

Sweet Blood and Social Suffering: Rethinking Cause-Effect Relationships in Diabetes, Distress, and Duress

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I draw upon anthropological engagements with bioscience and embodiment in order to unpack current approaches to defining and preventing diabetes mellitus. The analysis stems from the conviction that carefully considering the symbolic frames through which we conceive of diseases, their origins, their distribution, and their consequences will assist us in planning and implementing interventions to improve population health. I argue that research and interventions focused on the sweetness of blood would benefit from rethinking intersections between diabetes, distress, and duress. In many instances, the lived experience of diabetes is consonant with an understanding of distress (i.e., “social suffering”) that expands conventional understandings of population health problems. Diabetes incidence is rising worldwide, but it is rising especially rapidly in Aboriginal and other disadvantaged populations. Notably, diabetes is now three to five times more common in Canada’s First Nations population than it is in its non-Aboriginal population. Yet as recently as 50 years ago, diabetes and associated health problems were rare in these groups. To come to grips with such transformations and disparities is to advance the population health research agenda.

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INTRODUCTION

I draw upon anthropological engagements with bioscience and embodiment in order to unpack current approaches to defining and preventing diabetes mellitus, a condition of great interest to anthropologists who specialize in biological variation and population health (see reviews by Szathmary 1994; Benyshek, Martin, and Johnston 2001). As discussed in greater detail below, the contemporary definition of diabetes mellitus as a disease hinges upon the consistent and measurable presence of sweet blood (chronic hyperglycemia). Medical anthropologists and other researchers concerned with population health have rarely scrutinized either how diseases are defined or the ramifications of disease definitions. I do not condemn the use of biomedical categories in population health research; rather, I seek to demonstrate the value of examining what each of these categories implies. In short, in this article I attempt to further the anthropology of (and for) population health by drawing upon the anthropology of bioscience and the anthropology of embodied experience.

My analysis stems from the conviction that carefully considering the symbolic frames through which we conceive of diseases, their origins, their distribution, and their consequences will assist us in fostering health and redressing disparities. Treating disease classification as a “black box” overlooks what various diagnostic criteria presume as well as how diagnostic categories help structure clinical practice, public health interventions, resource allocation, and more (Cambrosio, Young, and Lock 2000:3). By examining the current diagnostic criteria for, and presumed causes of, diabetes mellitus so that they no longer remain hidden from view (i.e., “black-boxed”) in population health research, this article suggests that, for the foreseeable future, the sweetness of blood will prove to be helpful with regard to conceiving of and promoting population health. Furthermore, scrutiny of how diabetes is diagnosed and how its causes tend to be conceived brings to the fore how sweet blood’s various dimensions combine in actual people’s lives. The scope of these dimensions calls into question distinctions between “physical” health and “mental” health.

Diabetes is defined according to a single attribute—the sweetness of blood—but, when it comes to lived experience, this definition does not suffice. Because they facilitate pattern recognition, categories such as diabetes may inform personal identities and aid researchers in analysis. We must scrutinize the categories used in population health research and recognize that, since all categories exclude, all patterns are necessarily partial. And it is crucial to reflect on just *how* knowledge about a given population is partial. For one thing, the definition and study of populations, as such, does not necessarily reflect the lived experience of all members. And that is a key point. Anthropology, with its epistemological emphasis on comparison and contrast, is founded on the notion that collectivities are lived realities in their own right. It follows that we can learn things from studying populations and smaller collectivities that we cannot learn from studying individuals as if they were independent from groups. Here my main objective is to reflect upon how epidemics achieve social significance and upon how an epidemic's perceived significance can foster *and* impede interventions that may prolong and improve lives.

More specifically, I argue that research and interventions focused on the sweetness of blood would benefit from more explicit attention to embodied intersections between diabetes, distress, and duress. Distress is a bona fide outcome in many cases of diabetes, although it is not always viewed as such. In addition, I discuss recent research that provocatively suggests that distress and duress may contribute *directly* to the sweetening of blood and concomitant complications, including cardiovascular disease, which is known to be the current leading cause of death in North America and many other parts of the world. Very often, the lived experience of sweet blood is consonant with an anthropological understanding of distress—"social suffering"—that expands conventional understandings of population health problems.

My literature review also suggests that consumption patterns linked to most modern-day cases of diabetes caution against any simple equation of "lifestyle" with individual behavior (or with culture, for that matter). It regards power—or, more specifically, the various ways in which capacity develops and is exercised—as central to the definition and redress of health problems. In theorizing and redressing health inequalities, forms and degrees of duress merit greater attention than they now receive.

BACKGROUND AND ANALYTIC APPROACH

Reflecting the rising incidence of diabetes worldwide, particularly in Aboriginal populations, as well as the recognition that this trend indicates profound socioeconomic changes, an entity known as the Cree Board of Health and Social Services of James Bay (CBHSSJB) commissioned a literature review on diabetes and mental health to assist with strategic planning. Taking on this assignment provided an opportunity to distill some “lessons learned” from a separate, ethnographic project. The ethnographic research project spans diabetes research, public policy, private commerce, general knowledge, and their interrelationships. Here I apply and extend some of that project’s findings in order to examine the interrelationships between diabetes, distress, and duress.

In order to develop this literature review, I supplemented references already on file by identifying journal articles published between 1980 and 2000 that dealt specifically with diabetes and mental health issues.¹ The sources that, taken together, provide the basis for this review were analyzed in terms of some theoretical preoccupations in contemporary medical anthropology—specifically, the perception and classification of disease, the experience and depiction of suffering, and the exercise of power in and through human bodies. Most of the sources consulted focus on epidemiological findings, clinical treatment, and programs targeting “high risk” individuals; far fewer document subjective accounts or initiatives aimed at primary prevention of diabetes in particular communities; even fewer explicitly construe diabetes, distress, and duress as public health problems that often entwine.

I have not attempted to weigh the significance of research on diabetes or mental health by grading study designs according to the number of subjects enrolled or their reproducibility; rather, my discussion of what the sweetness of blood implies for understanding and promoting health is grounded in previous work documenting the diabetes epidemic, mental health concerns, history, and culture of the population served by the CBHSSJB. In addition to research carried out under the auspices of the CBHSSJB (see Torrie 2001 for summary and bibliography), I draw upon ethnographic and historical research (Adelson 2000a, in particular). Instead of recommending particular interventions, I focus on contributing to a renewed appreciation of how, every day, blood sweetens in many

people's lives and of the global impact that this can have on individuals, families, communities, and populations.

The population served by the CBHSSJB currently numbers about 13,500 persons living in nine settlements that dot an area known in Cree as *Eeyou Istchee*. This area is about the size of France and is located in the northwestern subarctic region of Quebec. While Eeyou Istchee qualifies as remote, it is hardly insulated from the rest of the world. Hydroelectric dams in the region supply electricity to Montreal and New York City, among other places.

The Canadian province of Quebec officially recognizes the CBHSSJB as a regional authority under the auspices of the 1975 James Bay and Quebec Northern Agreement. The Quebec government's decision to build hydroelectric dams as part of its bid to modernize the province's economy provided the impetus for this agreement. As a consequence of the government's plans, the Cree living in the area had to undergo "modernization."

Sweetened blood has flowed from the "modernization" of Eeyou Istchee, as has knowledge about the scope and sources of this problem. Since 1988, when nurses working in the region alerted the CBHSSJB to a growing diabetes problem in Eeyou Istchee, a number of diabetes research projects have been carried out (Torrie 2001 for summary). The first diabetes registry in an Aboriginal population has also been put in place to support further research as well as practical interventions. The CBHSSJB therefore has current and comprehensive data on the scope and scale of the diabetes problem in Eeyou Istchee—information that has been shared with inhabitants in many ways, ranging from face-to-face clinical encounters to local mass media coverage to community-centered events. A qualitative study based on 27 extended interviews suggested that many Cree in Northern Quebec perceive a causal relationship between the spread of diabetes and, as one person put it, "the decline of bush life" due to economic and social changes experienced since the 1970s, particularly those changes that led to and followed from the 1975 James Bay and Quebec Northern Agreement (Boston et al. 1995:9-10).

In 1989 there were 230 diagnosed cases of diabetes in the region; by 2001 there were more than four times as many diagnosed cases—975 to be precise (Cree Board of Health and Social Services of James Bay 2001). One-quarter (24 percent) of the people living today with diabetes in Eeyou Istchee have not reached 40 years of age, and 94 percent of them qualify as either overweight or obese. When

adjusted to take into account the average age, the diabetes prevalence rate in this population is more than three times higher than is the Canadian diabetes prevalence rate, which has been pegged conservatively at about 5 percent (Canada Health 1999).

