


## BRIEF REPORT OPEN ACCESS

# Continuous Glucose Monitoring-Guided Self-Management Leads to Diabetes Remission in a Newly Diagnosed Overweight Patient With Type 2 Diabetes: A Brief Report

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## ABSTRACT

We report the case of a newly diagnosed overweight patient with type 2 diabetes mellitus who achieved diabetes remission using continuous glucose monitoring (CGM), which promotes patient engagement in self-management. Key measures included selection of a patient newly diagnosed with type 2 diabetes mellitus, use of CGM, analysis of glucose trends and contributing factors, and patient guidance in maintaining a health diary and developing personalized self-management strategies (e.g., dietary modification and exercise regimens). Following 6-month CGM-guided self-management, the patient's glycated hemoglobin level decreased from 7.3% at baseline to 6.0% and his body weight decreased from 83 to 77 kg, a 7% reduction; thus, the patient met the criteria for diabetes remission.

The 2021 International Diabetes Federation Diabetes Atlas reported that approximately 537 million adults aged 20–79 years worldwide met the diagnostic criteria for diabetes, with type 2 diabetes mellitus (T2DM) constituting 90%–95% of cases [1]. With the escalating prevalence of obesity, obesity-associated T2DM is also increasing rapidly, accounting for 60%–70% of all diabetes cases. Studies show that lifestyle interventions, including dietary modification and physical activity, may result in diabetes remission in overweight/obese patients with T2DM who have a short disease duration [2]. Self-management is recognized as the cornerstone for preventing complications and improving health outcomes in patients with T2DM, but self-management practices in these patients are reportedly poor. A national survey among Chinese patients with T2DM reported

only 25.7% consistently monitored blood glucose, 74.5% adhered to dietary restrictions, and 12.8% engaged in regular physical activity [3]. Continuous glucose monitoring (CGM) is a pivotal tool in optimizing diabetes management that can motivate self-management and improve glycemic control in patients with T2DM [4, 5]. However, few studies have investigated the impact of CGM-guided self-management on achieving glycemic control and diabetes remission in newly diagnosed patients with T2DM not taking glucose-lowering medications.

In this case study, we present a newly diagnosed overweight patient with T2DM who achieved diabetes remission through CGM-guided self-management using a health diary and weight management strategies.

Xia Yang and Xiu-Dong Liu contributed equally to this study.

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## 1 | Patient Information

The patient, a 55-year-old man, had been engaged in light physical labor for an extended period. In March 2023, he was diagnosed with T2DM following a routine physical examination, with a fasting blood glucose level of 7.2 mmol/L and glycated hemoglobin (HbA1c) level of 7.3%. The patient had no symptoms of polydipsia, polyphagia, polyuria, or weight loss. He initially attempted lifestyle modification and occasionally monitored his blood glucose via fingerstick testing. However, his glycemic variability was substantial, and he did not achieve effective glycemic control. In March 2024, the patient revisited the clinic after a physical examination showing a fasting blood glucose level of 7.26 mmol/L and HbA1c of 7.2%, indicating suboptimal glycemic control after 1 year of lifestyle adjustments.

This patient had a 10-year history of hypertension and had experienced acute myocardial infarction 5 years earlier, for which he underwent percutaneous coronary intervention. He was taking long-term antihypertensive, antiplatelet, and lipid-lowering medications. Physical examination revealed a height of 175 cm, weight of 83 kg, and body mass index of 27.1 kg/m<sup>2</sup>. Pancreatic function tests showed a fasting C-peptide level of 3.5 µg/L and postprandial (2-h) C-peptide level of 15.5 µg/L. Complication screening indicated stage I retinal arteriosclerosis on fundus examination and moderate fatty liver on abdominal ultrasound.

During shared decision-making, the patient admitted difficulty taking multiple daily medications and expressed a desire to improve his glycemic control through lifestyle interventions.

