6 Essentials to Physical Health and Wellbeing

by Dr John Briffa

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Introduction

My work as a doctor specialising in natural medicine has convinced me that health and wellbeing are subject to an enormous array of factors and influences. However, my experience in practice is that while just about any factor influence health, some factors are much more common than others. In this e-book I detail what I believe to be most important physiological components of health. Briefly, these are breathing, water consumption, detoxification of the body, blood sugar balance and adrenal gland health, thyroid function and exercise. During my time in practice, I have come to realise that the causes of health issues is a highly individual affair. Not all of these areas will be relevant to you. To this end, I have included in this e-book information and questionnaires that may help you to identify specific imbalances in your body. The e-book will also give you plenty of practical information and advice about how to remedy any issue you may have and lead a healthier life in general. This book is also an essential accompaniment to my e-book '**Natural Solutions to Common Ailments**' which can be obtained free of charge from www.drbriffa.com.

Dr John Briffa

Chapter 1
Give your Body Oxygen

While the human body can survive a few weeks without food, and perhaps a few days without water, it can't do without oxygen for more than a few minutes. Oxygen is an essential ingredient in the reactions which burn food to make energy, and any shortfall in the supply of this gas can therefore impair our sense of vitality and well-being. Not only that, but *all* the body's cells require oxygen to function normally. From the cells in the liver which neutralise toxins from the gut, to the cells in the glands which secrete essential hormones into the blood stream, one thing they all have in common is their need for oxygen.

Oxygen is supplied to the body through the act of breathing. Breathing is something we generally don't have to think about, so there's a tendency for us to feel it's something we do perfectly well. However, experience shows that many of us don't breathe nearly as well as we might, and this can have a significant impact on both our physical and emotional health. Learning and practising proper breathing is, quite simply, fundamental to abundant health and vitality.

The essential role that oxygen plays in the function of the body's organs is most evident in conditions such as heart attacks and stroke. Here, parts of the body become starved of oxygen due to an interruption in blood supply leading to death in the body's tissues. Also, in conditions where the lungs fail to absorb adequate amounts of oxygen from the atmosphere such as chronic bronchitis and emphysema, breathlessness, fatigue and a reduced capacity for exercise and activity are the result. Let's make no mistake about it, oxygen is of prime importance to life and health.

Beyond the physiological roles that breathing appears to fulfil, other benefits lie. In Eastern medicine, breathing exercises are often used as an integral part of many different therapies which link mind and body. In many traditional forms of therapy, including yoga, t'ai chi and ki gong, proper breathing is believed to help harmonise the whole self and is thought to offer diverse healing effects. Breathing exercises are often used in treating conditions and symptoms as diverse as high blood pressure, menopausal hot flushes, migraine, panic attacks and depression. Many individuals find that practising efficient breathing has a calming, balancing effect on their mood and sense of well-being, but also leaves them feeling energised and focused.

Are you breathing right?

While many of us assume breathing is something we do perfectly well, this may not be the case. We know that the efficiency of basic systems in the body can vary enormously between individuals. For instance, while some people have cast iron digestions, and are able to break down and absorb any food without ill-effect, others may not be so lucky and therefore run into problems with nutrient deficiency and food sensitivity as a result. While certain individuals may have strong immune systems and get through the year without so much as a sniffle, others may be susceptible to just about any bug that happens to be lurking in their immediate environment. The same is true of breathing. Some people get all the oxygen they need for optimum health through their complete and efficient breathing habits, though many others don't. To understand what efficient breathing is all about, and what can go wrong, it helps to know a little about the structure and function of the lungs.

The act of breathing

Breathing fulfils two main functions in the body. As we know, all the cells in the body require oxygen to function, and the act of breathing allows this gas to be absorbed from the air into the blood stream. While the cells use oxygen, they also generate a waste product - carbon dioxide. The other main function of breathing is to allow the body to rid itself of this unwanted gas. The process of oxygen absorption and carbon dioxide elimination by the body is sometimes referred to as 'gas exchange'.

The structure and function of the lungs

Oxygen is taken into the body from the air via the lungs. Air which is inhaled through the nose and/or mouth first travels down the windpipe (trachea) to enter two tubes called the 'bronchi', each of which takes the air into the lung itself. The bronchi divide again and again, forming a branching network of tubes which get ever smaller in size as the approach the outer reaches of the lung tissue. Finally, these tubes end in the form of tiny sacs called 'alveoli'. It is in the alveoli that gas exchange takes place. Surrounding the alveoli is an intimate network of tiny blood vessels known as capillaries. Oxygen and carbon dioxide can pass back and forth between the alveoli and the blood in the capillaries, and this allows the lungs to perform their function of gas exchange.

When oxygen is breathed into the lungs, some of it will transfer across the wall of the alveoli into the blood contained in the capillaries. This blood (known as 'oxygenated blood') eventually travels to the heart in a vessel called the pulmonary vein. The heart then pumps this blood to the body's tissues, where the oxygen is used, and swapped for carbon dioxide. This blood (known as 'deoxygenated blood') travels back to the heart, so that it can pump it once again to the lungs. In the lungs, the carbon dioxide leaves the blood stream and enters the alveoli, after which it can be removed from the body as the lungs breathe out. On the in-breath, more oxygen is absorbed into the blood stream from the air, and

this then travels to the heart to be pumped to the rest of the body. And so this cycle repeats.

The act of breathing and the process of gas exchange depend on the mechanics which get air in and out of the lungs. Inspiration (breathing in) and expiration (breathing out) is controlled by muscular contractions in and around the chest.

The chest cavity is essentially made up of the spine at the back, the sternum or breastbone at the front, and ribs on either side which connect the two. After breathing out, the curved ribs hang down somewhat, rather like bucket handles. Between the ribs there are muscles (called the 'intercostal muscles') which contract during inspiration. The effect of the intercostal muscle contraction is to draw the ribs up, increasing the size of the chest which in turn causes air to be drawn into the lungs (inspiration).

Apart from the intercostal muscles, there are other muscles involved in the act of breathing, the most important of which is the 'diaphragm'. The diaphragm is a dome-shaped thin muscular sheet which lines the base of the chest and separates it from the abdomen. During inspiration, the diaphragm contracts and flattens, and this causes air to be drawn into the lungs.

Broadly speaking, individuals can be classified as chest breathers or diaphragmatic (belly) breathers. Chest breathers tend to breathe in an out using mainly their intercostal muscles. The breaths tend to be shallow and often relatively short. In chest breathing, air is drawn into the smaller upper parts of the lungs, but may never make it into the lower reaches of the lung where much of gas exchange takes place. In Eastern medicine, this type of breathing is viewed as inefficient and incomplete.

Belly breathing on the other hand is viewed as both healthy and important to well-being. Here, instead of the intercostal muscles doing the bilk of the work, it is the diaphragm which contracts to draw air into the lungs. In diaphragmatic breathing, inspired air can make its way into the expansive lung tissue at the base of the chest. Belly breathing goes a long way to optimising the process of oxygen absorption and carbon dioxide removal.

Assessing your breathing

This simple exercise will enable you to get a good idea about whether you are predominantly a chest breather or belly breather:

Put your left hand in the middle or your chest with your right hand over your navel. Breathe normally. Look at your hands and take a note of which hand moves more when you breathe. If your left hand is moving more than your right, it is a sign that you are a chest breather. If your right is moving more than your left, however, it is likely that your breathing is essentially diaphragmatic in nature.

Is inefficient breathing your problem?

The questions in the following questionnaire are designed to help you assess the efficiency of your breathing. Score each question as indicated, and then add up your total score.

1. Having done the exercise above, do you rate yourself as a:
chest breather?- 8 points
belly breather? - 0 points
somewhere in between? - 4 points

2. Can walking up just one or two flights of stairs make you very breathless?

never - 0 points

sometimes - 2 point

often or always - 4 points

3. You are sometimes aware of the need to take a big breath of air at rest?

never - 0 points

sometimes - 2 points

often - 4 points

4. Do you consider yourself as a:

generally relaxed individual who is not prone to bouts of anxiety or stress? - 0 points

highly strung and anxious individual who quite often feels anxious or stressed out - 4 points

somewhere in between - 2 points

5. Count the number of breaths you take in a minute at rest (no sooner than a hour after any form of exercise). Do this three times during the day and average the result. Is the number of breaths you take in a minute:

between 5 and 9? - 0 points

between 10 and 15? - 3 points

16 or more? – 6 points

Interpreting your Score

0 - 8: your answers to the questionnaire suggest that you have good breathing habits, and that poor breathing is unlikely to be an issue in your weight or health issues

10 – 16: your answers to the questionnaire suggest that your breathing habits may benefit from the breathing exercises outlined in this chapter

more than 16: your answers to the questionnaire suggest that your breathing pattern is not healthy and that you would almost certainly benefit from practising the breathing techniques outlined in this chapter on a regular basis

Hyperventilation and health

As we discussed earlier in this chapter, many of us can take rapid, shallow breaths that simply do not allow enough oxygen to be absorbed into the system. Another effect of hyperventilation is that we can end up with lower than normal levels of carbon dioxide in the body. Now, while carbon dioxide is essentially a waste product, we do need some of it. Why? Well, one thing about carbon dioxide is that it is acidic. The more carbon dioxide we have in the blood, the more acidic the blood is. If through hyperventilation carbon dioxide levels drops, then the blood becomes more alkaline. Now for a bit of physiology: Due to something called the Bohr effect, as the blood becomes more alkaline, less oxygen is released from haemoglobin in the red blood cells into the tissue. Basically, when we over-breathe, our tissues become starved of oxygen.

Over 40 years ago, a Russian scientist by the name of Professor Buteyko developed a breathing system designed to reduce over-breathing and reduce the effects of chronic illnesses including asthma and emphysema. The Buteyko method is becoming increasingly recognised as a useful tool in the treatment of ill-health.

Do you need the Buteyko method?

Professor Buteyko developed a test designed to measure depth of breathing and the consequent levels of carbon dioxide and oxygen in the body. It is called the 'control pause breathing test':
Breathe in gently for two seconds.
Exhale gently for three seconds.
Close your mouth, pinch your nose and hold your breath
Start timing
Stop timing when it becomes difficult to continue to hold your breath

According to Professor Buteyko, less than 10 seconds suggests a very significant problem with hyperventilation. Between 10 and 25 is also significant, though less severe. 25 – 40 seconds generally means some attention to needed. More than 45 seconds is good and more than 60 is excellent.

The Buteyko method is taught by specially trained practitioners. It normally involved a series of five or more hourly tuition sessions. More details about the Buteyko Method can be obtained via the website www.thebuteykoshop.co.uk.

Belly breathing exercise

If you have identified yourself as a chest breather, it will almost certainly help you to learn the art of proper, belly breathing. Even if you think you breathe mainly from the diaphragm, the following exercise is likely to help you make your breathing even more complete and efficient.

Breathe gently in and out through your nose. Breathe out all the air from your lungs, pause briefly, and begin to breathe in again. Concentrate on taking long, smooth, unhurried breaths.

As you breathe in push your belly out, as this will ensure you are filling the whole of your lungs with air. When your lungs feel comfortably full, pause briefly again, and then breathe out through your nose. Repeat this cycle always making sure that your belly is moving in and out as you breathe.

If you're not used to deep breathing exercises, and particularly if you tend to chest breathe, you might be pleasantly surprised at just how quick and effective this is for reviving your energy and clearing your head. Just 10 breaths are all that it normally takes for the benefits of deep breathing to be felt.

Although belly breathing takes some conscious effort to begin with, practice usually makes perfect. In time, you may well find that deep, diaphragmatic breathing becomes second nature to you.

I generally recommend that individuals who are learning belly breathing start with 10 good breaths, three times a day. In most cases, this really does seem to be enough to get things started. Within a couple of weeks, individuals normally feel like they've got the hang of diaphragmatic breathing, and may be extending their 10 breaths to 20 or more at a time without even thinking about it. From time to time, it's a good idea to do the hand test to see whether or not you tend to belly or chest breathe at rest. You may be surprised to find that your old chest breathing habits give way to healthier and invigorating belly breathing in time.

More breathing exercises

There are a couple of breathing exercises which I quite like myself and often teach to clients. They are based on belly breathing, but use pauses between inhalation and expiration to maximise the effect.

Breathing in threes

Take a good long belly breath and count 'one thousand, two thousand' etc in your head while you do this. Once you have inhaled fully, hold your breath for the same number of counts as it took you to inhale, and then exhale completely over the same number of counts again. For instance, if you inhale to the count of six, hold your breath for six counts, exhale for six counts and then repeat this cycle. I generally recommend 10 – 15 cycles, repeated three times a day.

To begin with, you may need to adjust your count until you find a length of time you are comfortable with. If you go too slowly to begin with, you may find that you start to run out of breath and are unable to complete the exercise. If your breaths are too quick, you are unlikely to get the maximum benefit from them.

Breathing in fours

Breathing in fours is very similar to breathing in threes. The only difference is that after exhalation, the breath is held for the same count as the other components of the cycle. As an example, breathe in over six counts, hold for six counts, breath out for six counts, hold for six counts and repeat. Breathing in fours is a little more challenging than breathing in threes, and is something to progress onto once you're comfortable with the easier exercise. I recommend 10 – 15 cycles, repeated three times a day, once you're proficient.

Summary

- Oxygen is an essential ingredient in the reactions which convert food into energy

- Insufficient oxygen or inefficient breathing may stall the metabolism and lead to problems with low energy and reduced vitality

- Inadequate oxygen might also impair the function of any of the body's cells

- Inefficient breathers tend to breathe into the upper chest, while efficient breathers tend to breathe into the lower reaches of the lungs using the diaphragm

- Hyperventilation and problems associated with it including asthma, can often be helped by a specific breathing technique known as the Buteyko method

- Learning diaphragmatic or belly breathing is a good first step in developing healthy breathing habits

- Once belly breathing is mastered, moving on to more ambitious exercises such as breathing in threes and breathing in fours can help maximise the effect

- Good breathing habits can be an effective way to enhance health and vitality, and may also be beneficial in terms of harmonising body and mind

Chapter 2
Give your Body Water

The body is about two-thirds water. Just that fact alone tends to suggest that water is an important component in health and well-being. However, while water plays a multitude of roles in the body and is essential to life, it very rarely gets the attention it deserves. I am convinced that drinking more water is one of the simplest, cheapest and most effective ways of improving health and vitality. In this chapter, we'll be exploring the benefits that water has to offer, how much water we need each day, and what types of water are the best for our health.

What, precisely, does water do in the body?

Every second of every day, the body partakes in countless reactions and processes that are integral to life. Nerve impulses from the brain stimulate movement in the body and control unconscious actions such as the speed at which the heart beats. Acid and digestive enzymes are secreted into the intestinal tract to break down food ready for absorption. Hormones are secreted in various organs around the body and travel in the blood stream to tissues where they have their effects. The circulation pumps blood around the system delivering oxygen and nutrients to the body's cells as it does this. The blood is filtered in the kidneys, allowing impurities to be eliminated from the body. The one thing that these and all other processes in the body have in common is water.

Water is absolutely essential for the maintenance of optimum health and efficiency in all the body's systems. Nerves simply do not transmit their messages efficiently if they are not properly hydrated. If the circulation is lacking in volume, it simply does not deliver oxygen, nutrients and other essential substances to the tissues as well as it might. Poor circulation to the kidneys means that toxins are less readily removed from the system.

Dehydration jeopardises all of the most basic processes and systems in the body.

The short-term effects of dehydration

It doesn't take much fluid loss from the body for it to impact on our well-being. There is evidence that as little as 1% dehydration (700 mls of fluid for a 70 kg adult) can impair the body's physiological and biochemical processes. In the short term, even mild dehydration can provoke problems with a diverse array of symptoms including headache, fatigue, loss of appetite, heat intolerance, light-headedness and dry mouth and eyes.

In the long term, however, dehydration can increase the risk of significant health problems including kidney stones and cancer.

Long term effects of dehydration

Dehydration generally causes the urine to be more concentrated. There is a theory that concentrated urine is more likely to lead to the development of kidney or bladder stones (urinary calculi). Research shows that kidney stones are more common in populations where urine volume is low (1-9). Not only this, but the research has also shown that increasing urine volume to about 2 – 2 ½ litres each day reduces the risk of kidney stones (1,4,5,7). Anyone wanting to protect themselves from kidney stones would therefore ensure a good fluid intake, and this is particularly important for individuals who have a history of this condition.

There is good evidence that a reduced intake of fluid can increase the risk of certain cancers. One study found an increased risk of cancers of the kidney, bladder, prostate and testes in individuals who consumed relatively low levels of fluid (10). Other research has found that

increasing fluid intake seems to reduce the risk of cancer of the bladder (11). More research has found a link between water consumption and cancer of the colon. One study found that women consuming five or more glasses of water per day had about half the risk of developing cancer of the colon compared to women consuming two or fewer glasses of water per day (12). There is even evidence that water can protect against breast cancer. One study found that water consumption was associated with about an 80% reduction in risk of breast cancer in women after the time of menopause. Risk for pre-menopausal women was reduced by a third (13).

Cancer is a condition which is rapidly becoming more common in the Western world. It seems incredible that doing something as simple as drinking more water might help significantly reduce our risk of this condition. Good hydration is likely to dilute and speed the elimination of toxic, 'cancer-inducing' substances within the body. Dehydration may also impair the activity of key enzymes involved in the regulation of important detoxification and immune-system related processes. Quite how water reduces cancer risk is not known for sure, but the evidence that it does is there!

How much water do we need?

Water is clearly fundamental to health, the question is, how much do we need? Water in the body is in a state of constant renewal. Water is lost from the body via the urine, faeces, breath and sweat. Each day an adult loses the equivalent of about 4% of body weight in water. For a 70 kg person this equates to about 2,500 - 3,000 mls (2½ - 3 litres) of water. Clearly, to prevent dehydration, this quantity of fluid must be replenished in the body.

Water is essentially obtained by eating and drinking. Our diet will provide us about 1,000 mls of fluid per day. The rest has to come from drinks. This means, that as a *minimum*, we need to consume between 1,500 and 2,000 litres of water per day. This rough approximation can be fine-tuned according to weight. For average day-to-day needs, we should aim to consume about 30 mls of water for each kg of our body weight (this equates to abut ½ ounce of water for each pound of body weight). A 70 kg adult should drink just over litres (30 X 70 = 2100 mls = 2.1 litres). A 100 kg adult would need 3 litres per day as a minimum requirement.

How do we know if we are getting enough?

Some people use thirst as a sign that they need to drink more. However, it does seem that by the time we're thirsty, the body is about 1 – 2% dehydrated (14, 15). Bearing in mind that at 1% dehydration we may already be feeling the effects, it seems as though thirst is not to be relied upon to tell us when it's time to drink.

The degree of the body's hydration can be gauged by measuring the concentration of the blood or urine in the laboratory. Clearly, this is not practical for day-to-day use. Fortunately, a simple and cost-free method for gauging hydrations does exist; it appears that we can assess our state of hydration quite simply and accurately from the colour of our urine (16). Essentially, the paler in colour our urine, the better our state of hydration. Our aim is to keep our urine colour very pale yellow or pale yellow throughout the day. If our urine colour strays into darker tones, particularly if this is accompanied by a pungent smell, then we know it's time to step up our water intake.

Does it have to be water?

Now we know why we need water, and have a pretty good idea of how much we need too. Does it really need to be water, though, or will other types of fluid do?

Let's have a look at some alternative drinks and their effects on hydration and health. Coffee and tea and some soft drinks contain caffeine. Caffeine is what is known as a 'diuretic'. This means it stimulates the production of urine, dehydrating the body in the process. Another substance which has a diuretic effect is alcohol. Both caffeine and alcohol containing beverages tend to induce toxicity in the body (more about this in chapter 3). So, in summary, caffeine and alcohol contribute to the body's toxicity, but also reduce the body's capacity to eliminate those toxins. Not ideal.

Clearly, caffeinated and alcohol containing drinks cannot be substituted for water. In fact, for each caffeinated or alcoholic drink, it makes sense to consume a glass of water on top of the normal recommended amount. This helps to dilute and eliminate toxicity in from the body, and obviously also helps to keep the body hydrated. The other thing about balancing caffeinated or alcoholic drinks with water is that it generally leads to a reduction in the consumption of these drinks anyway (there's only so much we can drink, after all!).

Perhaps decaffeinated drinks are better? Because decaffeinated drinks have little or no caffeine, they tend not to be diuretic in nature, and therefore are better than their caffeinated versions in terms of body hydration. However, it is interesting to note that in some studies, water, and only water, seems to be associated with health giving properties. For instance, in the study mentioned above which found increased fluid consumption reduced the risk of colon cancer in women, this association was only true for water: not even fruit juice appeared to have a protective effect.

Sugar-laden soft drinks should generally be avoided. Not only can they upset blood sugar control, but they may also suppress the immune system, reduce levels of 'healthy' HDL cholesterol, and increase levels of uric acid levels in the body (which may increase the risk of gout). Sugared soft drinks have also been found to be linked to childhood obesity (15). One study found that for each additional can or glass of sugar sweetened soft drink consumed each day, risk of obesity rose 60%. Perhaps 'diet' drinks are a viable alternative. It turns out that artificial sweeteners are not without hazards of their own. These are discussed in chapter 4.

There really is no getting away from the fact that there is no better fluid than water. Don't forget, for pretty much all of our evolution, we drank nothing but water. While these days there is a bewildering array of beverages which are readily available and sometimes very enticing. Unfortunately, from a health perspective it's difficult to make a case for any of them.

What form of water?

There are three main forms of water – *tap, distilled and mineral.* Let's look at each of these and discuss their pros and cons in turn.

Tap water

A common theme in nutrition is that processed foods should be generally avoided. What about processed water? After all, that's what tap water is. Not only that, but water in some countries is not processed just once, but again and again. Many of us are basically drinking sanitized water that comes from dishwashers, washing machines, baths and showers!

For water to be made 'fit to drink' it is first allowed to sit so that some of the impurities can sediment out. After this, the water is treated chemically to encourage the sedimentation of some of the lighter impurities in the water. Next, the water is filtered, after which it is disinfected. Disinfection generally involves chlorine, although ozone and ultraviolet light radiation are other more expensive options.

