COALITION FOR METABOLIC HEALTH

Why Nutrition Matters for Comprehensive Type 1 Diabetes Care

Type 1 diabetes (T1D) is a lifelong autoimmune condition that causes insulin deficiency and affects approximately **2.1 million** Americans.[1]

The disease is associated with increased risk for all ten of the leading causes of death[2], including kidney disease and cardiovascular disease.[3,4] Despite advances in insulin therapy, continuous glucose monitoring, and automated insulin delivery systems, most people with T1D do not achieve recommended glucose targets[5] and remain vulnerable to long-term complications.[6,7]

These challenges have fueled interest in low-carbohydrate and ketogenic therapies that can complement existing treatment strategies, which are typically defined as less than 130 grams of total carbohydrates per day and less than 50 grams of total carbohydrates per day, respectively.[8]

Disparities in Type 1 Diabetes Outcomes

Although prevalence differences are modest compared to White patients, Black and Hispanic patients with T1D experience poorer glycemic control and lower use of diabetes technologies, including insulin pumps and continuous glucose monitoring systems.[9,10] These disparities can contribute to higher rates of diabetes-related complications and hospitalizations as well as greater healthcare costs among communities of color.[9,10,11]

Beyond the challenges of daily disease management, T1D is associated with four to ten times the risk of cardiovascular disease compared with the general population, and cardiovascular disease remains the leading cause of morbidity and mortality among people with T1D.[12]

Beyond Glucose: A Broader View of Metabolic Health

Historically, T1D management has focused primarily on blood glucose control to prevent complications. However, growing evidence shows that long-term outcomes are also influenced by broader markers of metabolic health, including blood pressure, cholesterol, triglycerides, body weight, and insulin resistance, a state in which the body's cells become less responsive to insulin. Cardiovascular risk reflects the cumulative impact of these factors over time, even among individuals with relatively good glycemic control.[3,4,13,14,15]

The growing prevalence of overweight and obesity further underscores the importance of this broader metabolic perspective: nearly two-thirds of U.S. adults with T1D now have overweight or obesity, a rate comparable to adults without diabetes.[16,17] Within this broader metabolic framework, carbohydrate intake can play a central role in day-to-day diabetes management because it directly influences blood glucose levels after meals and the amount of insulin required to manage it.[6,18,19] This has increased clinical and research interest in low-carbohydrate and ketogenic therapeutic approaches as complements to insulin therapy for adults with T1D.[6,20]

What the Science Shows

The most consistent research finding is that low-carbohydrate therapies, applied alongside insulin therapy, are associated with meaningful improvements in glycemic control for T1D patients. Studies have reported reductions in glycated hemoglobin (HbA1c), a measure of average blood glucose over approximately three months, together with increased time spent within target glucose range, reduced time spent above target range, and lower total daily insulin requirements.[20,21,22,23]

Evidence regarding outcomes beyond glycemic control is less conclusive. Studies evaluating low-carbohydrate and ketogenic therapies in people with T1D have reported variable effects on body weight and blood pressure,[6,21,22] as well as triglycerides and cholesterol.[6,7,22]

What the Science Shows

Across these cardiometabolic measures, findings range from favorable changes to little or no significant change, with unfavorable changes in some lipid measures.[6,18] At the same time, the American Diabetes Association notes that most evidence supporting cardiovascular risk reduction strategies in T1D has been extrapolated from studies conducted in people with type 2 diabetes.[24]

Toward a More Comprehensive Approach to T1D Care

> **These evidence limitations highlight two important areas for future research:**

understanding how low-carbohydrate and ketogenic therapies impact T1D management and the broader cardiometabolic profile of people with T1D, and generating more T1D-specific evidence to better understand how metabolic risk factors contribute to long-term cardiovascular outcomes.[4,14] Most studies have been relatively small, short in duration, variable in study design, and focused primarily on glucose-related outcomes.[6,19,20] Larger and longer-term studies are needed to better evaluate these emerging research areas, as well as solutions for populations that experience disproportionate barriers to diabetes care.[4,13,14] Although important questions remain, the consistency of the glycemic findings and reduced insulin requirements has established low-carbohydrate and ketogenic therapies as credible areas of investigation for improving diabetes management in patients with T1D.