## 2 | Self-Management Intervention

The 2024 Standards of Medical Care in Diabetes published by the American Diabetes Association (ADA) highlight that diabetes remission can serve as a potential therapeutic target for patients with T2DM, especially in newly diagnosed individuals [6]. The standards also emphasize that weight management is central to self-management in overweight patients with T2DM; additionally, CGM can reduce the risk of hypoglycemia and enhance adherence to self-management in those with substantial glycemic variability [6]. According to ADA standards, we established the following diabetes remission goals for this patient: achieving an HbA1c < 6.5% and maintaining a fasting blood glucose within the target range after 6 months of self-management intervention, without the use of glucose-lowering medications. On the basis of DiRECT trial [7] findings demonstrating a 29% remission rate among patients achieving 7%–10% body weight reduction, we set the weight loss target at 7%–10% of the patient's initial body weight.

## 3 | CGM Monitoring and Health Diary Recording

CGM uses a sensor to monitor glucose levels in subcutaneous interstitial fluid, which reflects blood glucose trends. This approach can help patients to understand the relationship between glucose fluctuations and associated factors, such as diet and physical activity. CGM is critical in guiding dietary and

exercise adjustments, improving HbA1c, and reducing the risk of diabetes-related complications and cardiovascular diseases [8]. Maintaining a health diary is shown to improve patient behavior and enhance self-management awareness [9].

With the patient's consent, a CGM device was worn for 8 days (April 8th–15th); the patient was also instructed to maintain a health diary over the same period. The content recorded in the diary included daily food intake (type, portion, and timing), physical activity (type, duration, and intensity), and any subjective discomfort symptoms (e.g., hypoglycemia). The CGM results revealed a time in range (TIR) of 67.5%–82.9% and a time above range (TAR) of 17.1%–32.5%, primarily occurring 1–2 h after breakfast and dinner, indicating significant postprandial glucose variability. A hypoglycemic episode (glucose 4.8 mmol/L) detected via CGM was identified as a measurement artifact upon validation with capillary blood glucose testing, consistent with known interference factors in subcutaneous glucose sensing (Figure 1).

## 4 | Weight Management

For newly diagnosed overweight/obese patients with T2DM, the cornerstone of self-management is weight control to improve insulin sensitivity. Based on the 2024 ADA Standards of Medical Care in Diabetes, we implemented individualized weight management measures for our patient, including dietary and exercise interventions.

The 2024 ADA standards emphasize that dietary management should be personalized, accounting for the patient's lifestyle, dietary preferences, and baseline health status. Based on CGM data analysis and communication with the patient, we found he preferred a high-calorie diet comprising foods rich in fats and carbohydrates; the composition of his daily diet was 2/5 at breakfast, 1/5 at lunch, and 2/5 at dinner. In shared decision-making, dietary modifications were implemented across three key dimensions: (1) total caloric intake, (2) macronutrient composition ratios, and (3) food variety/selection, based on evidence-based nutritional guidelines for diabetes management. The patient's daily caloric intake decreased from 1800 to 2000 kcal to 1400–1500 kcal, his carbohydrate intake decreased from 300 g/day to 200 g/day, and fat intake declined from 30 to 35 g/day to 25 g/day. At the same time, the patient consumed more low-glycemic-index vegetables and fruits and finally adjusted the composition ratio to 1/3 at each meal.

The 2024 ADA standards highlight that it is important to make individualized exercise plans based on the patient's health status and physical capabilities. In the assessment, we found that our patient engaged in regular exercise. He undertook aerobic activities such as brisk walking and jogging five times a week for 30 min per session. In shared decision-making, more resistance training was added to enrich the exercise composition, such as Baduanjin (a traditional Chinese exercise) twice a week for 30 min per session, alternating with aerobic activities. We suggested that all exercises be performed 1 h after meals. The patient was also advised to wear a fitness tracker to monitor his heart rate and blood pressure and to carry nitroglycerin