A Quebec-wide survey that included people living in Eeyou Istchee touched on the relationship between chronic physical disease and mental health (Daveluy et al. 1994). The survey was not designed to examine the relationship between diabetes and mental health, and the diabetes epidemic in Eeyou Istchee was in its infancy when people living there were surveyed in 1991; however, the data may still shed some light on the nexus of diabetes, distress, and duress. Analysis of the survey data revealed that Cree women in white-collar occupations were experiencing significant strain (Kirmayer et al. 2000). This finding is worth keeping in mind, given that diabetes is currently hitting women harder than men in Eeyou Istchee. Moreover, to the extent that blood glucose levels reflect food consumption and physical activity patterns, role-related strain among mid-life women could convert into higher blood glucose levels across the population. This is because Cree women tend to buy and prepare food for the household and also often take a leading role in supervising children.

Ironically, during the first decade or so of the diabetes epidemic in Eeyou Istchee, funding for research was often more available than was funding for training, materials, and programs (Torrie 2001). In 2001 an action plan that prioritizes primary prevention, education and training, clinical care, and surveillance was presented to the Cree and Quebec governments. This plan has received funding.

By situating the current state of epidemiological knowledge about the lived effects of sweet blood in relation to theories about disease and disease causation, I hope to inform discussions about how to redress the diabetes epidemic in Eeyou Istchee and, more broadly, how to interpret this phenomenon. Since the diabetes epidemic among the Cree of Northern Quebec is hardly an isolated incident, discussions about theory and practice with reference to this population stand to have broad relevance.

DIABETES: A BRIEF OVERVIEW

In the Western medical tradition, the diagnosis and classification of something called “diabetes” has a long history, stretching back to

Ancient Greece.² In recent years, diabetes specialists have altered the classification of diabetes to reflect their understanding of etiology (World Health Organization 1999; Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus 1997; Meltzer et al. 1998). They focus on mechanisms internal to the human body to distinguish between different types of diabetes. The condition formerly known as “juvenile diabetes mellitus,” or “insulin-dependent diabetes mellitus” (IDDM), is currently known as type 1 diabetes mellitus, while the condition formerly known as “maturity-onset diabetes mellitus,” or “non-insulin-dependent diabetes mellitus” (NIDDM), is currently known as type 2 diabetes mellitus. Specific genes have been linked with particular cases of type 2 diabetes, leading to the characterization of several genetically defined subtypes. In fact, a plethora of conditions that all share one feature—dangerously sweet blood—have been grouped together under the category of diabetes. The Canadian Diabetes Association, the American Diabetes Association, and the World Health Organization currently recognize four main etiological types of diabetes, one of which (“other specific types”) includes many subtypes. At last count, the American Diabetes Association recognized more than 50 “specific types” of diabetes (see Figure 1).

Type 1 diabetes has been characterized by a failure of the pancreas to produce insulin, which is essential for survival because it enables the transfer of energy (glucose) into the cells that make up the body. Deprived of insulin, glucose builds up in the bodies of people with type 1 diabetes. Before the characterization, distillation, and commercialization of insulin in the 1920s, type 1 diabetes was invariably fatal. What causes the insulin-producing cells in the pancreas to fail remains unclear, but most cases involve an autoimmune response. Certain combinations of genes increase the likelihood of developing type 1 diabetes, but even identical twins exhibit concordance for type 1 diabetes only about one-third of the time (Barzilai and Shamoon 1997). Type 1 diabetes develops most frequently in children and adolescents, but it may set in later in life.

Type 2 diabetes mellitus currently accounts for about 90 percent of all cases. The bodies of people with type 2 diabetes produce varying amounts of insulin, but this insulin is not very effective in enabling the transfer of glucose into cells. High body mass and infrequent physical activity are the two main known contributors to type 2 diabetes. It usually sets in after age 45. Increasingly, however,

- I. **Type 1 diabetes*** (β -cell destruction, usually leading to absolute insulin deficiency)
 - A. Immune mediated
 - B. Idiopathic
- II. **Type 2 diabetes*** (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance)
- III. **Other specific types**
 - A. Genetic defects of β -cell function
 - 1. Chromosome 12, HNF-1 (MODY3)
 - 2. Chromosome 7, glucokinase (MODY2)
 - 3. Chromosome 20, HNF-4 (MODY1)
 - 4. Mitochondrial DNA
 - 5. Others
 - B. Genetic defects in insulin action
 - 1. Type A insulin resistance
 - 2. Leprechaunism
 - 3. Rabson-Mendenhall syndrome
 - 4. Lipotrophic diabetes
 - 5. Others
 - C. Diseases of the exocrine pancreas
 - 1. Pancreatitis
 - 2. Trauma/pancreatectomy
 - 3. Neoplasia
 - 4. Cystic fibrosis
 - 5. Hemochromatosis
 - 6. Fibrocalculous pancreatopathy
 - 7. Others
 - D. Endocrinopathies
 - 1. Acromegaly
 - 2. Cushing's syndrome
 - 3. Glucagonoma
 - 4. Pheochromocytoma
 - 5. Hyperthyroidism
 - 6. Somatostatinoma
 - 7. Aldosteronoma
 - 8. Others
 - E. Drug- or chemical-induced
 - 1. Vacor
 - 2. Pentamidine
 - 3. Nicotinic acid
 - 4. Glucocorticoids
 - 5. Thyroid hormone
 - 6. Diazoxide
 - 7. β -adrenergic agonists
 - 8. Thiazides
 - 9. Dilantin
 - 10. -Interferon
 - 11. Others
 - F. Infections
 - 1. Congenital rubella
 - 2. Cytomegalovirus
 - 3. Others
 - G. Uncommon forms of immune-mediated diabetes
 - 1. "Stiff-man" syndrome
 - 2. Anti-insulin receptor antibodies
 - 3. Others
 - H. Other genetic syndromes sometimes associated with diabetes
 - 1. Down's syndrome
 - 2. Klinefelter's syndrome
 - 3. Turner's syndrome
 - 4. Wolfram's syndrome
 - 5. Friedreich's ataxia
 - 6. Huntington's chorea
 - 7. Laurence-Moon-Biedl syndrome
 - 8. Myotonic dystrophy
 - 9. Porphyria
 - 10. Prader-Willi syndrome
 - 11. Others
- IV. **Gestational diabetes mellitus (GDM)**

* Patients with any form of diabetes may require insulin treatment at some stage of their disease. Such use of insulin does not, of itself, classify the patient.

Figure 1. Etiologic classification of diabetes mellitus endorsed by the American Diabetes Association.

children under ten years of age, teenagers, and adults in their 20s and 30s are being diagnosed with type 2 diabetes (Dean, Mundy, and Moffatt 1992; Fagot-Campagna et al. 2000). Early onset dramatically increases the likelihood of complications and of death at a younger than average age.

In 1989 the World Health Organization (WHO) adopted a resolution urging public health action to prevent and control diabetes. In the 1997 *World Health Report* diabetes prevalence was defined as a basic health indicator (World Health Organization 1997). Given the high current prevalence rates in industrialized countries and in some developing countries, the WHO currently estimates that 140 million people around the world have diabetes, and it predicts that the number of people with diabetes will reach an alarming 300 million by 2025 (World Health Organization 2001b). A WHO report notes that incidence is rising particularly rapidly among Aboriginal populations in North America and Australia (Alderete 1999).

To raise the profile of diabetes, in 1990 the WHO and the International Diabetes Federation proclaimed 14 November as World Diabetes Day and November as International Diabetes Month. The themes chosen for World Diabetes Day in the late 1990s—the “seriousness of diabetes” in 1997, “equality” in 1998, and “the human and economic costs of diabetes” in 1999—suggest that diabetes is still not taken as seriously as its global impact warrants.

At least one in 18 people in the United States and one in 20 in Canada have diabetes (Canada Health 1999; Centers for Disease Control and Prevention 2000). The epidemiology of diabetes reflects socioeconomic inequalities, with those near the bottom of the ladder tending to have sweeter blood, concomitant health problems, and earlier-than-average death (Carter, Pugh, and Monterrosa 1996; Kutner and Brogan 2000; Narayan and Venkat 1997). In the United States, the epidemic is hitting Hispanic and Black members of the population very hard (Black 2002).

In both Canada and the United States, after adjusting for the younger average age of the Aboriginal population, the prevalence rate among Aboriginal peoples is at least three times higher than the national average (Bobet 1997; Young 1997). It bears underscoring that the disease was virtually absent in these populations as recently as the 1950s. Furthermore, the problem remains on the upswing (Young et al. 2000). Given the magnitude of the diabetes

epidemic in Aboriginal populations, it has been recommended that people with Aboriginal ancestry undergo screening for type 2 diabetes at an earlier age than most; that is, before age 45 (Meltzer et al. 1998).

