How Do You Define “Hypertension” in a Patient With Type 1 Diabetes?

Matthew R. Weir

The definition of “hypertension” is an arbitrary term, which refers to a level of blood pressure that carries increased risk for cardiovascular morbidity and mortality. Given that patients with type 1 diabetes have more baseline risk for vascular disease than the general population, many consensus guidelines committees have recommended lower blood pressure goals, preferably <130/80 mm Hg. These recommendations are, in large part, based on observational and interventional studies in people with type 2 diabetes. Moreover, as one evaluates both observational and interventional clinical trial data, it is quite clear that there is a continuous relationship between blood pressure and cardiovascular events. Thus, although guidelines recommend lower target blood pressures, what is the correct number in a type 1 diabetic? In addition, does this depend on the presence or absence of microalbuminuria or other subclinical measures of cardiovascular disease?

Older clinical trial data in patients with type 1 diabetes provided the suggestion that lower blood pressure goals might provide clinical benefit. Viberti et al reported that type 1 and type 2 diabetics with a mean blood pressure of 127/78 mm Hg derived advantage from captopril therapy (associated with a blood pressure reduction of 4/2 mm Hg) compared with placebo in reducing the likelihood of progression from microalbuminuria to macroalbuminuria (Figure). Ravid et al demonstrated similar benefits with enalapril in type 2 diabetics. The MICRO-Heart Outcomes Prevention Evaluation data also indicated that lower blood pressure (3/2 mm Hg) with ramipril therapy also reduced the risk of progression from microalbuminuria to macroalbuminuria. What could not be explained from these studies is whether it was the drug (the angiotensin-converting enzyme inhibitor), the blood pressure reduction, or both that may have provided the benefit. However, none of these studies evaluated the development of incident GFR <60 mL/min/1.73 m². The importance of the observations of Shankar et al is that they follow the blood pressures of a sizeable population of adults with type 1 diabetes and observe over the course of 16 years that lower systolic and diastolic blood pressure were protective against incident proteinuria and incident estimated GFR <60 mL/min/1.73 m². Their results are intriguing in that they demonstrate that the maximum protective effect of these 2 kidney disease–related outcomes were seen at systolic blood pressures <120 mm Hg and diastolic blood pressures <70 mm Hg. These lower blood pressures were associated with an ≅50% in reduction in incident proteinuria and incident estimated GFR <60 mL/min/1.73 m² in type 1 diabetics. Should treatment start before patients reach 120/70 mm Hg to prevent escalation of blood pressure to levels that are more likely to be associated with incident kidney disease? One must be cautious in evaluating these data. The strengths of the observations are the large cohort size and long duration of follow-up. However, it is observational and not interventional. The cohort was 99% white from a generally rural area of southwestern Wisconsin. Thus, the observations may not be extrapolatable to other ethnic populations or residents of urban areas.

However, there are important strengths to this observational cohort study. The authors carefully analyzed their results for a variety of different demographic factors and, most importantly, adjusted the data for adequacy of glycemic control and antihypertensive medications, including angiotensin-converting enzyme inhibitors. Thus, their observations that levels of blood pressure <120/70 mm Hg early in the course of type 1 diabetes can be protective against the subsequent risk of incident proteinuria and incident estimated GFR <60 mL/min/1.73 m² are not confounded by other factors.

Do these results suggest that lower blood pressure goals are beneficial to limit other microvascular diseases in the type 1 diabetic subject, like retinopathy and neuropathy? How generalizable are these data to macrovascular disease leading to myocardial infarction or stroke? Although one must be cautious in these considerations, it is fair to consider that data from interventional studies in type 2 diabetics illustrate the advantage of more intensive blood pressure, cholesterol, and glucose management in reducing the risk of both microvascular and macrovascular disease. In addition, because proteinuria and estimated GFR <60 mL/min are important coronary artery disease equivalents both in the diabetic subject and in the general population, it is quite likely that lower levels of blood pressure that reduce the likelihood of incident kidney disease will also likely be protective from subsequent microvascular and macrovascular disease.

Current clinical trials are underway to evaluate lower blood pressure goals with active treatment in people with type 2 diabetes.
diabetes. The Action to Control Cardiovascular Risk in Diabetes (ACCORD) Study (National Heart, Lung, and Blood Institute) and the Stop Atherosclerosis in Native Americans With Diabetes (SANDS) Study (National Heart, Lung, and Blood Institute) are evaluating systolic blood pressure goals/<120 and <115 mm Hg, respectively. The advantage of these studies is their prospective clinical trial design. Unfortunately, the results may not be generalizable to the type 1 diabetic.

Ultimately, the risk:benefit analysis for each patient needs to be considered with regard to earlier treatment standards until we have better genetic markers or subclinical measures of atherosclerotic risk to assist in the decision-making process. Given the burden of kidney and cardiovascular disease associated with type 1 diabetes, interventional trials are desirable to expand on these interesting and important observations.

**Disclosures**

None.

**References**


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