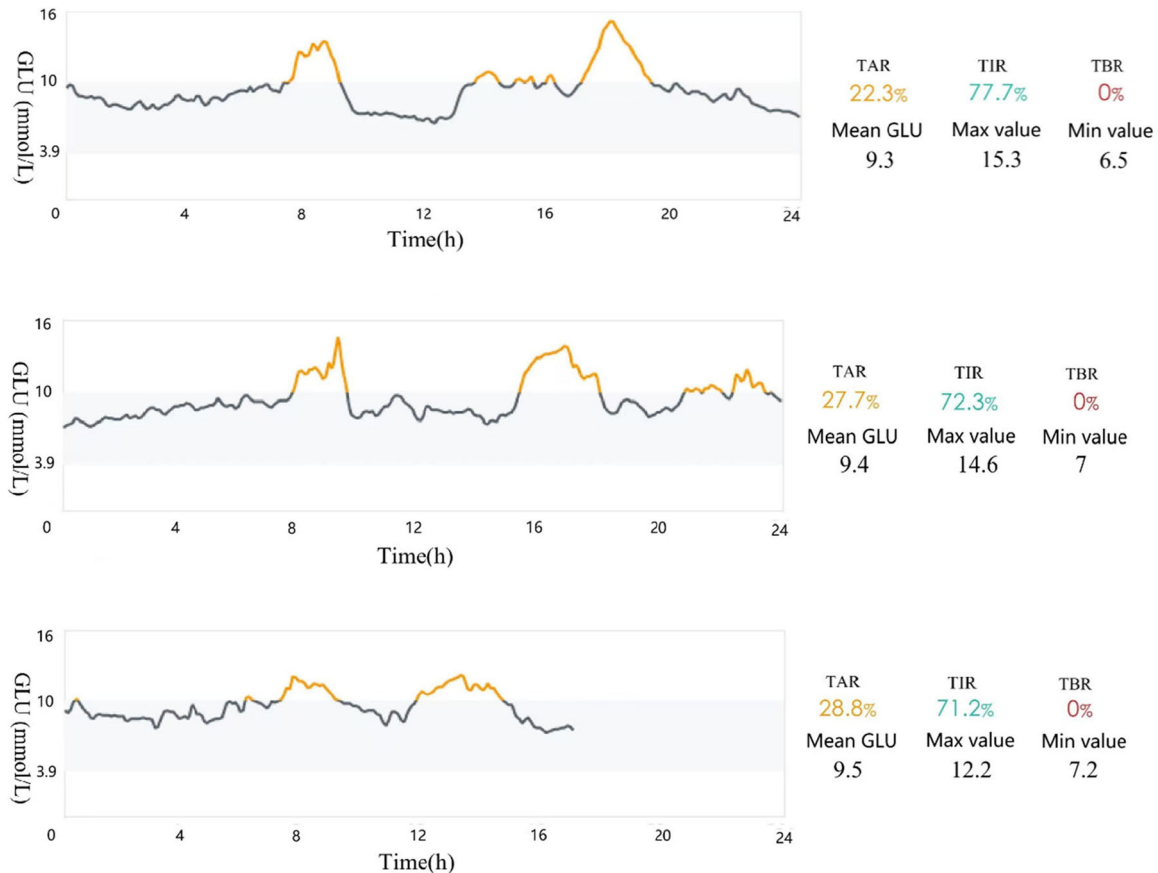
tablets and some hard candies to prevent cardiovascular events or hypoglycemia.