DIAGNOSIS, PROGNOSIS, AND POPULATION HEALTH

Diagnostic practices aim to identify the origins of problems the better to redress them. The example of diabetes highlights that statistics about the distribution of disease within populations currently inform the detection and treatment of pathology in individual patients. More specifically, based on statistics derived from the study of populations, the criteria used today to diagnose cases of diabetes stem from the calculation of an individual's *potential* for various pathology and earlier-than-average death ("complications"). Thus, modern prognostic information does not apply directly to individuals; however, with the proliferation of statistics about disease, it has become more acceptable—even ethically imperative—to predict individual experience by situating the person in question in relation to statistically defined populations (Keating in press).

While diabetes mellitus has long been recognized as a disease in the Western medical tradition, the current "gold standard" diagnostic test for both type 1 and type 2 diabetes—the oral glucose tolerance test (OGTT)—received international acceptance as recently as the 1980s (Lieberman 1993). The OGTT is cumbersome to administer, so the fasting plasma glucose (FPG) test has been recommended as a more convenient alternative for routine clinical usage, with the explicit goal of reducing the number of undiagnosed (and therefore untreated) cases of type 2 diabetes (Meltzer et al. 1998; Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus 1997). Both the OGTT and FPG diagnostic tests establish a binary classification (having diabetes mellitus versus not having diabetes mellitus) in relation to several distribution curves derived from the study of several large samples. That is, research on variation within populations provides the basis for distinguishing pathology from normalcy. The current blood glucose measures used as cut-off points for diagnosing diabetes were identified based on a sharp inflexion observed in the correlation between glucose levels (at certain concentrations) with microvascular pathologies; namely, eye and kidney disease (Meltzer et al. 1998; Report of the Expert

Committee on the Diagnosis and Classification of Diabetes Mellitus 1997; World Health Organization 1999).

Since treatment varies by type, the diagnostic process is not complete until the diabetes has been "typed." The distinction between type 1 and type 2 diabetes according to physiological processes indicates that discussions about just how sweet blood can become before posing a health hazard mainly concern cases of type 2 diabetes (more precisely, the physiological processes associated with type 2 diabetes). In the absence of insulin, people with untreated type 1 diabetes will slip into a coma. By contrast, people with type 2 diabetes can live and even die (from a heart attack, for example) without the condition ever being diagnosed.

Some physicians have questioned whether routine screening for type 2 diabetes makes sense, suggesting that the diagnosis defines essentially healthy people as sick (e.g., Roedde 1999). In response to such concerns, it has been stressed that people with undiagnosed type 2 diabetes are not essentially healthy since, compared to counterparts whose blood is not as sweet, they have a higher chance of developing several health problems and will likely die at a younger age; it has also been emphasized that, at least in industrialized countries, effective pharmaceutical treatments have been developed and are available (Harris and Macaulay 1999; Gerstein 1999). In other words, once blood sweetens to the point where relative risk calculations suggest that a given individual can no longer be described as "perfectly healthy," available interventions make screening worthwhile. The potential to avert microvascular and macrovascular complications through early diagnosis and intervention (secondary prevention) forms the basis for screening for type 2 diabetes.

Secondary prevention has been shown to be possible in cases of both type 1 and type 2 diabetes. More specifically, recent clinical trials have shown that combining medications with intensive self-surveillance to approximate normal glucose levels as closely as possible can reduce complications among people diagnosed with type 1 or type 2 diabetes (Diabetes Control and Complications Trial Research Group 1993, 1995; United Kingdom Prospective Diabetes Study Group 1998a, 1998b). Crucially, these clinical trials have brought closure to debates that harassed, since the commercialization of insulin in the 1920s, have argued about whether tight blood glucose control in diagnosed diabetics was worthwhile (Marks 1997; Sinding 1999).

Since their blood glucose levels tend to be higher than average but still lower than the cut-off for diagnosing diabetes, many people defined as at high risk for type 2 diabetes may be good candidates for primary prevention (averting the onset of the disease). Recent epidemiological studies in several populations (see, for example, Pan et al. 1997; Uusitupa et al. 2000; Tuomilehto et al. 2001) have found that susceptible individuals who reduce their weight and become even slightly more physically active seem less likely to have their blood sweeten to the point that they meet the diagnostic criteria for diabetes (defined, it should be recalled, with reference to other clinical epidemiological studies).

Given the rising incidence of type 2 diabetes, certain public health researchers have decried the emphasis on secondary prevention, but they have not pushed their analysis as far as they might because they have not attended to how evidence related to secondary prevention underpins the very definition of the disease. If, indeed, "the risk factor approach to diabetes has hit a wall" (McKinlay and Marceau 2000:757), then the fact that this approach underlies the very definition of diabetes as a disease merits serious consideration. For proponents of the risk factor approach to which these critics refer, the key unit of analysis is the individual body. This approach stresses the identification of those members of a given population who appear to be at the highest risk for presenting with a specific health-related trait (such as elevated blood pressure or blood glucose). It presumes that maximum benefit will accrue from focusing on these high-risk individuals. And it reflects the belief that these people are clearly in danger, and so merit the most attention and resources. McKinlay and Marceau (2000) argue that more can and needs to be done to prevent people from exhibiting such traits (e.g., having blood sweet enough to diagnose type 2 diabetes) in the first place.

Peering through a kaleidoscope of statistical data often reinforces the tendency to think that, first and foremost, interventions should target (through face-to-face clinical interventions) those individuals at the greatest perceived risk. Yet the extent to which the prevalence of diabetes, its complications, and associated deaths increasingly compromise public health calls into question the value of studying "independent risk factors" as though they truly occurred in isolation (McKinlay and Marceau 2000). Keying intervention strategies to these ostensibly distinct risk factors stands to perpetuate public health problems, postponing *ad infinitum*

concerted efforts to understand why “risk factors” and adverse outcomes tend to cluster:

Risk factors implicated in diabetes include sex, ethnicity, family history, age, obesity, body-fat distribution, and socioeconomic status. To what extent these factors contribute to diabetes remains uncertain ... What gets diabetes—genes, cells, organ system, individual or social group? The risk factor approach to diabetes has hit a wall. (McKinlay and Marceau 2000:757).

McKinlay and Marceau view social structure, environmental influences, lifestyle influences, and physiological influences as distinct levels of causation that warrant different kinds of interventions (see Figure 2). These interventions would aim to come into play at different points along the distribution of blood glucose in a given population (see Figure 3).

In keeping with Rose’s (1985, 1992), seminal insights, to which I return shortly, McKinlay and Marceau (2000) urge planners and

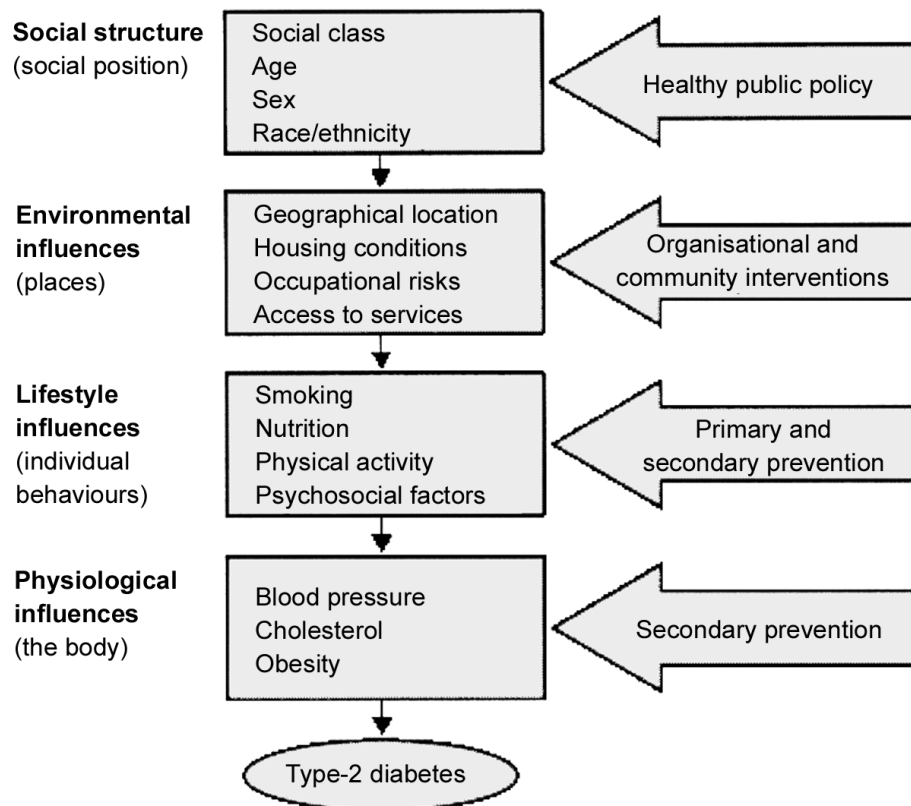


Figure 2. Levels of causation and corresponding types of health intervention.

