CHAPTER 3.4

TYPE 2 DIABETES, GLUCOSE TOLERANCE AND CARDIOVASCULAR DISEASES IN THE SEVEN COUNTRIES STUDY

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The prevalence and incidence of type 2 diabetes (formerly called non-insulin-dependent diabetes) are increasing worldwide. The WHO predicts that the number of diabetic patients will increase from 143 million in 1997 to about 300 million in 2025 (1). A major determinant of diabetes is obesity and large increases in the prevalence of obesity were observed in the developed countries during the last decades of the 20th century and in developing countries more recently. Worldwide more than 250 million people are estimated to be obese (2). Another important determinant of diabetes is physical inactivity. There is now evidence from ecological, cross-sectional, and cohort studies that physical activity is inversely related to risk of type 2 diabetes (3).

Diet has always been viewed as a major determinant of diabetes. In an ancient Hindu document from 400 BC the diabetic syndrome was described to include "honey-like urine" (4). It took, however, till 1776 before it was demonstrated that the sweet substance in the urine of diabetic patients was glucose. A major event in the history of diabetes was the discovery of the hormone insulin in 1921, when Banting and Best produced the first insulin preparation for treatment of diabetic patients.

Carbohydrates influence β-cell activity and have therefore been suspected to influence glucose tolerance and diabetes. Himsworth suggested in 1935 that insulin sensitivity increased with a high-carbohydrate diet and this became the basis of a standard recommendation regarding dietary preparation for the oral glucose tolerance test (5). He also suggested that not only the energy density of carbohydrates but also dietary fat might play a role in the etiology of diabetes (6).

The diet traditionally prescribed for diabetic patients was low in carbohydrate and high in fat (7) and contained a large amount of saturated fat, thus promoting the occurrence of CHD. Currently, a diet low in saturated fat and high in fiber-rich carbohydrates is recommended for the prevention and amelioration of both diabetes and CHD (7).

There is also a genetic basis for diabetes; a family history of diabetes occurs more frequently in diabetic than in non-diabetic women (8). It is not clear whether type 1 (insulin-dependent) and type 2 diabetes have the same genetic basis. There is quite some evidence suggesting that type 2 diabetes results from an interaction among genetic, dietary, and lifestyle factors (9).

This chapter summarizes the findings of the Seven Countries Study on type 2 diabetes and glucose tolerance. We will describe trends in prevalence of diabetes over 35 years, including the relationships among body fatness, physical activity and diabetes from a cross-cultural perspective. Also described are the relationships among body fatness, lifestyle, dietary and genetic determinants of glucose tolerance and diabetes at the individual level. Finally, the relationship between diabetes and the risk of cardiovascular and all-causes mortality will be outlined.

TRENDS IN THE PREVALENCE OF DIABETES OVER A 35-YEAR PERIOD

In the Seven Countries Study, information about prevalence of diabetes had been collected since the baseline survey in 1958-1964. The diagnosis was based on a typical history of diabetes under treatment. During follow-up the cumulative prevalence was calculated, which means that a man who was diagnosed as a diabetic stayed a prevalent case during the whole follow-up period. The prevalence of diabetes varied at baseline between 0% in Japan and 2.1% in Belgrade. Ten years later the cumulative prevalence was found between 0% in Japan and 12.8% in Belgrade (Fig. 1).