## 5 | Regular CGM Monitoring and Evaluation

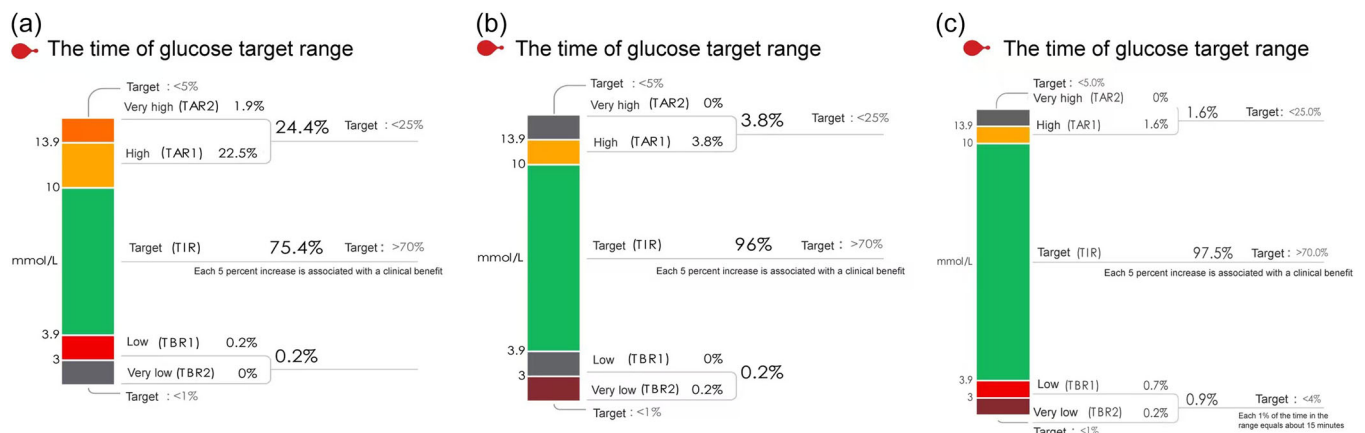
The patient underwent CGM monitoring three times (at 1, 2, and 6 months) during the 6-month self-management intervention; the corresponding variables are illustrated in the figure below. By the second month, the patient achieved an HbA1c of 6.5% and weight reduction from 83 to 79 kg. By 6 months, the

patient's HbA1c reached 6.0% and his weight decreased to 77 kg, a 7% reduction; he therefore met the criteria for diabetes remission. Pancreatic function tests showed a fasting C-peptide level of 2.84  $\mu\text{g/L}$  and postprandial (2-h) C-peptide level of 11.1  $\mu\text{g/L}$ . Complication screening revealed no fatty liver, no new complications, and no deterioration of existing conditions.

