benefits of Coordination of Care**

Benefits	References
A. Improve patient outcomes and improve use of recommended treatments, including increased referral to appropriate services and patient compliance	Young et al., 1998 Grade C
B. Improve communication between providers streamline services, decrease duplication and reduce costs.	
C. Better coordination of inpatient care is associated with lower inpatient morbidity and mortality and higher patient satisfaction	
Better coordination of outpatient care is associated with higher levels of perceived health status and receipt of preventive services	Safran et al., 1998 Grade C

## Physical Activity and Cancer

Physical activity has been proposed as a nonpharmacologic intervention to combat the physiologic and psychologic effects of treatment in cancer patients (Friedenreich 2001).

**Table 15: Physical Activity in Cancer Patients**

Benefits	References
<p>Exercise during cancer treatment:</p> <ul style="list-style-type: none"> <li>• Safe and feasible</li> <li>• Improves cardiorespiratory fitness during and after cancer treatment</li> <li>• Improve symptoms and physiologic effects during treatment, and vigor post treatment</li> </ul>	<p>(Schmitz et al., 2005) Grade A</p>
<p>Indications:</p> <ul style="list-style-type: none"> <li>• Patient receiving chemotherapy and radiation therapy who are already on an exercise program : Exercise at a lower intensity and progress at a slower pace, but the principal goal should be to maintain activity as much as possible.</li> <li>• Patients who were sedentary before diagnosis: Low-intensity activities such as stretching and brief, slow walks should be adopted and slowly advanced.</li> <li>• Older persons and those with bone disease or significant impairments such as arthritis or peripheral neuropathy: Careful attention should be given to balance and safety to reduce the risk for falls and injuries.</li> </ul>	<p>(Doyle et al., 2006) Grade B</p>
<p>Benefits:</p> <ul style="list-style-type: none"> <li>• Statistically significant improvements in QoL particularly in physical functioning and peak oxygen consumption and in reducing symptoms of fatigue</li> <li>• Exercise has been shown to improve cardiovascular fitness, muscle strength, body composition, fatigue, anxiety, depression, self-esteem, happiness, and several components of QoL (physical, functional, and emotional) in cancer survivors.</li> </ul>	<p>( McNeely et al., 2006) Grade A</p> <p>(Courneya et al., 2003). Grade B</p>

**Table 16: Contraindications and Recommendations for physical activity in cancer patients (Grade C)**

Contraindications	Recommendations
Severe anemia	<ul style="list-style-type: none"> <li>Do not exercise, other than activities of daily living, until anaemia is improved.</li> </ul>
Compromised immune function	<ul style="list-style-type: none"> <li>Avoid public gyms and other public places until white blood cell counts return to safe levels.</li> <li>Patients who have completed a bone marrow transplant are usually advised to avoid such exposures for 1 year after transplantation.</li> </ul>
Severe fatigue	<ul style="list-style-type: none"> <li>Do not engage any exercise program</li> <li>Encouraged to do 10 minutes of stretching exercises daily</li> </ul>
Undergoing radiation	<ul style="list-style-type: none"> <li>Avoid chlorine exposure to irradiated skin (e.g. from swimming pools).</li> </ul>
Indwelling catheters	<ul style="list-style-type: none"> <li>Avoid water or other microbial exposures that may result in infections.</li> <li>Avoid resistance training of muscles in the area of the catheter to avoid dislodgment.</li> </ul>
Significant peripheral neuropathies or ataxia	<ul style="list-style-type: none"> <li>May do better with a stationary reclining bicycle, for example, than walking on a treadmill.</li> </ul>

Doyle et al., 2006

### Suggested Ways to Increase Physical Activity

- Use stairs rather than an elevator.
- If you can, walk or bike to your destination.
- Exercise with your family, friends, and co-workers.
- Take an exercise break to stretch or take a short walk.
- Walk to visit nearby friends or coworkers instead of sending an e-mail.
- Plan active vacations rather than only driving trips.
- Wear a pedometer every day and increase your daily steps.
- Use a stationary bicycle or treadmill while watching TV.

Source: Doyle et al., 2006

Nutrition monitoring and evaluation is activity whereby the interval data will be collected and reviewed to evaluate how chosen interventions have altered the signs and symptoms associated with nutrition problems. Table 17 shows tools and parameters used to monitor and evaluate cancer patients.

**Table 17: Nutrition Monitoring & Evaluation in Cancer Patients**

**1) PG-SGA**

Tool	Frequency of Monitoring				Ideal/ Goal Targets	Strategy
	Baseline	Daily	Weekly	Monthly		
PG-SGA		✓		✓	Target is to reduce or maintain PG-SGA score (DAA 2006, Grade B)	

**2) Anthropometry**

Parameter	Frequency of Monitoring				Ideal/ Goal Targets	Strategy
	Baseline	Daily	Weekly	Monthly		
Weight/ BMI	✓		✓		<5% wt loss in 1 month or 10% in 3 to 6 month	<ul style="list-style-type: none"> <li>• Monitor weight and nutritional status during and post (chemo) radiotherapy (Grade A) (COSA, 2011)</li> <li>• Weight maintenance or the prevention of further weight loss may be more appropriate for patients with cancer rather than restoring pre illness weight (Grade B) (Capra et. Al., 2002)</li> </ul>
Height	✓				-	-



## 2) Anthropometry

Parameter	Frequency of Monitoring					Ideal/ Goal Targets	Strategy
	Baseline	Daily	Weekly	Monthly	As Needed		
Lean Body Mass	√				√	-	<ul style="list-style-type: none"> <li>• Skinfold such as Tricep Skinfold (TSF), Mid-arm Muscle Circumference (MAMC) and Corrected Arm Muscle Area (CAMA) can be used to record anthropometric measures over time (Grade B) (DAA, 2008)</li> <li>• Bioelectrical impedance analysis is not suitable for body composition measurement in individual patients with cancer cachexia (Grade B) (DAA, 2006)</li> </ul>

## 3) Biochemistry

### Renal Profile

Parameter	Frequency of Monitoring					Ideal/ Goal Targets	Remarks
	Baseline	Daily	Weekly	Monthly	As Needed		
Sodium	√				√	135-145 mmol/L	<ul style="list-style-type: none"> <li>• To monitor various patients such as those receiving TPN or who have renal conditions, COPD, uncontrolled DM, various endocrine disorders, ascitic and edematous symptoms, or acidotic or alkalotic conditions; decreased K+ associated with diarrhea, vomiting or NG aspiration and diuretics; increased K+ associated with renal diseases, crush injuries, infection and hemolyzed blood specimens (Litchford, 2008)</li> </ul>
Potassium	√				√	3.5-5.1 mmol/L	
Magnesium	√				√	0.7-1.15mmol/L	
Phosphate	√				√	0.87-1.45 mmol/L	
Urea	√				√	2.9-7.9 mmol/L	
Creatinine	√				√	35-132 umol/L	

