

CHAPTER 23 NUTRITION, EXERCISE AND PSYCHOTHERAPIES

23.1 Introduction

This chapter addresses the questions patients frequently ask about diet, exercise, and psychological support. Questions about complimentary and alternative health practices are discussed in Chapter 24.

23.2 Nutrition

23.2.1 Nutrition and dietary recommendations

Nutrition is an important aspect of patient care. Its goals are to support nutritional status, body composition, functional status, and quality of life.¹ Maintenance of body composition and adequate nutritional status can help people with cancer look and feel better, and can maintain or improve both performance and daily functional status.² It may also help them tolerate therapy.³ The type of nutritional intervention will depend on the basis of the nutritional risk or deficit. Studies have stressed the importance of incorporating nutritional evaluation, counselling, intervention (as needed) and follow up in the routine care of the oncology patient.⁴

Dietary guidelines for lymphoma patients are basically the same as those for the general population, that is, a healthy balanced diet. The following recommendations were developed by the Commonwealth Department of Health and Family Services from recent research in nutrition⁵:

To obtain a balanced and varied diet, it is important to eat food from the five food groups each day. The main food groups are as follows:

- 1 Bread, cereals, rice, pasta, noodles
- 2 Vegetables, legumes
- 3 Fruit
- 4 Milk, cheese, yoghurt
- 5 Meat, fish, poultry, eggs, nuts, legumes.

In addition to eating a variety of foods, it is recommended to:

- 1 Drink eight glasses of water every day for adults. All fluids, except for alcohol, contribute to this requirement.
- 2 Eat a diet low in fat and in particular, low in saturated fat.
- 3 Eat only a moderate amount of sugars and foods containing added sugars.
- 4 Choose low salt foods and use salt sparingly.
- 5 Maintain a healthy body weight by balancing physical activity and food intake.

The actual amount of protein and kilojoules each patient needs will vary, depending on the person's current nutritional status, particular nutritional deficits and individual factors. The aim is to build up strength, improve tolerance to treatment and aid in recovery. Calculating individualised kilojoule and protein requirements for a patient with lymphoma (and/or family or caregiver) will allow them to

meet specific and realistic goals. A dietician can offer guidance in determining the appropriate macronutrient and micronutrient needs for individuals.

Guidelines — Nutrition and dietary recommendations	Level of evidence	Refs
Studies have stressed the importance of incorporating nutritional evaluation, counselling, intervention (as needed) and follow up in the routine care of the oncology patient.	IV	4
Dietary guidelines for lymphoma patients are essentially the same as those for the general population, that is, a healthy balanced diet. Recommendations have been developed by the Commonwealth Department of Health and Family Services from recent research in nutrition.	IV	5
A dietician can offer guidance in determining the appropriate macronutrient and micronutrient needs for individuals.	IV	4

Energy and dietary fat

There is little evidence to suggest an etiological link between dietary factors and lymphoma, but the area warrants additional investigation. Studies have not shown an association between lymphoma risk and energy⁶ or dietary fat intakes.⁷⁻⁹

Guideline — Energy and fat intake	Level of evidence	Refs
Adults should be advised to keep within healthy weight range and their fat intake to <25% of their energy intake.	IV	5

Meat

There is no significant association between animal protein intake and lymphoma as evidenced by both cohort and case control studies.^{6,8,10} Several studies showed a positive association between red meat and lymphoma risk.⁶ Other studies did not confirm this association.^{8,9,11}

High-temperature cooking (such as barbecuing) of red meat can produce carcinogenic oxidised heterocyclic amines. However, no statistically significant increase in risk of lymphoma was found with consuming barbecued or broiled meat.⁷

Dairy products

Some case control and cohort studies have shown a link between milk consumption and lymphoma.^{7,8,12,13} The data were not consistent, with others reporting no association between milk and dairy product consumption and an increased risk of lymphoma.^{6,9}

Only pasteurised dairy products should be consumed.

Fibre

Fibre is a heterogenous group of plant non-starch polysaccharides and non-carbohydrates that is resistant to digestion in the upper digestive tract. The majority of case-control and cohort studies have shown that the consumption of fruit and vegetables is inversely related to the risk of lymphoma.^{6-9,11,14} To date, the results of antioxidant trials using beta-carotene have not shown that it is responsible for tumour suppression. Thus vegetable consumption should not be replaced by taking selected

vitamins/antioxidants, as the active ingredient(s) are unknown. Two case control studies have looked at cereal fibres.^{7,8} Both showed a frequent use of wholegrain foods was inversely related to lymphoma.