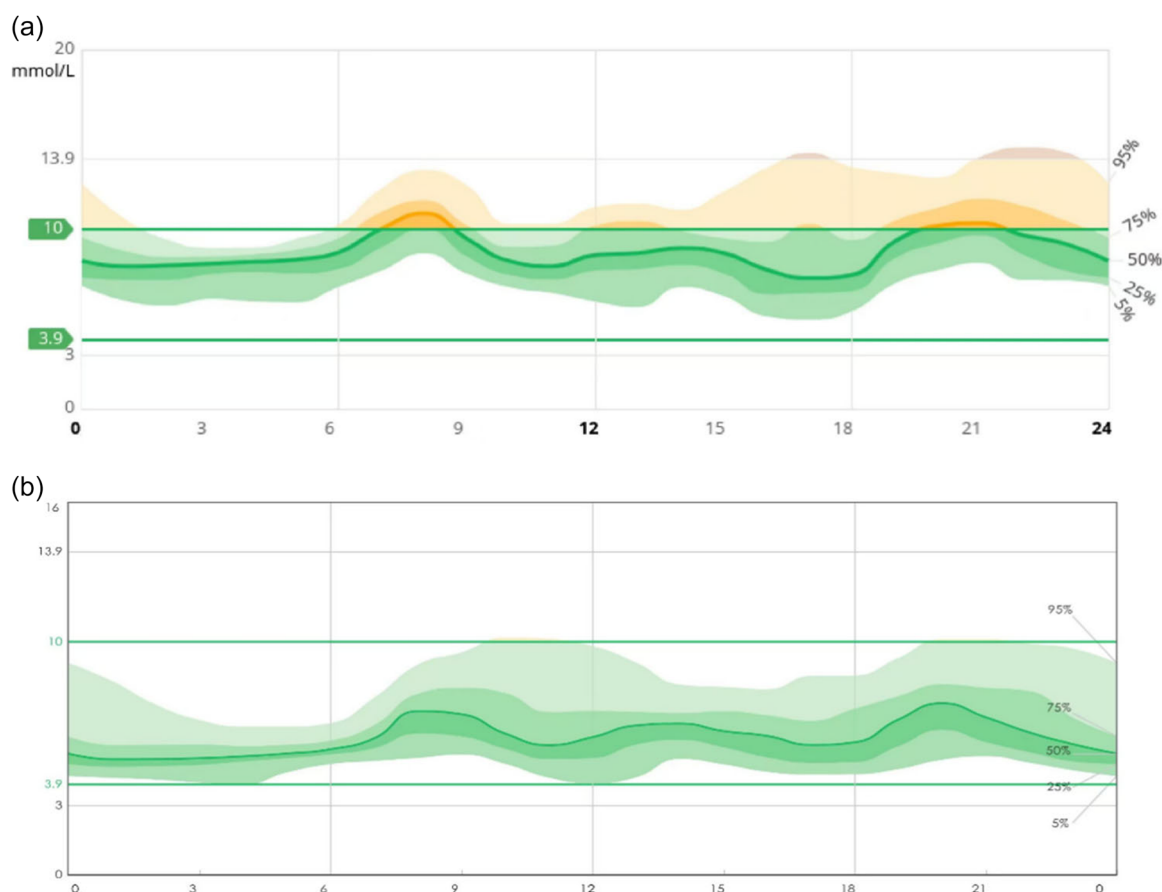
As shown in Figure 2, the TIR increased from 75.4% to 97.5% by the end of 6 months, indicating that the patient's glucose levels could be kept within the target range for a longer period. The TAR decreased from 24.4% to 1.6%, reflecting a



**FIGURE 1** | Daily glucose (GLU) analysis profile. TAR, time above range; TBR, time below range; TIR, time in range. (a) April 13th GLU analysis profile. (b) April 14th GLU analysis profile. (c) April 15th GLU analysis profile.



**FIGURE 2** | Time in range (TIR) change profile. TAR, time above range. (a) April the time of glucose target range. (b) May the time of glucose target range. (c) September the time of glucose target range.



**FIGURE 3** | Continuous glucose monitoring (CGM) analysis profile. (a) April CGM analysis profile. (b) September CGM analysis profile.

significant reduction in hyperglycemia. Hypoglycemic events observed during the monitoring periods were all attributed to external interference. Nevertheless, we recommended vigilance regarding predinner hypoglycemia. The dynamic glucose analysis graph in Figure 3 illustrates the trends in median glucose levels during the night and at breakfast, lunch, and dinner. By 6 months, the patient's glucose variability was significantly decreased, with median glucose levels consistently maintained within the target range, indicating improved glycemic stability and effective self-management over the intervention period.

## 6 | Summary

We evaluated the impact of CGM-guided self-management—including a health diary as well as dietary and exercise intervention—on glycemic control in an overweight patient newly diagnosed with T2DM. The results demonstrated that CGM-guided self-management significantly improved glycemic levels and led to diabetes remission without the use of glucose-lowering medications. These findings provide evidence for early intervention and nonpharmacological treatment in such patients. However, this study has some limitations, including a small sample size and relatively short follow-up period. Future research should expand the sample size and extend the follow-up duration to further validate the effectiveness of CGM-guided self-management interventions in overweight patients with T2DM.

## Author Contributions

**Xia Yang:** writing – original draft (equal). **Xiu-Dong Liu:** writing – review and editing (lead). **Yi-Qi Guo:** data curation (supporting); writing – original draft (equal).

## Acknowledgments

The authors have nothing to report.

## Ethics Statement

The study protocol was approved by the Ethics Committee of Beijing Tsinghua Changgung Hospital (25808-6-01).

## Consent

Informed consent has been written.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The authors have nothing to report.

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