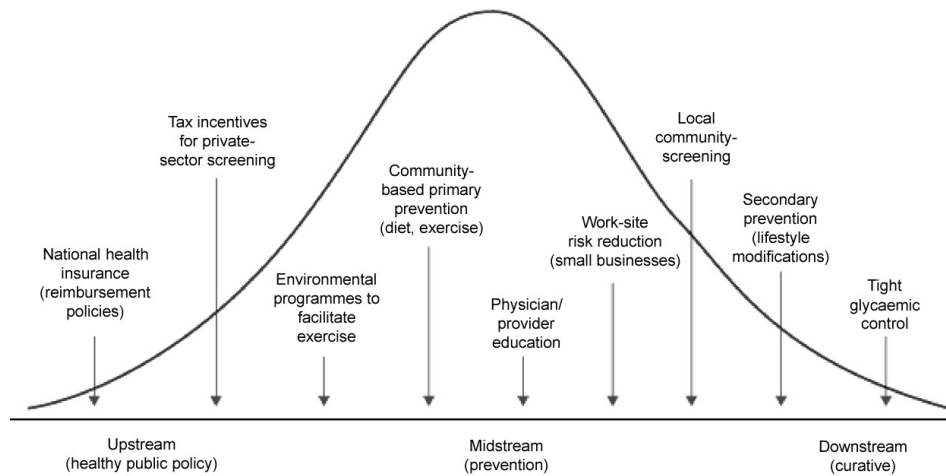


Figure 3. Some possible points of intervention for a new public-health approach to diabetes given the distribution of risk. Source: McKinlay, J. and Marceau. L. 2000 *The Lancet* 356:759.

policy makers to place greater emphasis on lowering the sweetness of blood across the American population:

An upstream or whole-population approach to disease prevention and health promotion shifts attention away from *relative risk* (how many times more likely is this exposed person to succumb than someone not exposed?) to *absolute risk* (what is this exposed person's increase in absolute level of risk?), and even further to some measure of *population attributable risk* (how much of the disease in this population can be attributed to this level of exposure?). (McKinlay and Marceau 2000:760, emphasis mine)

McKinlay and Marceau argue that the best way to go about preventing type 2 diabetes and its complications would be to lower the average blood glucose levels in populations; that is, to shift the mean to the left without going so far as to court undernourishment. Those with the highest blood glucose concentrations would be targeted but not exclusively or even predominantly. At least as much stress would be placed on limiting the sweetness of blood among people who do not presently meet the diagnostic criteria for diabetes (primary prevention) as among people who have already been diagnosed with diabetes. The point would be to avert and delay the onset of cardiovascular disease and other conditions linked to elevated blood glucose.

To the extent that the distinction between primary and secondary prevention structures the allocation of resources, such that programs and products designed to align dietary and physical activity pat-

terns with improved future prospects focus on secondary prevention among those diagnosed with diabetes (to the exclusion of those at risk for type 2 diabetes), McKinlay and Marceau (2000) argue that the risk factor approach favored in modern-day North American epidemiology has failed millions of people.

Since the risk factor approach undergirds the criteria used to define individual cases of diabetes, the distinction between primary and secondary prevention (upon which McKinlay and Marceau [2000] rely) itself pivots upon the measurement of risk factors. Moreover, how sweet blood can become at any moment of time, and over time, before posing a danger to human health remains an open research question in epidemiology. While diabetes is defined in relation to the relative risk for eye and kidney disease, the relationship between glucose levels and cardiovascular morbidity and mortality is an active area of study (Balkau et al. 1999a, 1999b; DECODE Study Group 1999; Gerstein et al. 1999). This state of affairs underscores the pertinence of reflecting upon the current emphasis on interventions guided by calculations concerning risk factors for diabetes. Investing the bulk of resources in those in a given population with the highest glucose levels or, for that matter, the highest cholesterol or blood pressure scores may not prove to be the most effective way to improve health (after Rose 1985).

Note that McKinlay and Marceau (2000) take disease and mortality classification for granted. However critical they may be of “the biomedical model,” public health researchers such as McKinlay and Marceau tend to regard disease categories as natural facts. Hence they regard the rising incidence of type 2 diabetes mellitus and related mortality as the main drivers behind the recent increased recognition of diabetes as a public health problem.

But the rising incidence of type 2 diabetes (the calculation of which, as discussed above, involves the application of diagnostic criteria that pivot on the calculation of risks to individuals) only partially accounts for the growing recognition of sweet blood as a public health problem in North America. Diabetes researchers and charities often stress that diabetes carries both human and financial costs; all told, it has been estimated that diabetes costs the Canadian and American economies over US\$100 billion each year (Canada Health 1999; Ray, Wills, and Thamer 1993), and such estimates have helped propel diabetes onto the front pages of daily newspapers (Picard 2001), the cover pages of popular magazines (Adler and Kalb 2000), and government agendas. Furthermore, people with diabetes

are prone to vascular disease, and perhaps one-third of all people with type 2 diabetes in North America have never been diagnosed (Harris et al. 1997; Meltzer et al. 1998).³ A recent Statistics Canada study found that diabetes was coded as an “underlying cause of death” in only 28 percent of the cases in which diabetes appeared on the death certificate; another study carried out in Canada found that diabetes did not appear on the death certificate in 41 percent of cases in which it had been diagnosed (Canada Health 1999:27). Studies in other countries have arrived at similar findings (Balkau and Papoz 1992). McKinlay and Marceau (2000) paint a somewhat misleading picture when they compare diabetes and cardiovascular mortality without taking these issues into account. As diabetes gains recognition as a pressing public health problem—a trend interwoven with efforts to increase the number of diagnoses made—it may appear more often on death certificates.

ETIOLOGY AND THE POPULATION CONCEPT

While all human societies have likely developed ways of classifying cases of sickness and their causes, biomedical nosology is probably unique in the extent to which it stresses the mechanisms internal to the individual body (Young 1976). Yet statistically defined populations have been part of biomedicine since its emergence in the nineteenth century. Populations have gained status as entities in their own right, subject to laws of dispersion, and this has led to conceptualizing normalcy in quantitative terms (Hacking 1990). Still, in the philosophy of science (see, in particular, Canguilhem 1989 [1943, 1966]) as in biomedicine, the notion persists that diseases are objective, material entities exhibited by *individual* bodies.

Accounting for the onset of individual cases of disease is quite different from accounting for disease incidence in one or more populations (Rose 1985). In other words, etiological questions that treat the individual body as the unit of analysis differ from etiological questions that treat the population as the unit of analysis. “Why do some individuals have hypertension?” is, as Rose (1985:33) observed, quite a different question from, “Why do some populations have so much hypertension, whilst in others it is rare?” Further, these different approaches to conceiving of etiology often imply different resource allocations and interventions.

Diabetic blood glucose levels have been defined in response to the question, “Why do some individuals have hyperglycemia?” It is

understood (based on studies of particular populations over time) that, above a certain threshold, the likelihood of developing a range of medical problems (and of dying) increases. As with the individual-centered, or risk factor, approach to intervention more generally, the definition of pathological-qua-pathogenic blood glucose levels represents etiological force in terms of relative risk (i.e., the risk in exposed individuals relative to the risk in non-exposed individuals within a defined population) (Rose 1985:32). The classification of diabetes into different types also reflects a concern with explaining why blood sweetens in certain individuals as opposed to why the average sweetness of blood varies in different populations.

When seeking to account for differences between populations with regard to continuous variables such as blood pressure or blood glucose concentration, it is important to keep in mind that the main objects of inquiry are population means, which only partly reflect the number of diagnosed cases of disease. This observation highlights the fact that the distinction between primary and secondary prevention of type 2 diabetes is useful in allocating clinical resources and pharmaceuticals; however, it may be misleading with regard to designing and evaluating interventions to lower mean blood glucose in a population. If a practice (such as regular physical activity) that may lower blood glucose levels becomes entrenched in a social group, then the ongoing maintenance of practice no longer requires individuals identified as at risk to distinguish themselves (through force of will and the fear of death and disease) from their peers (Rose 1985). People with and without diabetes may benefit. More specifically, since clinical trials have shown that even modest reductions of blood glucose can reduce complications in diagnosed diabetics, changing social norms in the name of averting new cases of type 2 diabetes (primary prevention) could also substantially benefit people who already have diabetes (secondary prevention).