### 3) Biochemistry

#### Indicators of Protein Status

Parameter	Frequency of Monitoring					Ideal/ Goal Targets	Remarks
	Baseline	Daily	Weekly	Monthly	As Needed		
Albumin	✓				✓	35-50 g/L	<ul style="list-style-type: none"> <li>Serum albumin has been shown to be an independent prognostic variable for survival in patients with cancer (Grade B) (DAA, 2006; Evans, 1987; Litchford, 2008)</li> </ul>
Prealbumin					✓	10-40mg/dL	-
Total Protein	✓				✓	64-83g/L	-
Nitrogen Balance	✓				✓	- ve balance (catabolism) + ve 4-6 g/day (anabolism)	<ul style="list-style-type: none"> <li>When nitrogen balance is positive, this suggests sufficient protein is being provided (Grade B) (ADA, 2006)</li> </ul>
C-reactive Protein (CRP)	✓				✓	0-0.5mg/dL	<ul style="list-style-type: none"> <li>Use to interpret current clinical condition(Grade B) (DAA, 2006)</li> <li>A high CRP level is associated with tumor progression and poor survival in patients with esophageal squamous cell carcinoma (Grade B) (Shimada et. al. 2003)</li> </ul>

### 3) Biochemistry Hematological Assessment

Parameter	Frequency of Monitoring					Ideal/ Goal Targets	Remarks
	Baseline	Daily	Weekly	Monthly	As Needed		
Haemoglobin	✓				✓	Male: 14.0-18.0 g/dL Female: 12.0-16.0 g/dl	• Use to interpret current clinical condition (DAA, 2006; Litchford, 2008)
White Blood Cell	✓				✓	4.5-11.0 x 10 <sup>3</sup> /uL	
Haematocrit (HCT)	✓				✓	Male: 39-49% Female: 35-45%	
Platelet	✓				✓	150-450 g/dL	
Lymphocyte count	✓				✓		

### 4) Clinical

Parameter	Frequency of Monitoring					Remarks
	Baseline	Daily	Weekly	Monthly	As Needed	
Temperature	✓	✓				Charney & Cranganu, 2010
GI Symptoms	✓	✓				
Medications	✓				✓	

## 5) Dietary

Parameter	Frequency of Monitoring					Ideal/ Goal Targets	Strategy
	Baseline	Daily	Weekly	Monthly	As Needed		
Energy Intake	✓		✓			At least 30kcal/kg/day (COSA, 2011; DAA 2008)	<ul style="list-style-type: none"> <li>The Dietitian should provide MNT consisting of a pre-treatment evaluation and weekly visits during radiation treatment for head and neck cancer to improve outcomes (Grade A) (ADA, 2007; COSA,2011)</li> <li>The need for follow-up can be determined at the initial assessment and can vary among individuals. Some may need to be seen by dietitian 2-3 weeks throughout the course of treatment (Grade C) (ADA, 2006)</li> <li>Patient should receive minimum fortnightly follow up by a dietitian for at least 6 weeks post treatment (Grade A) (ADA, 2007; COSA, 2011)</li> </ul>
Protein Intake	✓		✓			At least 1.2g protein/kg/day (COSA, 2011; DAA 2008)	
EPA Intake	✓		✓			2g of EPA/day (ASPEN, 2009; DAA 2005)	<ul style="list-style-type: none"> <li>Administrate for at least 4 weeks to achieve clinical benefits (Grade B) (DAA, 2006)</li> </ul>
Fluid Intake	✓		✓			-	-
Appetite	✓	✓				-	-
Food allergies	✓					-	-

## 6) Functional Status and QoL

Tool	Frequency of Monitoring				Remarks	
	Baseline	Daily	Weekly	Monthly		As Needed
Karnofsky Performance Scale (KPS)	√				√	<ul style="list-style-type: none"> <li>KPS used to compare the efficacy of different therapies and to assess an individual's prognosis. Lower scores (&lt;40) are associated with rapid disease progression and poor survival rate (Grade B) (Ottery, 1995)</li> </ul>
EORTC QLQ-C30	√				√	
Handgrip strength	√				√	

\*Reference range given is adapted from different sources. Always refer to reference given together with laboratory result at your respective institution.

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## **American Cancer Society (ACS)**

Website: [www.cancer.org](http://www.cancer.org)

## **American Institute for Cancer Research (AICR)**

Website: [www.aicr.org](http://www.aicr.org)

**American College of Radiology (ACR)**

Website: [www.acr.org](http://www.acr.org)

**American Society for Therapeutic Radiology and Oncology (ASTRO)**

Website: [www.astro.org](http://www.astro.org)

**National Cancer Institute (NCI)**

Website: [www.cancer.gov](http://www.cancer.gov)

**Cancer Council Victoria (CCV)**

Website: [www.cancervic.org.au](http://www.cancervic.org.au)

**Breastcancer.org**

Website: [www.breastcancer.org](http://www.breastcancer.org)

**Cancerbackup**

Website: [www.cancerbackup.org.uk](http://www.cancerbackup.org.uk)

## Appendix 1: The Malnutrition Screening Tool

### The Malnutrition Screening Tool

1. Have you lost weight recently without trying? If no (0) If unsure (2) If yes, how much weight (kg) have you lost?  <input type="checkbox"/> 0.5–5.0 (1) <input type="checkbox"/> >5.0–10.0 (2) <input type="checkbox"/> >10.0–15.0 (3) <input type="checkbox"/> >15.0 (4)
2. Have you been eating poorly because of a decreased appetite?  <input type="checkbox"/> Yes (1) <input type="checkbox"/> No (0)
If score <input type="checkbox"/> 0 or 1 not at risk of malnutrition <input type="checkbox"/> $\geq 2$ at risk of malnutrition

Ferguson M, Bauer J, Banks M, Capra S. 1999. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. *Nutrition*. 15: 458–464.

## Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History (Boxes 1-4 are designed to be completed by the patient.)

