PREFACE

A major area of research interest at the present time is the extent to which nutrition in early life can influence later health and disease. In volume 8 we hope to include an article on this topic. But what is the best nutrition for the human infant? *Goedhart and Bindels* begin this volume with an exploration of the composition of human milk and the features that make this food so special. They highlight the important balance between a nutrient profile that is designed to take account of the relative immaturity of the baby's gut, kidneys and brain, and an array of molecules whose function is to protect the baby against infection.

Not all mothers are able to breast feed and these authors write from the point of view of scientists in the infant foods industry who seek to produce a food that, while not aiming to mimic the composition of human milk in every respect, nevertheless achieves the physiological effects expected in breast fed infants. They rightly point out that it will be extremely difficult to demonstrate clear functional advantages of supplementing formulas with specific components of human milk (for example lactoferrin) and that benefits of compositional modifications should be weighed against costs. Guidelines to the industry should provide a reasonable balance between protecting the public against opportunistic supplementations while leaving room for scientific innovation.

The perinatal period is an important time for the development of the infant's immune defence system. As indicated in *Goedhart and Bindels*' article, the newborn receives some immunological assistance from components of human milk. However, as *Lovegrove and Morgan* point out, the infant's immune defence has already been given a start by the transfer of immunoglobulins from mother to fetus across the placenta. These authors are mainly concerned with factors that disrupt the normal functioning of the immune system to produce states of hypersensitivity and allergy. Thus infants, especially those born into families with a history of atopy, may already have been sensitized to allergens transferred *in utero* from the mother *via* the placenta or may be sensitized by allergens in the breast milk derived from foods the mother has eaten during lactation. These authors make a plea for parents with atopy to be aware of the potential for their offspring to develop allergic symptoms and to adopt strategies to minimize the risk, such as avoiding foods known to be allergenic certainly in lactation and possibly also during pregnancy. They do warn however that, such is our state of knowledge, there is as yet no simple means of guaranteeing prevention of infant allergy.

Proponents of the view that diet is a major, if not *the* major factor in both the development and prevention of cardiovascular disease are prone to state that this topic is not now one of scientific controversy. *Macnair's* paper should cause readers to reflect seriously upon, if not to abandon, this simple view. *Macnair* considers four key so-called 'risk factors' for cardiovascular disease: blood lipids; insulin resistance; hypertension and failure of energy balance. The author poses some important questions about the physiological significance of the relatively high concentrations of plasma lipids in human infants. He argues that the human nervous system has an exceptional requirement for cholesterol in the first few months of life. Furthermore he concludes that a key factor in metabolizing circulating lipids in later life is the degree to which muscle tissue is 'trained' by physical activity. It is commonplace now to find 'meta-analyses' of publications relating plasma lipid profiles to dietary fatty acid intakes but it is less widely known that the literature describing physical activity as a key determinant of plasma lipids is quite as large.

Concepts relating physical activity to each of the 'risk factors' and finally to atherosclerosis and ischaemic heart disease are plausibly integrated in a summarizing diagram (page 60).

Continuing the theme of interactions between nutrition and physical activity, *Wilson* addresses their combined effects on women's bone health, taking as particular examples female athletes. While regular physical activity is recognized to have many beneficial effects, not the least of which is the enhancement of bone mineralization and protection against premature osteoporosis, there is a paradox in that intensive exercise in the young may actually reduce bone mineral density. The author identifies menstrual dysfunction as a key factor in this problem. Nutrition is important because of the high prevalence of eating disorders in athletes. Whereas the increased levels of physical activity demanded result in higher energy requirements, many athletes desire to have a low body weight for either functional or aesthetic reasons and may develop a psychology that results in undereating, low body fat reserves, menstrual dysfunction and compromised bone metabolism. The quality as well as the quantity of dietary intake may be important. Greater awareness is needed of the prevalence of eating disorders among athletes, and nutrition should be placed high on the agenda for optimum performance.

Many organizations worldwide are dedicated to the continuing assessment of important practical aspects of human nutrition. One of these is the European Union through its 'FLAIR Concerted Action' Programmes. One sometimes has the impression that the hard work undertaken by the numerous expert committees of scientists in producing reports to these organizations is not sufficiently rewarded in terms of the widest possible dissemination of the results of their efforts. *Nutrition Research Reviews*, while focusing mainly on nutritional concepts, nevertheless believes that there is room in the *Journal* for 'archival material' which might not otherwise be so readily available to the general reader. The scholarly review by *Bates*, *Heseker* and their colleagues on vitamin bioavailability in this issue is an example. The aim has been for comprehensive coverage and this has necessitated rather brief commentaries on each aspect of each vitamin. We hope that the succinct and up to date information contained in this review will be helpful to teachers, nutritional advisers and research workers alike and welcome comments from our readers on the extent to which the *Journal* should devote future space to similarly treated topics.