There is concern about the presence of chlorine in tap water and its role in cancer. Chlorine is what is known as an 'oxidising' agent, and can induce chemical changes which, at least in theory, should increase cancer risk. Water may also contain related compounds which are by-products of the chlorination process known as 'trihalomethanes'. These are also thought to have cancer-inducing potential. A review of 10 studies which examined the link between chlorine and its by-products and found that exposure to these harmful chemicals increased the risk of bladder cancer by 21% and rectal cancer by 38% (16). Another study found that exposure to chlorine or trihalomethanes was associated with an increased risk of brain tumour (19).

Another substance which is used in the purification of water is aluminium sulphate. There is some concern that aluminium may have some role to play in Alzheimer's Disease (see *Alzheimer's Disease* in e-book *'Natural Solutions of Common Ailments'*). While the evidence here is far from clear-cut, it is known that aluminium is a potentially toxic substance, and there does seem to be at least enough research which suggests it should be viewed with suspicion.

And what of fluoride? This substance is added to the water in some countries because it is believed to protect teeth from decay. The most recent study to look at this association - often referred to as the 'York study' - did indeed confirm this to be the case (20). However, the York study also found that the protection offered by fluoride is much lower

than previously thought. In fact, just one in six people drinking fluoridated water benefits from this practice. However, drinking fluoridated water was also found to cause 'dental fluorosis' (a condition in which the teeth become mottled due to excess fluoride) in half of individuals drinking fluoridated water. One might question the wisdom in preventing dental disease in one in six while at the same time causing dental disease in one in two!

Also, because dental fluorosis is a sign of fluoride toxicity, could it be that fluoride might also lead to more sinister health effects. There is at least some evidence which suggests, for instance, that fluoride exposure may increase the risk of bone fracture. Not only all this, but there is a wealth of scientific evidence that fluoride may have toxic effects in many parts of the body including the brain, pineal gland and thyroid. More information about the potential hazards of fluoride can be found on the website www.fluoridealert.org.

What can be done to improve tap water quality?

My advice is to avoid tap water. At the very least, I recommend that it is treated to reduce some of its potentially harmful qualities. A simple and relatively inexpensive way to do this is to us a jug which has an integrated carbon filter. These filters help to get rid of much of the chlorine and other chemicals that may be in your tap water, but will allow most of the healthy minerals in water (see below) to get through. Bacteria are not removed either. It is important to remember to change the filter frequently (most are good for 50 - 200 litres of water).

A step up from jug filters are filters which are plumbed into the water supply. These generally contain carbon filters, though some also include fine clay particles to help filter out bacteria. These are more expensive than the jug filters (expect to pay about £200) and cartridges do need

replacing from time to time (usually annually). However, they are very convenient and generally do a good job.

Another form of 'in-house' water purifications is known as the 'reverse osmosis system'. This is good for removing impurities including bacteria, but also puts pay to many of the healthy mineral water may contain. The systems are on the expensive side, quite costly to run, slow and discard about 80% of the water they treat. Overall, I prefer the plumbed-in carbon and ceramic filters.

Distilled water

Distilled water is 'pure' water. One of the major advantages that distilled water has over other forms of water is that it is free from impurities and potentially hazardous elements such as lead, fluoride, chlorine and pesticides. Personally, I'm not convinced that distilled water is actually the best water for the human body. For a start, I always thing it is a good idea to stick quite closely to the sort of diet we evolved on, because it stands to reason that this is the diet we are best adapted to. We did not drink distilled water during evolution, and this does cast some doubt about its suitability for us as human beings. Another factor against distilled water is that there is some evidence to suggest that the minerals dissolved in other forms of water may actually have some health giving properties.

Water hardness and health

Tap and mineral waters contain elements such as calcium and magnesium. The 'hardness' of a water basically refers to the concentration of calcium carbonate in the water. 'Hard' waters are classified as having 75 mg or more of calcium carbonate per litre, while 'soft' waters have less than this. The forms of nutrients such as calcium

and magnesium found in water are known as 'inorganic' salts. These compounds are not thought to be easily used by the body in its physiological and biochemical processes, and have traditionally been believed to have little in the way of health-giving properties. However, there is some evidence that hard water may protect against certain conditions, particularly heart disease and stroke.

Dozens of studies in several countries (particularly the UK, the United States and Canada) have examined the link between water hardness and health. Not all the results of these studies have been consistent, but there has certainly been a strong trend to suggest that hard water can protect against cardiovascular conditions such as heart disease, stroke, high blood pressure, and other conditions. Studies in the United States and Canada have reported that cardiovascular mortality rates are about 15 - 20% higher in populations using very soft water compared to those consuming hard water.

There are two main theories which have been put forward to explain why hard water might protect against cardiovascular disease. One is that it might contain nutrients that are beneficial to health. The other is that soft water may contain relatively high levels of harmful elements.

Hard water and its beneficial properties

The two main nutrients in water are calcium and magnesium. There has been some research which has suggested that these minerals have a beneficial effect on health. In one study, calcium and magnesium in drinking water was found to protect women from heart attack (21). Another study found that low levels of magnesium in drinking water appeared to increase the risk of death due to stroke (22). Other research has found that individuals consuming water containing 13.5 mg or more of magnesium per litre, had a 40% reduction in risk of stroke (23).

Magnesium in drinking water has also been found to be associated with a reduced risk of diabetes (24) and prostate cancer (25).

The harmful effects of soft water

Soft water tends to be more corrosive that hard water. As a result, certain potentially harmful metals in plumbing materials are more likely to leach into soft water and contaminate. Two of the metals that have been linked to an increase risk of disease include cadmium and lead. Cadmium has been shown to produce high blood pressure in rates. Other studies show that cadmium can damage the human kidney, which may lead to an increase in blood pressure. While research here is lacking, it is likely that cadmium has an adverse effect on human health. The same is true of lead, high levels of which have been found in individuals living in homes served by lead pipes.

Mineral Water

As their name suggests, mineral waters can supply the body with minerals such as calcium and magnesium. According to European law, mineral waters much emerge from the ground in a state fit to drink, and must be bottled at source. The water must also be protected from pollution to ensure it purity. Natural mineral waters have nothing added, and nothing taken away. I'm a fan!

Are all bottled waters good to drink?

In a word – no. Bottled waters may be labelled in a variety of ways. Commonly used terms are 'natural mineral water', 'mineral water', 'spring water' and 'table water'. In Europe, only one of these terms (natural mineral water) refers to proper mineral water which has not been processed other than perhaps the addition of some carbon dioxide

bubbles. The other terms are used to label waters from other sources, including rivers, lakes and municipal water supplies. The quality of these bottled waters is not assured in the same way as natural mineral waters and I would therefore avoid them.

In the USA, as in Europe, proper mineral water can be found labelled as natural mineral water. However, in the USA, natural spring water is also used to describe this premium water. Natural spring water is generally used to describe waters of lower mineral content, while higher mineral content water is usually labelled natural mineral water. However, just to confuse matters there is some overlap. My advice is to opt for waters labelled 'natural mineral water', or to study the label for mineral content if you are looking for specific mineral quantities.

What about mineral content then?

Bearing in mind the potential benefit of 'hard' water over 'soft', I like waters with a high mineral content. While a lot has been made of the benefits of calcium, there is good evidence to suggest that magnesium is very important for health. Some of the evidence supporting magnesium's role in disease protection was discussed above. In general, I think calcium is a somewhat overrated mineral, while magnesium appears to be quite underrated. When I look at mineral waters, I look at the magnesium content first. After this, I check the calcium (I'm less concerned about this), and then I look at the sodium content. Because of concerns about sodium raising blood pressure in some people, and the fact that we appear to get far too much sodium in our diets than we need, I tend to avoid it wherever possible. My all-time favourite mineral water in the UK is called Ashbourne. It has a very high level of magnesium, a good level of calcium, and very little sodium.

Sparkling or still?

I generally advise people to drink still rather than sparkling mineral waters. Why? Well, first of all, carbon dioxide is acidic. There is a concept in natural medicine that many of us are prone to acidity in the body, and this can predispose us to disease including inflammatory conditions such as arthritis. Does putting carbon dioxide into the body into the body via water add to this acidity? I don't think anybody knows for sure but it stands to reason that it might. Remember also that carbon dioxide is a gas which the body is generally trying to rid itself of.

Another qualm I have over fizzy water concerns digestion. The bubbles in carbonated water can coat food in the stomach, which may impair acid and other digestive secretions from penetrating the food.

Overall, I feel the relative merits of still over sparkling water, are pretty marginal. My general advice is to drink the one that you prefer and is most convenient too – this should help to keep up a good intake of water, whatever precise form it takes.

Keep water around!

For many people, the idea of drinking 2 plus litres of water a day seems quite a feat. However, if we assume we are awake for 16 hours a day, then 2 litres a day equates to 125 mls per hour. Put that way, 2 litres a day doesn't seem quite so daunting.

The one big piece of advice I have about getting 2 litres of water into the body each day is this - *keep water by you*. Water is something that we don't tend to seek out. For this reason, I suggest it is kept readily to hand. If you're doing the gardening, keep a bottle of water with you. Put a bottle of water on your desk at work. Make sure there is water available in meetings. Put a ½ litre bottle of water in the car and carry

one in your handbag or briefcase when you are out and about. My experience with clients has led me to conclude that if we keep water by us we generally get through decent quantities of the stuff, but if we don't - we *won't*.

Summary

- Water is essential to all the body's most basic physiological and biochemical processes

- Even mild dehydration can provoke symptoms such as fatigue, headache and loss of appetite

- Long term dehydration can increase the risk of important conditions such as kidney stones and certain forms of cancer

- We should aim to consume about 30 mls of water for each kg of body (about ½ ounce of water per lb of body weight)

- Thirst is a relatively late indicator of the need to drink

- We can tell how well hydrated we are from the colour of our urine – aim to ensure your urine is very pale yellow or pale yellow throughout the day

- Tap water should be avoided as there is concern over some of its common constituents including aluminium, chlorine and fluoride

- If tap water is drunk, it is best to filter it first

- Distilled water lack minerals which have proven value for health including calcium and magnesium

- Natural mineral water is probably the best form of water for regular consumption

- To ensure you get through your water quota each day – keep it by you!

Chapter 3
Detoxify the System

Our body is constantly exposed to a stream of substances which can lead to toxicity within it. Some of these, such as the pollutants we breathe and the herbicides and pesticides that lace many of the foods we eat, come from the outside. Others are the result of the metabolic and physiological processes that go on in our bodies everyday. Fortunately, the body has evolved ways to process and eliminate unwanted substances from the body. Unfortunately, partly due to the fact that we are now exposed to thousands of toxic substances from our environment including our food supply, our body cleansing processes can't always keep up. If the toxic load in the system is large, and/or if there is some problem with the body's detoxification processes, then toxins may build up. This toxic accumulation effectively poisons the body, and may manifest in a number of ways including fatigue, lethargy, weight gain, headache, poor skin condition, acne, spots or pimples, bad breath, dark urine, pre-menstrual syndrome and cellulite.

In order to understand how toxicity in the body comes about, we must first understand the systems which are designed to keep the body pollutant free. Central to these processes is an organ called the liver.

The Liver

The liver is the body's largest solid organ, weighing about 5 lbs (2 – 2½ kg) in the adult. The liver sits in the upper right hand side of the abdomen, and is the primary organ of detoxification in the body. Blood which comes from the digestive tract goes first to the liver (via a vessel known as the hepatic portal vein). This means that anything potentially harmful to the body which starts out in the gut is passed directly to the liver. One of the liver's chief jobs is to process potential toxins, so that

they can be removed harmlessly from the body. In this way, the liver acts as a buffer between the gut and the rest of the body. Small amounts of toxins absorbed from the gut are really no problem, as the liver is quite likely to be able to deal with them effectively.

The liver also takes blood from the general circulation via a vessel called the hepatic artery. In this way, the liver is also exposed to toxins from other sources, including those inhaled through the lungs (e.g. cigarette smoke and pollution) and absorbed through the skin (e.g. cosmetics and detergents). So, wherever a toxin has come from, the chances are the liver will have a crack at dealing with it.

So, what exactly are all these toxins that the body has to deal with every day? Some of the potential hazards lurking in the body which keep the liver busy include:

- Food additives including artificial colourings and preservatives
- Artificial sweeteners
- Herbicides and pesticides
- Airborne pollution
- Heavy metals such as mercury (from amalgam fillings)
- Toxins derived from cigarette smoke
- Hormone-like molecules (often derived from plastics) which may be contaminate our food and water supply
- Naturally occurring food toxins
- Incompletely digested food molecules
- Cleaning substances and detergents
- Cosmetics and personal hygiene products
- Toxins produced from gut organisms (e.g. yeast, parasites, and undesirable bacteria)
- Prescription medication
- Alcohol

- Recreational drugs
- Caffeine

Because the liver is exposed to so many different types of potentially toxic substances, it has had to develop some sophisticated ways of dealing with them. Let's take a closer look at the processes which the liver uses to neutralise unwanted substances in the body.

Liver detoxification – a two-stage process

The way the liver deals with toxins involves a two-stage process known as Phase 1 and Phase 2 detoxification. The first phase of detoxification involves a system of enzymes called cytochrome P450. Through a variety of reactions, toxins are treated in a way that makes it easier for them to be attached to other molecules. The significance of this will be apparent later.

Phase 1 detoxification is a good thing, but it is not without hazards of its own. During this phase, destructive molecules called free radicals can be generated, which have the potential for damaging the liver. It is important therefore, to ensure that the liver has an adequate supply of substances called antioxidants. Antioxidants quench free radicals, and can therefore protect the body from their damaging effects. More about these antioxidants later.

It is also important to bear in mind that efficient Phase 1 detoxification depends to a degree on the supply of certain nutrients. If these nutrients are not present in adequate amounts, then there is a very real risk that Phase 1 detoxification will stall, eventually leading to toxic build-up in the body. The natural substances which participate in liver detoxification will be covered at the end of this chapter.

Once toxins have been through the chemical processes of Phase 1 detoxification, it's time for them to pass on to the Phase 2 reactions. Many of the end-products of Phase 1 detoxification are married with one of four carrier molecules, in a process known as 'conjugation'. The products of these reactions can then be eliminated from the body. Some of these pass out in the urine, while others get dumped into bile, which eventually makes its way out of the body in the stool. As with the Phase 1 pathways, Phase 2 detoxification is also dependent on the supply of certain natural substances (see below).

If for any reason either Phase 1 or Phase 2 detoxification is faulty, then problems with toxicity may arise. Sometimes, liver function is generally good, but it just gets overwhelmed by the sheer weight of the toxic load on it. Later in the chapter, we shall be exploring ways of supporting liver function and reducing the quantity of toxins which the body is exposed to.

Is toxicity your problem?

The following questionnaire is designed to help you assess if toxicity is a problem in you. Score each question as indicated, and then add up your total score.

Do you suffer from:

1. Bad breath

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

2. Abdominal bloating

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

3. Constipation

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

4. Fatigue

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

5. Intolerance to rich / fatty food

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

6. Food sensitivities

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

7. Sensitivities to perfumes, paint fumes, traffic fumes or detergents

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

8. Headaches

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

9. Acne or spots

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

10. Do you suffer from cellulite?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

11. Do you suffer from gallstones or episodes of gallbladder inflammation?

No – no points

Yes – 4 points

12. Have you ever suffered from hepatitis?

No – no points

Yes – 4 points

13. Are you frequently exposed to industrial or agricultural chemicals such as solvents, paint fumes, plant sprays and fertilisers?

No – 0 points

Yes – 4 points

13. How many caffeinated drinks will you have in a day?

None – 0 points

1-3 – 3 points

4 or more - 6 points

16. How many units of alcohol do you consume each day on average?

0–1 – 0 points

2–3 – 3 points

4 or more – 6 points

Interpreting your score

0 – 9: body toxicity is very unlikely

10 – 19: body toxicity should be considered as a possibility

20 – 29: body toxicity is quite likely, and steps taken to reduce this may well be beneficial

30 and above: body toxicity very likely, and steps taken to reduce this will almost certainly be beneficial

Optimising the body's detoxification processes

While liver function may be somewhat sluggish from time to time, the good news is that it has enormous capacity for regeneration. Cut two thirds of the liver away, and it will re-grow in the matter of a few months. The liver has enormous potential for self-healing, just as long as it's given the opportunity.

The cornerstone of a liver-friendly programme is a healthy diet. Certain foods demand more work from the liver than others. While fruits, vegetables, beans, pulses and grains tend not to tax the liver, foods such as meat and dairy products do. The more the diet is based on foods which support liver function, rather than stress it, the more likely it is that the system will be clear and toxin free. The essentials of a liver-supporting diet are:

1. The diet should contain an abundance of fresh fruits and vegetables. Not only do these foods tend not to tax and stress the liver, they also contain an abundance of nutrients such as vitamin C and carotenoids (e.g. beta-carotene) which can support liver function. Try and include as many organic foods in your diet as possible.

2. Foods which contain artificial additives such as sweeteners, colourings, flavourings and preservatives should be minimised in the diet.

3. Just about everyone will be aware of alcohol's ability to stress the liver. For this reason, alcohol should be moderated, and preferably eliminated during the initial phase of any detoxification regime.

4. Caffeine should also be moderated in the diet, as it too stresses the liver.

5. Plenty of fluid helps detoxification. About 1 ½ litres of fluid each day is right for most people. Most of this should come in the form of still, filtered or mineral water. Other acceptable beverages include herb and fruit teas and diluted freshly squeezed fruit and vegetables juices.

Constipation and liver toxicity

One of the main functions of the large bowel is to eliminate waste material from the gut. Sometimes, bowel function is sluggish, leading to a problem with constipation. There is no universally accepted definition of this term, but generally it is taken to mean either infrequent bowel motions, difficulty in passing stools or incomplete passage of stools. Either way, constipation is not good for us. In the long term it may lead to problems such as diverticular disease (the development of small out-pocketings in the lining of the large bowel) and haemorrhoids (piles). However, as an everyday problem, constipation increases the likelihood that that toxins in the waste

material within the large bowel is reabsorbed into the system, giving the liver more work to do.

Overcoming any degree of constipation is therefore important if the liver is to be kept as toxin free as possible. The major underlying factors in constipation are:

1. Lack of fibre in the diet

Fibre in the diet is essential to give the bowel wall something to grip on to. A diet low in fibre and high in refined foods will almost certainly hamper the passage of waste material along the colon.

2. Lack of fluid

Just as important as fibre in healthy bowel function is fluid. If fluid intake into the body is low, the body will absorb as much of the water from the colon as possible. This can cause the faeces to become very dry, causing it to stick in the gut.

3. Lack of exercise

Exercise can help stimulate the movement of matter along the large intestine probably due to the mechanical action of the abdominal muscles and the diaphragm pushing against the bowel during exercise. A lack of exercise can therefore be a factor in constipation.

4. Pregnancy

Constipation is a common side-effect of pregnancy. This can be explained at least in part by the presence of an enlarged womb pressing against the lower end of the large bowel.

5. Thyroid disease

The thyroid is a gland in the neck that governs the body's metabolism. Should the thyroid become under-active all of the body's major systems slow down, including large bowel function. A common symptom of an under-active thyroid is therefore constipation. For more details about thyroid disease, read chapter 4, Keep up the Heat.

6. A Tumour in the colon

A tumour of the large bowel can cause constipation. Often, the constipation will alternate with diarrhoea. Sometimes there may be blood in the bowel motion. Anyone over the age of 40 who has had a persistent change in bowel habit should have this investigated by his or her doctor.

7. Drug therapy

Certain medications can cause constipation as a side effect. These include antacids, painkillers based on codeine and iron.

Combating constipation

Bowel regularity is very important for health. Many individuals use laxatives based on substances such as sennakot to ensure regular bowel movements. While these may temporarily relieve a constipation problem, many people find that they can become reliant on laxatives for their bowel function. Part of this is because laxatives may stimulate the gut abnormally, causing the gut to lose its ability to function normally. Also, laxatives often contain agents that irritate the lining of the gut, which is not good for general digestive health. As much as possible, any problem with constipation should be relieved naturally and the use of laxatives, especially in the long term, should be avoided.

1. Increase your intake of fibre

One essential ingredient for healthy bowel function is fibre. High-fibre breakfast cereals based on wheat bran are often advised for people suffering from constipation. However, the fibre in these cereals is quite

hard and scratchy and may actually irritate the delicate lining of the gut. The fibre found in oats, fresh fruits and vegetables, beans, lentils, nuts and seeds is generally much kinder to the gut and you should increase your consumption of these foods. Aim at eating at least five servings of fruit or vegetables a day.

2. Use natural bulking agents

An effective and convenient way to increase your fibre intake is to add a natural bulking agent to your diet. These can really help to improve bowel regularity. Take 1 - 2 dessert spoonfuls of either psyllium husks or linseeds with water each day. These can be sprinkled over cereals, soups or salads.

3. Drink more water

Apart from fibre, the other essential ingredient for bowel regularity is fluid. However, some alcohol and drinks that contain alcohol can dehydrate the body and therefore worsen constipation. The best form of fluid for bowel health is water. Drink at least 1 ½ - 2 litres of still water each day.

4. Take exercise

Exercise can help relieve constipation. Aim to take 30 minutes worth of aerobic exercise (e.g. brisk walking, light jogging, cycling, rowing, aerobics, aqua-aerobics) at least 3 or 4 times a week at least.

5. Always respond to the call of nature

In the long term, failing to respond to urge to open your bowels may cause a suppression of processes essential for defecation to take place.

Other detoxifying methods

A word of caution

During the initial stages of any detoxifying regime, it is not uncommon for individuals to feel worse, rather than better. The theory is that once the body has the opportunity, it may throw off toxins which might have been building up for a long time. Such a large outpouring of toxins from the body's cells can be too much for the liver, and the spill over may give rise to symptoms such as headache, lethargy, achiness and mild flu-like symptoms. Detoxification reactions of this nature normally only last a few days, but if the system is very toxic or if the liver function is very compromised, symptoms may persist for two weeks or more. To help minimise the adverse effects of a fast or cleansing regime, it is important to ensure that plenty of fluids are taken (these help flush toxins out through the urine) and liver supporting nutrient are taken. These nutrients are covered in the section on supplements at the end of this chapter.