<p style="text-align: center;">Patient ID Information</p>	
<p><b>1. Weight</b> (See Worksheet 1)</p> <p>In summary of my current and recent weight:</p> <p>I currently weigh about _____ pounds</p> <p>I am about _____ feet _____ tall</p> <p>One month ago I weighed about _____ pounds</p> <p>Six months ago I weighed about _____ pounds</p> <p>During the past two weeks my weight has:</p> <p><input type="checkbox"/> decreased <sup>(a)</sup> <input type="checkbox"/> not changed <sup>(a)</sup> <input type="checkbox"/> increased <sup>(a)</sup>      Box 1 <input style="width: 30px; height: 20px;" type="text"/></p>	<p><b>2. Food Intake:</b> As compared to my normal intake, I would rate my food intake during the past month as:</p> <p><input type="checkbox"/> unchanged <sup>(a)</sup></p> <p><input type="checkbox"/> more than usual <sup>(a)</sup></p> <p><input type="checkbox"/> less than usual <sup>(a)</sup></p> <p>I am now taking:</p> <p><input type="checkbox"/> normal <sup>(a)</sup> food but less than normal amount <sup>(a)</sup></p> <p><input type="checkbox"/> little solid food <sup>(a)</sup></p> <p><input type="checkbox"/> only liquids <sup>(a)</sup></p> <p><input type="checkbox"/> only nutritional supplements <sup>(a)</sup></p> <p><input type="checkbox"/> very little of anything <sup>(a)</sup></p> <p><input type="checkbox"/> only tube feedings or only nutrition by vein <sup>(a)</sup>      Box 2 <input style="width: 30px; height: 20px;" type="text"/></p>
<p><b>3. Symptoms:</b> I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply):</p> <p><input type="checkbox"/> no problems eating <sup>(a)</sup></p> <p><input type="checkbox"/> no appetite, just did not feel like eating <sup>(a)</sup></p> <p><input type="checkbox"/> nausea <sup>(a)</sup></p> <p><input type="checkbox"/> constipation <sup>(a)</sup></p> <p><input type="checkbox"/> mouth sores <sup>(a)</sup></p> <p><input type="checkbox"/> things taste funny or have no taste <sup>(a)</sup></p> <p><input type="checkbox"/> problems swallowing <sup>(a)</sup></p> <p><input type="checkbox"/> pain, where? <sup>(a)</sup> _____</p> <p><input type="checkbox"/> other <sup>(a)</sup> _____</p> <p>** Examples: depression, money, or dental problems</p> <p style="text-align: right;">Box 3 <input style="width: 30px; height: 20px;" type="text"/></p>	<p><b>4. Activities and Function:</b> Over the past month, I would generally rate my activity as:</p> <p><input type="checkbox"/> normal with no limitations <sup>(a)</sup></p> <p><input type="checkbox"/> not my normal self, but able to be up and about with fairly normal activities <sup>(a)</sup></p> <p><input type="checkbox"/> not feeling up to most things, but in bed or chair less than half the day <sup>(a)</sup></p> <p><input type="checkbox"/> able to do little activity and spend most of the day in bed or chair <sup>(a)</sup></p> <p><input type="checkbox"/> pretty much bedridden, rarely out of bed <sup>(a)</sup></p> <p style="text-align: right;">Box 4 <input style="width: 30px; height: 20px;" type="text"/></p>
<p>Additive Score of the Boxes 1-4 <input style="width: 30px; height: 20px;" type="text"/> A</p>	

# Appendix 2: The scored Patient Generated Subjective Global Assessment (PG-SGA)

The remainder of this form will be completed by your doctor, nurse, dietitian or therapist. Thank you.

