Chapter 1

What's Nutrition, Anyway?

In This Chapter

- Exploring why nutrition matters
- Understanding the value of food
- Finding reliable sources of nutrition information
- Making sense of nutritional studies

As you read this book you'll follow a fantastic journey through the body – a journey that carries food from your plate to your mouth, through your digestive system and into every tissue and cell. Along the way, you'll have an opportunity to see how your organs and digestive systems work. You'll discover why some foods are particularly important to your health. And most importantly you'll find out how to manage your diet so that you can get the biggest return (nutrients) from your investment (food).

Why Nutrition Matters

Technically speaking, *nutrition* is the science of how the body takes in and uses food. All living things need food and water just to stay alive. If you want to live *well*, then you need not only food but *good* food, meaning food with the essential nutrients. Without these nutrients:

- Your bones can become brittle (not enough calcium or vitamin D).
- Your gums may bleed (not enough vitamin C).
- You may feel tired and short of breath (not enough iron).

But optimal nutrition isn't just about avoiding deficiency diseases. We now know that a good diet can help to:

- Protect against common health problems such as heart disease, stroke, cancer, and high blood pressure (see Chapters 5 and 23)
- Provide enough of the right fuel and fluid for regular physical activity (see Chapters 7 and 12)
- Improve your mood and your concentration levels (see Chapter 22)

Understanding how a good diet protects against these health problems requires a familiarity with the language and concepts of nutrition. Knowing some basic chemistry is helpful (don't panic: Chemistry can be easy when you read about it in plain English). A smattering of sociology and psychology is also useful, because although nutrition is mostly about how food sustains your body, it's also about the cultural traditions and individual differences that explain how and why we choose food (see Chapter 3).

Nutrition is about why you eat what you eat and how it affects your health and wellbeing.

You are what you eat

I bet you've heard that before! However, it's worth repeating because the human body really is built from the things it gets from food: water, protein, fat, carbohydrates, vitamins, and minerals. Your diet provides the energy and building blocks you need to construct and maintain every cell and organ in your body. To do this you need a range of nutrients from two different and distinct groups:

- **Macronutrients (macro = big):** Energy, protein, fat, carbohydrates, and fibre
- **Micronutrients (micro = small):** Vitamins and minerals

Daily requirements for *macronutrients* are always in the order of several grams. For example, an average man needs about 55 grams of protein a day and 24 grams of fibre.

Your daily requirements for *micronutrients* are much smaller. For example, the *reference nutrient intake* (RNI) for vitamin C is measured in milligrams (⅓,000 of a gram), while the RNIs for vitamin D, vitamin B12, and folate are even smaller and are measured in micrograms (⅓,000,000 of a gram). You can find out much more about the RNIs, including how they vary for people of different ages, in Chapter 15.

Energy from food

Energy is your power supply. Your body cells burn or metabolise virtually every mouthful of food you eat to give you energy, even when the food doesn't give you many other nutrients. The amount of energy released

from food in this way is measured in *kilocalories* (kcal) or in *kilojoules* (kJ). Kilojoules is the standard international (SI) unit for energy and as such is the more scientifically accurate way to express energy. However, most of us are more familiar with food energy expressed as kcals or even more usually as calories. One kilocalorie is equal to one calorie, which is equal to 4.18 kilojoules.

You can read more about metabolism in Chapter 2, and Chapter 6 is your source for information about energy. However, all you need to know for now is that food is the fuel on which your body runs. If you don't eat enough food, you won't get enough energy.

Other nutrients in food

Your body needs other nutrients to build, maintain, and repair tissues. Nutrients also empower cells to send messages back and forth and conduct essential chemical reactions, such as the ones that make it possible for you to move, see, hear, eliminate waste, and do everything else natural to a living body.