The current and projected distribution of type 2 diabetes, not least in Aboriginal populations, serves notice that it is crucial to ask why type 2 diabetes incidence and prevalence differs between, not just within, populations. To explain prevalence and incidence rates, the characteristics of populations—not individual members—become the focus (Rose 1985:34), foregrounding the methods and concepts of social science. Rose suggested that differences between populations often stem from differences in what constitutes typical behavior. And, to typical behavior, I would add

typical *experience*. To understand why blood now tends to be sweeter among the Cree of Northern Quebec than among Canada's non-Aboriginal population (even as blood becomes sweeter in the latter population), it is helpful to attend to how the history of particular communities has interacted with the history of Quebec and Canada. Further, it is important to consider why type 2 diabetes incidence is so high among other Aboriginal populations in Canada and around the world, and, more generally, among racialized minorities in "developed" countries (Cruickshank et al. 2001). Such preoccupations challenge the notion that social structure, environment, lifestyle, and physiological processes constitute distinct "levels of causation" (cf. McKinlay and Marceau 2000; Figure 2).

Genetic research projects focused on type 2 diabetes in Aboriginal populations (e.g., Hegele et al. 1999) have lent credence to the notion that some people have "thriftier" genotypes than others; that is, that they metabolize glucose more efficiently (Neel 1962, 1982; Szathmary 1994). Under conditions of famine, such as were experienced by the Cree of Northern Quebec within living memory (Adelson 2000a), "thrifty genes" would aid survival. In recent years, as caloric intake increased while physical activity decreased, a former advantage has turned into a disadvantage.⁴ Put another way, even though geneticists tend to focus on the contribution of genes to individual cases of disease, contemporary genetic research related to type 2 diabetes in Aboriginal populations suggests that genotype (genetic make-up) only partly accounts for phenotype (including disease onset). It would appear that social organization and cultural norms contribute significantly to the average sweetness of blood at any given time within various populations. And systems of appropriation, exploitation, and exchange—in other words, political economy—have helped shape the genetic composition of human bodies, social organization, and cultural norms. More specifically, as regards Aboriginal populations, the alarming rise in type 2 diabetes incidence closely corresponds with changes wrought by colonization (Benyshek, Martin, and Johnston 2001; McDermott 1998).

DISTRESS, DURESS, AND THE FIBRE OF BEING

Partly because the lived experience of distress does not receive due attention as a public health problem in its own right, distress has not

received as much attention as it deserves in relation to the diabetes pandemic. Several reports and reviews suggest that distress and duress routinely entwine with diabetes. Nevertheless, mental health issues do not appear on lists of common complication of diabetes (Meltzer et al. 1998; Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus 2002).

It is exceedingly difficult to calculate precisely the prevalence of mental health problems. Many people who would meet the criteria for one or more internationally recognized disorders have not been formally diagnosed. This may be because they do not seek out medical attention, because clinical services are inaccessible, or because practitioners do not identify their patients as suffering from mental health problems. The diagnostic process is complicated as the idioms of distress employed by the patient may not correspond directly or consistently with the symptom checklists that guide clinical practice and, by extension, public health interventions. Indeed, the distinction between “mental” and “physical” does not hold across all cultures, nor is it uniformly manifest even in Western societies, where so many people subscribe to some form of mind-body dualism (Lock 1993).

Mortality rates are often interpreted as indicators of overall well-being, especially when significant disparities between social groups are discerned (Fiscella and Franks 1997). Yet, except in cases of suicide, mental health problems are rarely identified as the cause of death. The emphasis on mortality figures to gauge population health has contributed to a lack of appreciation of the global impact of mental health problems and the social conditions within which they are so often rooted (Desjarlais et al. 1995). After combining mortality and morbidity data into a single composite measure,⁵ in 1990 psychiatric disorders were found to account for more than 10 percent of the impact of disease around the world. And, in 2000, they accounted for 12 percent, with major depression ranking fourth in contributing to the global impact of disease (World Health Organization 2001a).

The diagnosis of diabetes depends strictly on the sweetness of blood, yet the lived experience of the disease can include many features that are often associated with such mental health problems as depression, anxiety, and compulsion disorders. Classic symptoms of diabetes that overlap with the symptoms of one or more psychiatric disorders include headaches, lethargy, sleep interruptions, compulsive eating, inability to concentrate, and mood swings. For

example, the survey instrument used in 1991 to study population health across the entire province of Quebec, including across Eeyou Istchee, asked respondents if, in the last week, they had lost their temper, became angry over little things, cried or felt like crying, had their mind go blank, felt nervous or shaky inside, felt down or blue, or felt easily annoyed or irritated (Daveluy et al. 1994; after Ilfeld 1976). In epidemiology and social science as much as in clinical medicine, it is worth keeping in mind that, even though the lived effects of sweet blood stem from an ostensibly physical condition, they may be experienced as “mental” distress.

The diagnosis of diabetes itself may spark or confirm distress. This point has been raised especially forcefully with regard to gestational diabetes (Lawson and Rajaram 1994; McMahon, Ananth, and Liston 1998), where evidence for the diagnosis remains less robust than it does for life-long diabetes (Naylor 1989). Moreover, diabetics’ efforts to re-establish a sense of well-being may clash with clinical recommendations, particularly when considerable cultural or social distance separates the clinician from the patient (Ferzacca 2000).

Disturbingly high rates of depression, anxiety, and eating disorders have been reported in the diabetic population (Lustman et al. 2000; Rubin and Peyrot 2001). While not classified as an eating disorder (see American Psychiatric Association 1994), obesity is strongly associated with type 2 diabetes. Distress can contribute to and stem from obesity (McIntyre, McCann, and Kennedy 2001). Alcohol abuse has also been linked to the onset and progression of diabetes (Boden-Albala and Sacco 2000; Fleming et al. 1999); nicotine addiction contributes to the onset of a host of complications (Boden-Albala and Sacco 2000; Reading 1999) and may also contribute directly to the onset of diabetes (Leistikow 2000; Persson et al. 2000); addiction to illegal substances may also play a role in raising blood glucose levels in the first place and in militating against blood glucose control among diagnosed diabetics (Giugliano et al. 1985; Mohs, Watson, and Leonard-Green 1990).

Meanwhile, the fact that physical inactivity often contributes to both the onset and the worsening of type 2 diabetes has important mental health implications. First, physical activity is positively associated with mental health (Fox 1999). Second, insofar as physical inactivity can contribute to the worsening of diabetes, it can also contribute to concomitant “mental” distress.

Many people are pessimistic about the feasibility of greatly increasing physical activity and substantially shrinking the ranks of

overweight children and adults in modern-day North America (Boden-Albala and Sacco 2000; Schonfeld-Warden and Warden 1997). Despite all that is known about the causes of type 2 diabetes incidence, the epidemic defies quick and easy fixes, not least among the Cree of Northern Quebec and other Aboriginal groups (Dyck and Cassidy 1995; Robinson 1995). One approach to this quandary has been to promote regular physical activity among children, with a view to preventing the sweetening of blood over the long term (Macaulay et al. 1997; Potvin et al. 1999). The inculcation of regular physical activity within populations with high average blood glucose (the whole North American population would seem to qualify) may promote mental health as much as it does physical health.

The diabetes example underscores the fact that primary *and* secondary prevention interventions routinely presume stable mental health. As noted above, the diagnostic criteria for diabetes presume the capacity for secondary prevention; that is, the capacity to avert or delay physical complications in people with diabetes. In adopting these diagnostic criteria, physicians and diabetes organizations imply that people need to be equipped—personally, socially, and materially—to exert influence over their own futures. As stated in the 1998 *Clinical Practice Guidelines for the Management of Diabetes in Canada*, “Diabetes care hinges upon the daily commitment of the person with diabetes to self-management, balancing appropriate lifestyle choices and pharmacologic therapy” (Meltzer et al. 1998:s3). To avert complications, these guidelines advise clinicians to carefully monitor such “social and psychological factors” as the support of family and friends, income security, access to medical insurance, and the wearing of a medic-alert tag (Meltzer et al. 1998:s10). Hinting at the perceived importance of mental health and social support for the management of diabetes, the landmark 1993 Diabetes Control and Complications Trial enrolled only subjects who scored highly on a variety of psychological tests, and these subjects were followed closely in order to maximize protocol adherence.⁶ Many primary prevention measures suggested by McKinlay and Marceau (2000), such as diet and exercise, imply planning; others, such as tax incentives for screening and more diabetes education for physicians and other health care providers, are as much oriented toward secondary as toward primary prevention (see Figure 3).