## Scored Patient-Generated Subjective Global Assessment (PG-SGA)

<p><b>Worksheet 1 - Scoring Weight (Wt) Loss</b></p> <p>To determine score, use 1 month weight data if available. Use 6 month data only if there is no 1 month weight data. Use protein below to score weight change and add one extra point if patient has lost weight during the past 1 wk.</p> <p><b>Wt loss in 1 month: Points</b>    <b>Wt loss in 6 months</b></p> <table style="width:100%; border: none;"> <tr> <td>10% or greater</td> <td>4</td> <td>20% or greater</td> <td></td> </tr> <tr> <td>5-9.9%</td> <td>3</td> <td>10 - 19.9%</td> <td></td> </tr> <tr> <td>3-4.9%</td> <td>2</td> <td>5 - 9.9%</td> <td></td> </tr> <tr> <td>2-2.9%</td> <td>1</td> <td>2 - 4.9%</td> <td></td> </tr> <tr> <td>0-1.9%</td> <td>0</td> <td>0 - 1.9%</td> <td></td> </tr> </table> <p><b>Numerical score from Worksheet 1</b> <input type="text"/></p>	10% or greater	4	20% or greater		5-9.9%	3	10 - 19.9%		3-4.9%	2	5 - 9.9%		2-2.9%	1	2 - 4.9%		0-1.9%	0	0 - 1.9%		<p style="text-align: right;"><b>Additive Score of the Boxes 1-4 (See Sub 1)</b> <input type="text"/> <b>A</b></p> <p><b>5. Worksheet 2 - Disease and its relation to nutritional requirements</b></p> <p>All relevant diagnoses (specify) _____</p> <p>One point each:</p> <p><input type="checkbox"/> Cancer    <input type="checkbox"/> AIDS    <input type="checkbox"/> Pulmonary or cardiac cachexia    <input type="checkbox"/> Presence of decubitus, open wound, or fistula</p> <p><input type="checkbox"/> Presence of trauma    <input type="checkbox"/> Age greater than 65 years    <input type="checkbox"/> Chronic renal insufficiency</p> <p><b>Numerical score from Worksheet 2</b> <input type="text"/> <b>B</b></p>																																																																						
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<p><b>6. Worksheet 3 - Metabolic Demand</b></p> <p>Score for metabolic stress is determined by a number of variables known to increase protein &amp; caloric needs. The score is additive so that a patient who has a fever of &gt; 102 degrees (3 points) and is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.</p> <table style="width:100%; border: none;"> <tr> <td style="width: 50%;"><b>Stressors (S)</b></td> <td style="width: 50%;"><b>high (3)</b></td> </tr> <tr> <td>Fever</td> <td>&gt;102</td> </tr> <tr> <td>Fluid overload</td> <td>&gt; 72 hrs</td> </tr> <tr> <td>Cardiovascular</td> <td>high dose steroid</td> </tr> <tr> <td></td> <td>(≥30mg prednisone equivalents/day)</td> </tr> <tr> <td></td> <td><b>moderate (2)</b></td> </tr> <tr> <td></td> <td>&gt;101 and &lt;102</td> </tr> <tr> <td></td> <td>72 hrs</td> </tr> <tr> <td></td> <td>moderate dose</td> </tr> <tr> <td></td> <td>(≥10 and &lt;30mg prednisone equivalents/day)</td> </tr> <tr> <td></td> <td><b>low (1)</b></td> </tr> <tr> <td></td> <td>&gt;99 and &lt;101</td> </tr> <tr> <td></td> <td>&lt;72 hrs</td> </tr> <tr> <td></td> <td>low dose</td> </tr> <tr> <td></td> <td>(&lt;10mg prednisone equivalents/day)</td> </tr> </table> <p><b>Numerical score from Worksheet 3</b> <input type="text"/> <b>C</b></p>	<b>Stressors (S)</b>	<b>high (3)</b>	Fever	>102	Fluid overload	> 72 hrs	Cardiovascular	high dose steroid		(≥30mg prednisone equivalents/day)		<b>moderate (2)</b>		>101 and <102		72 hrs		moderate dose		(≥10 and <30mg prednisone equivalents/day)		<b>low (1)</b>		>99 and <101		<72 hrs		low dose		(<10mg prednisone equivalents/day)	<p><b>7. Worksheet 4 - Physical Exam</b></p> <p>Physical exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, &amp; fluid status. Since this is subjective, each aspect of the exam is rated for degree of deficit. Muscle deficit increases point score more than fat deficit. Deduction of categories 0 - no deficit, 1+ - mild deficit, 2+ - moderate, 3+ - severe</p> <table style="width:100%; border: none;"> <tr> <td style="width: 30%;"><b>Muscle Status:</b></td> <td style="width: 30%;"></td> <td style="width: 30%;"></td> </tr> <tr> <td>temples (temporalis muscle)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>clavicles (pectoralis &amp; deltoid)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>abdomen (abdom)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>interscapular muscles</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>scapula (interscapular chest, axilla)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>thigh (quadriceps)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>calf (gastrocnemius)</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td><b>Global muscle status rating</b></td> <td><b>0 1+ 2+ 3+</b></td> <td><b>0 1+ 2+ 3+</b></td> </tr> <tr> <td><b>Fat Status:</b></td> <td></td> <td></td> </tr> <tr> <td>orbital fat pads</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>triceps skin fold</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>fat covering lower ribs</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td><b>Global fat deficit rating</b></td> <td><b>0 1+ 2+ 3+</b></td> <td><b>0 1+ 2+ 3+</b></td> </tr> <tr> <td><b>Fluid Status:</b></td> <td></td> <td></td> </tr> <tr> <td>ankle edema</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>axilla edema</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>scapular edema</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td>ascites</td> <td>0 1+ 2+ 3+</td> <td>0 1+ 2+ 3+</td> </tr> <tr> <td><b>Global fluid status rating</b></td> <td><b>0 1+ 2+ 3+</b></td> <td><b>0 1+ 2+ 3+</b></td> </tr> </table> <p><b>Numerical score from Worksheet 4</b> <input type="text"/> <b>D</b></p> <p style="text-align: center;"><b>Total PG-SGA score</b> <input type="text"/></p> <p style="text-align: center;">(Total numerical score of A+B+C+D above)</p> <p style="text-align: center;">(See triage recommendations below)</p> <p><b>Global PG-SGA rating (A, B, or C)</b> - <input type="text"/></p>	<b>Muscle Status:</b>			temples (temporalis muscle)	0 1+ 2+ 3+	0 1+ 2+ 3+	clavicles (pectoralis & deltoid)	0 1+ 2+ 3+	0 1+ 2+ 3+	abdomen (abdom)	0 1+ 2+ 3+	0 1+ 2+ 3+	interscapular muscles	0 1+ 2+ 3+	0 1+ 2+ 3+	scapula (interscapular chest, axilla)	0 1+ 2+ 3+	0 1+ 2+ 3+	thigh (quadriceps)	0 1+ 2+ 3+	0 1+ 2+ 3+	calf (gastrocnemius)	0 1+ 2+ 3+	0 1+ 2+ 3+	<b>Global muscle status rating</b>	<b>0 1+ 2+ 3+</b>	<b>0 1+ 2+ 3+</b>	<b>Fat Status:</b>			orbital fat pads	0 1+ 2+ 3+	0 1+ 2+ 3+	triceps skin fold	0 1+ 2+ 3+	0 1+ 2+ 3+	fat covering lower ribs	0 1+ 2+ 3+	0 1+ 2+ 3+	<b>Global fat deficit rating</b>	<b>0 1+ 2+ 3+</b>	<b>0 1+ 2+ 3+</b>	<b>Fluid Status:</b>			ankle edema	0 1+ 2+ 3+	0 1+ 2+ 3+	axilla edema	0 1+ 2+ 3+	0 1+ 2+ 3+	scapular edema	0 1+ 2+ 3+	0 1+ 2+ 3+	ascites	0 1+ 2+ 3+	0 1+ 2+ 3+	<b>Global fluid status rating</b>	<b>0 1+ 2+ 3+</b>	<b>0 1+ 2+ 3+</b>
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<p><b>Worksheet 5 - PG-SGA Global Assessment Categories</b></p> <table style="width:100%; border: none;"> <tr> <td style="width: 30%;"><b>Category</b></td> <td style="width: 30%;"><b>Global Assessment</b></td> <td style="width: 30%;"><b>PG-SGA Rating</b></td> </tr> <tr> <td>Weight</td> <td>At least moderately malnourished (&gt; 10% of ideal body weight) OR 10% or less of ideal body weight for 1 month OR Progressive loss</td> <td>1+ 2+ 3+</td> </tr> <tr> <td>Protein intake</td> <td>At least moderately deficient</td> <td>1+ 2+ 3+</td> </tr> <tr> <td>Protein intake</td> <td>At least moderately deficient</td> <td>1+ 2+ 3+</td> </tr> <tr> <td>Fluid status</td> <td>At least moderately deficient</td> <td>1+ 2+ 3+</td> </tr> <tr> <td>Physical Exam</td> <td>At least moderately deficient</td> <td>1+ 2+ 3+</td> </tr> </table>		<b>Category</b>	<b>Global Assessment</b>	<b>PG-SGA Rating</b>	Weight	At least moderately malnourished (> 10% of ideal body weight) OR 10% or less of ideal body weight for 1 month OR Progressive loss	1+ 2+ 3+	Protein intake	At least moderately deficient	1+ 2+ 3+	Protein intake	At least moderately deficient	1+ 2+ 3+	Fluid status	At least moderately deficient	1+ 2+ 3+	Physical Exam	At least moderately deficient	1+ 2+ 3+	<p><b>Nutritional Triage Recommendations:</b> Active score is used to define specific nutritional intervention including parent &amp; family education, symptom management including pharmacologic, intervention, and appropriate nutrient intervention (fluid, nutritional supplements, enteral or parenteral support).</p> <p><i>Please see metabolic interventions for further optimal symptom management.</i></p> <p>Triage based on PG-SGA point score</p> <p>0-1 No intervention required at this time. No assessment on routine and regular basis during treatment.</p> <p>2-3 Patient &amp; family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.</p> <p>4-5 Requires intervention by dietitian. In conjunction with nurse or physician as indicated by symptoms (Box 3).</p> <p>&gt; 5 Indication a critical need for improved symptom management and/or nutrient intervention options.</p>																																																																							
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# Appendix 3: Subjective Global Assessment

