

## **“EFAD European Specialist Dietetic Network for Oncology” Briefing paper**

### **Nutrition as a factor in aetiology of cancer**

The World Health Organisation highlights that according to current evidence, between 30% and 50% of cancer deaths could be prevented by modifying or avoiding key risk factors, including avoiding tobacco products, reducing alcohol consumption, maintaining a healthy body weight, exercising regularly and addressing infection-related risk factors. The impact of nutrition and the development of cancer is via its influence on body weight in addition to factors relating to the overall balance of the diet.

Systematic reviews of the evidence have been undertaken by the World Cancer Research Fund. These are reviewed and updated on a regular basis and are published as both a detailed review of published research literature and a set of guidance for populations and individuals. The latest guidance was published in May 2018 [1]

The role of diet, obesity and physical activity on the development of cancer is an integral part of the WHO Global Strategy on Diet, Physical Activity and Health. A key part of the strategy focuses maintaining an ideal body weight, altering the balance of the diet to promote the consumption of fruit and vegetables and decrease the intake of red and processed meat, sugar, salt and alcohol.

#### Summary of WCRF / AICR Cancer Prevention Recommendations [1]

1. Be a health weight
2. Be physically active
3. Eat wholegrains, vegetables, fruit and beans
4. Limit 'fast foods'
5. Limit red and processed meat
6. Limit sugar sweetened drinks
7. Limit alcohol consumption
8. Don't rely on supplements
9. Breast feed your baby, if you can
10. After a cancer diagnosis, follow these recommendations, if you can

### **The impact of cancer on nutrition**

With more than 3.7 million new cases and 1.9 million deaths each year, cancer represents the second most important cause of death and morbidity in Europe.

On a global scale, cancer accounted for 8.2 million deaths (around 13% of the total) in 2012.

Worldwide, the most commonly diagnosed cancers (excluding skin cancers) are lung, breast, and colorectal cancers, with lung cancer being the primary cancer cause of death.

In developed countries, hormonal-related cancers are the most prevalent types of cancer; in underdeveloped areas, the most common cancers are those arising from infectious agents. In men, prostate cancer is the most common type of cancer in high-income countries, followed by lung, stomach, and colorectal cancers. In men in underdeveloped countries, lung cancer prevalence exceeds oesophageal, stomach, and liver cancer prevalence. In women residing in developed countries, breast cancer is the most commonly diagnosed cancer, followed by lung, colorectal, and endometrial cancers. In underdeveloped countries, breast cancer is also the most prevalent cancer diagnosed in women, followed by lung, stomach, and cervical cancers.

The lifetime probability of developing cancer is greater for men (46%) than for women (38%), although many young women are diagnosed with breast cancer, thereby placing women at a higher risk of developing cancer before the age of 60.1 While cancer rates differ greatly throughout the world, rates are projected to more than double by the year 2030. Projected increases are due to several factors:

- Growth of the worldwide population
- Aging of the population
- Improved screening, detection, and treatments, resulting in higher survival rates
- Projected increases in tobacco use
- Increases in the number of individuals with HIV/AIDS in some countries.

Cancer is a cluster of more than 100 different diseases that arise due to uncontrolled cellular growth. Normal cellular growth and differentiation are controlled by a complex system, which involves a number of physiologic functions such as cell signalling and gene expression that influence cellular development and communication, as well as cell death.

The continuum of cancer survival includes diagnosis, treatment, recovery, living with cancer and possibly recurrence of disease. Each stage is associated with different needs and challenges for the patient, caregivers, and clinicians. Both cancer and the oncological therapies utilized for its treatment can have profound effects on an individual's nutritional status, thereby making nutrition an important component of care.

One of the most significant nutritional issues that can arise during cancer treatment is malnutrition. Malnutrition may result from the disease process, from the use of antineoplastic therapy, or from both.

Cancer patients may have several metabolic changes arising from tumour-host interaction and resulting in modifications of the normal body composition. These changes, along with a reduction in food intake due to anorexia, may contribute to progressive and involuntary weight loss [2, 3]

All these metabolic changes are typical of a hyper metabolic state.

Proteolysis is increased, whereas muscle protein synthesis is depressed and "diverted" from muscles to the liver, resulting in decreased protein turnover with consequent loss of lean mass. Also, in lipid metabolism there is a marked increase in peripheral fat mobilization by increased lipolysis, culminating in a decrease in adipose tissue reserves.

Carbohydrates metabolism of is also modified, with increased gluconeogenesis, from amino acids, and insulin resistance, increasing circulating glucose levels and decreasing their accumulation in adipose tissue.

Finally, inflammatory cytokines produced by monocytes induce increased production of acute phase proteins, also associated with hyper metabolism and acute phase response.

The term cancer cachexia may be used to describe the multifactorial syndrome of weight loss, loss of muscle and fat and inflammatory changes. Although there is no international consensus on a definition a European guideline group published a definition that is often accepted [3]. It describes pre-cachexia, cachexia and refractory cachexia which may occur at different stages of the disease. The term sarcopenia is often used alongside cachexia but specifically relates to low lean body mass (mostly muscle) and is associated with fatigue, loss of strength and physical function. Sarcopenia can occur in those of normal body weight or in obesity. Sarcopenic obesity is a predictor of adverse outcome and increased toxicity of treatment [3].