The capacity to plan for the future is widely regarded as a fundamental attribute of, and prerequisite for, mental as well as

physical health (Desjarlais et al. 1995). Nevertheless, not all people in sound mental health place equal emphasis on planning for the future. Indeed, the conception of the future varies cross-culturally. Moreover, diabetics are often more preoccupied with certain health risks rather than with others: ethnographic researchers have found that the possibility that people with diabetes might lose their sight, a limb, or kidney function (necessitating regular dialysis) often carries greater emotional salience than do correlations between cardiovascular disease and the sweetness of blood (Cohen et al. 1994; Loewe and Freeman 2000).

Given that diabetes researchers tend to assume that good mental health is necessary to combat the disease, it is not surprising that the presence of "stable psychosocial resources" has been found to correlate with better overall disease control in people with both type 1 and type 2 diabetes (Peyrot, McMurry, and Kruger 1999). These researchers found that stress levels affected the degree of "regime compliance" but that differences in compliance did not fully account for variation in blood glucose concentration. They conclude that stress can directly affect blood glucose concentration.

Some provocative research suggests that distress may lead directly to the sweetening of blood. More specifically, sensitivity to social hierarchy as well as social, cultural, and material changes may become inscribed in the fiber of human beings. One line of research emphasizes the fact that stress hormones can boost glucose levels. Higher concentrations of blood glucose have been found in Aboriginal populations than in non-Aboriginal populations (Daniel et al. 1999c, 1999b; Szathmary and Ferrell 1990). In light of the contribution of socioeconomic conditions to the incidence of diabetes (which, paradoxically, genetic research on diabetes has laid bare), another line of research posits that nutritional stress (just one of the blows of colonialism borne by many Aboriginal populations) increases the likelihood of blood sweetening over one's lifespan and in future offspring (Benyshek, Martin, and Johnston 2001). In other words, across Aboriginal populations the collective experience of having suffered over several generations is now being expressed in the sweetening of blood.

In summary, in current epidemiological statistics the emphasis on relative risk and, hence, on individual prospects places a premium on the measurable attributes of individual bodies. This has had both positive and negative consequences for understanding links

between diabetes, distress, and duress. On the one hand, increased technological capacity in measuring blood glucose has yielded provocative findings concerning the impact of distress on overall health. On the other hand, insofar as both type 2 diabetes and mental health problems are inconsistently diagnosed, the emphasis on measurable attributes may have obscured the extent to which distress entwines with sweet blood. In addition, unlike retinopathy, for example, the relative risk of distress may not increase at a set rate as blood glucose levels rise. Also, distress may be experienced by people (e.g., family members and friends) other than those who have been diagnosed. Furthermore, although the symptoms and complications of diabetes may be experienced as distressing, once diabetes has been diagnosed professionals may view them as essentially “physical” rather than “mental” problems. Yet (following Rose 1985) each individual case of diabetes may not involve the same degree of suffering. Also, profound suffering is not at the root of each and every case of diabetes.

DISEASE, ILLNESS, AND SICKNESS

So far I have examined how the current biomedical definition of diabetes and related epidemiological statistics *partially* capture the lived effects of sweet blood. By calling attention to the reliance upon correlations between the sweetness of blood and the likelihood of developing certain health problems, I have shown that diabetes often accompanies distress and vice versa. I have also argued that these conjunctures continue to be eclipsed in some contemporary portraits of diabetes and diabetes prevention strategies.

This analysis stems from and extends the theoretical distinctions between disease, illness, and sickness that ground contemporary medical anthropology. In defining “disease” as objective abnormalities found in individual bodies, anthropologists have explicitly reproduced biomedical knowledge (see also Canguilhem 1989 [1943, 1966]). The theoretical advance in contemporary anthropology came from attending to the lived experience of disease, the social distribution of disease, and the processes through which people may vest diseases with social significance. Since the late 1970s and early 1980s, medical anthropologists have understood “illness” to refer to the lived experience of a socially devalued state, usually, but not

necessarily, a state that would meet a biomedical definition of disease.⁷ Through Kleinman (1980) and Eisenberg (1977), the disease-illness distinction entered biomedicine, particularly family medicine. “Sickness,” Kleinman suggested, is a blanket term covering both disease and illness; however, Young (1982) argued that sickness is a process through which worrisome behavioral and biological signs, particularly ones originating in disease, acquire social significance. With this definition of sickness, Young acknowledged the material reality of disease, but he also explicitly placed biomedical disease classification within the ken of anthropological theory. Kleinman (1988:6) later defined sickness as “the understanding of a disorder in its generic sense across a population in relation to macrosocial (economic, political, institutional) forces.” This conceptualization of sickness is consonant with the current research agenda in anthropology concerning social suffering, which Kleinman helped establish and which I engage below.

I seek to extend the disease/illness/sickness framework by underscoring that material culture—specifically, statistical technologies and technologies designed to measure the sweetness of blood—underpins the biomedical definition and classification of diabetes as a disease. Notably, by drawing upon prospective studies to define, in probabilistic terms, the threshold between normalcy and pathology, the definition of diabetes as a disease explicitly implicates populations. My analysis therefore revisits the relationship between epidemiology and disease. Rather than “simply” summing up the number of diagnosed cases, my analysis highlights how epidemiological research now permeates the diagnosis and classification of diabetes.

The appearance of AIDS and “mad cow disease” in the latter decades of the twentieth century served as a reminder that biology is not inherently stable and that culture and social hierarchy are integral to the detection, interpretation, and spread of epidemics (Lindenbaum 2001). Every so often new things do appear under the sun. More subtly, a series of developments over the course of the twentieth century—including the commercialization of insulin; the ability to measure the amount of glucose as well as insulin in the blood (which provided a physiological marker with which to distinguish type 1 from type 2 diabetes); a marked increase in type 2 diabetes incidence, particularly among children and Aboriginal populations; the standardization of a test to measure blood glucose levels; and the invention of the randomized clinical trial—highlight

the fact that technological capacities and social arrangements always ground the practice of diagnosis, the detection of epidemics, and what diagnoses and epidemics mean. Given the impact of recent technological changes on the definition of diabetes as a disease, we can reasonably expect that the biomedical understanding of sweet blood, as well as epidemiological portraits, will continue to change.

Diabetes, as much as AIDS, is an epidemic of signification (cf. Treichler 1999). The diagnostic category “diabetes” corresponds to a material reality—a material reality that people have interpreted in particular ways. The diagnosis is currently based on a statistical association between the sweetness of blood and the likelihood of developing certain health problems. While often dismissed as a “mild” condition, many health researchers and professionals currently conceive of type 2 diabetes as a public health scourge that is bleeding away life, limbs, and billions of dollars. Moreover, by strengthening the salience of associations between sweet blood and such fearsome health problems as blindness, limb amputations, dialysis, the need for organ transplants, heart attacks, and sexual dysfunction, health researchers and professionals have put greater emotional weight on the diagnosis of diabetes. Explanations for why diabetes incidence is on the rise thus currently carry a strong political and emotional charge. Not surprisingly, therefore, the process of planning, evaluating, and securing funds to support prevention-focused activities can involve frustration and uncertainty (Daniel et al. 1999a; Gray-Macdonald et al. 2000; Hanley et al. 1995; Potvin et al. in press).

Following from the distinctions between disease, illness, and sickness in anthropology discussed above, I take it as a given that diseases such as diabetes and depression exist as embodied realities but that they are not necessarily recognized as such within a given social context. Thus, it is worthwhile to consider how epidemics achieve social significance, both through their material presence and through the symbolic representation of their causes and effects. Below, I reflect on why the epidemiological portraits of diabetes and mental health have taken their current forms as well as on how these portraits interact with decision making in clinics, governments, homes, and other settings. I argue that “lifestyle” differs from culture, and I draw attention to some of the strengths and limitations of the literature on social suffering in medical anthropology.

COLLECTIVE LIFESTYLES

The lifestyle concept is a convenient and even necessary device in contemporary epidemiology. Disagreements have tended to center on the extent to which lifestyle is an individual as compared to a collective attribute. My position is that lifestyles are collective (after Frohlich, Corin and Potvin 2001; cf. McKeown 1976). The size and other properties of the collectivity in question are, however, defined using the epidemiologist's toolkit. Hence "culture" should not be conflated with lifestyles.

Given the survival and revival of many culturally cultivated ideals and practices among the Cree of Northern Quebec and other Aboriginal groups in the face of sweeping changes and extraordinary challenges (Adelson 2000a, 2000b), including a diabetes epidemic, it behooves social scientists and public health professionals not to collapse culture into lifestyle. To do so could well make it appear as though the mass consumption of manufactured commodities—from processed foods to pressure-treated lumber—truly has stripped away every treasured vestige of difference.