Essential nutrients for pot plants and pampered pets

Many organic compounds (substances similar to vitamins) and elements (minerals) are an essential part of the diet for your green or furry friends but not for you, because you make them yourself from the food you eat. Two good examples are the organic compounds choline and myoinositol. *Choline* is an essential nutrient for several species of animals, including dogs, cats, rats, and guinea pigs. It is essential for human beings because it forms part of cell membranes and helps form nerve-endings in the brain, but the human body produces choline on its own. You can get extra choline from milk, eggs, liver, and peanuts. *Myoinositol* is an essential nutrient for gerbils and rats, but human beings synthesise it naturally and use it in many body processes, such as transmitting signals between cells.

Here are some more nutrients that are essential for animals and/or plants but not for you:

Organic compounds	Elements
Carnitine	Nickel
Myoinositol	Silicon
Taurine (but essential in newborn human infants)	Tin
	Vanadium

What's an essential nutrient?

In nutrition speak; an *essential nutrient* is a very precious thing:

- **An essential nutrient cannot be manufactured in the body.** You have to get essential nutrients from your diet or from a nutritional supplement.
- **The lack of an essential nutrient in your diet is often linked to a specific deficiency disease.** For example, people who go without protein for extended periods of time develop the protein-deficiency disease *kwashiorkor.* Those who do not get enough vitamin C develop the vitamin C–deficiency disease *scurvy.* A diet or supplement rich in the essential nutrient cures the deficiency disease, but you need the proper nutrient. In other words, you can't cure a protein deficiency with extra amounts of vitamin C.
- **Not all nutrients are essential for all species of animals.** For example, vitamin C is only essential for human beings, apes, and guinea pigs. All other animals, including cats, dogs, and horses, can make all the vitamin C they need in the liver just from a type of sugar called glucose.

Essential nutrients for human beings include many well-known vitamins and minerals, along with several *amino acids* (the building blocks of proteins) and some fatty acids. Head to Chapters 4, 5, 9, and 10 for more about these essential nutrients.

Other interesting substances in food

One of the latest tremors in the nutrition world has been caused by phytochemicals. *Phyto* is the Greek word for plants, and *phytochemicals* are simply chemicals from plants. Many vitamins are phytochemicals, such as beta carotene, a deep yellow pigment in fruits and vegetables that your body can convert to a form of vitamin A. *Phytoestrogens*, hormone-like chemicals, grabbed the spotlight when it was suggested that a diet high in *isoflavones* (a type of phytoestrogen found in soya beans) may lower the risk of heart disease and cancers of the breast, ovary, and prostate. To find out more about phytochemicals, including phytoestrogens, check out Chapter 11.

Your nutritional status

Nutritional status is a phrase used to describe the state of your health related to your diet. People with a poor diet do not get all the nutrients they need for optimum health and are *malnourished* (mal = bad).Overweight or obese people can still be malnourished! Malnutrition may arise from:

- **A diet that does not provide enough food.** This situation may occur in times of famine, or through voluntary starvation because of an eating disorder, or because something in your life disturbs your appetite, such as illness.
- **A diet that, while otherwise adequate, is deficient in a specific nutrient or nutrients, such as vitamin C or iron.**
- **A rare metabolic disorder that prevents your body from absorbing or metabolising (processing) specific nutrients, such as protein or carbohydrate.**
- **A medical condition that prevents your body from using nutrients.** For example, malabsorption is a side effect of many digestive tract disorders such as coeliac disease or inflammatory bowel disease.

Health professionals have many tools with which to rate your nutritional status. They can:

- **Review your medical history to see whether you have any conditions** that may make it hard for you to eat certain foods or problems that interfere with your ability to absorb nutrients.
- **Perform a physical examination to look for obvious signs of nutritional deficiency or recent unplanned loss of weight.**
- **Carry out blood tests that can identify early signs of malnutrition,** such as the lack of red blood cells that characterises anaemia caused by an iron deficiency.

At every stage of life, the aim of a good diet is to maintain a healthy nutritional status.

Finding Nutrition Facts

Getting reliable information about nutrition can be a daunting challenge. Most of your nutrition information is likely to come from television and radio, newspapers and magazines, books, and the Internet. So how can you tell whether what you hear or read is based on sound evidence?