Side effects related to common oncological therapies, including chemotherapy, radiation, immunotherapy, and surgery, are key contributors in promoting a deterioration in nutritional status.

Malnutrition is characterized by a variety of clinical symptoms, including weight loss, poor wound healing, electrolyte and fluid imbalances, depressed immune function, and increased morbidity and mortality.

Deterioration in nutritional status has been found to predict outcome prior to the initiation of therapy. Dewys and colleagues found that as little as a 6% weight loss predicted response to therapy [4]. These researchers also noted that overall survival rates, performance status, productivity, and quality of life declined concurrently with weight loss in cancer patients. Of note, approximately 80% of the study patients presented with weight loss before being diagnosed with cancer. There may be additional costs incurred due to the management of people with malnutrition and associated increased toxicity of treatment [5, 6]

Although all patients with cancer are at nutritional risk, not all patients with cancer become malnourished. Therefore, nutrition screening and the nutrition care process—including nutritional assessment, ongoing monitoring, and follow-up—are crucial for preventing or minimizing the development of malnutrition at all stages of treatment. This plan of care allows for the implementation of the appropriate intervention to target problem areas as warranted. Long-term follow-up upon completion of therapy is also recommended, as nutrition-impact symptoms may be experienced months or years following commencement of therapy and have been associated with reductions in quality of life [7].

Reductions in oral intake alone do not explain why malnutrition often occurs in people with cancer; indeed, cachexia may occur in patients who consume apparently sufficient energy intake [8]. Moreover, nutrition support alone may not successfully restore the loss of lean body mass with cancer anorexia–cachexia syndrome [2]. Increasingly a multi-modal approach including strategies such as physical activity and symptom control is required [3]. Anyone who has been diagnosed with cancer, from the time of diagnosis through the rest of life, is considered a cancer survivor. Many cancer survivors are highly motivated to seek information about food choices, physical activity, dietary supplement use, and

complementary nutritional therapies to improve their response to treatment, speed recovery, reduce risk of recurrence, and improve their quality of life.

## **Nutrition and hormonal cancers**

Treatment of some cancers such as breast or prostate cancer may result in increased body weight. For these cancers, increased weight may be associated with a poorer prognosis although it has yet to be established if weight loss improves overall survival. Body weight and body composition may be important determinants of quality of life, function and overall survival.

## **Nutrition and late effects of cancer treatment**

Some people living with and beyond cancer may experience long term side effects of their treatment. Gastrointestinal side effects may arise following surgery, chemotherapy or particularly radiotherapy. Symptoms may include bowel obstruction, diarrhoea, steatorrhea, urgency and frequency of defecation and nutritional consequences of malabsorption and malnutrition. Management of these symptoms requires a multi-disciplinary approach that centres on the diagnosis of the causes of symptoms and appropriate nutritional and medical management [9, 10].

## **Nutrition in palliative care and end of life**

Intake of food and drink continues to play a crucial role in quality of life through to palliative care and end of life. The metabolic changes that occur in refractory cachexia may make the goal of a good nutritional status impossible to achieve although for comfort and enjoyment the role of food and drink should not be underestimated [11].

## **Dietitians in the management of nutrition in cancer**

Signs and symptoms of cancer may impact on dietary intake and nutritional status prior to diagnosis. It is essential that changes in nutritional status are identified at an early stage through nutritional screening. Dietitians working in oncology have a vital role in ensuring that nutritional aspects of patient management are an integral component of multidisciplinary care and that all cancer patients receive the dietetic support they need. Many countries recommend that dietitians working in oncology are basic or advanced level practitioners, who have knowledge of the impact of the disease and treatment, and the complex needs of such patients to be able to provide the high level of care required. Dietitians must work in close collaboration with other team members to meet patient needs both during treatment and for those living with and beyond cancer. It is increasingly recognized that Dietitians play an integral role in improving clinical outcomes for people with cancer.

A comprehensive nutritional approach is required for each person following a diagnosis of cancer. It should be based on the diagnosis, the clinical condition, the planned treatment, patient wishes and prognosis. It will require a multi-professional approach with the nutritional aspects of support being managed by a dietitian with knowledge and experience of cancer and its treatment.

Many aspects of cancer and its treatment can affect nutritional status, and impaired nutritional status can in turn affect the response to treatment, the amount of treatment required and quality of life therefore it is crucial to address these issues in a timely fashion.

Nutrition therapy may be considered as adjuvant therapy. It may prevent therapy-associated weight loss and treatment interruptions in cancer patients and it may potentially modulate treatment morbidity. It may improve disease prognosis, functional and clinical outcomes; and it may have a positive effect on health-related quality of life of those living with and beyond cancer.

Nutrition interventions aimed at maintaining and promoting normal growth may include nutrition counselling, oral supplements, appetite stimulants, enteral nutrition, or parenteral nutrition [3]. A number of studies have shown that nutritional support has beneficial metabolic effects, reduces the risk of infectious and non-infectious morbidity, and reduces mortality.

