COMMENT ON KAMINSKI ET AL.

Assessment of Glycemic Control by Continuous Glucose Monitoring, Hemoglobin A_{1c}, Fructosamine, and Glycated Albumin in Patients With End-Stage Kidney Disease and Burnt-Out Diabetes. Diabetes Care 2024;47:267–271

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The pilot study by Kaminski et al. (1) that was recently published in *Diabetes Care* assessed glycemia in patients with end-stage kidney disease (ESKD) with "burnt-out diabetes" by measuring interstitial fluid glucose with a Dexcom G6 continuous glucose monitor (CGM). This study addresses the important issue of glycemic monitoring in patients who require hemodialysis. The authors concluded that patients with burnt-out diabetes have hyperglycemia that is undetected by traditional measures but is detected by CGM use.

The burnt-out diabetes phenomenon was initially believed to correspond to a spontaneous improvement in glycemia seen in ESKD potentially related to reduced insulin clearance. However, inaccurate measurement of hemoglobin A_{1c} (HbA_{1c}) in ESKD may be associated with overattribution of this phenomenon. This is reinforced by the results of Kaminski et al. (1), which raises the important issue of diagnostic test accuracy in the altered state of ESKD.

A fundamental basis of the study by Kaminski et al. (1) is that measurement of interstitial fluid glucose with Dexcom G6 acts as an accurate reference investigation against which the other glycemic measures of HbA_{1c}, fructosamine and glycated albumin, can be compared. While measurement of blood glucose (plasma or capillary/arterial/venous whole blood) provides far fewer daily readings than CGM, the addition of blood glucose testing as a reference to confirm the assumption of CGM interstitial glucose accuracy may have added to the strength of the present study given that the Dexcom G6 user guide (2) advises against use in dialysis-requiring patients because of accuracy concerns.

CGM accuracy data for patients who require hemodialysis are limited. Recent data suggest Dexcom G6 remains accurate in patients with estimated glomerular filtration rate (eGFR) <30 mL/min/1.73 m^2 (3). However, aggregate accuracy data for patients with eGFR <30 mL/min/1.73 m^2 may not necessarily be applicable to dialysis populations, given the marked differences in physiology and glycemia that occur between stage 4 chronic kidney disease and dialysis-requiring ESKD. One small study of 20 patients who require hemodialysis reported a mean absolute relative difference (MARD) of 13.8% during the interdialytic period compared with capillary glucose (4). The largest study to date, the Assessment of the Accuracy of Continuous Glucose Sensors in People With Diabetes Undergoing Hemodialysis (ALPHA) study (40 participants), reported a MARD of 22.7% for the Dexcom G6 during hemodialysis compared with plasma glucose assessed with the Yellow Springs Instrument method (5). While substantially different from the overall MARD of 9.8% reported by Dexcom in a nondialysis population (2), reassuringly, these studies reported 98.7% and 98.9% of glucose values fell within zones A and B of the Parkes error grid (4) and Clarke error grid (5), respectively, suggesting no significant errors would have occurred if CGM glucose was used for treatment decisions.

Thus, based on these limited published data, it appears that Dexcom G6 is accurate enough to be used in patients who require hemodialysis. However, additional multisite studies would strengthen this assertion of CGM accuracy. With CGM use now widespread and more people living with diabetes developing ESKD, use of CGM in dialysis-requiring patients is likely to become increasingly commonplace. Establishing the reliability of CGM glucose results in such situations will be of high relevance to clinical care and research in the field.

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References

1. Kaminski CY, Galindo RJ, Navarrete JE, et al. Assessment of glycemic control by continuous glucose monitoring, hemoglobin A1c, fructosamine, and glycated albumin in patients with end-stage kidney disease and burnt-out diabetes. Diabetes Care 2024;47:267–271
2. Dexcom. G6 User Guide. 2022. Accessed 20 September 2023. Available from https://www.dexcom.com/en-us/guides
3. Davis GM, Spanakis EK, Migdal AL, et al. Accuracy of Dexcom G6 continuous glucose monitoring in non-critically ill hospitalized patients with diabetes. Diabetes Care 2021;44:1641–1646
4. Villard O, Breton MD, Rao S, et al. Accuracy of a factory-calibrated continuous glucose monitor in individuals with diabetes on hemodialysis. Diabetes Care 2022;45:1666–1669
5. Avari P, Tang W, Jugnee N, et al. The Accuracy of Continuous Glucose Sensors in People with Diabetes Undergoing Haemodialysis (ALPHA study). Diabetes Technol Ther 2023;25:447–456