## Subjective Global Assessment Scoring Sheet

Patient Name: \_\_\_\_\_ Patient ID: \_\_\_\_\_ Date: \_\_\_\_\_

### Part 1: Medical History

#### 1. Weight Change

- A. Overall change in past 6 months: \_\_\_\_\_ kgs.  
 B. Percent change: \_\_\_\_\_ gain - < 5% loss  
                               \_\_\_\_\_ 5-10% loss  
                               \_\_\_\_\_ > 10% loss  
 C. Change in past 2 weeks: \_\_\_\_\_ Increase  
   \_\_\_\_\_ no change  
   \_\_\_\_\_ decrease

#### 2. Dietary Intake

- A. Overall change: \_\_\_\_\_ no change  
                               \_\_\_\_\_ change  
 B. Duration: \_\_\_\_\_ weeks  
 C. Type of change:  
       \_\_\_\_\_ suboptimal solid diet            \_\_\_\_\_ full liquid diet  
       \_\_\_\_\_ hypocaloric liquid             \_\_\_\_\_ starvation

#### 3. Gastrointestinal Symptoms (persisting for >2 weeks)

\_\_\_\_\_ none    \_\_\_\_\_ nausea    \_\_\_\_\_ vomiting    \_\_\_\_\_ diarrhea    \_\_\_\_\_ anorexia

#### 4. Functional Impairment (nutritionally related)

- A. Overall impairment: \_\_\_\_\_ none  
                                       \_\_\_\_\_ moderate  
                                       \_\_\_\_\_ severe  
 B. Change in past 2 weeks: \_\_\_\_\_ improved  
                                       \_\_\_\_\_ no change  
                                       \_\_\_\_\_ regressed

SGA Score

A	B	C

### Part 2: Physical Examination

5. Evidence of:    Loss of subcutaneous fat  
 Muscle wasting  
 Edema  
 Ascites (hemo only)

	SGA Score			
	Normal	Mild	Moderate	Severe

### Part 3: SGA Rating (check one)

- Well-Nourished                       Mildly-Moderately Malnourished                       Severely Malnourished

Source: Detsky et al., 1987

## Appendix 4: Karnofsky Performance Scale

The Karnofsky Performance Scale Index allows patients to be classified as to their functional impairment. This can be used to compare effectiveness of different therapies and to assess the prognosis in individual patients. The lower the Karnofsky score, the worse the survival for most serious illnesses.

### KARNOFSKY PERFORMANCE STATUS SCALE DEFINITIONS RATING (%) CRITERIA

Able to carry on normal activity and to work; no special care needed.	100	Normal no complaints; no evidence of disease.
	90	Able to carry on normal activity; minor signs or symptoms of disease.
	80	Normal activity with effort; some signs or symptoms of disease.
Unable to work; able to live at home and care for most personal needs; varying amount of assistance needed.	70	Cares for self; unable to carry on normal activity or to do active work.
	60	Requires occasional assistance, but is able to care for most of his personal needs.
	50	Requires considerable assistance and frequent medical care.
Unable to care for self; requires equivalent of institutional or hospital care; disease may be progressing rapidly.	40	Disabled; requires special care and assistance.
	30	Severely disabled; hospital admission is indicated although death not imminent.
	20	Very sick; hospital admission necessary; active supportive treatment necessary.
	10	Moribund; fatal processes progressing rapidly.
		Dead

# Appendix 5: The European Organisation for Research and Treatment of Cancer Care QoL Questionnaire (EORTC QLQ-C30)



## EORTC QLQ-C30 (version 3)

We are interested in some things about you and your health. Please answer all of the questions yourself by circling the number that best applies to you. There are no "right" or "wrong" answers. The information that you provide will remain strictly confidential.

Please fill in your initials:

--	--	--	--	--	--

Your birthdate (Day, Month, Year):

--	--	--	--	--	--	--	--	--	--	--	--

Today's date (Day, Month, Year):

31

--	--	--	--	--	--	--	--	--	--	--	--

	Not at All	A Little	Quite a Bit	Very Much
1. Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?	1	2	3	4
2. Do you have any trouble taking a <u>long</u> walk?	1	2	3	4
3. Do you have any trouble taking a <u>short</u> walk outside of the house?	1	2	3	4
4. Do you need to stay in bed or a chair during the day?	1	2	3	4
5. Do you need help with eating, dressing, washing yourself or using the toilet?	1	2	3	4

### During the past week:

	Not at All	A Little	Quite a Bit	Very Much
6. Were you limited in doing either your work or other daily activities?	1	2	3	4
7. Were you limited in pursuing your hobbies or other leisure time activities?	1	2	3	4
8. Were you short of breath?	1	2	3	4
9. Have you had pain?	1	2	3	4
10. Did you need to rest?	1	2	3	4
11. Have you had trouble sleeping?	1	2	3	4
12. Have you felt weak?	1	2	3	4
13. Have you lacked appetite?	1	2	3	4
14. Have you felt nauseated?	1	2	3	4
15. Have you vomited?	1	2	3	4
16. Have you been constipated?	1	2	3	4

## Appendix 5: The European Organisation for Research and Treatment of Cancer Care QoL Questionnaire (EORTC QLQ-C30)

<b>During the past week:</b>	<b>Not at All</b>	<b>A Little</b>	<b>Quite a Bit</b>	<b>Very Much</b>
17. Have you had diarrhea?	1	2	3	4
18. Were you tired?	1	2	3	4
19. Did pain interfere with your daily activities?	1	2	3	4
20. Have you had difficulty in concentrating on things, like reading a newspaper or watching television?	1	2	3	4
21. Did you feel tense?	1	2	3	4
22. Did you worry?	1	2	3	4
23. Did you feel irritable?	1	2	3	4
24. Did you feel depressed?	1	2	3	4
25. Have you had difficulty remembering things?	1	2	3	4
26. Has your physical condition or medical treatment interfered with your <u>family</u> life?	1	2	3	4
27. Has your physical condition or medical treatment interfered with your <u>social</u> activities?	1	2	3	4
28. Has your physical condition or medical treatment caused you financial difficulties?	1	2	3	4