If lifestyle is not culture, then what is it? By "lifestyle" I understand an assemblage of bodily practices *that are amenable to quantification*. As such, lifestyles can be shown to co-occur with other things, such as certain diseases, in patterned ways across space and over time. A sedentary lifestyle, for example, involves long periods of time spent sitting, whether the person is sitting in front of a television screen, within reach of a computer, or behind the windshield of an automobile. The fact that, in characterizing a sedentary lifestyle, I mention a series of technologies and infer others (chairs, electricity, and gasoline-powered engines, to name but a few) is not coincidental. Similarly, smoking is a lifestyle in that it involves habitual human contact with cigarettes—contact enabled by the local availability of cigarettes as well as by opportunities (both seized and created) to smoke. Rules and norms embodied by the smoker as well as others within her/his milieu play a crucial role in the generation and perception of opportunities to smoke (Frohlich et al. 2002).

Lifestyles are defined in relation to routine interactions between sentient human bodies and other materials; similarities in these interactions permit quantification. Confounding the work of social

scientists and epidemiologists, but also continuously generating new phenomena for research, assemblages of bodily practices can be described in words, images, and numbers. And they take hold and are perpetuated for innumerable reasons. People may become aware of, play with, claim ignorance of, and exert some control over bodily practices, yet they are not necessarily conscious of how these assemblages of practices take hold. They may also find that the capacity to refrain from certain practices eludes them.

Researchers and/or health promoters look at any number of persons, histories, and surroundings in order to abstract from them certain statistical categories—smokers, non-smokers, former smokers, heavy smokers, and so on. In doing this they are constituting assemblages of practices as a particular kind of analytic object: the “lifestyle.” This process of abstraction is a cultural feat in that it was not always possible, in that it is performed by particular people, in that it is indebted to particular technologies, and in that it expresses and helps constitute particular values and norms.

Crucially, researchers who study collective lifestyles cannot be sure that the people involved share the same ways of thinking about things. Even within a cultural grouping, one in which there is some agreement about what is important, people do not necessarily share the same meanings. Knowledge is distributed and controlled, and “cultures are webs of signification as well as mystification” (Keesing 1987:161; cf. Geertz 1973).

Statistics systematically exclude particularities in a bid to develop knowledge on a larger (more general) scale than would otherwise be possible (Daston 1995). Yet, to prove effective, interventions need to resonate with local knowledge and to address local circumstances. This paradox lies at the heart of applying statistical knowledge so as to promote population health. The internalization of statistical categories can affect how people think about themselves and their future (Hacking 1986), but the circulation of these categories will not guarantee that people will change their behavior to conform to the (statistical yet individualist) doctrine of risk reduction. Meanwhile, the issue of why disease incidence varies in different populations demands in-depth knowledge about the lives of the people who make up these populations. The issues in play include calculating and controlling not only disease incidence but also the authority to collect and use information about bodies and lives (O’Neil, Reading, and Leader 1998).

SWEETNESS AND SUFFERING

With regard to comprehending diabetes, distress, and duress in Eeyou Istchee and other territories, the contemporary social suffering research agenda in anthropology is promising (see also Adelson 2000b). This agenda is broader in scope than is the anthropology of disease, illness, and sickness:

Social suffering results from what political, economic and institutional power does to people and, reciprocally, from how these forms of power themselves influence responses to social problems. Included under the category of social suffering are conditions that are usually divided among separate fields, conditions that simultaneously involve health, welfare, legal, moral and religious issues. (Kleinman, Das, and Lock 1997:ix)

As Kleinman moved away from emphasizing professional-patient communication, which rooted his deployment of the disease/illness distinction, and toward focusing on the social dimensions of disease causation and living with illness, he began to invoke the term "suffering" (e.g., Kleinman 1988). The visitation of AIDS, the rapid imbrication of AIDS with poverty, and racist interpretations of this association certainly contributed to the establishment of social suffering as a research agenda in anthropology (Farmer and Kleinman 1989; Farmer 1992).

The social suffering approach merits careful appraisal in population health research because it encompasses, yet nuances, concern for the social determinants of health or, more accurately, the socio-economic mediation of disease patterning in epidemiology (Berkman and Kawachi 2000; Evans, Barer, and Marmor 1994; Frank and Fraser 1994; Kawachi, Kennedy, and Wilkinson 1999; Krieger 1999; Marmot and Wilkinson 1999). In keeping with the tenets of social epidemiology, the social suffering research agenda views disease and death rates as indexing social structures. To the extent that anthropology and epidemiology knowingly express a moral code with global aspirations, an academic interest in social justice is served. Whether such intellectual conjunctures can actually further social justice, however, remains to be seen, yet it seems destined to fuel academic debate (Desjarlais et al. 1995; Kim et al. 2000; Rock 2000; Butt 2002).

The social suffering approach can help to explain the routine rhetorical use of disease categories among anthropologists, social epidemiologists, and activists who, in the next breath, may

proclaim that health means more than the absence of disease and, thus, that health promotion properly extends beyond disease prevention (as per World Health Organization 1986). In the social suffering literature as much as in social epidemiology there exists a tendency to equate, however heuristically, health with the lack of disease. This tendency remains entrenched because, quite simply, it is possible to strengthen claims about social injustice with numbers (Butt 2002; Rock 2000). For example, a masterful ethnographic account of how the AIDS epidemic has affected Haitians focuses on the social dimensions of suffering and local idioms of distress but relies heavily on epidemiological statistics to nail down its arguments (Farmer 1992). However, in order to count, one must first classify. While conceptualizations of health may prove incommensurable (Adelson 2000a; Povinelli 2001), cases of diseases are *by definition* commensurable, although not identical.

Extending beyond the conventions in contemporary social epidemiological research, the social suffering research agenda accords sentient human bodies a central place in defining, classifying, measuring, redressing, developing, and interpreting disease—and health. Some epidemiologists imply that the knowing human body plays an important role in “translating” social structures (particularly social hierarchy) into health inequality (e.g., Krieger 1999; Wilkinson 1996; Yen and Syme 1999). Most discussions of knowledge, ignorance, consciousness, and agency in this literature, however, are theoretically impoverished (but see Frohlich, Corin, and Potvin 2001). In writing this review article, I hope to garner greater appreciation for the implications of this veritable lacuna. I also aim to reinforce reflexivity in medical anthropology with regard to the politics of representing suffering, whether through narratives, numbers, or the interplay of images.

By conceiving diseases and their causes as dimensions of suffering rather than collapsing suffering into diseases and their causes, the social suffering research agenda may permit understandings of pain, health, and happiness other than those captured by disease diagnoses. In other words, while anthropological research on social suffering often relies rhetorically on disease classification and distribution, this approach, unlike social epidemiology, expressly allows a place for theorizing understandings of health and illness that does not accord neatly with biomedical disease categories and the statistics based on them.

If the social suffering literature is to fully inform the design and implementation of interventions, then caution is required lest the interventions be experienced by the “targets” as simply the latest come-from-away, down-from-above, bound-to-go-wrong imposition. This approach leaves open the role of public debate (how public?) and the possibility of refusal (whose idea was this? and whom will it most benefit?).

One of the implications of the social suffering literature—and one that deserves more consideration in social epidemiology and medical anthropology—is that statistics about the distribution of disease cannot be used uncritically as a barometer of the causes and nature of human suffering. For one thing, as seen in epidemiological portraits of diabetes and mental health, statistics are not always reliable, and even when they are, they still mask some of the lived dimensions of suffering. The presence of a bodily condition that corresponds to a disease category or risk factor may only partly overlap with the roots and contours of suffering. In other words, the validity of epidemiological statistics as a proxy for suffering and its causes is hardly automatic.

The social suffering research agenda underscores the fact that lived experience cannot be separated from collective frames of reference—not even heuristically, not even for North Americans who conceive of individual minds and bodies as separate but linked entities (as suggested by Cartesian dualism). In the case of diabetes, this approach would suggest that living with sweet blood in Eeyou Istchee would differ fundamentally from living with sweet blood on Wall Street by day and the Upper West Side of Manhattan by night. Statistics suggest that one case of a disease is fundamentally like another, which is true only in an abstract sense that deliberately leaves out marked variation in how people experience the world. Yet, as is shown by statistics tracing the alarming rise in diabetes incidence among Aboriginal peoples across North America and beyond, the abstraction permitted by disease classification and distribution offers powerful inferences about the distribution of social suffering and the causes of disease incidence.

So powerful are these inferences that they need to be interpreted with great care. There is a fundamental tension between, on the one hand, the subjective experience of suffering and well-being and, on the other, tallying up cases of disease and death.