Saunas and steam baths

One way the body can eliminate toxins is through the sweat. This is certainly not the main way that the body rids itself of toxins, but it's not insignificant. Because saunas and steam baths encourage sweating, they can be a useful adjunct to any detoxification programme. 20 – 30 minutes of cooking, two or three times a week can help keep the system clean.

Skin brushing

Toxins in the body tend to accumulate in the fat cells and in the lymphatic system. The lymphatic system is made up of a network of vessels, along which are stationed collections of immune cells called lymph nodes. The lymphatic vessels take tissue debris and many of the end products of cell metabolism and shunt these to the lymph nodes where immune cells may process and deactivate them before they are dumped into the body's

circulation. In this way, the lymphatic system functions as a sort of sewage disposal system.

It is thought that lymph fluid can become somewhat sluggish, causing toxins to accumulate. Incidentally, accumulation of toxins in the lymph system and fat cells at the back of the thighs is probably a major factor in the development of cellulite. Skin brushing can be used to help shift lymph fluid and the toxins contained within it, and can be a useful technique in combating cellulite and promoting detoxification.

Skin brushes made of natural fibre can usually be found for sale in health food stores. Ideally, skin brushing should be performed on dry skin, for about five minutes, twice a day. The brush should be used quite vigorously on the legs and arms, and the direction of brushing should always be towards the heart (see diagram). If cellulite is a problem, particular attention should be given to the back of the legs.

Lymphatic massage

Another way lymph fluid can be coaxed into a more fluid state is through massage. Aromatherapy, sports, and beauty-based massages are unlikely to do the trick here. What is needed is a practitioner who has been trained in what is known as manual lymphatic drainage (MLD). For details about how to go about finding an MLD practitioner, see the section entitled Useful Information at the back of the book.

Colonic Irrigation

Colonic irrigationists generally believe that the large bowel can harbour undigested food matter and other nasties accumulated over many years, and that these may compromise health by fouling up the system. Clearing out this debris using warm water and maybe natural agents is claimed to help reduce toxicity in the body and improve health. This form of natural therapy does tends to polarise people somewhat. Some hate it,

and find the whole idea utterly repulsive. Others love it, and claim it can be a great way to clear out old toxins and rejuvenate the body. I have seen many individuals do well through colonic irrigation, particularly those who have large bowel related symptoms such as chronic constipation, flatulence, erratic bowel habit or haemorrhoids (piles).

Supporting the liver with supplements

The world of natural medicine throws up a wide range of agents which may help support liver function and the process of detoxification. Some of the more important nutrients include:

Milk thistle – milk thistle is a herb the use of which as a natural remedy can be traced back more than 2000 years. The herb contains a complex of bioflavonoid molecules known collectively as silymarin. Silymarin appears to have the ability to protect the liver cells by reducing the take-up and enhancing the removal of harmful toxins (1, 2). Silymarin also has powerful antioxidant activity (3) and can help in the regeneration of injured liver cells (4).

Inositol – this nutrient which is generally classified as part of the B vitamin complex helps in the breakdown and utilisation of fat and cholesterol, and can help to reduce fatty build-up in the liver.

Choline – similar in action to inositol, this nutrient helps reduce fatty build-up in the liver, and also helps the liver detoxify the by-products of protein metabolism.

Biotin – generally regarded as one of the B complex vitamins, biotin participates in fat metabolism and can therefore help in the processing of fat in the liver.

Methionine – this amino acid is essential to good liver function and also helps the liver detoxify the by-products of protein metabolism.

Taurine – is another important amino acid for the liver, which can help reduce fatty build-up here.

Lipase – lipase is a fat digesting enzyme. Lipase helps reduce the fatty load on the liver and may help to keep the liver cells free from fat.

Alpha lipoic acid – this nutrient is itself a powerful antioxidant which has the power to protect the liver from free radical damage. It also participates in the recycling and regeneration of other liver protective antioxidants.

Green tea extract – Green tea is a rich source of substances called polyphenols which have potent antioxidant activity. Like alpha lipoic acid, it can also participate in maintaining the activity of other liver protective substances.

Summary

- Toxicity is an important cause of weight gain and other health issues
- Toxins can come from the outside (e.g. pollutants, food toxins) or the inside (e.g. by products of metabolism)
- The function of the liver is key to the elimination of potentially toxic substances
- The liver neutralises toxins with a two stage process

- A liver supporting diet is one which includes easily digested food such as fruit, vegetables and grains, and is low in liver taxing foods such processed foods, alcohol and caffeine

- Toxicity can be related to other factors such as food sensitivity, Candida overgrowth, leakiness in the gut wall and constipation

- Sauna, steam baths, skin brushing, lymph drainage massage and colonic irrigation may also help the detoxification process

- Certain nutrients and herbs including milk thistle, choline, inositol, green tea extract and alpha lipoic acid can be very effective in improving liver function and reducing toxicity in the long term

- For some individuals, detoxification can lead to significant weight loss and health rejuvenation

Food sensitivity and liver toxicity

There is a theory that before food is absorbed into the blood stream from the gut, it is first broken down into its smallest molecular constituents. However, this does not necessarily seem to be the case. It appears as though undigested food molecules can indeed make their way through the gut wall, and can then go on to give rise to adverse reactions in the body such as fluid retention, fatigue, eczema and arthritis. These reactions are often referred to as food intolerance.

Once food leaves the digestive tract, the first place it goes to is the liver. The liver is not really designed to cope with partially digested food, these larger than normal molecules can really pose enormous problems for it. If you suspect liver toxicity, then you need to give at least a passing thought to food sensitivity as a potential underlying factor in this.

In general terms, the concept of food sensitivity has not gained wide acceptance by the conventional medical establishment. Most doctors and dieticians believe that food reactions are rare and only affect a small proportion of the population. However, in recent years there has been growing interest and research into a type of food reaction which cannot be identified by conventional testing, but which is nonetheless common and quite often a factor in variety of medical conditions such as irritable bowel syndrome, migraine headaches, Crohn's disease, eczema, rheumatoid arthritis, infantile colic and childhood ear infections. For many individuals, identifying the foods to which they are sensitive is a critical step in bringing about vibrant health.

Understanding food reactions

To understand how food reactions come about, we need to first understand the concepts of food digestion and absorption.

Digestion

Digestion takes place in the digestive tract, that begins at the mouth and runs to the anus at the other end. The parts of the digestive tract which are actively involved in the process of digestion are the mouth, stomach and small intestine.

The mouth

Digestion of food starts in the mouth. The very act of chewing stimulates the secretion of digestive juices lower down in the gut. Chewing also mixes food with an enzyme which starts the digestion of starchy foods such as bread, potatoes, rice and pasta. By breaking food up, chewing also increases the surface area available for contact with the digestive juices, allowing them to penetrate the food and do their digestive work.

The Stomach

The stomach secretes acid which starts the digestion of protein based foods such as meat, fish and dairy products.

The Small Intestine

Once food leaves the stomach, it passes into the small intestine. Here it is subjected to the action of digestive enzymes that continue the digestive process. Some of these are found in the wall of the gut itself, while some of these are secreted by a gland called the pancreas. Bile, secreted by the gallbladder, also works on the food and helps with the digestion of fat.

The purpose of digestion is to break food up into pieces small enough to be absorbed through the gut wall into the blood stream. The main constituents in the diet that need to be broken down in this way are fats, starches and proteins. Fat are themselves made up of chains of smaller molecules known as fatty acids. Starches are actually composed of chains of sugar molecules, while proteins are comprised of molecules called amino acids.

The lining of the small intestine is composed of finger-like structures called villi. Each villus is covered in much smaller structures called microvilli. The presence of villi and microvilli increase the surface area of the gut available for absorption. The total surface area of the small intestine is about the size of a tennis court.

Digestion and its role in food sensitivity

Conventional medical wisdom dictates that before food is absorbed through the gut wall into the bloodstream, it is first broken down into its smallest molecular constituents. In other words, fats are broken down into fatty acids, starches are broken down into individual sugar molecules, and proteins are broken down into amino acids. If this were the case,

then the reality is there would be very limited potential for foods to cause adverse reactions in the body. The basic molecular constituents of food are simply too small to be seen as foreign by the body.

A new way of looking at food sensitivity

In recent years, however, this conventional view of digestion and food sensitivity has been challenged. There is emerging evidence to suggest that it is possible for food to pass into the bloodstream in a partially digested form. When this happens, there is enormous potential for unwanted reactions to food in the body.

Adverse food reactions can occur when partially digested food is absorbed into the bloodstream and comes into contact with the immune system. The immune system is made up of various types of white blood cells. The function of these cells is to protect the body from anything which may be perceived as foreign and therefore a threat to the body. The immune cells are constant in 'search and destroy' mode, continually on the lookout for harmful organisms such as bacteria and viruses.

However, undigested or partially digested food may also trigger the immune defences, and this may lead to a wide variety of conditions. The immune reactions caused by food can occur anywhere, which opens up a host of possibilities for any manner of conditions or symptoms. Conditions believed to have no specific underlying cause such as irritable bowel syndrome and eczema are in fact often due to the body's reactions to food. In Britain, these unwanted food reactions are often termed 'food intolerance'. In the USA, the more commonly used term is 'food allergy'. To avoid confusion, the rest of the chapter will refer to these adverse food reactions as 'food sensitivity'.

The Immune System and Food Sensitivity

The white cells of the immune system contain a sub-class of cells known as the lymphocytes. A particular type of lymphocyte, termed the B-lymphocyte, is responsible for making substances called antibodies (also known as immunoglobulins). The antibodies produced by the B-lymphocytes help the body neutralise or destroy invading organisms. Antibodies come in five different forms, two of which IgE and IgM (the prefix Ig stands for 'immunoglobulin') concern us with regard to food sensitivity.

IgE sensitivity

IgE can bind to immune cells called mast cells, triggering the release of a substance called histamine. Histamine is the substance which causes the sneezing and runny eyes characteristic of hay fever. In hay fever, the IgE production and histamine release is a response to pollen, but sometimes, these reactions can be triggered by food. If an individual eats a strawberry and quickly develops a red rash, this is almost definitely an IgE reaction. Some childhood food sensitivities are IgE related. This sort of food reaction is well accepted by the conventional medical establishment, but plays little if any role in the more subtle sorts of food sensitivity issues discussed there.

IgG sensitivity

The sort of reactions which may contribute to weight gain can often be related to the production of IgG. If blood samples are drawn from food sensitive individuals, it is often possible to detect IgG antibodies to specific foods. There is a theory that the IgG antibodies produced in response to certain foods can also cause the immune response to spill over into the body's own tissues, and it is this process which is often at the root of many health conditions.

IgG food reactions tend to come on much more slowly than IgE reactions. While IgE reactions are pretty much immediate, IgG reactions can take two or more days to show themselves. Also, while the symptoms of IgE sensitivity tend to be quite obvious (e.g. vomiting, rash), those related to IgG tend to be more subtle.

Is food intolerance your problem?

The following questionnaire is designed to help you ascertain whether food sensitivity is a problem in you. Score each question as indicated, and then add up your total score.

1. Do you feel lethargic soon after eating?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

2. Do you often feel better if you don't eat?

No – 0 points

Marginally better – 2 points

Much better – 4 points

3. Did you have problems such as colic, glue ear, ear infections, eczema, asthma or recurrent tonsillitis as a child?

No – 0 points

Yes, occasional problems – 3 points

Yes, frequent and/or severe problems – 5 points

4. Do you have recurrent, unexplained symptoms?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

5. Do you suffer from excess mucus or catarrh formation in the throat, nose or sinuses?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

6. Do you feel particularly drawn to certain foods such as bread or cheese?

No – 0 points

Occasionally – 2 points

Frequently – 4 points

7. Do you have dark circles under your eyes?

No – 0 points

Yes – 2 points

Frequent or severe problems – 4 points

8. Do you suffer from fluid retention? (tight rings, puffy face or ankles and a weight which fluctuates by a two or more pounds from day to day are classic signs)

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

9. Do you suffer from irritable bowel syndrome?

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

10. Do you suffer from eczema, hives (urticaria) or undiagnosed rash?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

Interpreting your score

0 – 9: food sensitivity is unlikely

10 – 25: food sensitivity should be considered as a possibility and testing (see below) is recommended

26 and above: food sensitivity is very likely, and testing is highly recommended

What causes food intolerance?

Many food intolerances start very early in life. There is even some evidence that children can become sensitised to food while they are still in the womb. Forceful kicking or hiccoughing of the foetus suggest food sensitisation in the womb. One born, foods can be introduced into a child's diet when the intestinal tract and immune system are relatively immature. As a result, the child is unable to deal appropriately with that food, causing him or her to become sensitive to it. For example, infants who are bottle fed often become sensitive to cow's milk formula feeds. This can manifest in a number of ways but colic and eczema are common signs.

There is a theory that food intolerances are becoming more common because we are eating more and more foods that are relatively recent additions to our diet. It may be that we just have not had long enough to adjust to these new foods. For example, although we have cultivated and eaten wheat for many thousands of years, the form of wheat we eat now is quite different from the form of wheat we evolved on. Milk is another example. Although we have drunk milk for quite some time during our evolution, for many populations it was predominantly goat's and sheep's milk, not cow's milk that they became accustomed to drinking.

Poor digestion and food sensitivity

It is very possible that inadequate digestion of food is a feature in food sensitivity. The less well food is digested, the more likely it is to leak into the blood stream in a partially digested form. Poor digestion may be related to a range of factors including inadequate chewing, lack of stomach acid or insufficient pancreatic digestive enzymes. These factors are discussed in depth in the section on digestion.

Leakiness in the gut and food sensitivity

The lining of the gut wall performs many functions, one of which is to ensure that food is not absorbed until it has been properly digested. However, in certain circumstances, the gut wall may become 'leaky', allowing larger molecules than is desirable into the blood stream. Gut leakiness is discussed in more detail later on in this chapter.

Testing for food sensitivity

If you suspect that you might have a problem with food intolerance, then there are number of methods that can be used to ascertain which foods are the problem. These include:

Scratch testing and IgE blood testing

The scratch test, also known as the prick test or patch test, involves breaching the outer layer of the skin, and introducing a tiny amount of the food or other substance (e.g. animal hair, pollen) to be tested. Redness and swelling at the site of the test indicates a sensitivity to whatever is being tested. Blood tests also exist which detect IgE

antibodies to specific foods. Because IgE reactions almost certainly have no bearing on weight, these tests have no relevance here.

The Cytotoxic test

This test is performed by mixing immune cells with individuals food extracts and then ascertaining which foods caused reactions in the immune cells. This test is usually interpreted by a technician who uses a microscope to assess whether the immune cells have reacted and to what degree. In this sense, the test may be affected by human error, though an experienced technician is likely to give an accurate interpretation.

The ALCAT test

ALCAT stands for the antigen leucocyte cellular antibody test. It is quite similar to the cytotoxic test, except that the white cells' reactions to foodstuffs is measured by a sophisticated piece of laboratory equipment rather than a technician. It is possible that ALCAT is more accurate than cytotoxic testing, but this has not been proven and ALCAT is usually more expensive.

IgG testing

It is possible to detect IgG antibodies to specific foods using sophisticated biochemical techniques. There are two basic techniques used, RAST (radioallergosorbent test) and ELISA (enzyme-linked immunoserological assay). These tests are thought to be quite reliable indicators of food sensitivity. It is believed that ELISA is more sensitive than RAST, and is cheaper too.

Electro-dermal testing

Practitioners of Chinese medicine believe that energy flows down tracts known as meridians in the body. In the 1950s a German doctor by the name of Reinholdt Voll discovered that you could derive much information about the health status of the body by measuring the electrical current flowing through the acupuncture points. Electro-dermal testing involves measuring the electrical current that flows through an acupuncture point, and then detecting any changes in this as the body is challenged with individual foods. In this form of testing, foods are often tested by having extracts of those foods put in the same circuit as the subject being tested. If adding the food changes the electrical current flow through the acupuncture point, then this suggests that there is a problem with the food. Some more sophisticated devices have foods stored on a computer in the form of the electromagnetic 'fingerprint' of that food.

In skilled hands, this method seems to give good results which are instantaneous. Electro-dermal testing is relatively cheap compared to the blood tests that are available for diagnosing food sensitivity. Because it is economical and instantaneous, I have to say I like this form of testing, but I think it helps to find a practitioner who has had plenty of testing experience.

Applied Kinesiology

This is similar to electro-dermal testing except that the practitioner measures muscle strength in response to foods rather than the electrical current flowing through the body. Typically, muscle strength is first ascertained by the practitioner pressing down on the subject's outstretched arm. This is repeated while challenging the subject with foods either by having them hold them close to their body or by putting samples of food under the tongue. Like electro-dermal testing the results are thought to be relatively accurate in skilled hands and the results are instantaneous. Again, testing tends to be inexpensive compared to blood tests for food intolerance.

The elimination diet

The elimination diet is regarded by many practitioners of nutritional medicine as the most accurate way of testing for food sensitivity. The concept is simple: all likely problem foods are removed from the diet for a period of time. Once the symptoms or condition being treated alleviate, foods are added back into the diet, one at a time, and a note is made of which foods cause a recurrence of the symptoms.

Knowing which foods to eliminate from the diet is an art in itself. To help you, here is some guidance:

Eliminate all sources of wheat (a very common problem food) from the diet. This includes most breads, pasta, pastry, pizza, biscuits, cakes, wheat-based breakfast cereals, wheat crackers, breaded food, battered food and anything containing flour.

Eliminate milk, cheese and yoghurt from the diet (very common problems, especially milk and cheese).

Eliminate foods and drinks which you consume repeatedly, say on four or more days each week (the more of a food you eat, the more likely it is to be a problem).

Eliminate the foods and drinks which you crave and think you might not be able to do without. These foods may have a stimulant or pick-me-up effect in you too.

Eliminate the foods and drinks which you suspect make you feel bad.

All these foods should be eliminated for two weeks.

Taking a food out of the diet is one thing, finding something to replace it with is another. The following table includes a list of the most common food sensitivities, and some viable alternatives.

Problem foodstuff	**Alternative**
Wheat-based bread	100% Rye bread Rye crackers Rye pumpernickel bread Rice cakes Oat cakes
Wheat-based breakfast cereals	Oat muesli Porridge (oatmeal) Cornflakes Puffed rice Multi-grain cereals based on non-wheat grains such as amaranth, millet and rice.
Egg noodles	Rice noodles
Gluten-containing food (wheat, oats, rye and barley)	Rice cakes Rice Rice noodles Potato Polenta (corn meal)
Cow's milk	Sheep's milk Goat's milk Soya milk Rice milk
Cow's cheese	Goat's cheese Sheep's cheese (e.g. feta)
Cow's yoghurt	Sheep's yoghurt Goat's yoghurt Soya yoghurt
Coffee and tea	Herb and fruit teas Dandelion coffee Chicory/barley based coffee substitutes

Generally speaking, the sort of meals which most food intolerant individuals settle on are based on the following theme;

Meat, fish, eggs (e.g. omelette or hard-boiled eggs) or tofu

Vegetables
Rice or potato

For example:
Roast chicken with steamed broccoli and carrots and roast potatoes
Tuna salad with new potatoes
Grilled salmon with salad and rice
Omelette and salad
Tofu casserole with rice and salad

If you do indeed suffer from food sensitivity, you may well be feeling much better after a week or two on this regime. Many individuals whose excess weight is linked with food sensitivity find that they experience a sudden and dramatic fall in weight. It is not uncommon for individuals to lose 10 or more pounds in just a couple of weeks. Other commonly experienced improvements include increased energy, enhanced mental clarity and less problematic digestive function.

It is worth noting that in the initial phase of an elimination diet, it is not uncommon for sensitive individuals to experience withdrawal reactions. A gnawing hunger, nasal stuffiness, inability to concentrate, fatigue, insomnia and nervousness are not uncommon symptoms of this. These reactions normally last for a few days, and very rarely longer than a week. The symptoms can be lessened by taking 1 gram of vitamin C every couple of hours or so.

Re-testing foods
If you are feeling better after a couple of weeks on the elimination diet, it's time to start testing foods. Take one of the foods you have eliminated, and have a substantial portion of it one morning. A glass of milk at breakfast is an example. Over the next few hours, you will need to look out for any symptoms which suggest food sensitivity. These include headache, itching,

depression, fatigue, irritability and foggy thinking. If you get any reaction, make a note that the provoking food is one of your sensitivities, and eliminate it again from your diet. If you have no reaction to your first exposure to the food, try it again at lunch and dinner. If by the following morning you are totally free from symptoms, add it provisionally to your safe list of foods.

For the next three days, re-eliminate the food and keep a watchful eye out for any symptoms that suggest a food reaction. It is possible that the symptoms of a reaction can come on two or three days after a food or drink is consumed. If such a reaction occurs, then you should suspect this food. If you still feel well after the three day break, you can be pretty sure the foodstuff you are testing is fine for you.

In this way, proceed through the major foods you have eliminated, making a note of safe and unsafe foods as you go.

What if the elimination diet outlined above didn't help?
If the elimination diet outlined above doesn't help your situation, then there are two main possible explanations:

1. The foods to which you are sensitive were not eliminated from the diet.

2. That you don't have a food sensitivity problem.

To find out which of these is the case, it might be worthwhile eliminating more foods than the ones outlined above. A useful diet which you can employ is what is known as the Stone Age or Caveman diet.

The Stone Age diet

In this diet, all foods which were introduced after the advent of farming and animal domestication practices are eliminated from the diet. This means no grains (wheat, oats, rye, barley, rice and corn), dairy products (butter, milk, cheese, yoghurt), refined sugar, alcohol, food additives including sweeteners and margarine. Eggs are often permitted on such a diet, but I prefer to eliminate them because in practice they are quite often a problem. Permitted foods include meat, fowl, fish, root vegetables and other vegetables, fruit, nuts, seeds, filtered or mineral water, herb teas and sea salt. This diet is very limited, but usually unearths food sensitivities if they are there. It is normal for individuals to feel the benefit from this elimination diet after only five to 10 days.

