Hematocrit Interference is a Common Phenomenon in Many Devices for Glucose Self-Measurement

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Background

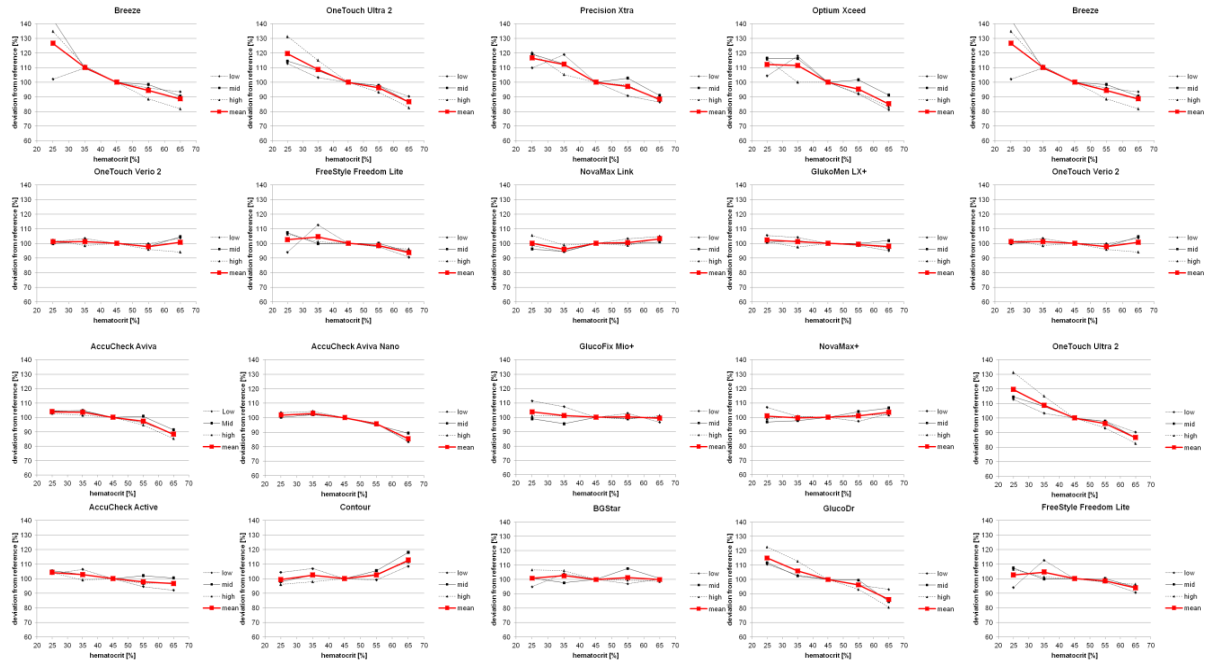
High hematocrit levels may lead to false low glucose readings and vice versa. Aim of this laboratory investigation was to assess the potential influence of hematocrit variations on a variety of blood glucose meters applying different measurement technologies.

Methods

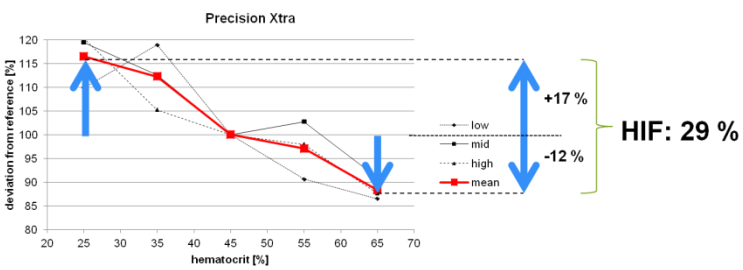
Venous heparinized blood was manipulated to contain 3 different blood glucose concentrations (50-90 mg/dL, 120-180 mg/dL, and 280-350 mg/dL) and 5 different HCT values (25%, 35%, 45%, 55%, and 65%). After careful oxygenation to capillary blood oxygen pressure, each sample was measuredeight times with the following devices: NovaMax Link & NovaMax+, AccuChek Aviva, Nano & Active, BGStar, Contour & Breeze, OneTouch Ultra2 & Verio2, Freestyle Freedom Lite, Precision Xtra & Optium Xceed, GlucoMen LX+ GlucoFix Mio+, OnCall+ & Platinum, GlucoLab, GlucoDr, and TaiDoc fora. YSI 2300 served as plasma reference method. Stability to hematocrit influence was assumed, with <10 % mean glucose result deviation between the highest and lowest hematocrit levels.

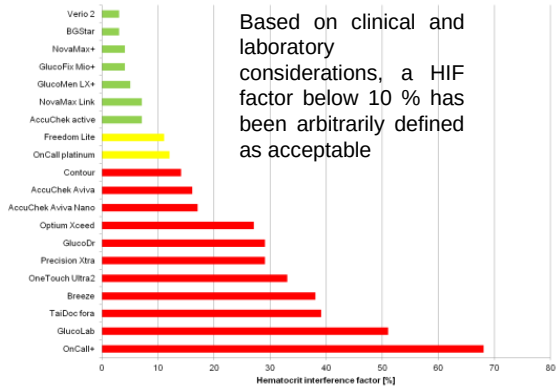
Results

Seven of the investigated meters showed a stable performance in this investigation: BG*Star (3%), Verio2 (3%), NovaMax+ (4%), GlucoFix Mio+ (4%), GlucoMen LX+ (5%), NovaMax Link (7%), AccuChek active (7%). All other meters failed this hematocrit interference test, with FreeStyle Freedom lite (11%), Platinum (12%) being the better devices and OnCall+ (68%), GlucoLab (51%), TaiDoc (39%), Breeze (38%) showing the worst performance.



HIFdescribes the sum of the maximal deviation of the mean HCT curve above 100 % plus the maximal deviation of the mean HCT curve below the 100 % reference (see graph).





Based on clinical and laboratory considerations, a HIF factor below 10 % has been arbitrarily defined as acceptable

Conclusion

Hematocrit variations may occur frequently in daily routine (e.g., due to dehydration/exercise, nicotin and alcohol abuse, pregnancy etc.). Our results encourage use of meters with stable performance under these conditions.