Guideline — Fibre requirements	Level of evidence	Refs
Eat five or more serves per day of a variety of vegetables and fruits, all year round.	III	6, 11, 14
It is recommended that adults consume a minimum of 30 g of fibre daily, in keeping with the general healthy diet guidelines.	IV	7, 8

Alcohol

The majority of case control and cohort studies show no association between alcohol and the risk of lymphoma in men and women.^{7,8,15,16} Several case control studies¹⁷⁻¹⁹ showed an inverse association between lymphoma risk and a higher alcohol intake for all types of alcoholic beverages, varying from >3.4 g to >5 drinks/day.

Key point

The Australian dietary guidelines recommend two standard drinks for women and four standard drinks for men per day, with two alcohol-free days per week.

Tea and coffee

Three of four studies that looked at the association between tea and coffee and the risk of lymphoma showed no association between risk of lymphoma and a regular intake of coffee and/or caffeinated and decaffeinated tea.^{9,19} Some animal studies have shown that green tea may delay disease progression of lymphoma²⁰, but more studies are needed to confirm these results. No conclusions can be drawn.

Key point

Drink no more than 2–4 cups of coffee/tea per day.

Nitrate

Nitrate is endogenously reduced to nitrite. Nitrosation reactions give rise to N-nitroso compounds, which are highly carcinogenic. There has been some speculation on the level of nitrates in drinking water and the risk of cancer. All cohort studies and case-control studies to date have found no association with nitrate levels in drinking water and lymphoma risk.^{21,22}

Guideline — Nitrate and lymphoma risk	Level of evidence	Refs
No cohort or case-control study to date has found any association with nitrate levels in drinking water and lymphoma risk	III	21, 22

Multi vitamins and antioxidants

The popularity of multivitamin supplementation and mega doses of vitamins has increased over the past decade. Published trials of vitamin supplementation for cancer prevention and treatment have not been particularly promising.^{5,14} There is no evidence to suggest that standard-dose vitamin

supplementation is harmful, even when taken in addition to a fully balanced diet. However, as well as the financial burden that can accompany vitamin supplementation, there are certain instances where vitamins may be counterproductive, for example, high folate diet and methotrexate therapy, antioxidants and radiotherapy — loss of O₂ free radicals.

Several laboratory studies have shown possible beneficial effects with beta-carotene, Vitamin E, Vitamin A and Vitamin C in immunoregulation with lymphoma. Most clinical studies, however, found no association between the intake of specific dietary carotenoids¹², Vitamins A, C, E and multivitamins and lymphoma risk, even with long-term use.^{13,23,24} Two studies found that Vitamin C and beta-carotene were inversely related to risk of lymphoma.^{8,11} More research is indicated in humans, however, before recommendations can be made.

Guideline — Antioxidant vitamin supplementation	Level of evidence	Refs
Antioxidant vitamin supplementation is not advised at present to protect against lymphoma.	III	12, 13, 23, 24

23.2.2 Influence of psychosocial stress on diet and nutrition

Food is more than a commodity that sustains health and promotes growth. It is a means of communication, a source of pleasure, and a major focus of social activity.² The best way to increase a patient's consumption of food is to determine individual food preferences and to provide the patient with as many of the highly preferred foods as possible. This requires flexibility and imagination.

Many psychological and social factors affect food choices and promote a reduced food intake. These include:

- The stress of coping with the cancer diagnosis and loss of control can have a major affect on nutritional intake.
- Learned food aversions may contribute to a decreased oral intake.
- Anorexia may be aggravated by changes in the palatability of many common foods.
- Food likes and dislikes are highly individual.
- Social factors such as living alone, or inability to cook or prepare meals, can contribute to a poor oral intake.
- Fatigue and weakness may impair the ability to carry out daily activities.
- Normal routines change during treatment and can affect intake.

All these factors can significantly affect the patient's quality of life, social interaction, and outlook.^{2,14}

23.2.3 Alternative diets and dietary modification

There are no special foods or diets that have been scientifically proven to cure cancer. More than 40 different cancer diets have been claimed to prevent or treat cancer.²⁵⁻²⁷ Several of these diets are an extension of conventional medicine; others are more in the realm of alternative approaches. Usually, the diets suggest avoiding meat, many are strictly vegetarian (e.g. Gerson diet, macrobiotic diet), and compelling evidence is largely absent. Many unproven dietary treatments recommend restrictive diets, for example, omitting food groups. This can compromise the intake of essential nutrients, cause

unwanted weight loss and tiredness, and decrease the immune function. As a result, life expectancy and quality of life may suffer.