Overcoming food sensitivities

The first step in over-coming food sensitivities is to avoid the problem foodstuff(s). The question is, how long for? In normal circumstances, it is wise for problem foods to be excluded from the diet for a month. Two months is better if you can manage it. There is no doubt that abstaining from a food for a period of time can make the body more tolerant to the food in the long term. Many individuals find that after, say, two months of wheat exclusion, they can go back to eating wheat without it having the adverse effects it had before. However, with regard to food reintroduction, there are few things that need to be borne in mind:

1. For some time after a food is excluded from the diet, the body's reaction to it is often worse than it was before

Even though exclusion of a food from the diet is ultimately likely to lead to greater tolerance to that food, it can take a month or two or longer for this to occur. In fact, for some time after the point of exclusion, it is common for an adverse reaction to a foodstuff to be worse than it was before. For example, while wheat may have caused problem with abdominal bloating and wind before, reintroducing it again just a couple of weeks after it had

been excluded may provoke bloating, wind, diarrhoea and abdominal discomfort. Experiencing a reaction of this nature might be quite alarming, but can also help to reinforce the idea that the food is not the best thing for you in the long term.

2. When a food is reintroduced, it is best not to eat too much of it, too frequently

It is usually possible to reintroduce a problem food back into the diet, and not have problems with it. However, if that food is eaten in relatively large quantities and/or is eaten quite frequently, then this increases the risk of the original problems recurring. For instance, if you find that you have an intolerance to wheat, exclude it for a couple of months, and then go back to your toast for breakfast, sandwich for lunch and pasta in the evening regime, then you will almost certainly experience a recurrence of your original problems. However, let's say you confine yourself to the occasional sandwich or bowl of pasta, then your chances of further problems are much lower. In fact, a good idea when reintroducing problem foods is to eat them in rotation. What this means is that only eating the food once every few days, often three or four days. So, toast for breakfast on Sunday followed by a pasta supper on Wednesday but no other wheat in between is unlikely to re-ignite the original weight or health problems which led to you excluding wheat in the first place.

As a general piece of advice about putting foods back into the diet I say, avoid it when you can and don't worry when you can't. In other words, avoid buying the foodstuffs which have been found to be a problem, and opt for something else if choosing from a menu. However, if you're at some friends for dinner and pasta's what is being served, have it, and for goodness sake don't let the fact that you're eating wheat ruin the meal.

3. In the long term, food sensitivities can be reduced by improving digestion and healing the lining of the gut

Earlier in this chapter, we have discussed how poor digestion and leakiness in the intestinal wall can underlie a food sensitivity problem. Discerning whether or not these factors are a problem, and combating them if they are, can really help to reduce the likelihood of old sensitivities returning or new ones developing.

Improving digestion in the stomach

A healthy stomach contains acid for the digestion of protein-based foods such as meat, fish and eggs. One of the most common symptoms associated with some dysfunction in the stomach is indigestion. Traditionally, indigestion is often thought to be related to the overproduction of acid in the stomach. This is why the conventional medical drugs prescribed for indigestion are essentially geared to reducing stomach acidity. However, for many individuals their problems with indigestion stem from too *little* acid, not too much. A low level of acid in the stomach stalls the digestion of food, causing it to ferment. If you tend to suffer from bloating, belching or burning immediately after meals, or feel that food tends to get stuck in the upper abdomen, or that you only need to eat a small quantity to feel full, suspect low stomach acid.

Stomach acid isn't just important for the digestion of food, but also plays a critical role in the absorption of certain nutrients including minerals such as iron and vitamins such as B12 and folic acid. All of these nutrients are essential for healthy red blood cell formation. As a result, long standing low acid secretion can lead to a problem with anaemia. If you tend to be anaemic, and find that supplementation with iron or other nutrients is not really helping, you need to consider the possibility of low stomach acid.

Apart from indigestion, other symptoms which suggest low acid secretion include weak nails and/or poor hair quality. Nails which are brittle or tend to flake and peel is quite a common symptoms in women with low stomach

acid. Men, even though their stomach acid secretion is low, tend not to suffer from weak nails. Another common symptom in women is hair that is thin, brittle and tends not to grow well. Interestingly, weak nails and poor hair quality tend not to coincide in an individual. It's usually one symptom or the other, and rarely both.

Low stomach acidity has also been associated with other illnesses, particularly those in which the body's immune system has turned against its own tissues (auto-immune diseases). Some of the conditions which have been associated with low stomach acid and the presence of which may point to this problem include thyroid disease, eczema, gallbladder symptoms, osteoporosis, rheumatoid arthritis, chronic urticaria (hives), systemic lupus erythematosus (SLE, lupus), vitiligo (depigmentation of the skin) and rosacea (a facial skin disorder).

Conventional medical tests for stomach acidity

Probably the most accurate test for stomach acidity uses something called radiotelemetry. Here, the subject swallows a capsule on a thin piece of string. The capsule, known as a Heidelberg capsule, contains a pH sensitive electrode. Once in the stomach, the capsule transmits a reading of the stomach acidity which can then be detected by a sensing device held over the stomach on the skin surface. This test is good and relatively inexpensive. However, this test is not considered to be part of mainstream medicine, and your doctor is unlikely to have heard of it. For details about relevant testing facilities, see the section entitled Useful Information at the back of the book.

A simple home test for low stomach acid

While the test described above can be a very good way to diagnose a low acid problem, a simple home test can help to identify this condition. Take a

level teaspoon of bicarbonate of soda and dissolve in some water. Drink this mixture on an empty stomach. If sufficient quantities of acid are present in the stomach, bicarbonate of soda is converted into gas, producing significant bloating and belching within 5 or 10 minutes of drinking the mix. Little or no belching is suspicious for low stomach acid.

Problems with digestive enzymes

Another potential cause of poor digestion and food sensitivity is a lack of the digestive enzymes normally present in the small intestine. Some of these enzymes are naturally present in the lining of the digestive tract, but most are secreted by the pancreas and enter the small intestine via a small tube known as the pancreatic duct. Low levels of digestive enzymes can also provoke feelings of fullness after meals, and also symptoms such as indigestion, bloating, belching and wind. However, whereas individuals with low stomach acidity tend to get their symptoms immediately after meals, individuals with an enzyme problem will only normally start to get symptoms 1 – 3 hours after the meal.

Natural methods for improving digestion

Certain supplements can be used to improve digestion, and we will cover these at the end of the chapter. However, there's an enormous amount that can be done to rev-up the digestion before you reach for the supplement bottle.

1. Chew your food thoroughly

Proper chewing is essential for proper digestion. As mentioned earlier in this chapter, chewing stimulates the secretion of acid and digestive enzymes. Chewing also mixes food with saliva which contains an enzyme which itself starts the digestion of starchy foods such as bread, potatoes, rice and pasta. And perhaps most importantly of all, chewing breaks food

up, massively increasing the surface area available for contact with the digestive juices. This increases the efficiency of digestion by giving digestive enzymes the opportunity to penetrate the food and do the digestive work. Each mouthful should be chewed to a cream before swallowing.

2. Avoid big meals

The larger the meal, the larger the load on the digestive system. Small, frequent meals ease the burden on the digestive system and reduce the risk of indigestion.

3. Avoid drinking with meals

Some people tend to drink quite a lot of fluid with meals and believe that this can only help to 'wash food down'. The reality is quite the reverse. Drinking with meals dilutes the acid and enzymes which do the digestive work, and does nothing to help the process of digestion. In the main part, drinking should be done between meals, not at meal time.

4. Consider food combining

Foods are made up of several chemical constituents including proteins, starches, fats, vitamins, minerals, fibre and water. The common proteins in the diet can be found in animal products such as meat, fish, dairy products and eggs. The common starches in the diet are bread, rice, pasta, cereals and potatoes. Proteins and starches are very different chemically, and are digested by different enzymes in the gut. In addition, proteins are initially digested in acid, while starches are digested in alkali (quite the opposite). Some individual's digestive systems are unable to cope with protein/starch combinations, and this can lead to impaired digestion.

The principle of food combining theory is to avoid mixing protein and starch at the same meal. This means eating either protein or starch, and combining it with a food which is classified as 'neutral' (neither protein nor

starch). Eating to this pattern can bring tremendous relief to sufferers of indigestion and increase the chances of complete and rapid food breakdown.

The following list includes all the common protein, starch and neutral foods.

1. Protein	2. Neutral	3. Starch
Meats: Beef Lamb Chicken Turkey Veal Venison Pork Bacon <u>Fish:</u> Mackerel herring trout salmon tuna cod plaice skate <u>Shellfish:</u> Prawns Cockles Mussels oysters crab lobster <u>Dairy products:</u> Cheese Eggs Milk yoghurt <u>Vegetable proteins:</u> soya beans soya bean curd (tofu)	All green and root vegetables apart from the potato: Asparagus Aubergines Broccoli Brussels sprouts Cabbage Carrots Cauliflower Celery Courgettes green beans leeks mushrooms onions parsnips spinach turnips <u>Salad vegetables:</u> Avocado Cucumber Tomatoes Lettuce spring onions red and green peppers radishes <u>Nuts and seeds</u> <u>Fats and oils:</u> Cream butter extra virgin olive oil other vegetable oils	Bread Potatoes Rice Pasta Cereal Foods made with flour: pastries & pies cakes biscuits Dried fruits: dates figs currants sultanas Other fruit: Bananas Mangoes <u>Sweeteners:</u> Sugar maple syrup honey

So, according to the principles of food combining, examples of healthy meals include:

Meat or fish with salad or vegetables other than the potato
Pasta with tomato-based sauce (no meat) and salad
Vegetable curry and rice
Meat stew with vegetables
Avocado salad sandwich

Leakiness in the gut wall and liver toxicity

It's only 3 mm thick, but the lining of the gut wall provides an incredibly important barrier between the contents of the gut and the rest of the body including the liver. Normally, only very small molecules can be admitted into the system through the gut wall. As far as the liver is concerned, the smaller the molecules it has to deal with, the better. Should the gut wall become somewhat leaky, then the liver may be exposed to toxins and food particles it is ill-equipped to deal with. Leakiness in the gut wall can actually be assessed with a laboratory test. In this test, the subject drinks a fluid containing molecules of a range of sizes. The urine is then collected and analysed for these molecules. If large molecules are found in the urine, this suggests leakiness in the gut.

Leaky gut tests (called tests for intestinal permeability in the trade) are available via specialist laboratories. For details about how to go about getting one of these tests, see the section entitled Useful Information at the back of the book. It is important to remember that leakiness in the gut is itself usually related to other factors such as food sensitivity and candida overgrowth (see below), and considering these factors is therefore important. It is often advisable to work with a practitioner who is skilled at

diagnosing gut and liver imbalance, and may therefore help you pinpoint the underlying nature of your symptoms.

Supplements for overcoming food sensitivity

Acid supplements

HCl and pepsin – supplements of HCl (hydrochloric acid) taken in capsule form can certainly assist in the digestive process in individuals who have low or no stomach acid. Part of the action of hydrochloric acid is to convert an inactive substance called pepsinogen, into an active enzyme called pepsin. The function of pepsin is to start the digestion of protein food molecules. Acid supplements are therefore best combined with pepsin for maximum potency. Acid supplements should be taken before meals.

Caution:

Acid supplements should not be used if there is a present or past history or peptic ulcers (stomach and duodenum) or stomach inflammation (gastritis) unless under the instruction of a nutritionally-oriented doctor.

Digestive enzymes – digestive enzyme supplements may help to make up for inadequate or sub-optimal digestion in the small intestine. A good digestive enzyme supplement will normally contain a range of enzymes, each of which is responsible for digesting a certain food type. Examples of such enzymes include:

Protease – for the digestion of protein
Bromelain – for the digestion of protein
Amylase – for the digestion of starch
Sucrase- for the digestion of sugar (sucrose)
Cellulase – for the digestion of cellulose in plant matter
Lactase – for the digestion of lactose (milk sugar)

Lipase – for the digestion of fat

Maltase – for the digestion of maltose (a form of sugar found in some grains and made naturally in the gut)

Contraindications:

Digestive enzymes should not be used if individuals suffering from gastritis (inflammation of the stomach lining) or stomach/ duodenal ulceration.

Gut healing nutrients – certain nutrients have an important role to play in healing the gut lining. Some of the important nutrients in this respect include:

Glutamine – an essential fuel for the cells which make up the lining of the small intestine, glutamine can help to promote healing in the gut.

N-acetyl glucosamine (NAG) – glucosamine is a nutrient which is known to help in the regeneration of body tissues. In its sulphate form it has been used traditionally to treat cartilage, ligament and tendon related problems (e.g. osteoarthritis). However, in its N-acetyl form it provides a sort of tissue cement to help bind gut cells together.

Gamma Oryzanol – actually an extract of rice bran, gamma oryzanol has anti-inflammatory and healing properties within the gut.

Vitamin E and Vitamins A – both of these nutrients play an important role in gut lining healing.

Yeast overgrowth and liver toxicity

Within in the gut reside large numbers of healthy bacteria which have a variety of roles in the body including assisting in digestion, keeping

unhealthy organisms at bay and ensuring that the lining of the gut remains healthy. The gut also contains the yeast organism candida albicans, and as long as there is not too much of this around, then it is unlikely to give us any problems. However, under certain circumstances candida can overgrow in the gut, and this can lead to number of symptoms including abdominal bloating, wind, fatigue, sweet or starch cravings and thrush (vaginal yeast infection). Candida is well known to produce a range of potential toxins which have the capacity to get into the system by breaching the gut wall.

And as if this was not enough, candida can also impair digestion and contribute to leakiness in the gut wall (see below). If you tend to feel that toxicity in your system is a problem and you suffer from some of the symptoms typical of candida overgrowth, then it may well help you take steps to combat yeast in the body.

The Internal Ecosystem

The main components of the gut are the mouth (where the digestion of starches starts), stomach (where the digestion of protein starts), small intestine (where fats, proteins and starches are digested and absorbed) and large intestine (where water is absorbed and from which waste matter is eliminated). The gut is by no means a sterile environment. Actually, it's packed with bacteria. The word bacteria generally conjures up negative images. We all know that bacteria are responsible for infections, right? Bacteria are often at the root of problems such as cystitis, chest infections and meningitis. However, for the main part, the bacteria in the gut are actually healthy, and participate in a number of beneficial bodily processes. Each of us holds about 3 or 4 pounds of bacteria in our intestinal tracts, and several important roles have been identified for them including enhanced digestion and the protection of the gut from unhealthy organisms such as yeast and parasites.

The healthy gut and what can go wrong

A healthy gut tends to contain relatively large amounts of healthy bacterial species, and little in the way of yeast. As long as the balance of gut organisms is towards the beneficial bacteria, then that's O.K. It's only when yeast overgrows and/or healthy bacterial species are lost in significant numbers that problems can arise. The sort of factors which may encourage an imbalance in the intestinal ecosystem include:

1. Antibiotics

Antibiotics are a major, perhaps *the* major factor, in candida overgrowth. Designed to kill harmful bacteria in the body, most antibiotics are taken by mouth. Down in the gut, antibiotics have the capacity to cut a swathe through the healthy gut bacteria, but do not touch yeast. As a result, antibiotics can lead to a predominance of yeast in the gut (5). Some women find that they can be prone to vaginal yeast infection (thrush) if they take antibiotics. The killing of healthy gut bacteria by antibiotics and subsequent yeast overgrowth explains this phenomenon.

In practice, antibiotics are very often at the root of an individual's candida problem. Very often, the imbalance is created way back in childhood or adolescence. What seems to happen very often is that the individual starts with some form of food sensitivity, often to milk, at a young age. Milk sensitivity will quite often give rise to problems with ear infections, tonsillitis, sinusitis and the like. Multiple courses of antibiotics will usually be prescribed for these problems, which in turns sows the seeds for a candida problem. Medium – long-term antibiotics prescribed for acne can also set up a significant imbalance too, and this is another common scenario for candida sufferers.

2. Stress

Stress is a common and important feature in so many of our lives. It has been demonstrated to reduce immune activity, with the potential that or ganisms such as candida can escape the body's normal control mechanisms and overgrow in the gut and elsewhere.

Stress is also known to have a number of direct effects on the gut including a reduction in certain secretions and changes in the time it takes for food to pass along the gut. It is possible that these factors may also favour the growth of yeast in the gut.

3. Diet

Yeast is a living organism and thrives on certain foods which provide ready fuel for the yeast cells. Foods which encourage yeast growth in this way include sugar and refined carbohydrates such as white flour products, pasta and white rice. Other foods which tend to encourage yeast growth include those that are yeasty, mouldy or fermented in their own right such as bread, alcohol, mushrooms, yeast extract spread, peanuts, pistachios, dried fruit, vinegar and soy sauce (these foods are covered in more detail in the section on dietary control of candida). The preponderance of yeast encouraging foods in our diet may help to explain the apparent prevalence of candida as a problem.

4. The Pill and HRT

It is generally noted that candida overgrowth is a more common problem in women than in men. This is thought to be due, at least in part, to the presence of female hormones such as oestrogen and progesterone. The presence of the hormones in significant quantities appears to encourage yeast growth in the body. The oral contraceptive pill and hormone replacement therapy (HRT) are both based on female hormones, and taking them is therefore thought to encourage candida proliferation in the body.

Is candida your problem?

The following questionnaire is designed to help you ascertain whether yeast overgrowth is a factor in you. Score each question as indicated, and then add up your total score.

1. Do you find that your bowel habit can be somewhat erratic, perhaps constipated some of the time, and on the loose side at others?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

2. Do you tend to suffer from excessive wind and flatulence?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

3. Can you suffer from significant abdominal bloating?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

4. Do you suffer from anal itching?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

5. Do you suffer from thrush (vaginal yeast infection) from time to time?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 6 points

6. Do you suffer from pre-menstrual syndrome, or painful or irregular periods?

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

7. Do you suffer from episodes of mental confusion, mental fatigue, loss of concentration, low mood or irritability?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

8. Do you suffer from periodic skin problems such as urticaria (hives), athlete's foot, generalised itching or a rash between your buttocks or in your groin?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 6 points

9. Do you suffer from recurrent bouts of cystitis and/or problems with vaginal irritation?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

10. Do you crave sugar, sugary foods such as chocolate, biscuits or cakes, or yeasty foods such as cheese, bread, alcohol or vinegar?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

11. Do you suffer from multiple allergies, and react to chemicals in the environment such as petrol and diesel fumes, cleaning fluids and perfumes?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

12. How would you describe your antibiotic consumption in the past, including childhood?

Very few antibiotics generally – 0 points

Moderate use for occasional infections such as winter infections, chest infections etc – 5 points

Frequent and/or extended use for problems such as acne, recurrent urinary tract infections, chronic sinusitis, tonsillitis etc – 10 points

13. Have you currently been taking the oral contraceptive pill for more than six months, or did you take it in the past for more than a year?

Yes – 3 points

No – 0 points

14. Have you had steroid drugs such as prednisolone, dexamethasone or betamethasone by mouth or cortisone injections?

Yes – 4 points

No – 0 points

15. Have you ever had inhaled steroids (usually for asthma) such as Becotide for three months or more?

Yes – 4 points

No – 0 points

16. Do you have a number of vague health problems which no one has been able to explain?

Yes – 4 points

No – 0 points

Interpreting your score

0 – 9: yeast overgrowth is unlikely

10 – 24: yeast overgrowth should be considered as a possibility and further testing or a trial of the anti-candida regime is likely to be worthwhile

25 – 39: yeast overgrowth is likely, and steps taken to combat yeast are very likely to help improve weight loss and general health

40 and above: yeast overgrowth is very likely, and steps taken to combat this are almost certainly going to improve weight loss and general health

If you have scored highly or moderately on the questionnaire, you may wish to confirm whether or not you have a yeast problem with some form of testing. Several types of tests are available, and the most commonly available are listed here:

Tests for Candida

1. Yeast cultures

Stool samples and swabs taken from the vagina, mouth, throat or skin can be sent to a microbiological laboratory for yeast analysis. These tests generally need to be administrated by a doctor, and are by no means foolproof. I don't think it's uncommon for someone with a genuine yeast problem (as indicated by their symptoms and response to treatment) for culture tests to come up as clear. My tendency is to treat for candida if

the culture shows candida, but not necessarily discount candida if the test is normal.

2. Candida antigen in the blood

An antigen is a particle which stimulates the immune system. There is a specific blood test for candida antigen, and if this is positive, it probably indicates an ongoing yeast infection. Not only that, but it suggests that the yeast has escaped from the gut itself, and made its way into the bloodstream. Antigen tests are thought to provide pretty hard evidence of a candida infection, but there is always the possibility that if candida is confined to the gut, the blood test will be negative.

3. Candida antibodies in the blood

Antibodies are what the immune system produces in response to antigens. Two types of antibody, IgG and IgM are usually measured. If the level of antibodies specific for candida is raised, this may indicate infection.

4. Candida antibodies in the gut

A type of antibody known as secretory IgA is produced within the gut. Measuring the amount of secretory IgA made specifically against candida can be a good guide to the presence of yeast in the gut. The higher the value, the more likely there is to be a yeast overgrowth in the intestine.

5. The gut fermentation test

Yeast tends to metabolise sugar into alcohol. The gut fermentation test is based on this principle. A blood sample is taken, and the subject is then given a measured dose of sugar. An hour later, another sample of blood is taken. Both blood samples are analysed for various fermentation products. The presence of these substances in significant quantity can point to the presence of excess yeast in the gut.

6. Other tests

It is possible to diagnose yeast overgrowth through a number of non-laboratory tests including iridology, electro-dermal testing (e.g. Vega, BEST system, Eclosion), dowsing and applied kinesiology. All of these forms of testing have their own merits, especially if the assessment is being carried out by an experienced and skilled practitioner. Assessment is usually relatively cheap and the results are immediate. Another advantage with these forms of testing is that they invariably allow contact with a practitioner who is likely to be able to guide you through the intricacies of an anti-candida programme, if testing shows this to be a problem.

How important is testing for candida?

The short answer to this is, in my opinion, not much. I do think it is usually possible to diagnose candida by looking carefully for the symptoms and underlying factors that are typical in the condition. Occasionally, I may perform a test where the diagnosis really is questionable, but usually the patient's story gives it away.

Candida and food sensitivity

Anyone who has a significant yeast overgrowth in the gut will be prone to food sensitivity. It does appear that once yeast gets to a certain level, it has the ability to make the gut 'leaky'. The lining of the gut is really designed to allow the transit of very small food particles which are then burnt for fuel, stored for later use, or converted into some other body component such as muscle or a hormone. When the gut becomes leaky, it is possible that larger than desirable food particles can escape through the gut wall into the blood stream, where they may provoke adverse reactions. These in turn may give rise to all sorts of symptoms including weight gain, fatigue, fluid retention, eczema, migraine and inflammatory

arthritis. For more about this, read chapter 6, entitled Eliminate your Allergies.