Registered Dietitians working in all cancer-related practice settings need to develop the appropriate skills, competencies, and knowledge to provide safe and effective care across the cancer continuum (prevention, treatment, and survivorship) to meet the growing demand for nutrition and lifestyle interventions for individuals affected by cancer.

Even before treatment begins, cancer can cause profound metabolic and physiological alterations that can affect the nutritional needs for protein, carbohydrate, fat, vitamin, and minerals. Protein, carbohydrate, and fat all contribute energy to the diet, and each of these dietary constituents is available from a wide variety of foods. Informed choices about foods that provide these macronutrients should be based in goals of achieving variety and nutrient adequacy. Many cancer survivors are at high risk for other chronic diseases, such as heart disease. Therefore, the recommended amounts and type of fat, protein, and carbohydrate to reduce cardiovascular disease risk are also appropriate for cancer survivors (5, 6).

Although currently there are only a small number of published research reports, it seems that intervention by a Registered Dietitian can improve quality of life and functional outcomes among oncology patients (12).

Oncology dietitians are members of oncology interdisciplinary health care teams. Oncology dietitians work in partnership with health care and community resources to provide continuity of nutrition services for clients and their families across the cancer continuum. Dietitians provide leadership in caring for the nutritional status of cancer patients and play an active role in screening, identifying, treating, and monitoring the nutritional status (10).

As members of a health care team, oncology dietitians a) provide oncology nutrition knowledge and expertise to the health care team; b) incorporate the role of nutrition services into the care pathways of relevant tumour site teams and c) advocate for the provision of nutrition services within comprehensive cancer care.

## The future

In recent studies it had been shown that malnutrition, which often occurs in cancer patients, has enormous economic consequences. A declaration of the European Union asserted that the „ costs of malnutrition in the EU are as much as double the economic costs of overweight and obesity“. [5, 6].

As it is convincing that early nutritional intervention in malnourished patients not only reduces morbidity and mortality but also treatment costs it is essential to define and treat malnutrition as soon as possible in order to help the patients as well as to support the health system.

There are also significant financial implications for malnutrition in cancer. Numerous studies have demonstrated the adverse effect that malnutrition has in the person with cancer contributing to high risk of surgical site infection, increased length of hospital stay, lower tolerance to chemotherapy with an increased risk of mortality and increased mortality in those who have lost a higher percentage of body weight. Economic analysis demonstrates significant increased healthcare costs associated with malnutrition in people with cancer.

Thus an individualized nutritional therapy is of much higher importance than it used to be up to now. Nutritional care will have to be integral part of an efficient care for oncological patients. To achieve this aim various factors are necessary important: nutritional care of inpatients as well as outpatients, the compulsory realization of a nutritional screening, standardized integration of the topic “Nutrition in oncology” in education and further education for all persons who are involved in the care of cancer patients. This requires a healthcare structure of quality assurance and peer review to ensure that existing guidelines are implemented for the care of those with cancer.

## Resource and practical information

The guidelines *Nutrition and Dietary Intervention treatment in cancer* are revised in 2017 by the Dutch Dietitians Oncology Group (DDOG) and published on Oncoline.nl. These guidelines are based on the Handbook Nutrition in Cancer, 2016 (only available in Dutch), written by 45 oncology dietitians in collaboration with the Academic Hospitals Surgical Dietitians Consultation Group and the National Dietitians Hematology and Stem cell Transplant Consultation group.

The *General Nutrition and Dietary Intervention Guideline* outlines the nutritional aspects, measures and dietary recommendations applicable to cancer care and treatment in general. The *Tumour Specific Nutrition and Dietary Intervention Guidelines* outline of 20 tumour types nutritional concerns according to tumour stage with respect to possible nutritional treatment (13).

Nutrition interventions in cancer care are based on a combination of existing research (evidence based) and practice experience from oncology dietitians, which has reached consensus within the DDOG (best-practice-based).

Additional resources are available at the following websites and books (14):

### Resources

Diet and cancer prevention [www.wcrf-uk.org](http://www.wcrf-uk.org)

Eating problems and cancer

<https://be.macmillan.org.uk/be/p-20051-eating-problems-and-cancer.aspx>

[https://nutriciahomeward.co.uk/upload/SCC2944\\_Carers\\_UK\\_cancer\\_booklet.pdf](https://nutriciahomeward.co.uk/upload/SCC2944_Carers_UK_cancer_booklet.pdf)

<https://www.royalmarsden.nhs.uk/your-care/living-and-beyond-cancer/eating-well>

Management of gastrointestinal symptoms following cancer treatment

<https://be.macmillan.org.uk/be/p-21663-guidance-the-practical-management-of-gastrointestinal-symptoms-of-pelvic-radiation-disease.aspx> (pelvic radiation disease)

<https://be.macmillan.org.uk/be/p-23613-guidance-managing-persistent-upper-gastrointestinal-symptoms.aspx> (upper gastrointestinal symptoms)

<https://www.oncoline.nl/general-nutrition-and-dietary-treatment>

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13. <https://www.oncoline.nl/general-nutrition-and-dietary-treatment>