Diabetic retinopathy is a serious complication of diabetes that can result in blindness. This study by Liu et al. evaluated the association of diabetes technology use and diabetic retinopathy by performing a retrospective cohort study of adult patients with type 1 diabetes who were seen in an academic center between 2013 and 2021. Liu et al. assessed 550 patients without diabetic retinopathy who were using a continuous glucose monitor (CGM) at the start of the study or began using CGM during the study period. At the end of the study, 44% of patients developed diabetic retinopathy. In multivariate models, they found that CGM use was significantly associated with lower odds of development of retinopathy (odds ratio [OR], 0.52; 95% CI, 0.32-0.84) and proliferative diabetic retinopathy (OR, 0.42; 95% CI, 0.23-0.75).

In recent decades, CGM has transformed the management of type 1 diabetes. While hemoglobin A1c (HbA1c) has continued to be the mainstay of evaluating mean blood glucose over a period of months, CGM has many additional advantages, including its ability to capture detailed daily glucose trends. There have been well-established associations of CGM use with several short-term outcomes, including improved HbA1c, reduced hypoglycemia, and lower diabetes distress, but the association of CGM with longer-term outcomes, including microvascular and macrovascular complications, is less established. The findings of this study by Liu et al. are important, as they shed light on the long-term clinical outcomes associated with CGM, specifically regarding a serious and common diabetes complication, diabetic retinopathy.

We know that worse glycemic control, measured by higher HbA1c, is associated with increased risk of microvascular disease. The study by Liu et al. found that CGM use was associated with lower retinopathy rates even after adjusting for HbA1c. This suggests that the protective association of CGM with retinopathy is irrespective of the fact that CGM is associated with improved HbA1c. Given that individuals with similar HbA1c levels may have very different glucose profiles, the association of CGM use with reduced odds of retinopathy may be related to the ability of CGM to capture more detailed aspects of a patient’s glucose trends, including short-term glycemic variability.

Glycemic variability is a known risk factor associated with diabetes complications, including retinopathy. It is thought that larger fluctuations in blood glucose result in damage through mechanisms of oxidative stress, activation of inflammation and coagulation, endothelial cell damage, and other related responses. A 2018 study by Lu et al. that evaluated the association of CGM metrics with retinopathy found several key findings. Lu et al. found that beyond HbA1c, time in range (blood glucose 70-180 mg/dL) was associated with diabetic retinopathy, glycemic variability varied with time in range, and measures of glycemic variability worsened progressively with more severe diabetic retinopathy. While Liu et al. evaluated CGM use rather than specific CGM metrics, the association between CGM use and reduced retinopathy may in part be related to the ability to readily identify and consequently address the variability seen in a patient’s glucose profile. Thus, CGM has a unique advantage that can support the prevention of diabetic retinopathy. This can be particularly beneficial in groups that are at the highest risk for retinal complications.

Studies have shown that individuals from racial and ethnic minority groups (eg, Black and Hispanic individuals) and individuals with lower socioeconomic status are increased risk of development of retinopathy and more advanced disease. While the findings in the study by Liu et al. suggest that CGM could be leveraged to improve retinopathy-related outcomes in these high-risk groups, the literature also describes disparities in CGM use in these very populations. While the
drivers of these disparities are multifactorial and span a variety of clinician-, system-, and patient-related barriers, successfully addressing the disparities in CGM use may be very impactful in improving retinal outcomes in these groups most at risk of diabetic eye complications.7