

Defining, Understanding and Controlling the Diabetes Epidemic in Canada's Aboriginal Population: Seeking Solutions Through Interdisciplinary Research

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INTRODUCTION

By now, it is widely recognized that type 2 diabetes mellitus has become a major health problem among Aboriginal people in Canada (1). In an effort to define, understand and control this emerging epidemic, an Interdisciplinary Health Research Team (IHRT) was formed, with funding from the Canadian Institutes of Health Research (CIHR). In this issue of *Canadian Journal of Diabetes*, the IHRT on *Diabetes in the Aboriginal Population: Defining, Understanding and Controlling an Emerging Epidemic* presents a series of papers that are the fruit of this collaborative research effort. Given that this 5-year program has yet to reach its halfway point, the output to date is both exciting and encouraging.

WHAT IS THE IHRT?

The IHRT is one of several 'transitional' programs introduced during the period between the old Medical Research Council and the new CIHR, aimed at stimulating research that crosses traditional academic disciplines, addresses important health issues and promotes multicentre collaboration. It was a flagship program to herald the new mandate and orientation of CIHR. The competition went through a rigorous, 2-stage selection process in 1999 and 2000, and ultimately, 10 IHRTs were funded.

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Research objectives

The IHRT on Diabetes in the Aboriginal Population proposes to: 1) define the extent and magnitude of the disease and its health and social impact; 2) enhance understanding of the etiology, pathogenesis and cultural concepts of the disease; and 3) develop strategies to control the problem and arrest the progression of the epidemic.

The IHRT on Diabetes in the Aboriginal Population is therefore directed at a single disease affecting a specific target population. It encompasses:

- different stages of the disease's natural history—exposure, pathogenesis, onset and progression (Figure 1);
- all levels of inquiry, from the molecular to the population;
- quantitative and qualitative methods;
- training and capacity building; and
- dissemination of results and translation into policy (Figure 2).

Research themes

The research projects, and papers resulting from them that are published in this issue of *Canadian Journal of Diabetes*, can be grouped into major themes.

Assessing disease burden

The first and fundamental step in addressing a population health problem is to accurately assess its burden and impact. This is being achieved using a variety of methods, including creating and maintaining population-based diabetes registries [Project 1], conducting screening surveys [Project 2], and electronic linkage of healthcare databases [Project 4] (Figure 1).

Chris Green, James Blanchard and colleagues used healthcare databases in Manitoba, Canada, to identify cases of diabetes among First Nations and other provincial residents and determine the temporal trends in incidence and prevalence during the past decade, as well as projections into the next 25 years. The technique pioneered in Manitoba has been adopted by the National Diabetes Surveillance System, a cornerstone in the Canadian Diabetes Strategy. A preliminary

report on the spatial distribution of diabetes within the city of Winnipeg, Manitoba, has been published (2).

The Canadian Constitution recognizes 3 groups of Aboriginal people: First Nations, Inuit and Métis. In contrast to the other 2 groups, very little is known about the health status of the Métis, in part because of the difficulty in identifying the population. In this issue (p. 442), Sharon G. Bruce and colleagues demonstrate that diabetes is a serious and prevalent health problem also among the Métis, based on 2 sources of data: 1) a health interview survey; and 2) data linkage between the membership of the provincial Métis organization and the database of Manitobans with diabetes.

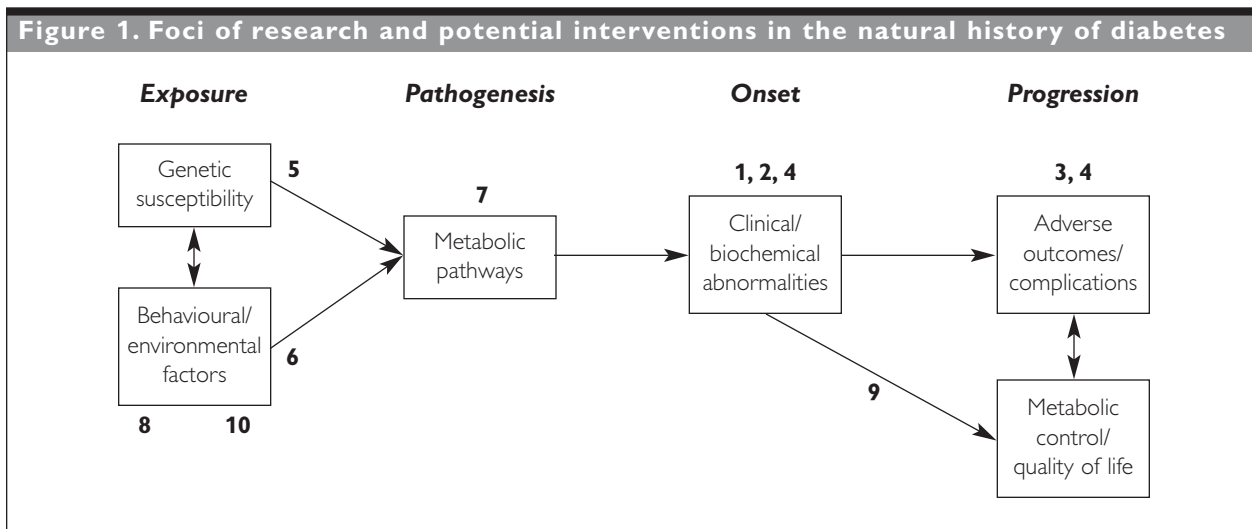
Type 2 diabetes is usually recognized to be a disease of adulthood. In the mid-1980s, Heather J. Dean was among the first clinicians to notice the increasingly younger onset of this disease in First Nations children and adolescents in Manitoba (3). In the intervening years, she and her team acquired considerable experience in the detection and management of type 2 diabetes in Aboriginal youth, which they share in their clinical and epidemiologic overview prepared for this issue (p. 449).

