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Commentary

A New Trend in Diabetes Self-Management Support for Diabetic Patients to Learn Carbohydrate Counting by Using FreeStyle LibreTM Flash Glucose Monitoring

Yuji Aoki[1*], Ayako Saito[2], Yumiko Aruga[3], Akiko Nishimura[4]

[1]Department of Internal Medicine, National Hospital Organization Matsumoto Medical Center Matsumoto Hospital, Japan

[2]Department of Nutrition Management, National Hospital Organization Matsumoto Medical Center Matsumoto Hospital, Japan

[3]Department of Nursing, National Hospital Organization Matsumoto Medical Center Matsumoto Hospital, Matsumoto, Nagano, Japan

[4]Yamanashi Prefectural University School of Nursing, Kofu, Yamanashi, Japan

[*]**Corresponding author:** Yuji Aoki, Department of Internal Medicine, National Hospital Organization Matsumoto Medical Center Matsumoto Hospital, 2-20-30 Minami, Murai, Matsumoto, Nagano 399-870, Japan. Tel: +810263584567; Fax: +810263863183; Email: yaoki55@nifty.com

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Abstract

The FreeStyle Libre™ (personal) flash glucose monitoring system was marketed in Japan at the end of January in 2017. It is the lowest cost of a continuous glucose monitoring, needs no calibration, and provides reliable data on demand throughout 14 days of use. This novel system could motivate both diabetic patients and their educators to enjoy learning and teaching carbohydrate counting, anticipating a new trend in diabetes self-management support.

Keywords: Carbohydrate Counting; Continuous Glucose Monitoring; Diabetes Education; Free Style Libre

Commentary

At the end of January in 2017, FreeStyle LibreTM (personal) flash glucose monitoring (Abbot Diabetes Care, California, USA), hereafter referred as Libre, was marketed in Japan. Libre was first licensed in Europe in 2014 and has had its rapid uptake in Europe, presumably because it is the lowest cost of a continuous glucose monitoring, needs no calibration, and provides reliable data on demand throughout 14 days of use [1,2]. The Libre system that display glucose values only when scanned is sometimes regarded as a separate entity from continuous glucose monitoring [3]. We are engaged in diabetes self-management support as a diabetes education team, and have been using carbohydrate counting for dietary education [4-6]. We were feeling a new trend in diabetes self-management support for diabetic patients to learn carbohydrate counting by using Libre, while some team members tested its performance early after the introduction of Libre to Japan.

The sensor of Libre remains inserted under the skin of the back of the upper arm for 14 days, with a button-like structure firmly adhering to the skin. It measures interstitial glucose every minute without fingerstick calibrations. Scanning of the sensor by a separate touchscreen reader collects the glucose measurements and shows a real-time glucose value and a trend graph of average values of every 15-minute measurements during the past 8 hours (Figure 1A). Figure 1B shows an output sheet of real-time glucose values and daily trend graphs for 3 days saved by the reader in a 70-year-old patient with 33-year duration of type 1 diabetes, who had been treated with multiple daily insulin injections. She learned glycemic variations after ingesting the variety of meals or foods by checking glucose values by herself on demand wearing the Libre system, while reassessing her insulin to carbohydrate ratio and confirming no nocturnal hypoglycemia. In this case, she was hospitalized in order to support her diabetes self-management without delay mainly by staff nurses looking at the real-time data of Libre.

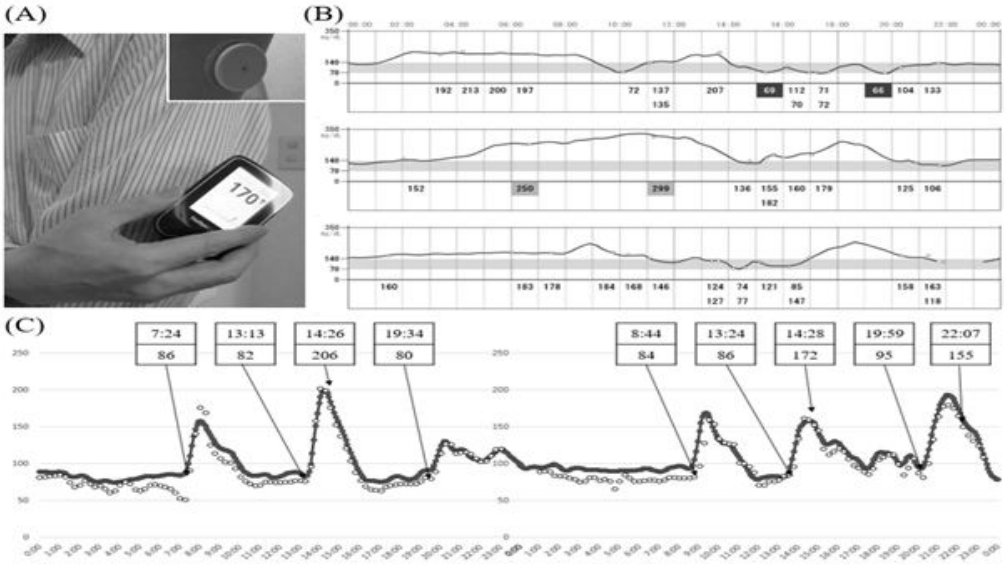

Figure 1(A-C): (A) A photo of FreeStyle LibreTM (personal) flash glucose monitoring. A sensor with a button-like structure is adhering to the skin of the back of the upper arm (inserted photo). **(B)** An output sheet of real-time glucose values and daily trend graphs for 3 days saved by the reader that scanned the sensor on demand as shown in A. **(C)** Daily glucose profiles (every 15-minute measurements for FreeStyle Libre (□) and every 5-minute measurements for iPro2™ (●)) and glucose values scanned by the reader (time, glucose value) during 2 days. The scanned data were used for the calibrations of iPro2.

Fokkert, et al. [7] have most recently reported the accuracy of Libre. In comparison to standard glucose measurement techniques, the Libre readings tended to be lower than actual results in the lower ranges, and higher than actual results in the higher ranges. After a 75g oral glucose load, a slower rise in glucose level was observed during the first 45-60 min. They concluded that these effects of such deviations can partly be overcome by optimizing the available user instructions. We also looked at the differences in glucose levels between Libre and iPro2TM (Medtronic, Pennsylvania, USA), a commonly used continuous glucose monitoring system [5]. Figure 1C shows daily glucose profiles (every 15-minute measurements for Libre and every 5-minute measurements for iPro2) and glucose values scanned by Libre, which were used for the calibrations of iPro2, during 2 days in one of authors, a member of the education team. Similarly, the Libre readings seemed to be lower in the low ranges and higher in the high ranges than the iPro2 readings. The glucose values at the moment of scanning were indicated not to lie on the line of the trend graph of every 15-minute measurements. Therefore, real-time glucose values should be useful if taking tendency of the deviations into account.

It has been reported that patients with type 1 and type 2 diabetes using Libre showed improvement in treatment satisfaction with only minimal changes in HbA1c [8,9]. In regard with diabetes education, Libre could make patients recognize the relationship between the amount of carbohydrate intake and the blood glucose excursion. As an observational fact so far, the majority of the diabetic patients wearing Libre during hospitalization appeared to be learning carbohydrate counting with pleasure, leading in turn to educators' satisfaction. Thus, the novel Libre system could motivate both diabetic patients and their educators to enjoy learning and teaching carbohydrate counting, anticipating a new trend in diabetes self-management support.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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