

The role of nutrition in the prevention and management of cancer

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Introduction

Almost 45,000 individuals are diagnosed with cancer in Ireland each year. The incidence is rising and currently one in two individuals will receive a diagnosis during their lifetime. The most common cancers diagnosed in Ireland are skin, prostate, breast, bowel and lung¹. This article discusses the role and importance of nutrition in the prevention and management of cancer.

Prevention

The development of cancer is the result of a complex interplay between lifestyle, environmental and genetic factors² and can take several years. While there are unlikely to be any foods or diets which cause immediate or acute effects on cancer development, there are a number of dietary considerations which can have a significant effect across the lifespan. The World Cancer Research Fund provides ten evidence-based recommendations to help people to adopt and maintain a healthy lifestyle to reduce the incidence of cancer². While each is important individually, they will be most effective when applied together to promote a healthy lifestyle. These have been illustrated in Table 1.

TABLE 1

World Cancer Research Fund Cancer Prevention Recommendations²

- 1 Be a Healthy Weight
- 2 Be Physically Active
- 3 Eat a Diet Rich in Wholegrains, Vegetables, Fruits and Beans
- 4 Limit Consumption of 'Fast Foods' and Other Processed Foods High in Fat, Starches or Sugars
- 5 Limit Consumption of Red and Processed Meat
- 6 Limit Consumption of Sugar Sweetened Drinks
- 7 Limit Alcohol Consumption
- 8 Do Not Use Supplements for Cancer Prevention
- 9 For Mothers: Breastfeed Your Baby, If You Can
- 10 After A Cancer Diagnosis: Follow Our Recommendations, If You Can



MANAGEMENT

During active cancer treatment, the overall goals of nutritional care for individuals should be to prevent or resolve nutrient deficiencies, achieve or maintain a healthy weight, preserve lean body mass, minimize nutrition-related side effects, and maximize quality of life. Studies confirm the positive effects of dietetic support during cancer treatment for improving outcomes, such as fewer treatment related symptoms, improved quality of life, and improved dietary intake. Currently, approximately one in three individuals with cancer in Ireland report having seen a dietitian^{3,4}.

Malnutrition and weight loss

Oncology patients are consistently reported as amongst the most malnourished of all patients, with incidence between 8 and 85% depending on tumour site^{5,6}. Involuntary weight loss affects 50-80% of those with cancer and has implications for tolerance to treatment, postoperative complications, quality of life and survival⁷.

Muscle

An array of abnormal muscle

characteristics can be prevalent (10-90% depending on cancer type and stage), including sarcopenia, low muscle attenuation and cancer cachexia. All of which can lead to negative clinical outcomes, including weakened response to anti-cancer treatments⁸, deterioration in functional status and overall quality of life^{7,9}.

Cancer cachexia (CC) is known as a multifactorial syndrome which embodies involuntary weight loss reflecting in low body mass index (BMI), systematic inflammation, metabolic changes and a low skeletal muscle mass. All reduce muscle strength and functional capacity correlated to impaired quality of life¹⁰. It can be diagnosed when there is an involuntary weight loss >6% over the last 6 months (in absences of starvation) or Weight loss >2% with BMI <20kg/m² or sarcopenia with a loss of skeletal muscle mass¹¹. Cachexia affects between 24 and 75% of oncology patients and is responsible for approximately 20% of oncology mortalities⁷.

Age-related sarcopenia (low muscle

mass) further compounds this muscle loss. The prevalence of sarcopenia can vary due to type of cancer and patient characteristics, with occurrence between 4-90%⁷. Sarcopenic obesity can be prevalent and difficult to detect as the individual may not appear malnourished and adipose tissue may mask the underlying muscle loss¹².

Low muscle attenuation has recently been recognised as an additional important indicator of unfavourable outcomes in those with cancer^{13,14}. This refers to the infiltration of skeletal muscle with adipose

practice using a handgrip dynamometer¹⁷ and computed tomography can provide precise quantification of both adipose and muscle tissue.

