

## EDITORIAL

*Nutrition Research Reviews* aims to publish articles that are wide ranging in subject matter and thought provoking in their approach. As with previous volumes, volume 8 contains something for the farm animal nutritionist, the clinical nutritionist, for behavioural scientists, physiologists, those interested in nutritional surveys and epidemiology and for those with interests in the underlying biochemistry and molecular biology of nutrition.

For many years the role of the plasma lipoproteins in the pathology that underlies cardiovascular diseases has been a subject of intense research interest. At the beginning, total plasma cholesterol was the focus of interest. Then attention turned to the importance of the low density lipoprotein (LDL) fraction, stimulated mainly by Brown & Goldstein's work on LDL receptors. Unfortunately researchers in this field became over obsessed with the genetic defects resulting in familial hypercholesterolaemia and this either diverted attention away from lipoprotein abnormalities in the general population or, more seriously, encouraged the view that familial hypercholesterolaemia was some kind of model for lipoprotein abnormalities in the general population. In the opening paper of this issue, Griffin & Zampelas draw our attention to the 'atherogenic lipoprotein phenotype' and discuss the impact of dietary fatty acids upon it.

Coming in the wake of the Department of Health's report on *Nutritional Aspects of Cardiovascular Disease* which took a traditional and now outdated approach, this review is important in several ways. It brings our attention to the importance of those lipoproteins rich in triacylglycerols and thereby further extends the theme of postprandial lipoprotein metabolism developed in volume 7 by Sethi and colleagues. It redirects our attention away from the saturated and *n*-6 polyunsaturated fatty acids to the importance of the hitherto neglected *n*-3 family of polyunsaturates. It makes the important point that the atherogenic lipoprotein phenotype is likely to go unrecognized by routine clinical testing procedures because values for total cholesterol, LDL-cholesterol and triacylglycerol usually fall below clinically defined action limits. Finally, it draws together the many metabolic abnormalities that together predispose apparently healthy individuals to increased risk of coronary heart disease, and opens up the all important topic of nutrient–gene interactions in regard to this important disease.

Earlier this century, the disciplines of biochemistry and nutrition were almost indistinguishable in their interests and approaches. Then biochemistry was transformed by the development and exploitation of the techniques of molecular biology and many have argued that nutrition has lagged behind and clung too rigidly to traditional approaches. The editors of *NRR* have for several years discussed the possibility of commissioning a review on molecular biological approaches to nutrition but have delayed doing so until the field had developed to an extent that important *nutritional* advances, as distinct from *biochemical* ones, could be discerned. Soraya Shirazi-Beechey, an acknowledged expert in the molecular biology of glucose transport, now writes on this topic for *NRR*. We hope that readers who are either teaching this subject or who are hoping to develop molecular biological approaches to their own work will derive benefit from Dr Shirazi-Beechey's lucid account of the techniques involved and the increased understanding of nutritional principles to be learned from this approach, amply illustrated by examples from her own work.

It is an important goal of clinical nutrition to learn how best to give nutritional support in the management of critically ill patients. Major trends have been a shift from parenteral

to enteral feeding and considerable improvements in the composition of the enteral feed. *Gardiner and colleagues* describe the functions and dysfunctions of the gut and discuss the ways in which specific nutrient supplements to enteral feed can improve gut function. They focus in particular on glutamine as a nutrient beneficial to the enterocyte and short chain fatty acids for the colonocyte. The *n*-3 family of polyunsaturates shows promise for patients with ulcerative colitis. Further research is required before a substantial case can be made for the effectiveness of other potential supplementary nutrients, for example, arginine, ornithine or nucleotides, but the prospects for further improvements to enteral feeds seem good.

*Grizard and colleagues* review current knowledge of the biochemistry of muscle protein turnover in relation to dietary intake. Net gain or loss of muscle protein is ultimately determined by a balance between protein synthesis and degradation. Whereas the reactions of protein synthesis and their regulation are well understood, much less is known about protein degradation and this provides a challenge for research. The review covers the roles of different substrates and hormones in the regulation of anabolic and catabolic processes and considers different time sequences during which regulation may occur. Thus accretion and depletion of muscle protein occur during daily cycles and over much longer periods of time, as in ageing. This thorough review provides a solid background for the reader to approach the next contribution.

*Millward* explores how growth may be controlled at the level of the whole organism. He poses two problems. The first is how the growth of individual tissues and organs is coordinated so that overall body growth control is achieved. The second is how man, most of whose long life is spent after growth has stopped, manages to maintain constancy of body protein content. In his protein-stat hypothesis, he proposes that whole body protein is controlled through an aminostatic appetite mechanism, acting primarily to maintain skeletal muscle mass at a level set by the linear dimensions of the organism. Bone lengthening occurs at rates determined by genetic programming and an appropriate anabolic drive, exerted by dietary protein. Net protein deposition in skeletal muscle during growth requires specific activation of new connective tissue synthesis and myofibrillar protein deposition by passive stretching of muscle by bone length growth. Muscle growth ceases when bone length growth ceases. The author proposes that the growth of most other organs is determined primarily by protein intake and consequent metabolic work and functional demand of the organ. Operation of the protein-stat would occur only at dietary protein levels sufficient to provide substrate and 'metabolic drive'.

There is considerable interest in the influence of protein nutrition on reproduction of farm animals, especially in developing countries where dietary protein may be of poor quality and in short supply and where deficiency is common. In contrast, in developed countries excess protein is often given to obtain more milk from high-yielding dairy animals and this, too, may have implications for reproduction. *Kaur & Arora* review current knowledge of the influence of protein nutrition on the age of puberty, the oestrous cycle, ovulation rates, success in conception, survival of embryos, fetal growth and neonatal viability and on the postpartum anoestrous interval. They discuss mechanisms by which protein nutrition influences reproduction. An increase in prepubertal luteinizing hormone pulse frequency is an important event for the onset of puberty and the way in which certain amino acids influence pulsatile luteinizing hormone secretion is now being actively researched.

