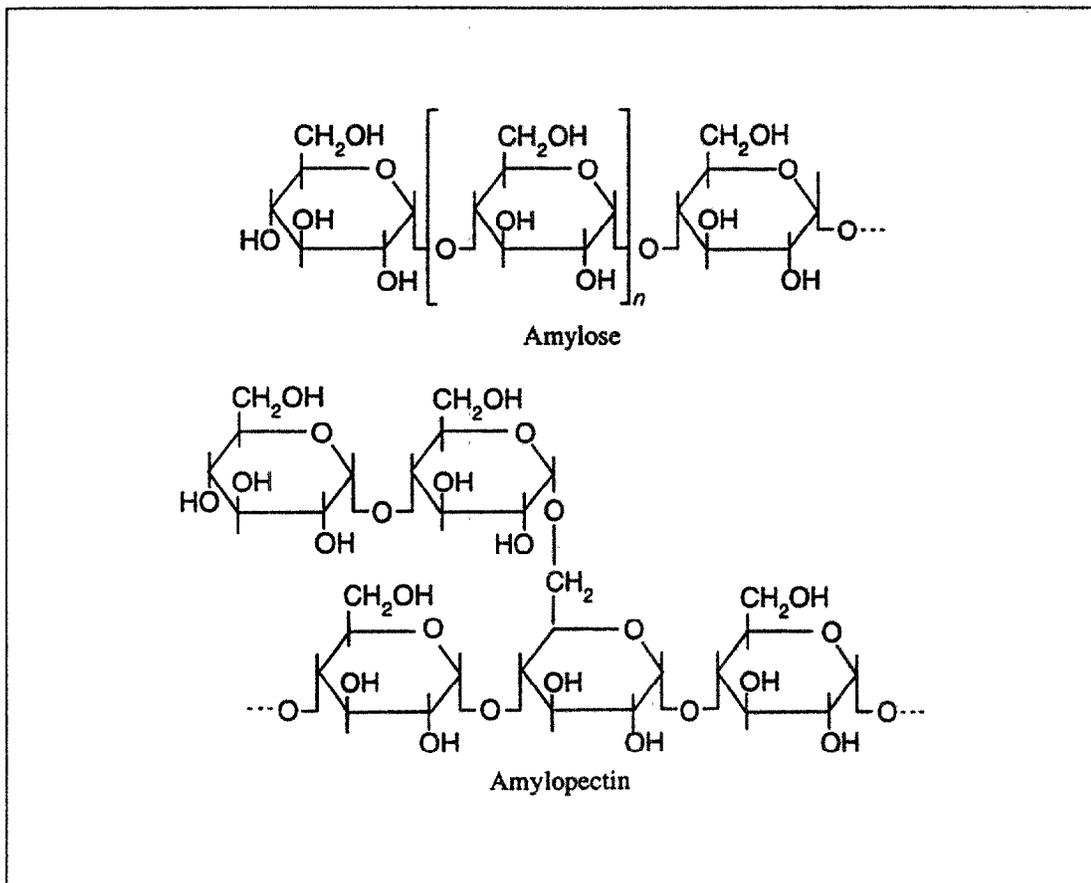


# Carbohydrates in human nutrition



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Food  
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of  
the  
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## CHAPTER 3 DIETARY CARBOHYDRATE AND DISEASE

Carbohydrates may directly influence human diseases by affecting physiological and metabolic processes, thereby reducing risk factors for the disease or the disease process itself. Carbohydrates may also have indirect effects on diseases, for example, by displacing other nutrients or facilitating increased intakes of a wide range of other substances frequently found in carbohydrate-containing foods. Evidence of associations between carbohydrates and diseases comes from epidemiological and clinical studies. There are relatively few examples in which direct causal links between carbohydrates and diseases have been proven. Thus the nutrient-disease or food-disease associations discussed below must be considered in terms of the strength of evidence from a range of observational studies and clinical experiments and the existence of plausible hypotheses.