Nutritional requirements

Where not measured directly, it is currently assumed that total energy expenditure is in the range of 25-30kcal/kg bodyweight¹⁶. This, however, does not take into account changes in body composition, tumour burden, systemic inflammation, brown adipose tissue activation, physical activity, dietary intake or treatment modalities and therefore there may be



tissue, reducing the 'quality' of the skeletal muscle¹⁵.

Assessment

To detect nutritional disturbances at an early stage, ESPEN¹⁶ recommends regular evaluation of nutrition intake, weight changes and BMI, beginning with cancer diagnosis and repeated depending on the stability of the clinical situation. Muscle strength can be easily assessed in clinical

some discrepancies between the calculated energy expenditure and actual energy expenditure¹⁸.

Protein intake is recommended to be above 1g/kg/day and up to 1.5g/kg/day¹⁶, with a recent literature review indicating that 2g/kg/bodyweight per day may be necessary to promote positive protein balance in those with cancer¹⁹.



SYMPTOMS IMPACTING NUTRITION

There are multiple factors that can occur as a result of the cancer itself and its treatment with some tips (this list is not exhaustive) on the management of some of these symptoms

SENSORY CHANGES (TASTE AND SMELL)

- Try new foods, anything that appeals
- Rinse mouth with solution of water and baking soda before and after eating to help normalise taste
- Cold or lukewarm water have a weaker taste and smell – may be more tolerable
- If bland add herbs, seasoning, spices, garlic or onion to boost flavour. Fat is a great flavour carrier – add to meals freely
- If metallic taste – rinse mouth regularly and try plastic cutlery instead of metal ones
- Marinating meats can help mask metallic tastes
- Sharp tasting foods like fresh fruit can be refreshing and leave pleasant taste in the mouth
- Re try foods every 2-3 weeks as taste may have returned to normal

NAUSEA AND VOMITING

- Eat little and often. Avoid skipping meals – leads to hunger which worsens nausea
- Bland cold foods have less taste and smell and will be better tolerated
- Avoid greasy, spicy and sugary foods

TABLE 2

Practical tips for dealing with common side effects which will have a nutritional impact

POOR APPETITE/EARLY SATIETY

- Eat whenever feel hungry. If hungrier in the morning have biggest meal then
- Frequent small meals
- Snack often and avoid large, off-putting portions. Make these high in calories and protein
- Limit drinks before and during meals
- Limit fibre as fills too quickly
- Bland foods may be easier to tolerate

FATIGUE

- Little and often 2 small meals and 3 snacks daily
- Full fat milk
- Food fortification
- Oral nutritional supplements
- Drink after meals
- Plan meals to include favourite foods
- Keep food visible and within easy reach
- Energy dense snacks, cheese and crackers, yoghurts, ready pot puddings

DYSPHAGIA

- Speech and language assessment
- Texture modified diet

DRY MOUTH

- Sip fluids throughout the day
- Maintain good dental health
- Soft, minced and moist, smooth pureed foods easier to eat
- Avoid salty foods, spicy food, caffeine and alcohol
- Chewing gum may help stimulate saliva
- Rinse mouth with one of following before meals
 - Baking soda with water
 - Salted water
 - Flavoured soda water
 - Sparkling soda water

SORE MOUTH

- Eat soft foods e.g. puddings, yogurts
- Moisten foods to make easier to eat e.g. with gravy or sauces
- Avoid rough texture foods e.g. toast and foods that are overly tart, salty or vinegar based
- Sip fluids throughout the day
- Cold foods such as ice cream may help (if allowed)

ALTERED BOWEL HABITS (CONSTIPATION AND DIARRHOEA)

- Drink plenty of fluids
- Avoid foods/drinks that may cause diarrhoea
- May need to change the amount of fibre consumed

- Include ginger with meals or drink flat ginger ale
- Avoid favourite foods when nauseated, as may grow to dislike them

Image: Freepik

Bone Health

Some cancer treatments can impact bone health by causing bone loss and increasing the risk of breaks²⁰. Lifestyle advice including increasing consumption of calcium and vitamin D, increasing weight bearing exercise and reducing/eliminating smoking, caffeine and alcohol as well as maintaining a healthy weight may be helpful. Bisphosphonates and monoclonal antibodies may also be prescribed²⁰.