So, by making the gut leakier than it should be, candida can contribute directly to problems with food sensitivity. Candida is also thought to impair digestion. Now we have a real double-whammy. Inadequate digestion of food (meaning large food particles in the gut) coupled with a greater risk of these food particles getting into the system. Experience shows that candida sufferers usually have some food sensitivities, and it appears that continuing to eat these foods tends to delay recovery from candida even though the basic anti-candida diet is adhered to. For some, it may be appropriate to identify their food sensitivities using one or more of the techniques outlined in chapter 6. However, there is an easier way. Because sensitivity to dairy products and wheat are so common, it is wise to start by taking these two food types out of the diet. My feeling is that for the vast majority of people, a dairy and wheat-free, anti-candida diet is usually very effective in restoring health to the gut, even if there are one or more additional food sensitivities lurking that have not been identified or countered. The main wheat containing and dairy foods to be aware of are covered later on in the chapter, along with viable alternatives.

The anti-candida diet

The cornerstone of the anti-candida approach is a diet which helps starve yeast out of the system. This means no foods which feed yeast directly, or encourage yeast by being yeasty, mouldy or fermented in their own right.

Yeast-feeding foods to avoid

Sugar

Sweetening agents such as maple syrup, molasses, honey and malt syrup
Sugar containing foods such as biscuits, cakes, confectionery, ice cream, pastries, sugared breakfast cereals, soft drinks and fruit juice, white flour products including white bread, crackers, pizza and pasta

Yeasty, mouldy or fermented foods to avoid

Bread and other yeast-raised items
Alcoholic drinks, particularly beer and wine which are very yeasty
Gravy mixes (most contain brewer's yeast)
Vinegar and vinegar containing foods such as ketchup (which also contains sugar), mustard, mayonnaise and many prepared salad dressings
Pickles, miso, tempeh and soy sauce (all fermented)
Aged cheeses including cheddar, stilton, Swiss, brie and camembert (cheese is inherently mouldy)
Peanuts (and peanut butter) and pistachios (tend to harbour yeast)
Mushrooms (mushrooms *are* mould!)
Dried fruit (are intensely sugary and tend to harbour mould)
Yeast-containing foods such as soups and pre-packaged foods

As we mentioned earlier, individuals who have a candida problem is likely to be sensitive to wheat and/or dairy products. The safest bet, therefore, is also to avoid these foods, at least for a month or two.

Wheat containing foods to avoid

Wheat bread (beware also breads labelled as 'rye bread' which may contain wheat flour – label checking needed here)
Wheat-based crackers
Biscuits
Pizza

Cake
Wheat-based breakfast cereals
Pastry
Anything containing wheat flour including sauces and soups
Breaded food
Battered food

Dairy foods to avoid

Within the dairy food group, it is really milk and cheese that tend to create the problems. Butter is usually very well tolerated, and natural, live, unsweetened yoghurt is usually O.K. too. Yoghurt also has the advantage of containing bacterial species (this is that the word 'live' refers to) which may contribute to the health of the gut. Soya milk and rice milk make good alternatives to cow's milk, and can be drunk freely.

As you can see, there's a lot of foods which may need to be avoided on an anti-candida diet, the question is, what can you eat? Generally,

Foods to eat freely

The foods which are generally very safe to eat on an anti-candida regime are listed below.

Protein foods
Eggs
Fish including naturally smoked fish
Shellfish
Chicken
Turkey
Lamb
Beef

Pork

Duck

Vegetables:

Lettuce

Tomato

Cucumber

Celery

Cabbage

Broccoli

Cauliflower

Spinach

Chard

Kale

Watercress

Brussel sprouts

Asparagus

Onion

Leek

Green beans

Parsnips

Aubergine

Artichoke

Avocado

Foods to be eaten in moderation

Certain foods such as grains, high-starch vegetables, legumes or pulses can be eaten on an anti-candida regime, but it's best not to eat masses of them because they do tend to have some fermentation potential. The bulk of the diet should be based around the foods which can be eaten

freely, supplemented with more limited amounts of the foods that follow in this list:

High starch vegetables:

Potatoes

Sweet potatoes

Squash (e.g. butternut)

Legumes:

Lentils

Split peas

Kidney beans

Navy beans

Lima beans

Black beans

Adzuki beans

Grains:

Yeast-free rye bread

Rye crackers

Brown rice

Wild rice

Rice cakes

Barley

Millet

Corn

Rye

Oats, oat cakes and oat-based breakfast cereals

Buckwheat

Quinoa

Spelt

Brown rice cakes

What about fruit?

And finally, a word about fruit. Whether or not fruit is advisable on an anti-candida regime is a real mute point. Some practitioners say it can be eaten freely, others say it should be completely excluded, at least to begin with. I have to say, I take the middle ground. My experience is that one or two pieces of fruit a day is generally very well tolerated, though I'm no fan of grapes which are intensely sugary and usually are covered in a mouldy bloom. All fruit that you're not going to peel prior to eating should be washed thoroughly. The best fruits are those that contain least sugar (raspberries, blueberries, grapefruit and fresh figs). Dried fruits, as mentioned before, are definitely off the menu for a while.

Candida and blood sugar balance

The body likes to keep the level of sugar in the blood stream between relatively narrow parameters, not too high, not too low. However, in certain individuals, the blood sugar level can tend to fluctuate, and this can lead to symptoms such as fluctuating energy, cravings for sweet or starchy foods and problems with low mood, irritability or mood swings.

The food craving problem often experienced by candida sufferers can really scupper them. The cravings most individuals get on an anti-candida regime are usually for the foods which are worst for them. So, getting on top of a blood sugar problem is of prime importance if the anti-candida diet is to be adhered to without too much angst. So, if you suffer from one or more of these symptoms, then it will almost certainly help you to read chapter 4, Balance Blood Sugar, which explains the principles of the blood sugar stabilising diet. In particular, the chapter also includes details of nutrients and supplements which may really help to counter this problem.

The anti-candida diet – quite a lot to think about

OK, so in constructing an anti-candida diet, we often have to combine several approaches. Just to recap, the main principles are these:

1. To avoid foods and drinks which feed yeast (sugar and refined carbohydrates)

2. To avoid food and drinks which encourage yeast (yeasty, mouldy or fermented foods).

3. To avoid wheat, milk and cheese because these foods are common sensitivities in candida sufferers (cheese also tends to encourage yeast overgrowth).

4. To eat a diet based around foods which release sugar slowly into the bloodstream.

Now, if you add to these principles the fact that the diet should be essentially healthy and acceptable to you, what does this leave? What I've outlined below is a few menu suggestions to help you get on your way. I'm well aware that I do not know your dietary preferences, but in my experience, just about everyone will find foods within these suggestions that they find practical and palatable. Here goes.

Breakfast:

Oats (soaked overnight in water or milk substitute) with chopped almonds and hazelnuts, pumpkin and sunflower seeds, rice or soya milk, natural, live unsweetened yoghurt and some chopped fresh fruit

Oat porridge made with, water, soya or rice milk sweetened with banana

Puffed brown rice cereal, or non-wheat multi-grain cereal (HFS) with rice or soya milk, natural yoghurt, nuts, seeds and some fruit.

Poached egg on yeast-free rye bread toast

Kipper or haddock with poached egg, grilled tomatoes and yeast-free rye toast

Lunch

Brown rice salad (brown rice with a variety of added ingredients such as tuna, chicken, chick peas, tomato, bell pepper, cucumber, spring onion, garlic, herbs and dressing made from extra virgin olive oil and lemon juice

Chicken or tuna salad sandwich made with yeast-free rye bread

Chicken, tuna or prawn salad (extra virgin olive oil and lemon juice dressing) with rye crackers or brown rice cakes

Spanish omelette (without cheese) and salad

Poached salmon, steamed vegetables with a few boiled new potatoes

Grilled chicken and roast vegetables including some potato

Chicken, turkey or fish with brown rice and salad

Stir-fried tofu and vegetables with brown rice or rice noodles

The supplements:

I can't stress strongly enough how important the anti-candida diet is to overcoming a candida problem. There really is no point in swallowing

handfuls of supplements if your diet is full of bread, cheese and wine. However, in conjunction with a good diet, certain supplements really do seem to be able to speed recovery and restore health to the gut and the body. The basic nutritional supplements which are often used to accompany an anti-candida programme include the following:

1. Healthy gut bacteria supplements to restore the intestinal ecosystem

2. Liver supporting agents to protect the liver and body from the toxins that can be released during the initial phase of an anti-candida regime

3. Nutrients to support blood sugar stability

4. Supplements to kill yeast

5. Supplements to help heal the gut lining

Not all of these need be used in every individual. In my experience, the first three play a big role in the management of the vast majority of sufferers, while the last two types of supplements seem to be required less.

Healthy gut bacteria supplements

Healthy gut bacteria supplements are also known as 'probiotics'. They have been given this name because they put bacteria back into the body, quite the opposite of antibiotics which take them away. Probiotic supplements have attracted a lot of criticism from certain quarters who claim that often the supplements that are bought off the shelf in health food stores do not contain what they say they contain on the label. There is some evidence that supplements do indeed exist which do not contain the quantities of living organisms declared on the label, and some even

seem to contain organisms which just shouldn't be there. If you know of another good, reputable brand of probiotics, that's fine. If you don't, I've included here a couple of probiotics which are independently validated.

2. Liver support

During the initial phases of an anti-candida regime, it is quite common for individuals to experience a worsening in their condition. Symptoms such as lethargy, fuzzy-headedness, and flu-like symptoms can start a day or so after the regime starts, and generally last from between a few days to a couple of weeks. This reaction is sometimes referred to a 'die-off', and is thought to be due to an increase in candida-derived toxins in the system. If yeast cells die, they will tend to liberate toxic substances which pass from the gut to the liver. Often, the liver does not cope adequately with them, which can allow the toxins to escape into the general circulation, where they may give rise to the sort of symptoms listed above.

One way to help reduce the effects of die-off is to use liver-supporting agents. Certain herbs and nutrients have the ability to strengthen the detoxifying action of the liver, which in turn can increase the likelihood of toxins being neutralised effectively here, before they get the chance to get out into the blood stream. Some of the main liver supporting agents and a combination supplement which may help protect the liver during the initial phases of an anti-candida are covered in this chapter.

3. Blood sugar control

If you do exhibit symptoms of blood sugar imbalance, and particularly if food cravings are a problem, you may well benefit from taking nutrients which play a role in maintaining blood sugar levels. These nutrients covered at the end of chapter 4, entitled 'Balance Blood Sugar'.

4. Anti-fungal supplements

Some of the natural agents which may be useful in combating yeast in the body include:

Oregano – oregano has been employed as an antiseptic in herbal and folk medicine for thousands of years. Oregano contains a number of active ingredients, probably the two most important of which are carvacrol and thymol. Studies have shown that oregano has anti-fungal properties and can inhibit the growth of candida.

Garlic – like oregano, garlic has a tradition of use in herbal medicine that goes back thousands of years. Garlic has the ability to kill a range of organisms including bacteria, viruses, parasites and fungi. In natural medicine, garlic is a widely used substance in the control and eradication of candida.

Grapefruit seed extract – extracts of grapefruit seed are thought to have the ability to kill candida in the body. Many candida sufferers report that taking grapefruit seed extract has helped them control their symptoms and conquer their yeast-related problems.

5. Gut healing nutrients

The nutrients which are thought to play an important part in healing and soothing the lining of the gut are covered earlier in this chapter.

Summary

- Candida albicans is a yeast organism that inhabits the human gut
- If candida overgrows in the gut it can lead to a wide range of health problems including weight gain, irritable bowel syndrome, mood disturbance, fatigue and food cravings

- Factors which encourage candida overgrowth include antibiotic use, stress, hormonal treatments and a diet which contains foodstuffs which encourage yeast growth including sugar, refined carbohydrates, bread and alcohol

- Food sensitivity, particularly to wheat, milk and cheese, is often a feature in candida

- Blood sugar fluctuation is often a feature in candida too

- The cornerstone of the anti-candida regime is a diet which is based on foods which do not encourage candida growth such as meat, fish, eggs and vegetables

- Supplements which help restore healthy gut bacteria can be very useful in the management of candida

- Other supplements which are very often of use in managing candida are those that support the liver and help to stabilise the blood sugar level

- Natural anti-fungal supplements and those that help heal the lining of the gut may also be of benefit

- Overcoming a yeast overgrowth problem and restoring health to the gut can be a very effective way of losing weight and combating a wide range of symptoms and conditions.

Chapter 4
Balance Your Blood Sugar

Every moment of every day, the body adjusts its internal mechanisms to keep it in balance. The name given to this principle of internal balance is 'homeostasis'. One very important component of homeostasis is the regulation of the level of sugar in the bloodstream. However, the mechanisms which are designed to keep blood sugar on an even keel can fail. In the short term, imbalance in the blood sugar level can give rise to symptoms such as fluctuating energy, mood swings and cravings for sweet and starchy foods. In the long term, problems such as weight gain, high cholesterol and diabetes can occur too. Experience shows that blood sugar imbalance is a common health issue. It is also true that correcting this problem almost invariably leads to a significant improvement in health and well-being.

Blood sugar balance in the body

For most of us, a significant proportion of our diet comes in the form of carbohydrates such as sugars (e.g. fruit, fruit juices, confectionery, cake, biscuits, desserts) and starches (e.g. bread, potatoes, rice, pasta, cereals). Starches actually consist of very long chains of sugar molecules which are too long to be absorbed through the gut into the blood stream. Consequently, in order to absorb starches we must first break them down into their single sugar components through the processes of digestion.

When we eat carbohydrate the blood sugar level rises. When this happens, a hormone called 'insulin' is secreted by the pancreas. One of the chief effects of insulin is to transport sugar out of the blood stream and into the body's cells. In this way, blood sugar is lowered again, preventing the accumulation of sugar in the blood stream. In general, the body copes well with foods which release sugar quite slowly into the blood

stream. However, if the blood sugar level rises very quickly, the body tends to secrete a lot of insulin in response. The problem here is that this may drive blood sugar levels lower than normal, a condition which is referred to as 'hypoglycaemia'. Hypoglycaemia can induce some pretty unwelcome symptoms. These include:

1. Fatigue

Sugar is *the* main fuel in the body, and if the level of sugar in the blood drops, fatigue is inevitable. Individuals with blood sugar imbalance tend to experience peaks and troughs of energy as a result of the rise and fall of blood sugar levels.

2. The mid-afternoon slump

A classic time for the fatigue associated with hypoglycaemia is the mid-late afternoon. The big rise in blood sugar which may follow lunch can trigger an insulin surge, leading to low blood sugar (and sleepiness) later on.

3. Morning grogginess

The fatigue associated with hypoglycaemia is often at its worst first thing in the morning. Individuals prone to blood sugar imbalance tend not to maintain blood sugar levels unless they eat. For this reason, blood sugar can fall during the night, leading to fatigue and grogginess in the morning.

4. Poor concentration, low mood or irritability

Although the brain makes up only about 2% of our weight, at rest it uses roughly half the sugar circulating in our bloodstream. What is more, while most of the body can use other foods to generate energy, the brain is almost entirely reliant on sugar for its normal and healthy function. Blood sugar imbalance quite commonly causes problems with poor concentration, depression, irritability and mood swings as a result.

5. Waking in the night

When blood sugar levels drop during the night, the body may attempt to correct this by secreting hormones which stimulate the release of sugar from the liver. The main hormone which the body uses for this is 'adrenaline' which increases arousal and may trigger feelings of anxiety and even panic. Not ideal for restful sleep! Hypoglycaemia is a very common cause of waking in the night.

6. Food Cravings

Another common symptom of hypoglycaemia is food cravings. If our blood sugar level drops it is natural for our body to crave foods it knows will restore the blood sugar level quickly. This commonly manifests as cravings for sweet and/or starchy foods.

The symptoms of blood sugar imbalance are most manifest when sugar levels are low. However, in response to a high blood sugar level, the body secretes insulin. While insulin is important for keeping blood sugar in check, excess amounts of this hormone can have significant hazards in the body.

The effects of excess insulin

Some of the effects of excess insulin include:

1. Fat production

Insulin stimulates the conversion of sugar into a starch-like substance called 'glycogen' in the liver and muscle. However, when the glycogen stores in the body are full, insulin stimulates the production of substances called 'triglycerides', which is actually fancy language for *fat*. People with blood sugar imbalance tend to put on weight for this reason. Excess insulin tends to predispose toward the deposition of fat around the middle, which may give rise to what is colloquially referred to as a 'spare tyre'.

2. High blood pressure and fluid retention

Many of the mechanisms the body uses to balance the amount of fluid it contains along with the levels of key substances such as sodium, potassium and chloride take place in the kidneys. In the kidneys, insulin causes the body to hang on to sodium (sodium retention), and this can predispose to high blood pressure (hypertension) and fluid retention in time.

3. Raised cholesterol

While much is made of the need to cut down of fats in the diet to control cholesterol, carbohydrates are rarely mentioned. However, most of the cholesterol in the bloodstream doesn't come from the diet, it is made in the liver. Insulin actually stimulates the liver to make more cholesterol, and this is likely to increase the risk of both heart disease and stroke.

4. Type II diabetes

High levels of insulin in the body can increase the risk of diabetes. If the body secretes a lot of insulin over many years, then it can become increasingly less sensitive to the effect of that insulin. This may lead to a condition known as Type II diabetes (also known as non-insulin dependent diabetes). Taking steps to improve blood sugar control is likely to reduce your risk of developing diabetes in the long term.

Is blood sugar imbalance your problem?

The following questionnaire is designed to help you assess whether blood sugar imbalance is a factor in you. Score each question as indicated, and then add up your total score.

1. Does your energy tend to fluctuate during the day?

No – 0 points

Occasional or mild symptoms – 2 points

Frequent or severe problems – 4 points

2. Do you find that eating something can often pick up your energy level?

No – 0 points

Occasionally – 2 points

Frequently – 4 points

3. Do you often feel tired or unable to concentrate in the mid – late afternoon?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

4. Do you feel tired or groggy on waking, despite sleeping for eight or more hours?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

5. Do you tend to wake in the middle of the night, sometimes feeling anxious or nervy?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

6. Are you prone to mood swings and/or irritability, especially if a meal is skipped?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

7. Can you crave sweet or starchy foods from time to time?

No – 0 points

Occasional or mild symptoms – 3 points

Frequent or severe symptoms – 5 points

8. Do you feel you need to eat very regularly?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

9. Can you find yourself craving alcohol in the early evening?

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

10. Do you have a history of Type II (mature-onset) diabetes in your family?

No – 0 points

Yes – 4 points

Interpreting your score

0 – 9: blood sugar imbalance is unlikely

10 – 19: blood sugar imbalance is quite likely and measures taken to stabilise blood sugar are likely to be of benefit

20 and above: blood sugar imbalance is likely, and measures taken to stabilise blood sugar are highly recommended

Blood tests for blood sugar balance

The symptoms of impaired blood sugar balance are usually clear-cut enough to enable a diagnosis to be made without the need for testing. However, if you decide a test is appropriate for you, several are available. The relative merits or otherwise of these tests is discussed here:

The Random Blood Glucose Test

The most commonly performed test for hypoglycaemia is the random blood glucose test. Here, a sample of blood is drawn and analysed for its glucose (sugar) concentration. However, this test only provides a snapshot in time of the level of sugar in the bloodstream. As blood sugar levels can vary greatly during the day, this test is virtually useless.

The Glucose Tolerance Test

A more useful test in the diagnosis of blood sugar imbalance, is the Glucose Tolerance Test (GTT). Here, a sample of blood is drawn, after which a measured dose of glucose is administered to the test subject in the form of a sugary drink. Blood samples taken at usually hourly intervals for five hours are then analysed for glucose. In individuals who have a problem regulating blood sugar, the test may reveal a rapid rise in blood sugar which often peaks at a level which is higher than we would like. In addition, this initial rise is often followed by a lower than normal blood sugar some time later. While it has its place, some doctors and scientists believe that even the GTT is not the best test for blood sugar imbalance (1). It is now thought that measuring insulin levels during the GTT is critical to the accuracy of this test. This test, known as the glucose-insulin tolerance test, is increasingly becoming regarded as the most relevant test for blood sugar imbalance.

The Glucose-Insulin Tolerance Test

In a glucose-insulin tolerance test (GITT), insulin levels are measured along with sugar levels for up to five hours. This test may reveal elevated insulin levels in subjects who have normal blood sugar levels (2). Because of this, the GITT is thought to be a much more sensitive indicator of blood sugar balance than the GTT. The GITT can be a very useful test because of its ability to pick up elevated insulin levels.