**For the following questions please circle the number between 1 and 7 that best applies to you**

29. How would you rate your overall health during the past week?

1            2            3            4            5            6            7

Very poor

Excellent

30. How would you rate your overall quality of life during the past week?

1            2            3            4            5            6            7

Very poor

Excellent

# Appendix 6: Oral Nutritional Supplement and Enteral Formula Composition

	Products	1 scp/ 1 can	Energy (Kcal)	Kcal/ ml	CHO (g)	Prot (g)	Fat (g)	Na (mg)	K (mg)	Mg (mg)	P (mg)	Ca (mg)	Fe (mg)	Fibre (g)	mosm/ kg H <sub>2</sub> O	Standard dilution	I	↓R	L <sup>F</sup>	G <sup>F</sup>
<b>STANDARD FORMULA</b>																				
<b>P</b>	Ensure	8.7g	38.1	1	5.2	1.4	1.2	32.0	59.6	7.0	20.5	25.0	0.4	0	466	6sc + 200ml = 250ml			✓	✓
	Eneral plus	13.2g	60.2	1	8.2	2.4	1.9	44.2	75.4	16.1	40.1	40.1	0.7	0	330	4sc + 200ml = 250ml	✓	✓		✓
	Nutren optimum	7.9g	35.0	1	4.6	1.4	1.4	31.0	44.0	9.7	24.0	24.0	0.4	0	350	7sc + 210ml = 250ml	✓	✓	✓	✓
<b>L</b>	Ensure	250ml	266.0	1	43.0	9.3	6.5	210.0	390.0	105.0	317.5	317.5	5.0	0	590	-			✓	✓
	Ensure plus	237ml	355.0	1.5	50.1	13.0	11.1	239.0	441.0	-	199.0	199.0	4.7	0	458	-			✓	✓
	Osmolite	237ml	250.0	1.1	35.6	8.8	8.2	149.0	239.0	50.0	126.0	126.0	2.4	0	300	-		✓	✓	✓
	Osmolite 1cal	237ml	250.0	1.1	33.9	10.5	8.2	220.0	370.0	72.0	180.0	180.0	2.4	0	300	-		✓	✓	✓
<b>ELEMENTAL FORMULA</b>																				
<b>P</b>	Peptamen	9.2g	41.7	1	5.1	1.7	1.6	33.0	52.0	17.0	29.0	34.0	0.5	0	375	6sc + 210ml = 250ml	✓	✓	✓	✓
<b>MODULAR FORMULA</b>																				
<b>P</b>	Carborie	2.0g	8.0	-	1.9	0	0	1.4	0.02	0	0.2	0.5	0	0	-	-			✓	✓
	Thixer	3.8g	14.0	-	3.5	0	0	6.1	0	0	0	0.6	0	0	-	-			✓	✓
	Polycose	100.0g	380.0	-	94.0	0	0	110.0	10.0	0	5.0	30.0	0	0	-	-			✓	✓
	Myotein	6.3g	26.1	-	0.4	5.0	0.5	8.8	0	0	0	0.3	0.06	0	-	-			✓	✓
<b>L</b>	MCT oil	1.0oz	225.0	7.5	0	0	27.0	0	0	0	0	0	0	0	-	-				
<b>CONDITION SPECIFIC FORMULA</b>																				
<b>P</b>	Nutren Diabetic	8.4g	35.0	1	4.0	1.4	1.6	31.0	45.0	10.3	24.0	25.0	0.5	0.6	350	7sc + 210ml = 250ml	✓		✓	✓
	Glucerna SR	8.7g	36.8	0.9	4.8	1.8	1.3	35.0	61.5	9.9	28.0	28.0	0.5	0.3	498	6sc + 200ml = 240ml			✓	✓
	Diabetasol	15.0g	62.5	1	8.5	2.5	2.0	23.8	52.5	13.0	30.0	37.5	0.6	0.8	320	4sc + 200ml = 240ml	✓			✓

Indication: P – Powder, L – Liquid, I – Iso-osmolar, ↓R – Low Residue, L<sup>F</sup> – Lactose Free, G<sup>F</sup> – Gluten Free

# Appendix 6: Oral Nutritional Supplement and Enteral Formula Composition

Products	1 scp/ 1 can	Energy (Kcal)	Kcal/ ml	CHO (g)	Prot (g)	Fat (g)	Na (mg)	K (mg)	Mg (mg)	P (mg)	Ca (mg)	Fe (mg)	Fibre (g)	mosm/ kg H <sub>2</sub> O	Standard dilution	I	↓R	L <sup>F</sup>	G <sup>F</sup>
<b>CONDITION SPECIFIC FORMULA</b>																			
Wellness 60+ Diabetic	10.6g	47.8	1	6.5	1.7	1.9	25.6	56.8	7.7	21.2	34.0	0.6	0.8	395	5sc + 200ml = 240ml			V	V
<b>ProSure (EPA enriched)</b>	<b>8.3g</b>	<b>33.4</b>	<b>1.3</b>	<b>5.4</b>	<b>1.8</b>	<b>0.7</b>	<b>39.8</b>	<b>53.0</b>	<b>7.5</b>	<b>27.9</b>	<b>39.0</b>	<b>0.03</b>	<b>0.3</b>	<b>635</b>	<b>9sc + 190ml =240ml (1.1g EPA per serving)</b>			V	V
Neo-Mune	8.5g	35.4	1	4.5	1.2	1.0	28.6	37.4	9.7	21.3	21.3	0.4	-	400	7sc + 200ml =250ml				
Aminoleban-Oral	10.0g	42.0	1.1	6.5	2.7	0.7	9.5	32.4	4.0	16.8	13.8	0.3	-	600	5sc + 180ml =210ml				
KABI glutamine	20.0g	74.0	-	8.0	10.0	0	-	-	-	-	-	-	1.2	250	1 sachet + 200ml				
Glutamine Plus	Neutral	80.0	-	10.0	10.0	0	3.0	10.0	-	-	-	-	0	250	1 sachet + 200ml				
	Orange	78.0	-	9.4	10.0	0	6.0	55.0	-	-	-	-	0	350	1 sachet + 200ml				
<b>CONDITION SPECIFIC FORMULA</b>																			
Glucerna	250ml	250.0	1	20.0	10.0	14.0	233.0	390.0	70	180.0	180.0	2.5	3.6	354	-			V	V
Nepro	237ml	475.0	2	52.8	16.6	22.7	199.0	249.0	50.0	166.0	325.0	4.7	0	665	-			V	V
Pulmocare	237ml	355.0	1.5	25.0	14.8	22.1	310.0	465.0	100.0	249.0	249.0	4.7	0	475	-			V	V
<b>FIBRE CONTAINING FORMULA</b>																			
Nutren Fibre	8.4g	36.0	1	4.5	1.4	1.4	31.0	45.0	9.7	24.0	24.0	0.4	0.5	360	7sc + 210ml = 250ml		V	V	V
Jevity (powder)	10.5g	44.2	1.1	6.6	1.7	1.5	39.6	66.8	7.7	25.5	39.0	0.6	0.5	300	6sc + 210ml = 250ml		V	V	V
Jevity (liquid)	237ml	250.0	1.1	36.5	10.4	8.2	218.0	374.0	72.0	178.0	216.0	2.4	3.4	300	-		V	V	V