Nutrition support

Initial support should focus on nutrition counselling, food fortification and oral nutrition supplements (ONS) where necessary. Many oncology specific ONS have been supplemented with long-chain N-3 fatty acids or fish oil to stabilize or improve appetite, food intake, lean body mass and body weight, however there is mixed evidence on the effectiveness of fish oils in reducing cancer cachexia and improving outcomes¹⁶. Where food fortification and oral nutrition supplements are not adequately meeting an individual's requirements, ESPEN¹⁶ recommends the use of enteral nutrition, and parenteral nutrition if enteral nutrition is not sufficient or feasible.

Physical Activity

Maintenance or an increased level of physical activity in cancer patients is recommended, where possible, to support muscle mass, physical function and metabolic pattern¹⁶.

CANCER SURVIVORSHIP

We have defined cancer survivors in this article as those who have completed active treatment and who are not palliative. Survival rates for most cancers are increasing and so there is a growing cohort of individuals with unique and specific nutritional needs. There are more

than 170,000 cancer survivors in Ireland with survival rates for individual cancers varying hugely¹. A recent Irish survey of 76 survivors indicated that 74% of respondents had not received any nutrition support since their cancer treatment ceased and 65% were still facing dietary issues, such as loss of appetite or loss of enjoyment of food, as a result of their cancer and treatment²¹.



Cancer recurrence

There is increasing evidence that being overweight or obese, will increase the risk of recurrence and decrease overall survival in those with cancer^{22,23,24}, with particularly strong evidence for breast cancer recurrence^{25,26}. It is important to be aware that in some cases, particularly in individuals with breast, prostate or ovarian cancer, that the treatment chosen could promote weight gain. Chemotherapy has been associated with a 65% increased risk of weight gain $\geq 5\%$ in women with breast cancer, when compared with women who did not receive chemotherapy²⁷.

With regard to diet, it is not clear if diet alone will prevent cancer recurrence. There is however, growing evidence that consuming a diet rich in plant-based foods can lead to a reduction in the risk of cancer overall. Many studies showing

that individuals with a diet low in meat and animal products and high in wholegrains, vegetables and fruit have a lower incidence of some cancers, such as lung, breast, colon and stomach cancers^{28,29}.

Nutrition impact symptoms

Nutrition impact symptoms can also persist into survivorship with symptoms such as fatigue, pain and difficulty sleeping being very well documented^{30,31}. These symptoms, in particular fatigue have



been reported in survivors several years after the cessation of active treatment and can have a substantial impact on an individual's nutritional status and quality of life. Table 2 contains some tips on guidance that can be provided to individuals who report these symptoms.

Cardiovascular disease risk

Compared to the general population, cancer survivors have an increased risk of developing cardiovascular disease risk factors. These risk factors include hypertension, dyslipidaemia, obesity and type 2 diabetes^{32,33}. Screening is important as is the promotion of lifestyle modifications such as increasing physical activity, consuming a healthy balanced diet and maintaining a healthy weight³⁴. The WCRF recommendations in Table 1 should be promoted. Use of medications such as aspirin, beta blockers, ACE inhibitors or statins may also be required³².

Nutrition recommendations for cancer survivors

The World Cancer Research Fund recommends that cancer survivors follow the recommendations for cancer prevention² (Table 1). These guidelines mainly focus on maintaining a healthy weight, consuming a plant-based diet with plenty of wholegrains, fruit and vegetables and also being physically active². There are currently no additional specific cancer survivor nutrition recommendations.



Useful resources

www.breakthroughcancerresearch.ie

- Good nutrition for cancer recovery
- Eating well with swallowing difficulties in cancer
- Healthy eating for cancer survivors

<https://www.wcrf.org/diet-and-cancer/>

Diet, Nutrition, Physical Activity and Cancer: a Global Perspective. The Third Expert Report

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