BACKCOVER

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A GUIDE TO NUTRITION AND HYDRATION FOR ACTIVE HEALTHY LIFESTYLES

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This booklet has been prepared as a joint initiative of:

British Dietetic Association

The English Institute of Sport

Sports Dietitians UK

The European Hydration Institute

Introduction

It has long been recognised that a sedentary lifestyle and poor food choices are not conducive to a long and healthy life. Humans evolved as hunter-gatherers: survival depended on a high level of physical activity and food was often scarce. Over the last century or so – a mere blink of the eye in terms of human evolution – the picture has changed dramatically. For most of us, there is little or no requirement for any physical exercise in our daily lives and most of us have access to more food than we need.

The result of these changes has been a dramatic rise in the rate of overweight and obesity. Less obvious, though no less deadly, is the accompanying rise in the rates of diabetes, cardiovascular disease and the other ailments of modern life. These illnesses are often debilitating, preventing sufferers from enjoying a full and happy life, but they are not inevitable. We can all make choices in our everyday lives that will increase or decrease our risk of contracting them. As with the use of tobacco or excessive use of alcohol, these lifestyle choices have profound effects on health and happiness. Diet and exercise go hand-in-hand as key parts of a healthy lifestyle. Neither is completely effective on its own and attention to both will pay many rewards over a lifetime.

To make effective choices, we all need information about the costs and benefits of the choices that are open to us. This little booklet contains some information and advice about nutrition and hydration for active healthy lifestyles. This information may be useful to those who are already committed to an active lifestyle or who perhaps just need a little prompt to make some changes to their current habits.

This booklet has been prepared as a joint initiative of:

- British Dietetic Association (Sports Dietitians UK)
- The English Institute of Sport
- The European Hydration Institute

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Remember that you are different from everyone else in the world. As with all general information, the information and advice in this booklet will apply differently to each individual. Following this advice will help you achieve an active, healthy lifestyle, but if you have been advised by your doctor, dietitian or other health professional to follow a special diet or exercise program, please consult them before making changes to your diet or exercise program.

Key Messages

A healthy lifestyle is an active one. To live well in today's hectic world you should try to incorporate physical activity into your day-to-day routine: get off the bus a stop or two earlier and walk, take the stairs instead of lifts or elevators, and while at work walk to talk to colleagues in place of email or a phone call. A regular program of exercise – jogging, tennis, or gym work, for example – is good too, but you should aim to be active most days of the week.

Good food choices are important too. There are no bad foods, but a poorly-chosen diet that provides too much energy or not enough essential nutrients will lead to less than optimal health.

Being active and maintaining a healthy weight are the two cornerstones of disease prevention: these two actions can greatly reduce the risk of obesity, cardiovascular disease, stroke, diabetes and other illnesses.

Exercise increases your need for energy (calories) and you should eat more if you are active – great news if you enjoy eating good food.

A diet that is high in carbohydrates, adequate in protein, and moderate in fat content is the best diet for an active lifestyle and for good health.

Consuming a carbohydrate-rich meal 3 to 4 hours before a hard exercise session will ensure that adequate fuel is available. A low-fat, carbohydrate-rich snack up to 1 hour before exercise can also help, but is not necessary unless the session will be hard and long.

If exercise lasts more than 1 hour, a carbohydrate-electrolyte sports drink may be useful, but plain water can be a good choice too.

Consuming carbohydrate and protein-rich foods and beverages immediately after exercise helps replenish muscle carbohydrate stores, aids tissue repair and healing, and maintains immune function.

Staying well hydrated is important for short-term physical and mental performance as well as for long-term health. Losses of sweat while exercising should be replaced with an adequate amount of water and salt.

Planning for old age starts while you are still young: strong bones will reduce the risk of poor bone health in old age. Peak Bone Mass should be achieved in the first 2-3 decades of life but requires both regular exercise and an adequate supply of calcium and Vitamin D. Dairy produce is the best source of calcium and 15 – 20 minutes of summer sun exposure to your hands and face each day will provide adequate Vitamin D.

Many different dietary supplements are widely used, but these are generally best avoided unless there is a clear benefit. Eating a varied diet in amounts to meet your energy needs should supply all the vitamins and minerals that you need.

Alcohol in moderation is not harmful, but you should remember that alcohol is not an essential part of the diet.

Remember that food should be a source of enjoyment as well as nourishment. Choose your foods wisely and enjoy eating them.

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1 Lifestyle Choices and Health: Why Exercise?

Our personal wellness and health are largely the result of choices we make. In recent decades lifestyles have changed dramatically, and most of us have become increasingly sedentary. The highly mechanised environment that we now live in has largely removed the need for hard physical work to earn a living, but has also removed most of the opportunities for us to incorporate physical activity into our daily lives.

The most common diseases we suffer from today, such as cardiovascular disease, diabetes and cancer, have also become more prevalent as activity levels have decreased, and this can be can be linked to the lifestyle choices we make. To stay healthy we should eat a varied diet, restrict alcohol and stress, find time to relax and get adequate sleep, avoid smoking, and take regular exercise.

Why Exercise?

To maintain good health throughout life, physical activity should be part of our daily routine. Despite the robust case presented for keeping active, many find it difficult to incorporate physical activity or structured exercise into daily living, even though just thirty minutes of moderate exercise five days a week would be enough to gain substantial health benefits.

Whilst we might marvel at the athleticism and achievements of athletes who excel in sport, many of us do not have the time or inclination to dedicate to developing such sporting prowess. There is much to gain, however, from embracing increased physical activity levels. You do not need to train like an elite athlete, nor do you need technical equipment, a gym environment, unlimited cash or extra hours in the day to realise these benefits: all you need is a dose of the same kind of enthusiasm and determination they demonstrate. Regular exercise should make you feel fitter, look better and provide you with more vitality and energy to go about your day-to-day tasks with ease.

The Benefits of an Active Lifestyle

Numerous health benefits are afforded by regular exercise participation. The more activity you plan into your lifestyle the more health benefits you can expect to enjoy:

- Weight loss and weight maintenance. Regular endurance type exercise improves the ability of muscles to burn fat as a fuel, while regular resistance type exercise can help to combat the loss of muscle mass that often occurs with dieting. Gains in muscle mass contribute to an increase in resting metabolic rate and can further aid weight loss and maintenance by increasing energy requirements even when at rest.

- A stronger heart and a reduction in risk factors associated with heart disease and stroke, such as high blood pressure and cholesterol, as well as overweight and obesity.

- A lower risk of developing Type 2 diabetes and an increase in the uptake of glucose for those who already suffer from impaired glucose tolerance.

- A lower risk of developing some cancers, such as cancer of the breast and colon.

- Stronger bones. Regular exercise promotes bone density, lowering the risk of osteoporosis in later life. It can also alleviate the symptoms of arthritic pain by keeping joints flexible and maintaining the strength of muscles surrounding joints.

- Enhanced mood, reduced anxiety, raised self-esteem and improved confidence. This is a growing area of scientific research, but surveys suggest that physically active individuals feel happier with life.

- Improved digestion as a result of physical activity and exercise supporting the proper functioning of the gut, reducing the risk of indigestion and constipation.

A lifelong commitment to regular exercise is essential to facilitate health benefits, but even small amounts of exercise can bring big benefits.

Recommendations and Guidelines

To gain health benefits, it is recommended that we do at least 30 minutes of moderate exercise on at least five, if not all, days of the week. This 30 minute a day recommendation ought to be viewed as a minimum requirement. The good news is it does not have to be achieved in a single effort. Several short bouts of activity can count towards the total making it easier to meet this daily target. New research suggests that even a few short bursts (1-2 minutes each) of high intensity efforts can bring many health benefits.

What is Moderate Activity and What Type of Activity Should You Undertake?

Moderate means that you need to get a little warmer and slightly out of breath. The type of exercise can be anything that raises your energy expenditure above resting level, enough to expend about 200 calories, and bring about the symptoms described. For example brisk walking, swimming, cycling and jogging are all fine, but dancing, heavy housework and gardening can count too.

Getting Started

For many, the mere notion of exercise will conjure up unpleasant thoughts or images of boring training programs, or rough competitive sports where the risk of injury is a real turn off. The first step in undertaking a regular exercise program is making the commitment to stick to it.

Current recommendations from the World Health Organisation for physical activity promotion for health gain recognize the importance of physical activity.

- Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity.
- Aerobic activity should be performed in bouts of at least 10 minutes duration.
- For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity.
- Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week.

http://www.who.int/dietphysicalactivity/factsheet_adults/en/index.html

To keep you on track it is important to set short, long and possibly medium term goals depending on your personal wants and needs. Setting goals, provided they are realistic, will provide a target to aim for and an incentive to continue, especially if the going gets tough or motivation starts to wane, whilst attaining them will improve self-esteem and motivation. If you have never exercised before, or are in poor physical shape you should not expect to see immediate results. Achieving an improved physical fitness requires time and a consistent approach.

Deciding what lifestyle components are important to you will help you to manage your health. Different types of exercise provide different health benefits. Once fitness goals have been determined the exercise undertaken must allow for the type of benefits you desire, such as weight control, stress management, muscle definition or the maintenance of flexibility. Important factors to take into account are convenience, cost, motivation and enjoyment. It is essential that your planned program is enjoyable if you are going to sustain it. Whatever you choose, start sensibly and listen to your body. If you experience any signs of discomfort or stress terminate the activity immediately and seek medical advice as soon as possible.

2 Food and Nutrition

Good nutrition is essential throughout your entire life cycle. The right balance of nutrition is necessary for physical and mental growth and development, performance and productivity in daily living, and general health and wellbeing, particularly your ability to defend against and recover from illness and disease.

Today we have ever-growing access to a vast range of fresh, convenience and fast foods. At the same time we seem to be losing our inclination and skills to plan and prepare meals. The goal of everyone's diet, whether they participate in sport and exercise or not, should be to consume a wide variety of healthy and wholesome foods, and to consume these in appropriate amounts. Good nutrition, particularly healthy eating, seems simple in theory, but is often difficult to achieve in day-to-day practice, particularly for those with busy lifestyles.

Nutrition-related topics feature regularly in the media and in advertising campaigns, making us more sensitive to information about food and nutritional practices. These sources, however, often present biased or contradictory information on what is good for our health. This can be particularly so in relation to aspects of sensible weight management and supplement use.

Eating ought to be straightforward; after all, food is fuel. Meeting your nutritional needs through a varied diet provides the nutrients you require to avoid dietary deficiencies and prevent chronic diseases. A healthy diet should fulfil two principal objectives: it should provide adequate energy and nutrients to maintain optimum physiological functioning, and it should offer you protection against the risk of disease. It is likely, though, that these objectives are overlooked when planning meals on a day-to-day basis.

Benefits of a Healthy Diet

Current research provides evidence of direct links between eating habits and the risk of succumbing to a variety of diseases. The benefits of a healthy diet include increased energy and vitality, improved immune system function, control of weight gain and maintenance, and reduced risk of many chronic diseases.

Deficiencies, excesses and imbalances in dietary intakes all have the potential to produce negative effects on health which can lead to an array of diet-related disorders. Disorders of deficiency include scurvy (lack of vitamin C), osteoporosis (lack of calcium) and anaemia (lack of iron), whilst disorders of excess include obesity (excess energy) and coronary heart disease (excess fat). Imbalances of dietary intake may occur during periods of high nutritional demand such as growth or pregnancy, during stressful life events or when physical or psychological difficulties make it difficult to achieve adequate nutritional intakes, such as during old age.

The Components of a Healthy Diet

Whether you are a casual exerciser or an Olympic hopeful, a healthy diet is one that supplies the optimum amount of energy and essential nutrients to keep you in good health and maximise your performance. It should provide you with the correct amounts of carbohydrate, protein, fat, vitamins, minerals, fibre and fluid. The foods we eat in our diet contain these nutrients, but amounts vary from food to food, hence the importance of variety. Most foods that we eat are categorised based on their carbohydrate, protein and fat content, but usually consist of more than one of these macronutrients as well as a differing range of micronutrients.

