



Danone Nutricia
Campus

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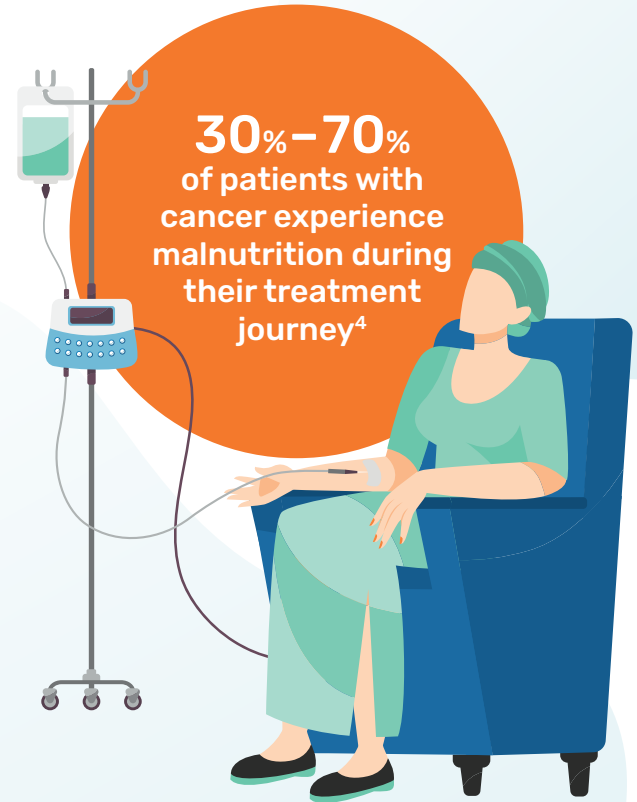
Nutrition Essentials: Oncology

The role of nutrition in
the cancer journey



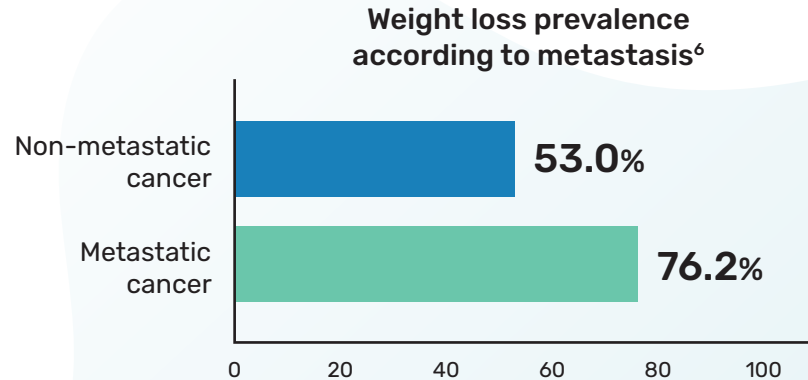
Optimal cancer care necessitates nutritional support

- Most patients with cancer experience metabolic and psychological stress, sensory alterations, poor appetite and malabsorption, resulting in malnutrition.¹⁻³
- Weight and muscle loss due to malnutrition in patients with cancer negatively impacts clinical outcomes such as post-surgery recovery, treatment tolerance and quality of life.⁴
- Nutritional support in patients with cancer can ensure optimal treatment outcomes and improve quality of life.⁵



Weight and muscle loss in patients with cancer is evident in early disease stages

- Up to 65% of patients with cancer experience weight loss at their first medical oncology hospital visit, with a weight loss range of 1–10 kg.⁶
- Weight loss prevalence is higher among patients with metastatic cancer.⁶



Assessing the risk of malnutrition early in the cancer journey should be prioritized to allow initiation of nutritional support, if necessary⁶

