



NUTRITIONAL THERAPY

BY STAFF OF ACS DISTANCE EDUCATION



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CHAPTER 1 INTRODUCTION

SCOPE & NATURE OF THERAPEUTIC NUTRITION

Nutrition is a potent component in human health, and can be a valuable contributor toward improving recovery from injury or illness. As such, nutrition can be used therapeutically to support recovery from a range of health issues.

Studies have shown how good nutrition promotes a healthy immune system preventing infections, aids tissue growth and replacement and supports the healthy functioning of organs such as the heart and pancreas. Conversely, inadequate intakes of nutrients, or depleted levels of nutrients in the body puts a person at risk of malnutrition. This in turn is associated with problems such as reduced immunity, poor wound healing and weakened response to recovery from disease or surgery - problems that increase the length of hospital admissions and duration/prognosis of a disease or illness and can also increase the risk of mortality.

The contribution of nutrition to recovery must be put into perspective though. The human body is complex; and there are many different factors that can affect our wellbeing. These include mental health, physical health, genetic predisposition, age, previous injury, environmental influences and daily activity; as well as what you eat.

HOW DOES THERAPEUTIC NUTRITION DIFFER TO NORMAL NUTRITION?

While recovering from illness, some things you eat, and the way you eat, may need to be different to how you might eat normally. Therapeutic nutrition aims to meet these requirements, for example, by modifying the basic nutrients in a person's diet i.e. the

amount of protein/ fat/ carbohydrate, vitamins/ minerals consumed; or by modifying a person's total energy intake increasing or decreasing their intake; or by changing the texture / consistency of a person's diet.

APPLICATIONS OF A THERAPEUTIC DIET

Therapeutic nutrition may be appropriate in a range of clinical conditions from short term interventions in acute illness, for example following a stroke or infection or surgery, to long term modifications used to treat chronic conditions such as diabetes and heart disease. While Chapter 4 concentrates on a wide range of clinical conditions and discusses appropriate nutritional treatments for each condition, in this chapter we shall discuss some different categories of situations where therapeutic nutrition may be appropriate.

NUTRITION IN THE RECOVERY FROM MALNUTRITION

A malnourished patient is one who has suffered from some degree of under-nutrition or over-nutrition or has a clinical condition that has affected their ability to absorb and utilise the nutrients required to maintain a healthy functioning body. Patients who are malnourished can suffer from a wide range of related physical, physiological and psychological effects. Among other examples, physical

effects include impaired growth and development, poor wound healing and reduced strength. Physiological effects include detrimental effects on a person's immune system and organ functioning. While psychological effects include mood swings and depression.

Malnutrition is diagnosed if a person's weight is low enough to be detrimental to their health or if they have unintentionally lost weight or have difficulty in swallowing or feeding themselves, or are acutely unwell. Research shows that malnutrition remains a significant problem around the world both within hospitals and in the community. The effects of untreated malnutrition can be significant and costly in terms of extended hospital admissions and detrimental effects on human health particularly in vulnerable groups such as in the elderly.