The nutrients found in the foods you eat are also categorised based on the amounts required by your body. Carbohydrate, protein and fat are termed macronutrients because you require these in comparatively large amounts. These (together with alcohol) are the energy-providing nutrients of your diet. Vitamins and minerals are termed micronutrients as these are required in much smaller amounts. Despite relatively small requirements for these nutrients, many play a critical role in regulating chemical reactions in your body and they are an important component of a healthy diet.

Healthy eating should be embraced as something to be enjoyed by all and not simply endured. Foods are often classed as good or bad, or as healthy or unhealthy, with healthy eating often viewed as a hardship or chore. We should take a different view of healthy eating and recognise that there are no good or bad foods, only good and bad diets. What is important is the overall balance of foods that are eaten.

When attempting to follow healthy eating it needs to be borne in mind that no food or foods need to be excluded from your diet completely. Doing this usually makes them more desirable and often leads to greater consumption in the long run, a common problem with many diet programs.

Adopting healthy eating boils down to choosing the right sorts of foods in the right quantities to provide enough energy to sustain your body through whatever level of activity you choose to do. The principles of a healthy diet essentially aim to reduce your risk of chronic disease such as coronary heart disease, obesity, diabetes and cancer, but following these principles will also benefit exercise performance and the maintenance of an active healthy lifestyle.

A simple guide to eating for an active healthy lifestyle

- Eat the correct amount to maintain a healthy body weight
- Cut back on fat intake, particularly that from saturated sources
- Eat plenty of foods with a high starch and fibre content
- Use salt sparingly and reduce reliance on convenience foods
- Ensure adequate intakes of vitamins and minerals by eating a wide variety of fresh and unprocessed foods
- Maintain a good fluid intake
- If you drink alcohol, keep within sensible limits
- When trying to adopt changes to the way you eat, make sure that you create a diet that you enjoy
- Adopt a healthier eating plan gradually over time rather than making drastic changes

See the list of information sources at the end of the booklet for further information, especially NHS Choices and the Food Fact Sheets of the British Dietetic Association.

3 Energy Needs for an Active Life

Dietary Energy

Section 2 above has described how a varied diet can provide our bodies with the energy and nutrients we need for an active healthy lifestyle. Simply put, the term "energy" represents the calories we consume from food and those burned through physical activity. Thus people who are more physically active in their work and daily routines and those who take part in sport and exercise training burn more calories than those who are less physically active and lead more sedentary lifestyles.

Energy Balance

An important part of a healthy lifestyle is maintaining energy balance to prevent excessive weight gain over time. Weight gain is the result of an excess of energy intake over energy expenditure. The aim should be for **ENERGY IN** (calories consumed from food and drink) and **ENERGY OUT** (calories burned through physical activity) to be in balance for weight maintenance.

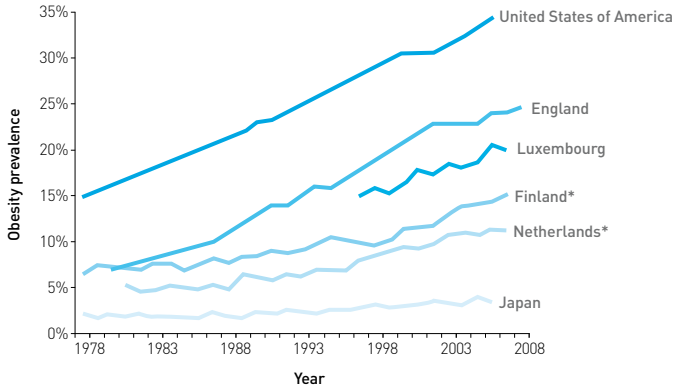
Weight gain will result when **ENERGY IN** over time is greater than **ENERGY OUT**

Weight loss can be achieved when **ENERGY OUT** is greater than **ENERGY IN** over time: this means increasing energy expenditure (more exercise) reducing energy intake (diet restriction) or a combination of both

Development of Overweight and Obesity

Rates of obesity around the world have more than doubled since 1980 **(Figure 1)**, though some countries have changed much more than others. These changes have coincided with a decline in physical activity and increased choice and availability of enjoyable foods.

Figure 1: International Comparisons of Obesity Trends



Are you a Healthy Weight?

A good way for adults to check if they are a healthy weight is to use the Body Mass Index (BMI). The calculation divides your body weight in kilograms by your height in metres squared. You can check this online at various websites, including:

http://www.nhlbisupport.com/bmi/bmi-m.htm

BMI is used to calculate whether a person is underweight, a healthy weight, overweight or obese for their height. It can indicate whether you're at increased risk of the serious health problems that are linked to being overweight, such as Type 2 diabetes, heart disease and certain cancers. BMI allows for natural variations in body shape, giving a healthy weight range for a particular height.

BMI between 18.5 - 24.9: you are in the healthy range

BMI score of 25 or more: your BMI is above the ideal range and this score means you may be overweight

BMI of 30 or more: you are officially classified as obese

For adults who are overweight or obese, losing even a little excess

weight has health benefits. Physical activity is an important part of losing weight, in combination with eating fewer calories.

Maintaining a Healthy Weight

At the individual level, you can achieve energy balance and a healthy weight by:

- limiting energy intake, especially intake from fats
- limiting the intake of sugars
- limiting intake of alcohol
- replacing some of the above with fruit and vegetables, as well as beans, pulses, whole grains and nuts
- engaging in regular physical activity

For more information, see Section 5 below and also see the list of information sources at the end of the booklet, especially NHS Choices and the Food Fact Sheets of the British Dietetic Association.

How Much Energy do I Need?

Energy requirements are highly dependent on body size and on habitual physical activity. Because of this, it is hard to make recommendations that are meaningful on an individual basis. What we can say is that if you are overweight, you should eat less and/or exercise more than you have been doing.

Managing your energy balance in real life

Eating just **150 calories more a day** than you burn can lead to an **extra 2.3 kg** body weight over **6 months**. That's a **gain of 4.5 kg a year** and **45kg over 10 years!**

If you don't want this weight gain to happen, or you want to lose any extra weight you are carrying, you can either reduce your **ENERGY IN** or increase your **ENERGY OUT**. Doing both is the best way to achieve and maintain a healthy body weight.

At rest, you will be using energy at a rate of about 1-1.2 calories per minute, which is equivalent to about 1400 to 1700 calories per day. All exercise increases the rate of energy expenditure. Walking or jogging requires about 1 kcal per kg of body weight per km covered. Note that heavier people burn more energy at the same speed and that the amount of energy needed depends on distance covered but not on speed. So if you weigh 70 kg and walk slowly (3 km per hour) you will use up about 105 calories in a 30 min walk, but if you weigh 100 kg, you will use about 150 calories. As you get fitter and progress to jogging, you might cover 4 km if you still go out for the same time (ie 30 minutes): now you will use about 280 calories if your body weight is 70 kg and 300 calories if you weigh 100 kg. Note that the highly trained athlete with a body weight of 70 kg who can cover 10 km in 30 min will use about 700 calories in the same time. No wonder highly trained endurance athletes eat so much!.

All other activities will increase **ENERGY OUT**, depending on the intensity and the time spent. Dancing can be as good as jogging or tennis, for example.

For ways to reduce **ENERGY IN** see **Section 5** on **Weight Management.**

4 Nutrition and Exercise

The health benefits of exercise have been widely reported amongst different age groups, genders and cultures. However, adhering to an exercise program within an active lifestyle may require the increased consumption of some nutrients to cope with exercise-induced losses (see sections 2 and 3 above). Indeed, the overall exercise experience and performance will be partly determined by the foods and beverages consumed before, during and after exercise.

The type and amount of foods and beverages consumed around exercise will support three main elements of exercise performance:

- Supply of rapid carbohydrate energy to the exercising muscles
- Maintenance of blood glucose levels during exercise, which will reduce fatigue
- Promotion of effective recovery and exercise adaptation during the rest period

Eating and Drinking before Exercise

Besides providing support in controlling hunger, the foods and beverages consumed before exercise serve two main functions: **i)** they can either contribute towards helping replenishment of the muscle carbohydrate stores, if there is sufficient time; or **ii)** they can support the maintenance of blood glucose levels during the initial stages of exercise.

Research studies have shown that consuming a carbohydrate rich meal 3 to 4 hours before exercise can help to fill up the muscle carbohydrate stores, especially if the overall diet is not providing sufficient carbohydrates to meet exercise demands. In the context of a meal, carbohydrate sources should have a moderate to high glycaemic index, and provide a variety of food groups that also contribute in providing other important nutrients that will generally be absorbed and assimilated prior to the onset of exercise. If a particular exercise session does not cause substantial carbohydrate depletion (e.g. a session generally lasting under 1 hour), the pre-exercise meal does not need to be predominantly carbohydrates. However, if performing strenuous exercise lasting longer than 1 hour, it is advised to select carbohydrate rich foods. It is also important to ensure exercise is commenced in a fully hydrated state (see section 8).

The glycaemic index, or GI is a measure of the effects of carbohydrates in food on blood sugar levels. It estimates how much each gram of available carbohydrate in a food raises a person's blood glucose level following consumption of the food, relative to consumption of glucose.

Examples of carbohydrate foods with a moderate to high Glycaemic Index

- **Most breakfast cereals**
- **Potatoes**
- **Most forms of rice**
- **White or brown bread**
- **Sugar, jam, honey**
- **Sports drinks and soft drinks**
- **Tropical fruits and juices**

You can find more information, and a list of the GI of various foods at: http://www.diabetes.org.uk/Guide-to-diabetes/Food_and_recipes/The-Glycaemic-Index/

Examples of foods and beverages for consumption 3 to 4 hours before exercise

Morning session:

- Large bowl of breakfast cereal with skimmed milk and 200 g of low fat fruit flavoured yoghurt
- 3 to 4 slices of toast with honey or jam and a large fruit smoothie.
- Large bowl of oatmeal made with skimmed milk and with an added handful of dried fruits

Afternoon session:

- Medium plate of boiled/steamed rice with low fat topping of choice (e.g. low fat chilli con carne)
- 2 sandwiches with filling of choice (e.g. lean unprocessed meats, tuna or salmon) with at least two types of raw vegetables (e.g. sliced lettuce, cucumber, tomato, or shredded carrot)
- Large bowl of pasta salad which includes some lean meat (e.g. grilled chicken breast), at least two types of different cooked vegetables (peas, carrots, broccoli, or cauliflower), and a low fat dressing

Note that you can use oat, soya, or rice products in place of dairy products and meat alternatives, such as quorn, in place of meat products if you wish.

A carbohydrate rich snack may be useful to support the maintenance of blood sugar levels during the initial stages of exercise. These foods/beverages ideally should be of a moderate to high glycaemic index (see text box).

Examples of foods and beverages for consumption up to 1 hour before exercise:

- Fruit smoothies
- Medium bowl breakfast cereal, with skimmed milk, and large banana*
- Large bread roll with thick spread honey or jam, and large glass of fruit juice
- 2 to 3 slices of sweet breads (e.g. raisin bread, fruit loaf, or malt loaf) or 1 sweet bun (e.g. current bun, hot cross bun, or low fat fruit scone) with jam or honey
- 1 low fat cereal bar (check labelling) with fruit juice or smoothie
- 3 pieces of fresh fruit or 2 handfuls of dried fruits

*Note: use oat, soya or rice drink in place of dairy milk if required.

Consuming these foods and beverages in the pre-exercise period will allow sufficient time for gastric emptying and intestinal absorption, lowering the probability of gastrointestinal distress that may occur with the onset of exercise. However, individual tolerance will determine which foods and beverages are chosen.

Pre-exercise nutrition

Consuming a carbohydrate rich meal 3 to 4 hours before exercise, which may contain a variety of food groups, is recommended.

Consuming a carbohydrate rich snack up to 1 hour before exercise, which is low in fat, is recommended.

Eating and Drinking during Exercise

Carbohydrate is the body's main fuel during exercise, becoming more important as exercise intensity increases, and will determine exercise effort and onset of fatigue. The body's carbohydrate stores are limited, and can sustain strenuous exercise for no more than about 90 -120 minutes. For an exercise session lasting up to 1 hour, carbohydrate reserves in the muscle before exercise will provide sufficient fuel to complete the exercise load provided these stores are well-filled at the start of exercise. However, additional intake of carbohydrate is essential during more prolonged exercise to help prevent significant declines in blood glucose levels and to maintain exercise performance.