Most cancer treatments are associated with malnutrition



- Up to 70% of patients with cancer experience taste changes during treatment, such as reduced taste threshold or bad taste, which decrease food intake and contribute to malnutrition and weight loss.²
- Surgeries can cause metabolic stress, leading to skeletal muscle breakdown and loss.¹
- Side effects from cancer treatments such as nausea, vomiting, mucositis, dry mouth and diarrhea, further compound the reduction in food intake and increase the risk of malnutrition.⁷

Taste changes are often exacerbated during treatment and lead to reduced appetite, reduced energy intake, and weight loss^{2,7}

Cancer-related malnutrition and/or low muscle mass (sarcopenia) may lead to suboptimal treatment outcomes^{8,9}

Lower muscle mass is a significant, independent predictor of:

Early treatment discontinuation/termination¹⁰



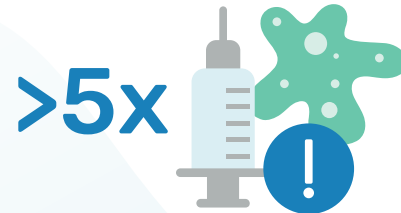
OR: 2.34
($p=0.03$,
95% CI: 1.04-5.24)

Dose reductions¹⁰



OR: 2.28
($p=0.01$,
95% CI: 1.19-4.36)

Risk of high-grade adverse events is increased



>5x
in patients with low muscle mass and/or low muscle attenuation* receiving cancer immunotherapy¹¹

Dose-limiting toxicity occurs more frequently in patients with low muscle mass (sarcopenia)¹²

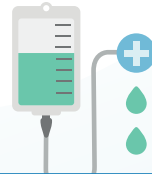
*Low muscle attenuation refers to a poor-quality skeletal muscle (increased intramuscular adipose tissue)

Early nutritional intervention improves patient outcomes during cancer treatment



Radiotherapy

- Medical nutritional intervention during radiotherapy improves nutritional intake, body weight, muscle mass and quality of life.^{13,14}
- Early nutritional intervention improves tolerance to radiotherapy treatment, fewer hospitalizations and emergency visits.^{15,16}



Systemic anti-cancer treatment

- High protein supplementation leads to better chemotherapy tolerance¹⁷ and improved quality of life.¹⁸
- High protein supplementation improves body weight and muscle mass during chemotherapy.^{17,18}



Surgery

- Nutritional support reduces post-operative complications by up to 50%.^{19,20}
- Reduction in length of hospital stay by ~2.5 days is observed.^{20,21}

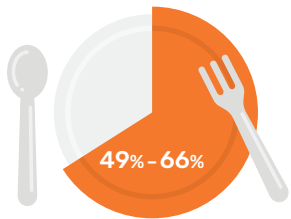
Nutritional support is beneficial during the cancer recovery and post-recovery phases

- Nutritional challenges are associated with ongoing symptoms or disease progression and can negatively impact a patient's ability to perform regular activities.⁴
- Patients with cancer who are in post-treatment recovery require nutrition which would support maintenance of optimal health and quality of life, as well as expedite recovery and the return to a normal diet.⁴

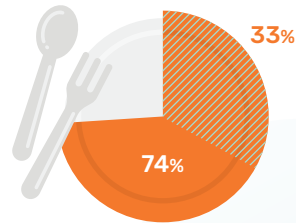
1 in 3
patients with cancer
report functional
impairments²²



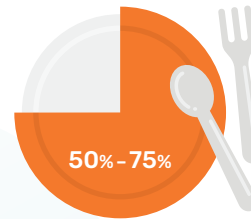
Reduced food intake in patients with cancer is associated with micro- and macronutrient deficiencies²³⁻²⁷



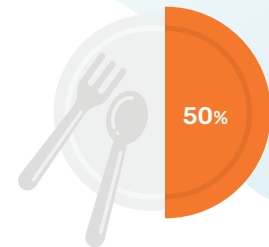
49% – 66% of patients **do not consume sufficient protein** according to recommendations²⁸⁻³⁰



Up to **74%** of patients have **vitamin D inadequacy** and up to **33%** have a **vitamin D deficiency**^{25,26}