### **Obesity**

The frequency of obesity has increased dramatically in many developed and developing countries. This is of profound public health importance because of the clearly defined negative effect of obesity, especially when centrally distributed, in relation to diabetes, coronary heart disease and other chronic diseases of lifestyle. Genetic and environmental factors play a role in determining the propensity for obesity in populations and individuals. Lack of physical activity is believed to contribute to the increasing rates of obesity observed in many countries and may be a factor in whether an individual who is at risk will become overweight or obese.

High carbohydrate foods promote satiety in the short term. As fat is stored more efficiently than excess carbohydrate, use of high carbohydrate foods is likely to reduce the risk of obesity in the long term. Much controversy surrounds the extent to which sugars and starch promote obesity. There is no direct evidence to implicate either of these groups of carbohydrates in the etiology of obesity, based on data derived from studies in affluent societies. Nevertheless, it is important to reiterate that excess energy in any form will promote body fat accumulation and that excess consumption of low fat foods, while not as obesity-producing as excess consumption of high fat products, will lead to obesity if energy expenditure is not increased. While high carbohydrate diets may help reduce the risk of obesity by preventing overconsumption of energy, there is no evidence to suggest that the macronutrient composition of a low energy diet influences the rate and extent of weight loss in the treatment of obese patients.

### **Non-insulin dependent diabetes mellitus (NIDDM)**

High rates of NIDDM in all population groups are associated with rapid cultural changes in populations previously consuming traditional diets, and also with increasing obesity, especially when centrally distributed. Although the precise mode of inheritance has not been established, there is no doubt that genetic factors are involved. Certain populations appear to have a strong predisposition to the development of NIDDM to the extent that in some groups about half the adult population have the disease (79). Within all populations a family history of NIDDM is an important predisposing factor. Diet and lifestyle-related conditions which

**NOTE**



### ***The role of carbohydrates in the maintenance of health***

The Consultation RECOMMENDS:

11. That the many health benefits of dietary carbohydrates should be recognized and promoted. Carbohydrate foods provide more than energy alone.
12. An optimum diet of at least 55% of total energy from a variety of carbohydrate sources for all ages except for children under the age of two. Fat should not be specifically restricted below the age of 2 years. The optimum diet should be gradually introduced beginning at 2 years of age.
13. That energy balance be maintained by consuming a diet containing at least 55% total energy from carbohydrate from various sources and engaging in regular physical activity.
14. Against consuming carbohydrate levels above the optimum, including carbohydrate-containing beverages, for purposes of recreational physical activity. Higher carbohydrate intakes are only needed for long-term extreme endurance physical activities.
15. That, as a general rule, a nutrient-dense, high carbohydrate diet be considered optimal for the elderly, but that individualization is recommended because their specific nutritional needs are complex.

### ***Dietary carbohydrate and disease***

The Consultation RECOMMENDS:

16. That a wide range of carbohydrate-containing foods be consumed so that the diet is sufficient in essential nutrients as well as total energy, especially where carbohydrate intake is high.
17. That the bulk of carbohydrate-containing foods consumed be those rich in polysaccharides and with a low glycemc index. Appropriately processed cereals, vegetables, legumes, and fruits are particularly good food choices.
18. That excess energy intake in any form will cause body fat accumulation, so that excess consumption of low fat foods, while not as obesity-producing as excess consumption of high fat products, will lead to obesity if energy expenditure is not increased. Excessive intakes of sugars which compromise micronutrient density should be avoided. There is no evidence of a direct involvement of sucrose, other sugars and starch in the etiology of lifestyle-related diseases.
19. That national governments provide populations in transition from traditional diets to those characteristic of developed countries, with dietary recommendations to ensure nutritional adequacy and retention of an appropriate balance of macronutrients.

### **NOTE**

### ***The role of glycemic index in food choice***

The Consultation RECOMMENDS:

20. That for healthy food choices, both the chemical composition and physiologic effects of food carbohydrates be considered, because the chemical nature of the carbohydrates in foods does not completely describe their physiological effects.