The consumption of at least 20-60 g of carbohydrate per hour of exercise, in a form that is rapidly converted to blood glucose, is generally recommended. This is particularly important if carbohydrate stores are not full prior to the start of exercise (e.g. insufficient carbohydrate has been consumed during the preceding hours and days). Sipping carbohydrate-electrolyte sports drinks (~6% carbohydrate) little and often at 15 to 20 minute intervals throughout exercise is generally effective in providing fluids, carbohydrates, and electrolytes (especially sodium) to the exercising body. However, individual tolerances will dictate which foods and/or beverages are chosen.

Examples of foods and/or beverages that contain about 60 g of carbohydrates:

- 500 ml isotonic sports drink
- 300 ml fruit juice or soft drink
- 2 handfuls of sweets (e.g. jelly beans, jelly babies) or dried fruit
- 2 cereal bars (make sure they are generally low in fat and fibre)
- 2 large pieces of fresh fruit
- 2 slices of white bread with honey or jam

Note: If consuming solid food sources, be aware these need to be supplemented with water intake.

The body is limited in how much carbohydrate it can absorb and utilise as energy during exercise. Therefore, it is important to fill up muscle carbohydrate stores before exercise, and then provide carbohydrates during the exercise bout as tolerated. Note that excessive food and fluid consumed during exercise may cause uncomfortable symptoms (e.g. bloating, nausea, vomiting, and/or abdominal pain) lowering exercise performance. Additionally, exercising in different environmental conditions (cold or hot) can also affect food and beverage tolerance during exercise. Therefore, each individual should to be aware of their own tolerance levels and adjust recommendations to suit their needs.

How to maintain hydration levels and avoid dehydration during exercise is described in section 8.

During exercise nutrition

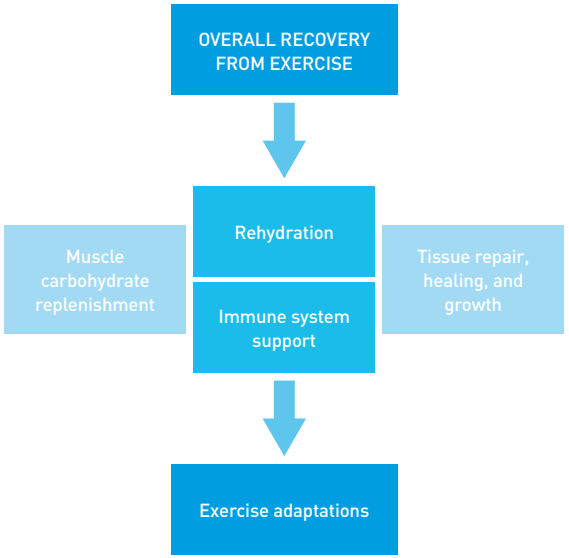
If exercising for less than 1 hour, carbohydrate stores in the muscle from daily dietary habits should be sufficient to support exercise.

If exercising for more than 1 hour, 20-60 g of carbohydrate per hour in an individually tolerated form is recommended.

Eating and Drinking after Exercise

After an exercise session it is likely that muscle carbohydrate stores are depleted, some normal exercise-induced tissue damage has occurred, hydration levels are below their starting levels, and the immune system may be functioning a little under the norm, potentially increasing the risk of illness and infection. Nutrition in this immediate post-exercise period is essential to assist the recovery process and re-establish normal levels **(Figure 2)**.

Figure 2: Recovery goals after exercise.



Immediately after exercise, and before the appearance of suppressed appetite, consumption of carbohydrate rich foods and/or beverages of moderate to high glycaemic index (GI) will promote the replenishment of muscle carbohydrate stores. Selecting recovery foods/beverages that also contain about 20-25 grams of protein can aid tissue repair and can stimulate the changes in the muscle that occur in response to the training stimulus.

20 grams of protein is provided by:

- 600 ml skimmed milk
- 40 g skimmed milk powder
- 60 g cheese
- 400 g yoghurt
- 70-100 g meat, fish or chicken
- 8 slices bread
- 180 g breakfast cereal
- 4 cups cooked pasta or 6 cups rice
- 800 ml soya drink
- 120 g nuts or seeds
- 240 g tofu or soya mince
- 300 g legumes or lentils
- 4 small eggs
- 400 g baked beans
- 300 ml fruit smoothie or liquid meal supplement

Examples of foods and beverages which combine adequate amounts of carbohydrate and protein (and also contain electrolytes):

- 500 to 750 ml low fat milkshake*
- 500 to 750 ml fruit smoothie made with low fat milk or yogurt*
- Large bowl of breakfast cereal with enriched skimmed milk (by adding skimmed milk powder) *
- 500 ml of a soft drink with a sandwich, pitta bread, or bagel filled with tuna, ham, or chicken#
- Cooked potatoes (jacket, roasted, boiled) with cottage cheese, tuna, or beans*#
- 3 to 4 slices of toast or 1-2 bagels with reduced fat peanut butter and 2 pieces of fruit
- 500 ml of fruit juice with two low fat cereal bars
- Large bowl of fruit salad with 200 g low fat yogurt

How to rehydrate after exercise is described in Section 8.

* Use oat, soya, or rice products in place of dairy products if required.
# Use meat alternatives, such as quorn, in place of meat products.

If not exercising on a daily basis, for longer term recovery (e.g. over 24 hours between exercise sessions), normal daily dietary habits (regular routine of meals and snacks) are sufficient to promote adequate recovery nutrition. Ensuring the consumption of a diet that includes items from all food groups, contains healthy fats, and provides sufficient micronutrient to meet requirements, will assist exercise recovery and adaptations.

First meal after training for longer term recovery:

- **Carbohydrate sources:**
  Pasta, rice, noodle, potatoes, couscous, bulgur wheat, and/or breads
- **Protein sources:**
  Fish, lean meats, low fat dairy, eggs, and/or vegetarian alternatives
- **Accompanied by:**
  Vegetables in main meal (at least 2 different types, cooked or as a raw vegetable salad) and fruit (fresh, dried, or tinned in natural juice) in selected dessert

Post- exercise nutrition

Consuming carbohydrate foods and beverages immediately after exercise helps replenish muscle carbohydrate stores and maintain immune function.

Selecting foods and beverages that contain some protein can improve overall recovery.

Beverage sources that contain carbohydrates, protein and electrolytes (e.g. milky drinks*) provide the best all round recovery (energy, repair, immune maintenance, and rehydration).

Recovery meals or snacks can be quickly made complete by consuming in addition 500 ml of milk* (protein), 500 ml of fruit juice (carbohydrate), or 500 ml flavoured milk* (protein and carbohydrate), depending on which nutrient is required and individual tolerance.

* Use oat, soya, or rice products to substitute dairy products if required.

5 Weight Management: Keeping/ Gaining Muscle and Losing Fat

If you are embarking on a weight loss program, forget fad diets and say goodbye to yo-yo dieting. A sensible program of weight management can help you to lose fat safely and protect against loss of lean muscle mass. The key to long-term weight control is to make several small changes that count on a day to day basis.

Setting a Realistic Fat Loss Goal

A sensible goal is to reduce body fat by about 0.5-1.0 kg per week, which represents a loss of between 3,500 – 7,000 calories. Where possible it is preferable to make these calorie savings by reducing your intake of dietary fat while maintaining the amounts of carbohydrate and protein in your diet.

How Many Calories?

1 gram Carbohydrate = **4 calories**

1 gram Fat = **9 calories**

1 gram Alcohol = **7 calories**

1 gram Protein = **4 calories**

Alcohol is high in calories and so it is important to be aware of the total energy intake from alcoholic drinks and its impact on energy balance. Although it is high in energy content, alcohol is not a good fuel for exercising muscles.

Alcohol - How many calories?

On average:

1 pint of bitter, lager or cider:
200 calories

1 pint of strong ale:
250-300 calories

1 small glass (125 ml) of wine:
60-80 calories

1 standard measure (25 ml) of spirits:
60-70 calories

Our guide to weight management will help you to identify some ways to cut your **ENERGY IN** by 500 calories per day from fat and alcohol calories. When combined with an increase in energy expenditure from being more active it will enable you to reduce your body fat and maintain your weight loss in a healthy way.

Reducing ENERGY IN

By reducing dietary fat intake by 50 g per day, an energy (calorie) saving of about 450 kcal per day or 3150 kcal per week can be achieved. Such a saving can result in a weight loss of about 0.5 kg per week providing additional energy is not consumed by eating more protein, and/or carbohydrate than needed or by consuming alcohol to excess.

The food swaps to reduce fat in **(Figure 3)** provide some easy ways to cut fat intake and reduce calorie intake. Remember that small changes can add up to significant savings over a week, month and year!.

Here are some ways to cut around 500 calories (ENERGY IN):

- By switching from a packet of crisps to a banana you save 12 grams of fat and 63 calories
- Replacing carbonara sauce by tomato-based sauce with pasta saves an amazing 27 grams of fat and 243 calories (based on a 200 gram serving of sauce)
- Switching from 500 ml of full fat milk to 500 ml fully skimmed milk saves 18.5 grams of fat and 167 calories.

The **3** food swaps in this example amount to an energy saving of **473** Kcal per day.

Figure 3: Food Swaps to Reduce Fat

Food Swap	Total Fat Saving (gram)	Total Energy Saving (kcal)
1 pork chop with fat replaced by 1 pork chop lean only	19	171
Egg mayonnaise replaced by egg with reduced fat mayonnaise	13	117
2 digestive biscuits replaced by 1 banana	7	63
A packet of crisps replaced by 1 banana	12	108
2 chocolate digestives replaced by 2 Jaffa cakes	5	45
A doughnut replaced by 2 slices malt loaf	10	90
A 50gm bar of dairy milk chocolate replaced by a bar of Turkish delight	11	99
Replacing carbonara sauce by a tomato-based pasta sauce (based on a 200 gram serving)	27	243
1 Cornish pasty replaced by a ham sandwich	37	333
Pilau rice replaced by boiled rice	22	198
2 grilled sausages replaced by 2 low fat grilled sausages	13	117
2 slices of bread with butter or ordinary margarine replaced by 2 slices with low fat spread	11	99
1 slice of ordinary cheddar replaced by 1 slice of reduced fat cheddar	7	63
500 ml full fat milk replaced by skimmed milk	18.5	167

Remember to check out the fat content of food on food labels where possible, and look for the lower fat alternatives.

Other Considerations

High-protein diets are sometimes popular with people wanting to lose weight, and there have been many studies looking at the effect of such diets on weight loss. There is some evidence to suggest that protein-rich foods can increase satiety and minimise hunger thus helping to reduce overall energy intake.

The fibre content and slow release of energy from carbohydrate foods with a low glycaemic index (GI) can also help regulate hunger between meals. You can read more at: http://www.bda.uk.com/foodfacts/GIDiet.pdf

Low GI foods include porridge, beans, pulses, sweet potato, basmati rice and milk and dairy foods. So when trying to reduce body fat it can be beneficial to include low GI carbohydrate foods with meals to provide slow releasing energy throughout the day and support your energy levels during exercise and training.

Regardless of the composition of the diet, weight loss will occur only if more energy is expended through exercise and being physically active than is consumed from food. It is also important to develop an eating pattern that suits your lifestyle and that you can sustain over a long period.