This issue contains two reviews devoted to dietary minerals, both concerned with zinc. *Swinkels*, *Kornegay and Verstegen* approach the topic from the standpoint of animal production. The authors review the biology of Zn particularly in farm animals, with emphasis on mechanisms of absorption. They then discuss the relative efficiencies of absorption of various Zn complexes. There are clearly opportunities for developing Zn compounds with higher biological value but more research will be needed on basic mechanisms of absorption before the animal feeds industry can benefit fully.

Gibson draws attention to the relative lack of recognition by international agencies of the importance of Zn deficiency in developing countries compared with the attention given to iron, iodine and vitamin A. She reviews requirements for Zn and concludes that widespread Zn deficiency does contribute to high morbidity and mortality. However, probability estimates for risk of Zn inadequacy do not identify actual individuals in the population who are deficient or define the severity of the nutrient inadequacy. Such information must be obtained by combining dietary intake data with laboratory and clinical indices of Zn status. In discussing strategies for prevention of Zn deficiency (supplementation, fortification and dietary modification and diversification based on traditional household principles) the author gives us important insights into ways in which political, economic and logistic factors impinge upon what are basically simple nutritional problems.

Whereas it is probably true that most if not all essential nutrients (absence of which from the diet eventually results in well-defined deficiency states fully reversible by including the

specific nutrient in the diet) have now been identified, there are many components of the diet that are now believed to influence general health and wellbeing and even protect against degenerative diseases. While not being 'essential' in the established sense, should these components be called 'nutrients'? *Johnson, Williamson and Musk* explore this question in regard to a range of compounds with diverse chemical structures: isothiocyanates, indoles, flavonoids, glucosinolates, polyphenols, phyto-oestrogens and many other substances present in a variety of plant foods. To argue their case they need to discuss mechanisms of carcinogenesis and the metabolic pathways that are involved in both the activation and the defence against carcinogens (xenobiotic metabolizing enzymes). For readers with minimal biochemical background, these sections will be difficult reading but the effort is well worthwhile since this opens up uncharted areas of nutrition science. An important question is raised as to whether the enzymes that protect us against carcinogens are 'inducible' by substances in the diet. If so, the regular exposure to certain dietary components (for which the authors have coined the term 'dietary phytoprotectants') may be a necessary part of normal nutrition.

Nugon-Baudon and Rabot continue the same theme, focusing specifically on the glucosinolates and their derivatives. These are sulphur-containing molecules produced from amino acids by the secondary metabolism of plants and they occur mainly in such cruciferous vegetables as cabbage, sprouts, turnip and cauliflower. Epidemiological studies seem to suggest that higher consumption of these vegetables is associated with reduced risk of cancers of the gastrointestinal tract. Experiments to investigate the effects of cruciferous vegetables or their isolated glucosinolate derivatives have given inconsistent results. There is suggestive evidence (all in laboratory animals) that glucosinolates may induce or otherwise modify the activities of the 'xenobiotic metabolizing enzymes' (also described by *Johnson and colleagues*). Inconsistencies may arise because, although these enzymes are normally regarded as protecting against carcinogenesis, they may themselves cause toxicity under certain circumstances. There is clearly a great deal to be learned about the strategies adopted by the body to defend itself against toxic compounds and the role of normal dietary constituents in this protection and we can expect this area of nutrition to develop rapidly in the coming years.

This issue concludes with a comprehensive review by *Kelly, Begbie and King* of the ways in which the endogenous microflora attach themselves to the membranes of the cells lining the gastrointestinal tract as a necessary part of colonization and the nutritional implications thereof. It has now been established that bacterial glycoproteins (adhesins) interact with receptors, also glycoproteins, on intestinal membranes and mucus. A combination of molecular, biological and X-ray crystallographic techniques is contributing to an understanding of these interactions and their role in pathogenesis and protection against pathogens. Nutrition may be important in modifying receptor expression. For example, changes in the amounts and types of proteins, fatty acids and possibly other nutrients may affect the activities of glycosyltransferases required to glycosylate receptors and adhesins. Another nutritional approach may be to tailor make oligosaccharides as probiotics for the prophylaxis and therapy of intestinal infections.

The Editorial Board of *Nutrition Research Reviews* has recently been enhanced by the introduction of four new international editors: Noel W. Solomons (Guatemala); John Nolan (Armidale, Australia); Leif Hambraeus (Uppsala, Sweden) and Lindsay Allen (Connecticut, USA). Their role will be to introduce new topics and writers to the *Journal* and to act as points of reference in their areas of the globe to make our publication more widely known. We welcome our overseas colleagues and are confident that the quality, timeliness and liveliness of the *Journal* will be thereby greatly enhanced.