Getting blood sugar back in balance

One important factor in getting blood sugar back in balance is to eat a diet based on foods which give a controlled release of sugar into the body. The speed and extent to which a food increases blood sugar can be quantified using something called the 'Glycaemic Index Scale'. Here, the speed and extent of a foods sugar release into the blood stream is compared with glucose which is given a value of 100. The higher a food's glycaemic index, the faster it releases sugar into the blood stream, and the worse it is for you. This is a list of the commonly eaten carbohydrates and their respective glycaemic indices:

	Glycaemic index
Bread	
baguette	95
bagel – white	72
wheat bread - white	70
bread – wholemeal	71
Rye bread - wholemeal	58
Rye bread - pumpernickel	46
bread – spelt, wholemeal	63
Crackers	
Rye crispbread	64
cream cracker	65
water cracker	71
Rice cakes	78
corn chips	63
potato crisps	54
popcorn	72

Pasta, rice and related foods	
brown rice	55
basmati rice	58
Rice – Arborio (risotto rice)	69
Rice - white	64
barley - pearl	25
pasta - corn	78
gnocchi	68
pasta – durum wheat	44
pasta - wholewheat	37
cous cous	65
Sweet foods	
digestive biscuits	59
croissant	67
crumpet	69
doughnut	76
muffin - bran	60
scone	92
shortbread	64
ice cream	61
low fat yoghurt	27
Mars bar	65
muesli bar	65
snickers bar	55
honey	55
sucrose (table sugar)	68
Beverages	
apple juice - unsweetened	40
cranberry juice	56
orange juice	50
Gatorade	78
Tomato juice	38
Coca cola	53
Fanta	68
Lucozade	95
Breakfast cereals	
All-Bran	42
Bran flakes	74
cornflakes	81
muesli	40-66
porridge - homemade	58
porridge - instant	66

Special K	54-84
Shredded wheat	75
Raisin bran	61
Fruit	
apple	38
apple - dried	29
banana	52
mango	51
grapes	46
kiwi fruit	53
cherries	22
peach	42
pear	38
pineapple	59
plum	39
watermelon	72
figs - dried	61
apricots – dried	31
sultanas	60
raisins	64
prunes	29
strawberries	40
Legumes (beans, lentils, peas)	
baked beans	48
black-eyed beans	42
butter beans	31
chickpeas	28
hummus	6
kidney beans	28
lentils - green	30
lentils - red	26
peas – dried then boiled	22
peas - boiled	48
Vegetables	
peas - boiled	48
parsnips	97
potato - baked	85
potato - boiled	50
potato - new	57
Chips (French fries)	75
potato - mashed	74
potato – instant mashed	85

yam	37
carrots - raw	16
carrots - cooked	58
pumpkin	75
beetroot	64

While there is continuing debate about how GI's should be classified, my preference is to call GIs of 70 or more as 'high', GIs of 50 - 69 inclusive as 'medium', and GIs of 49 or less as 'low'.

What is very telling indeed is that the starchy carbohydrates that are generally taken to give a slow and sustained release of sugar actually turn out to be very disruptive indeed. Many of these starchy staples, notably cornflakes, wholemeal bread, baked potatoes, have high GIs, actually, even higher than table sugar (sucrose).

Look closely at the GI list, and you will see that some fruits and vegetables, including beetroot, pineapple and watermelon, have high-ish GIs too. Does that mean that these foods are equivalent to foods with similar GIs such as corn chips and Mars bars?

Actually, while the GI is an important measure of the nutritional attribute of a food, it's not the sole arbiter of a foods suitability our diet. One other factor that needs consideration is the amount we eat of a food. Foods with a relatively high GI will be most disruptive if we tend to eat a lot of them. The eating of foods of high or medium GI matters less if we don't tend to consume too much of them at any one time.

So, anyone that polishes of a plate or two of pasta is likely to experience considerable disruption in blood sugar and insulin levels. On the other hand, it's highly unlikely that anyone is going to eat similar quantities of beetroot or pineapple.

This concept has spawned the development of another measure of the effect of food in the body known as the 'glycaemic load'. The glycaemic load of a food is calculated by multiplying its GI by the amount of carbohydrate contained in a standard portion of food. This figure is then divided by 100.

Basically, a food's glycaemic load (GL) is thought to give a more realistic guide to the impact of that food, in the real World, on blood sugar and insulin balance. What follows is the table of glycaemic indexes, now with the glycaemic loads of foods added too.

A GL of 20 or more is generally regarding as high, whereas one of 10 or less is low. Anywhere in between is classified as medium.

	Glycaemic index	**Glycaemic load**
Bread		
baguette	95	15
bagel – white	72	25
wheat bread – white	70	10
bread – wholemeal	71	9
rye bread – wholemeal	58	8
rye bread – pumpernickel	46	5
bread – spelt, wholemeal	63	12
Crackers		
rye crispbread	64	11
cream cracker	65	11
water cracker	71	13
rice cakes	78	17
corn chips	63	17
potato crisps	54	11
popcorn	72	8
Pasta, rice and related foods		
brown rice	55	18
basmati rice	58	22
rice – Arborio (risotto rice)	69	36
rice - white	64	23
barley - pearl	25	11

pasta - corn	78	32
gnocchi	68	33
pasta – durum wheat	44	21
pasta - wholewheat	37	16
cous cous	65	23
Sweet foods		
digestive biscuits	59	10
croissant	67	17
crumpet	69	13
doughnut	76	17
muffin - bran	60	15
scone	92	7
shortbread	64	10
ice cream	61	8
low fat yoghurt	27	7
Mars bar	65	26
muesli bar	65	26
snickers bar	55	19
honey	55	10
sucrose (table sugar)	68	7 (10g)
Beverages		
apple juice - unsweetened	40	12
cranberry juice	56	16
orange juice	50	13
Gatorade	78	12
Tomato juice	38	4
Coca cola	53	14
Fanta	68	23
Lucozade	95	40
Breakfast cereals		
All-Bran	42	8
Bran flakes	74	13
cornflakes	81	21
muesli	40-66	12
porridge - homemade	58	13
porridge - instant	66	17
Special K	54-84	11-20
Shredded wheat	75	15
Raisin bran	61	12
Fruit		
apple	38	6
apple - dried	29	10

banana	52	12
mango	51	8
grapes	46	8
kiwi fruit	53	6
cherries	22	3
peach	42	5
pear	38	4
pineapple	59	7
plum	39	5
watermelon	72	4
figs - dried	61	16
apricots – dried	31	9
sultanas	60	25
raisins	64	28
prunes	29	10
strawberries	40	1
Legumes (beans, lentils, peas)		
baked beans	48	7
black-eyed beans	42	13
butter beans	31	6
chickpeas	28	8
hummus	6	0
kidney beans	28	7
lentils - green	30	5
lentils - red	26	5
peas – dried then boiled	22	2
peas - boiled	48	3
Vegetables		
peas - boiled	48	3
Parsnips	97	12
potato - baked	85	26
potato - boiled	50	14
potato - new	57	12
Chips (French fries)	75	22
potato - mashed	74	15
potato – instant mashed	85	17
Yam	37	13
carrots – raw	16	1
carrots – cooked	58	3
Pumpkin	75	3
Beetroot	64	5

Now looking at this table we see a different picture emerging. Many of the foods that have medium or high GI, turn out to have low GLs. Examples include kiwi fruit (GI 53 GL 6), pineapple (GI 59 GL 7), watermelon (GI 72 GL 4), cooked carrots (GI 58 GL 3) and beetroot (GI 64 GL 5). On the other had, many of the grain based foods with medium or high GI have relatively high GLs too. Examples include bagel (GI 72 GL 25), white rice (GI 65 GL 23), rice cakes (GI 78 GL 17), cornflakes (GI 81 GL 21), baked potato (GI 85 GL 26), pasta (GI 44 GL 21).

It's not just the fast sugar-releasing nature of the grain-based foods and the potato that poses problems for the body, but the fact that they tend to be carbohydrate rich and eaten in quantity. Overall, we might expect that eating less of these foods could help reduce both blood sugar and insulin levels in the body. Let us remember too that foods of high GI tend not to satisfy the appetite as much as lower GI foods. Put all this together, and it stands to reason that cutting down on high GI/GL carbs should help us shed any excess weight.

Protein and blood sugar control

We know that insulin lowers blood sugar levels. However, there is another important hormone called 'glucagon' which has the opposite effect. Also secreted by the pancreas, glucagon works in concert with insulin, balancing its effect. One of the major triggers for the release of glucagon is dietary protein, so in addition to cutting back on fast-releasing carbohydrates, upping our intake of protein may also help to stabilise blood sugar levels.

A moderate amount of fast-releasing food may be OK

You might be wondering whether you need to completely exclude the high glycaemic index foods from your diet. The answer is, no, not necessarily.

While the glycaemic index scores are a good guide to the tendency of a food to upset blood sugar, they actually represent the effect of a standard amount of that food eaten on its own. Basically, if we eat a lot of a high glycaemic index food, the chances are we'll get a massive rise in blood sugar and a huge surge of insulin to go with it. A much smaller amount of the same food is obviously going to be much less disruptive. There's a world of difference, for example, between eating a huge baked potato and couple of new potatoes or a handful of chips or crisps.

Mixing Meals for Better Balance

One way to ensure our diet is generally slow releasing is to mix foods in a way which 'dilutes' the effects of the faster releasing foods. Protein helps here, as we have already discussed. Another way would be , say, to add plenty of slow-releasing vegetables to a meal. For example, let's say you're going to eat a meal which contains white rice. White rice has a high glycaemic index and is therefore not ideal from a blood sugar balance point of view. However, if that white rice is eaten as part of a meal which also contains some fish or lean meat, or beans and pulses with plenty of fresh, steamed vegetables such as broccoli and French beans, then it is much more likely that there will be a controlled release of sugar into the blood stream. Studies show that the overall glycaemic index of a meal comes from a balance of the speed of sugar release of its components and their relative amounts.

Regular meals are essential to overcoming hypoglycaemia

Many hypoglycaemics do not maintain blood sugar levels at all well if a meal is skipped or delayed significantly. This is often connected to weakness in organs known as the 'adrenal glands'. This problem is discussed in more depth later on in the chapter. Obviously, though, to give our body a fighting chance of keeping blood sugar levels stable it is

important to eat regular meals. Breakfast does seem to be especially important. I have very rarely seen an individual with blood sugar imbalance get stability in this area without eating a breakfast of some sort or other. Also, at least in the initial stages of re-establishing better blood sugar control it is almost always beneficial for healthy snacks to be had between meals too.

The afternoon is usually a real danger time for individuals with blood sugar imbalance. The insulin surge that comes after lunch can drive blood sugar levels down in the mid-late afternoon causing problems with lethargy, drowsiness and cravings for something sweet such as chocolate or biscuits. If we succumb, blood sugar levels may rise quickly which can get us out of the whole. But the body's response to this generally drives blood sugar levels back down again putting us back at square one.

Tactical Eating

If you do tend to get a problem with hypoglycaemia it can be useful to employ the principle of tactical eating. What this means is having something to eat in anticipation of low blood sugar later on, even when you don't feel hungry. Eating something before your blood sugar level drops into your boots can stop it happening at all. So, if you tend to fall to bits around 4.00 pm, why not eat a piece or two of fruit and some raw cashew nuts around 3.00 pm? This will generally save a lot of grief later on.

A snack before bedtime

As we discussed earlier, hypoglycaemia in the night can cause a surge of adrenaline which can disrupt sleep. Eating a snack before bedtime can give your body 'something to chew on' while you're asleep, which can help maintain blood sugar levels (and sleep!) throughout the night. We

don't won't to overtax the digestive system though, so keep it light. Again, some fresh fruit and a handful of raw nuts should do the trick.

Caffeine and blood sugar control

Caffeine is a favourite energy prop of many individuals with blood sugar imbalance. However, caffeinated drinks such as coffee, tea, and cola are a bit of a disaster for individuals with unstable blood sugar levels. The reason is because caffeine stimulates the secretion of insulin, effectively destabilising the blood sugar system. Caffeine, because it has stimulant effects in the body will almost certainly pick up flagging energy levels, but its effect on blood sugar generally leads to a slump in energy later on. Another downside to caffeine is that it appears to worsen the symptoms of hypoglycaemia. This means, that for a given level of blood sugar, hypoglycaemic symptoms are more likely and generally more pronounced if there is caffeine in the system.

Coming off caffeine

If you habitually take caffeine in your diet, either in coffee, tea or caffeinated soft drinks, then you would do well to kick or at least moderate this habit. One way to get off caffeine is the 'cold turkey' method, which means just stopping caffeine dead. This method is quick, but there's usually a price to pay. Anyone with a half-decent caffeine intake is likely to get caffeine withdrawal, which normally manifests itself as general fatigue accompanied by a horrendous headache. These symptoms generally last a couple of days, after which a state of calm returns pretty briskly to the system.

Another way of coming off caffeine is to gradually reduce your intake. This takes longer than the cold turkey method, but is much less painful. I generally advise my clients to reduce their intake of caffeine by a drink

per day every three or four days. This means that if the drink five cups of coffee a day, that for three or four days they drink four cups per day, reducing this to three cups per day and so on until they're drinking nothing at all. Another tactic is to swap your caffeinated drinks with their decaffeinated versions. Look out for coffee which has been decaffeinated using the water (also known as the 'Swiss' method) or carbon dioxide methods. These methods of decaffeination avoid the potentially hazardous solvents which are often used in the extraction process.

Artificial sweeteners

Individuals who are quite wedded to sugar may look forward to reducing their intake of this foodstuff with some trepidation. The natural tendency may be, therefore, to opt for artificial sweeteners instead. However, there is emerging evidence that sweeteners such as aspartame (Nutrasweet, Equal) and saccharin are not necessarily the healthy alternatives to sugar they're made out to be. Aspartame may reduce levels of the brain chemical serotonin, which in turn can lead to mood and sleep disturbances (3). Large amounts of aspartame may provoke headaches, fainting, seizures, memory loss, mood swings, depression and nausea. Small doses can cause itching and rashes in susceptible individuals.

And, if that isn't enough, there is some scientific evidence to suggest that artificial sweeteners may actually encourage us to eat more in the long term (4). In one study, experimenters found that subjects were inclined to eat more after eating yoghurt sweetened with saccharin than those who had eaten yoghurt sweetened with sugar (5). One study showed that saccharin induced hypoglycaemia in test subjects, even if it was only tasted and not swallowed (6). It looks as though the body just can't be fooled into feeling satisfied by mimicking more natural sources of sweetness.

Menu Suggestions for stabilising blood sugar levels

With the theory behind us, what does all this mean in practical terms? Here are some meal ideas based on the fundamental principles outlined in this chapter:

Breakfast

Poached egg on whole, rye toast with grilled tomato

Poached egg and grilled haddock or kipper with grilled tomato, mushrooms and wholewheat or whole rye toast

Unsweetened muesli with milk (cow's, goat's, rice), live natural yoghurt (this is slow-releasing), seeds and fresh fruit

Oat porridge (oatmeal) topped with live natural yoghurt and flaked almonds

Lunch / Dinner

Grilled trout or chicken with fresh steamed vegetables and a few boiled new potatoes

Brown rice salad made with chicken or fish, chopped vegetables (e.g. tomato, cucumber), beans and pulses

Spanish omelette and salad

Smoked salmon on pumpernickel bread with salad

Wholewheat pasta with meat or fish sauce and salad

Chicken or fish with brown rice and steamed vegetables.

In between meal snacks

Raw nuts and seeds

Fresh fruit

Rye cracker with chicken and tomato topping

Nutrients for blood sugar balance

The processes which regulate the level of sugar in the bloodstream are dependent on hormones and enzymes. The function of these hormones and enzymes is, at least in part, dependent on the availability of certain nutrients. What follows is a guide to the most important nutrients which can help combat hypoglycaemia and return you to a state of well-being.

Chromium polynicotinate – the trace mineral chromium has a very important part to play in the regulation of blood sugar levels, and can be effective in combating hypoglycaemia (7, 8). It seems to have the capacity to regulate the action of insulin in the body, and in so doing helps in ensuring the efficient handling and metabolism of sugar.

Manganese – this trace mineral plays an important part in activating the enzymes which are involved in sugar metabolism in the body (9).

Magnesium – this mineral is very important for blood sugar regulation. One of its key actions is to activate the enzymes which mediate the conversion of glycogen (a storage carbohydrate) in the body to sugar and vice versa. Magnesium supplementation has been shown to improve the action of insulin and stabilise the blood sugar (10).

There are several different forms of available magnesium. Some of the most useful forms of magnesium for blood sugar balance include:

Magnesium ascorbate – actually a buffered (non-acidic) form of vitamin C, this nutrient can also help support adrenal gland function which is often weakened in cases of sugar dysregulation.

Magnesium pantothenate – also known as vitamin B5, this nutrient also supports adrenal gland function.

Magnesium malate and magnesium fumarate – both these forms of magnesium feed an energy-producing system in the body known as the Kreb's cycle.

Vitamins B1, B2 and B3 – all of these nutrients have a critical role to play in the metabolism of carbohydrate sources of energy in the body.

Glutamine

Glutamine is an amino acid (basic building block in protein). Glutamine can be used as fuel for the brain, and can therefore be very effective in reducing the carbohydrate cravings caused by hypoglycaemia. This supplement is useful in the initial stages of the rebalancing process when food cravings are most likely to strike.

Recommended dosage:

500 – 1000 mg, three or four times a day

Availability:

Glutamine is widely available in health food stores.

The Adrenal Glands and their role in Health

Some individuals just don't do well on the normal measures typically used to stabilise blood sugar levels. Despite eating regular meals and snacks based around slow sugar-releasing foods, they can still have continued

problems with fluctuating energy, food cravings and a need to eat very regularly. In my experience, what is usually underlying such a problem is weakness in organs known as the 'adrenal glands'. In recent years, there has been growing interest in the role of these organs in the maintenance of health and well-being. Weakness in this area may not only impair blood sugar balance, but can have profound effects in many other areas including immune function and energy.

There are two adrenal glands, and each one sits on top of the kidney and is about the size of an apricot. The adrenal glands secrete a variety of hormones which play important roles in maintaining homeostasis, or balance, in the body. They are also the body's chief glands responsible for dealing with stress. Some of the most important hormones secreted by the adrenal glands include:

Adrenaline

Adrenaline is one of the main hormones secreted by the adrenal glands in response to stress. It is this hormone which is involved in what is known as the 'flight or fight' response. Amongst other things, adrenaline increases the heart rate and increases blood pressure. As was mentioned earlier, adrenaline can increase blood sugar levels by stimulating the conversion of glycogen into glucose.

Cortisol

The other main stress hormone secreted by the adrenal glands is cortisol. However, while adrenaline has a relatively short duration of action in the body, cortisol is chiefly involved in the body's handling of longer term stress. Like adrenaline, cortisol tends to increase blood sugar levels, partly through its ability to stimulate the conversion of non-carbohydrate fuels such as amino acids (the building blocks of protein) into glucose. It also has very important roles in the regulation of various body systems including the immune system and the control of inflammation in the body.

Cortisol is absolutely essential to life, but like anything else, you can get too much of a good thing. Prolonged stress can cause higher than normal levels of cortisol which may in turn lead to problems such as impairment of the immune system, insomnia and depression.

Dihydroepiandrosterone (DHEA)

DHEA has a number of regulating roles in the body including helping in the growth and repair of proteins in body tissues, especially muscle. This hormone also plays a part in the processes that heal tissues after injury or infection. In addition, DHEA can be converted into other hormones, principally testosterone and oestrogen, which themselves have important actions in the body.

Aldosterone

Aldosterone is what is referred to as a 'mineralocorticoid' – essentially meaning that it participates in the regulation of minerals in the body. Aldosterone helps to preserve sodium levels in the body, and encourages loss of potassium. These actions help to maintain fluid levels and blood pressure in the body.

Adrenal Weakness

In some individuals, adrenal function may be somewhat weakened. This condition is sometimes referred to as 'hypoadrenalism', 'adrenal exhaustion' or 'adrenal weakness'.

What are the symptoms of adrenal weakness?

Some of the most prominent symptoms of adrenal weakness include:

Fatigue

Adrenally weakened individuals tend to be tired. They often lack the get up and go they once took for granted. They quite often have to force

themselves through the day, and may prop themselves up with caffeine to give them the energy they need to complete whatever tasks they have facing them. As time goes on, these individuals tend to need more and more sleep. However, despite taking more sleep, they very often feel very tired on waking.

'Fatigueability'

Adrenally weakened individuals often have little in the way of energy 'reserve'. Not only do they generally feel tired, but they often get tired out quite easily. I use the term 'fatigueability' to describe this feature of the condition. For people with adrenal weakness, any additional stress (of a physiological and/or emotional nature) on the body can cause real energy lows. A busy week at work, the stress associated with a child's illness, or a couple of late nights can be all it takes to bring energy crashing down.

One activity which tends to bring this concept to the fore is exercise. Individuals with good adrenal function tend to feel buoyed up and energised by exercise. While adrenally weakened individuals may feel emotionally satisfied to have taken exercise, the fact is it can lead them to feel tired and 'wiped out'. Some individuals are so compromised that even orgasm leaves them feeling drained and physically weak.

Fatigue and 'fatigueability' are two very common features of the conditions 'chronic fatigue syndrome'. In my experience, adrenal weakness is a common underlying feature in this condition. What is more, many cases of chronic fatigue syndrome tend to respond to measures designed to support adrenal gland function.

Low blood pressure

Low blood pressure (hypotension) is quite a common feature in individuals who have weak adrenal function. The normal blood pressure

is usually around 120-130/70-80 mmHg. Adrenally weakened individuals often have a blood pressure of 110/70 mmHg or less. These individuals also tend to have a blood pressure which drops on standing from a seated or lying position. This condition, the medical term for which is 'postural hypotension', can cause occasional dizziness on standing.

There is a theory that the hypotension characteristic of adrenal weakness is caused by a failure of the adrenal glands to secrete sufficient quantities of the hormone aldosterone. A lack of aldosterone can lead to the body losing sodium, lowering the blood pressure as it does this.

Salt craving

Some individuals with adrenal weakness will crave salt. Probably what is going on here is that the body is looking to salt to help replenish sodium which is not being retained due to a lack of aldosterone or other hormones.

The need to eat regularly

Individuals with adrenal weakness tend to need to eat regularly to keep them from feeling weak and light-headed. If the body is not being fuelled from the outside (by eating), the body needs to generate sugar from the breakdown of stored fuels in the body such as glycogen in the liver. If the adrenal glands are weakened, it is possible that the stress hormones such cortisol are not made in sufficient quantities to enable adequate amounts of sugar to be mobilised in this way.

Is adrenal weakness your problem?

1. Do you sometimes feel dizzy on standing from sitting or lying down?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

2. Do you ever crave salt or salty foods such as salted peanuts or crisps?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

3. Do you suffer from persistent fatigue which does not appear to have any identifiable cause?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

4. Can you feel 'wiped out' after strenuous exercise?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

5. Are you prone to mood swings and/or irritability if a meal is skipped?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

6. Do you feel the need to eat very regularly?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

7. Do you feel tired or groggy on waking, despite sleeping for eight or more hours?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

8. Are you generally slight in stature and find it difficult to gain weight?

Yes – 4 points

No - 0 points

9. Do you tend to 'feel the cold' but also find yourself intolerant of heat too?

Yes – 4 points

No - 0 points

10. Do you tend to be prone to allergic conditions such as hay fever, asthma, or sensitivity to perfumes, pain fumes and cigarette smoke?