People you can trust about nutrition

The people who make nutrition news can be scientists, reporters, or simply someone who wandered in off the street with a bizarre new theory. (Apricots cure cancer! Never eat bread and cheese at the same time! Eating vegetable soup makes you lose weight!) The following few groups of people *can* give you sound advice you can trust:

- **Registered dietitians** (RDs) are the only qualified health professionals who assess, diagnose and treat diet and nutrition problems at an individual and wider public health level. Uniquely, dietitians use the most up to date public health and scientific research on food, health and disease which they translate into practical guidance to enable people to make appropriate lifestyle and food choices.

  In the UK, registered dietitians are the only nutrition professionals to be statutorily regulated and governed by an ethical code, to ensure that they always work to the highest standard .The title 'registered dietitian' is protected by the Health Professions Council (HPC). A person with the letters *RD* after his or her name must be suitably qualified and registered with the HPC as being fit to practise within an agreed ethical code of conduct. All registrants of the HPC must commit to continuing professional development to remain registered and call themselves a dietitian. The HPC publishes its online register at `http://hpc-portal.co.uk/online-register`, so you can check to see whether a dietitian is registered.

  Most people can see a registered dietitian within the NHS after a referral by an NHS GP, doctor, health visitor or other medical staff. You can also self-refer. Consultations with dietitians within the NHS are free.

  Alternatively if you want to see a registered dietitian who practises privately, you can search on-line for a dietitian near you at the Freelance Dietitians web site, `www.freelancedietitian.org`, which is run by the British Dietetic Association.

- **Nutritionists** are qualified in the study of and research into nutrition and can often offer sound advice about food and healthy eating. A nutritionist usually has a first degree in nutrition or a related science subject, or may be a professional in another field such as medicine. In the UK, the Association for Nutrition (AfN; `www.associationfornutrition.org`) is a new professional body for the regulation and registration of nutritionists (including public health nutritionists, exercise nutritionists, and animal nutritionists). Nutritionists on the AfN Register have high ethical and quality standards, founded on evidence-based science.

  

  At present the title 'nutritionist' is not protected. As a result, almost anyone can call himself or herself a nutritionist. You can be sure of the credentials only if you choose a registered nutritionist.

- **Health reporters and writers** specialise in providing information about the medical and/or scientific aspects of health and food issues. Like reporters who concentrate on politics or sports, health reporters often gain their expertise through years of investigating their field. Most health writers have the scientific background required to make it possible for them to translate technical information into language that non-scientists can understand. Some health reporters are also trained as dietitians or nutritionists.

Research you can trust

You open your newspaper or turn on the evening news and find out that a group of researchers at an impeccably prestigious scientific organisation has published a study showing that yet another food or drink you enjoy is dangerous to your health. For example:

- Drinking coffee puts a strain on your heart.
- Food additives cause allergic reactions.

So you throw out the offending food or drink or rearrange your daily routine to avoid the once acceptable item. And then what happens? Two weeks, two months, or two years down the road, a second, equally prestigious group of scientists publishes a second study conclusively proving that the first group got it wrong: In fact, coffee has no adverse effect on your heart and may even protect against diabetes. and only certain additives may cause a problem in *some* sensitive individuals.

What's a body made of?

On average approximately 60 per cent of your weight is water, 20 per cent is body fat (slightly less for a man), and 20 per cent is a combination of mostly protein, plus carbohydrates, minerals, vitamins, and other naturally occurring biochemicals.

An easy way to remember this formula is to think of it as the *60–20–20 rule*.

Based on these percentages, you can reasonably expect that an average 70 kilogram person's body weight consists of about:

- 40 kilograms of water
- 15 kilograms of body fat
- 15 kilograms of a combination of protein (up to about 80 per cent), minerals (up to 15 per cent), carbohydrates (up to 5 per cent), and vitamins (a trace).

The exact proportions vary from person to person.