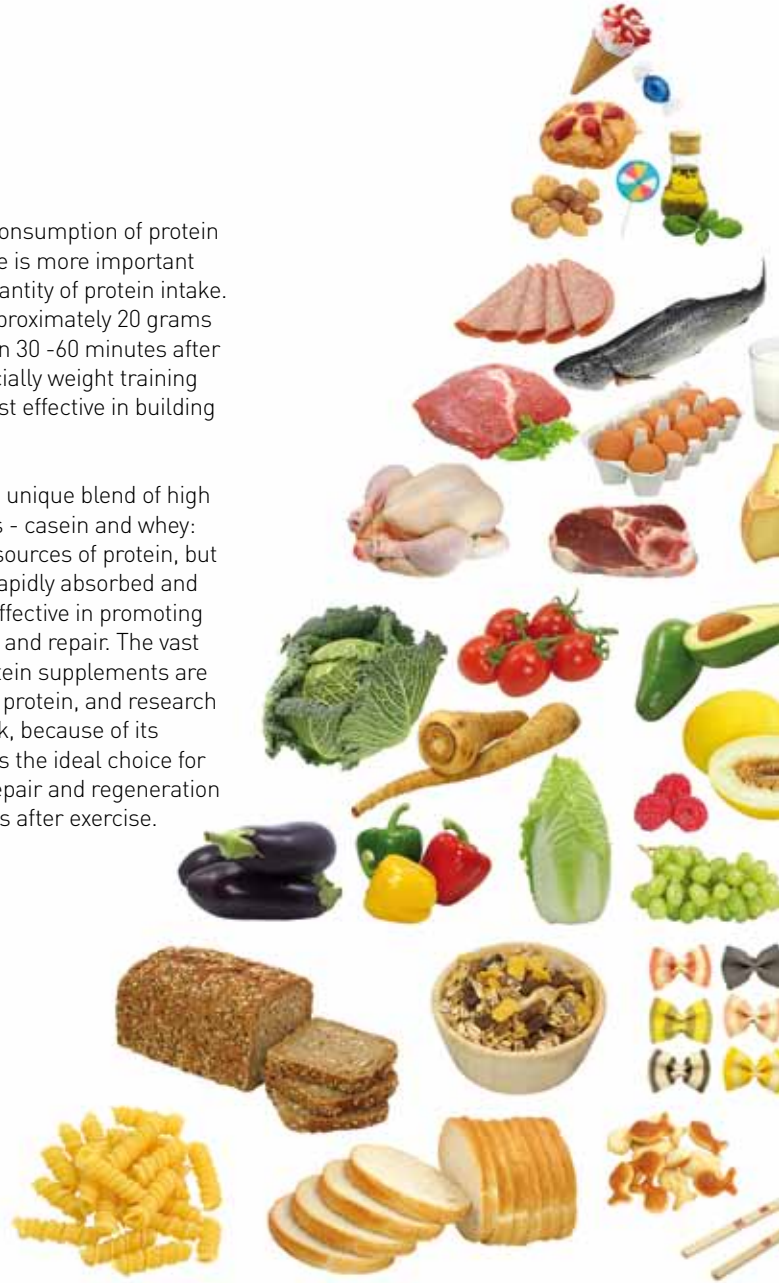
Keeping/Gaining Lean Body Mass

Very low calorie diets can result in a loss of lean body mass (mostly muscle) as well as fat, and this is not a good idea. Diet and exercise programs aimed at preserving and increasing lean body mass in adults can improve metabolic health as well as strength and functional capacity in later life. The inclusion of resistance training in an exercise program, along with an adequate protein intake, provides the stimulus for muscle protein synthesis. Once the hard work of training is done diet can play an important part in optimising the repair and regeneration of muscle tissues. A source of high quality protein providing all the essential amino acids, the building blocks of muscle, taken with some carbohydrate will stimulate insulin production which in turn promotes the uptake of amino acids into the muscles.

Sometimes people believe that they need to turn to protein supplements to meet the additional requirements for maintaining lean body mass, but there is no scientific evidence that protein or amino acids in supplements are more effective than ordinary food. Most people get plenty of protein through a varied diet and average helpings of everyday foods can supply similar amounts of protein to that provided by food supplements.

The timing of consumption of protein around exercise is more important than overall quantity of protein intake. Consuming approximately 20 grams of protein within 30 -60 minutes after exercise, especially weight training exercise, is most effective in building muscle tissue.

Milk contains a unique blend of high quality proteins - casein and whey: both are good sources of protein, but whey is more rapidly absorbed and may be more effective in promoting muscle growth and repair. The vast majority of protein supplements are based on whey protein, and research shows that milk, because of its whey content, is the ideal choice for recovery and repair and regeneration of muscle fibres after exercise.



6 Vitamins, Minerals and Micronutrients

A large number of different nutrients are needed in small amounts to keep the body healthy. These micronutrients, mostly vitamins and minerals, are found in tiny amounts in a wide range of foods, which is why it is best to eat a variety of foods every day. An adequate intake of all of these nutrients is essential for good health.

Vitamins are usually classified into two groups: those that are soluble in water and those that are soluble in fats.

Water-Soluble Vitamins

There are two main types of water-soluble vitamins: the 'B vitamins' (including vitamin B1, B2, B3, B6, B12 and folic acid) and vitamin C.

- B vitamins help the body use energy and nutrients from food. This is especially important for people taking part in sport and exercise. They have many different functions in the body. For example, riboflavin (vitamin B2) helps to keep skin, eyes and nervous system healthy, as well as making red blood cells.
- Vitamin C keeps the skin and gums healthy – vital for preventing infection.
- Water-soluble vitamins are found in many different foods, such as fruits and vegetables, wholegrain or fortified breakfast cereals, meat, fish and eggs.
- Fruits and vegetables are very high in water-soluble vitamins. New research into nutrition suggests that there are other important substances in fruits and vegetables. These include antioxidants and phytochemicals that can help the body to cope with the effects of training and exercise.
- Our bodies do not store water-soluble vitamins. Any extra is passed in the urine, so it is important to eat foods that contain these nutrients every day.

Why Eat More Fruit and Vegetables?

Eating plenty of fruit and vegetables helps to prevent diabetes, stroke, heart disease and obesity. Current advice is to eat at least 5 'portions' of fruit and vegetables a day, but only about a third of adults achieve this. Boys and girls aged 11-18 typically eat only about 3 portions a day. For more information, see: http://www.nhs.uk/LiveWell/5ADAY/Pages/5ADAYhome.aspx

One portion for an adult is:

- One medium sized piece of fruit, such as an apple (about 80 g)
- Half a handful of dried fruit (about 30 g)
- 3 serving spoons of vegetables (about 80 g) or cooked pulses (beans and lentils)
- 1 small, cereal bowl of salad
- 1 glass of 100% fruit juice (150 ml)

Steaming, stir frying or microwaving in a small amount of water helps keep the nutrients.

They don't have to be fresh - frozen fruit and vegetables count, as do tinned or canned. Adding vegetables to soups, casseroles or stews counts too.

Children should also eat at least 5 portions a day. A portion for children is the amount they can fit in the palm of their hand.

Smoothie recipe

Put into a blender or liquidiser:

- 125 ml low fat yogurt
- 125 ml low fat milk (or alternative non-dairy such as soy milk)
  (or use 250 ml pure fruit juice if preferred, instead of milk and yogurt)
- 80 g frozen berries, such as blueberries or raspberries (or use fresh berries and add a handful of ice)
- 1 medium banana
- Runny honey to taste

Put on lid! Liquidise until smooth. Add extra liquid if too thick.

Fat-Soluble Vitamins and Essential Fatty Acids

Fat-soluble vitamins (vitamins A, D, E and K) are found in margarines, oils, dairy products (milk, butter and cheese), liver, egg yolks and oily fish, as well as some vegetables. Vitamins are normally obtained from food, but a few can be made by the body. Vitamin D is made by the skin when exposed to sunlight (See Section 7: Healthy Bones). Vitamin K can be made by bacteria which live in the gut. Even so, it is still possible to become deficient in these vitamins.

Extra fat-soluble vitamins are stored in the body and can become toxic if levels are too high, so it is important not to eat too much. For example, high doses of Vitamin A can cause fatal liver damage. For this reason, pregnant women and women trying to conceive should avoid liver and liver-containing products as well as supplements containing Vitamin A or fish liver oils.

Essential fatty acids cannot be made by the body, so we need to eat them in our food. Omega-6 fatty acids are found in some vegetable oils, including rapeseed or canola oil, soybean oil, sunflower seed oil, and corn oil. Omega-3 fatty acids are also found in vegetable oils, as well as in oily fish such as salmon, mackerel, sardines and herring. Aim for at least two portions of fish a week, including one portion of oily fish. You can choose from fresh, frozen or canned, but canned and smoked fish can be high in salt. Essential fatty acids are important to help fight inflammation and infection as well as reducing the risk of heart disease. For more practical advice, see http://www.nhs.uk/Livewell/Goodfood/Pages/Healthyeating.aspx

Minerals

Iron deficiency is a cause of fatigue and reduced performance. Women and girls are particularly at risk because of increased iron requirements due to menstrual blood losses matched against a smaller intake of food. Iron-rich eating will help to reduce this risk.

A healthy balanced diet, which includes a variety of foods containing iron, will help people achieve adequate iron status. Many breakfast cereals have iron added to them.

Other minerals, such as magnesium and zinc, should be available in adequate amounts from a varied, nutrient-rich diet. This should be based on fruits, vegetables, whole grains and starchy foods, lean meats, beans and pulses, dairy foods, nuts and healthy oils.

People are at risk of deficiency if their diet lacks variety. This could be due to following a very strict diet to lose weight or eating only a few foods. If you need to restrict your diet for any reason, you should seek advice from a dietitian or qualified sports nutritionist.

7 Healthy Bones: Calcium and Vitamin D

One of the commonest problems of old age, especially among women but also in men, is a weakening of the bones that can lead to an increased risk of fracture. Hip fractures are a common cause of hospitalisation and loss of independence. For this reason, it is important to achieve a high peak bone mass in the first 2-3 decades of life while bone mass is still increasing, and to slow the loss of bone in later life.

Nutrition

The average adult human body contains about 1.2 kg of calcium, of which 99% can be found within our bones and teeth. The other 1% is stored in the soft tissues and body fluid where it assists metabolic function and signal transmission. The main role of calcium is to maintain the structural and mineral content of the bone. When there is an adequate amount of calcium in the diet, there is a reduction of mineral resorption from the bones themselves.

The average adult requires a daily intake of calcium from the diet of between 400 and 700 mg. Calcium is lost in the urine, which means that despite peak bone mass being reached relatively early in life, there is a need to have calcium as part of a healthy diet throughout life. An inadequate intake of calcium increases the risk of the bone-weakening diseases osteoporosis and osteopenia. The main dietary sources of calcium are milk (all varieties) and dairy produce, tinned fish containing soft bones, green leafy vegetables, and nuts. **(see Figure 4)** Foods such as bread and soya drinks that are fortified with calcium can also make a significant contribution. Very high intakes of calcium can have a negative effect on the uptake of other essential minerals such as zinc, so high dose supplements should be used with caution.

Vitamin D aids the absorption of calcium, regulates bone mineralisation and plays important roles in the immune system. Vitamin D can be obtained by humans in three ways: firstly through exposure to sunlight, from food eaten (although there are very few natural foods from which humans can obtain significant amounts of vitamin D), and by taking dietary supplements or fortified foods. It is recommended that the arms and face should be exposed to 15 minutes of sun each day.

The following groups of people may be at risk of vitamin D deficiency:

- All pregnant and breastfeeding women, especially teenagers and young women.
- Infants and young children under 5 years of age.
- Older people aged 65 years and over.
- People who have low or no exposure to the sun, for example those who cover their skin for cultural reasons, who are housebound or confined indoors for long periods.
- People who have darker skin, for example people of African, African-Caribbean and South Asian origin, are not able to make as much vitamin D.

The main dietary sources of Vitamin D are oily fish, egg yolk and fortified foods such as fat spreads and some breakfast cereals. Intakes of vitamin D of up to 25µg/day appear to be well tolerated and may be needed by some groups, but long term intake of higher levels may not. As with all other vitamins and minerals, more is not always better.

For more information, see http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_132508.pdf

Figure 4: Foods that are good sources of calcium.
The calorie count is for a typical serving size, and the second column shows the fraction of the recommended daily amount of calcium that each serving will provide.