Indication: P – Powder, L – Liquid, I – Iso-osmolar, ↓R – Low Residue, L<sup>F</sup> – Lactose Free, G<sup>F</sup> – Gluten Free

## Appendix 7: Commonly Used Drug and Dietary Supplement Interaction

Drug	Possible micronutrient interactions (s)	Notes
Antibiotics		
Cefalosporin	<ul style="list-style-type: none"> <li>• Hypokalemia</li> <li>• Vitamin K deficiency</li> </ul>	
Gentamicin	<ul style="list-style-type: none"> <li>• Magnesium and potassium depletion because of increase excretion</li> </ul>	
Pentamidine isoethionate	<ul style="list-style-type: none"> <li>• Folate deficiency, especially with malabsorption or decreased intake</li> <li>• Hypocalcemia</li> <li>• Hyperkalemia</li> </ul>	Used in treatment of pneumocystis carinii pneumonia
Tetracycline Brand names: <i>Ala-Tet, Panmycin, Sumycin</i>	<ul style="list-style-type: none"> <li>• Decreased vitamin K synthesis</li> <li>• Increased urinary riboflavin and folate loss with potential for deficiency in long term use</li> <li>• Forms insoluble complexes with calcium, magnesium, iron, and zinc</li> </ul>	Used with infection bronchitis
Trimetroprim with sulfamethoxazole Brand names: <i>Bactrim DS, Septra, Septra DS, SMZ-TMP DS, Sulfatrim Pediatric</i>	<ul style="list-style-type: none"> <li>• Folate depletion</li> <li>• Folate antagonise (methotrexate, phenobarbital, phenytoin sulfasalazine) enhance possibility of deficiency</li> </ul>	Used in treatment of pneumocystis carinii pneumonia
Zidovudine or azidothymidine (AZT) (also called ZDV) Brand Names: <i>Retrovir</i>	<ul style="list-style-type: none"> <li>• Megaloblastic anaemia</li> <li>• Folate depletion</li> </ul>	Used in treatment of HIV and AIDS infections
Ketoconazole Brand Names: <i>Nizoral</i>	<ul style="list-style-type: none"> <li>• Calcium and magnesium supplement and antacid should not be taken within 2 hours because these supplement decrease ketoconazole's absorption if taken together</li> </ul>	Used for treatment of fungal infections

## Appendix 7: Commonly Used Drug and Dietary Supplement Interaction

Drug	Possible micronutrient interactions (s)	Notes
Gastrointestinal agent		
Bisacodyl Brand names: <i>Alophen, Bisac-Evac, Bisco-Lax</i>	Malabsorption of vitamin D and K, calcium and potassium	Laxative
Bismuth subsalicylate Brand names: <i>Bismarex, Bismatrol</i>	With chronic use, folate, iron, vitamin C supplement may be indicated	Antidiarrheal
Calcium carbonate	Can inactivate thiamine Hypercalcemia may occur with chronic, high intake: with vitamin D supplementation or with renal insufficiency	Used as an antacid and for treatment of hypocalcemia and osteoporosis
Ranitidine Brand Names: <i>Dosaflex, Senexon, Senokot</i>	Reduced vitamin B12 Iron deficiency	Used for treatment of ulcer and in management of gastroesophageal reflux disease
Senna Brand Names: <i>Dosaflex, Senexon, Senokot</i>	Excessive use associated with hypokalemia, malabsorption, electrolyte imbalance	Used to treat constipation
Phenolphthalein	Malabsorption of fat soluble vitamin D and K, calcium and potassium possible	Used to treat constipation
Magnesium hydroxide with aluminium hydroxide	Vitamin A, folate, riboflavin, iron, phosphorus, copper absorption may be reduced May inactivated thiamine May increased magnesium absorption : monitor phosphorus	Used in treatment of ulcer



## Appendix 7: Commonly Used Drug and Dietary Supplement Interaction

Drug	Possible micronutrient interactions (s)	Notes
<b>Gastrointestinal agent</b>		
Famotidine Brand names: <i>Pepcidine and Pepcid , Gaster. Heartburn Relief, Leader Acid Reducer, Mylanta AR, Pepcid, Pepcid AC, Pepcid AC Maximum Strength, Pepcid RPD</i>	Vitamin B-12 depletion	Used in treatment of ulcer and gastroesophageal reflux disease
<b>Diuretic</b>		
Furosemide, thiazides Brand Names: <i>Lasix</i>	<ul style="list-style-type: none"> <li>• Hypomagnesemia</li> <li>• Hypokalemia</li> <li>• Hyponatremia</li> <li>• Hypercalcemia</li> </ul>	
Spironolactone Brand names: <i>Aldactone, Novo-Spiroton, Aldactazide, Spiractin, Spirotone, Verospiron or Berlactone)</i>	<ul style="list-style-type: none"> <li>• Hyperkalemia</li> <li>• Hyponatremia</li> <li>• Decrease serum folate</li> </ul>	

Source: Adapted from The American Dietetic Association: The Clinical Guide to Oncology Nutrition 2nd Ed. 2006. p 62-63

## Appendix 8: Five categories of T&CM \* according to NACCM (The National Center for Complementary and Alternative Medicine)

Categories of T&CM*	Definition/ Implication	Example of therapy	Recommendation/ Efficacy	Grade
1 Whole medical system	Complete system of theory and practice that have evolved independently from or parallel to conventional medicine	Traditional Chinese Medicine, Ayurvedic medicine, homeopathy, naturopathy	For cancer patients who wish to use supplement included botanical for purported antitumor effects, they should evaluate supplement used & referred to a trained professional to meet nutritional needs.	B
2 Mind-body intervention	Emotional, mental, social, spiritual and behavioural factors can directly affect health.	Meditation, yoga, tai chi	As part of a multi-disciplinary approach to reduce anxiety, mood disturbance, chronic pain and improve QoL.  Support group, supportive/ expressive therapy, cognitive-behavioural therapy and cognitive behavioural stress management are recommended as part of a multi-disciplinary approach to reduce anxiety, mood disturbance, chronic pain and improve QoL.	B  A
3 Biologically based therapies	Involved the use of natural and biological based practices and products	Herbs & botanicals, animal derived extracts, vitamins, minerals, fatty acids, proteins, prebiotics, probiotics, amino acids, whole diets and functional food	Dietary supplements, including botanicals and megadose of vitamins and minerals be evaluated for possible side effects & potential interaction with other drugs, including chemotherapeutic agents, should not be used concurrently with immunotherapy, chemotherapy or radiation or prior to surgery.  Specific dietary supplements are not recommended for cancer prevention.	B  A