The following are points to consider before dietary changes are made:

- Collect enough information before making a decision
- The diet should not conflict with the above healthy eating guidelines
- Ability to maintain a healthy weight
- The changes should not interfere with medical treatment
- Are the doses of vitamins and minerals toxic to the body?
- Take into account the cost, time and effort to prepare diet
- Does the diet claim to have realistic or unrealistic results?

23.2.4 Effects of chemoradiotherapy

Patients with lymphoma most commonly experience nutritional problems induced by chemotherapy. It is important to note that side effects of treatment vary from patient to patient. Not all patients have side effects during treatment, and most go away when treatment ends.

To support the nutritional status of the patient undergoing cancer therapy, adequate symptom management is first-line nutritional intervention. Nutritional problems can be induced by each type of anti-cancer therapy, such as procarbazine, vincristine and prednisolone.²⁸ The frequency and severity of these side effects depend on the class of drug, the dose, the drug combination, individual susceptibility, and whether the chemotherapy is part of a combined modality program. Symptoms that last longer than two weeks are especially significant. Glutamate has been shown to ameliorate vincristine neuropathy without reducing its antitumor effect.²⁹ Chemotherapy toxicity adversely affects nutritional intake, digestion, or absorption through one or several mechanisms, for example, it has an adverse impact on the gut and central nervous systems.^{2,30}

Myelosuppression can lead to an increased susceptibility to infection, or a neutropenic reaction that increases the metabolic demands of the patient. The patient's metabolic needs may increase 25% with a temperature of 39°C.

Protein deprivation has also been shown to increase risk of infection and enhance myelotoxicity caused by chemotherapy.^{31,32}

The role of diet in the development of infection and food-borne illnesses in patients with neutropenia is unclear. There is controversy in the literature about the need for low bacterial diets.³³ In patients with a weakened immune system, it is important to ensure good food hygiene and proper food handling.

Lymphoma patients receiving radiation therapy may experience oesophagitis, nausea, vomiting, diarrhoea and enteritis. In addition, radiotherapy is often associated with fatigue, which may result in decreased appetite and motivation to eat.²

Guidelines — Effects of chemoradiotherapy	Level of evidence	Refs
Chemotherapy toxicity adversely affects nutritional intake, digestion, or absorption through one or several mechanisms, including the gut and central nervous systems.	III	2, 30
The patient's metabolic needs may increase 25% with a temperature of 39°C.	III	2, 30
Protein deprivation has also been shown to increase risk of infection and enhance myelotoxicity caused by chemotherapy.	III	31, 32
In patients with a weakened immune system, ensure good food hygiene and proper food handling.	IV	33

23.2.5 Effects of bone marrow transplantation

Nutrition support is an integral part of the supportive care of bone marrow transplant (BMT) patients. Poor transplant outcome has been associated with both underweight³⁴ and overweight³⁵ patients who are having stem cell transplants.

The effect of autologous and allogeneic BMT on nutritional status may be substantially different.³⁶ The use of peripheral stem cells and growth factors has greatly reduced the duration of profound neutropenia and related side effects, such as neutropenic mucositis, in autologous BMT patients. These patients usually return to premorbid nutritional status more rapidly than those undergoing allogeneic BMT. Pre-transplant conditioning using high-dose chemoradiotherapy leads to gut damage and loss of body mass. Neutropenia leads to an increase in infections that alter metabolic needs. Allogeneic BMT patients experience more profound and severe clinical conditions in the post-BMT period, including graft versus host disease (GVHD) and opportunistic infections. This may result in decreased oral intake, malabsorption of nutrients, and loss of nutrients from the gut, especially amino acids.