We sometimes forget that water is a nutrient and a very important one too! The review by *Mroz and colleagues* has two important components. Firstly they describe in great detail the physiological importance of water in the wellbeing of the animal – in this case, pigs – and the way in which water intake is regulated. This leads logically to a discussion of the

nutritional allowances for water appropriate to pigs of different ages and in different physiological conditions. The other main consideration is the very practical aspect of environmental impact. The authors remind us that water consumption (especially as influenced by the amount and type of protein consumed) has implications for manure production which can be of immense environmental concern in countries like The Netherlands.

After these physiological considerations, we turn to matters of nutritional epidemiology. *Nelson & Margetts'* review is a timely and useful summary of the current armoury of techniques available to nutritionists who need to take the epidemiological approach. Like Dr Shirazi-Beechey's paper, this will be valuable to teachers of nutrition as well as those entering the field who wish to appreciate the limitations of nutritional epidemiology techniques as well as the opportunities they afford. As a non-specialist in epidemiology, I had always made the distinction in my own mind between *epidemiology* as primarily an observational discipline, recording what exists in populations and trying to make sense of it, and *experimental nutrition*, in which the scientist himself imposes conditions and measures the outcomes. This seems to be borne out by my medical dictionary's definition: *epidemiology, the study of the occurrence, distribution and causes of disease in human kind*. Nelson and Margetts, however, take the view that intervention trials, essentially experimental nutrition, are legitimately part of epidemiology. This confuses me and I wonder how many other readers will be similarly perplexed?

*Margaret Thorogood* then shows us how epidemiology can be used to assess the impact of a vegetarian lifestyle on health. In view of the intense interest in vegetarianism now, many readers will be pleased to have this knowledge collected together and so succinctly discussed. While summarizing the undoubted health benefits that may flow from a vegetarian lifestyle, the author clearly points out at least one major difficulty in the interpretation of epidemiological information on this topic: are these benefits due to the absence from the diet of meat or to the presence in the vegetarian diet of components, such as fruit and vegetables, with specific positive attributes? The author puts her faith in a recently initiated European prospective epidemiological study to provide some of the answers, but concedes that, so complex are nutritional interactions, some effects may never be fully teased out.

The important subject of the role of nutrition in dental health is reviewed by *Paula Moynihan*. She concludes that dental caries continues to be the major cause of tooth loss in the UK. Its development is determined by interactions between the sugar content of the diet, the presence of plaque, the flow of saliva, the availability of fluoride and the strength of the teeth. Widespread improvements in nutrition and the use of fluoride have undoubtedly led to improvements in the nation's dental health but the author stresses the need to continue to urge control of sugars intake in the context of dietary advice for good overall health. The possible involvement of free radical damage and the availability of dietary antioxidants in the development of periodontal disease needs further research.

Study of the regulation of eating behaviour is fascinating both for its intrinsic scientific interest and also because of the light it may throw on the all too evident problem of obesity in developed countries. Those who have entered nutrition from the disciplines of biochemistry and physiology may well be confused because of the strong contribution to this subject made by psychologists who introduce different concepts and terminology into the discussion. *Blundell and Tremblay* help to steer us through this confusion by discussing the two approaches developed by the 'appetite' and 'energy balance' schools, explaining the different terminologies and ways of thinking. They expertly review the different models for control of eating behaviour that have been developed over the years and present their own view of an appetite control model. A key issue is the extent to which the control of

appetite is linked to fuel balance within the body. Evidence is presented that appetite control is only partly influenced by the body's capacity to store or oxidize fuel; the part that is not, apparently, influenced by metabolic activity will continue to present a challenge to research.

In a related paper, *Peter Rogers* explores the ways in which the foods we eat can determine our mood or alternatively how mood determines what we eat. The author concludes that eating and drinking can indeed affect mood substantially and their effects are mediated by the sensory, predigestive and post absorptive influences of the substances consumed. He discusses the behavioural effects of the major nutrients and the effects of individual psychoactive substances. At a time when so much interest is being focused on the amount and type of fat in the diet it is perhaps surprising that so little was said about the potential effects of the *n*-3 polyunsaturated fatty acids on mood (see for example Hibbeln & Salem, 1995). In turn, appetite can certainly be affected by mood and the mechanisms by which this occurs should be a priority for future research.

Although *NRR* is a young journal, it is already becoming a tradition regularly to publish comprehensive multi-author reports arising from large internationally funded nutrition projects. The editors believe that it is important that the results of these massive and wide ranging projects should be widely available, rather than collecting dust on a shelf in the office of the funding body. To complete this issue, *W. van Dokkum* and colleagues have reported on the intakes of selected minerals and trace elements in European countries. This highlights important comparisons between different countries and gives an overall picture of nutritional adequacy in respect of these nutrients. While the intake of toxic elements reassuringly does not appear to be a major problem, there is some suggestion that intakes of certain essential elements, especially iron, copper and selenium, may be less than adequate in many population groups.

Readers will note that we now have a team of *International Editors* who are making a valuable contribution to the *Journal*. It is a great pleasure to welcome our latest colleagues, Professor Jun-ichi Okumura (Japan) and J. Black (Australia).

## REFERENCE

- Hibbeln, J. R. & Salem, N. (1995). Dietary polyunsaturated fatty acids and depression: when cholesterol does not satisfy. *American Journal of Clinical Nutrition* **62**, 1-9.