Patients have a **50%–75% gap** between micronutrient intake and the RDA²⁷



Patients **often fail to reach 50% of the RDA** for potassium, calcium, vitamin D, folate and vitamin C²⁷

Meeting the specific nutritional needs of patients with cancer may better support treatment tolerance

Cancer patients have specific nutritional needs

..... and

individual patients may have specific requirements to support adherence to medical nutrition

ESPEN/ESMO guidelines recommend:^{31,32}

- ✓ High protein
- ✓ High energy
- ✓ Adequate micronutrients, in particular vitamin D
- ✓ Omega-3 fatty acids

- ✓ Tailor-made or sensory adapted flavors to improve palatability in patients with sensory changes³³
- ✓ Different flavors to provide variety
- ✓ Small volume to improve compliance in patients with low appetite³⁴

Guidelines recommend early assessment of nutritional risk in patients with cancer

- ESPEN and ESMO guidelines recommend routine screening to detect nutritional imbalances in patients with cancer.^{31,32}
- Nutritional intake, weight changes, body mass index, muscle mass and systemic inflammation should be evaluated.^{31,32}
- Routine screening for malnutrition allows early nutritional intervention and prehabilitation strategies, in patients with cancer.



1

Screen all cancer patients for nutritional risk beginning at diagnosis



2

In patients at nutritional risk, provide or refer patients for prompt nutritional assessment and intervention







3

Re-screen patients for nutritional risk at regular intervals

Specific nutritional needs for patients with cancer are recommended by international guidelines

ESPEN and ESMO recommend a high-energy diet rich in proteins, micronutrients (vitamin D in particular) and omega-3 fatty acids, for patients with cancer.

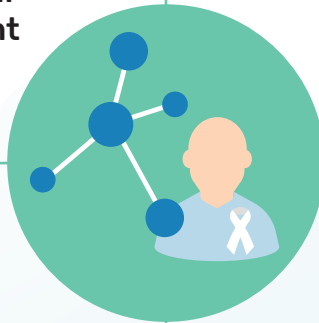
ESPEN guidelines on nutrition in cancer patients (2017) ³¹		ESMO guidelines on cancer cachexia in adult patients (2021) ³²
25–30 kcal/kg/day in all patients with cancer, if energy expenditure is not measured directly	 Energy	25–30 kcal/kg/day to maintain nutritional status, adjust regimen as required
>1 g/kg/day and if possible, up to 1.5 g/kg/day in all patients with cancer	 Protein	At least 1.2 g protein/kg/day should be provided to patients with cancer
Vitamins and minerals be supplied in amounts approximately equal to the RDA	 Micronutrients	
In patients with advanced cancer undergoing chemotherapy, use supplementation with long-chain omega-3 fatty acids or fish oil to stabilize or improve appetite, food intake, lean mass and body weight	 Omega-3 fatty acids	Offer patients receiving chemotherapy, radiotherapy or chemoradiotherapy high-protein ONS enriched with omega-3 to increase body weight, attenuate loss of lean body mass and improve quality of life

A diet abundant in protein, energy, micronutrients and omega-3 fatty acids is guideline-recommended for patients with cancer

Protein intake is essential at every stage of the cancer journey

Protein is important for numerous structural and functional purposes. It is **essential for growth and repair of the body and plays an important role in immune functioning.**^{35,36}

In patients with cancer, protein needs are increased as a result of abnormalities in protein metabolism, whereby protein breakdown is increased and protein synthesis rates are reduced, leading to muscle loss.³⁷



Low muscle mass can happen at any stage of cancer and is associated with severe side effects of cancer treatment, poorer surgical outcomes and shorter survival time.¹²

Preserving adequate nutritional status and muscle can support outcomes during anti-cancer treatment. Therefore, prompt nutritional support to address energy and protein needs is recommended along the oncology journey.^{31,32}

Guideline recommendations for protein intake in patients with cancer

Inadequate protein intake is associated with poor clinical outcomes and compromised quality of life.