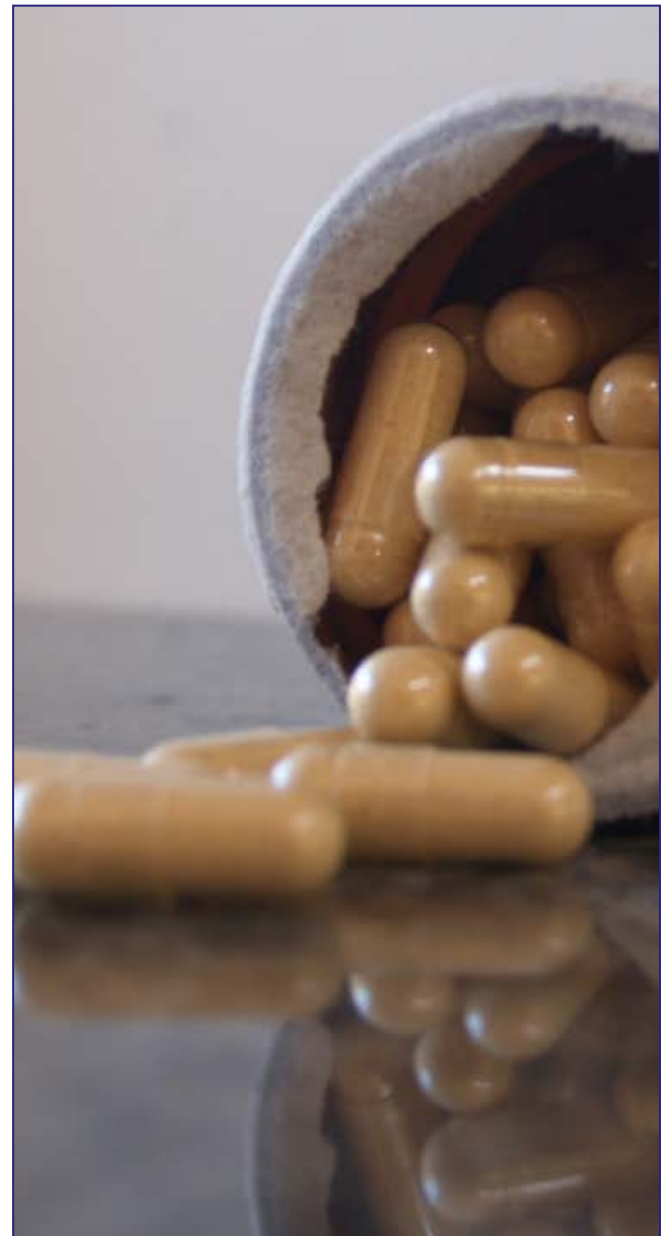
Specific measurements to diagnose malnutrition include an assessment of a person's body mass index (BMI) which is a comparison of their weight in kilograms against their height in metres squared i.e. weight in kilograms divided by height in metres squared. A BMI of below 20 indicates that a person is underweight and a BMI of below 18.5 indicates that they are significantly underweight.

In addition to BMI a measure of unintentional weight loss will also indicate whether a patient is malnourished. This assessment is important since a person categorized as overweight based on their BMI may have unintentionally lost a significant amount of weight and therefore be malnourished. Unintentional weight loss is calculated by the following formula:

Usual weight in kilograms minus current weight, divided by usual weight = percentage unintentional weight loss.

A percentage weight loss of 5 or more % over a period of 3-6 months indicates some degree of malnutrition. In addition to the above, a patient will be considered at risk of malnutrition if they have a clinical condition that puts them at an increased risk or if they have eaten little or nothing for the past 5 days.

Once diagnosed, malnutrition must be treated through the provision of a modified diet. Suitable therapeutic diets include a high protein diet, fortified diet, texture modified diet, supplements and tube feeding, each of these diets are considered in chapter 2.



NUTRITION IN THE RECOVERY FROM INFECTIONS

Nutrition and infections are very closely related where inadequacies in a person's diet lead to low nutritional reserves in the body causing weight loss and muscle wastage. Depleted nutritional reserves are also linked to lowered immunity which in turn compromises the body's response to an infection. Also, an infective state further exacerbates the loss of nutrients in the body, for example through diarrhea or other body secretions, and this in turn worsens malnutrition and causes further reductions in immunity. To compound the problem many infectious diseases are associated with loss of appetite which causes further reductions in dietary intake.

Dietary intervention during and after an infection, can affect how a person recovers from an infectious disease and also the extent to which their nutritional status becomes compromised. In the case of chronic infections such as tuberculosis and AIDS dietary intake also forms an important part of the management of the disease. In most cases dietary management involves the provision of foods with a higher energy density and the provision of foods on a little and often basis to allow for any reduction in appetite. Nutritional therapy must also aim to correct any deficiencies of micronutrients in a person's diet and in some cases should provide additional micronutrients to boost a person's immune system. Micronutrients themselves have an effect on the formation of antibodies and development of an immune system. Deficiency of micronutrients such as vitamins A, C and E and minerals such as zinc, iron and iodine are linked to an increased susceptibility to infection. Their different roles can be seen below, along with suggested food sources:

- Vitamin E is an antioxidant which scavenges free radicals in the body boosting the body's defensive mechanisms. Foods high in Vitamin E include sunflower seeds, peanuts, dried apricots, avocados, tomatoes and sweet potatoes .
- Vitamin C is another powerful antioxidant which has been shown to affect different metabolic processes and functioning of the immune system, such as the function of immune system cells like T cells. An increased intake of vitamin C has also been shown to increase the body's resistance to infections such as the common cold. Good sources of vitamin C include citrus fruit, as well as many other fruits and vegetables.
- Vitamin D is also implicated in the prevention of infections and is thought to affect the functioning of infection fighting B, T and antigen-presenting cells in the blood. The most important source of Vitamin D is sunlight while food sources include fortified foods and oily fish. People at most risk of Vitamin D deficiency are those who have limited exposure to sunlight such as people who are housebound or in an institution, these groups may therefore benefit from Vitamin D supplementation.
- Zinc has also been shown to have essential functions in supporting a healthy immune system and zinc supplementation has had proven benefits in the treatment/ prevention of infections in patients with a deficiency of this mineral. Zinc is present in a wide range of foods including meat, fish, chicken, eggs, cheese and shellfish as well as in fortified foods such as breakfast cereals.

■ Iron is also associated with immunity and a deficiency of this mineral has been linked to impaired immunity, particularly in the elderly. Sources of iron include dried beans, eggs, dried fruit, iron fortified cereals, liver, and fish.

■ Iodine is a chemical element needed for normal metabolism and as with the previous micronutrients also affects the normal functions of the immune system. Iodine is found in egg and dairy products and also in high concentrations in seaweed.



NUTRITION IN THE TREATMENT OF CHRONIC CONDITIONS

Chronic diseases such as those affecting the liver, pancreas, kidneys, liver and gastrointestinal tract can have significant effects on a person's nutritional status, for example by causing a person to lose weight and affecting their recovery or management of their condition. Each condition will have specific dietary requirements and these are considered more comprehensively in chapter 4

NUTRITION IN THE REHABILITATION OF PATIENTS FOLLOWING A TRAUMATIC EVENT

Traumatic events include any serious injury or shock placed on the body including those resulting from violence, accidents (burns, road traffic accidents

etc) and surgery- planned or unplanned. These events can place significant stress on the human body and will require therapeutic diets to meet additional nutritional demands brought about by the stressed state. In most instances a traumatic event will bring an increased demand for protein and energy. Exact nutritional requirements will vary though and dietitians will use different formulae to calculate a person's nutritional requirement based on their particular clinical condition. Generally patients who have had an uncomplicated surgery will require no or only slight increases in their energy intakes, while those who have had complicated surgery may require 25% to 40% more energy than their normal requirements and those who present with sepsis or trauma may require twice as much energy. These diets will require careful planning and perhaps some degree of artificial tube feeding as described in chapter 4.

INTERPRETING NUTRITIONAL ADVICE

In the remainder of this e book we shall review current principles and guidelines around therapeutic nutrition looking at how nutrition affects physical and mental health and how it can affect the management of different types of disease and illness states. As we consider different applications and conditions it is important to recognise that advice can change in response to new research and developments, and while we should aim to stay as up to date as possible with changing advice, we must also be aware of its limitations.

How do you tell the Information You Hear or Read is Correct?

Always understand that even the “experts” are only human.

Doctors and nutritional scientists don't always get it right; but that doesn't mean you shouldn't follow their advice. Someone who has studied and worked with health science for years will always be more informed than someone who has not; but every specialist in the field of health will know their own area of expertise better than other areas of health science.

Health professionals can also have their attention spread thin; and a patient who understands this; observes their own symptoms, and communicates those symptoms to their doctor is always more likely to get better medical advice than one who hides things from their doctor, or simply communicates poorly.

VALIDITY OF RESEARCH

Most medical recommendations tend to be based upon research; but often that research is funded by people or organisations who have a bias to achieve certain results.

Research in recent years has noticed a weakening over time of evidence which originally supports therapeutic responses to a health problem.

