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A comparative effectiveness analysis of three continuous glucose monitors: Guardian, G5 and Libre

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Objective: Self-monitoring blood glucose (SMBG) with a traditional glucose meter often misses peak post-prandial glucose and hypoglycemia. Currently, continuous glucose monitoring (CGM), which determines diurnal blood glucose patterns on a continuous basis, is being introduced to identify fluctuations and trends of blood glucose levels as soon as possible. This study was aimed to compare the accuracy of three continuous glucose monitoring (CGM) devices in subjects with normal glucose tolerance, type 1 and type 2 diabetes mellitus.

Research Design & Methods: Nine subjects with normal glucose tolerance (age 23 to 58 years), 9 subjects with type 1 diabetes mellitus (age 27 to 58) and 9 subjects with type 2 diabetes mellitus (age 20 to 67) participated in 96-hour closed-loop blood-glucose control experiments. Capillary blood glucose (BG) obtained 7 times a day were paired in time with corresponding CGM glucose (CGMG) measurements obtained from three CGM devices, the Guardian (Medtronic), G5 (DexCom), and Freestyle Libre (Abbott Diabetes Care) worn simultaneously by each subject. Errors in paired BG–CGMG measurements and data reporting percentages were obtained for each CGM device.

Results: The accuracy of each device did not change for 5 days. Compared with capillary BG reference readings, the G5 showed the lowest mean absolute relative difference (MARD), with 9.1% overall and 18.1% in the hypoglycemia range. For the Guardian and the Libre, MARD was 16.9%/32.2% and 11.7/14.2%, respectively. Also, the mean and SDs for all BG-ARD pairs associated with BG values within 70-300 mg/dL was lowest in the Libre (6.9±1.5) among 3 devices, indicating higher precision of the Libre. Regarding sensor to sensor variability, the SD for the Guardian was the highest, 14.3% and the Libre and G5 comparable results were 6.9% and 8.7%, respectively.

Conclusions: This study with three CGM devices for BG values from 35 to 544 mg/dL revealed several differences in performance characteristics that include accuracy, precision and reliability. The G5 and Libre showed comparable accuracy and precision, of which the G5 showed the best accuracy and the Libre showed the best precision.

Biography

Young Joo Cha is a Medical Doctor specialized in Laboratory Medicine, and has completed her PhD from Seoul National University College of Medicine in Seoul, Republic of Korea. She is a Professor and Chair of Department of Laboratory Medicine, in Chung-Ang University, Seoul, Republic of Korea. She has published more than 200 papers in reputed journals.

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