Diabetic Nephropathy: Incidence, Prevalence, and Treatment

Diabetic nephropathy represents a significant risk for morbidity and mortality within all patient populations with diabetes (1,2). Major efforts have been mounted to address the increasing incidence of both type I and type II diabetes and for all diabetic patients the incidence of micro- and/or macrovascular complications. Despite the progress in demonstrating a clear benefit of optimal glycemic control in affecting the complications of diabetes as defined by papers emanating from the Diabetes Control and Complications Trial (DCCT) Study Group (3,4), a substantial number of patients still experience diabetic renal disease, extending from the presentation of microalbuminuria to significant clinical diabetic nephropathy and finally to end-stage renal failure. The large number of diabetic patients undergoing dialysis and/or transplantation attests to the inability to apply intensive diabetic therapy to many patients. The beneficial application of antihypertensive agents to retard or arrest the progression of diabetic nephropathy (5,6) arises from a primary failure to prevent diabetes and a secondary inability of routine diabetic therapy to alter the course of diabetic nephropathy.

Within the last decade several papers from epidemiological and/or population-based studies have determined the incidence and prevalence of diabetic nephropathy, as documented by various measurements and at different stages of disease (1,7–11). One of the most recent studies from a national perspective calculated the incidence and prevalence of Finnish hospital admissions for diabetic nephropathy over 2–3 decades (11). This study, like some of the others, advantageously used one of the rich databases within the national health systems in Scandinavia, each capable of tracking the health care of each individual within the population. Without attempting to address the possible inconsistencies within the Finnish system of classification of diseases summarized in a thoughtful manner by the authors, I wish to contrast current data with those previously reported from Denmark (8,10), also reflecting a recent unchanged incidence in diabetic nephropathy, and uniquely from Sweden, wherein a decline in the incidence of this major complication was reported (9).

The currently reported data from hospital admissions in Finland resemble those reported from Denmark by Rossing et al. (10) on the unchanged incidence of diabetic nephropathy in a very large and highly effective regional referral clinic. The contrast lies with the study by Boestig et al. (9) in a very carefully monitored and implemented system of delivering health care to a largely pediatric population in the Linköping area of Sweden. The discussion sections of both the Danish and Finish studies are highly informative about why differences may exist between their experiences and the Linköping diabetic population. The bottom line lies with the level of glycemic control achieved in Linköping, contrasted with the Danish (10), Finnish (11), and even other Swedish populations (12). The results of the Stockholm Diabetes Intervention Study provide great insight into this issue (12). Their achievement of a difference in mean HbA_{1c} in their intensive versus standard treatment groups nearly matches that of the DCCT (Table 1) (1). From my own perspective within the DCCT Study Group, the capacity to achieve such consistently low HbA_{1c} levels over an extended period of time is a significant accomplishment. Thus, the "routine" management of patients reported by Boestig et al. (9) in Linköping equaled the "intensive" HbA_{1c} values at other sites (Table 1). In turn, these results would expectedly lower the incidence and prevalence of diabetic complications, as demonstrated by the North American (3) and Swedish (12) trials.

What is the impact of these several messages for the physician trying his or her best to deliver the best possible care to all diabetic patients and thereby to diminish the possibility of complications against an increasing risk of hypoglycemia (1,13)? Under nearly all circumstances in the routine practice of diabetic medicine, the delivery of DCCT or Stockholm Study intensive management presents the major practical challenge of implementation. Most health care delivery teams cannot do so, even in Scandinavia as shown by the recent Danish (10) and Finnish (11) studies and earlier from the group in Linköping (14) wherein HbA_1 levels averaged 10% (HbA_{1c}, ~8%). The bad news potentially relates to the "disparity" in the most recent Linköping experience with the rest of Scandinavia and therefore much of the world. Taken to a logical conclusion, the incidence of diabetic nephropathy is not declining. The total health care burden of diabetic complications is increasing substantially with the increase in the combined incidence in the various types of diabetes. However, the good news lies with the emphasis on the well-described benefits of intensive diabetic management in lowering the incidence of albuminuria and the delivery of better diabetic management to all patients. We know where we need to travel, but we do not know which vehicles will practically transport us to our goals. Hopefully, those institutions that have achieved "intensive" results in routine practice will share their findings and protocols most assiduously with others in the peer-reviewed literature.

Table 1—*Glycemic control (as assessed by HbA_{1c}) achieved in several reported trials and studies*

	Reference range	Standard treatment	Intensive treatment
DCCT (3)	4.0–6.1	9.0 ± 1.0	7.1 ± 0.8
Stockholm Trial (12)	3.9–5.7	8.5 ± 0.7	7.1 ± 0.7
Steno Study (10)	4.1–6.1	8.8 ± 1.1	One treatment group
Linköping Study (9)	3.2–6.0	7.0 ± 1.2	One treatment group

Data are %. No data for glycemic control are given in the Finnish study published in this issue (11). However, one may assume that they match the values for standard treatment in the DCCT, Stockholm Study, and Steno Study.

Also, the admixture of a Danish author with the Finnish contributors in the current manuscript (11) may optimistically portend attempts to link and assimilate databases across Scandinavia (e.g., the lack of glycated hemoglobin levels in the present study diminishes the opportunity to compare outcomes with other studies reported in the literature) (Table 1). The resultant conjoined population base carefully documented in a consistent manner among nations may yield even greater power to answer many of the vexing problems facing researchers in diabetes and other chronic and complicated diseases.

Nevertheless, on a practical level, we can appreciate and implement the most recent advances in antihypertensive therapy, which may extend the functional lifetime of the diabetic kidney (3,4) and thus sustain the lifestyle of the diabetic patient, who may face a significant risk of morbidity and mortality with dialysis or transplantation of a kidney and/or pancreas (15,16). Nevertheless, we must not lose track of the fact that without diabetes, there would be no diabetic complications. And with the optimal application of treatment to most diabetic patients, the risk of developing the complications falls. While the risk may not reach zero outside the "normal" range for HbA_{1c}, it will approach low levels (13). This is a laudable goal, one that should be joined by the health care givers, the pharmaceutical industry, and the scholars who direct their attention to diabetes and its complications.

MICHAEL W. STEFFES, MD, PHD

From the Department of Laboratory Medicine and Pathology, Medical School, University of Minnesota, Minneapolis, Minnesota.

Address correspondence to Michael W. Steffes, MD, PhD, Department of Laboratory Medicine and Pathology, Medical School, University of Minnesota, Mayo Box 609, 420 Delaware St. SE, Minneapolis, MN 55455. E-mail: michael.w.steffes-1@tc.umn.edu.

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