Food	kCals	%Daily Value
Yogurt	154	45%
Tofu	86	40%
Sesame Seeds	206	35%
Sardines	189	35%
Milk	122	30%
Spinach	41	25%
Cheese	72	22%
Turnip Greens	29	20%

Physical Activity

Exercise, particularly exercise that places stress on the bones, is a powerful stimulus to bone formation. Good examples include walking, jogging, racquet sports like badminton, squash or tennis, and weight training. Dancing is just as good. Girls and boys and young adults who are physically active on a regular basis usually achieve higher peak bone mass than those who do not. In middle age and beyond, regular exercise can slow the rate of bone loss that inevitably occurs in both men and women. Realising in middle age that you need to do something is too late: you need to start when you are young and to stay active to get the best protection.

Lifestyle

Cigarette smoking has been linked to low bone density in young people, and if a high peak bone mass is not reached by the age of 20-30, problems with bone health will be more likely in later life. This is yet another reason to stay away from cigarettes.

High alcohol intakes are also linked to poor bone health, though moderate intakes probably do not have any significant adverse effects.

8 Hydration, Health and Performance

Water plays many important roles within the body, and hydration refers simply to the amount of water present. An excess of water (hyperhydration) and a shortage of water (hypohydration, or dehydration) both prevent optimum functioning of the body. Water is the main constituent of the human body, representing about 60% of body weight in adult males, and 50-55% in females due to their higher proportion of body fat compared with men.

Good hydration is essential for health and wellness, and body water content is usually maintained within 1-2% of the ideal level on a daily basis. Balance depends on the rates of water intake (water from all sources in the diet, including foods, plus the water generated by metabolism of fat, carbohydrate, protein and alcohol) and water losses (urine, faeces, loss through the skin and from the lungs, and sweating). Balance may be achieved at high or low turnover rates, but increased losses must be matched by an increased intake. Severe vomiting or diarrhoea, or hard exercise in a warm environment, for example, will greatly increase the rate of loss, so there must be a corresponding increase in intake.

Failing to ensure a sufficient intake of water over prolonged periods of time may increase the risk of a number of disease states, including:

- Constipation
- Urinary tract infection and kidney stones
- Hypertension, coronary heart disease, stroke
- Bladder and colorectal cancer

There may also be an increased risk for some other diseases. Though the evidence is not totally conclusive, it does seem sensible not to take the risk. How strong does the link have to be before it's worth doing something about it?

The European Food Standards Agency has identified levels of adequate water intake for sedentary individuals living in temperate climates, and set these at 2.5 litres per day for men and 2.0 l/d for women. Some individuals will need more than this, though, and some will need less, and the requirement will vary from day to day for any individual, so these should not be seen as absolute values that must be met. Water can be obtained from all foods and drinks in the diet. In the typical diet, about 20-30 % of the daily water intake comes from foods and the remaining 70-80% comes from drinks. The water content of some commonly consumed foods is:

80+% soups, fruit, most vegetables

40-70% most hot meals

<40% cereal products

<10% savoury snacks, confectionery

In addition, the oxidation of the energy nutrients in foods will add about 200-400 ml of water per day, depending on how much you eat.

Plain water is fine, but all drinks will contribute to meeting the body's water needs (except strong alcoholic drinks – see section 10 on alcohol). Caffeine is a mild diuretic, stimulating an increase in urine output, but most caffeinated drinks will result in a positive fluid balance: the caffeine content is low and the water they contain will more than match any losses. Consuming a variety of drinks will help ensure that requirements are met, and drinks should be chosen to meet individual needs after taking account of their content of energy, sugar and micronutrients. This may be especially important for the elderly or for young children, who may not feel thirsty or who may forget to drink.

Even low levels of dehydration as a result of not drinking enough are associated with a number of unwanted symptoms: these include headache, inability to concentrate, low levels of alertness, impairment of cognitive function and an increased sensation of tiredness. Simply increasing fluid intake can alleviate some of these symptoms. If it does not, there may be another cause and medical help may be needed.

There is no simple and reliable way to assess hydration status with a high degree of precision, but keeping an eye on urine losses will give a good idea. If you visit the

bathroom only two or three times a day and pass only small volumes of dark-coloured urine, then you probably need to drink more. If you need to pass urine every 15 minutes and pass large volumes of colourless urine, you are probably drinking too much.

It is clear that dehydration, if sufficiently severe, can lead to impairments in:

Mental performance
Cognitive tasks
Skilled movements
Judgement

Physical performance
Athletic performance
Health-related activity
Occupational tasks

The level at which these effects will appear is variable – it depends on how quickly the body water level has been reduced, on the ambient temperature, and on the characteristics of the individual. In general, though, some effects may be apparent when the level of body water loss reaches about 2% of the starting body weight - that's a loss of 1 kg for a 50 kg person, 1.5 kg for a 75 kg person and 2 kg for someone who weighs 100 kg. Most serious athletes will get into the habit of weighing themselves before and after a training session, at least until they learn to recognise how much they need to drink. If you have lost more than 2% of your body weight, you should probably drink more next time. If you have drunk so much that your weight has gone up, then you should drink less next time.

For short exercise sessions, there is probably no benefit from taking drinks during the session, provided that you are well hydrated when you start. If you are planning to exercise for more than about 40 minutes, taking drinks may help the session feel easier and more enjoyable. Water will help, but carbohydrate-electrolyte sports drinks are probably better. After any exercise session that has caused significant sweat loss, replacement of both the water and the salts lost in the sweat is essential. Mostly, the salts can come from the foods eaten at the next meal (unless the sweat loss is very high), but prompt replacement of water losses can help ensure rapid and effective recovery.

Follow these three simple steps to check on your hydration

1. Start exercise sessions well hydrated. If you are passing urine less often than normal, you may be dehydrated. If urine colour becomes darker than what is normal for you, then you may not be drinking enough. The aim should be to keep the urine a pale straw colour.

2. Monitor your sweat losses and the success of your drinking plan during training sessions in different situations. How did you feel? How did you perform? What was your weight loss over the session? For exercise sessions lasting more than about 40 minutes, you should weigh yourself before and after: weight loss should generally not exceed about 1-2% of your starting body weight. If you lost more than this, you probably did not drink enough. Drink more next time. If you lost less, you might have drunk too much. Did it make you feel uncomfortable? Did you take time out to drink that was unnecessary?

3. Most people should reduce their salt intake, but if you are a "salty sweater", you may need drinks with more salt and may need more salt in food when sweat losses are high. To check whether you are a salty sweater, wear a black T-shirt in training and look for salt stains (white powder) under the arms and on the chest. High salt losses are a contributing factor in some cases of muscle cramp. Sports drinks with higher salt (sodium) levels (e.g. 300-500 mg sodium per 500 ml liquid) may help reduce the risk of cramps.

9 Dietary Supplements: Do We Need Them?

Supplements come under many names, 'dietary supplements', 'functional foods', 'ergogenic aids' and 'sports supplements' to name a few. According to the Oxford Dictionary, a supplement is "something added to supply a deficiency", but consumers take supplements for many different reasons, though usually in the expectation that a health or performance benefit will result. It is important to recognise, though, that current regulations do not require manufacturers to provide evidence of efficacy.

Sports Foods

The use of sports foods can help active individuals with busy lives to meet their sport nutrition goals. They come in a variety of forms, such as drinks, powders, bars and gels, and are portable, practical and convenient to take before, during and after workouts and are often used by athletes in the period around competition.

Fortified Foods

Many foods are enriched with specific vitamins and minerals during manufacture. Examples include breakfast cereals, which are have added iron and B vitamins (usually at about 20-50% of the RDA per serving) and dairy produce, which is often fortified with vitamin D. These can be a useful source of nutrients in the diet.

Supplements for Health

Various vitamin and mineral supplements can be bought over the counter, but there is no scientific evidence to support their use to enhance performance by athletes who eat a varied diet in amounts sufficient to meet their energy needs. There is some evidence to support their use by athletes who have a diagnosed deficiency: short-term supplementation with Vitamin D, iron or calcium, for example, may be useful in cases where a deficiency has been diagnosed. In the longer term, though, dietary solutions should be successful. It is important to remember that more is not always better: iron is a good example, as excess iron is toxic and harmful to health. Supplementation may also be warranted where there is severe restriction of food choice available or during periods of calorie restriction to achieve weight loss. Immune system supplements are widely used, but there is no strong evidence of benefits for healthy individuals. Weight loss supplements are best avoided: most are not effective and those that are often contain stimulants that may be harmful.

Fish oils: The evidence that athletes and those involved in regular exercise will benefit from taking fish oil supplements (a good source of essential fatty acids) is insufficient to make any specific recommendations, but there is some evidence that it may be beneficial to those individuals who suffer from exercise induced bronchoconstriction (EIB).

Antioxidants: Antioxidants play a key role in the body's natural defences against free radicals. Free radicals harm cells and may contribute to muscle soreness after exercise and have also been linked to the increased risk of some diseases. Eating at least 5 portions of fruit and vegetables a day should be sufficient. The deeper the colour of the fruit or vegetable the higher the antioxidant content of that item. The use of high doses of single antioxidants is generally discouraged as they may do more harm than good.

Supplements for Performance

Of the many thousands of supplements on sale to athletes and fitness enthusiasts, only a handful are supported by evidence of efficacy and safety. Anyone contemplating the use of a dietary supplement should seek advice from a qualified sports dietitian or sports nutritionist.

Caffeine is perhaps the most widely used stimulant in the world and it can help improve both physical and mental performance. Even small doses (about 1-3 mg per kg of body weight) such as those found in a cup of coffee or a couple of cans of cola can be effective. High doses, such as are sometimes found in "energy" tablets and drinks, are not a good idea, especially late in the day when they can make it difficult to fall asleep.

Creatine supplements are widely used by athletes in strength and power events. Creatine phosphate is an essential energy source for high intensity exercise and is stored in high amounts in muscle. Eating muscle (meat, poultry, fish) provides about 1 gram of creatine in the diet each day and the body can synthesise some from amino acids. Taking higher amounts (3-5 grams per day) in the form of supplements can increase muscle creatine phosphate stores and can lead to gains in muscle mass, power output and especially in speed of recovery between repeated sprints. There are no reports of adverse events if creatine is used in accordance with recommendations.

Buffering agents (bicarbonate and Ð-alanine) are used by athletes in high intensity events where lactic acid production rates are high and where acidity in the muscle can contribute to fatigue. These are typically events lasting about 1-10 minutes, so there is probably no role for these supplements in those who exercise for health or fitness.

Risks and Rewards of Supplement Use

There are many risks due to the presence on the market of poorly regulated supplements. Some contain toxic doses of heavy metals, and some contain biological contaminants that can cause severe gastrointestinal problems. Some slimming products contain banned pharmaceuticals, even though the packaging states that only natural ingredients are present.

You can get more information on supplements for healthy active lifestyles at:

http://www.bda.uk.com/foodfacts/sportsfoodfacts.pdf

10 Alcohol and Health

Alcohol is an energy-supplying nutrient that is present in the normal dietary intake of a large part of the world's population, but it is not an essential part of the human diet. Alcohol intake may be measured in grams or ml of ethanol, or in units of alcohol: each unit of alcohol in the UK contains approximately 8 grams (10 ml) of ethanol **(see Figure 5)**.The UK Department of Health recommends that adult men should not consume more than 3-4 units of alcohol per day and women should not consume more than 2-3 units daily, though up to 40% of male and 25% of female drinkers exceed those values on a regular basis.

Alcohol has a relatively high energy content (29 kJ /7 kcal) per g of alcohol), but alcoholic drinks are generally poor in other nutrients. A pint of strong beer contains about 300 calories, a gin and tonic about 150 calories and a medium glass of wine about 120 calories. Consumption is therefore associated with a significant extra intake of energy, but provides little in the way of essential nutrients. For anyone wanting to lose weight, a reduction in alcohol intake is an obvious starting point.

Figure 5: Alcohol content of some common drinks.

	Measure (ml)	Alcohol (%)	Alcohol (ml)	Units
Beer or lager	Pint (568)	4	23	2.3
Strong beer, cider	Pint (568)	6	34	3.4
Wine	Glass (125)	8-12	10-15	1-1.5
	Large glass (250)	8-12	20-30	2-3
Fortified wine	Glass (125)	16-22	20-28	2-2.8
Spirits	25	40	10	1

Notes: The strength of drinks and the serving sizes can vary considerably, and there is a growing tendency for drinks to become stronger and measures larger. The alcohol content is expressed by volume (ABV). In the United Kingdom, a single unit of alcohol is defined as 10 ml, but a unit is 7.6 ml of alcohol in Austria, and 25 ml in Japan.

