



STUDIES ON THE EPIDEMIOLOGY OF DIABETES
IN PACIFIC POPULATIONS

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SUMMARY

Increasing interest has been shown in the epidemiology of diabetes in the past decade. It is now clear that, because noninsulin-dependent diabetes may often remain asymptomatic for many years, epidemiological methods are vital for the accurate description of the frequency and natural history of the disease in populations.

The various island communities of the Pacific, with their ethnic and cultural diversity, their geographical integrity, and the apparent disparity in the prevalence of noninsulin-dependent diabetes between their populations, constitute an ideal natural laboratory for the study of this disease. For this reason, the Pacific region has been one of the most active areas for diabetes research in recent years.

In this thesis, six original studies are presented. They are based upon data collected from over 7000 subjects in four Pacific nations. Each addresses a key question in Pacific diabetology, some being of universal relevance. Although complimentary, each forms a discrete area of research.

Glucose tolerance in a highland population in Papua New Guinea

There has been prolonged debate as to whether Melanesians may constitute an ethnic group which is less susceptible to noninsulin-dependent diabetes than other Pacific populations, due to some genetically mediated resistance. A confounding factor in all Melanesian studies to date is that they were performed on coastal populations, which had been exposed to ancestral genetic influence from other Pacific societies known to be susceptible to diabetes.

The first study to examine a highland Melanesian population known to be free of "external" genetic admixture, using standardized methodology, is described in Chapter 1. No cases of noninsulin-dependent diabetes were found in over 300 subjects examined, and the prevalence of abnormal glucose tolerance was the lowest to be reported from the Pacific. These findings provide renewed support for the concept of genetic resistance to noninsulin-dependent diabetes in Melanesians.

Noninsulin-dependent diabetes in the Republic of Kiribati

A survey of 2938 subjects, constituting the first diabetes study in the newly independent Republic of Kiribati (formerly the Gilbert Islands) is described in Chapter 2. This Micronesian community is a neighbour of Nauru, where the highest prevalence of noninsulin-dependent diabetes yet recorded in the Pacific has been documented.

The prevalence of diabetes was found to be over twice as high in an urban, as compared with a rural, sample in Kiribati, and to be associated with high relative body weight, physical inactivity and the consumption of a non-traditional diet. Further analysis showed that obesity was not a sufficient explanation of the rural-urban difference in prevalence of noninsulin-dependent diabetes in this population.

The consequence of hyperglycaemia in Pacific populations

The study presented in Chapter 3 examines data collected in the first total population diabetes survey of adult Nauruans, which was conducted in 1982. Nauruans are known to suffer from an exceptionally high prevalence of noninsulin-dependent diabetes (one quarter of the adult population suffer from the disease).

The prevalence of diabetic retinopathy was found to be 24 per cent in diabetics. The presence of retinopathy was strongly associated with both duration of disease and plasma glucose concentration at examination. These results are in accord with those from Caucasoid and American Indian populations, and confirm that Nauruans suffer from the morbid consequences of noninsulin-dependent diabetes, rather than exhibit hyperglycaemia as an innocent biochemical trait.

The natural history of impaired glucose tolerance in Nauruans

Impaired glucose tolerance is a newly defined category of glucose tolerance, intermediate between normality and diabetes. For a sub-set of subjects examined both in the 1982 survey and in the original Nauru survey in 1975-6, data were compared at the two points in time (Chapter 4). This is the fourth study of impaired glucose tolerance to appear in the literature, and the first for a Pacific population.

Impaired glucose tolerance was found to have an unpredictable outcome, with approximately one third of subjects returning to normality, one third remaining with impaired glucose tolerance status, and one third progressing to diabetes. However, subjects with impaired glucose tolerance were at significantly higher risk of subsequent diabetes than normals, after controlling for differences in age and obesity.

Ethnic differences in susceptibility to noninsulin-dependent diabetes : a comparative study of two urbanized Micronesian communities

In Chapter 5, the prevalence of noninsulin-dependent diabetes in Nauruans is compared with that in an inactive, urbanized Micronesian sample in Kiribati. After allowing for differences in age and obesity, the risk of noninsulin-dependent diabetes was found to be threefold for Nauruans, suggesting that the high prevalence in Nauruans could not be explained by differences in age and obesity alone.

The results support genetic studies which suggest that Nauruans may have enhanced genetic susceptibility to noninsulin-dependent diabetes.

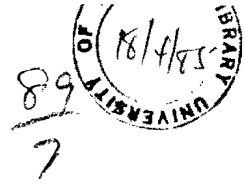
Risk factors for diabetes in Pacific populations

The association between the prevalence of diabetes and three suspected risk factors - obesity, physical inactivity and urbanization - was studied in 5519 subjects from three populations : Melanesians and migrant Asian Indians in Fiji, and Micronesians in Kiribati. The results are presented in Chapter 6.

Associations were found to be inconsistent between populations, and between the sexes within populations. In some cases obesity was strongly associated with the prevalence of noninsulin-dependent diabetes, in others the principal variable associated with diabetes appeared to be physical inactivity. More than one factor was associated with increased risk in Micronesians.

These results indicate that risk factors may be heterogeneous in their effect upon different populations,

and the findings have important implications for the planning of primary prevention programmes for diabetes.



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SUPPLEMENTARY VOLUME OF TABLES AND FIGURES

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Due to the size of many of the tables in this thesis, all tables and figures were placed at the end of the manuscript.

For the convenience of the reader, a supplementary volume of tables and figures accompanies each copy of the thesis. The contents have been collated in the exact order in which they appear in the text.