Workshop Report: Glucose Metabolism

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Fibre is now accepted to have both short and long term effects which may be completely unrelated in mechanism. For this reason it is important to consider acute and long term effects separately.

Different fibres have been shown to delay carbohydrate absorption by a variety of mechanisms, including delayed gastric emptying, increased viscosity of the intestinal contents or limiting access of digestive enzymes to carbohydrate in whole foods. Effects which result include slower entry of glucose into the splanchnic circulation and an altered profile of gut hormone release and insulin secretion. Such effects may result in different patterns of peripheral glucose utilisation possibly associated with reduced lipogenesis.

Long term consequences of the ingestion of different types of dietary fibre may be related more to changes in gut morphology and function.

The interpretation of many experiments is complicated by the difficulty of separating effects due to change in fibre consumption from those which occur as a result of changes in other major nutrients in the diet. In high carbohydrate, high fibre diets, which have been used successfully in the treatment of diabetes, the relative quantities of almost all the major nutrients have been changed: as well as being high in fibre, the type and quantity of carbohydrate, fat and protein have also been changed. Furthermore, in some experiments in which diabetic patients have been hospitalized, changes such as level of care, dependable meal pattern and alcohol withdrawal may bring about changes which are difficult to separate from those due to dietary manipulation.

Management Considerations

• **A prudent diet for diabetics** Diabetics are at the same or greater risk of diseases characteristic of affluent society as others in the community. A high carbohydrate, high fibre (HCHF) diet for diabetics is consistent with dietary guidelines now advanced for many developed countries. Those diabetics in developing countries should be enabled to continue traditional HCHF diets as long as they are nutritionally adequate.

• **Source of dietary fibre** Diabetics should obtain their dietary fibre from intact food and from as wide a variety of foods according to biological origin as possible. It is not advisable for diabetics to obtain extra dietary fibre as supplements. This would be a pharmacological rather than a nutritional approach, a failure to recognise the properties of fibre which might not be retained when separated from the food of origin and a denial of the several properties of food affecting glucose metabolism.

• **Special features of the diabetic diet** As far as food type is concerned, it would appear that the diabetic can follow a diet that is healthful for the population at large. However, where insulin secretion is limited, it is desirable to spread the carbohydrate load out across the day by an increase in meal or snack frequency. When on insulin the constraint on meal or snack timing is how well it is accommodated by the profile of action of the administered insulin. There may also need to be some guidance in regard to fruit consumption. Fruit juice should be avoided and whole fruit preferred. When particular fruits are in season, there can be a tendency to overeat them. Perhaps a limit of six to eight servings of fruit each day could be considered.

• **Nutrition education for the diabetic in regard to dietary fibre** The use of a wide variety of dietary fibre rich food should be stressed, as this is likely to lead to an adequate intake that is safe. Since diabetics come from a wide range of age groups, cultural backgrounds and socio-economic groups and can have other health problems, individualisation of advice is required. A repertoire of nutrition education techniques to choose from would be helpful.

The diabetic will need to be assisted in the recognition of HCHF foods and their use, whether by principle, lists, exchanges or other methods.

Further Research

The role of a low fat diet needs to be explored in detail. The effect of the type of fat needs to be considered in relation to gut morphology, gut hormone release and insulin sensitivity. There is a need to quantify insulin sensitivity and to determine whether dietary manipulation can alter insulin sensitivity apart from changes due to alteration of body weight.

For more general studies involving diet, there is a need for a more uniform means of describing diet: for example, what is meant by refined carbohydrate?

There is a need to know more of the long term effects of different kinds of dietary fibres and

dietary changes in general on gut structure and function. More information is also required on the mechanisms of the acute effects of dietary fibres

Recommendations

- Recommendations regarding level of intake of dietary fibre appear, at this stage, to be meaningless. There is insufficient definition of what fibre is, a lack of standard methods of measurement or of appropriate tables.

- Preventive health measures should include nutrition education for young people with emphasis on the consumption of a wide range of foods. It needs to be recognised that such a programme may conflict with commercial interests and agricultural lobbies.

- Nutrition education for the public needs to include information on dietary fibre. The "natural food" approach would appear to be most useful: perhaps "preserve nature's packaging" would be an appropriate theme.

- The importance of national nutrition policies is to be emphasised. Such policies should be developed in conjunction with government, commercial and agricultural interests: the Norwegian model appears to be appropriate.

- The special nutritional problem posed by the excessive use of high sugar beverages should be recognised: such drinks contribute little but energy to the diet.

Conclusions

It is clear that little is known of the mechanism of effectiveness of high carbohydrate, high fibre diets in the treatment of diabetes, and such information is urgently required. Of what relative importance are the types and amount of fibre, carbohydrate and fat in the treatment of diabetes?

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