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The authors fully recognise that knowledge is continuously changing, and awareness in all areas of study is constantly evolving. As such, we encourage the reader to recognise that nothing they read should ever be considered to be set in stone. They should always strive to broaden their perspective and deepen their understanding of a subject, and before acting upon any information or advice, should always seek to confirm the currency of that information, and the appropriateness to the situation in which they find themselves.

As such, the publisher and author do not accept any liability for actions taken by the reader based upon their reading of this book.
INTRODUCTION

Nutrition can be defined as the provision of food required by all organisms to support life. Food itself is anything (solid or liquid) that has a chemical structure that enables it to provide organisms with material capable of producing heat or any form of energy when it is broken down. Food can also provide substances which allow life processes to continue e.g. the process of growth, maintenance, repair and reproduction. The usual food consumed by an individual is referred to as their diet. Good nutrition requires organisms to consume a diet that contains everything required to keep an individual in good health. This diet must contain each of the 6 essential nutrients- carbohydrates, fats, protein, vitamins, minerals and water. These nutrients are essential because the body cannot make them and must therefore, obtain them from food. In humans, nutrition is achieved through the process of putting food into the mouth, chewing and swallowing it and then digesting it to obtain nutrients. While all 6 essential nutrients are required by everybody, the exact amount required by the human body varies according to factors such as age, gender, body composition, physical activity and also the presence of disease e.g. cancer, osteoporosis and coeliac disease.

Today an individual’s choice of food will depend on their energy and nutrient requirements as discussed above, as well as on a wide range of factors e.g. their likes/dislikes, personal and cultural beliefs, environmental considerations and also the effect of friends and family. Diets have also evolved across the ages, whereas our earliest ancestors in the Paleolithic period (2.5 million to 12000 years ago) were hunter-gathers depending on a diet based on vegetables, fruit, nuts, roots and meat, today’s diets are much more highly processed with evidence to suggest that for many people less than 10% of their diet consists of food in its natural form.

Throughout history there has been a vast array of nutritional claims and dietary advice. For example, there is evidence of dietary regimens involving fasting as far back as in Ancient Greece and many examples since of diet being used either to restrict intake to loose weight or to act as a cure for a medical complaint. Notable examples include the use of a weight loss diet by William the Conqueror who apparently followed a diet based on wine to help him return to a size that would enable him to ride his horse. While in 1747, a naval physician called Dr James Lind carried out the earliest documented piece of nutritional research leading to the discovery of limes as a treatment for scurvy- a painful bleeding disorder suffered by sailors on long sea voyages, around 80 years before the discovery of Vitamin C.

Over the past 100 years early discoveries have been supported by, and expanded by, the expansion of nutritional science and investigations into the metabolic, genetic and physiological response of the human body to diet. This research has in turn led to a wealth of dietary plans and special foods to treat disease, some more successfully than others. It is the extent of dietary advice that is confusing and people can lose confidence where they perceive that advice is always changing. Here it is important to bear in mind that whilst it is true that the areas of diet and nutrition are subject to evolving research, there are basic concepts and advice that does not alter. Throughout this ebook we will return to these basic concepts whilst also considering the value of new research and developments.
NUTRITION & NUTRIENTS

Nutrition can be defined as the science of food and it’s relation to health. It involves processes where all people (all living organisms) receive and process the nutrients essential for life.

Nutrients themselves are defined as the chemical compounds from food that are found in a person's diet. Nutrients are essential to life; they play a variety of vital life roles such as in the provision of energy, the promotion of growth and development and in the regulation of bodily processes. There are six main classes of nutrients in food - proteins, lipids, carbohydrates, vitamins, minerals and water.

Foods have very different nutritional densities – this is the nutritional value of food relative to the number of kilojoules (energy) it supplies. In general terms, foods which have a high nutrient density are a good source of that nutrient relative to its contribution of energy. To explain, eggs or liver have high nutrient density as they contribute a great number of nutrients relevant to their kilojoule count, whereas fats and soft drinks provide energy, but have very low nutrient density as they contain few nutrients.

The most essential aspect of nutrition is the volume and variety of nutrients a person consumes in their diet. All people require the same nutrients during each stage in their life cycle although the volume of each nutrient necessary does vary. Here we will consider the differences of each life stage specifically and the major nutritional requirements during this time.

Please note the information herein is general and may not be directly applicable to every population/community group, chronological information is not absolute, but is based generally accepted standards. Additionally, the numerical data is given as approximates only – based on mean averages from a number of sources.

Infancy

This life stage extends from birth to two years. This is a time of rapid growth and development with the average newborn (average birth weight 3.5 kg) doubling in weight in the first 4-5 months and tripling in weight over the first year. Babies also have high basal metabolic rates (BMR) - two times that an adult and these factors contribute to a comparatively high energy requirement of around 100 kcal*/kilogram body weight.

BMR stands for basal metabolic rate. It refers to the daily expenditure of energy during rest.

* In the context of human nutrition we note the use of calorie (cal) and kilocalorie (kcal) are equivalent, therefore these are used interchangeably throughout the book.

NUTRITIONAL REQUIREMENTS DURING INFANCY:

In the first year of life, breast milk or infant formula milk is the main source of nutrition. Breast milk is considered to be the superior food for babies, containing the correct amounts of proteins, vitamins, minerals, fat and carbohydrates required for optimum growth and development. As well as providing nutrition, breast milk also has benefits for the immune system as it contains antibodies (specialised immune proteins) to provide protection against disease and infection from foreign microorganisms, thus reducing the chance of developing allergies, asthma and eczema, for example.

Mother’s breast milk naturally changes over time to suit the baby’s specific nutritional needs. The first milk produced is called colostrum. Colostrum contains protein, vitamins, minerals and hormones that encourage the growth of healthy gut flora (“good” bacteria in the intestine). Colostrum contains a high level of antibodies. It is yellow in colour due to its high level of proteins and nutrients. Colostrum is produced in relatively small quantities, to match the small size of the baby’s stomach. After the first two weeks, the baby’s requirements change, so the type of milk produced changes to suit their needs.

Mature milk produced is paler in colour and thinner in consistency. It has a high proportion of fats and lactose, the main source of carbohydrate, and is lower in proteins and minerals whilst still contains a high volume of antibodies. The first milk that comes during a feeding session is called foremilk. This is watery and satisfies the baby’s thirst. After 5-10 minutes comes hindmilk, which is high in fat content and provides the baby with energy, allowing healthy growth and weight gain.

The additional benefits of breastfeeding, include strengthening of the bond between mother and child, helping the mother lose weight gained through pregnancy and decreasing the risk of some cancers and osteoporosis later in life.

There are a number of reasons a mother may not be able to breast feed. If this is the case, they can substitute infant formula for breast milk. Baby formulas have been developed to match breast milk as closely as possible to provide babies with their nutritional needs, however not all aspects