Consider:

- When a new treatment is conceived, it will always be newsworthy; and likely to be promoted strongly in the media; but when it becomes widely accepted, it will become more newsworthy to attack the remedy. It must remember that the commercial media is motivated to print things that are more attractive to a reader.
- Academics need to get papers published in order to further their careers. Research that is more controversial or newsworthy will always get published before things that are dull and uninteresting. If one research trial shows controversial results, and three others find contradictory but dull results; the controversial can often be published, popularised and accepted above the research that was proven more often.
- If a food manufacturer or pharmaceutical company is conducting research into the usefulness of a new product; it will always be in their interest to ignore results that are not in their interest, and promote results that are in their interest

CHAPTER 2 INTERACTIONS WITH NUTRITION

In this chapter we shall look more closely at health and disease and consider the range of factors which influence our health and how different factors affect diet and lifestyle advice.

WHAT IS HEALTH?

Health has been defined by the World Health Organisation (WHO) as ‘a state of complete physical, mental and social well being’. A healthy body can provide a person with a greater ability to deal with everyday life - by helping to fight off infections, deal with everyday stresses on the mind and body and do all the things they want to do. When we consider health we tend to think about our physical health which refers to our organs, muscles, bones etc and also of our mental health which is defined as a state of emotional and psychological wellbeing. Many factors affect our physical and mental health, and it is important to understand these factors as they will affect how the body

responds to different nutrients and diets as a whole. Understanding this will allow you to develop an appreciation of which diets are most suited to yourself or to an individual client based on their own specific needs. Here we shall consider these different factors:

AGE

Our bodies respond to the ageing process in a number of ways. These changes include a loss of muscle mass which causes us to progressively lose strength and become weaker, and a reduced functioning of the nervous system making us more prone to mental illness. Diet and lifestyle can help delay some of the age related illnesses as can be seen in the following table.

PART OF THE BODY	AGE RELATED EFFECT	DIET AND LIFESTYLE RECOMMENDATIONS
The brain	Age related effects include a decline in memory, concentration, focus and judgment and an increase in neurological problems such as Alzheimer’s disease and stroke.	<p>Ensure adequate intakes of vitamin B6, B12 and folate as deficiencies of these vitamins can lead to a decline in the nervous system. Sources of vitamin B6 include pulses and whole grains while B12 levels are particularly high in meat, fish and dairy products. Folate is found in green leafy vegetables and fortified foods such as breakfast cereals-</p> <p>See also the section on mental health for more advice.</p> <p>In addition to dietary changes exercise the mind by taking part in exercise classes and other recreational activities such as crosswords and mind games.</p>

PART OF THE BODY	AGE RELATED EFFECT	DIET AND LIFESTYLE RECOMMENDATIONS
The heart	The muscles of the heart become weaker with age placing more stress on the heart. In addition fatty deposits can form on the inner walls of the arteries making it even harder for the heart to pump blood through them.	Most benefits come from controlling weight and intakes of dietary fat (particularly from saturated fats). Regular exercise has also been shown to be beneficial- see also chapter 4 for lots more advice.
Bones	As we age bone density declines which makes them weaker and more susceptible to fractures.	To help maintain bone density include plenty of calcium rich foods such as milk, cheese and yoghurt. Also ensure adequate intakes of vitamin D from sunlight and dietary sources such as oily fish or from Vitamin D supplements. Again please see Chapter 4 for more dietary advice. Bone density is also improved through weight bearing activities including walking.
The digestive system	Our digestive system tends to become more sluggish with age and older people are particularly prone to constipation which can be caused by decreased functioning of the digestive tract as well as from reduced intakes of fluid and fibre and from reductions in activity.	Maintain a healthy digestive system by including 8 cups of fluid a day and aiming to increase intakes of fibre e.g. from fruits and vegetables and wholegrain cereals.

GENDER

Gender has a number of effects on health. Overall women are more likely to visit a doctor than men and more likely to take medicines but male death rates are higher in all age groups. In particular

men have a higher mortality from heart disease and higher rates of injuries from accidents and greater incidence of lifestyle related illness such as lung disease associated with smoking and alcohol related liver disease.