References

1. Centers for Disease Control and Prevention. Diabetes data and statistics. Updated 2025. Accessed August 26, 2026.
2. Watso JC, et al. Advanced cardiovascular physiology in an individual with type 1 diabetes after 10-year ketogenic diet. *Am J Physiol Cell Physiol. 2024;327(2):C446-C461.*
3. Bebu I, et al. Relationships between the cumulative incidences of long-term complications in type 1 diabetes: the DCCT/EDIC study. *Diabetes Care. 2023;46(2):361-368.*
4. Viñals C, et al. Evaluation of cardiovascular risk in people with type 1 diabetes: a comprehensive and specific proposed practical approach. *Diabetes Therapy. 2024;15:1831-1844.*
5. Ebekozien O, et al. Longitudinal trends in glycemic outcomes and technology use for over 48,000 people with type 1 diabetes (2016-2022) from the T1D Exchange Quality Improvement Collaborative. *Diabetes Technol Ther. 2023;25(11):765-773.*
6. Korakas E, et al. Low-carb and ketogenic diets in type 1 diabetes: efficacy and safety concerns. *Nutrients. 2025;17(12):2001.*
7. Lennerz BS, et al. Management of type 1 diabetes with a very low-carbohydrate diet. *Pediatrics. 2018;141(6):e20173349.*
8. Volek JS, et al. Expert consensus on nutrition and lower-carbohydrate diets: an evidence- and equity-based approach to dietary guidance. *Frontiers in Nutrition. 2024;11:1376098.*
9. Ebekozien O, et al. Addressing type 1 diabetes health inequities in the United States: approaches from the T1D Exchange QI Collaborative. *Journal of Diabetes. 2022;14(1):79-82.*
10. Vendrame F, et al. Addressing inequities in the access to diabetes technology in the Type 1 Diabetes Exchange Quality Improvement Collaborative (T1DX-QI): a multicenter experience. *Diabetes, Obesity and Cardiometabolic Care. 2026;1(1):37-39.*
11. Haw JS, et al. Diabetes complications in racial and ethnic minority populations in the USA. *Curr Diab Rep. 2021;21(1):2.*
12. Colom C, et al. Cardiovascular disease in type 1 diabetes mellitus: epidemiology and management of cardiovascular risk. *J Clin Med. 2021;10(8):1798.*
13. Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Research Group. Risk factors for cardiovascular disease in type 1 diabetes. *Diabetes. 2016;65(5):1370-1379.*
14. Miller RG, et al. 30-year cardiovascular disease in type 1 diabetes: risk and risk factors differ by long-term patterns of glycemic control. *Diabetes Care. 2022;45(1):142-150.*
15. Rawshani A, et al. Relative prognostic importance and optimal levels of risk factors for mortality and cardiovascular outcomes in type 1 diabetes mellitus. *Circulation. 2019;139(16):1900-1912.*
16. Fang M, et al. Prevalence and management of obesity in U.S. adults with type 1 diabetes. *Ann Intern Med. 2023;176(3):427-429.*
17. Kueh MTW, et al. The emergence of obesity in type 1 diabetes. *Int J Obes (Lond). 2024;48:289-301.*
18. Isaksson SS, et al. The effect of carbohydrate intake on glycaemic control in individuals with type 1 diabetes: a randomised, open-label, crossover trial. *The Lancet. 2024;37:100799.*
19. Turton JL, et al. Low-carbohydrate diets for type 1 diabetes mellitus: a systematic review. *PLOS One. 2018;13(3):e0194987.*
20. Sperkowska BM, et al. Dietary interventions for adults with type 1 diabetes: clinical outcomes, guideline alignment, and research gaps – a scoping review. *Nutrients. 2025;17(21):3349.*
21. Igudesman D, et al. Dietary patterns for weight and glycemic management in persons with type 1 diabetes: a meta-analysis of clinical trials. *J Clin Endocrinol Metab. 2025;110(11):3289-3300.*
22. Krebs JD, et al. A randomised trial of the feasibility of a low carbohydrate diet vs standard carbohydrate counting in adults with type 1 diabetes taking body weight into account. *Asia Pacific Journal of Clinical Nutrition. 2016;25(1):78-84.*
23. Turton JL, et al. Effects of a low-carbohydrate diet in adults with type 1 diabetes management: a single arm non-randomised clinical trial. *PLOS One. 2023;18(7):e0288440.*
24. American Diabetes Association Professional Practice Committee. Cardiovascular disease and risk management: Standards of Care in Diabetes 2025. *Diabetes Care. 2025;48(1):S207-S238.*