Low muscle^{38,39}



Cancer-related fatigue^{30,40}

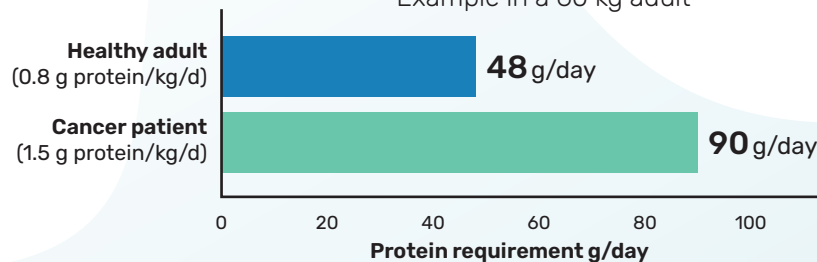


Survival^{30,41}

ESPEN and ESMO guidelines recommend increased protein intake during cancer treatment.^{31,32}

ESPEN & ESMO protein recommendations^{31,32} **>1 g/kg/day and if possible, up to 1.5 g/kg/day in all patients with cancer**

Increased protein requirement +42 g/day:
Example in a 60 kg adult



For patients with cancer, the dietary need for protein is higher than for healthy adults

Enhance patient outcomes with high protein supplementation

If food intake is not sufficient to meet energy and protein needs, oral nutritional supplements (ONS) can support nutritional intake.^{31,32}



Body weight and muscle mass^{19,42}



Tolerance to anti-cancer treatment^{13,43}

High-protein ONS in patients with cancer has demonstrated improvement in:



Length of stay²⁰

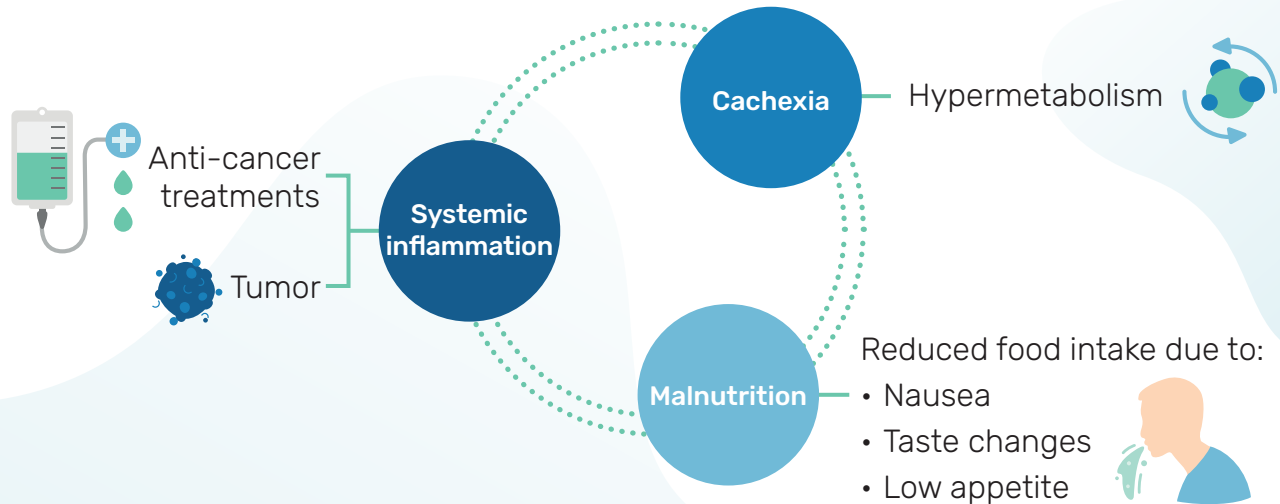


Post operative complications^{19,20}



Radiotherapy tolerance¹³

Systemic inflammation accelerates the cycle of malnutrition and cachexia^{44,45}



Systemic inflammation is a hallmark of cancer-related malnutrition⁴⁴ that contributes to anorexia, metabolic changes, and muscle and fat depletion⁴⁵