Gender and diet/ lifestyle

While a healthy diet is an effective way of preventing chronic disease in both men and women, some nutritional guidelines are gender specific and when planning a therapeutic diet for

a man or woman it is essential to take into account a person's gender so appropriate intakes of energy and nutrients can be recommended. The table below shows some specific gender related recommendations:

ENERGY/ NUTRIENT	ADVICE
Protein	Average daily requirements are higher for men than women- around 46 grams per day for women against around 56 grams per day for men. This difference is largely related to the difference in size of the average man and woman. Overall in both men and women protein requirements should be about 15% of a healthy person's daily energy requirement. Both men and women should be cautious not to have too high intakes of protein as excess intakes cause increased loss of calcium in the urine which is linked to an increased risk of osteoporosis (more of a problem in women) and increased risk of kidney stones (more likely in men).
Energy	Daily energy requirements also vary between men and women. Whereas men have an average daily requirement of around 2500kcal (10500KJ), women need an average intake of 2000kcal/day (8400 KJ) a day. This difference results from the fact that men tend to be larger than women and have a larger lean muscle mass which raises metabolic rate to a greater degree than the higher body fat mass in women.
Calcium	Rates of osteoporosis (weakened bones) are also higher in women than men. Specific requirements for healthy bones are considered in chapter 4, but simple advice is to ensure women have good intakes of calcium rich foods such as milk and dairy foods.
Iron	Women of childbearing age require more iron per day than men as they lose iron with each menstrual period. The average Iron requirement is around 18mg a day for women against 8mg a day for men. Women should therefore ensure good intakes of Iron rich foods such as lean red meat, egg, fish, fortified cereals and beans.

PHYSICAL ACTIVITY

Physical activity is related to many different aspects of human health. Among the many benefits, activity can help in weight control and protect against heart disease and stroke, high blood pressure, Type 2 diabetes and osteoporosis. Physical activity can also benefit mental health by helping to improve mood and reduce stress.

Research around diet and activity has shown close links between activity and diet. Like dietary restrictions, activity has been shown to be especially beneficial to people aiming to lose weight while evidence also suggests that people who engage in regular physical activity are more likely to follow a healthy diet and not require dietary intervention in the first place. Physical activity also helps to raise the metabolic rate by raising lean body mass and can also help a person become more sensitive to the physiological signs of fullness which is again linked to improved weight control. Due to the many benefits of physical activity we are generally recommended to do around 30 minutes of physical activity around 5 times a week.

GENETIC PREDISPOSITION

Research suggests that genetics play a role in a number of conditions including in cancer, diabetes, cardiovascular disease and mental health conditions. In these instances while diet and lifestyle factors have important roles in reducing the risk of disease, an individual can have a higher risk of developing a condition even if they have a healthy diet and lifestyle. Genetics can also be directly responsible for some inherited health conditions such as muscular dystrophy, cystic fibrosis and Down's syndrome. In these conditions dietary change may be an important

aspect of managing different symptoms, for example patients with cystic fibrosis tend to have difficulty maintaining a healthy weight and can require nutritional support to gain weight or prevent further weight loss.

Obesity is one area of controversy when considering genetic predisposition. Research has shown a genetic influence on obesity and scientists have isolated genes affecting metabolism, appetite and the distribution of fat within the body. But while genes can put some people at a higher risk of developing obesity, lifestyle factors will affect whether obesity develops and individuals can still avoid obesity through following a healthy balanced diet and taking regular physical activity.

ENVIRONMENTAL INFLUENCES ON HEALTH

Environmental factors can influence health in a number of ways. These factors include natural factors such as the weather and bacteria, viruses and animal life, together with manmade factors including tobacco smoke, housing problems, traffic and chemical pollutants. The environment a person is exposed to also impacts on a person's dietary habits and their levels of physical activity- two factors which will in turn affect their health. It is therefore essential to understand the impact of environment before planning any dietary intervention. For example, when advising a person to consume a healthy diet a practitioner should be aware of possible environmental constraints such as their access to healthy foods and leisure facilities i.e. is there a shop near to a client's home that sells healthy food and is it affordable to them? Also will the client be able to travel to a leisure facility or access open spaces such as parks?

EFFECT OF DIET ON PHYSICAL AND MENTAL HEALTH

As we have seen, our health is affected by a range of factors such as our age, gender and genetics. Chapter 4 will concentrate on physical health in much greater detail by looking at the effect of diet and lifestyle on our organs, bones, muscles and blood. In terms of mental health, scientists have discovered that the food we eat not only affects our physical health, but also our mental health. It has been shown that physical health is linked to mental health, where a poor diet and lifestyle increases the risk of developing some forms of mental illnesses and makes other conditions harder to manage.