The public health impact of diabetes derives from the many serious long-term complications affecting the heart, brain, nerves, eyes and kidneys. Little is known about the

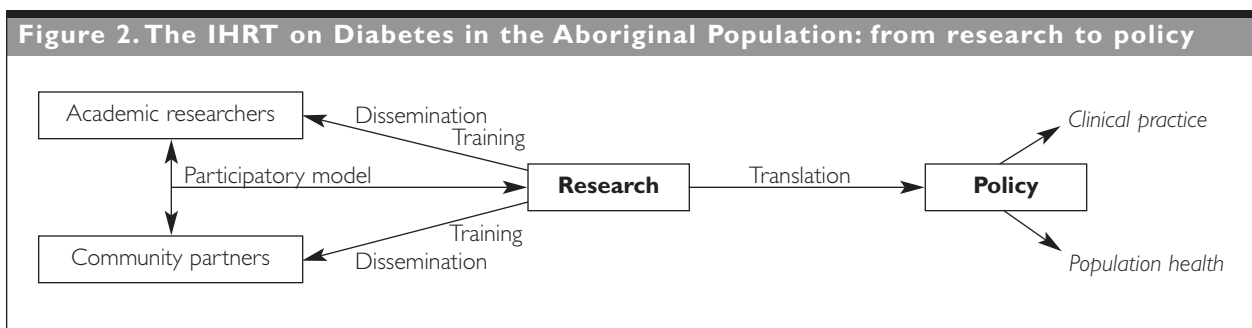
prevalence of such complications in Canadian populations. Following their earlier epidemiologic studies (4), Anthony J.G. Hanley, colleagues and their team launched a comprehensive survey of diabetes complications in Sandy Lake, an Oji-Cree community in Northwestern Ontario, Canada, with which they have developed a decade of research partnership [Project 3] (Figure 1). Their paper describes the rationale and methods used in the survey (p. 455). Complications screening surveys are also underway in several Manitoba First Nations using comparable protocols and techniques.

Identifying risk factors

The current consensus regards type 2 diabetes as resulting from interactions between genetic susceptibility and environmental/behavioural risk factors. The laboratory of Robert A. Hegele discovered the private G319S mutation in the transcription factor hepatocyte nuclear factor (HNF) -1 α , encoded by the *HNF1A* gene in the Oji-Cree in Sandy Lake (5). With support from the IHRT, his team continues their extensive search for susceptibility genes for diabetes and related metabolic conditions in DNA samples from Sandy Lake and other First Nations participating in community-based surveys [Project 5] (Figure 1).



Note: numbers refer to current research projects



IHRT = Interdisciplinary Health Research Team

Another project [Project 6] (Figure 1), funded jointly by the CIHR and the Canadian Diabetes Association, was a case-control study of prenatal and early infancy risk factors for type 2 diabetes in youth. Breastfeeding was found to be protective, while maternal type 2 and gestational diabetes were strong risk factors for diabetes in the mother's offspring (6).

Designing and implementing interventions

Current strategies for the prevention of type 2 diabetes focus on modification of lifestyle or behaviour (especially weight loss and physical activity), and enabling environmental change. Community-based diabetes prevention projects have been initiated in a few locations across Canada, including the Mohawk Nation of Kahnawake, Quebec, Canada, and Sandy Lake First Nation (7,8). These participatory research projects respect Aboriginal culture, traditions and learning styles, and have achieved a high degree of community support and awareness. The Kahnawake and Sandy Lake projects joined forces to compare and contrast their experience in community-based diabetes prevention, in an effort to produce a 'best practice model' that can be adopted by other Aboriginal communities, and indeed, non-Aboriginal ones as well. In this issue, Ann C. Macaulay and colleagues identify the commonalities and differences between the 2 projects in terms of design, interventions and evaluation (p. 464).

Prevention must be incorporated with treatment for those already diagnosed with diabetes, an aspect that is also supported by the IHRT. In this issue, Dean and colleagues also refer to various initiatives in the clinical care of First Nations children with type 2 diabetes [Project 9] (Figure 1) (p. 449).

Relevance and importance

The IHRT addresses and seeks a solution to an emergent health problem that affects a substantial proportion of the Aboriginal population in Canada. The prevalence and severity of diabetes will hamper current efforts to improve the overall health status of Aboriginal people to a level comparable to the rest of the population.

The anticipated results of this research will also have broader relevance beyond Aboriginal people or Canada. The IHRT encompasses basic laboratory research in genetics and pharmacology investigating human biological systems. Studies conducted in Aboriginal communities will make significant contributions to epidemiologic and anthropologic research methods. Intervention strategies developed and evaluated during the course of the research program are also potentially transferable to other settings and populations.

Preliminary results from several projects within the IHRT on Diabetes in the Aboriginal Population are collected in this issue of *Canadian Journal of Diabetes*. We hope that they support our contention that the interdisciplinary research approach offers the best hope in seeking urgent solutions to a public health crisis in Canada.

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