Negative nitrogen balance is due to intestinal losses, catabolic effects on skeletal muscle from the underlying disease and/or conditioning treatments and possible complications such as sepsis and GVHD.³⁷ Protein requirements are generally satisfied by the provision of 1.4–1.5 g/kg body weight/day.³⁶

BMT patients have increased energy needs because of the stress-induced catabolic state from the cryoreductive therapy and associated complications.³⁷ Energy requirements may reach 130–150% of predicted basal energy expenditure. Recommendations for energy requirements are 30–35 kcal/kg body weight per day.³⁶

Carbohydrate metabolism may be affected, especially from the administration of steroids or cyclosporine, or septic complications. Long-term cyclosporine or corticosteroid therapy for chronic GVHD can cause severe magnesium wasting, hyperlipidaemia extreme muscle wasting, glucose intolerance, hyperlipidemia, hyperphagia, osteoporosis and growth failure.

Vitamin status may be altered in allogeneic BMT patients as a result of poor intake and malabsorption.³⁸ The use of cyclophosphamide and radiation has been reported to increase the need for antioxidant vitamins such as beta-carotene. Trace element deficiency may occur with malabsorption and increased needs for bone marrow reconstitution. Zinc deficiency was shown to correlate with mortality after BMT.³⁶

Veno-occlusive disease of the liver can cause sodium and water retention, ascites, liver failure and hepatic encephalopathy. A low sodium diet and fluid restriction is often needed. Occasionally, a low protein diet is also warranted.

Acute and chronic GVHD can affect the whole GI track, liver, leading to reduced food intake, malabsorption and liver failure. Generalised severe GVHD also causes hypermetabolism. Appropriate nutritional management of these problems includes a hyperalimentation during the severe stage of the disease, followed by a low-fibre or low-residue, low-lactose, low-fat and bland diet.

Guidelines — Bone marrow transplantation	Level of evidence	Refs
Poor transplant outcome has been associated with both underweight and overweight patients who are having stem cell transplants.	III	34, 35
Allogeneic bone marrow transplant (BMT) patients experience more profound and severe clinical conditions in the post-BMT period, including graft versus host disease (GVHD) and opportunistic infections. This may result in decreased oral intake, malabsorption of nutrients, and loss of nutrients — especially amino acids — from the gut.	III	36
Protein requirements are generally satisfied by the provision of 1.4–1.5 g/kg body weight per day.	IV	36
Zinc deficiency was shown to correlate with mortality after BMT.	III	36
Appropriate nutritional management of these problems includes a hyperalimentation during the severe stage of the disease; followed by low-fibre or low-residue, low-lactose, low-fat and bland diet.	IV	36

23.2.6 Nutritional support in bone marrow transplantation

Traditionally, total parenteral nutrition (TPN) has been the nutrition support method for bone marrow and stem cell transplant patients when oral intake becomes inadequate.³⁹

There has been renewed interest in enteral nutrition for transplant patients because it is physiologically safer and less expensive than TPN. Several prospective trials looking at early post-transplant enteral feeding in adults have not found significant benefits.^{40–42} However, TPN was found to be associated with more severe complications and was more expensive when compared to enteral nutrition. Another study showed positive results by using enteral nutrition as a transition step from TPN to oral diet.⁴³

Glutamine is necessary for cell proliferation and enhances inflammatory cell function. It is thought that under physiologic stresses, glutamine synthesis is insufficient to meet the body's needs. In animals, glutamine supplementation was found to support immune function, reduce infectious complications, and improve tolerance of anti-tumour therapy and support gut function without affecting tumour growth.^{44,45}

Some randomised double-blinded controlled trials showed patients had an improved nitrogen balance, a diminished incidence of mouth pain⁴⁶ and clinical infection, lower rates of microbial colonisation, and a shorter length of stay.^{47,48} Conversely, several randomised, double-blind controlled trials found oral and parental glutamine seemed to be of limited benefit.⁴⁸

In conclusion, further studies are required to assess whether nutrition support can improve outcome by manipulation of nutrients, route of delivery, or timing of therapy.

Guideline — Nutritional support in bone marrow transplantation	Level of evidence	Refs
A study showed positive results by using enteral nutrition as a transition step from total parenteral nutrition (TPN) to oral diet.	III	42

23.3 Exercise

23.3.1 Effect of exercise on psychological and physical health

Only a small number of lymphoma patients have been included in exercise studies to date. Two small studies that included lymphoma patients have shown aerobic exercise reduced fatigue, psychological distress⁴⁹, and the loss of physical performance⁵⁰ in patients undergoing high-dose chemotherapy and stem cell transplantation.

