High-fat diets need not increase tryptophan availability to the brain: importance of the choice of the control diet

We were pleased to see that Badawy *et al.* (1984) have essentially confirmed our results that the replacement of carbohydrate by fat in the diet did not significantly alter the concentrations of 5-hydroxytryptamine and 5-hydroxyindoleacetic acid in the brain (Cousins *et al.*, 1982; Lawson *et al.*, 1981a). This occurred despite the fact that there were significant changes in other aspects of metabolism (Lawson *et al.*, 1981a,b; Brindley *et al.*, 1981). All of these studies employed a 3 week feeding period. The fat contents of the diets varied from 8% to about 49%, and the carbohydrate content from 70% to 33% of the energy respectively. The diets were specifically designed so that the proportion of protein remained fairly constant relative to the energy content (Lawson *et al.*, 1981a). If this had not been done, then the interpretation of the results might have been complicated by large variations in protein consumption. In the event, the total protein intakes were relatively similar (Lawson *et al.*, 1981a).

Previous work that showed an effect of dietary fat on tryptophan metabolism involved short-term feeding of rats with fatty food (Madras *et al.*, 1973, 1974; Hutson *et al.*, 1976). This is a more unstable dietary model in which the intake of protein relative to total energy must have changed.

The implication from the letter of Badawy *et al.* (1984) is that we should have compared our results with those from rats fed on a 41B diet, since this would have been the valid control. We do not consider this to be so.

The 'control' diet in Lawson *et al.* (1981a) and Cousins *et al.* (1982) was the starch diet which was based on the formulation of 41B. The contributions of 8% fat, 21% protein and 70% carbohydrate in the starch diet relative to the total energy are almost identical with that recommended for the 41B diet when these are calculated on the same basis (Lawson *et al.*, 1981a). The starch, sucrose, corn oil and beef tallow diets were produced by the same manufacturer at the same time, and by using the same ingredients. We do not consider that it is valid for Badawy *et al.* (1984) to use a 41B diet from Oxoid as a control for other diets obtained from B.P. Nutrition. The 41B could have been prepared at a different time of year and from different raw ingredients. This is especially important since raw materials vary markedly in composition because of seasonal variations and the localities of the original suppliers. The type of protein present in the diets is also important since it is known that the balance of

amino acids can modify tryptophan metabolism (Fernstrom & Wurtman, 1972). Furthermore, there can be large differences in the concentrations of micronutrients in diets depending upon the source of the ingredients. The 41B diet used by Badawy *et al.* (1984) also had different proportions of the basic ingredients to those in the other four diets which we and they used.

It is important to note that 41B is also a high-carbohydrate, low-fat diet which should not differ significantly in overall fat, protein and carbohydrate content from that in the starch diet. It is therefore not possible to infer that the different effects of these diets are caused by the high carbohydrate content of the latter diet. The observations of Badawy *et al.* (1984) that rats fed on these apparently similar diets showed differences in tryptophan metabolism and in serum fatty acid concentrations is indeed intriguing, and it deserves some explanation. It is a pity that no values are given for food consumption, since it is necessary to know whether the rats on the 41B or starch diets were over-eating to compensate for a nutritional deficiency. This can be accompanied by altered energy expenditure that might not be indicated by differences in body weight gain, or even in body composition had this been measured. The reason for the differences in metabolism for rats on the 41B and starch diets can only be determined by careful dietary control, and by a detailed chemical analysis of the diets employed.

David N. BRINDLEY,* Ian A. MACDONALD† and Charles A. MARSDEN†
Departments of *Biochemistry and †Physiology and Pharmacology, University of Nottingham Medical School, Queen's Medical Centre, Nottingham NG7 2UH, U.K.

(Received 25 October 1983)

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