A regular moderate intake of alcohol is associated with a 25-40% reduction in the risk of adverse cardiovascular events, possibly via an increased level of high-density lipoprotein cholesterol. This may be the result of other lifestyle factors as much as of the alcohol itself, though there is some evidence of benefits from the polyphenols present in red wine. These possible benefits, however, are not reasons in themselves to consume alcohol. Excessive intake is associated with several serious negative health outcomes, including an increased risk of liver disorders, some cancers, and suicide.

Alcohol and exercise may interact in a number of ways, and while an occasional drink will do no harm, it seems sensible to avoid alcohol before exercise. An initial response to ingestion of small doses of alcohol is an enhanced sense of wellbeing, but even low doses (sufficient to elevate the blood alcohol concentration to about 30 mg/dl) will impair hand-eye coordination and alcohol is not a good fuel for muscles during exercise. Progressively increasing the dose leads to loss of social inhibition, loss of fine motor control, erratic behaviour, increased aggression and finally loss of control of voluntary activity.

Ingestion of alcohol can increase the risk of hypoglycaemia (low blood sugar) due to the suppression of glucose production by the liver. The diuretic action (increased loss of water in the urine) of ethanol is also well recognised, and it is estimated that an excess urine production of about 10 ml occurs for each gram of ethanol ingested. This effect is small when alcohol is consumed in dilute solution (such as weak beer) by dehydrated individuals – in other words, a beer shandy is OK after a long workout on a hot day. Concentrated alcohol solutions, however, are likely to result in net negative fluid balance: a 25 ml measure of spirits (40% ethanol) contains 10 ml of alcohol and 15 ml of water, resulting in a urine output of about 100 ml and net negative water balance of 85 ml. Strong drinks should therefore be avoided when sweat losses are high. Too much alcohol also interferes with other recovery strategies after exercise and should be avoided when rapid and effective post-exercise recovery is needed.

11 Growing Older, Staying Healthy

As we move through the stages of life what we eat and how active we are becomes more important to the quality of life we live and can expect to live in the future. People age differently, so chronological age may not be useful in predicting health or physical status. The world best performance in the marathon for a 74 year old is 2 hours 58 minutes: this is pretty good at any age, let alone for someone who has been drawing a pension for 10 years.

Loss of muscle mass and the resulting weakness often restrict physical activity in older adults and this further affects the energy intake and nutrient density of the diet. An increasing number of studies highlight how regular exercise improves our functional capacity as we age, leading to improvements in muscle function, mobility, and metabolism. Even beyond the age of 100 years, muscle and other tissues can still adapt if a training stimulus is applied. Mental function is also enhanced by regular exercise and this aspect should not be neglected.

Good nutrition supports all these improvements and the right timing and intake of certain nutrients (carbohydrate, protein and fluids) can have important benefits to health and to the enjoyment of exercise.

This section is for those older adults who are relatively healthy without major chronic diseases or limiting conditions (and also perhaps for those who plan on being older one day!).

Stages of growing old

Young adults:
lifestyle changes; new family; time pressures

Middle years 35-50 years:
changing demands of family and work; early health concerns

Young older years 50-75:
weight changes; loss of lean mass; health concerns

Old old over 75 years:
possibly several health issues (cancer, heart disease, diabetes); more time for recreation; loss of strength, flexibility and mobility; lower energy requirements

We are all getting older and living longer with the over 85's the fastest growing segment of the population in many developed countries. The longest documented life span is 118 years. As we age through adulthood we may need to learn to live with a range of health conditions which also may affect our ability to exercise and limit mobility (arthritis and some forms of cancer, for example). The need to take drugs and medications becomes increasingly common. Exercise is highly protective from the aging process and when combined with the right food choices can greatly influence the quality of life as we get older.

As we age, changes in body functions include changes in hormone status in both men and women. Absorption of some vitamins and minerals decreases (especially iron, calcium and vitamin B12) altering the ability to provide the nutrients we need to maintain health. Slightly higher intakes of iron-rich foods are encouraged especially for the active elderly as iron is a key nutrient in energy production and the transport of oxygen to the muscles (although older women may actually require less iron as menstruation ceases after the menopause). Colon function declines and the abdominal and pelvic muscles weaken, increasing the problem of constipation. Being active, staying well hydrated, and ensuring a higher fibre intake can relieve constipation and reduce the need for some medications. Calcium-rich foods are critical for older individuals, as bone loss occurs naturally with aging, but varying levels of lactose intolerance (resulting in bloating and discomfort, requiring smaller serving of lactose-containing dairy foods such as milk and yoghurt) become more common. Physical activity and a diet rich in nutrients for bone health (calcium, protein, vitamins and minerals, and vitamin D) are important considerations to help older adults delay these losses. The elderly may be at greater risk of having low levels of vitamin D, especially the less mobile and those who seldom venture out of doors. Care in the choice of activity may be required for those people at risk of falls. The primary aim should be to minimise the time spent sitting, in bed or resting for long periods of time: any exercise is better than no exercise at all.

Energy needs decline with age; both overweight and underweight can be areas of concern for the elderly. Between 20 and 60 years of age, body fat is typically reported to increase by 10% in males and 14-15% in females (due to decreases in activity and declines in hormones such as testosterone and growth hormone affecting energy metabolism and lean tissue). This increase, especially in abdominal body fatness, is associated with an increased risk of several chronic diseases (cardiovascular disease, diabetes, and others). The need for protein does not decline as it does for fat,

carbohydrate and total energy intake as we age, and more protein may be needed for those who are increasingly active. Body protein levels are 30-40% less in healthy older adults than in young adults, with lean mass declining at 2-3% per decade after adulthood is reached. Sarcopenia is the age-related muscle loss in skeletal muscle and is seen as a reduction in muscle strength. Loss of strength can threaten independence and increase the risk of falls. Being physically active is protective of both energy needs (improving nutrient intake) and lean muscle mass. Protein intake and timing may be particularly important for older individuals to help maintain muscle function and to delay the age-related loss of strength.

Changes in blood flow and kidney function also occur in later life (greater water losses as the kidney is less effective in conserving water). Thirst also alters with age, with the elderly often losing their sense of thirst, and they may need to be encouraged to consume additional fluids or to develop a greater awareness of when to drink, especially when exercising or in hot environments. Pleasant tasting and cool fluids are easier to drink and more likely to be consumed. Water may be the preferred beverage for mild exercise sessions, but variety is important too.

12 Vegetarian Eating

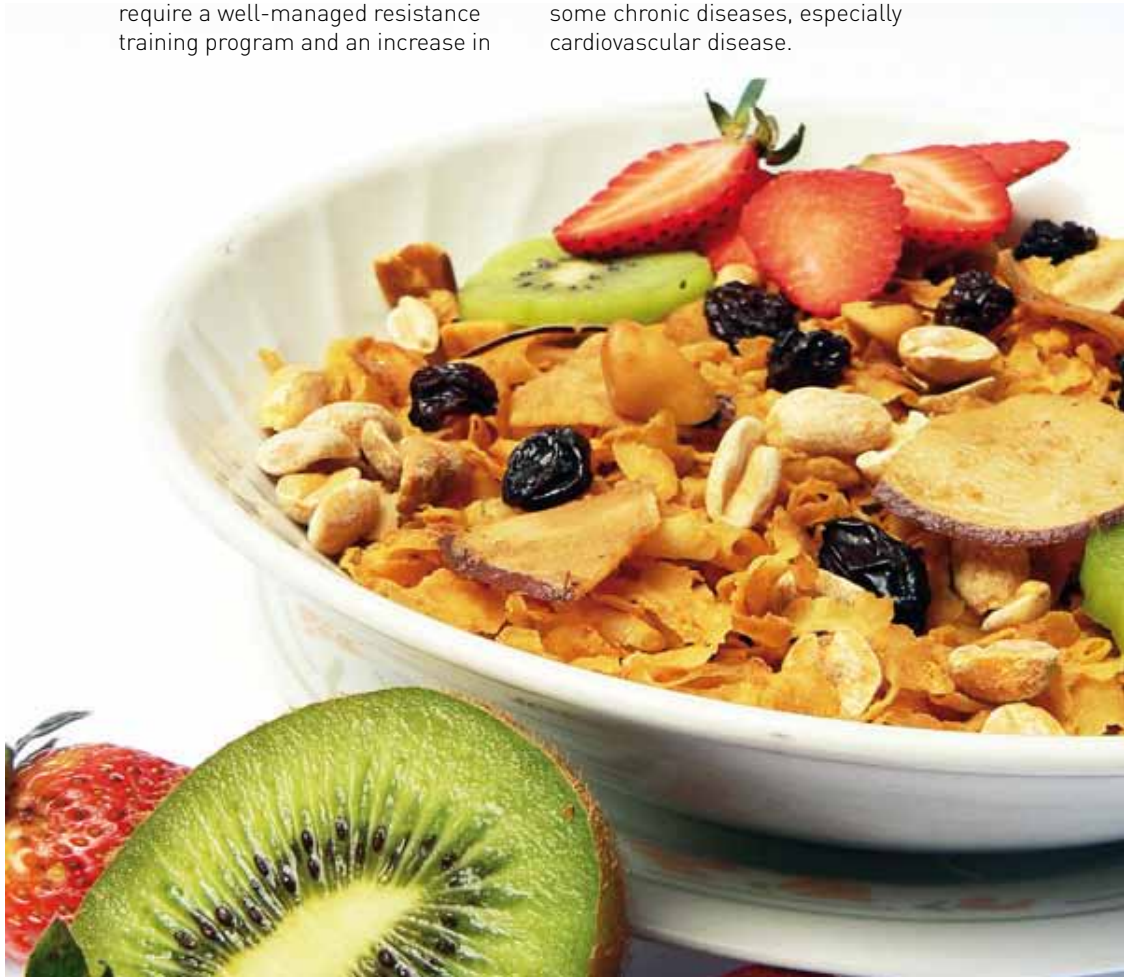
There are many reasons why people become vegetarian and there are many different styles of vegetarian eating. The common element is not eating meat and meat products, although specific dietary practices may vary. Lacto-ovo vegetarians consume milk and egg, while vegans follow a stricter diet that excludes all animal-based food (such as gelatine). Macrobiotic and fruitarian (only fruit, nuts, honey and nut or tree oils such as olive oil) eating styles are more extreme, and can be dangerous to health if followed for long periods.

People may be vegetarian for religious (Buddhism, Hinduism, Seventh day Adventist), cultural, social, moral or economic reasons, but many are vegetarian as they believe it to be a healthier option. This may or may not be true, depending on the types and amounts of foods that are chosen. In some parts of the world where food is scarce vegetarian eating style is a necessity rather than a choice.

Some cancers (breast and colon) appear to occur less often in vegetarians than non-vegetarians possibly due to the protective benefits of a high fibre and high fruit and vegetable intake. Vegetarians generally have lower blood cholesterol levels as they consume less total fat and saturated fat.

There are many examples of vegetarian athletes who perform at the highest level in sport, more often in endurance events than in strength and power events, so a well-chosen vegetarian diet is entirely consistent with an athletic lifestyle. Some nutrients (especially iron, zinc, vitamin B2, vitamin B12) require special attention for vegetarians, and it is important to recognise that just excluding animal products from the diet without considering suitable replacements may lead to some deficiencies. Meat is an important source of iron, for example, though most breakfast cereals are fortified with iron and there are other options that can be chosen. Vitamin B12 is important for red blood cell formation to assist oxygen transportation throughout the body and a deficiency leads to a form of anaemia. Animal food sources are considered to be the most reliable source, but mushrooms, tempeh (soya bean curd) and fortified foods, such as some varieties of rice and soy milk, are alternative sources.

