

Comparative Analysis of Capillary Whole Blood by Two Blood Glucose Monitoring Systems (BGMS) with Venous Plasma Hexokinase Glucose Results in Patients Undergoing an Oral Glucose Tolerance Test (OGTT)

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Objectives: To compare glucose results from capillary whole blood specimens using blood glucose monitoring systems (BGMS) with a venous plasma hexokinase method during a 75 gram Oral Glucose Tolerance Test (OGTT), and to determine if capillary whole blood methods are an acceptable alternative to plasma hexokinase (HK) methods on a central laboratory clinical chemistry analyzer.

Materials and methods: StatStrip Hospital Glucose Monitoring System (Nova Biomedical, MA, USA) and Glutestmint (Panasonic Healthcare) were the two whole blood capillary point-of-care BGMS that were compared to the plasma HK method (L-type Wako GLU, Wako, Tokyo, Japan) on a Hitachi LABOSPECT008 Automatic Analyzer (Hitachi High-Technologies, Tokyo, Japan). A total of 11 patients participated in the study. Each participant received a beverage containing 75 grams of glucose following a standard OGTT protocol. Eight (N=8) patients were non-diabetic and three (N=3) were diabetic. Specimens collected included fasting at 30, 60, 90, and 120 minutes after ingestion of the 75-gram glucose drink. The results from both BGMS methods were compared to the plasma HK method using routine statistical methods to determine if there were any significant differences.

Results: StatStrip's venous glucose compared more favorably to the HK method: N=55, slope =0.97, intercept=2.7 mg/dl, sy/x=5.8, and $r^2=.995$. The mean venous glucose for StatStrip was 162.7 versus 164.7 for the HK method. Glutestmint data versus HK were: N=55, slope=0.99, intercept=-5.2 mg/dl, sy/x=8.4, and $r^2=.990$. The mean venous glucose for Glutestmint was 157.3 versus 164.7 for the HK method. N=11 capillary whole blood measurements were also made. Capillary glucose for StatStrip compared more favorably to the HK method: N=11, slope =0.94, intercept=.27 mg/dl, sy/x=7.4, and $r^2=.993$. The mean venous glucose for StatStrip was 165.2 versus 168.6 for the HK method. Glutestmint data versus HK were: N=11, slope =0.96, intercept=-5.2 mg/dl, sy/x=11.8, and $r^2=.982$. The mean venous glucose for Glutestmint was 154.9 versus 168.6 for the HK method. There were no significant differences between capillary and plasma glucose results on StatStrip versus the HK method. Glutestmint did demonstrate statistically significant differences.

Conclusions: Preliminary feasibility study of capillary whole blood glucose by BGMS versus plasma HK glucose shows promise with a relative bias of mean values of StatStrip capillary to HK method of 1.2%. As a result, it is suggested that whole blood capillary glucose by skin puncture maybe an acceptable method for OGTT studies. Further study with more patients is required.