

## BOOK REVIEWS

## Food for thought

G. Curzon

BEFORE the 1970s most neurochemists (stimulated by current ideas on biochemical regulation) were probably more interested in brain enzymes than in the substrates they acted on. Consequently, the availability of these substrates to the brain was given relatively little attention. Also, it was thought that, except in severe malnutrition, the brain controlled its nutritional intake so that this was appropriate to its needs. But in the past decade emphasis has shifted, especially with regard to neurotransmitter synthesis. The change began with studies on how brain synthesis of the transmitter 5-hydroxytryptamine (5HT) is controlled. Tryptophan hydroxylase, one of the two enzymes required for 5HT synthesis, is rate-limiting but normally well below saturation with its substrate, tryptophan. This is an essential amino acid, mammals are completely dependent on dietary sources and it is found that normal dietary changes of tryptophan availability to the brain can affect how much of the transmitter is made there.

These findings have led to an explosion of research activity in which Wurtman and his group have played a major role. This interest is strongly reflected in the series so that many chapters describe how dietary constituents get to the brain and their effects on transmitter synthesis therein. Indeed, the whole of Vol. 5 derives from a symposium on the effect of choline supply on brain acetylcholine synthesis. Apart from this, five chapters, distributed between Vols 1, 3 and 4, deal wholly or in major part with dietary or other extracerebral influences on transmitter synthesis. Thus, in Vol. 1, Pardridge describes how amino acid availability to the brain is regulated and Ordonez similarly discusses folic acid derivatives and choline. Volume 3 contains a chapter by Growdon on dietary neurotransmitter precursors and their use in the treatment of brain disease. Another chapter by Sourkes is on other nutritional factors that may affect transmitter synthesis. Volume 4 includes a chapter by Guroff on how inborn errors of extracerebral metabolism of amino acids and other substances alter the nutrition of the brain.

*Nutrition and the Brain*. Edited by R.J. Wurtman and J.J. Wurtman. Five volumes. (Raven: New York.) Vol. 1. *Determinants of the Availability of Nutrients to the Brain*, pp.336, 1977, \$29. Vol. 2. *Control of Feeding Behavior and Biology of the Brain in Protein-calorie Malnutrition*, pp.323, 1977, \$29. Vol. 3. *Disorders of Eating. Nutrients in Treatment of Brain Disease*, pp.314, 1979, \$29. Vol. 4. *Toxic Effects of Food Constituents on the Brain*, pp.232, 1979, \$23. Vol. 5. *Choline and Lethicin in Brain Disorders* (edited by A. Barbeau, J.H. Growdon and R.J. Wurtman), pp.474, 1979, \$42.

Another major area is covered in Vol. 2 and the rest of Vol. 3. These chapters are on normal and pathological aspects of feeding: control of eating (Vol. 2, Lytle); metabolism in obesity and anorexia nervosa (Vol. 3, Cahill *et al.*); medical aspects of these disorders (Vol. 3, Bruch); a critical analysis of claims for megavitamin therapy in mental disease (Vol. 3, Lipton *et al.*). Most of this material is on effects of disturbances of volition towards eating. The brain obviously has a causal role in these disturbances although little is at present known about its nature. The rest of Vol. 2 is on protein-calorie malnutrition — a primarily involuntary disorder. Here the important questions concern effects of the reduced food intake on the human brain, their reversibility and their behavioural consequences. As Shoemaker and Bloom point out in their chapter on the effect of undernutrition on brain morphology, early undernutrition might conceivably affect subsequent behaviour and other brain functions by numerous mechanisms. While present evidence for specific mechanisms may well be unclear this does not diminish the enormous potential social importance of research in this area. Other chapters in Vol. 2 are on biochemical (Nowak and Munro) and behavioural (Pollitt and Thomson) effects of protein-calorie malnutrition. Background material on the dietary patterns of numerous human societies and of non-human primates is given in Vol. 1 by Gaulin and Konner.

Tables 7–9 are particularly fascinating.

Volume 4 is largely on toxic effects of food constituents, i.e. food additives and hyperkinesia (Lipton *et al.*), glutamic acid (Garattini), peptides (Zioudrou and Klee), alcohol (Tabakoff *et al.*). These effects range from the obviously important but imperfectly understood (alcohol) to the probably unimportant (glutamic acid), although it is necessary to keep in mind the conclusion of the chapter on hyperkinesia that there is probably no food or drug without some toxicity to some individuals.

Volume 5 is substantially different from the other volumes, which each contain four to six chapters, as it contains 38 contributions to a symposium. Topics include choline, lecithin and acetylcholine metabolism, and the pharmacology of the cholinergic neurone. The main focus is on the extent to which functional brain cholinergic activity is affected by dietary supplements of choline and lecithin and whether these compounds can be used to treat various disorders of the central nervous system. There seems to be some evidence that large dietary supplements may alleviate tardive dyskinesia but not other dyskinetic states such as Huntington's chorea and dopa dyskinesia. Patients with presenile dementia, though they have a major defect in brain acetylcholine synthesis, show disappointingly little response. In general, the therapeutic trials described were of a preliminary nature. Neither of the studies on tardive dyskinesia was done 'blind'. The chapters by Ansell and Spanner, Haubrich *et al.* and Karczmar are particularly useful, as they provide a biochemical and pharmacological background for assessing the (on the whole less substantial) clinical papers which take up much of the volume.

The series in general is strongly recommended. It is attractively produced and well indexed. The overall clarity of presentation must indicate much hard editorial work. One may expect these volumes to be a major influence on future research in their field. □

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