Systemic inflammation can reduce the success of anti-cancer treatment^{46,54,55,56}



Cancer-associated systemic inflammation



Alterations in drug metabolic pathways and drug transporters, especially cytochrome P450 3A4



A central blue rectangular box. At the top is an icon of a play button over a brain. Below it is the text "Slower clearance of anti-cancer drugs". In the center is a white plus sign. Below the plus sign is the text "Increased treatment-related toxicity". At the bottom is an icon of a warning sign with an exclamation mark and an upward-pointing arrow.



Reduced treatment efficacy

Omega-3 polyunsaturated fatty acids have established anti-inflammatory properties^{31,47,48}



Increased

- Production of eicosanoids with lower biological potency
- Production of anti-inflammatory endocannabinoids
- Production of proresolution resolvins and protectins



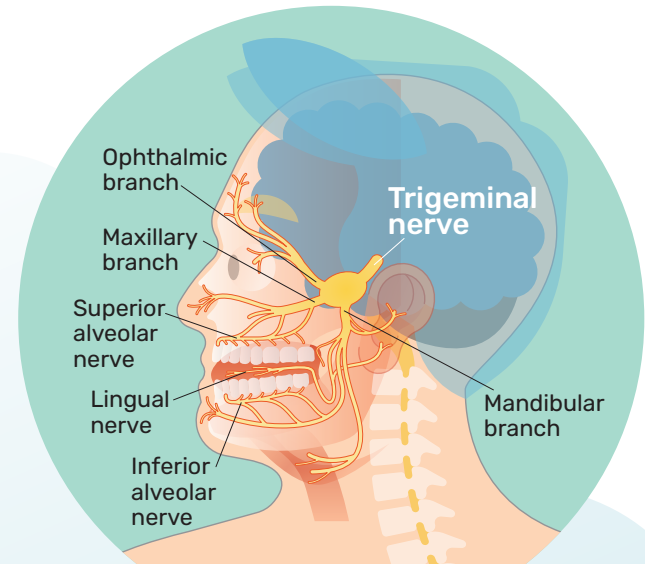
Reduced

- Leucocyte chemotaxis
- Adhesion molecule expression and leucocyte-endothelial adhesive interactions
- Production of pro-inflammatory eicosanoids from arachidonic acid (prostaglandins, leukotrienes)
- Production of inflammatory cytokines
- T-cell reactivity

Oral nutritional supplements enriched with EPA, an omega-3 polyunsaturated fatty acid, can reduce inflammation and improve nutritional status, weight, and muscle mass in patients with cancer⁵⁷⁻⁶¹

Nutritional support in patients with cancer should consider change in taste perception

- The trigeminal somatosensory system, which plays a fundamental role in experiencing flavor, may be impacted by chemical agents such as those used in chemotherapy.⁴⁹
- Patients may experience hypo- or hypersensitivity to flavors or a distorted sense of taste (dysgeusia).^{50,51}
- Sensory adapted flavors may be used for patients experiencing taste alterations.



The need for intense taste stimuli can be met by adding more spices, salt and ginger to meals.^{52,53}

Optimizing nutrition strategies to better support cancer care

- Early assessment of specific nutritional needs in a cancer patient's journey allows implementation of strategies to minimize the risk of malnutrition.^{31,32}
- Optimal protein intake per guideline recommendations is necessary in improving clinical outcomes.^{31,32}
- Nutritional intervention should consider sensory alterations due to cancer treatment.⁴⁹⁻⁵¹
- Omega-3 PUFAs are known to have anti-inflammatory properties and ESPEN recommends the use of supplementation with omega-3 fatty acids to stabilize or improve appetite, food intake, lean mass and body weight.³¹



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