# PREFACE

From its inception, it was intended that papers in *Nutrition Research Reviews* would be mainly commissioned by the editors. An advantage of such a policy is to be able to plan to provide updates of progress in established areas of nutrition research and specifically to highlight developing areas. As the *Journal* has become more widely read and gained in reputation, the editors have been receiving more unsolicited papers. Indeed, we now advertise for readers to send us their suggestions for future topics. The best of these are accepted and enhance the *Journal* by adding a degree of spontaneity, while we may need politely to decline others that may either duplicate already commissioned papers or that do not meet our criteria. The latter may often present excellent 'archival' material but do not meet our desire to explore nutritional concepts.

We intend to develop a number of themes in this and subsequent issues. One of these is to explore interactions between nutrition and lifestyle factors, such as physical activity, as they affect predisposition to chronic diseases. The paper by *Després and Lamarche* is an example in this issue. Another group of papers will be devoted to techniques in nutrition research, of which the review of stable isotope methods in mineral nutrition by Sandström and her colleagues in this issue is an example.

By way of contrast, we start this issue with a more personal account of nutritional history. With few exceptions, the lone scientist, pursuing single-mindedly research topics of intense personal interest, perhaps under private patronage, is a romantic vision of the past. In modern science, large centralized funding organizations, ever vigilant ethical committees, and statisticians concerned to have a large '*n*' discourage research in which the experimenter is his own subject of study. Yet nutrition is a subject that lends itself to this approach and *Widdowson* shows us, in her own inimitable style, how many discoveries in nutrition, that might otherwise long have remained obscure, have come to light through self-experimentation. Both self-observation and self-experimentation have played their part in discoveries concerning the dietary roles of vitamin C, nicotinic and folic acids, man's requirement for protein, the metabolism of diverse minerals and the importance of the essential fatty acids in health. *Dr Widdowson* takes us on a fascinating journey through a world of discovery which is but a vision of the past. In our modern world of 'directed' research, multidisciplinary teams and the *Safety at Work Act*, what ethical committee would now sanction the work described here?

Science has always been about measuring things. In nutrition science, the measurement of child growth and development is of immense importance since it enables us to judge whether such growth is 'adequate' and whether some nutritional intervention may be needed to improve it. *Cole* discusses the vexed question of what the 'reference' or 'standard' should be against which measured growth in children should be compared. Does a 'growth standard' represent 'good' growth – a norm to aspire to – or is it a yardstick for comparison? The question is by no means academic. A growth standard based on Western children represents a size of child seen in only the most well off sections of society and may be unhelpful for the majority of children in developing countries. However, the standard does provide a reminder of what may be possible in better conditions. *Dr Cole* argues that growth standards are for reference purposes rather than to be regarded as 'norms' and shows us, in a comprehensive and comprehensible review, how modern mathematical and statistical concepts can be used to construct and use growth standards to improve our understanding of child growth and development.

Still on the subject of growth, *Prentice and Bates* examine the extent to which available

dietary supplies of the minerals Ca, Zn, Mg and P are able to support adequate bone growth in children in different parts of the world. While supplies of P and Mg are generally greater than the biological requirements for these minerals, the authors conclude that intakes of Ca and Zn in some developing countries may be close to requirements. Given the likelihood of poor bioavailability, there may be a link between the supply of Ca and Zn and the stunting of growth. It will be important to understand the extent to which slow growth represents an adaptation to limited nutrient supplies. This review indicates quite clearly how lack of fundamental knowledge can limit progress in nutrition science. The authors' conclusions are limited by lack of precise information on the mineral content of the body and the child's ability to adapt to low intakes by changing rates of absorption and excretion. Moreover, estimation of mineral requirements on the basis of mineral deposition rates does not take account of additional amounts, especially of Zn and Mg, that may be required for optimal body function.

A solution to some of the above mentioned problems may be assisted by the development and use of stable isotopes for studies of mineral absorption and metabolism. In a very thorough survey, *Sandström* and her colleagues describe the current state of the art in the use of stable isotopes of several essential mineral nutrients. Progress in understanding human nutrition and metabolism must surely be achieved by direct experiments in our own species rather than by relying extensively on extrapolation from other animals. Stable isotopes offer one of the most rewarding approaches but there are limitations arising from the natural abundance of isotopes, cost and availability. This careful review will be invaluable for those needing to make informed choices in this area of research.

The concept that many nutrients are dietary essentials because they are absolutely required in metabolic pathways, yet cannot be synthesized in the body, is now well established. There is no question about the essentiality for man of ascorbic and linoleic acids, lysine and zinc, to quote familiar examples, and there are many more. *Grimble* introduces us to the concept of *conditional essentiality* which may arise when a nutrient is made in the body but at a rate that limits the effectiveness of the process for which it is required. Such limitation is often induced by clinical conditions of stress due to rapid growth, infection or other trauma. The review defines the proper grounds on which a nutrient may be considered 'conditionally-essential' in man. The author then develops the concept that conditionally-essential nutrients can be used in clinical medicine to improve certain functions such as tissue repair after injury. Compounds discussed include glutamine, arginine, ornithine $\alpha$-ketoglutarate, some nucleotides and the short chain fatty acids, which have variously been described as 'conditionally-essential', 'functional' or 'pseudo' nutrients or 'nutriceutics'.

