**Title:** Hyperglycemia during continuous glucose monitoring in obese/overweight male individuals without diabetes

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**Abbreviations:** (CGM) continuous glucose monitoring, (BMI) body mass index, (OGTT) oral glucose tolerance test, (AG) anhydroglucitol, (NGT) normal glucose tolerance, (IGT) impaired glucose tolerance, (HOMA) homeostatic model assessment, (TAR) time above range, (IQR) interquartile range, (SD) standard deviation, (CV) coefficient of variation

**Key Words:** Continuous glucose monitoring, Postprandial hyperglycemia, Obesity, Non-diabetes

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**Letter to the editor**

Hyperglycemia is both a causative factor and an early marker for β-cell dysfunction before the onset of diabetes [1,2]. Thus, understanding the extent of hyperglycemia in individuals without diabetes is of significance for prevention of diabetes. In the present study, to detect hyperglycemia in overweight/obese men without diabetes, continuous glucose monitoring (CGM) was performed.

A total of 50 male (age 50–65 years, body mass index [BMI] ≥25 kg/m2) participants without previously documented dysglycemia were recruited into this study. On the first day, anthropometric and laboratory data were obtained, the 75-g oral glucose tolerance test (OGTT) was performed, and the iPro™2 Professional CGM (Medtronic, MN, USA) device was attached. The recorder and Enlite sensor were worn for 6 days. The participants were instructed to calibrate the sensor four times throughout the day. Individuals with normal (NGT) or impaired glucose tolerance (IGT) by OGTT, and ≥1,800 CGM recording data, were chosen for inclusion in the analysis (n=36). The glucose concentrations corresponding to the cutoff points proposed as clinical targets [3,4] were used as the thresholds. The study was performed in accordance with the principles of the Helsinki Declaration and approved by the institutional and independent review boards. Written informed consent was obtained from all participants.

The median BMI (interquartile range [IQR]) was 27.9 (26.5–29.4). One quarter of the study population had HbA1c levels >5.6% (38 mmol/mol), and 19.4% had 1,5-AG levels <14.0 µg/mL. Although the β-cell function estimated by the HOMA-β was well preserved, approximately a quarter of the study population had an insulinogenic index of <0.4. The results of the 75-g OGTT revealed that 73% had NGT, whereas 27% had IGT. The median (IQR) at 1-h post-challenge and the maximal glucose levels during OGTT were 176 (150–194) mg/dL and 181 (161–194) mg/dL, respectively. The CGM results, for which the median total count was 1,964 (163.7 hours), showed that the median maximal CGM glucose level and CV were 193 (173–219) mg/dL and 18.3% (15.4–20.6), respectively (Table 1). Approximately half (47%) of the participants had CGM-recorded sensor glucose levels of ≥200 mg/dL at least once, whereas approximately 30% had CGM glucose levels ≥180 mg/dL at least once in every five meals. The median TARs higher than 140, and 180 mg/dL were 10.4%, and 0.6%, respectively, whereas the median percentages of postprandial peaks ≥140, and ≥180 mg/dL were 57.5%, and 8.1% of meals, respectively (Table 1).

In individuals with diabetes, postprandial hyperglycemia is associated with various comorbidities, and a peak postprandial glucose level of <180 mg/dL is the recommended target [5]. However, whereas the glycemic response to meals has been studied widely in patients with diabetes mellitus, there is limited CGM-based data on the frequency of postprandial hyperglycemia in individuals without diabetes [6]. The present study suggests that, in non-diabetes, most of which exhibits NGT on 75-g OGTT, a substantial proportion of obese/overweight people exhibited elevated sensor glucose levels above the recommended target for diabetes management and caution must be exercised to prevent postprandial hyperglycemia.

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**Author Contributions**

Ichiro Kishimoto contributed to the conception and design of the study, analyzed data, and wrote the manuscript. Akio Ohashi contributed to the acquisition of data, data analysis, and interpretation of the results. All authors provided final approval of the version to be published and agree to be accountable for all aspects of the work.

**Conflicts of interest**

There are no conflicts of interest to disclose.

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