## Appendix 8: Five categories of T&CM\* according to NACCM (The National Center for Complementary and Alternative Medicine)

Categories of T&CM*	Definition/ Implication	Example of therapy	Recommendation/ Efficacy	Grade	
4	Manipulative and body based methods	Methods concentrate on bodily structures and systems, included bones, joints, soft tissues, circulatory and lymphatic system.	Chiropractic and osteopathic manipulation, massage therapy, Tui Na, reflexology, Bowen technique.	For cancer Pt experiencing anxiety or pain, massage therapy delivered by an oncology-trained massage therapist is recommended as part of multimodality treatment.	C
			The application of deep or intense pressure is not recommended near cancer lesions or enlarged lymph nodes, radiation field sites, medical devices or anatomix distortions such as postoperative changes or in Pts with a bleeding tendency.	B	
			Regular physical activities can play many positive roles in cancer care. Pt should be referred to a qualified exercise specialist for guidelines on physical activity to promote basic health	B; Grade A for breast cancer survivors post-therapy for QoL).	
5	Energy therapies	examine energy into two types: veritable energy (measurable) and putative energy (not yet been measurable by reproducible means)	Veritable energy: magnetic therapy, sound energy therapy and light therapy. Putative energy: qi gong, acupuncture, homeopathy and therapeutic touch.	Therapies based on a philosophy of bioenergy fields are safe and may provide some benefit for reducing stress and enhancing QoL.	B
			Limited evidence efficacy for symptom management including reducing pain and fatigue.	C	

\* These terms are similar [Complementary and Alternative Medicine (CAM) vs Traditional & Complementary Medicine (T&CM)]  
References: Deng et al., 2009

There is no clear evidence on use of biological based therapy for cancer prevention (eg. Pau D'Acro, Echinacea, Kombucha Tea, Laetrile, Cartilage, Milk Thistle, Hydrazine Sulfate, Coenzyme Q10, Flexseed oil, Evening Primrose oil, Spirulina therapy, Ginger, Garlic, Green tea extract, Gingseng, St. John's wort, Tumeric, Dong Guai, Gingko Biloba, Ma Huang, Kava kava, Yohimbe and Antineoplaston Therapy) (Grade C). There is a suggestive evidence for soy, selenium & Huang Chi in cancer prevention or to prevent cancer recurrence (Grade B). However, further studies especially in clinical study is required to confirm these.

	Chemical components	Claim/ Clinical efficacy	Adverse effects/ Side effects	Recommendations	Grade	References
<b>Astragalus/ Huang Chi</b>	Betaine, beta-sitosterol, choline, glycosides, plant acids	Demonstrated immune enhancing properties/ immunostimulant. Clinical trial in pt with ESRD increased interleukin 2 levels with use of IV astragalus compared to placebo.	No adverse effects reported. May decrease immunosuppression following treatment with cyclophosphamide.	<ul style="list-style-type: none"> <li>Not recommended</li> <li>No recommendation suggested.</li> <li>Need larger clinical trials to be conducted</li> </ul>	C	Marian, 2010
<b>Selenium</b>	Selenomethionine, selenocysteine	Clinical trial showed effective for reducing therapy related lymphoedema. May decrease hair loss, abdominal pain & anorexia in ovarian Cancer pt.	Prolonged intakes >750µg/d may caused slowed growth, eye damage, hair loss, tooth decay and compromised bone function	<ul style="list-style-type: none"> <li>Taking daily supplementation of 200ug did not recurrence of skin cancer and significantly reduced occurrence &amp; death from total cancers.</li> <li>Potential in cancer prevention in areas with low levels of Se but no evidence to support as treatment for cancer.</li> </ul>	B	Combs et al., 1997; Combs et al., 2001; <a href="http://ods.od.nih.gov/factsheets/selenium">http://ods.od.nih.gov/factsheets/selenium</a>

	<b>Chemical components</b>	<b>Claim/ Clinical efficacy</b>	<b>Adverse effects/ Side effects</b>	<b>Recommendations</b>	<b>Grade</b>	<b>References</b>
<b>Soy</b>	Glycine max, phytoestrogens chemicals (isoflavones, saponins, phytates, phytosterols and protease inhibitors).	Decrease risk of breast, colon, prostate and endometrial Ca due to the presence of phytoestrogens and other anticarcinogenic phytochemicals.	Allergy response, flatulence	<ul style="list-style-type: none"> <li>No specific dosage suggested.</li> <li>Soy intake may be associated with a small reduction in breast cancer risk, however the result should be interpreted with caution due to potential exposure misclassification, confounding and lack of dose response.</li> </ul>	B	Trock et al., 2006

## Appendix 10: Nutrition (Diet) and Metabolic Therapies

All diet therapies were not recommended as there is no valid published data to support the safety & efficacy. They might be harmful and give dramatic deviation from recommended nutrition intakes. ASPEN, 2009 (Grade C)

Therapy	Description	Caution	References
Metabolic Therapy	Detoxification, strengthening of the immune system & minimize the intake of toxic agent & increase oxygenation of oxygen starved tissues	Electrolytes imbalance, sepsis, toxic coli	Tareke et al. 2002
Macrobiotic Diet Therapy	50-60% energy source from whole grain, 25-30% from vegetables, balance are from beans, seaweed & soups. Avoid meat, processed vegetables	Inadequacy in Calcium and Vitamin B	ASPEN, 2009; Richardson et al., 2000
Multivitamin Therapy	Megadose of single or multiple vitamin intake	Vitamin toxicity	Richardson et al., 2000
Gonzalez regimen	Use pig derived pancreatic enzymes as supplement. Organic are food required but may include red meat 2-3 times/day. Synthetic and refined food are avoided.	Coffee enemas are used twice daily.	ASPEN, 2009; ADA, 2006
Gerson Therapy	Organic vegetarian diet plus nutritional supplement with potassium compound, vitamin B-12, thyroid hormone, injectable pancreatic enzymes. Coffee or other types of enemas to 'detoxify' the body while building the immune system & potassium level in cells	Electrolytes imbalance, death might due to infection	ASPEN, 2009; <a href="http://www.cancer.gov/cancertopics/pdq/cam/gerson/healthprofessional/page6">http://www.cancer.gov/cancertopics/pdq/cam/gerson/healthprofessional/page6</a> .