Yes – 4 points

No - 0 points

0 – 15: adrenal weakness is unlikely

16 – 28: adrenal weakness is quite likely and measures taken to strengthen adrenal function are likely to be of benefit

29 and above: adrenal weakness is very likely, and measures taken to strengthen adrenal function are highly recommended

What causes the adrenal glands to weaken?

The adrenal glands are only really designed to cope with relatively defined periods of stress. During our evolution, the adrenal glands were adapted to coping with relatively short and defined periods or stress. However,

these days, the frenetic pace of life and the challenges brought by modern-day living can cause the adrenal glands to weaken in time. Almost incessant stimulation of the adrenal glands can take their toll eventually.

In my experience, adrenal weakness almost always manifests in individuals who are 'doers'. Usually from an early age, these individuals have been used to packing a lot into the day. As children, these individuals are often quite academic and competitive, possibly with a sporty bent too. They often progress to busy jobs with long working hours. If they are women and have opted for a family, usually they are juggling a number of different commitments. Some individuals find describe themselves as chronically 'stressed', and are often consumed with personal, financial and/or work-related pressures.

It is also possible that the adrenal glands may malfunction as a result of something known as 'auto-immune disease'. Autoimmune diseases are those in which the immune system reacts against the body's own tissues. Addison's disease (adrenal insufficiency) is known in many cases to be an auto-immune disease, where the immune system is reacting to adrenal tissue. It is entirely possible that some individuals with low adrenal function have it due to this same mechanism.

Laboratory tests for adrenal function

At this stage, it is probably useful to distinguish adrenal weakness from another condition – 'adrenal insufficiency'. This condition, also known as 'Addison's disease', is characterised by extreme adrenal weakness to the extent that regular doses of steroids (such as cortisol) and perhaps other drugs are necessary to maintain health. This condition is severe, but thankfully rare.

To understand the laboratory tests for adrenal function, we need to know a little more about the physiology of the adrenal glands. The secretion of stress hormones is governed by another hormone known as adrenocorticotrophic hormone (ACTH for short). ACTH is secreted by a small organ at the base of the brain known as the 'pituitary gland'. When we become stressed, the pituitary gland makes more ACTH, which stimulates the adrenal glands to make stress hormones such as cortisol. When the stress goes away, ACTH levels decline and so does the production of stress hormones from the adrenal glands.

The main conventional medical test used is something called the 'short ACTH stimulation test' – also known as the 'Synacthen® test'. Here a blood sample is taken, after which an injection of ACTH is given. Half an hour later a second sample of blood is taken. The cortisol levels are measured in both samples. If the first sample shows a low level of cortisol, and/or if there is not a sufficient rise in the cortisol level in response to ACTH, further testing is usually advised.

The next test which is commonly used is known as the 'prolonged ACTH stimulation test'. Here, ACTH is given on three consecutive days. If the cortisol level has failed to reach a certain level six hours after the last injection, Addison's disease is diagnosed.

Many doctors do not believe in the concept of adrenal weakness. The attitude here is that if blood tests do not show Addison's disease, then the adrenal gland function is fine. However, is it not possible that between fabulous adrenal function and Addison's disease there are many shades of grey in between? The fact is, the conventional criteria used to diagnose adrenal problems tell us only whether or not someone has Addison's disease. Unfortunately, most individuals with evidence of with adrenal weakness are simply labelled as 'normal'.

One person who did a lot of pioneering work on adrenal health is the American doctor William McK Jefferies. In his book *Safe Uses of Cortisol Acetate* (Charles C Thomas Publisher Ltd, Spingfield, Illinois, USA), he describes his own version of the short ACTH test. Here, cortisol levels are compared before and ½ - 1 hour after an injection of ACTH. According to Dr McK Jefferies, the second sample does not show a doubling of the original cortisol level, this signifies adrenal weakness.

Adrenal hormones can also be measured using saliva samples. One of the most commonly used tests is known as the adrenal stress index (ASI) test. Here, four saliva samples taken at intervals during the day are measured. The test aims to detect any abnormality in the 'normal' levels of cortisol which are generally high in the morning, and gradually decline during the day. In addition, one or more of these samples is also analysed for levels of DHEA.

Any disruption of the cortisol rhythm and either high (rare) or low (common) DHEA suggests adrenal weakness. One of the reservations I have with this test is that, like most tests, it really only provides a snap-shot of adrenal function on a given day. Also, even though the test takes several measures of cortisol in that day, it does measure the adrenal *response.* Plus, there is much controversy about whether it is possible to measure adrenal hormones accurately in the saliva, particularly the active form of DHEA known as DHEA-sulphate.

If your symptoms suggest adrenal weakness, then by all means seek out a practitioner who can give you access to these tests. *All* tests have some use and validity. However, remember also that *no* test will *always* tell us what is really going on in the body.

Blood Pressure, adrenal weakness and chronic fatigue

In practice, if an individual's symptoms suggest low adrenal function, I will want to take their blood pressure. I am suspicious if this is on the low side (110/70 mmHg or less). Even more telling is if the blood pressure tends to drop on standing (the medical term for which is 'postural hypotension').

Clinically, many individuals with adrenal weakness have been diagnosed a condition known as chronic fatigue syndrome (CFS). The official line on the cause of CFS is that it remains a mystery. However, in my experience there are many different factors which can underlie CFS including food sensitivity, nutrient deficiency, inefficient breathing and low thyroid function. However, I see adrenal weakness as a very common and under-diagnosed problem too.

It comes as no surprise that while postural hypotension is a common feature in adrenal weakness, research suggests that it is a common feature in CFS too (11). Another study which suggests a link between CFS and adrenal weakness is one in which it was found that CFS sufferers had less than half the amount of adrenal tissue compared to healthy subjects (12). Work in animals has shown that stress initially causes the glands to enlarge. However, in long term stress, glands have been shown to reduce in size or 'atrophy'.

Restoring adrenal health

I'll say from the outset, restoring health to the adrenals is not always easy, and doesn't generally happen overnight. However, if successful, adrenal enhancement almost always leads to a significant and sustained improvement in an individual's well-being and vitality. There are a number of different approaches which can be taken, including the use of natural substances.

Supplements for supporting the adrenal glands

There are a range of nutrients and herbs which appear to help support adrenal function and restore health to the area. Some of the most widely natural agents are:

Vitamin C

In the whole body, the place where vitamin C is found in highest concentration is the adrenal gland. Vitamin C is thought to play an important part in adrenal gland function, which is why practitioners of natural medicine often advise supplement with this nutrient in cases of adrenal weakness. A good dose would be 1 g of vitamin C, twice a day.

Vitamin B5

Vitamin B5, also known as pantothenic acid, is believed to be important for adrenal gland function. 500 mg, taken twice a day provides a level of vitamin B5 which is thought to help support adrenal gland function.

Ginseng

One of the most popular agents for treating adrenal weakness is Siberian ginseng (Eleutherococcus senticosus). Siberian ginseng has been shown to have a number of beneficial effects on the physiology of both animals and humans. One of this herb's most important effects appears to be an ability to protect the adrenal glands, increasing their capacity to withstand prolonged stress. In animals, Siberian ginseng has been shown to protect against the effects of a wide range of potential stresses, including heat, cold, surgery, blood loss and infection. Numerous studies have shown that Siberian ginseng can be of benefit in a diverse array of individuals including explorers, sailors, deep sea divers, rescue workers, truck drivers, pilots and factory workers.

Siberian ginseng is widely available in health food stores. The normal dose is 1 – 4 g of dried herb per day, or 2 – 8 ml per day of a liquid extract. Sometimes, Siberian ginseng products will be standardised to the content of one of its active ingredients, a compound known as eleutheroside E. 1.25 g tablets containing 0.7 mg of eleutheroside E should be taken 1 – 3 times a day. Traditionally, it is recommended that Siberian ginseng be taken for periods of six weeks, interspersed with breaks of two weeks. Siberian ginseng appears to be safe to take in the long term.

Liquorice

Another natural substance which is commonly used in natural medicine to treat adrenal weakness is liquorice. Liquorice contains a compound called glycyrrhizin. In the body, glycyrrhizin breaks down to glycyrrhetinic acid. Glycyrrhetinic acid has anti-inflammatory actions in the body, and also slows down the breakdown of cortisol in the body. In this way, liquorice can enhance the effects of cortisol, and may help to 'take the strain off' the adrenal glands.

The normal recommended dose is 5 - 6 g of whole liquorice root taken in two or three divided doses during the day. Alternatively, 250 – 500 mg of concentrated extract can be taken three times a day. High dose liquorice can lead to sodium accumulation and a loss of the mineral potassium in the body. These changes may increase blood pressure. Even though this may have positive benefit for someone suffering from hypotension, it does pose a small risk too. For this reason, it is best that liquorice is taken under the supervision of a practitioner experienced in its use.

Medications

Cortisol

If the adrenal glands are weak, and there is evidence that they are not producing sufficient quantities of cortisol, then it makes sense that

supplementing with cortisol might help. This concept is explored in the book *Safe Uses of Cortisone Acetate*. Here, William Mck Jeffries writes about the use of low-dose cortisone in the treatment of many health conditions including chronic fatigue. The dosing regime he recommends is 5 mg of hydroxycortisone, four times a day (one dose with each meal and then again before bed). He reported impressive results for many individuals with evidence of adrenal weakness using this regime.

There is some support for the use of low-dose hydrocortisone in the medical literature. One study found that 5 – 10 mg of hydrocortisone given for just a month significantly reduced fatigue and disability in a group of individuals with CFS (13). Another trial found benefits were had 25 – 35 mg of hydrocortisone a day, although this dose also seemed to suppress the adrenal glands' own output of cortisol.

While hydrocortisone may offer benefit to adrenally weakened individuals, particularly those with CFS, it needs to be used with caution. My advice is generally that no more than 15 mg be taken each day (usually in three or four divided) as any more may suppress the adrenal function. I do recommend working closely with a practitioner who is experienced in the use of low dose cortisol.

DHEA

As with cortisol, DHEA may be used to supplement inadequate levels of this hormone due to adrenal weakness. Useful doses are in the range of 5 – 15 mg for women and 10 – 30 mg for men. While DHEA is available over-the-counter in some countries (notably the USA), my feeling is that it should not be used unless under the guidance of a practitioner.

Adrenal glandulars

In the next chapter I talk about how the use of preparations of thyroid tissue (also known as 'thyroid glandulars') may help individuals who have

low thyroid function. It is also true that adrenal glandulars can help some sufferers of adrenal weakness. Again, adrenal glandulars are best taken under the supervision of a practitioner experienced in their use.

Summary

- The body likes to keep the level of sugar in the bloodstream within relatively narrow limits

- Blood sugar instability is a major underlying factor in overweight and other health problems including fatigue and diabetes

- In most cases, blood sugar instability can be diagnosed on the basis of symptoms. The best laboratory test is the glucose insulin tolerance test

- Individuals who suffer from hypoglycaemia should base their diet around foods which release sugar slowly into the blood stream including beans, pulses, vegetables (other than the potato) and fresh fruit. Protein in the diet (e.g. natural yoghurt, eggs, meat, fish and tofu) can also help to stabilise blood sugar levels

- Regular meals should be taken (including breakfast) with healthy snacks such as fruit and raw nuts in between

- Supplements of certain nutrients such as chromium, vitamin B3 and magnesium can help improve blood sugar stability and control the symptoms of hypoglycaemia

- Weakness in the adrenal glands can underlie a problem with blood sugar imbalance and may cause significant health issues.

- Common problems associated with adrenal weakness include fatigue, fatigue after exercise, the need for regular meals, salt craving and low blood pressure

- Nutrients and herbs which can help restore adrenal health include vitamin C, vitamin B5, Siberian ginseng and liquorice

- Other agents which may help to restore adrenal health and improve health include cortisol, DHEA and adrenal glandulars

- Better blood sugar balance and restoration of adrenal gland health can often lead to very significant improvements in energy, general health and well-being

Chapter 5
Maintain Thyroid Function

The thyroid is a gland, about the size and shape of a bow tie, which sits in the front of the neck just above the top of the breastbone and collarbones. The thyroid is essentially the body's thermostat, and determines its temperature and the speed at which it burns fuel. Each cell in the body burns fuel for energy, some of which is released as heat. The speed at which the cells do this, also known as the 'metabolism', is regulated by the thyroid. If, for any reason, thyroid function should falter, all the cells in the body tend not to function as well as they should. The problems associated with low thyroid function are incredibly diverse and include a tendency to feel the cold, fatigue, mental lethargy, frequent infections, depression, and dry skin and hair. Ensuring proper thyroid function has important implications for physical and mental health.

The physiology of the thyroid

The thyroid produces a variety of hormones the most important of which is thyroxine (also known as 'T4'). Outside the thyroid, T4 is converted into T3 (tri-iodothyronine), which is the active form of the hormone. In normal circumstances, T3 travels in the bloodstream to all the body's tissues, entering each of the body's cells. T3 stimulates cells to burn fuel with oxygen to release energy, some of this being released as heat. Essentially, the more T3 there is around, the faster metabolism, the less tendency there is for weight gain and the warmer the body is.

The thyroid's production of hormones is itself regulated by another gland, the pituitary, which sits underneath the front of the brain. One of the pituitary's jobs is to monitor and control the level of thyroid hormones in the blood. If the pituitary senses that thyroid hormone levels are dropping, it increases its own production of a substance known as 'thyroid

stimulating hormone' (TSH). This hormone instructs the thyroid to produce more thyroid hormones, thereby up-regulating the metabolism. As the thyroid hormone levels rise, the production of TSH is down-regulated, bringing thyroid hormone levels back down again. This mechanism is designed to ensure stable levels of thyroid hormones in the body.

The thyroid and health

The effect of the thyroid hormones on the body is far-reaching. A lack of thyroid hormones, referred to by the medical profession as hypothyroidism, can bring about a whole host of symptoms and conditions. We have already touched on the tendency for a sluggish thyroid to lead to weight gain. In addition, low levels of thyroid hormones the body tends to retain water, salt and protein. Blood cholesterol levels also tend to rise when thyroid hormones are deficient. The growth of the skin, hair and nails all tend to be slower when thyroid hormones are in short supply. Thyroid hormone is essential for the normal functioning of the nervous system, and mental fatigue and sluggishness are common in individuals who suffer from low thyroid function. The thyroid's function is intimately woven with other elements of the hormone system, such as glands which control sexual function. As a result, men often manifest low thyroid function as impotence while women may suffer from menstrual problems including heavy or irregular periods.

Is low thyroid function your problem?

The questions in the following questionnaire are designed to help you identify a potential thyroid problem. Score each question as indicated, and then add up your total score.

Do you:

1. Suffer from unexplained fatigue or lethargy?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

2. Find that your energy can be low in the morning even after a good night's sleep?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

3. Feel the cold, and have to wrap up more than others?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

4. Suffer from cold hands and feet?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

5. Suffer from dry skin?

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

6. Suffer from dry or brittle hair?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

7. Find that you do not sweat much even when you exercise?

No – 0 points

Yes – 4 points

8. Suffer from constipation?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

9. Find it very difficult to lose weight, despite eating less or exercising more?

No – 0 points

Yes - 5 points

10. Suffer from swelling in the face?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

11. Find that your eyelids tend to be swollen and puffy?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

12. Find that you suffer from bags under your eyes?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

13. Feel that your memory is not what it used to be?

No – 0 points

Occasional or mild problems – 1 points

Frequent or severe problems – 2 points

14. Have yellowing of the skin, particularly in the palms of the hand and soles of the feet?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

15. Suffer from depression?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

16. Suffer from ankle swelling?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

17. Feel that your movements are somewhat slow?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

18. Suffer from a hoarse voice which is not connected to throat infection?

No – 0 points

Occasional or mild problems – 3 points

Frequent or severe problems – 5 points

19. Think that you are less mentally sharp than you used to be?

No – 0 points

Occasional or mild problems – 2 points

Frequent or severe problems – 4 points

20. Feel that your eyebrows are not as thick as they used to be?

No – 0 points

Yes - 5 points

Interpreting your score

0 – 9: low thyroid function is very unlikely

10 – 24: low thyroid function should be considered as a possibility and testing (see below) is recommended

25 – 39: low thyroid function is quite likely, testing is highly recommended

40 and above: low thyroid function is very likely, testing is highly recommended (see below), and thyroid support is likely to be of benefit

Testing for low thyroid function

If answering the questionnaire above has aroused your suspicions about your thyroid, you may consider having your thyroid status assessed with a conventional blood test. My feeling is that while conventional blood testing may pick up some individuals with low thyroid function, it misses a lot of others. Let me explain why:

T4 and TSH – good in theory but not necessarily in practice

The conventional medical test for hypothyroidism involves drawing a blood sample and having this measured for TSH (thyroid stimulating hormone) and T4 (thyroxine). In theory, if thyroid function is low, then we should see this reflected in a low T4 level. As TSH tends to rise as T4 falls, the low T4 should also be accompanied by a high TSH level. Some individuals with hypothyroidism do indeed have low T4 and high TSH

levels. However, many people who have clear symptoms and signs of low thyroid function, have 'normal' blood test. Why is this?

The normal ranges of thyroid hormones are determined by measuring the hormone levels of a people deemed to have normal thyroid function. The question is, how can we be sure that the sample of the population used to assess what is 'normal' are actually representative of good thyroid function? Assessing thyroid function clinically is notoriously difficult, and this certainly opens up the possibility that the population whose hormone levels used to set the normal range actually included individuals with sub-optimal thyroid function.

Another potential deficiency of conventional thyroid testing is that while it may show the level of hormones in the bloodstream, it does not tell us how active and effective those hormones are. It is now well recognised, for instance, that individuals can become resistant to the hormone insulin (known as 'insulin resistance'), which may eventually lead to a problem with diabetes. It is possible, therefore, that individuals may have perfectly normal levels of thyroid hormones in their systems, but that their bodies are failing to respond.

Assessing thyroid function using a simple home test

Last century, an American doctor called Broda Barnes became very interested in the thyroid. After years of research, he came to the conclusion that it is possible to get a very good idea of thyroid function by measuring an individual's temperature first thing in the morning (1). The theory behind this is that in the absence of an infection, the body's temperature is essentially determined by thyroid function. Low thyroid function is therefore often reflected in a low body temperature.

To assess body temperature, Barnes developed the following test, which is usually referred to as the Barnes Test.

Take a mercury thermometer and before you go to sleep shake it down and leave it by the bed. On waking, before getting up, place the bulb of the thermometer in your armpit and wait for a full 10 minutes. Record the temperature.

A mercury thermometer should be used as these seem to be more accurate than the newer digital models currently available. The 10 minute cooking time is important because it is essential to make sure the mercury has risen to its maximum value before the reading is taken. Men and post-menopausal women can take the temperature on any day, as long as they don't have an infection. Because pre-menopausal women's temperatures tend to fluctuate with the hormonal cycle, Barnes suggested that the most accurate time to assess temperature was on the second, third and fourth day of the period.

The normal body temperature in the morning is between 36.6 and 36.8 °C (97.8 – 98.2 °F). A temperature which is 36.4 °C (97.4 °F) or less strongly suggests low thyroid function.

What could be causing low thyroid function?

A few theories have been put forward to explain the apparent prevalence of thyroid-related problems in the population. These are:

1. Iodine deficiency

Iodine is an essential nutrient for thyroid function. Without it, the thyroid gland tends to malfunction and enlarge, creating what is known as a goitre. Goitres, and other symptoms of hypothyroidism, are rare in Japan, a country with a population which has a very high intake of iodine. Iodine deficiency, and therefore goitres, are common in mountainous or inland areas which are far from the sea such as the Alps and Pyrenees

mountain areas in Europe, the Andes in South America and the Himalayas of Asia.

Another theory relating to iodine is that it may not be able to do its job, even though it is available in adequate amounts to the body. Iodine comes from the same chemical group as fluorine, chlorine and bromine. These substances are becoming increasingly more common in the environment, and some scientists think that they may interfere with the way iodine is utilised by the body.

2. Chemical Pollutants

There is some evidence that goitres can occur as a result of poisoning by chemical substances. The increasing prevalence of pollutants in the environment might therefore be a factor in problems with hypothyroidism.

3. Genetic factors

Hypothyroidism can lead to increased susceptibility to infection and reduced sexual functioning. Because of these factors, many sufferers of hypothyroidism did not get the opportunity to pass their genes on to future generations. With the advent of antibiotics and effective thyroid treatments, this has all changed, meaning that the genes which may increase the likelihood of thyroid disease are now likely to be much more prevalent.

Treating a sluggish thyroid

There are several options for treating a low thyroid function. From a physiological point of view, the main treatments are:

1. Nutrients and herbs
2. Conventional drugs such as thyroxine
3. Thyroid extracts

1. Nutrients and herbs

There are several herbs and nutrients which may be of benefit in supporting thyroid function. These are the best of the bunch:

Iodine:

As discussed earlier in the chapter, iodine is an essential component of the thyroid hormones, and without it, the thyroid simply cannot make these hormones in sufficient quantity. Supplementing with iodine, for instance in the form of kelp or dulce, may therefore help to improve thyroid function.

Cautions:

Iodine is one of those nutrients for which too much can be a bad thing. High levels of iodine may in fact suppress thyroid function. Do not exceed 500 mcg per day unless under the instruction of a doctor with an interest in this area.

Selenium

Low selenium may reduce the effectiveness of the thyroid hormones. Selenium participates in the conversion of T4 into T3, and a deficiency of selenium may stall this process. Other studies have also linked low levels of selenium with hypothyroidism.

Caution:

Very high levels of selenium may actually lower levels of T3. It is important, therefore, not to exceed 300 mcg per day unless under the advice of a doctor.

Vitamin A

Vitamin A has a very important role to lay in thyroid function, and a deficiency of this nutrient does seem to significantly affect thyroid output.

Caution:

Women who are pregnant or are planning pregnancy should not take more than 10,000 IU or more of vitamin A per day in supplement form.

Calcium and magnesium

Calcium and magnesium are important minerals which help in the regulation of the function of the thyroid and parathyroid glands.

L-Tyrosine

L-Tyrosine is an amino acid which has an essential role in the formation of thyroid hormones. Tyrosine has also found to help in the treatment of hypothyroidism.

L-Glutamine and L-Glycine

These two amino acids are required for normal functioning of the thyroid gland.