Here we shall look specifically at mental illness and discuss diet and lifestyle advice to help mental health, we will then expand on this information in chapter 4 looking at some specific mental health conditions.

MENTAL HEALTH

The brain is fed by glucose, which is broken down from the food we eat. The types of food we eat, and when and how much we eat can affect mood, behaviour and brain function in a number of different ways, primarily by altering the chemistry and functioning of the brain. An obvious and often dramatic example is the affect of coffee on a person's mental state. People often experience heightened energy, alertness and possibly agitation after drinking a cup of coffee. The effects of nutrition on mental health are not always instantly observable, and may occur over a matter of hours or years. For example, skipping a meal can result in a lack of energy supply to the brain a couple of hours later and may reduce a

person's motivation and problem-solving ability (amongst other things). In a longer term example, deficiencies in the B-vitamin Thiamin can lead to Wernicke-Korsacoff syndrome that can result in vision changes, confusion and impaired memory.

Eating regularly

To maintain a positive, stable mood, it is beneficial to eat regular meals. The brain requires energy to function, so if energy requirements are not met the body's processes start to slow or shut down. When this happens mental functioning is affected, and can result in symptoms such as low energy levels and motivation, reduced cognitive functioning, irritability and a depressed mood state. Another aspect of eating regularly is to keep blood sugar levels balanced. As mentioned, when we eat food part of it is broken down into glucose that feeds the brain. As this gets used up between meals, the blood sugar levels drop. If the blood sugar levels drop too low, people may experience depressed mood, irritability, an inability to cope, anger or fatigue.

High blood sugar levels can also affect moods (not to mention a person's overall health), for example eating foods with a high glycaemic index (GI - this will be discussed in further detail later in the chapter) that cause the blood sugar levels to spike can also affect mood and behaviour, potentially causing irrational behaviour, aggression, mood swings and fatigue. Some ways to prevent blood sugar level fluctuations include eating every four hours or so (this may include a small healthy snack between meals); eating at least three meals a day (including breakfast); and eating low GI foods that take longer to be absorbed so release glucose into the bloodstream at a slower rate.

Food and Neurotransmitters

Neurotransmitters are chemicals in the brain that allow for communication between neurons - nerve cells that make up the nervous system. Neurotransmitters play an important role in mental health, and contribute to a variety of mood states. For example, serotonin is associated with states of relaxation, calm and sometimes

drowsiness. Stable serotonin levels are associated with positive moods and a greater sense of wellbeing. Dopamine and norepinephrine are associated with states of alertness and concentration. Dopamine is a natural energiser and is thought to reduce depression. Low levels of these neurotransmitters are implicated in a variety of mood disorders, such as depression, anxiety, bipolar and eating disorders.



Neurotransmitters need precursors (building materials) to reproduce, and these precursors are largely gained through the diet. Insufficient amounts of the precursors means the brain can not produce adequate amounts of neurotransmitters which can result in mental disorders or disruptions.

The precursor for serotonin is tryptophan – an amino acid. Amino acids are the building blocks of protein, so tryptophan is found in high protein food such as dairy products, meats and eggs. Eating sufficient amounts of these foods can keep the serotonin levels stable. Without adequate tryptophan in the diet, levels of serotonin in the brain can drop, affecting the person's mental health. Serotonin levels can also be increased by the consumption of carbohydrates, as carbohydrates triggers the release of the hormone insulin, and an increased insulin level causes more tryptophan

to enter the brain. Higher levels of tryptophan allows for higher levels of serotonin to be produced.

The precursor for dopamine is the amino acids phenylalanine and tyrosine, which can be found in foods such as eggs, almonds, meat, grains, avocado and bananas (amongst others). Like serotonin, without adequate levels of the amino acids, insufficient levels of dopamine are produced and may result in mood and other disorders.

So a diet that includes sufficient amounts of protein is important for mental health. Carbohydrates also play a role in mental health. As mentioned, carbohydrates help to increase serotonin levels however, it is important to note how different types of carbohydrates can produce a more positive or more negative effect.