For example, a young person's body has proportionately more muscle and less fat than an older person's, while a woman's body has proportionately less muscle and more fat than a man's. As a result, more of a man's weight comes from protein and calcium, while more of a woman's weight comes from fat. Protein-packed muscles and mineral-packed bones are denser tissue than fat, so weigh a man and a woman of roughly the same height and size, and the man is likely to be the heavier every time.

Who's right? Nobody seems to know. That leaves you on your own to come up with the answer. Never fear – simply ask a few common-sense questions of any study you read about.

Where was the study published?

Studies published in scientific journals are usually *peer reviewed*. This means that an independent group of scientists has looked in detail at the study before it's published. The scientists will have checked that the study was well designed, how it was carried out, and whether the conclusions are appropriate. One of the quickest ways to find information from these studies is to go to a reputable nutrition-related web site. We've taken on some of the leg work and given you ten such web sites in Chapter 25, but another good source you can search for reliable information is `www.scholar.google.com`.

Does this study include human beings?

Animal studies can alert researchers to potential links between diet and health, but working with animals alone cannot give you conclusive proof. Different species respond differently to various nutrients. Many foods or drugs that harm a laboratory rat won't harm you or are given in such large doses that you would not be at risk from the amount found in a normal diet.

Are enough people in this study?

Any study must include sufficient numbers of participants to have adequate power to show anything useful or applicable to others. If you don't have enough people in the study – several hundred to many thousand – to establish a pattern, some effects may just have occurred by chance. If you don't include different types of people, which generally means young and old men and women of different ethnic groups, the results may not apply across the board. For example, the original studies linking high blood levels of cholesterol to an increased risk of heart disease and small doses of aspirin to a reduced risk of a second heart attack were done only with men. It wasn't until researchers conducted follow-up studies with women that they were able to say with any certainty that high cholesterol is dangerous and aspirin is protective for women as well as men.

Is there anything in the design of this study that can influence its conclusions?

To establish the links between diet and health you need to be able to measure someone's diet. This is easier said than done. You can do it in a *retrospective* study (by asking the participants in a study what they ate in the past, usually by a food frequency questionnaire). However, because memory isn't always accurate people tend to forget what they ate in the past. As a result, this type of study is considered less accurate than a *prospective* study (one

that asks people to record what they actually eat as they go along, usually in a food diary). However, even prospective studies have their flaws because they can only ever provide a snapshot of the diet.

The longer the record of someone's diet, the better the picture you get (for instance, seven days is more accurate than three days). Using weighing scales may be more accurate than estimating portion weights. However, the more accurate the method, the greater the burden on the participants. Studies comparing reported food intake (food records) with biological markers of actual food intake have shown that participants often fail to record everything they eat (under recording), or even alter their diet by eating what they think the researchers want or expect (undereating). New technologies try to minimise theses errors by asking people to take photos of what they've eaten with a camera or their mobile phones. These photos are then sent off to researchers who analyse the information.

Other types of study look at the links between diet and health by randomly assigning people to groups and asking them to eat a certain diet. They will then compare various aspects of their health with a control group on their normal diet. But you still don't know whether the participants really ate the diet to which they were assigned. Other studies, known as feeding studies, actually provide the food for their participants so it's more likely they will follow the diet. Bear in mind that errors of measurement occur in any dietary study, so be aware of the limitations of the method used.

Are the study's conclusions reasonable?

When a study comes up with unexpected results, the conclusions need to be examined very carefully. For example, in 1990 the long-running Nurses' Study at the Harvard School of Public Health in the USA concluded that a high-fat diet increased the risk of colon cancer. However, subsequent analysis of the data showed a link only to diets high in red and processed meats. It didn't find any link to diets high in fat from dairy foods. Researchers are still working out whether this finding is really true and whether something other than fat in meat is involved. Later findings from the same nurses' study literally went against the grain. Contrary to prevailing medical wisdom, the results suggested that eating dietary fibre doesn't protect against the risk of colon cancer. Many view these findings with a healthy degree of scepticism, but we're still waiting (over ten years on) for a more definitive answer.