If this tension is massaged into harmony, then the analyst may quickly conclude that the type 2 diabetes epidemic involves less

social suffering than, say, tuberculosis (given that tuberculosis is an infectious disease historically associated with food deprivation while type 2 diabetes has been linked to excessive caloric intake). In the 20th century, as diabetes came to be defined according to blood glucose levels rather than urine or insulin production, it became very apparent to clinicians and researchers that the onset of type 2 diabetes and associated complications tends to correlate with being above the ideal body weight (which itself has changed over time). Yet weight gain often accompanies poverty in contemporary North America for, increasingly, socioeconomic disadvantage is marked by the routine consumption of few nutrients but many calories and infrequent physical exertion (Daponte 2000; Jacobs Starkey, Gray-Donald, and Kuhnlein 1999; Jacobs Starkey and Kuhnlein 2000; Teron and Tarusuk 1999). Contemporary forms of labor tend to involve less physical activity than did those in the past. Concomitantly, North Americans increasingly live in cities and their suburbs rather than on farms and in villages. Physical activity has largely become a leisure activity in North American cities, practiced most avidly by people with secure revenue streams. Hence poor North Americans tended to be emaciated during the Great Depression of the 1930's, but by the year 2000 the statistical association between wealth and girth had inverted.

It is challenging to compare the complexion of poverty in Eeyou Istchee with villages, cities, and towns in mainstream North America as their institutional structures, cultural histories, and material environments are so different from one another. Differences in cultural values and histories also affect direct comparisons. In recent years, however, calorie consumption has increased while physical activity has decreased in Eeyou Istchee, as across North America more generally. In these respects, the lifestyle of many residents in Eeyou Istchee resembles that of millions of North Americans.

Traditionally, the Cree have valued larger bodies. Such bodies were difficult to cultivate and maintain while living strictly off (or, perhaps more accurately from the traditional perspective, with) the land. Extended ethnographic research in Eeyou Istchee found that there is no Cree word that directly translates into English as "health" (Adelson 2000a). The closest phrase has been translated as "being alive well," which means that people are able to hunt, pursue traditional activities, eat the right foods, and stay warm. The local terminology regroups physical and mental well-being as well as

individual experience and social conditions. This way of thinking about health challenges the Cartesian dualism and individualism that has contributed to the paucity of sustained concern in the clinical and epidemiological literature for what might be thought of as the “psychological” or “social” dimensions of diabetes. With the transition to a cash-based economy, it has become much easier to grow and keep a large body, to the point that weight gain has contributed significantly to the diabetes epidemic in Eeyou Istchee. Now it might be argued that the Cree of Northern Quebec are wealthier than before because the amount of money that passes through their hands has increased; however, such an argument would need to be nuanced by recognizing that, traditionally, the people of Eeyou Istchee have conceived of wealth in largely non-monetary terms. Moreover, whether or not the people of Eeyou Istchee are healthier, on average, than they were fifty or 100 years ago is debatable. Clearly, morbidity and mortality patterns have shifted.

CONCLUSIONS

At the most basic level, human beings need water and energy in order to survive. Hunger and thirst lend themselves to social and cultural elaboration, including elaborations that, within biomedicine, qualify as diseases. Many people crave substances besides food or water—substances that carry amounts of calories that increase the likelihood of diseases such as type 2 diabetes. In this light, the increasing average weight and rising incidence of type 2 diabetes among adults and children across North America, including among the Cree of Northern Quebec, gives us pause. To counter these trends, it will be important to consider the place of certain foods and their consumption in real time and real lives. And it will be important to consider carefully how the organization of societies (i.e., political economy) affects consumption and physical activity patterns.

In social and clinical epidemiology the vagaries of subjective experience tend to be bracketed unless they fall neatly into a disease category. The result of this is that the tension between knowing viscerally versus knowing quantitatively has been framed as a measurement issue. This has often precluded consideration of how distress and duress may accompany the sweetening of blood.

Drawing on anthropological research and theory, I suggest that the recent rise in concern about diabetes as a public health problem is a thoroughly social and cultural process through which claims to resources and status are being advanced. The profound impact of sweetened blood on lived experience remains poorly articulated and characterized; consequently, when it comes to planning and implementing interventions targeting diabetes, lived experience is a key consideration and one that remains underdeveloped. In order to explain and understand these phenomena it is necessary to take into account theories and methods that expressly address space, time, culture, power, and control.

The social suffering approach to health issues, developed by certain medical anthropologists, can assist in explicating why, in the contemporary period, blood tends to be sweeter in some populations than in others. This approach emphasizes the fact that suffering tends to take different forms in different social contexts and historical periods. It also asks whether suffering is more common in some populations than in others and, if so, why. In this regard, the anthropological research agenda on social suffering articulates neatly with contemporary social epidemiology (in particular, Rose 1985, 1992). Such points of departure indicate that population health researchers and allied professionals must consider why risks to “physical” and “mental” health, such as elevated blood glucose, are distributed differently across populations. It also indicates that, especially when incidence of a disease is quickly rising, more benefits may accrue from trying to change what is normal, or typical, in a given population than from focusing exclusively (or mostly) on those individuals who may seem to be in the most immediate danger.

Yet, to apply these insights implies the measurement of traits such as blood glucose concentration for entire populations. Such information is related to, but distinct from, prevalence data. It involves the collection, storage, and analysis of measurements derived not only from people who have diabetes and other health conditions but also from those who appear “perfectly normal,” for what is “perfectly normal” in a given population requires a historical account and can actually contribute directly to sickness and suffering.

The Cree of Northern Quebec and many other Aboriginal peoples in Canada have signaled that they want more say in interpreting and applying information about their health and social status (O’Neil, Reading, and Leader 1998; McComber et al. 1998; Bates et al. 2000;

Reading and Nowgesic 2002). It cannot be stressed enough that population health, its study and surveillance, and interventions guided by health information are thoroughly and inescapably political.

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NOTES

1. Specifically, the MEDLINE, PUBMED, CINHALL, PAIS, and SOCIOFILE databases were searched by combining the keyword "diabetes" with, respectively, "mental health," "mental illness," "depression," "anxiety," "stress," "eating disorder," "obesity," "exercise," "psychology," "psychiatry," "addiction," "smoking," and "alcohol." I also searched MEDLINE using "glycated hemoglobin" and "hemoglobin A1C" as keywords. In all, over 400 sources dealing with diabetes, mental health issues, and/or public health were consulted.
2. Ancient Greek physicians noted that, in cases of what they termed diabetes (meaning "pass through"), their patients seemed to melt down into urine (Bliss 2000 [1982]). In the early 1700s, a physician noted the sweet taste of the urine produced by some, but not all, diabetics (Mintz 1985:129). This discovery gave rise to the distinction between diabetes mellitus (Latin for "sweet") and a much rarer condition, diabetes insipidus (Latin for "lacking flavor or taste"). Since at least the late 1800s,

clinicians have recognized that diabetes mellitus tends to present in two ways—one occurring mainly before adulthood and one well into adulthood—and that diabetes could also appear during pregnancy and disappear after childbirth (Lieberman 1993). Precise measurement of the amount of sugar in a person's bloodstream entered routine medical practice in the twentieth century (Lieberman 1993). Then, in 1921-1922, researchers characterized the role of insulin in diabetes, with particular regard to the type of diabetes that tends to set in in childhood or adolescence (Bliss 2000 [1982]). At that time and since, many have thought that the commercialization of insulin represented nothing short of a diabetes cure. But it soon became apparent that even diabetics treated with insulin tended to die at a younger-than-average age, and from the kinds of problems (e.g., heart failure) that also tended to befall diabetics who did not need daily insulin injections in order to survive (Feudtner 2003). In the 1950s it became possible to measure the precise amount of insulin in a blood sample. This biochemical marker was used to distinguish diabetics who lack insulin altogether and who tend to develop the condition before adulthood, from diabetics who produce varying amounts of ineffective insulin and who tend to develop the condition well into adulthood.

3. In the specific case of Eeyou Istchee, however, the ratio of diagnosed to undiagnosed cases is very low due to the broad availability and uptake of physician services, combined with sustained concern in the 1990s on the part of health professionals about diabetes (Torrie 2001).
4. Similar statements apply to many European populations. It is important to recall that undernourishment was rampant in Europe both before and during the Industrial Revolution (Mintz 1985; Wolf 1982) as well as during the First World War, the Depression, and the Second World War.
5. See Rock (2000) for an anthropological analysis of this measure.
6. The main conclusion of the DCCT—namely, that tight glucose control reduces future health risks among people with type 1 diabetes—was later confirmed in a type 2 diabetes clinical trial that did not use psychological tests to select its subjects (United Kingdom Prospective Diabetes Study Group 1998b, 1998a).
7. With regard to people whose bodies meet the criteria for any “socially devalued state,” this definition denies the possibility of their experiencing health. Yet many people with disabilities insist that they are not sick (Rock 2000).

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