Benefits from consuming a vegetarian diet include higher intakes of fibre and of some vitamins and minerals, as well as many of the phytochemicals that are present in small amounts in plants. The bulky nature of the diet and higher fibre content also assist with weight stability and can help to prevent undesirable increases in fat mass. Followers of a vegetarian eating style who wish to gain lean mass will require a well-managed resistance training program and an increase in protein and total energy intake which may require some adjustments to their usual diet (higher intake of protein from dairy and milk-based foods). The type of fat in a vegetarian diet is usually higher in mono- and poly-unsaturated fats, and this can help to lower the risk of some chronic diseases, especially cardiovascular disease.



Vegetarians who compete in sport may need to consider some particular nutrition issues. Those competing in strength and power sports may wish to consider the use of a low dose of creatine supplement. Creatine (as creatine phosphate in the muscles) is an important energy source in sprinting, but the main dietary sources are meat and fish (not surprising as most of the body's creatine is stored in muscle, so muscle-foods are the main sources). Serious athletes may also wish to consider iron, zinc, protein, vitamin B12 and riboflavin supplementation if following a vegan eating style or a form of eating that excludes milk and dairy foods.

Guidelines for active vegetarians

1. Choose a wide variety of foods based on soy, nuts, seeds, grains, fruit and vegetables, adding dairy, milk, eggs and add other animal foods if possible.
2. Choose a variety of different fruits and vegetables.
3. Be careful to avoid too much fibre in the diet, especially before any long-distance or endurance activities.
4. If using animal foods choose varieties that are lower in fat and contain more unsaturated fat.
5. Followers of a vegan eating style need to be sure that they learn about nutrition so that they can make appropriate food choices.
6. If sunlight exposure is limited, as is normal in the winter months or because little time is spent outdoors, include an alternative source of vitamin D such as fortified milk or spreads.
7. Be alert to any symptoms of undue fatigue and if need be get your iron stores checked (especially female menstruating individuals). This requires a blood test.
8. Vegetarians performing resistance training to gain muscle size or strength should focus on the quality, quantity and timing of ingestion of protein to maximise the benefit of the activity session.

13 Managing Established Disease

Many overweight people are concerned about their appearance and how others see them, but really they should be more worried about the effects on their health. Obesity increases the risk of various diseases, including cardiovascular disease and Type 2 Diabetes Mellitus. Both of these are considered lifestyle diseases which can be prevented and managed by diet and exercise.

If you have these conditions, weight loss and a regular program of exercise are likely to reduce the symptoms and improve your quality of life. Professional help is needed and you should ask your family doctor where you can get help to make the necessary changes in your life.

Cardiovascular Disease

Cardiovascular disease includes coronary heart disease (CHD), peripheral vascular disease and stroke. The disease is established by damage and progressive fatty deposits (formed by LDL, or "bad", cholesterol) in the artery wall, a process referred to as atherosclerosis. Obesity, especially if the excess fat is around the abdominal area, accelerates the processes involved in the development of all types of cardiovascular disease.

Risk factors

Cardiovascular disease is caused by a number of different risk factors. Some risk factors cannot be changed (i.e. they are non-modifiable), but most can be changed by living a healthy lifestyle (i.e. they are modifiable). Improving the level of one risk factor appears to have little impact on overall disease risk, so it is essential to address all risk factors.

Managing risk factors

a) **Obesity.** Reducing weight (even modest weight reductions of about 5% weight loss) especially around the abdominal area - "central obesity" - or maintaining weight in a healthy range (see http://www.nhs.uk/Livewell/healthy-living/Pages/height-weight-chart.aspx), is associated with improvements in cardiovascular risk factors, including reductions in blood pressure, lower total and LDL blood cholesterol, higher HDL ("good") blood cholesterol, reduced blood inflammatory profile, and improved blood glucose control.

b) **Hypertension (high blood pressure).** High blood pressure can be the result of genetic, lifestyle, environmental, and psychosocial factors. The factors which influence blood pressure include: age progression, obesity, stress levels, fat and cholesterol metabolism, kidney function, certain medications, and lifestyle activities (e.g. smoking, alcohol habits, diet (including salt intake, total daily intake of fruits and vegetables), and physical activity. Managing all the contributing factors will support overall reductions in high blood pressure.

c) **Dyslipidaemia.** A diet high in total fats, saturated fats, and trans-fats not only contributes to obesity progression, but is also linked with increases in total and LDL blood cholesterol levels, decreases in HDL blood cholesterol levels, and prolonged increases in triglycerides after a meal. These factors are a complete recipe for the progression of cardiovascular disease. On the other hand, consuming a diet rich in whole grains, fruits and vegetables, and consuming foods that contain monounsaturated fats (MUFA) and marine-based polyunsaturated fats (PUFA), can substantially improve the blood lipid profile.

d) **Chronic inflammatory syndrome.** Fat that is stored around the waist releases a multitude of chemical factors, some of which are linked with increases in the risk of cardiovascular disease.

Evidence-Based Dietary habits for Cardiovascular protection

- Maintain weight in a health range or promote weight reduction in overweight or obese individuals.
- Consume freshly prepared wholegrain foods that are rich in fibre.
- Consume more fruits and vegetables.
- Consume less fatty foods.
- Use olive or rapeseed/canola oil in food preparation.
- Consume foods rich in monounsaturated fats (MUFA).
- Consume foods that are rich in Omega-3 polyunsaturated fats (PUFA), especially from marine sources.
- Limit the consumption of foods that are rich in Omega-6 PUFA.
- Consume less added sugar.
- Consume less salt.
- Drink alcoholic beverages in moderation.
- Maintain daily physical activity.

In individuals with very high blood pressure and/or blood cholesterol levels, making positive dietary changes and undertaking daily physical activity may have little impact or reducing the overall cardiovascular risk factors associated. Prescription medication may be required, together with support from a multi-disciplinary health professional team.

Type 2 Diabetes Mellitus

Diabetes is a metabolic condition caused by defective production, secretion, and/or action of insulin. Tissues that normally respond to insulin by taking up blood glucose become less sensitive (insulin resistance), leading to impaired glucose tolerance: if this is not managed, Type 2 Diabetes develops. The resulting high blood sugar levels can lead to damage to blood vessels, especially in the retina and in the feet, kidney damage, and impaired nerve function, and is a major risk factor for the development of CVD.

Risk factors

- Family history (genetic predisposition)
- Being overweight or obese
- Physical inactivity
- High total fat and saturated fat dietary intakes

Dietary management:

- Maintain weight in a healthy range or promote weight reduction in overweight or obese individuals. You can check if you are the right weight for your height at: http://www.nhs.uk/Livewell/healthy-living/Pages/height-weight-chart.aspx
- Maintain a regular evenly spaced meal plan with three healthy main meals and appropriate snacks in-between meals
- Meals and snacks should contain low-moderate glycaemic index carbohydrates that are high in fibre, fruits and vegetables, low fat dairy products, oily fish, and MUFA based fats
- Reduce daily intake of foods and beverages rich in total and saturated fats
- Reduce daily intake of foods and beverages rich in added sugars and salt
- In addition, get at least 30 minutes of exercise most days

In individuals with Type 2 diabetes and/or metabolic syndrome, dietary and lifestyle interventions may not succeed in maintaining blood glucose level within the healthy norm. Therefore, prescription oral hypoglycaemic agents and/or insulin may be required alongside behaviour change, with support from qualified health professionals.

Joint Health within Cardiometabolic Conditions

Osteoarthritis (OA) and rheumatoid arthritis (RA) can be debilitating, but diet and exercise can reduce the risk of these conditions developing and can be important parts of treatment. Exercise prescription highlights the important of physical movement in joint health.

Dietary management for healthy joints

- Seek advice and accompaniment from a qualified exercise professional for exercise prescription for these conditions.
- Modify the diet to support weight reduction in overweight and obesity (see section 5).
- Have a healthy, varied diet that includes lots of whole grains, fruits and vegetables.
- Use MUFA and Omega-3 PUFA as the main type of fats in the diet.
- Avoid unhealthy fats (saturated and trans fats), and fats which may stimulate inflammation (Omega-6 PUFA).

Supplements containing chondroitin and glucosamine are popular among individuals with joint pain, but research has failed to clearly identify benefits of these supplements in joint health, although they do seem to help a few people feel better. The use of these supplements is not recommended, but they are unlikely to do any harm.

In individuals with advanced arthritis, dietary and lifestyle changes alone may have little success in reducing inflammatory status of joints. Therefore, anti-inflammatory agents may be required alongside behaviour changes, and this requires medical evaluation and support.

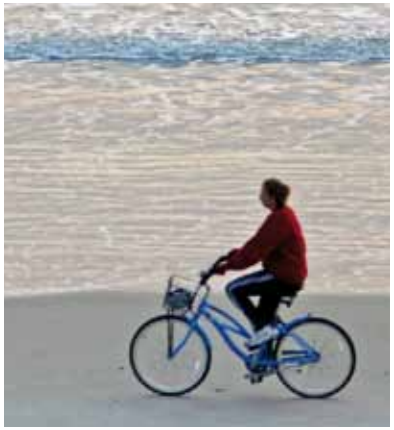
Gastrointestinal Health and Physical Activity

The gastrointestinal (GI) system controls food digestion, nutrient absorption, and waste excretion. In addition, the large intestine harbours a multitude of natural bacteria, which contribute towards food digestion, nutrient absorption, and general GI health. Moderate physical activity has been shown to improve general GI health, and is part of the management of some gastrointestinal disorders (e.g. Irritable Bowel Syndrome- IBS). However, prolonged intensity exercise, especially in hot weather, may negatively affect GI health. Therefore, looking after the GI system while following an exercise program is an essential strategy to promote overall good health.

Probiotics are live good bacteria that, when ingested in adequate amounts (available consumable forms include drinks, yogurts, capsules, and powders), have been suggested to provide health benefits. Suggested benefits include: reduced episodes of diarrhoea, reduced GI distress, and reduced GI infection and illness rates and severity. Even though probiotic bacteria may act directly in the human GI system, the evidence is limited, so the use of probiotics should be advised on an individual tolerance basis.

On the other hand, the bacteria present in the large intestine may be changed by food components that have prebiotic effects (e.g. oligofructose and inulin, naturally found in whole grains, vegetables and fruits). Prebiotic effects increase the activity of some bacterial species in the GI tract, and are often claimed to have health benefits, including: improved stool quality, reduced risk of GI infection and illness, reduced GI inflammation, reduced frequency and severity of allergy responses, and improvements in GI diseases such as Inflammatory Bowel Disease (IBD) and IBS. Once again, though, there is limited research to guide recommended prebiotic doses, so the use of prebiotics within health and exercise should be advised on an individual tolerance basis.

For anyone with GI conditions such as Coeliac Disease, IBD, and IBS, physical activity is considered an important part of the condition management strategy. It is advised that individuals consult a qualified and/or registered Sports Dietitian for more individually tailored nutritional advice in regards to meeting nutritional requirements for exercise load, especially during periods of disease remission.



14 Putting it all Together: Making Good Choices.

Today, more than at any other time in history, people around the world, are getting less exercise and activity levels are still falling. A 2008 survey in the UK on physical fitness found only 39% of men and 29% of women aged 16 or more met the minimum recommendations for physical activity and obesity rates worldwide continue to keep rising (even in developing countries). The effects of obesity (in the UK 22% of men and 24% of women aged 16 or over were classified as obese in 2011) on increasing the risk of Type 2 diabetes, some forms of cancers, heart and liver disease, lowering life expectancy along with reduced sense of wellbeing have been highlighted above.

Fitting in exercise and good food choices with all the distractions and conveniences of the modern world can be challenging, but eating well and being active can reduce your risk of developing a major illness, can delay the effects of aging, and can make you less likely to develop depression or dementia and better able to handle stress.

We all lead busy lives and regularly report we are time poor, but with some careful planning improvements in physical activity and nutritional health can be incorporated into any lifestyle. It's never too late to start, and being in control of your health allows you to look forward with confidence.