In one study, the exercise program involved biking on an ergometer in the supine position for 30 minutes every day during hospitalisation.⁴⁹ In the other study, patients walked on a treadmill five days a week, starting shortly after completing treatment. The duration of exercise was five sessions of three minutes in the first week, working up to a single 30-minute session by the sixth week.⁵⁰

Fatigue is common among cancer patients, and has a detrimental effect on quality of life. Exercise is currently the most promising intervention for reducing fatigue in cancer patients⁵¹. It may also improve psychological wellbeing.

Improvements in psychological health of cancer survivors were shown in two studies of women treated for breast cancer^{52,53}. Fatigue, depression and anxiety were improved by exercising for 30 minutes a day, for 4–5 days per week.

Cancer-induced muscle wasting can occur despite adequate nutritional intake. Resistance exercise has been shown to attenuate muscle wasting in a variety of conditions such as breast cancer⁵⁴, prolonged bed rest, HIV infections, and aging.⁵⁵ In a randomised study of patients undergoing bone marrow transplant for leukaemia, fifteen repetitive resistance exercises performed up to five times per week may improve muscle mass, compared to sedentary controls.⁵⁶

Interestingly, a randomised study of patients with a variety of cancers who underwent high-dose chemotherapy and stem cell transplantation showed a reduction in the duration of neutropenia, thrombocytopenia and hospitalisation with an aerobic exercise program.⁵⁷

23.3.2 Prevention of co-morbidity

Exercise can also reduce co-morbidity in cancer patients because it reduces the risk of other diseases, particularly coronary heart disease, stroke, hypertension, diabetes, colon cancer and osteoporosis.⁵⁸ Both population and non-population-based studies have shown greater physical fitness is linked to longer survival.⁵⁹ Furthermore, exercise tests can be used as a predictor of survival.⁶⁰ Recent data suggest an increased level of fitness in less active subjects can improve their survival.⁵⁰

Regular exercise can also improve mental health, prevent injury from falls in older people and help to manage arthritis. The Commonwealth Department of Health and Ageing recommends 30 minutes of moderate-intensity physical activity on most, or all days, of the week, to gain these benefits.⁵⁵

Guideline — Exercise to prevent co-morbidity	Level of evidence	Refs
Recent data suggest an increased level of fitness in less active subjects can improve their survival.	II	50

23.3.3 Precautions

Patients should be screened for cardiopulmonary risk factors, as well as for standard disease and treatment-related toxicities, before an exercise regimen is recommended.⁵¹ Contact sport, excessive exercise and repetitive strain should be avoided, particularly during and immediately after therapy, and in patients on high-dose or prolonged steroids, or with bone involvement.

Guideline — Exercise on psychological and physical health	Level of evidence	Refs
Regular aerobic and resistance exercises are recommended to patients.	II–III	49, 50, 56, 57

23.4 The role of psychotherapy in patient treatment

There is overwhelming evidence that some form of psychotherapy benefits patients with cancers. There are at least ten randomised studies on assessing the impact of psychotherapy on cancer patients.^{61–72} Two main modalities of psychotherapy — cognitive-behaviour type and expressive-supportive group therapy — have been used in these studies. They conclusively show that such treatment improves the quality of life of the patients, but there is no conclusive evidence that this type of therapy influences patient survival. Two of these studies^{64,67} involving patients with haematological malignancies, including lymphoma, showed that psychosocial intervention and compliance to treatment have a beneficial effect on patient outcome.

It is not uncommon that patients who are receiving chemotherapy or radiation treatment experience both physical and psychosocial stresses. A number of randomised trials also demonstrate the benefit of psychosocial interventions in reducing nausea and emotional distress for patients undergoing chemotherapy.⁷³ The interventions include: relaxation with guided imagery, behavioural treatment (systemic desensitisation), and biofeedback. Interestingly, a recent study shows that self-administered stress management during chemotherapy is more cost effective than professionally administered intervention.⁷⁴

The concept that the mind can alter health is an extremely attractive one, as it bestows power of controlling personal destiny. Various types of mind-over-matter techniques, including psychosocial therapy, meditation, biofeedback and yoga, have been shown to reduce anxiety and to control certain physiological functions. However, as the idea that one can alter the course of cancer through mental power is not substantiated, the enthusiastic pursuit of this therapeutic goal could lead to the detrimental consequence of guilt and inadequacy in the patient.⁷⁵

Guideline — Psychotherapy	Level of evidence	Refs
Some form of psychotherapy should be offered to patients with certain cancers because it has a positive affect on quality of life, and possibly in the overall treatment of lymphoma.	II	61–72

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