2. Thyroxine

The conventional medical approach to hypothyroidism is centred around the use of a synthetic version of the hormone thyroxine (T4). This is normally administered at a dose of 50 - 100 mcg per day, and increased in doses of 50 mcg every three or four weeks until blood results come into the normal range. The usual maintenance dose is between 100 and 200 mcg.

Certainly, some hypothyroid individuals feel significant benefit from taking thyroxine in the right dose. However, there are also many others who do not. Often, individuals who have been diagnosed hypothyroid feel little or no better on thyroxine treatment.

One reason for this may be that some individuals may have a problem converting thyroxine in to T3, the active form of the hormone. If you are currently taking thyroxine and feel it is not doing as much for you as you would like, it might be worth adding a selenium supplement to your regime, as this helps in the conversion of thyroxine to T3. Take 200 mcg per day.

Some doctors prescribe T3 for low thyroid function, either with or without thyroxine. This obviously gets round any problem there may be with the conversion of thyroxine into T3. T3 has a much shorter duration of action in the body than thyroxine, and this makes regular dosing quite important. However, T3 can offer significant benefit for individuals who do not respond to thyroxine,

In addition to thyroxine, the thyroid also secretes a hormone called di-iodotyrosine. Some doctors believe that this hormone has a more important effect than thyroxine in regulating thyroid gland function. This may help to explain why some individuals fail to feel real benefit from treatment with thyroxine alone.

3. Thyroid glandulars

Some doctors, usually naturally orientated ones, recommend supplements which contain actual thyroid tissue. These extracts, often referred to as 'thyroid glandulars', are usually made from cow or pig thyroid, and contain not just T4, but T3 also. It is believed that the range of hormones available in a glandular supplement is much more likely to have a beneficial effect of hypothyroid individuals than the single hormone conventional treatment.

Some individuals who do not do well on thyroxine seem to respond much better to glandular supplements. The most widely used thyroid glandular in the USA is a product called Armour desiccated thyroid. Often, patients

are started on ¼ - ½ grain of this product per day, after which the dose is increased by ¼ - ½ grain increments every seven to ten days, until the patient feels well. Adults usually require a maintenance dose of between one and three grains a day.

Apart from containing a range of hormones, rather than just one, are there any other advantages for using a thyroid glandular over thyroxine. Individuals who start on thyroxine usually take it for the rest of their lives. This doesn't seem to be so true for individuals on thyroid glandulars. It seems that after a period of treatment (between one and two years is typical) it is possible for individuals to wean themselves off thyroid glandulars without ill effect. Why this should be is not known for sure, but it is thought that giving glandular products may give the thyroid the opportunity to rest and recover in time. I have a strong suspicion that thyroid recovery of this nature is even more likely if other thyroid supportive measures are taken. I often find that the best results are achieved through using a combination of nutrients, herbs and glandular based products.

Cautions:

I strongly recommend that anyone considering using thyroid glandulars should work with a doctor with experience and expertise in this area. Thyroid glandulars must be used with special caution in individuals with a history of heart disease. Thyroid glandulars do have the potential for side-effects if taken in excess such as anxiety, nervousness, palpitations, excessive weight loss and insomnia.

Monitoring your Progress

With the appropriate support, thyroid function can improve in time. As it does this, you may start to notice changes in your health that reflect this improved function. You can expect general improvements in your levels

of energy, both physical and mental, and less tendency to depression if this is a feature in you. In my view, the best way to monitor your progress with regard to your thyroid function specifically is the Barnes Test. I have found in practice, that symptoms of low thyroid do not resolve unless the temperature approaches normal, and that the temperature correlates very well with the overall functioning of the thyroid.

Summary

- Undiagnosed low thyroid function plays a major role in problems with health and vitality

- Common symptoms of low thyroid function include sensitivity to cold, weight gain, cold hands and feet, dry skin and hair, puffiness around the eyes, low mood and lethargy

- The conventional blood tests designed to diagnose low thyroid function may miss a significant proportion of sufferers

- Diagnosing hypothyroidism may be better done on the basis of an individual's symptoms and the Barnes temperature test

- The treatment options for a sluggish thyroid include thyroxine (conventional treatment), herbs and nutrients, and thyroid glandulars

- The Barnes test is generally a good guide to how well the thyroid is responding to treatment

- Supporting the thyroid with appropriate agents often leads to significant enhancement in general health and well-being

Chapter 6
Take Exercise

During exercise the circulation pumps the blood more forcefully into the tissues, supplying them with greater amounts of oxygen and nutrients as this happens. It comes as no surprise that most people find exercise energising and exhilarating. Exercise has also been shown to benefit the body and mind in a myriad of ways. Research has attributed a number of health benefits to regular exercise. It is known to improved muscular strength and mobility, reducing the risk of any disability in the long term. Several studies now show that weight-bearing exercise can increased bone density and reduced the risk of osteoporosis. Regular exercise and activity is also associated with a reduced risk of chronic illnesses such as heart disease, stroke, diabetes and obesity. Those who exercise can generally look forward to a longer life too. And if that were enough, there is research which supports the use of exercise in the treatment of psychological conditions such as anxiety and depression. In this chapter we shall be exploring exercise, how much we need to take, and how to go about taking it!

Some general guidelines about exercise

If you haven't exercised for a while, and even if you have, it may be worthwhile taking note of the following general points.

1. Get checked out

If you suffer from a significant illness such as heart disease, high blood pressure or arthritic condition, it is a good idea to check with your doctor that you are fit to exercise.

2. Get in gear

You might need to invest in some suitable exercise clothing. I would suggest that the only piece of clothing you really need is a good pair of running shoes or cross trainers. These will help ensure that you do not jar your body during exercise, reducing the risk of muscular and joint injury.

3. Keep hydrated

Get into the habit of drinking plenty of water on a daily basis. Having water on board before you exercise is well known to enhance performance. Keeping a small bottle of water with you when you exercise and taking sips from this is a good idea too. More information about how to keep up adequate fluid levels in the body can be found in chapter 2.

4. Get planning

If you have a busy life, don't expect for exercise slots to just pop up in your diary. Part of the secret to getting more exercise into your life is to schedule activity sessions in advance. As a rule, it helps to put exercise sessions in your diary just as you might schedule meetings, or lunches or what have you.

5. Warm up

Any exercise session is best preceded by a five minute warm-up. Taking some very gentle exercise to begin with prepares the body for the more strenuous activity ahead. During a warm-up, you will get the heart rate up a bit, increase muscle temperature, activate cooling mechanisms in the body and mobilise the joints. Brisk walking or light jogging is an ideal way to warm up. Straight after the warm-up, take a few minutes to stretch (see below).

6. Cool Down

Just as the body should be started up slowly, it should be turned down slowly too. What this means is that after each session, it's a good idea to go through a period of cooling down. One of the main benefits of cooling

down is that it can help in the elimination of waste products from the muscles, which reduces the risk of soreness setting in a day or two later. So, if you started your session with five minutes of brisk walking or light jogging, repeat this at the end of the session. After the cool down, stretch again.

7. Listen to your Body

If at any point during exercise you feel faint, dizzy, develop chest pain, have unusual difficulty breathing or experience severe muscular or joint discomfort, stop immediately and if symptoms persist, seek medical attention. Individuals with a history of high blood pressure or heart disease should be especially suspicious of symptoms such as unusual shortness of breath or chest pain.

Stretch it Out

Stretching needs to form an integral part of any exercise programme. What stretching does is encourage muscle and joint flexibility. This is important, because even if you are fit and strong, if you lose flexibility, you lose function. Between the ages of 20 and 70 we can expect to lose about 40% of our flexibility, and this had an enormous impact on our ability to do whatever it is we want to do in our lives, whether that be gardening, dancing, golf, marathon running or just getting out of bed or a chair without the need for assistance.

The following stretch routine should ideally be performed everyday, and at least twice on a day where you take exercise (before and after exercise). Stretching is best performed after a short warm-up as warm muscles are more pliable and less prone to injury than cold ones.

Each stretch should be performed in a slow controlled manner. The muscle group being stretched should be taken to a point where it starts to offer

some resistance. At this point a little more tension can be applied, but not so much that the muscle hurts. The stretch should be steady – no bouncing!. Hold each stretch for a steady count of 20, but do remember to keep breathing throughout.

1. Overarm Shoulder Press

Clasp your hands together above your head with your elbows slightly bent. Slowly push your arms backward and hold. Keep looking forward and remember to keep your neck in a comfortable position at all times (avoid craning your head and neck forwards).

2. Underarm Shoulder Press

Clasp your hands behind your back with your elbows slight bent. Slowly, raise your arms and hold. Do not bend forward and remember to keep your neck in a comfortable position throughout.

3. Hamstring Stretch

Place your right foot one step in front of the left. Lean forward by bending at the waist, keeping your back straight and your head up. Support both of your hands on the top of your left thigh. Slowly drop your hips and buttocks backward and downward until you can fell mild tension in the back of the right thigh. Keep your right knee slightly bent throughout this exercise. Repeat this stretch on the other side.

4. Quadricep Stretch

Face a wall and support your body with your left arm, hand placed against the wall. Hold your right foot in your right hand, slowly easing the heel of your foot toward the buttocks. Hold. Keep your left leg slightly bent throughout this exercise, keep your knees together and keep your back straight. Repeat this stretch on the other side.

5. Back Stretch

Lie on your back with your knees bent, and hold the back of your thighs. Slowly pull your knees towards your chest, with you hands clasped behind your thighs. Hold and then relax.

Training Programmes

What follows is a guide to some of the exercise sessions which you can incorporate into your life in order to enhance your health. These simple, low-tech programmes, do not require you to go to a gym or invest in any fancy equipment. The exercises suggestions here are based around three principal activities:

1. Walking
2. Jogging
3. A home circuit session based around both strength and aerobic based activities

Take a Walk

I rate walking as an excellent form of exercise. It's cheap, convenient, recreational and needs no special equipment other than a decent pair of trainers. Now, if the idea of walking for exercise conjures up images for you of lone individuals in top-to-toe sports gear walking determinedly on treadmills, then it may do you well to consider other options. You can don all the gear and join a swanky gym if you want, but there are plenty of other ways too. Maybe you want to walk outside, in a local park, for instance. Perhaps you want to take a partner with you - a sort of walking buddy. Maybe the dog wants to come too. The main thing here is that you should do whatever you enjoy the most. And maybe that will vary from day to day.

A little word of advice about the walking itself: in general, it is better to take quick steps rather than long strides. Longer steps are hard on the joints, especially the knees, and don't allow you to go any faster. Take steps slightly longer than you would normally, landing on your heels and rolling through to your toes.

Although walking is predominantly a lower body exercise, there's no reason why you shouldn't get your upper body involved. Bend your elbows to 90 degrees, relax your shoulders and swing away as you go. This can only help you to use more energy and at the same time give you a better overall workout.

As your fitness improves, you may find that you are able to step up the pace, without getting any more tired. From time to time, you might want to check how long it takes you to get round a set course. Sometimes it helps, especially during the initial stages of a new exercise regime, to get objective proof of your progress. A word of warning here, for goodness sake do not become a slave to the stopwatch. There can be a tendency for individuals who get into timing themselves to get competitive with themselves, often looking to achieve faster and faster times. There will come a point, this does happen to everyone (even world class athletes), where they just can't go any faster, and this may turn out to be a bit of a de-motivator. Besides, getting all fussed about times and speeds tends to detract from the enjoyment of the activity, and is completely unnecessary anyway. So, if you're going to time yourself, do it once in a while, and don't let it get in the way of your enjoyment.

You may wish to start your programme with walks of say fifteen minutes duration. As you become fitter, you might want to build up gradually to 30 minutes or more. Once you can walk briskly for half an hour at a good, even steady pace, then you may consider progressing to jogging.

Keep on Running

If, for whatever reason, walking is the only form of exercise you take, that's fine. However, if you find you can progress to jogging without too much aggravation, then you're probably going to lose weight more efficiently in the long term. This is especially important where time is at a premium. If you've only got 30 minutes of exercise time at your disposal, then going just a little bit faster by breaking into a jog is very likely to reap rewards.

If you are new to jogging, then there's a few pointers which should help you get the most from your exercise sessions. First of all, take it easy to begin with. What you should be looking to achieve is a good steady pace throughout the run. There is a tendency for individuals new to running to go off too fast, which may mean they need to stop prematurely. The trick is to start off at a pace which is actually lower than what you think you can sustain. If you still feel comfortable after five or minutes, then you can step up the pace a little, but not before. As you get more experienced, you will be able to judge your natural pace much more easily, and settle into this very quickly after a warm-up and stretch. Don't forget the warm-up and stretch!

When you begin to jog, you might find that you are unable to keep going for more than a few minutes at a time. That's fine. If you want, you can run for, say, three or four minutes, and then walk for a while. Start running again when you feel you are able to. Gradually, you should be able to build up the amount of time you are able to run for without needing to stop, while gradually reducing the amount of recovery time you need in between. Whatever your ratio of jogging to walking, aim initially to be exercising for a total of about 15 minutes. Again, you can gradually increase the total exercise time as you get fitter. Build up to sessions lasting about 30 minutes.

Now, if you really get into the running thing, you might want to get a bit more adventurous. Maybe you start jogging in a place which has some inclines and hills. Take small steps and pump those arms up any incline, and hold yourself back a little on your way down - running downhill can be hard on the knees, back and ankles.

Another way to spice up your jog is to vary the pace. Perhaps you can experiment with picking up the pace for 30 seconds or so, going more slowly for a minute and then repeating this cycle. Maybe, if you are running in a place which is lined with lampposts or trees, you can use these as markers for your changes of pace.

A caveat

While regular exercise may be generally beneficial to health and well-being, it may be counter-productive for certain individuals. In my experience, those that show signs and symptoms suggestive of adrenal weakness (see previous chapter) tend to be further compromised by strenuous exercise. For this reason, while adrenal restoration is taking place, I do not recommend any exercise which is strenuous or causes the individual to get very out of breath. Walking is usually fine, but running is generally to be avoided. Other activities that may suit adrenally compromised individuals include light swimming and yoga.

How much exercise?

To get a real weight loss and health related benefit, you're probably going to need to set aside enough time to take half an hour's worth of exercise, about four times a week. Five times is better, three will do. These figures are only guides. If you can only grab 20 minutes of exercise, twice a week, then that's clearly much better than none. So, do whatever you can manage, and be satisfied with what you have achieved. If you can do a little more the next week, fine. If you can't, that's fine too.

How hard does the exercise need to be?

Since the 1960s, the heart rate has been used as a measure of the intensity of exercise. It has been established that an exercise effort of between 60 - 80% maximum heart rate (MHR) is sufficient to gain fitness and health benefits. The MHR is the rate at which the heart rate peaks with maximum effort. The MHR can be estimated using the following formula:

Maximum Heart Rate = 220 - age

The maximum heart rate for a 40 year old is therefore 180. This equates to a target heart rate between 108 and 144.

To find out whether you are exercising to the correct intensity, stop exercising for a moment to take your pulse. The pulse can be felt on the inside of your wrist close to the base of your thumb. Count the number of beats you feel in 15 seconds. Using the example above, for a 40 year old individual, the number of beats in 15 seconds should be between 27 and 36.

A more high-tech approach to this would be to invest in something called a 'heart rate monitor'. Essentially, this consists of a band worn around the chest and a watch. The band contains a heart beat sensing device which is then beamed to the watch for display. Good, basic models are generally inexpensive and can be bought in good sports stores.

The very low tech guide to assessing exercise intensity is simply to gauge how hard you're working. Generally, if you are taking what is known as an 'aerobic' activity such as brisk walking, jogging, cycling and rowing, you should aim to be so breathless that you just about snatch a conversation. At this level of intensity you will be working hard enough to get real benefit at a pace you can sustain.

Aerobic – Resistance Training

So far, this chapter has focused on the benefits of walking and jogging for health. These activities are what are known as 'aerobic' exercises. This means that they are sustainable and demand the body to use a lot of oxygen. Other examples of aerobic activities include rowing, aerobics (of course!), cycling and step machine exercise. Now, if you have any particular favourites in this bunch, then go for it. They make great substitutes for walking and jogging, their only down-side is that they demand special equipment or access to a gym.

Strength training

It's now time to turn our attention to a type of exercise known as 'strength' or 'resistance' training. For many of us, strength training conjures up images of men lifting heavy weights, building big biceps and broad shoulders. However, improving muscle strength doesn't necessarily mean building bigger muscles. Plus, there is good evidence that strength training can have a range of benefits which can be a very powerful adjunct to those we get from aerobic activity. One major boon of strength training is enhanced metabolism.

Muscle metabolism

Muscle is what is termed 'metabolically active'. Muscle burns calories all of the time, even at rest. This means that the more muscle you have, the faster your metabolism is and the less likely you are to put on weight. The bad news is that, left to their own devices, muscle tissue tends to dwindle in time. Adults who do not maintain their muscle mass through strength training lose between 5 and 7 lbs of muscle every 10 years. Now, because muscles burn calories, this muscle loss leads to an inevitable drop in the

body's metabolic rate. In fact, studies indicate that the metabolic rate drops by 2 – 5% every 10 years, and loss of muscle tissue is probably the most important thing here.

The best way to keep the muscle bulk strong and healthy is strength training. It turns out that even relatively small changes in muscle mass can pay big dividends in the long term. Research has showed that just be putting on 3 lbs of muscle increases the metabolism by 7%. Individuals who gain muscle burn more calories, even when they're inactive, and are less likely to accumulate fat as a result. To get this extra three pounds of muscle doesn't necessarily take too much effort either. One study showed that this sort of gain could be achieved by both men and women training for 25 minutes, three times a week for just eight weeks.

Resistance training for improved muscle strength

Another major benefit of resistance training is that it improves muscle strength. This is important because as we age, the muscles can weaken, and this is a major cause of disability. Studies show that even modest strength training can help maintain and restore mobility, and this obviously has important implication for our quality of life, particularly as we age.

Below is set out an exercise circuit for use in the home. This workout does contain strength based exercises which are designed to help you at maintain and develop your muscle strength and mass, interspersed with aerobic exercises.

The Home Circuit

The home circuit is based on a series of exercises which alternate between resistance and aerobic–focused activities. If you complete the entire circuit

three times, this should take about 20 – 30 minutes. If you can manage a couple of such sessions each week, then there's no doubt that you will be ensuring that you will be going a long way to serving your body's exercise needs.

Some technical points about the home circuit session

1. Perform the exercises in order, ensuring that you alternate between resistance and aerobic activities.

2. The exercises should be performed at a slow or moderate pace. Aim at a good consistent pace throughout rather than getting through the session as quickly as possible.

3. Aim to do 10 repetitions of each of the resistance-based exercises, followed by 30 seconds of each aerobic exercise. The resistance exercises should be performed with a controlled, smooth action. If you are in the process of getting fit, you might want to restrict the aerobic exercise to something not too strenuous such as actively marching on the spot.

4. Remember to keep breathing! During the resistance exercises it is common for individuals to restrict their breathing.

5. Don't forget to stretch before, and particularly after, the home circuit.

1. Press-ups

There's a choice of three here:

Full – keep your hips and knees straight. Your hands should be directly under your shoulders. Lower your body by bending your elbows until your chest is about 10 cm from the floor. Push up again.

Half – similar to full press-ups, but the knees are on the ground set behind the hips.

Box – similar to the half, but the knees are directly under the hips.

2. Active march

March on the spot, lifting your knees high and pumping your arms.

3. Sit-ups

Lie with your back flat on the floor with your knees bent and your feet flat. Place one hand on the thigh of the same side and the other hand behind your neck. Slowly lift your shoulder off the floor by squeezing your abdominal muscles. Curl your upper torso and you move forward towards your knees. Slide your hand along your thigh until your wrist gets to your knee. Hold briefly, and lower yourself back to the ground slowly and in a controlled fashion. Keep your lower back in contact with the floor throughout this exercise, and do not pull your neck and head with the supporting hand.

4. Jog on the Spot

Run on the spot keeping upper and lower body relaxed.

5. Bicep Curls

Take two plastic 1½ L bottles full of water, one in each hand. Hold the bottle with palms up and forearms parallel to the floor. With your feet shoulder width apart and knees slightly bent, bend your arms at the elbow, slowly raising your hands towards your chest. Pause briefly at the top and then lower the bottles with an easy, smooth action.

6. Ski Jumps

Assume the ski position with feet slightly apart, knees slightly bent, your body slightly forward and your arms out in front. Jump slowly from side to side, cushioning your landing with your knees.

7. Squats

Starting with your feet a little more than shoulder width apart, toes pointed out at about 45 degrees and knees slightly bent, sit back until your thighs are roughly parallel with the floor. Keep your knees over your ankles and swing your arms forward as you sit back to keep your balance. Return to standing but do not lock your knees.

8. Active march

9. Dips

You will need a chair for this. Place the front of the chair behind you. Put your palms on the seat of the chair with your fingers pointing forward. Bend your knees and keep your feet flat on the floor. Take your weight on your arms, and slowly bend your elbows to 90 degrees, lowering your hips towards the floor. Push back up again. Keep your back straight and close to the chair throughout this exercise.

10. Jog on the Spot

11. Back Extensions

Lie face down on the floor, and support your upper body by placing your hands palm-down under your chest. Bend your right leg slightly and lift it up off the floor, hold at the top for a count of one or two, and then lower. Repeat with your left leg. Keep the movements slow and rhythmical.

12. Ski Jumps

13. Lateral Raises

Take two 1½ L plastic bottles full of water, one in each hand. Stand with your feet shoulder width apart, and knees slightly bent. With your arms straight, slowly raise them out to the sides until your elbow is in line with your eyes. Pauses briefly and slowly return the bottles to your sides.

14. Active march

Summary

- Regular exercise has a number of potential benefits for both body and mind
- If you are new to exercise, walking is an ideal way to start your fitness campaign.
- If you are able, progressing to jogging is likely to help with both weight loss and health-related benefit
- For significant health related benefits, aim to take about 30 minutes worth of exercise, four times a week
- Aim to be working at about 60 – 80% of your maximal heart rate (roughly equivalent to 220 – your age)
- If you can just snatch a conversation during exercise, then you are working hard enough but not too hard
- Resistance exercises can help weight loss by maintaining or developing muscle mass, which in turn impacts positively on the metabolism

- A home exercise session based on both resistance and aerobic exercises offers a great way to get a convenient all over workout

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