Some of the benefits from eating well and being active

- Greater enjoyment in life –more energy to do things and feeling better
- Increased life expectancy
- Reduced risk of many common diseases
- Achievement and maintenance of a desirable body weight
- Enjoying a wide selection of great tasting foods
- Better brain function and improved mood
- Reduced risk of injury, fatigue, illness, stronger bone health, greater flexibility
- Delay in some of the negative effects of aging while enjoying the positive effects

Some examples of ways to increase daily fruit and vegetable intake in the diet:

- Include both fresh and frozen vegetables
- Try to include 2 to 3 different types of cooked vegetables in meals
- In a vegetable salad, include 3 to 4 different types of raw vegetables
- If using tinned vegetables, select no salt or salt reduced brands
- A medium bowl of homemade vegetable soup made with the whole of the vegetable is one portion
- Use both fresh fruit and dried fruit
- If using tinned fruit, select that in natural juice
- A glass of 100% natural juice counts as one fruit portion

Some examples of ways to reduce total daily salt intake in the diet:

- Try to avoid adding salt or salt alternatives in your cooking and at the table. Use more herbs and spices to suit taste instead
- Avoid salty snacks: crisps, salted nuts, pepperoni sticks, cheese, pastries, biscuits, snack bars, and savoury flavoured snacks
- Be aware of hidden salt in products: some breakfast cereals, sauces, tinned foods, meat products, ready meals, processed foods, seasoning mixes, soy sauce, spreads, yeast extract, and stocks are very high in salt. Check the labels for salt content.

Read food labels and select products that contain less than 0.1 g of sodium (0.25 g salt) per 100 g of product. If the food type contains more that this amount, use the food labels to select the brand which has the lowest sodium (salt) value. You can find more information at: http://www.bda.uk.com/foodfacts/Salt.pdf

Some examples of ways to incorporate healthy fats into the diet

- Try to cut down overall total fat in your daily diet. Read food labels and select products that contain less than 3 g of total fats per 100 g of product. If a food contains more that this amount, use the food labels to select the brand which has the lowest total fat and sugar value.
- Avoid foods that contain a large amount of saturated and trans-fats. Read the food labels and select products/ingredients that contain less than 1.5 g of saturated fats per 100 g of product. Also, read nutritional information and ingredients list to identify and avoid trans-fats (hydrogenated fats).
- Cut down on saturated fats by using lean cuts of meat, and avoid consuming the skin of poultry and use reduced-fat dairy products.
- Choose olive or rapeseed oil for daily food preparations (cooking oils, dressing oils, and spreads).
- Add some nuts (hazelnuts, cashew nuts, pecan nuts, pistachio nuts, almonds, or macadamia nuts) to recipes, especially salads
- Chop some avocado into a salad.
- Eggs have a high MUFA (see Glossary at the end) content, so should be included in the diet.
- Good foods to add to your diet include oily fish (salmon, sardines, kippers, pilchards, mackerel, herring, trout, and fresh tuna) oats, pulses, rapeseed oil, flaxseeds, walnuts, and soya products.

Some recommendations for fitting more exercise into an active lifestyle

- Get out of bed 15 minutes earlier and go for a brisk 10 min walk
- Walk the dog for an extra 10-15 minutes
- Take a 10-20 min walk at lunch time before or after you eat your lunch
- Walk to a meeting and take the stairs instead of a lift for at least three or four flights
- Walk over to and talk to colleagues in the same office rather than sending an email
- Walk around the pitch/court when supporting children at sports events rather than standing still or sitting
- Get friends together for games in a park
- Set up a morning walking group followed by coffee
- Set a new goal every 6 months: 10k walk, 10k run, 10k bike ride, ½ marathon, full marathon
- Plan a family bike ride and picnic for the weekend
- Plan an active school holiday break
- Find and visit your nearest outdoor gym or outdoor recreation centre
- Make cleaning the car a fun family activity session
- Have the whole family participate in a fitness DVD
- Turn housework into an exercise routine
- Try gardening as an activity or join a walking group
- Take up a new activity: learn to swim, dance, row, play tennis
- Be a healthy role model with activity for the family and friends
- Take up a sport or activity you used to enjoy in the past

Some recommendations for healthy eating choices

- Choose a lower saturated fat milk, cheese or lower fat yoghurt
- Use unsaturated fats when cooking or on salads (plant, nut or seed oils)
- Have a food treat (chocolate, crisps) once or twice a week (not every day) and have a smaller portion
- Share a treat with a friend
- Take flowers, books, magazines as gifts instead of cakes and biscuits
- Have the coffee after a walk, bike ride or other activity with friends to catch up
- Remove one teaspoon of sugar from cereal, tea or coffee
- Spread less butter, mayo or margarine on to bread, toast, muffins or baked items
- Buy less French fries (chips) and add some vegetables or salad to a takeaway meal (boil, steam, microwave)
- Cook a meal from scratch at least twice a week
- With a roast meal Choose from ONE roast vegetable or the gravy
- Eat three servings of fruit and three servings of vegetables everyday
- Choose more whole grain and granary breads and cereals
- Try a new food once a month
- Include more colours on lunch and dinner plates
- Be aware of your sodium intake and aim for low salt options
- Use more fresh herbs and spices
- Try a new recipe every week
- Be healthy role model with food choices, portion sizes
- Reduce the number of units of alcohol a week – choose a smaller glass of wine, beer or spirits
- Serve soup as a meal, and try adding extra vegetables to it
- Be sure to drink plenty of fluids, especially when active and during warmer weather
- Choosing a variety of different drinks can help you to stay well hydrated
- Drink water when thirsty and where exercise is less intense and short (under 45 minutes) and consider sports drinks for longer or more intense activities

15 Getting More Information

In most countries in the world, you can get advice on good food choices through your government's Department of Health or equivalent. The Internet, of course, allows you to access an enormous amount of material. There are many commercial sites, but you need to be careful as these are not always independent and they often contain opinion presented as fact.

Websites that contain useful information include:

http://www.nhs.uk/livewell
Health advice on a wide range of topics from the British National Health Service. Many excellent resources.

http://www.bda.uk.com/foodfacts/index.html
Food Fact Sheets from the British Dietetic Association

http://www.bdaweightwise.com/
A consumer website on all aspects of weight management developed and managed by the British Dietetic Association. Provides a number of useful resources including BMI calculators and a food and activity diary.

http://www.eatright.org/Public/
Site of the American Dietetic Association. This could be the only site address you need as it has a wide range of information. It also includes an extensive directory of links to other sources of information.

http://navigator.nutrition.tufts.edu/
This is on the Tufts University website and provides links to different websites and ratings of those sites.

http://fnic.nal.usda.gov
This is the US Department of Agriculture site. As you might expect form a US Government site, this is comprehensive and is an enormous resource, with sections on dietary guidelines (including the background evidence) dietary supplements, and a comprehensive (but American) food composition database.

http://www.dietwatch.com
A variety of different resources are available on this site, mostly on health-issues, but it includes an extensive food composition database. This is a commercial site and offers a perspective that is different from that of the sites listed above.

http://ific.org/
The International Food Information Council has industry funding to provide information aimed at consumers. They have many excellent resources on paper as well as on their website. Much of the information is on food safety and legislation issues, but various other topics are covered too.

http://europe.ilsi.org/
Industry-funded organisation that publishes good information on a wide variety of topics. Many of the resources are available in print format free of charge.

http://www.gssiweb.com
The site of the Gatorade Sports Science Institute contains various resources - most are related to sports nutrition, but a wide range of other topics is also included. This is a commercial site, but is not overtly selling a product.

http://www.ais.org.au
The website of the Australian Institute of Sport. This contains a substantial number of sports nutrition and other sports science resources.

http://www.americanheart.org
Website of the American Heart Association. The Healthy Lifestyle section has information on current (American) recommendations on exercise and diet as well as numerous other resources.

http://www.topix.net/food/nutrition
This is part of a large search engine that reports news stories. The result is an eclectic mix, including a number amount of trivial stories, but it does give a snapshot of the nutrition stories that are making the news.

http://ndi.npicenter.com/
NPIcenter describes itself as the leading global online information resource for professionals in the Nutraceutical, nutritional, dietary supplement, cosmetic, and food industries. This part of their site consists largely of company press releases, but these are sometimes of interest.

http://www.nhs.uk/Pages/HomePage.aspx
An official UK government website including news and large amount of resource material on various food and nutrition topics. Includes sections on sports nutrition, healthy eating, food labelling, etc.

http://www.cdc.gov/nccdphp/sgr/summ.htm
The US Surgeon General's report on Physical Activity and Health. The summary provides key information, but the whole report is available and shows the evidence for the intimate link between nutrition, physical activity and health.

http://www.who.int/en/
World Health Organisation. Useful information on a wide range of health issues

http://www.iotf.org/
International Obesity Taskforce. All you need to know about diet and obesity.

http://www.b-eat.co.uk/
Information and help on all aspects of eating disorders, including Anorexia Nervosa, Bulimia Nervosa, binge eating disorder and related eating disorders

http://www.europeanhydrationinstitute.org/
Website of the European Hydration Institute. A range of resources relating to hydration, health and active lifestyles.

http://www.nutrition.org.uk/
Website of the British Nutrition Foundation (BNF) providing academic reviews of published research on issues of diet and public health and a Nutrition Bulletin covering topical issues. The BNF also provides teaching and learning resources for schools on diet and health for children and young people, aged 3-16+ years via an educational website, foodafactoflife.org.uk.

For professional advice contact the Sport and Exercise Nutrition Register (SENr) to identify a qualified Sports and Exercise Nutrition expert (www.senr.org)

16 Glossary of Terms Used

Atherosclerosis: the formation of fatty plaque on the artery wall restricting blood flow.

Dyslipidaemia: abnormality in, or abnormal amounts of lipids or lipoproteins in the blood.

Free radical: an atom or compound with an unpaired electron, thought to cause cellular damage, but also important in fighting infection and perhaps also in promoting positive responses to exercise.

Functional foods: foods that contain additive substances intended to provide health or performance benefits beyond that of basic nutrition.

Glycaemic index: a measure of the effects of carbohydrate foods on the rate and amount of increase in the blood glucose concentration following ingestion of a standard portion of the food.

HDL: high density lipoprotein: often referred to as 'good cholesterol', generally functions to transport cholesterol to the liver where it can be metabolised.

Hyperglycaemia: a blood glucose level that is higher than normal.

Hypoglycaemia: a blood glucose level that is lower than normal.

Hypertension: high blood pressure.

Inflammation: the immune system's initial response to body tissue damage or infection. Associated with an influx of immune cells to the damaged or infected area, causing local increased swelling, temperature, and soreness. If the inflammation becomes generalised throughout the whole body, it is known as a fever.

LDL: low density lipoprotein: often referred to as 'bad cholesterol', generally functions to transport cholesterol from the liver to the other tissues where it may accumulate and cause damage.

Metabolic syndrome: a cluster of characteristics, including a large waist circumference, hypertension, dyslipidaemia, and impaired glucose tolerance, which promotes the release of chemical factors that predispose an individual to cardiovascular disease and Type 2 diabetes mellitus.

MUFA (monounsaturated fatty acids): a healthy type of fat predominantly found in olives, rapeseed, avocado, and some nuts, such as macadamia nuts, hazelnuts and almonds. Is also the predominantly type of fat in eggs.

Oxidation: a reaction in living cells involving the transfer of hydrogen atoms or electrons from one molecule to another with the end product releasing energy. In some situations (e.g. free radical oxidation) the process of oxidation may damage cells and initiate the inflammatory cascade.

PUFA (polyunsaturated fatty acids): two main groups of fats, omega 3 and omega 6. Omega 3 fats are considered anti-inflammatory, and are found in both marine fats and certain plant oils. Omega 6 fats are considered inflammatory, and are found in both plant and animal food sources.

Phytochemicals: a class of biologically active plant chemicals thought to play a role in the maintenance of health.

Saturated fat: a fat that contains only saturated fatty acids. Saturated fats are usually solid at room temperature and come mainly from animal sources.

Thrombosis: blood thickening (due to blood platelets sticking together), clot formation, and artery tightening around areas of arterial damage. All these processed contribute to restricting or blocking blood flow to tissues.

Triglycerides: a form of fat that circulates in the blood. High levels of triglycerides in the blood are a risk factor for the development of cardiovascular disease.