Kwashiorkor is a widespread and debilitating nutritional disease characterized by low serum albumin concentration, abnormal amino acid patterns, oedema, protein depletion, increases in subcutaneous fat with muscle wasting, pancreatic dysfunction and atrophy, and nephrosis. In this review it is not the author's purpose to provide a comprehensive survey of the many hypotheses to account for the aetiology of this still mysterious disease. Instead, *Kamalu* focuses on her concept that the common factor in, and basic cause of, kwashiorkor is the cyanogenic glucoside linamarin. This compound is found in cassava, a staple food for more than 500 million people worldwide. In times of famine, cassava is often the only food available. Although the toxicity of this crop is well known and it is always processed before eating to reduce the concentration of linamarin, residual amounts are always found, so that linamarin is always ingested wherever cassava is eaten. The author argues persuasively for the link between the consumption of cassava (and also various pulses that contain linamarin) and the occurrence of kwashiorkor both on epidemiological grounds and from her own experiments with dogs, published in a series of papers in the

*British Journal of Nutrition*. She suggests that the mechanism is the inhibition by the glycoside of $Na^+$-$K^+$-ATPase, giving rise to electrolyte imbalance with $K^+$ depletion. These events can in turn explain the various metabolic characteristics of kwashiorkor described above. Further discussion of this thought provoking theory will be important in future attempts to reduce the misery due to this dreadful disease.

While there is unanimity that obesity is detrimental to health and contributes to the adverse effects of several chronic diseases, there is no general consensus about precisely why it is so prevalent in developed countries and the extent to which the distribution of body fat, as distinct from the total amount, is important in contributing to health risks. *Després and Lamarche* review current concepts of how the distribution of fat in the body is related to insulin resistance, hyperinsulinaemia, diabetes, disturbances in the amounts and proportions of plasma lipoproteins and to hypertension. They suggest that a simple measurement of waist circumference, reflecting excessive deposition of adipocytes in the visceral abdominal depot, is a valuable indicator of 'metabolic risk'. These authors argue for the combined effects of a low fat diet and increased physical activity (favouring loss of visceral fat as well as improving insulin sensitivity and plasma lipid profiles) for improving the obese patient's risk profile without necessarily normalizing total body fatness.

On a related theme, *Sethi, Gibney and Williams* examine the metabolism of the plasma lipoproteins immediately after the consumption of a meal in relation to the development of arterial disease. They rightly point out that almost all epidemiological investigations of plasma lipids as risk factors for ischaemic heart disease have relied on fasting values. In reality, most of us spend much of the day with our metabolism being influenced by a recent meal. The authors conclude that postprandial lipaemia provides a daily state of challenge to our capacity to transport and metabolize triacylglycerols. Individuals differ in the rate at which they are able to metabolize lipoprotein particles rich in triacylglycerols. Those with a low metabolic capacity are likely to shunt cholesteryl esters into triacylglycerol rich particles, large and persistent concentrations of which may exacerbate the development of atherosclerotic plaques. The literature reviewed suggests that a disturbance in the activity of the enzyme lipoprotein lipase may underlie the impaired triacylglycerol metabolic capacity. This enzyme is under hormonal control, the activities in the adipose tissue and muscle changing in opposite senses in response to availability or restriction of dietary energy. More research on the key nutritional metabolic role of this enzyme is clearly needed.

Continuing a tradition of this journal, *Seal and Reynolds* discuss the metabolic cooperation between organs and tissues in supplying the appropriate pattern of nutrients required for growth and development. In particular, they describe how the intestinal tissues in ruminants influence the flux of nutrients from diet to lumen to bloodstream and how the liver then further modifies and redistributes these nutrients to peripheral tissues for maintenance or productive functions such as muscle growth or milk synthesis. They bring us up to date on the techniques now available for such studies, comparing and contrasting the information available from preparations *in vitro* and *in vivo*, describing their advantages and disadvantages. They predict that judicious use of multicatheterization techniques should further our quantitative understanding of how diet affects nutrient supply for productive processes and may assist in the formulation of diets to meet the nutritional requirements of specific tissues, including the gut and liver.

*Jansman* summarizes current knowledge of the chemistry, occurrence and natural functions of plant tannins, giving special attention to the harmful effects of tannins in animal feeds, especially in poultry and pigs. An interesting conclusion is that, despite the long history of research into tannins, considerably more information will be required before the details of tannin chemistry are elucidated and their nutritional effects fully explained.

Techniques such as HPLC and NMR should go a long way to providing the much needed chemical information. Most of the effects of dietary tannins in simple-stomached animals can be considered antinutritional. One approach to the problem – the development of low-tannin plant varieties – is not without its problems since these are more susceptible to disease and to predators than native varieties. Efforts have been made to eliminate or reduce tannins in feedstuffs by processing with varying degrees of success. Most processes appear to be laborious, expensive or ineffective and there is a clear need for better technology in this regard. A few beneficial effects of tannins have been suggested for simple-stomached animals but the author remains sceptical. This review highlights the need for greater knowledge of the chemistry, mechanisms of antinutritional influences and processing effects on tannins.

While this issue is in preparation, details of volume 7 and subsequent volumes are being addressed. The Editorial Board, the Society and the Publishers are keen to promote a wider international readership for *Nutrition Research Reviews*. Among the new developments will be an enlarged editorial board, incorporating corresponding editors from North America, Continental Europe and the Pacific Region. We are considering the possibility of more frequent publication. Finally, we are exploring ways in which the readership can be more involved in the voice of the *Journal*, for example by inviting commentaries on articles published in the same issue. We hope these innovations will increase the attractiveness and usefulness of the *Journal* for our readers.