

Evaluation of the VIA[®] Blood Chemistry Monitor for Glucose in Healthy and Diabetic Volunteers

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Abstract

Background:

Manual methods of blood glucose monitoring are labor-intensive, costly, prone to error, and expose the caregiver to blood. The VIA[®] blood chemistry monitor for glucose can automatically measure plasma glucose (PG) every 5 minutes for 72 hours using blood sampled from a peripheral vein/artery or a central vein.

Methods:

VIA performance was evaluated in eight normal and five type 1 diabetic (T1DM) subjects in 15 separate experiments. The VIA device was connected to a peripheral vein and reported a PG value every 5 minutes during each 510-minute experiment. Blood samples were collected manually every 10 minutes and assayed using a HemoCue[®] β -glucose analyzer (HC). Whole blood HC measurements were corrected to PG values. Paired HC/VIA measurements ($n = 717$) were analyzed.

Results:

Mean PG was 90 ± 14 and 96 ± 12 mg/dl in normal subjects and 194 ± 64 and 173 ± 48 mg/dl in T1DM subject as measured by the HC and VIA, respectively. Clark error grid analysis revealed 86% points in zone A, 11% points in zone B, and 2% points in zone D. Linear regression analysis yielded the following equation: $VIA = 0.732 \times HC + 30.5$ ($r^2 = 0.954$). Residual analysis revealed a glucose-dependent bias between the HC and the VIA. VIA data were transformed using the linear regression equation to correct for bias. After the correction, the mean absolute relative difference between the VIA and the HC was less than 10%, and 99.6% of data were in zones A and B. The VIA was able to sample blood automatically every 5 minutes for more than 8 hours in the laboratory setting. On average, the VIA reported glucose values for 94% of the samples it attempted to obtain.

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Abbreviations: (CEG) Clark error grid, (CVC) central venous catheter, (HC) HemoCue β -glucose analyzer, (IIT) intensive insulin therapy, (MARD) mean absolute relative difference, (PG) plasma glucose, (T1DM) type 1 diabetes mellitus, (VIA) VIA blood chemistry monitor for glucose

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Abstract cont.**Conclusions:**

This study demonstrated that the VIA blood chemistry monitor for glucose can reliably sample blood frequently for a prolonged period of time safely and effectively in diabetic and nondiabetic volunteers. Agreement between the two devices was the closest at normal glucose concentrations. After correcting for a glucose-dependent bias between the devices, the MARD was consistently less than 10% for all glucose ranges.

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